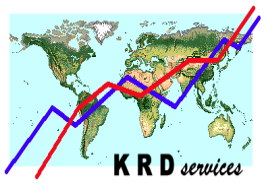

Environmental accounts
State of play of recent work

Report to Eurostat – Unit E3: Environment statistics

Contract n°71401.2006.012–2006–743

Final report

Covering the period from 21 December 2006 to 21 December 2007

December 2007

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Foreword

In early 2007, Eurostat – Unit E3 (Environment statistics) launched a study in order to assess the state of play and progress made and foreseen activities by EU Member States and partner countries in the compilation of environmental accounts (EA). This study includes among other tasks (examination of existing countries reports to Eurostat, publications on EAs, data available on websites, etc.) a survey on the present state of EA in European countries.

One purpose is to evaluate the role played by pilot applications and Eurostat methodological support in the development of environmental accounts. Another purpose is to get an impression of the barriers that countries encounter in developing and implementing environmental accounts. It will also investigate the use of EA results by policy makers and the communication tools for EA. Further Eurostat intends to use the results of the survey in the priority setting in connection to the renewed Task Force on the European Strategy on Environmental Accounting (ESEA)

As a result of the restricted call for tenders AMI/08/2006/E3, KRD-Services sàrl was commissioned by Eurostat to carry out the study entitled *Environmental accounts – state of play of recent work* under the contact n°71401.2006.012–2006–743.

The interviews were carried out by Jean-Louis Pasquier who prepared the report with the collaboration of Catherine Kesy and Giorgio Quirino. The authors benefited from comments by Barbara Bacigalupi and Oliver Zwirner of the DG Environment and by Elisabeth Møllgaard and Julio Cabeça of Eurostat.

Abstract

In 1994, the European Commission identified the main lines of actions for the development of a *Green National Accounting* framework based on satellites to National Accounts. Since then, Eurostat, in collaboration with Member States' statistical offices and the DG Environment's financial support, has developed and implemented different accounting frameworks that cover almost all types of accounts of the *System of Environmental and Economic Accounting* (SEEA) and the *European Strategy for Environmental Accounting* (ESEA) approved in 2003 prioritised the different modules.

The main objective of the present study was to assess the progress made by European countries (European Union plus Norway and Switzerland) in the compilation of EA from 2000 onwards and to engage the reflection on the further development of EA in Europe towards 2010 in the context of the revision of the ESEA. This assessment is based on the examination of 136 reports carried out over the period under review, as well as on a survey to the experts in charge of EA in European countries that was conducted in June and July 2007. This study also includes a review of the implementation of EA by a selection of relevant non-European countries.

Some 20 EU countries plus Norway and Switzerland have a programme for EA (6 have a legal basis), despite the lack of resources clearly appears as the main barrier encountered by European countries. Eurostat's priorities and methodological support is the most determining factor on the countries' decision to develop one module or another. One can estimate that around 40% of the total EA data produced since 2000 resulted from pilot studies that were financially supported by the European Commission. Also, the review of a selection of non-European countries highlights how much Eurostat had a certain influence on the development and the implementation of environmental accounting world-wide.

The European countries concentrated most of their attention on 3 modules: environmental protection expenditure accounts (EPEA), economy-wide material flow accounts (MFA) and air emission accounts for national accounting matrix including environmental accounts (NAMEA-air) that were all identified as first priorities in the ESEA.

Concerning the future development of EA in Europe, it is recommended to attach the first priority to filling the remaining gaps for the most advanced modules (EPEA, EW-MFA and NAMEA-air). The priority might also be given to modules that either offer potential improvement in terms of analysis (energy and environmental tax accounts for NAMEA), benefit from a recent institutional progress (waste and water accounts) or economic development (environment industry). The development of EA-based-analysis and the collaboration between countries should be encouraged too.

Executive summary

Context

Echoing to the emergence of the concept of sustainable development, the United Nations published the first version of their *System of Environmental and Economic Accounting* (commonly referred to as SEEA) handbook in 1993. Soon after, the European Commission identified the main lines of actions for the development of a *Green National Accounting* framework based on satellites to National Accounts and aiming at linking economic performance indicators and environmental pressure indices/indicators.

Since then, Eurostat has been playing a leading role in the development of environmental accounting in Europe, as well as worldwide especially by contributing to the revision of the SEEA. At the EU level, Eurostat, in collaboration with Member States' statistical offices and the DG Environment's financial support, developed, promoted and implemented different accounting frameworks that cover almost all types of accounts of the SEEA (monetary, physical and hybrid accounts). In 2003, a *European Strategy for Environmental Accounting* (ESEA) that characterised and prioritised the different modules of the environmental accounts (EA) has been approved. Recently, the high level ESEA-Task Force has been revived in order to revise the Strategy.

The main **objective** of the present study was to assess the progress made by European countries (European Union plus Norway and Switzerland) in the compilation of EA from 2000 onwards and to engage the reflection on the further development of EA in Europe towards 2010 in the context of the revision of the ESEA. The study also includes a review of the implementation of EA in a selection of relevant non-European countries. This assessment is based both on the examination of the pilot applications (whether co-financed or not by the European Commission) prepared by the countries over the first half of the decade and a survey to the experts in charge of EA in European countries.

A total of **136 reports** (covering 153 different applications) has been examined. The distribution across areas and modules shows that the countries concentrated most of their attention on 3 modules (43% of the studies): environmental protection expenditure accounts (EPEA), economy-wide material flow accounts (EW-MFA) and air emission accounts for national accounting matrix including environmental accounts (NAMEA-air). Some 5 countries (Belgium, Denmark, Germany, Sweden, and Norway) produced more than half (53%) of the pilot applications and only Italy needs to be added to this group of countries in order to obtain a similar result when focusing on the 3 abovementioned modules.

Some 27 European countries, out 29 that were contacted, responded to the **survey** conducted in June and July 2007 (including 23 telephone interviews). On top of the assessment of the impact of Eurostat methodological support, the survey aimed to get countries' opinion on the barriers they encounter in developing and implementing environmental accounts. It also investigated the dissemination of EA results and their use by policy makers at national level, as well as countries' future plans.

Results

Some 20 EU countries plus Norway and Switzerland have a programme for EA, of which 6 have a legal basis. However, according to the national experts surveyed, the lack of resources – both human and financial resources – is the main barrier encountered by European countries in the development and the compilation of EA. So far, EA in Europe has rather followed a *supply driven* development process, Eurostat's priorities and methodological support being identified as the most determining factor on the countries' decision to develop one module or another, users' need and demand being among the least determining factors. User's demand is currently emerging.

One can estimate that around 40% of the total EA data that have been produced since 2000 by EU countries plus Norway and Switzerland resulted from pilot studies that were financially supported by the European Commission. Also, around 45% of the countries that have implemented regular production of EA benefited from the European Commission's financial support in order to prepare pilot application(s) before. However, only one third of the countries that undertook EU-funded studies have implemented a regular production of EA in the corresponding module(s) afterwards.

The situation differs significantly across EA areas as well as across the modules within each area. Given the lack of resources declared by most countries, priorities were made, that coincide with the orientations adopted in the course of the period concerned for the ESEA.

Concerning the **economic environmental accounts** (EEA), the European countries concentrated their investigations on the EPEA module (including studies dealing with EPE data collection instead of EPEA compilation) and, to a lesser extent, on environmental taxes and environment industry[1] accounts.

- However, several reasons might explain the relatively limited success in the implementation of EPEA: the comprehensiveness of the framework that needs to mobilise data from a large number of sources, the coexistence of two different systems of EPE (the OECD/Eurostat Joint Questionnaire and the SERIEE), despite the efforts undertaken for bridging them, and the relative lack of users' demand probably played a non negligible role too.
- Environmental tax accounts have been progressing without much EU financially supported pilot applications, except for the recent development of NAMEA-type accounts. Most of the countries involved in this module have started working on the distribution of environmental taxes (mostly energy and transport related taxes) across industries plus households.
- Environment industry accounts remained behind, especially in terms of regular production. Such a result does not match the expectations of this sector in terms of business potential.

The evolution of the implementation of the main two types of **material flow accounts** (MFA), economy-wide MFA and physical input-output tables (PIOT), diverges significantly.

- The recent increase in the countries' interest for EW-MFA is likely to be due to some extent to the relative flexibility of the MFA framework that enables countries to start implementing such accounts using mostly existing official statistics on a step-wise approach, as well as to its "easy to use" set of standard indicators.
- On the other hand, despite their great interest for analytical purposes, the implementation of PIOT remains very limited. The compilation of PIOT is too resource-consuming.

The compilation of physical accounts dedicated to the **national accounting matrix including environmental accounts** (NAMEA) framework started especially with air emissions. The development of NAMEA-types accounts progressively covers other environmental domains, especially in physical terms but also including monetary data (see environmental taxes above or water accounts).

- The success of the air emission accounts results from a combination of factors: the growing importance of the air pollution issue and particularly climate change, the availability of basic data resulting from international agreements, and also probably the relatively simple framework adopted at Eurostat level compared to the initial fully fledged Dutch NAMEA.
- Energy accounts did not receive the same attention despite their close connection to air emission accounts (although all European countries do not compile air accounts from energy accounts) as well as their interest for analytical purposes.
- The implementation of water accounts for NAMEA was not stimulated as expected by the 2000 Water Framework Directive as well as the ambitious Eurostat water accounting framework, because of a relative lack of basic data or the difficulty to mobilise them.
- The implementation of solid waste accounts for NAMEA remains relatively limited since Eurostat did not wish to push for their development at European level before the European Regulation on waste statistics was finalised and the works were not launched once the Regulation was adopted in 2002.

Most **natural resources** accounts compiled so far concerns forest and forestry.

- However, most of the methodological work done in the late 1990s for the development of forest accounts has not been translated into a regular implementation EU-wide.

[1] - In relation with the preparation of a new compilation guide, the expressions *Environmental Goods & Services Sector* (EGSS) and *Environment Sector* for short were adopted to replace the former Environment Industry.

- Only a limited number of countries are concerned by subsoil asset accounts (oil and gas).
- Land accounts have not been envisaged yet as a priority in the development of EA in Europe.

As concerns the future development of EA by European countries, a large majority (58%) of the short term plans identified comes from countries that are newcomers in the corresponding modules. Therefore, they should reinforce the current situation: NAMEA-air, EW-MFA and EPEA would remain the most investigated modules and they would then be implemented (including at pilot stage) by almost all EU countries plus Norway and Switzerland. The 3 modules that were just behind in terms of number of countries involved (environmental taxes, forest and NAMEA-energy) would also keep a similar position, but would be joined by environmental industry.

So far, the use of EA is not well established all over European countries. Monitoring environmental and/or sustainable performance and research activity are the main two types of uses identified in their country by the national experts. In this context, monitoring performances consists mostly in the calculation of indicators, especially based on MFA and, to a lesser extent, on NAMEA data. Research activities are mostly undertaken externally by universities or research institutes; only a few European statistical offices develop their own EA-based research. A limited number of national statistical offices are aware of the use of EA for policy assessment. Some regret the lack of feedback from governmental institutions they provide with EA data and for others EA are not yet elaborated enough to be used for policy assessment.

The selection of non-European countries included Australia, Brazil, Canada, China, India, Japan, New Zeland and USA. This review highlighted the existence of a European influence in the implementation of EA world-wide beyond Eurostat's contribution to the development of the SEEA, especially relating to NAMEA and MFA.

Recommendations

The recommendations formulated here concern successively the compilation of the EA (prioritisation of the modules), the use of these accounts (analysis), and organisational aspects.

Concerning the compilation of the accounts, the first priority should consist in filling the remaining gaps for the most advanced modules (EPEA, EW-MFA and NAMEA-air) as regards both the coverage in terms of countries involved and the methodological compliance.

- EPEA: only 6 EU countries have not worked on this module and 2 of them have already planned to do so in the short term. However, for the countries already involved in this module, further investigations need to be carried out as regards the methodological compliance, since only a dozen of countries actually used the EPEA framework.
- Economy-wide MFA: 12 EU countries are not yet engaged in this module, but 8 of them have already planned to start working on it in the short term. Furthermore, since most of the countries already involved have focused on the input side, additional efforts need to be dedicated to the output side.
- Air emissions accounts for NAMEA: only 5 EU countries have never worked on this module and 2 of them have planned to do it in the short term. However, all the other countries do not produce air accounts on a regular basis and some methodological gaps remains (residence principle, detail of the industry breakdown…).

Among the other modules, the priority might be given to those that offer the greatest potential in terms of development and improvement of analytical possibilities, as well as to those modules that should benefit from a recent institutional progress or economic development.

- Environment-industry accounts should deserve a greater attention, given the high potential of economic development (one of the sustainable development pillars) that is currently expected for environmental goods and services activities.
- Almost a dozen of countries have recently developed environmental taxes by industry, with a focus on energy related taxes in relation with NAMEA for air emissions. The effort engaged should be promoted and stimulated in order to enlarge both the group of countries involved and the domains covered (pollution, resources and transport taxes). Such environmental tax

accounts by industry reinforce the analytical possibilities of EA thanks to a better connection with physical accounts.

- Energy use is a domain in which statistics are usually rather well developed. The countries that have not yet developed NAMEA-type energy accounts should be encouraged to investigate how they can take profit of these statistics. Such accounts might be used to improve NAMEA-air accounts and they improve the possibilities for decomposition analysis of air emissions structural changes.
- Also for analytical purposes, the development of economy-wide material input accounts by industry should be encouraged in order to be exploited in connection with NAMEA-based analysis.
- Following the recent adoption of the *System of Environmental-Economic Accounting for Water* (UN, 2007), the implementation of NAMEA-type water accounts (flows and emissions) should be reactivated.
- In relation to the implementation of the 2002 regulation on waste statistics, countries might be encouraged to investigate the impact on the feasibility of NAMEA-type waste accounts.

Also, the development of EA-based-analysis should be encouraged too in several possible directions, like the connection between different EA modules, the connection between EA and social statistics and the contribution of EA to sustainable impact assessment (SIA) of EU international trade policy. Countries should be invited to report on the use of EA at national level more systematically.

- The integrated approach of EA – especially the connection between monetary and physical data, like for instance energy taxes by industry and NAMEA-air/energy –, needs to be reinforced in order to assess the efficiency of environmental protection policies. Even though the question of what is an *integrated* approach is still a matter of debate, the SEEA 2003, recognised such a connection as one of the possible and promising orientations.
- The connection between social and environmental data in the EA framework appears as a response to the EU preoccupations regarding the links between the social and environmental pillars of sustainable development. Such a connection would enable to investigate the distributional effects related to the environment and in particular the distributional aspects of environmental policies.
- So far, one of the most developed domains of MFA and NAMEA-based analysis deals with some of the international trade related environmental issues. Therefore, EA might be promoted as a relevant tool to contribute to the regular commissioning of the SIA by the EU concerning its agreements with its trading partners.

Finally, Working subgroups or Task Forces composed of countries facing the same difficulties (e.g. new EU members) or sharing common characteristics (e.g. Nordic countries), as well as bilateral collaboration, might be encouraged and developed more than it currently is.

Also, more systematic information on countries' works on EA and dissemination of the resulting reports would be profitable.

1 Introduction

1.1 POLICY CONTEXT

Research on *green accounting* started around thirty years ago when some economists became aware of the system of national accounts' (SNA) shortcomings related to the environmental crisis emerging then[2]. According to these economists, the SNA does not correctly take environmental degradations into account, since they usually result in an increase in the economic value without indicating the threat these degradations represent for future life support base (Simon, 2000). Since then two general approaches have been developed: the first advocating the addition of subtraction elements from the existing SNA aggregates, the second approach proposing to change the structure of the accounts or, at least, to develop separate (satellite) accounts.

In 1993, echoing to the recent promotion of the sustainable development (SD) concept in the late 80s and early 90s[3] and to the recommendations of the Agenda 21 (UN, 1993a)[4], the United Nations published its first *System of Environmental and Economic Accounting* (commonly referred to as SEEA) handbook (UN, 1993b). The SEEA, which is a satellite system of the SNA, aims at expanding the analytical capacity of the national accounts without overburdening the central framework.

At same time at the European Union (EU) level, in the 5th Environment Action Programme of the European Community a high level of priority was assigned to "*exploiting and strengthening the experiences and capacities of the European statistical system to deliver environmentally relevant statistics on a regular basis, which will be comparable with and linked to the traditional official statistics in economic and social fields*" (European Commission, 1993, p. 68). Soon after, the Commission identified the main lines of actions for the development of a *Green National Accounting* framework based on satellites to National Accounts and aiming at linking economic performance indicators and environmental pressure indices (European Commission, 1994). This approach was confirmed later by the European Parliament and the Council in a 1998 Decision stating that "*Particular attention will be given to* […] *developing auxiliary or satellite accounts to national accounts as a first step towards the integration of environmental aspects into Member States' and Community accounting concepts.*"[5].

In line with the Cardiff Council conclusions initiating the process towards the integration of sustainable development indicators (SDI) within all EU policy areas[6], this preoccupation remained in the 2001 European Commission's Communication on the 6th Environment Action Programme, according to which "*a good understanding of socio-economic trends which are often the main driving forces behind environment issues is also critical to the development of effective policy*"[7]. More recently, in its renewed strategy for sustainable development, the European Council stated that "*For better understanding of interlinkages between the three dimensions of SD, the core system of national income accounting could be extended* […] *by satellite accounts e.g. environmental expenditures, material flows and taking into consideration international best practices*" (European Council, 2006, p. 22, § 20).

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[2] - The first United Nations' conference on Environment was held in Stockholm in 1972.
[3] - this concept became famous after the G.H. Brundtland's report to the UN World Commission on Environment and Development entitled *Our common future*, published in 1987 and promoted by the UN Conference on environment and Development held in Rio in July 1992.
[4] - See chapter 8 (section D) and chapter 40 (§ 40.6);
http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21toc.htm
[5] - Decision No 2179/98/EC of the European Parliament and of the Council of 24 September 1998 on the review of the *European Community programme of policy and action in relation to the environment and sustainable development "Towards sustainability"*.
[6] - European Council, *Presidency Conclusions*, Cardiff, 15 and 16 June 1998, SN 150/1/98 REV 1, p. 13.
[7] - COM (2001) 31, Brussels, 24 January 2001, p. 63.

1.2 METHODOLOGICAL DEVELOPMENT UNDER THE AEGIS OF EUROSTAT

Since the early 90s, Eurostat has been playing a leading role in the development of environmental accounting in Europe as well as worldwide. Within the London Group on Environmental Accounting[8], Eurostat contributed to the revision of the SEEA. The second version of the SEEA (UN, 2003) was jointly published by five international organisations, including the European Commission. The SEEA comprises four categories of accounts – accounts relating to physical flows of materials and energy, to environment-related transactions in the system of national accounts (SNA), to environmental assets and on how adjusting SNA aggregates – that are based either on monetary or physical data only, or combining both monetary and physical data (*hybrid accounts*).

At the EU level, Eurostat, in collaboration with Member States' statistical offices and the DG Environment's financial support, developed, promoted and implemented different accounting frameworks that are covering almost all the types of accounts the SEEA is now comprised of: *monetary accounts* with the European System for the Collection of Economic Information on the Environment (SERIEE[9]); *physical accounts* with the Material Flows Accounting (MFA); and *hybrid accounts* with the National accounting Matrix including environmental accounts (NAMEA). In 2003, the Statistical Programme Committee (SPC) approved a *European Strategy for Environmental Accounting* (ESEA) that characterised and prioritised the different modules of the abovementioned environmental accounts (EA) areas (Eurostat, 2003a). The high level ESEA-Task Force has recently been revived in order to revise the Strategy with a special attention to the use of EA in EU, the readiness and ability of the countries to compile EA and to the further developments of EA.

1.3 PURPOSE AND SCOPE OF THE STUDY

The objective of the project *Environmental accounts – state of play of recent work* was twofold. Firstly, it aimed at giving an overview of the progress made by EU members and partner countries (Norway and Switzerland) in the compilation of Environmental Accounts (EA) as a result of the studies (co-financed or not by the European Commission) carried out from 2000 onwards. The project also included an overview of the implementation of EA in relevant non-European countries. Secondly, the study also aimed at engaging the reflection on the further development of EA in Europe towards 2010, bearing in mind the objectives of the United Nations Committee of experts on Environmental-Economic Accounting (UNCEEA).

The workload was composed of two tasks. The first task consisted in the examination of the studies prepared by the countries. As far as European countries are concerned, this task also included a survey to the experts in charge of EA at national level.

Based on the examination of the studies and the survey's results, the second task aimed firstly at assessing the contribution of the countries' pilot applications, especially those that benefited from EU financial support, to the development and the dissemination of EA in Europe. Secondly, this assessment resulted in recommendations dedicated to contribute to the revision of the ESEA.

1.4 STRUCTURE OF THE DOCUMENT

Chapter 2 provides a general **overview** of the implementation of EA by country and EA area in Europe, including a statistical description of the coverage across EA areas of the studies prepared by European countries. This chapter includes also information on European countries' plans for the future development of EA at national a level as well as on their current use and actions for the dissemination of EA.

Chapter 3 presents the results on the **implementation of EA by European countries area by area**: environmental economic accounts (EEA), material flow accounts (MFA), physical flow accounts for NAMEA, and natural resources accounts. Each section starts with a brief presentation of the

[8] - http://unstats.un.org/unsd/envaccounting/londongroup/
[9] - stands for Système Européen pour le Rassemblement des Informations Economiques sur l'Environnement (from the French version).

methodological context, before dealing with the progress made thanks to the pilot applications in terms of time coverage and methodological compliance with Eurostat's recommendations.

The implementation of EA by a selection of **non-European countries** is presented in chapter 4. After a brief overview in which the different applications have been classified according to the ESEA's categories, a presentation is provided for each country.

Chapter 5 contains the **conclusion** and the abovementioned recommendations for the future development of EA at European level.

Five **annexes** contain respectively a list of additional references (i.e. in addition to the reports prepared by European countries), the summaries of the reports that have been prepared following as far as possible systematic guidelines, 2 lists of the reports examined (one by ascendant numbering, one classified by EA area), and information related to the survey (process, list of contacts and a copy of the questionnaire).

2 General overview of the implementation of environmental accounts by European countries

Concerning the implementation of environmental accounts, this study is mainly based on two sources of information: the reports prepared by the countries, as well as a few studies undertaken by consultancy companies, within Eurostat's environmental accounting programme and the survey to the national institutions in charge of environmental accounting that has been conducted for the present study (annex 4). For the preparation of this survey, Eurostat benefited from the collaboration of the United Nations Statistical Division that provided the individual responses from European countries to the inquiry undertaken during the second half of 2006 as phase 1 of the UNCEEA's *Global Assessment of Environmental Statistics and Environmental-Economic Accounting*. The websites of the corresponding countries' institution in charge of environmental accounting (mostly statistical offices) have also been consulted.

The preliminary results presented in this chapter are based both on the survey and the examination of the reports. Further investigation will be made for the final report.

2.1 INSTITUTIONAL CONTEXT

According to the above mentioned survey, 22 countries out of 27 responding countries declare having a programme for EA, even though only 6 of them have a legal basis. It was indicated in the questionnaire (annex 4) that an institution is considered having a programme on environmental accounting when the preparation of environmental accounts follows a planning that covers different phases from the development of pilot applications to the regular production of accounts.

Figure 2.1 – Institutional basis for the development of environmental accounts in Europe

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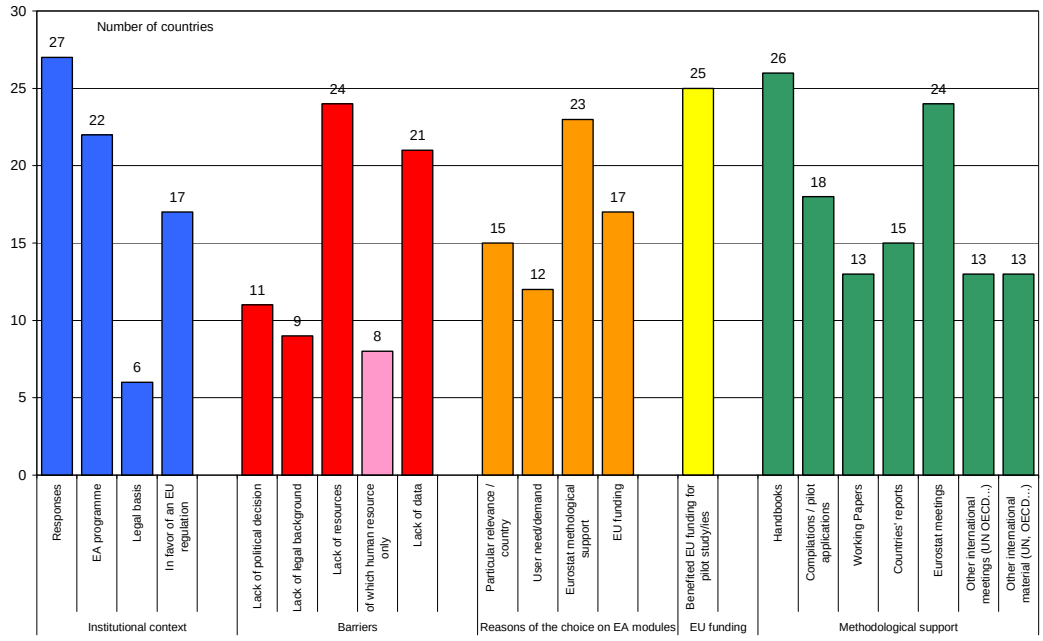

Source: Survey to the institutions in charge of EA at national level conducted during June - July 2007 (see annex 4)

However, the lack of resources (human and financial) appears as the main barrier encountered by European countries in the development and the compilation of EA. Some 24 countries consider that they lack resources. However 19 countries have a programme on EA.

The other barriers (lack of political decision and legal background) played a less important role in the limitation of the development EA in the corresponding European countries. When countries are in favour of a regulation on EA at EU level, they mostly expect that more resources would be engaged at national level in the development and the compilation of EA. However, this question turns out to remain controversial. However, the opinions expressed by the respondents do not necessarily represent the views of their countries' policy-makers.

Almost all the responding countries benefited from EU funding to carry out pilot studies during the period under review (2000-2005/06). Some 11 of them, that declared having a programme of EA despite the lack of resources, acknowledge that the EU funding influenced their country's decision to choose the modules on which they work.

The most cited factor among those that influenced the countries' choices across EU modules is the Eurostat methodological supports, including the existence of the Eurostat's programme and priorities. In this context, almost all the responding countries have used the handbooks, manuals and compilation guides prepared by or under the aegis of Eurostat to compile their EA or a part of them. The compilations of pilot applications have not been used as systematically. However, this aspect needs to be further investigated area by area and country by country. Working Papers and countries' reports that were not disseminated as Working Papers were not systematically used either. It seems that the latter were not easy to find on the former pages dedicated to EA on the CIRCA website. Some countries also regret the lack of information on the projects of the other countries when they are still under development.

Considering all types of technical meetings together (working groups, task forces, workshops, training sessions etc.), only a few of the responding countries did not attend any of them: they are all among the most recent EU members (Bulgaria, Cyprus, and Hungary). The 13 countries that participate to EA related meetings within other international institutions than Eurostat (i.e. UN, OECD) come almost entirely from the former EU-15 countries plus Norway and Switzerland.

Users' need and demand are the factors that are the least cited among those that influenced the countries in the decision they made to develop one module or another. One can say that EA in Europe has been so far following a rather *supply driven* development process. However, many of the experts interviewed feel that a demand is currently emerging.

2.2 STATE OF PLAY OF EA PILOT APPLICATIONS IN EUROPE

This section deals with the coverage of EA in EU countries plus Norway and Switzerland regarding both the number of pilot applications carried out during the period under review (2000 onwards)[10] within Eurostat activity and the number of countries involved by EA module.

A total of 136 reports has been examined, of which 10 have been split into several studies[11] in order to be distributed across different areas (see annex 3). For instance, such a split has been used for reports dealing with different areas (e.g. n°33 covering all Norwegian EA) or different modules of the same area (e.g. study n° 42 on the Belgian air and water accounts for NAMEA), as well as to distinguish chapters specifically dedicated to EA-based analysis (e.g. n° 45 on the Danish NAMEA compilation and NAMEA-based analysis). Therefore, the overview presented here is based on 153 studies (see table 2.1).

Table 2.1 is based on categories (areas and modules) identified by the European strategy for environmental accounts (ESEA) approved in 2003 (Eurostat, 2003a). A specific category has been included in the table for the studies that deal with EA-based analysis or the use of EA in general, instead of EA compilation. However, this category is broken down according to the ESEA areas.

[10] - A few Eurostat Working Papers taken into consideration were published in the late 1990s.

[11] - n°15 (a, b); n°30 (a to d); n°33 (a to f); n° 42 (a, b); n°45 (a, b), n°53 (a, b), n°59 (a, b), n°67 (a, b), n°108 (a, b); n°125 (a, b); n°131 (a, b). See annex 3, in which the list of studies is provided twice: one list following an ascendant numbering (which is not chronological), the other list presenting the studies classified by area.

Table 2.1 shows how the distribution of the pilot applications carried out by the countries since 2000 (or the late 1999s) is unbalanced both across areas (and modules) and countries. The countries concentrated most of their efforts on 3 modules: EPEA (including studies dealing with EPE data collection instead of EPEA compilation), economy-wide MFA and air emission accounts for NAMEA. Around 43% of the studies were dedicated to these 3 modules. Eco-industry and water accounts for NAMEA also show relatively high numbers of pilot applications. When including these 2 other modules the proportion reaches 57% of the total number of studies. Relatively few studies were undertaken in the area of natural accounts during the period under review.

Table 2.1 also shows that some countries are more active than others. From 2000 onwards, 7 countries (Belgium, Denmark, Germany, Italy, Austria, Sweden, and Norway) produced two-third of the studies. When focusing on the 3 abovementioned modules (EPEA, economy-wide MFA and NAMEA-air), the result is only slightly lower (56%).

So far, only 1 country (Malta) has actually not carried out any pilot application. Cyprus recently carried out a study on EPEA that was not available when this study was under preparation and Luxembourg carried out a pilot exercise on air emission accounts in the late 1990s (see below).

When looking at the distribution across ESEA modules in terms of number of countries involved in the compilation of accounts, either as pilot application or as regular/official statistical production (see figure 2.2), the same 3 modules attracted most of the countries' efforts. Only the hierarchy is different compared to the ranking based on the number of studies carried out (table 2.1).

The table 2.2 also highlights the significant role played by the pilot applications financially supported by the European Commission in the implementation of EA in Europe. For the 3 most advanced modules, most of the countries involved either produced their corresponding accounts directly from EU funded pilot applications or produce them on a regular basis following pilot applications they carried out with EU financial support.

As for the other modules, even the less advanced, most countries are also involved thanks to EU financially supported studies, except for environmental taxes, for which most EU funded pilot applications are related to their distribution across industries.

Figure 2.2 – Involvement of the European countries in the different ESEA modules

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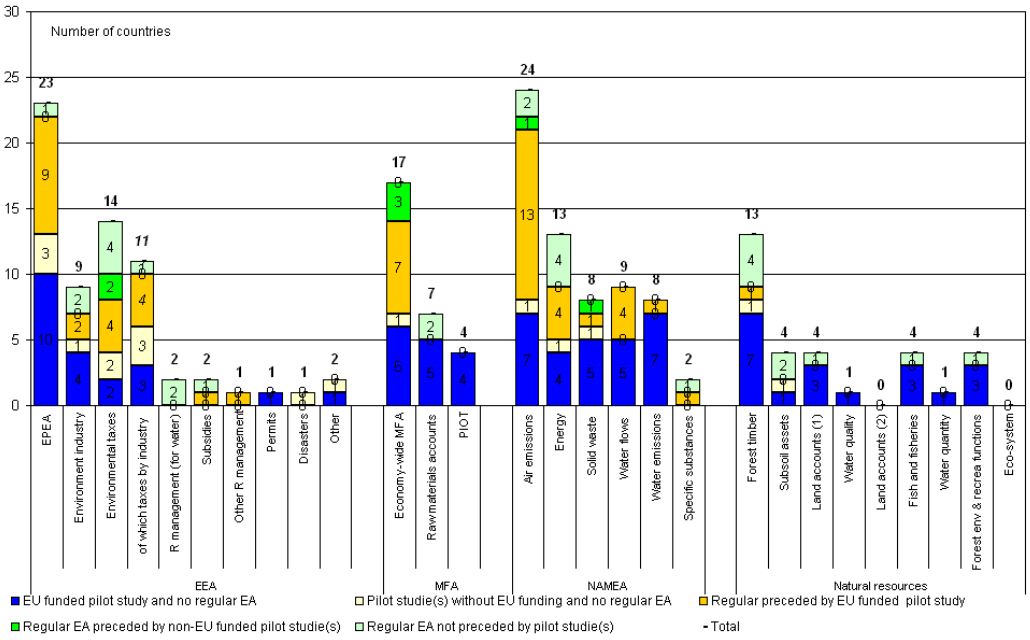

Source: Survey to the institutions in charge of EA at national level conducted during June - July 2007 (see annex 4).

Table 2.1 –Numbers of pilot applications released from the late nineties across areas and countries

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Country name	Country code	Economic Environmental Accounts				Material Flow Accounts		NAMEA (physical and monetary supply-use tables)					Natural resources				EA-based analysis				Other	Total
		EPE(A)*	eco-industry	taxes / subsidies	Economic instruments	economy-wide	PIOT	air	energy	water	waste	chemicals	forest	land	subsoil	water	EEA	MFA	NAMEA	Other		
European Union	EU					1												3		1		5
Belgium	BE	5	1	1				2	1	1									1			12
Bulgaria	BG									1												1
Czech Republic	CZ					1		1														2
Denmark	DK	2		1	1	1	1	1		2	1		1		1				2		1	15
Germany	DE					1	1	1		1	1							1	1	1	1	9
Estonia	EE												1									1
Greece	EL	1						1														2
Spain	ES									1												1
France	FR		1							1						1						3
Ireland	IE	1				1																2
Italy	IT	2				3	1	3														9
Cyprus	CY																					0
Latvia	LV	1				1							1									3
Lithuania	LT	1						1														2
Luxembourg	LU																					0
Hungary	HU	1				1		1					1	1								5
Malta	MT																					0
Netherlands	NL		2							1	1				1				1			6
Austria	AT	1	1	1		1		1		1	2											8
Poland	PL	1																		1		2
Portugal	PT	1	1					1														3
Romania	RO	1				1																2
Slovenia	SI					1		1														2
Slovakia	SK	1																				1
Finland	FI					1	2				1								1			5
Sweden	SE	2	3	2		2		1		1		3		2					6	2		24
United Kingdom	UK	1		2		1													2			6
Norway	NO	4	1	3		1		2	1	2				1					1			16
Switzerland	CH	1	1			2		1														5
Nordic Countries	Nordic**																1					1
Total countries		**27**	**11**	**10**	**1**	**19**	**5**	**18**	**2**	**12**	**6**	**3**	**4**	**4**	**2**	**1**	**1**	**1**	**15**	**4**	**2**	**148**
	Total	**27**	**11**	**10**	**1**	**20**	**5**	**18**	**2**	**12**	**6**	**3**	**4**	**4**	**2**	**1**	**1**	**4**	**15**	**5**	**2**	**153**

* Environmental protection expenditure accounts, including report dealing with EPE data collection (i.e. not with EPEA compilation)

** Nordic Countries: Denmark, Norway, Finaland and Sweden

Source: Eurostat and countries statistical offices or environmental agencies (see annex 2).

2.3 FROM PILOT APPLICATION TO REGULAR PRODUCTION

One of the main purposes of this study is to assess the progress made by EU Member States and partner countries in the compilation of environmental accounts and to appreciate the role played by pilot applications that were financially supported by the EU, especially those that were carried out from 2000 onwards. The contribution of these pilot applications is assessed here both in terms of data production (i.e. proportion of data resulting from pilot studies) and in terms of methodological framework development and implementation (i.e. regular production of official EA in relation with pilot applications).

2.3.1 Contribution of the EU financially supported pilot studies to the EA data available in Europe

The contribution of the European countries' pilot studies that were financially supported by the European Commission to the EA data that are currently available in Europe is estimated here in terms of years covered, i.e. number of years compiled within EU-funded pilot applications out of the total number of years available (i.e. both from pilot application and regular production)[12]. Several conclusions can be drawn from the upper part of table 2.4 below[13] that presents the resulting percentages by module and area.

Around 43% of the EA data that were produced since 2000 by EU countries plus Norway and Switzerland resulted from EU-funded pilot studies. The proportion is the same when considering all EA data that are currently available, whatever the period when they were produced.

The contribution of EU-funded studies varies notably across EA areas (EEA, MFA, NAMEA and natural resources) as well as across modules (EPEA, eco-industry etc.) within each area.

- Despite the differences between the 3 most advanced modules (EPEA, EW-MFA and NAMEA-air) in terms of countries involved (see figure 2.2 above), the proportions of data resulting from EU-funded pilot studies are rather significant (respectively 37%, 73% and 56% from 2000 onwards). The differences across these 3 modules are partially due to the respective number of years covered by the corresponding pilot applications (see table 2.2).
- Concerning MFA, the contribution of EU-funded applications remains at a rather high level (68%) for the area as a whole, since specific raw material accounts represent a small proportion of the total MFA data compared to the numerous time series of EW-MFA.
- Within NAMEA area, the very high percentages for water emission and waste accounts (respectively 100% and 81%) are, in fact, due to the very limited number of countries that produce such accounts on a regular basis (1 for water emissions and 2 for waste).

For most of the modules, the contribution of EU-funded pilot applications to the availability of EA data is similar between the entire period starting from the beginning of Eurostat's programme of EA and from 2000 onwards[14]. However, there are 2 remarkable exceptions: EPEA, and forest accounts.

- For EPEA the proportion of data resulting from EU-funded pilot studies is higher since 2000 than for the entire period. This is especially due to the fact that many of the most recent studies have not been translated yet into regular production, whereas the time series produced following pilot studies carried out before 2000 are now rather long compared to the limited number of years covered by the pilot applications.
- Conversely, for forest accounts the percentage of data resulting from EU-funded since 2000 is lower than for the entire period. This result is due to the long time series (24 years) produced by Finland within a pilot application carried out before 2002.

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[12] - This assessment does not take into account the data resulting from EU-wide estimates carried out by Eurostat or by consultancies for Eurostat.

[13] - The detailed information on which the calculations of table 2.4 are based is presented in table 2.2 and table 2.3.

[14] - The criterion that has been used is the date of publication of the reports.

2.3.2 Contribution of the EU financially supported pilot studies to the regular production of EA in Europe

On top of the EA data production, the studies financially supported by the European Commission aim at helping the countries to develop and/or improve their national methodological framework that should enable them to prepare EA on a regular basis. This role played by the pilot studies is estimated here considering both the proportion (in terms of number of countries) of pilot studies followed by regular production and the proportion of regular productions that were preceded by a pilot study or by pilot studies.

According to the lower part of table 2.4 below, that presents the abovementioned estimate by area and module, on average 42% of the countries that undertook EU-funded studies have implemented a regular production of EA in the corresponding module. The percentage of countries is lower (34%) when focusing on pilot studies undertaken since 2000. This difference is especially due to the new EU members that have not had yet the possibility to implement regular production of EA in all the modules they have started to investigate. Also for other countries, like Belgium, Greece or Portugal, the lack of resources prevented them from implementing regular production of EA even in the modules for which their methodology is sufficiently elaborated.

On the other hand, still on average, more than half (53%) of the countries that produce EA on a regular basis had prepared beforehand pilot application(s) that were financially supported by the European Commission in the corresponding module. This proportion is lower (46%) when considering the period from 2000 onwards, because of divers regular production that were implemented during this period without being preceded by EU-funded pilot studies, e.g. in environment industry, EW-MFA, energy accounts for NAMEA or forest accounts.

These results shows that, on average, if a large proportion of the pilot applications have not been translated yet into official regular production of national EA, on the other hand regular production of EA mostly results from the preparation of pilot applications that were made possible thanks to EU financial support.

Table 2.4 also delivers remarkable results for a certain number of modules. Concerning the 3 modules on which, as observed above, the countries have been focusing their attention:

- Out of the 10 countries that produce **EPEA** on a regular basis, 9 prepared EU-funded pilot application(s) before, of which 6 carried the relevant study (or studies) during the period under review.
- 7 of the 10 countries that compile **economy-wide MFA** on a regular basis developed EU-funded pilot applications during the period under review.
- Concerning **NAMEA-air**, 13 countries out of 16 preceded their regular compilation by EU-funded pilot applications, of which 10 carried out the corresponding study (or studies) from 2000 onwards.

For 2 other EA modules the situation is quite different, either because the regular production was only preceded by a few EU-funded pilot applications or because few countries have eventually been engaged in regular production following pilot applications.

- Out of the 10 countries that regularly produce **environmental taxes accounts**, only 2 carried out EU-funded pilot applications that were not specifically dedicated to the distribution of the taxes across industries.
- Only 1 of the 8 countries that developed pilot application(s) on **forest accounts** is now producing such accounts on a regular basis while 4 other countries produce regular forest accounts without having prepared EU-funded pilot studies before.

Table 2.2 – Time coverage of the pilot applications carried out from 2000 onwards

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Country	Economic Environmental Accounts					Material Flow Accounts			NAMEA (physical and monetary supply-use tables)							Natural resources				
	EPE(A)*	eco-industry	eco-taxes	*of which taxes by industry*	subsidies	economy-wide	PIOT	Raw material accounts	air	energy	water flows	water emissions	waste	chemicals	land	forest	fish and fisheries	land	subsoil	water
ESEA**	**A**	**A**	**A**	**--**	**C**	**A**	**B**	**B**	**A**	**A**	**A**	**B**	**B**	**C**	**--**	**A/D**	**C**	**B/C**	**A**	**B/C**
BE	97-02	95-05	97-02	*97-02*					90, 94-02	90/94-02	98	97-99								
BG			00-01	*00-01*					01-03		04	04								
CZ						93-04			98-99, 03											
DK	94, 2001		93-98	*96*		93-02	90, 04		80-92, 80-00		94 97, 99-03	data availability	99			90-01				
DE	91, 95			*95-99*		91-01	90, 95		90,91,93 , 94-99		95 91-98	91-98								
EE									03							01	04			
EL	95-96 , 01								88-01	88-01										
ES	95-01		95-03	*95-03*		96-00			95-00	02	97-01					95-00				
FR	94								80-97	97		00	late 90s			00-01, 02				
IE	1998					2000			94, 96	94, 96			95, 98							
IT	97					88, 80-01	feasibility		90, 99	92	99-05								80-05	
CY																				
LV	03					02										03				
LT	04								05											
LU									94-98											
HU	01					00-03			00-03				04			00, 05		90, 00		
MT																				
NL	91	97, 03								95	91, 03-04	91	03	90-98					90-91	
AT	95-96 , 99	97 03-04	99	*99*		60-97			80-87, 80-01	99		94 method	96-02, 04							
PL	02					feasibility			95-03											
PT	03	97							95, 97, 99		98									
RO	05					94-03														
SI	01-06		03, 04			00-05			00-04											
SK	04																			
FI			99	*99*		80-97, 99	92, 99		93, 95				97-03			80-03				
SE	91, 04	00	93, 95	93, 95	2004	87-98		early 90s	89, 91, 93-98		95, 00					93		80, 90, 95, 00		
UK	94, 97, 01		93-05	*01*		70-01											00-03	98		1997/98
NO	01-04	04	91-01	*00-01*	2001	96-04			91-97, 91-98	91-04		95-97, 03	90-99		02	91-97	na		na	
CH	93, 03	98				80-01			02											
Total	**22**	**7**	**10**	***10***	**2**	**17**	**4**	**1**	**22**	**9**	**9**	**8**	**8**	**1**	**1**	**9**	**3**	**3**	**3**	**1**

* Environmental protection expenditure accounts, including report dealing with EPE data collection (i.e. not with EPEA compilation)

: EU funded pilot applications carried out from 2000 onwards

: EU funded pilot applications carried out before 2000

: pilot application undertaken without EU financial support

**** Priorities of the European Strategy for Environmental Accounting (ESEA) adopted in 2003**

A : Priority areas recommended for harmonised EU-wide reporting

B : Areas for short-term development and experimental implementation in volunteer countries

C : Areas for medium-term development and experimental implementation in volunteer countries

D : Areas for long-term development

Source: Survey to the institutions in charge of EA at national level conducted during June - July 2007 (see annex 4) complemented by information from the pilot studies examined (see annexe 2) and Eurostat compilation of pilot studies (see the bibliography provided in annex 1).

Table 2.3 – Time coverage of the Environmental accounts prepared on a regular basis or as official statistics (survey)

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Country	Economic Environmental Accounts					Material Flow Accounts			NAMEA (physical and monetary supply-use tables)							Natural resources				
	EPEA	eco-industry	eco-taxes	*of which taxes by industry*	subsidies	economy-wide	PIOT	Raw material accounts	air	energy	water flows	water emissions	waste	chemicals	land	forest	fish and fisheries	land	subsoil	water
ESEA **	**A**	**A**	**A**	**--**	**C**	**A**	**B**	**B**	**A**	**A**	**A**	**B**	**B**	**C**	**--**	**A/D**	**C**	**B/C**	**A**	**B/C**
BE			03-04	*03-04*												99-01				
BG									04											
CZ						05			00-05											
DK			93-05	*95-04*	93-05				90-05	75-05	95-04								90-05	
DE	94-04	96-05	91-06			94-05		95-04	90-05	90-05	91-04				93-01	01-04		91-04		
EE																				
EL																				
ES						00-03			90/95-03		00-04									
FR	90-05								95-04	95-04										
IE									90-04	90-04										
IT	97-06		90-06			80-04			90-03											
CY																				
LV						05														
LT																				
LU																				
HU									04											
MT																				
NL	95-05		90-05	*90-05*					90-05	90-05	03-05	95-05	03-05	90-05						
AT	01-04	97-05				60-05			99-04	70-05						99-05				
PL																				
PT									95-04							86-05	86-05			
RO																				
SI	01-06		03, 04																	
SK																				
FI	92-04		80-04			70-05		80-04	97-04							80-04				
SE	99-05	02-05	93-04	*95-03*	00-06	04			93-04	93-04				96-05						
UK	00-04	00-05	93-05	*95-03*		70-03			90-05	90-05									80-05	
NO	00-06								90-05				95-05							
CH			90-05			90-05														
Total	**10**	**4**	**10**	***5***	**2**	**10**	**0**	**2**	**16**	**8**	**4**	**1**	**2**	**2**	**1**	**5**	**1**	**1**	**2**	**0**

: regular/official production of EA that has NOT been preceded by EU funded pilot applications

: regular production of EA that has been preceded by EU funded pilot applications carried out from 2000 onwards

: regular production of EA that has been preceded by EU funded pilot applications carried before 2000

**** Priorities of the European Strategy for Environmental Accounting (ESEA) adopted in 2003**

A : Priority areas recommended for harmonised EU-wide reporting

B : Areas for short-term development and experimental implementation in volunteer countries

C : Areas for medium-term development and experimental implementation in volunteer countries

D : Areas for long-term development

Source: Survey to the institutions in charge of EA at national level conducted during June - July 2007 (see annex 4)

Table 2.4 – Contribution of EU financially supported pilot applications to the availability of environmental accounts in Europe

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	Economic Environmental Accounts				Material Flow Accounts			NAMEA (physical and monetary supply-use tables)							Natural resources				
	EPE(A)*	eco-industry	eco-taxes	subsidies	economy-wide	PIOT	Raw material accounts	air	energy	water flows	water emissions	waste	chemicals	land	forest	fish and fisheries	land	subsoil	water
Contribution of the countries' pilot studies financially supported by the EU to the availability of EA data in terms of years covered																			
Number of countries that prepared EU-funded pilot study/ies																			
Total	19	5	6	2	13	4	1	20	8	9	8	6	1	1	8	3	3	2	1
From 2000 onwards	16	4	6	2	13	4	1	17	4	8	7	5	1	1	7	3	3	2	1
Contribution of the EU-funded pilot studies, whatever the period, to the EA data availability in terms of years covered (% of the years covered)**																			
By module	32%	41%	20%	10%	73%	100%	23%	58%	16%	59%	54%	74%	35%	10%	55%	33%	33%	3%	100%
By area	27%				68%			43%							32%				
Total	43%																		
Contribution of the EU-funded pilot studies carried out from 2000 onwards to the EA data availability in terms of years covered (% of the years covered)**																			
by module	37%	43%	20%	10%	73%	100%	23%	56%	20%	61%	100%	81%	35%	10%	37%	33%	33%	3%	100%
by area	27%				68%			44%							23%				
Total	43%																		
Contribution of the countries' pilot studies financially supported by the EU to the regular production of EA																			
Number of countries that preprared EA on a regular basis																			
Total	10	4	10	2	10	0	2	16	8	4	1	2	2	1	5	1	1	2	0
After EU pilot study/ies	9	2	4	1	7	0	0	13	4	4	1	1	1	0	1	0	0	0	0
After EU pilot study/ies from 2000 onwards	6	1	4	1	7	0	0	10	0	3	0	0	1	0	0	0	0	0	0
Proportion of countries of which the EU-funded pilot applications have been followed by official regular production of EA, whatever the period																			
By module	47%	40%	67%	50%	54%	0%	0%	65%	50%	44%	13%	17%	100%	0%	13%	0%	0%	0%	0%
By area	43%				41%			47%							6%				
Total	42%																		
Proportion of countries of which the EU-funded pilot applications carried out from 2000 onwards have been followed by official regular production of EA																			
By module	38%	25%	67%	50%	54%	0%	0%	59%	0%	38%	0%	0%	100%	0%	0%	0%	0%	0%	0%
By area	50%				41%			37%							0%				
Total	34%																		
Proportion of countries of which the official regular production of EA has been preceded by EU-funded studies, whatever the period																			
By module	90%	50%	30%	50%	70%	--	0%	81%	50%	100%	100%	50%	50%	0%	20%	0%	0%	0%	--
By area	48%				58%			64%							11%				
Total	53%																		
Proportion of countries of which the official regular EA production has been preceded by EU-funded studies, since 2000																			
By module	86%	33%	30%	50%	70%	--	0%	77%	0%	100%	--	0%	50%	0%	0%	0%	0%	0%	--
By area	50%				58%			52%							0%				
Total	46%																		

* Environmental protection expenditure accounts, including report dealing with EPE data collection (i.e. not with EPEA compilation)

** Total: number of years compiled within EU-funded pilot applications / number of years available (i.e. both from pilot application and regular production)
From 2000 onwards: number of years compiled within EU-funded pilot applications carried out from 2000 / number of years available from the corresponding countries (i.e. excluding countries of which the pilot application(s) was/were carried out before 2000.

Sources: Table 2.2 and Table 2.3 below.

2.4 EUROPEAN COUNTRIES' FUTURE PLANS

In addition to the assessment of the impact of the work carried out by European countries from 2000, the present study also intended to deal with the future development of the EA in Europe. The European countries surveyed within this study were therefore questioned on their plans to complement their set of environmental accounts in the near future (annex 4).

Figure 2.3 below gives an overview of the situation by EA module once the European countries that have short term plans are taken into account. For each module, the countries are classified here into 3 categories: those that have already developed pilot application(s), but that did produce the corresponding EA on a regular basis, the countries that produce the relevant accounts on a regular basis (including after the preparation of pilot application) and the additional countries that plan to start working on the corresponding module in the near future.

Once the future plans will be implemented, NAMEA-air, EPEA and EW-MFA would remain the modules the most investigated, being implemented by almost all EU countries plus Norway and Switzerland. EW-MFA, with the highest number of additional countries (8), would catch up EPEA that, on the contrary, shows one of the lowest numbers of additional countries. The development of EW-MFA seems to benefit from the recent Eurostat's activity related to this module, especially the training session organised in August 2007 and the preparation of a compilation guide (Weisz, 2007b).

The 3 modules (environmental taxes, forest and NAMEA-energy) that were just behind in terms of number of countries involved (see table 2.2 above) would keep a similar position. However, they would be joined by environmental industry that shows one of the fastest increases in the number of countries involved. The interest in environment industry accounts might be boosted by the high potential of economic growth that is currently expected for such economic activities.

Figure 2.3 – Involvement of the European countries in the different ESEA modules, including their short term plans for future development

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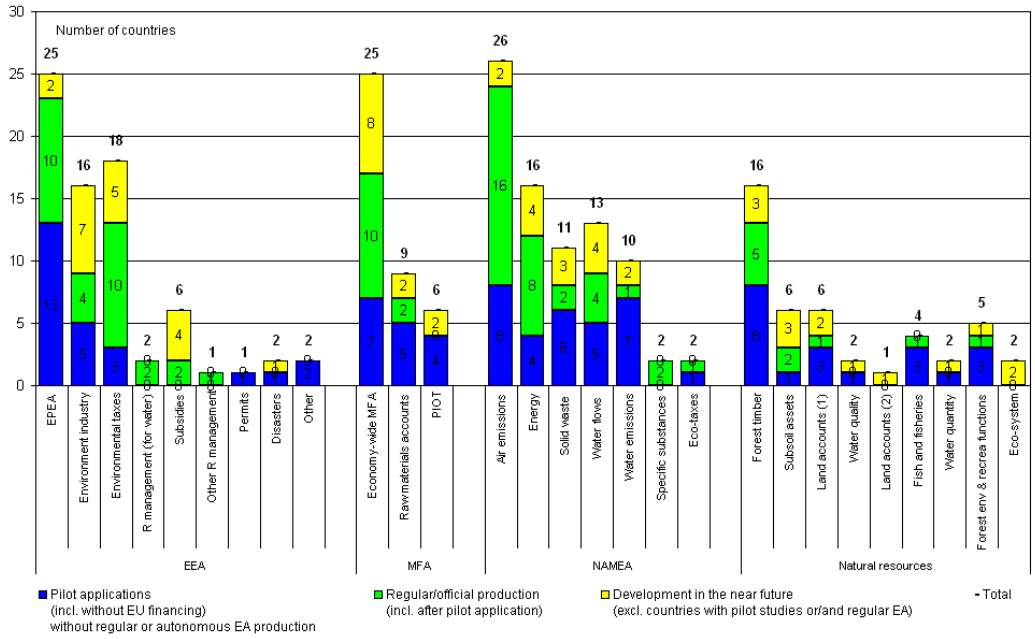

Source: Survey to the institutions in charge of EA at national level conducted during June - July 2007 (see annex 4) plus additional information from Eurostat on Countries' applications for grants (July 2007).

Within NAMEA area, behind air and energy accounts, water (flux and emissions) and waste accounts seem to emerge as promising modules, given the needs related to the water framework directive[15] and the regulation on waste statistics[16].

A series of modules would remain far behind, especially in the EEA and natural resources areas. As concerns EEA, the other modules that EPEA, environment industry and taxes are classified as third and fourth priority in the ESEA (see table 2.5). Only subsidies accounts might be developed in parallel with environmental taxes accounts. About natural resources, despite subsoil asset accounts is a first priority in the ESEA, this module directly concerns only a limited number of countries in EU plus Norway. With only 2 countries planning to work on land accounts, this module would remain neglected despite it actually concerns every country. Also, no improvement should be expected from water quality and quantity (stocks) accounts, since many countries need already to make an effort on NAMEA related water flow emission accounts.

Table 2.5 below summarizes the situation as regards pilot applications, regular production and countries' short term plans for future development. On the one hand, it provides information on the distribution of the future plans across countries and EA modules, and enables to identify the extent to which these short term plans would result in an increasing number of countries involved. On the other hand, it shows the remaining gaps in the different modules.

On average, 58% of the short term plans identified within this study come from countries that are newcomers in the corresponding modules. Therefore 42% of the plans intend to improve existing accounts. These proportions are rather similar for EEA (56% of newcomers), MFA (50%) and NAMEA (54%), whereas 10 out 11 short term plans related to natural resources come from countries that intend to start working on the corresponding modules.

Concerning **EPEA,** out of the 8 countries that have short term plans on EPEA, only 2 have never worked on this module before. A possible explanation of such a situation comes from the need for further improvement as regards the compliance with the SERIEE methodology (see section 3.1.1 below), even though EPEA is the second module in terms of countries already involved (see table 2.2 above). For the other modules within the EEA area, two thirds of the countries are newcomers. The proportion is even higher for environment industry, for which 5 out of the 7 additional countries are among the most recent EU members.

Within the **MFA** area, most of the countries' short term plans are related to EW-MFA. Despite less than half of these plans come from newcomers, they would boost this module to the second place in terms of countries involved. For the other countries, new pilot applications intend to either refine estimates or to extend the coverage (e.g. including hidden flows, or output side, see section 3.2.1). One can also note that the 2 countries that plan to work on PIOT have never compiled such accounts before.

The **NAMEA** can be split into 3 groups of modules as regards countries' short term plans. Air emissions module forms alone the first group, for which most of the future works intend to improve the existing accounts, given that this is currently the most advanced module in terms of number of countries involved. On the contrary, for the second group of modules, which is composed of energy, water (flows and emissions) and waste accounts, 65% of the short term plans come from countries that intend to start developing new EA modules. Finally, for the third group (chemicals, taxes and land), the only project comes from Sweden that plans to improve its NAMEA type accounts of chemicals.

As concerns the remaining gaps, one can note here those that are the less obvious, i.e. in the most advanced modules. Some 5 countries that have not started working respectively on EPEA (Estonia, Ireland, Cyprus, Luxembourg and Malta) and EW-MFA (Greece, Ireland, Luxembourg, Malta and Slovakia) that have not started working the corresponding module did not plan yet to do so in the near future. For NAMEA-air, only 3 countries (Latvia, Malta and Slovakia) are in a similar situation.

[15] - Directive 2000/60/EC of the European Parliament and of the council of the 23 October 2000 establishing a framework of community action in the field of water policy, Official Journal of the European Union, 22 December 2000, pp. L 327/1-72.
[16] - Regulation (EC) N° 2150/2002 of the European Parliament and of the Council of 25 November 2002 on waste statistics, Official Journal of the European Union, 9 December 2002, pp. L 332/1-36.

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Table 2.5 – Summary table on the situation of EA in Europe, including countries' short term plans for future development

Country	Economic Environmental Accounts					Material Flow Accounts			NAMEA (physical and monetary supply-use tables)							Natural resources				
	EPE(A)*	eco-industry	eco-taxes	*of which taxes by industry*	subsidies	economy-wide	PIOT	Raw material accounts	air	energy	water flows	water emissions	waste	chemicals	land	forest	fish and fisheries	land	subsoil	water
ESEA**	A	A	A	--	C	A	B	B	A	A	A	B	B	C	--	A/D	C	B/C	A	B/C
BE	-	-	- - -	- - -		-			- -	- -	- -	-				-		-		
BG	-	-	- -	- -		-			- -	-	-	-							-	
CZ	-	-	-	-		- - -		-	- -		-					-				
DK	- -		- -	- -	-	- -	-		- - -	-	- - -	-	-			-			- -	
DE	- -	- -	- -	-	-	- - -	-	- -	- - -	-	- - -	-	-	-	- -	- -		- -		
EE		-	-			-			-							-	-			
EL	- -								-	-										
ES	-		-	-		- -			- -	-	- -					-				
FR	- -	- -				-			- -	- -	-	-	-			-	-			
IE	-					-			- -	-	-		-							
IT	- -	-	-			- -	-		- - -	-	-								-	
CY		-				-				-										
LV	-					- -										-				
LT	-					-			-											
LU									-											
HU	-			-	-	-			- -	-	-	-	-			-		-	-	-
MT																				
NL	-	-	-	-	-	-	-		-	- -	- -	- -	- -	- -				-	-	
AT	- - -	- - -	-	-	-	- -		-	- - -	- - -	-	- -	-			-					
PL	-			-		-			-	-										
PT	-	-					-		- -		-					-	-			
RO	-			-		-				-	-		-							
SI	-	-	-			-			-	-										
SK	-																			
FI		-		-		- -	-	-	- -							-					
SE	- - -	- -	- -	- -	- - -	- -	-	-	- - -	-	-			- -		-		-		
UK	- -	-	-	-		- -			-	-							-	-	-	-
NO	-	- -	-	-	-	-			- -	-		-	- -		-	-	-		-	
CH	-	- -	-			- - -		-	-								-			
Total	22 10 8	7 4 10	10 10 9	*10 5 4*	2 2 5	17 10 17	4 0 2	1 2 3	22 16 7	9 8 7	9 4 6	8 1 3	8 2 4	1 2 1	1 1 0	9 5 4	3 1 0	3 1 2	3 2 4	1 0 1

* Environmental protection expenditure accounts, including report dealing with EPE data collection (i.e. not with EPEA compilation)

- : EU funded pilot applications carried out from 2000 onwards
- : EU funded pilot applications carried out before 2000
- : pilot application undertaken without EU funding
- : Regular production
- : Short term plans for future work (development or improvement)

**** Priorities of the European Strategy for Environmental Accounting (ESEA) adopted in 2003**

- **A** : Priority areas recommended for harmonised EU-wide reporting
- **B** : Areas for short-term development and experimental implementation in volunteer countries
- **C** : Areas for medium-term development and experimental implementation in volunteer countries
- **D** : Areas for long-term development

2.5 THE CURRENT USE OF EA AND THEIR PROMOTION BY EUROPEAN COUNTRIES

The major part of the information presented here regarding the use of EA by European countries, as well as the media used to disseminate and promote EA results, stems from the survey undertaken on behalf of Eurostat to the institutions in charge of EA in EU Member States plus Norway and Switzerland (see annex 4). Some pieces of information also come from the countries' statistical offices websites. The number of reports dedicated to EA-based analysis (i.e. instead of EA compilation) is rather limited compared to the total number of reports examined within the present study.

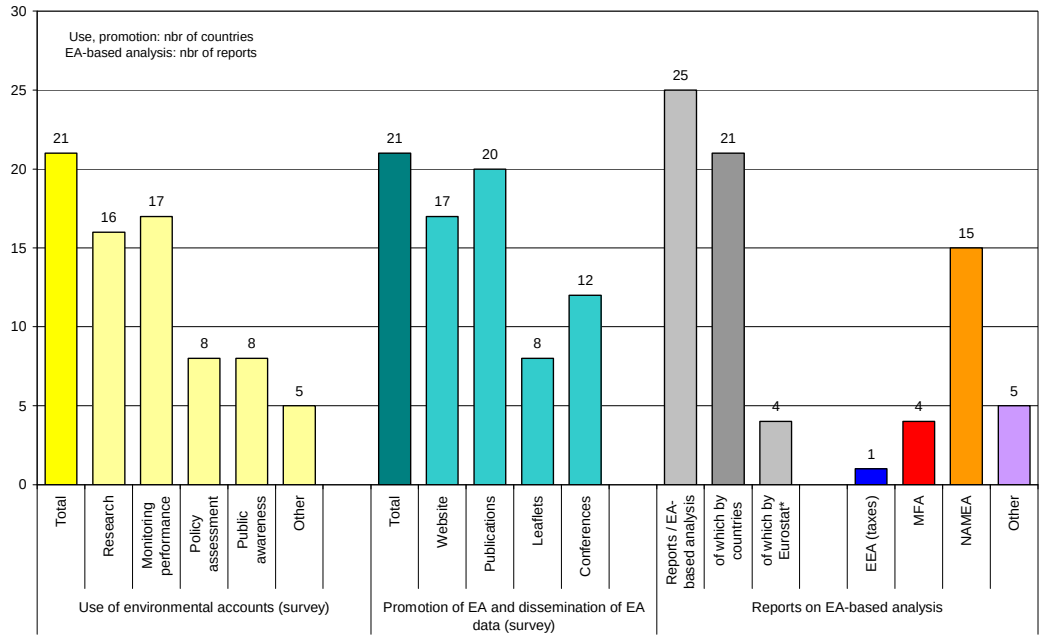
Out of the 153 pilot applications taken into consideration for the present study only 25 reports or parts of reports were specifically dedicated to the development or the application of analyses from EA. This is mainly due to the fact that, in the field of EA in the early 2000s, European countries had to place their efforts firstly on the compilation of the accounts. However, the abovementioned proportion might not reflect properly European countries' contribution regarding EA-based analysis (see section 3.5 below).

2.5.1 The use of EA in Europe

Out of the 27 countries that responded to the survey, 21 provided information on the use of the EA at national level. For the 6 other countries (Bulgaria, Ireland, Cyprus, Lithuania, Luxembourg and Poland) EA were not significantly developed enough to enable the production of a specific analysis. The table 2.6 below gives an overview of the uses of EA by country and by type of use.

Figure 2.4 – Use and promotion of EA in Europe

Deleted: 2



* Reports carried out by consultancies or Universities for Eurostat.

Source: reports prepared from 1999 onwards within Eurostat's environmental accounting project; survey to the institutions in charge of EA at national level conducted during June - July 2007 (see annex 4)

Among the different items enumerated in the questionnaire (see annex 4), *monitoring environmental and/or sustainable performance* and *research activity* (17 and 16 countries respectively) are the 2 main types of uses of EA identified in their country by the European national experts interviewed. The contribution of EA to monitoring performances consists mostly in the calculation of indicators, especially MFA-based indicators (at least 11 countries) that are usually included in regular reports either related the state of the environment or to the national sustainable development strategy. A lower number of countries refer to NAMEA (8) and only a few to EPEA (3) in this context.

Among the European countries surveyed, 16 are aware of research activities using EA either in other governmental departments or in universities and research institutes. For 4 of these countries (Denmark, Netherlands, Sweden and Norway), the national statistical office also develops internal EA-based research activities. However, most statistical offices are dedicated to the production of statistics only. The information on the types of EA used is not available for the 16 countries. However, NAMEA, MFA, and EPEA (or EPE data) occurred respectively 7, 5 and 4 times among countries' responses related to this topic (see table 2.6). Also, Portugal and Finland indicated research activities using natural resources accounts (forest and/or fisheries accounts).

The use of EA for policy assessment has been indicated by 8 countries only (table 2.6) and in Austria a project is under progress at the Federal Ministry in charge of environment for the development of an EA-based tool dedicated to policy analysis. For some countries, EA are not yet developed enough to enable policy assessment, but for other countries like Belgium, Spain, Italy, United Kingdom or Norway, the absence of such a use of EA seems relatively surprising; unless this would result from a lack of feedback from the relevant institutions. For instance, among the 8 countries for which the EA experts are aware of EA-based policy assessment, 2 complained about the lack of feedback from the other governmental departments or political institutions they provide with data.

Among the 8 relevant countries, the use of EA for policy assessment is mentioned either in relation with specific institutions or with particularly relevant domestic issues. In the first case one can find France with the Directorate for economic studies and environmental evaluation (*D4E*) of the ministry of ecology, Sweden with *ad hoc* committees on green taxation, climate change etc. or the Nordic Council of Ministers on environment & natural resources Committee. In the second case, there are Estonia with Fisheries and Finland with forest related issues. Sometimes policy assessment is not clearly separated from other types of uses of EA. In Denmark, it is considered as part of research activity and the Czech and German experts related policy assessment with SDI.

It seems also surprising that only 8 countries responded that EA are used to enhance public awareness, since 21 of the countries surveyed responded positively to the question related to the promotion and the dissemination of EA (see below), even though such a promotion is not necessarily directed towards a wide public. One can also note that 2 additional countries (Estonia and Portugal) plan to develop this activity in the near future and in Austria this is not the statistical office but the Federal environment agency that is responsible for the dissemination of environmental information to a wide public.

Some 5 countries mentioned *other uses* of EA, of which Denmark and Norway found out that the compilation of EA enables them to check the consistency of basic statistics. It is particularly true concerning the comprehensiveness regarding economic activities. In Belgium, EA are used similarly to environmental statistics, with which they are in fact in competition. For 2 other countries, the *other uses* of EA are not totally separated from the kind of uses enumerated above. In Germany, EA are used to prepare sectoral reporting modules, e.g. on transport (see study n° 134), agriculture and private households, in order to address specific policy-relevant issues. This type of use is therefore closely related to policy assessment. Statistics Sweden indicated using EA to prepare papers published in scientific journals (e.g. *Ecological Economics*, *Journal of Industrial Ecology*…), an activity that is not totally disconnected from the development of public awareness, even though the public targeted in this case is not wide. Also, despite none of the other countries have responded so, some of them (e.g. Denmark, Germany, Netherlands, Austria, United Kingdom, Norway…) also publish EA-based scientific papers.

Table 2.6 – Use and promotion of EA by European countries

Deleted: 2

Country name	Types of uses of environmental accounts							Promotion of EA			
	Research activity	Types of accounts	Monitoring performances	Types of accounts	Policy assessment	Public awareness	Other uses	Website	Publications	Leaflets	Conferences
Belgium											
Bulgaria											
Czech Republic				MFA							
Denmark		NAMEA									
Germany		All		MFA, NAMEA							
Estonia				(genuine saving)							
Greece		na									
Spain		NAMEAair		MFA							
France				NAMEA							
Ireland											
Italy		NAMEA		EPEA, MFA NAMEA							
Cyprus											
Latvia				MFA							
Lithuania											
Luxembourg											
Hungary		na		NAMEA-air							
Malta											
Netherlands		NAMEA		NAMEA							
Austria		EPEA, MFA		EPEA, MFA							
Poland											
Portugal		NAMEA, (forest, fish)*									
Romania		na		na							
Slovenia		na		MFA							
Slovakia											
Finland		Forest		MFA							
Sweden		NAMEA, MFA		MFA, NAMEA							
United Kingdom		MFA		MFA, NAMEA							
Norway		NAMEA		NAMEA							
Switzerland		EPEA, MFA		EPEA, MFA							
Nbr of countries	16		17		8	8	5	17	20	8	12

na: the information was not available

* Monetary data only

Source: survey to the institutions in charge of EA at national level conducted during June - July 2007 (see annex 4).

At EU level, in the 2007 edition of the Eurostat (forthcoming) bi-annual publication dedicated to *Measuring progress towards a more sustainable Europe*, 3 of the SDI are based on EA: environmental taxes for the *Implicit tax rate on energy*, DMC for the *Resource productivity* and defoliation for *Forest: increment and fellings*. Another example at European level is the MFA data-set used for the Environment European Agency's third environment assessment (EEA, 2003).

2.5.2 Dissemination and promotion of EA by European countries

The total number of countries that undertake actions in order to promote EA approach and disseminate EA results is the same as the total number of countries that responded positively on the use of EA (figure 2.4), however the lists of countries do not totally coincide (tables 2.6). Both Ireland and Poland undertake actions to promote EA despite they do not use them. On the other hand, Latvia does not undertake any specific action to promote EA, although it uses MFA as an indicator of performance. For Greece that did not respond to the Eurostat survey, its responses to the UNCEEA's *Global Assessment* (see annex 3) on EA-based modelling, economic analysis is interpreted here as EA-based research activity.

Four media were proposed in the questionnaire concerning the promotion of EA: website, publications, Leaflets and conferences. Most countries disseminate EA related information and EA data through official publications that could be split into 2 categories. On the one hand there are publications dedicated to EA; on the other hand there are environmental and sustainable development related publications that include EA. In the first category, one can find annual reports that cover all EA areas investigated by the corresponding countries, like the annual GEEA in Germany, the bi-annual Environmental accounts in UK, since 2006, the annual report on EA in Netherlands (in Dutch), as well as the annual NOREEA reported to Eurostat by Norway. There are also reports dedicated to a specific area, like for instance the annual EPEA-based report to the Commission on environmental accounting

and economics in France (in French) or the NAMEA-air-based annual EA report in Ireland. This category also includes the EA related studies that are made accessible to the public, including studies financially supported by the European Commission. In the second category, one can find reports on the state of the environment or sustainable development reports, as well as environment statistical yearbooks, that include either a selection of EA-based data or indicators or that include a section dedicated to EA. In addition to the publications of the national statistical offices, environment agencies or institutes, some countries publish EA results (methodological and data) in scientific journals[17].

Internet is now a widely used medium of information, including statistical information. Therefore, a majority of EU countries plus Norway and Switzerland disseminate EA related results through their statistical institutions' website. Like for the publications, EA related information is either included within other statistical information (mostly environment and natural resources items) or presented in a dedicated section.

In terms of number of countries involved, conferences, seminars and similar meetings arrive in third position among the European countries' actions to disseminate and promote EA. This category includes both national meetings (like seminars dedicated to specific EA area and committees to which statistical offices participate together with other environment related institutions) and international conference. One can note here the initiative of the Republic Czech that organises since 2004 alternately a seminar and an international conference on *Environmental Accounting and Sustainable Development Indicators*[18], to which many European and non-European countries participate. Also, the same countries that are used to publishing results in scientific journals (e.g. Denmark, Germany, Netherlands, or Sweden) are involved in scientific networks and regularly intervene in international conferences.

Only a few of the European countries disseminate EA related information using leaflets or similar brief documents. For some countries these short publications are actually dedicated to the presentations of results, whereas for other countries it is a newsletter that aims to release information on EA related activities. Concerning the first situation, such documents are usually intended for the general public and they are produced by the statistical offices in their national language only (e.g. Germany, Spain and France).

[17] - Among others and in alphabetical order: *Economic Systems Research*, the *International Journal of Water*, the *International Statistical Review*, the *Journal of Industrial Ecology*, *Review of Income and Wealth, Structural Change and Economic Dynamics*.
[18] - http://ea-sdi.ujep.cz/

3 Environmental accounting in Europe by areas and modules

In this chapter, the contribution of countries' pilot applications, including those that were financially supported by the European Commission, is analysed in terms of time coverage. Tables, by area or by module, covering the period from 1990 onwards, present the data availability by country and the condition of their production: pilot study (EU funded or not) or regular production. The information comes from the survey to the (annex 4), countries' reports and publications as well as statistical offices websites. Information resulting from the detailed examinations of the reports (annex 2) is also used to appreciate the consistency with Eurostat's methodological recommendations.

Also, based on EW-MFA and NAMEA-air, two of the most advanced areas of which the data are collected on a regular basis and for which estimates are made in order to produce EU-wide aggregates, comparisons were made between some results of the pilot studies and Eurostat dataset(s). Such comparisons show the importance of the countries' studies and also illustrate the incremental approach used for the development EA in Europe (i.e. succession of studies progressively improving the accounts as regards the most difficult principles to implement).

Chapter 3 is structured in accordance with the areas and modules identified in the ESEA (Eurostat, 2003a): economic environmental accounts (EPEA, environment industry, environmental taxes); material flow accounts (economy-wide MFA and PIOT), NAMEA-type accounts (air emissions/energy, water, solid waste, as well as chemical products); and natural resources accounts (forest, subsoil assets, land…).

3.1 ECONOMIC ENVIRONMENTAL ACCOUNTS (EEA)

This section focuses on the modules of the EEA (EPEA, environment industry, and environmental taxes) that have been the most investigated, in terms of pilot applications carried out and European countries involved (see tables 2.1 and 2.3 and figure 2.2 above). These modules were identified as a first priority in the 2003 ESEA.

3.1.1 Environmental protection expenditure accounts (EPEA)

The Environmental Protection Expenditure Accounts (EPEA) was the first module of environmental accounts developed by Eurostat. The work began in this area in the early 1990s and the SERIEE manual was published in 1994 (Eurostat, 1994). The classification of environmental protection activities (CEPA) was revised in 2000. A few years later Eurostat published two complementary methodological documents: a compilation guide (Eurostat, 2002c) and a compilation of pilot applications carried out from 1995 to 1999 (Eurostat, 2002d). However, no full EPEA data collection has ever been implemented in Europe.

In parallel, OECD and Eurostat have a joint questionnaire (JQ) on environmental protection expenditure and revenues since 1996. Several revisions intervened since then (the latest in 2002) that led the JQ to adopt the CEPA and a classification of institutional sectors rather close to the SNA classification used for the EPEA. The data resulting from the 2004 OECD/Eurostat JQ were published in March 2007 (OECD, 2007). Also, the structural business statistics (SBS) regulation, which has been revised in 1998, obliges EU countries to provide statistics on current and capital environmental protection expenditure by businesses[19].

[19] - Commission Regulation (EC) No 2700/98 of 17 December 1998 concerning the definitions of characteristics for structural business statistics, Official journal of the European Communities, 18-12-98, L344/49-80; Commission Regulation (EC) No 2701/98 of 17 December 1998 concerning the series of data to be produced for structural business statistics, Official journal of the European Communities, 18-12-98, L344/81-101; Commission Regulation (EC) No 2701/98 of 17 December 1998

One of the main characteristics of the module *environmental expenditure* is the coexistence of two concepts: (national) expenditure according to SERIEE and expenditure according to the JQ. Differences regard mainly the inclusion or not of the consumption of fixed capital within current expenditure (cf. Eurostat, 2005a).

According to the survey carried for the present study, 23 countries have already worked or work on a regular basis on the area of environmental protection expenditure accounts (table 3.1). Among these countries, 16 countries carried out EU-funded pilot applications during the period under review, 3 did so before 2000 only (Germany, France and Netherlands), and 4 countries developed EPEA or part of EPEA from their own resources, either as pilot application or for regular publication (Spain, Ireland, Finland and Switzerland).

Table 3.1 – Time coverage of pilot applications and regular production of EPEA*

Deleted: 3

Country code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Number of years
BE								1	1	1	1	1	1					6
BG																		0
CZ																		0
DK					1							1						2
DE		1			1	1	1	1	1	1	1	1	1	1	1			12
EE																		0
EL						1	1					1						3
ES						1	1	1	1	1	1	1						7
FR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			15
IE									1									1
IT								1	1	1	1	1	1	1	1	1	1	10
CY																		0
LV														1				1
LT															1			1
LU																		0
HU												1						1
MT																		0
NL		1				1	1	1	1	1	1	1	1	1	1	1		12
AT						1	1			1		1	1	1	1			7
PL													1					1
PT														1				1
RO															1			1
SI												1	1	1	1	1	1	6
SK															1			1
FI			1	1	1	1	1	1	1	1	1	1	1	1	1			13
SE		1								1	1	1	1	1	1	1		8
UK					1		1				1	1	1	1	1			7
Total EU	1	4	2	2	5	7	8	7	8	9	9	14	11	11	12	4	2	
NO											1	1	1	1	1	1	1	7
CH				1										1				2
Total	1	4	2	3	5	7	8	7	8	9	10	15	12	13	13	5	3	

: EU funded pilot applications carried out from 2000 onwards
: EU funded pilot applications carried out before 2000
: pilot applications without EU funding
: prepared on a regular basis or as official statistics at national level
: overlap between pilot application and regular production

* Including works that either partially cover the full EPEA – i.e. covering only one of the institutional sectors (e.g. the public sector), or only some of the environmental protection activities (e.g. waste and wastewater management) – or do not fully comply with the SERIEE methodology, as well as pilot studies dealing with EPE data collection.

The pilot application(s) was/were translated into time series by 10 countries out of the 19 that benefited from EU funding to develop EPEA or part of EPEA, either directly or indirectly. Therefore, 9 countries that carried out a pilot study on EPEA from 2000, have worked so far on a single year or on a few years only.

concerning the technical format for the transmission of structural business statistics, Official journal of the European Communities, 18-12-98, L344/102-117.

More than half of the pilot exercises dealt with EPE data collection, surveys in the context of the SBS implementation, or JQ collection of data. Among the former EU-15 countries, only 3 countries made pilot exercises concerning the implementation of the full EPEA (Belgium, Ireland, Italy and Austria). Among the 12 new EU Member States, 4 actually engaged in the implementation of the EPEA (Latvia, Lithuania, Hungary, and Poland).

Despite important efforts by Eurostat and national statistical offices, there is little progress on the general implementation and regular publication of the EPEA. EPE statistics are more developed thanks to the OECD/Eurostat JQ, the SBS regulation[20] and the new classification with regard to National Accounts reporting according to COFOG[21].

3.1.2 Environment industry[22]

Alongside with the development of EPEA, Eurostat in collaboration with OECD has been working for almost two decades on classifications and manuals concerning environmental industry (OECD/Eurostat, 1999). A new manual is under development (Eurostat, 2007b).

A lower bound estimate of the size of the environment industry for 1994 at EU-15 level was carried out in collaboration with EU Member States by a consortium of consultancies commissioned by the DG Environment (Ecotec, BIPE and IFO, 1997). A new estimate for 2004 and covering EU-25 was recently undertaken again by consultancies on behalf of the DG Environment, based on data provided by Eurostat (Ernst & Young and RDC-Environment, 2006).

At the present time, 9 countries have already worked or are working on environmental industry accounts. From 2000 onwards, 6 countries carried out pilot studies in relation with environmental industry (Belgium, Netherlands, Portugal, Sweden, Norway and Switzerland) and 4 produce accounts on a regular basis in this domain (Germany, Austria, Sweden and United Kingdom). Only two countries are included in both groups, i.e. countries that developed a regular production whereas they benefited from EU financial support to prepare pilot applications on this module (see tables 2.2 and 2.3 in chapter 2).

During the period under review, there was little progress in the compilation of environment industry accounts and this domain remains the least developed in the countries among the 3 types of EEA dealt with in this chapter.

3.1.3 Environmental taxes

The basic framework used in Europe for statistics on environmental taxes was developed jointly by Eurostat, the European Commission Directorate General Environment (DG ENV) and Directorate General Taxation and Customs Union (DG TAXUD), the Organisation for Economic Co-operation and Development (OECD) and the International Energy Agency (IEA) (Eurostat, 2001c).

Data produced by Eurostat derive from the detailed tax data annually reported to Eurostat (national accounts) as part of the national accounts' transmission programme. Based on the data reported, Eurostat (Unit "Environmental statistics and accounts"), in co-operation with the DG TAXUD, and based on a list of individual environmental taxes agreed upon for each country, produces statistics on total environmental tax revenues (without a breakdown by tax payer) and on broken down by category of environmental taxes (energy, transport, pollution, and resources).

At the meeting of the Task Force on NAMEA-air in 2003, Eurostat made a proposal for a table dedicated to report the environmental taxes by industry (Schucht, 2003). The final version of the tables was sent out in 2006 and a part of the data collected was published recently, with a focus on energy and transport taxes (Eurostat, 2007a).

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[20] - Regulation (EC) No 2056/2002 of the European Parliament and the Council of 5 November 2002 amending Council Regulation (EC, Euratom) No 58/97 concerning structural business statistics.

[21] - Commission Regulation (EC) No 113/2002 of 23 January 2002 amending Council Regulation (EC) No 2223/96 with regard to revised classifications of expenditure according to purpose, Official journal of the European Communities, 21-1-2001

[22] - In relation with the preparation of a new compilation guide, the expressions *Environmental Goods & Services Sector* (EGSS) and *Environment Sector* for short were adopted to replace the former *Environment Industry*. Eurostat – Unit E3, *Draft Minutes from the task Force meeting on Environmental Goods & Services Sector* on 10 October 2006.

According to the survey carried out within the present study, out of the 14 countries that already produced environmental taxes accounts, 7 benefited from EU funding to develop pilot applications (in table 3.2, the highest total is 12, since there is no year in common for Slovenia and Norway). All these pilot applications deal with the distribution of environmental taxes (and subsidies for 2 of them) by industry.

Table 3.2 - Time coverage of pilot applications and regular production of environmental taxes

Deleted: 3

Country code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Number of years
BE								1	1	1	1	1	1	1	1			8
BG											1	1						2
CZ																		0
DK				1	1	1	1	1	1	1	1	1	1	1	1	1		13
DE		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
EE																		0
EL																		0
ES						1	1	1	1	1	1	1	1	1				9
FR																		0
IE																		0
IT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
CY																		0
LV																		0
LT																		0
LU																		0
HU																		0
MT																		0
NL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		16
AT										1								1
PL																		0
PT																		0
RO																		0
SI													1	1				2
SK																		0
FI	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			25
SE				1	1	1	1	1	1	1	1	1	1	1	1			12
UK				1	1	1	1	1	1	1	1	1	1	1	1	1		13
Total EU	3	4	4	7	7	8	8	9	9	10	10	10	10	10	8	5	2	
NO		1	1	1	1	1	1	1	1	1	1	1						11
CH	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		16
Total	4	6	6	9	9	10	10	11	11	12	12	12	11	11	9	6	2	

: EU funded pilot applications carried out from 2000 onwards

: EU funded pilot applications carried out before 2000

: pilot applications without EU funding

: prepared on a regular basis or as official statistics at national level

: overlap between pilot application and regular production

Note: the table focuses on the period from 1990 onwards, but for a few countries the series starts in the 1980ies (see the number in the last column).

In general, 11 of out the 14 countries have started working, even partially or at a preliminary stage, on the distribution of environmental taxes across industries plus households: Belgium, Denmark, Bulgaria, Denmark, Germany, Spain, Netherlands, Austria, Finland, Sweden, United Kingdom (cf. Eurostat' web site[23] plus a study by Nordic countries (n° 69) and Austr ia (n° 102) [24]). All of them have started working on energy taxes, 8 on transport related taxes, 6 on pollution taxes and only 2 on resource taxes.

[23] http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996,45323734&_dad=portal&_schema=PORTAL&screen=welcomeref&open=/env/env_acc&language=en&product=EU_MASTER_environment&root=EU_MASTER_environment&scrollto=16

[24] - The other reports dealing with environmental taxes by industry are the following: Belgium (31), Denmark (94), Sweden (93), United Kingdom (34, 77), and Norway (30c).

3.2 MATERIAL FLOW ACCOUNTS (MFA)

The material flow accounting framework covers 2 kinds of accounts: economy-wide material flow accounts (MFA) or balances and physical input-output tables (PIOT). **PIOT** provide a comprehensive description of material flows both between environment and economy and within the economy. The economy-wide material **balances** give an aggregated description of the material input and output of economies (including stock changes). Economy-wide material **MFA** correspond to the situation when the full balances (i.e. the output side) is not established.

Table 3.3 – Time coverage of pilot applications and regular production of MFA

Deleted: 3

Country code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Nbr of years I	Nbr of years IO
BE																	0	0
BG																	0	0
CZ				I	I	I	I	I	I	I	I	I	I	I	I	I	13	0
DK				I	I	I	I	I	I	I	I	I	I		I		11	0
DE	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	0	16
EE																	0	0
EL																	0	0
ES							I	I	I	I	I	I	I	I			8	0
FR																	0	0
IE											IO						0	1
IT	I	I	I	I	I	I	I	IO	I	I	I	I	I	I	I		24	1
CY																	0	0
LV													I			I	2	0
LT																	0	0
LU																	0	0
HU											I	I	I	I			4	0
MT																	0	0
NL																	0	0
AT	I	I	I	I	I	I	I	IO	I	I	I	I	I	I	I	I	45	1
PL																	0	0
PT																	0	0
RO					I	I	I	I	I	I	I	I	I	I			10	0
SI									I	I	I	I	I	I	I	I	8	0
SK																	0	0
FI	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	IO	0	36
SE	I	I	I	I	I	I	I	I	I						I		13	0
UK	I	I	I	I	I	I	I	I	I	I	I	I	I	I			34	0
EU / I	4	4	4	6	7	7	8	6	9	8	9	9	10	8	6	4		
EU / IO	2	2	2	2	2	2	2	4	2	2	3	2	2	2	2	2		
NO							I	I	I	I	I	I	I	I	I		9	0
CH	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	25	0
Total / I	5	5	5	7	8	8	10	8	11	10	11	11	12	10	8	5		
Total / IO	2	2	2	2	2	2	2	4	2	2	3	2	2	2	2	2		

I and IO stand respectively for input side MFA and input & output MFA

: EU funded pilot applications carried out from 2000 onwards

: EU funded pilot applications carried out before 2000

: pilot applications without EU funding

: including EU funded pilot applications on PIOT

: prepared on a regular basis or as official statistics at national level

: overlap between pilot application and regular production

Note: the table focuses on the period from 1990 onwards, but for a few countries the series starts in the 1980ies (see the number in the last column).

3.2.1 Economy-wide MFA and balances

Eurostat has been involved in the development of material flow accounting for more than two decades. It was associated to an international project that led to the publication of the complementary books dealing respectively with the input and output sides (Adriaanse et al., 1997 and Matthiews et al., 2000). This was the first time that macroeconomic MFA was translated into practice at international level. Moreover, Eurostat was the first to promote MFA techniques in Europe (Eurostat, 1997), and to work actively on a harmonised methodology.

A Task Force on MFA was set up in 2000 with the objective of developing a methodological framework. A methodological guide was published in 2001, with a focus on economy-wide MFA (Eurostat, 2001a). As regards the compilation of accounts, EU-15 time series were published, relying on estimates from the Wuppertal Institute and the IFF Social Ecology Vienna[25] for the missing countries (Eurostat, 2001b, 2002a, and 2005b).

At the present time, 16 countries are engaged in the compilation of MFA at national level (excluding Poland, of which the environment protection inspectorate carried out a feasibility study), most of them (13) focusing on economy-wide MFA (input side). Almost all these countries benefited from EU funding to carry out pilot studies (Spain and Latvia developed pilot exercises from their own resources). It is worth mentioning that all these pilot applications resulted, either directly or indirectly, in the compilation of time series and that 9 of these countries have included MFA in their regular statistical production.

The comparison of DMI that resulted from the pilot applications examined here and DMI from different data-sets prepared for Eurostat by the Wuppertal Institute or the IFF Social Ecology shows how much estimates undertaken by the countries themselves could improve EU wide estimate (Moll, 2003)

The comparison, even focusing on the smallest perimeter (DMI)[26], between results from the pilot applications examined here and different datasets prepared for Eurostat by the Wuppertal Institute or the IFF Social Ecology (Moll, 2003; Eurostat, 2002a; and Weisz et al. 2007) shows how important estimates undertaken by countries' relevant institutions are. In table 3.4 below, a certain number of DMI from countries' reports carried out since 2000 are significantly higher than the corresponding estimation prepared for Eurostat, the differences ranging from around 20% to 30% for Italy, Hungary, Romania, Slovenia, and Norway, and even reaching 50% for Ireland.

In its latest report to Eurostat, the Wuppertal Institute (study n° 56) adopted the Italian statistical office's DMI that was almost 20% higher for the year 1998. Also, in the same report, the DMI calculated for Ireland (159 Mt for 1997) is closer to the Irish EPA's DMI than previous estimates for Eurostat, although the two studies do not cover the same year (2000 for the Irish EPA and 1997 for the Wuppertal Institute). Given the relative important size of Italy or the significant difference for Ireland, each of these adjustments, all things being equal, increased the EU-15 DMI by 2.5% and 1% respectively.

Concerning, Latvia and the Swedish MFA for 2004, the DMI is lower than the one estimated for Eurostat since they were not calculated following all Eurostat's methodological recommendations (especially about biomass and the crude ore concept).

Only 4 countries (Germany, Italy, Austria and Finland) have already worked both on input and output sides, and 2 (Germany and Finland) have been compiling time series of annual economy-wide material balances.

Recently a set of MFA standard tables was proposed for data collection (2006). This set of tables was sent out to the countries in the course of 2007 and the first responses have just been received.

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[25] - IFF stands for Interdisziplinäre Forschung und Fortbildung (Alpen-Adria-Universität Klagenfurt).

[26] - The focus on DMI is justified both by data availability and the relevance regarding countries' contribution. As indicated above, most of the countries engaged in the compilation of EW-MFA have been focusing so far on the input side. Also, when unused and indirect flows are taken into account, estimates are mostly based on factors provided by the Wuppertal Institute. Therefore, at this stage, countries contribution mainly matters for direct flows.

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Table 3.4 - Comparison of DMI from countries' reports and different datasets prepared for Eurostat

Country code	(1) study nbr	Domestic material input (DMI)								Comments
		Countries' studies(1)	Wuppertal Institute (WI) (2)	IFF/Eurostat 2002 (3)	IFF/Eurostat 2007 (4)	difference: countries' studies minus WI 2003 (except / SE study n°108a)		difference: IFF/Eurostat 2007 minus WI 2003		
		A	B	C	D	(A - B)		(H - F)		
		Mt	**Mt**	**Mt**	**Mt**	**Mt**	**%**	**Mt**	**%**	
CZ	**71**	219	222	na	na	-3	-1%	na	na	1999 (latest year available in Moll (2003)
DK	**61**	172	164	164	169	8	5%	5	3%	2000
DE	**58**	1 738	1 737	1 737	1 750	1	0%	12	1%	2000
ES	*****	770	760	760	721	11	1%	-38	-5%	2000
IE	**133**	151	101	101	104	50	50%	3	3%	2000
IT	**54**	982	824	805	747	158	19%	-77	-9%	1998 (latest year available then from Istat)
	59a	1 061	843	843	799	218	26%	-44	-5%	2000
LV	**119**	41	56	na	na	-15	-27%	na	na	2002 for LV env ministry and 1999 in Moll (2003)
HU	**72**	136	120	na	na	16	13%	na	na	2000 for HCSO and 1999 for Eurostat/EEA and
AT	**88**	185	185	185	185	1	0%	0	0%	1997 latest year available then for Stat. Austria
RO	**73**	212	193	na	na	19	10%	na	na	1999 (latest year available in Moll (2003)
SI	**129**	44	34	na	na	10	29%	na	na	2000 for SORS and 1999 for Eurostat/EEA
FI	**83**	209	206	219	229	2	1%	23	11%	1997 (latest year available for Stat Finland)
SE	**84**	242	225	225	225	18	8%	0	0%	1997 (latest year available for the SCB)
	106	180	na	na	291	-111	-38%	na	na	2004 (difference: SCB less IFF/Eurostat 2007)
UK	**57**	873	890	890	889	-17	-2%	-1	0%	2000
NO	**108a**	314	268	na	na	46	17%	na	na	1999 (latest year available in Moll (2003)
CH	**62**	105	na	na	na	na	na	na	na	2000

na : not available or not relevant
(1) Report examined for the present study (the number refers to the list in annex 3
(2) Moll (2003)
(3) Eurostat (2002a)
(4) Weisz et al. (2007)
* Website of the Spanish statistical office

3.2.2 Physical input-output tables (PIOT)

Only 3 countries (Germany, Denmark and Finland) have already compiled a full PIOT for a limited number of years (2 reference years each) and Italy carried out a feasibility study. As indicated in the UK's report on MFA (study n° 57), the Stockholm Environment Institute based at the University of York, has been working on the compilation of a PIOT for the United Kingdom as part of the resource and energy analysis programme (REAP)[27], although the ONS has no current plans to do it.

As stressed in Eurostat economy-wide MFA methodological guide, the implementation of PIOT compilation is quite resource-consuming. Such a task implies the collaboration of monetary input output tables' experts and experts of environmental statistics and accounts. It was estimated then, that the cost for compiling detailed PIOT would probably be similar with those of compiling input output tables in monetary unit.

Therefore, considering this and the almost general lack of resources (human and financial) declared by the EA experts surveyed for the present study (see above section 2.1), the lack of enthusiasm for the compilation of PIOT seems logical. Also, some of the corresponding countries do not even have input output tables in monetary unit on a regular basis.

[27] - Weidmann T. and Barrett J. (2005), *The envisaged structure of the REAP tool*, Resource and Energy Analysis Programme (REAP), Report n° 3, Stockholm Environment Institute (York) in collaboration with the Centre for urban and Regional Ecology (Manchester University) and Cambridge Econometrics, July 2005, 22 p.

3.3 NAMEA (PHYSICAL AND MONETARY SUPPLY-USE TABLES)

The fully-fledge NAMEA framework was initially developed at the Dutch statistical office (see Keuning, Van Dalen, and De Haan, 1999; Keuning, 2000). In 1994, the NAMEA system was identified by the European Union as a relevant part of the EA framework (European Commission (1994). In the *hybrid accounts* (UN, 2003) adopted by Eurostat, the national accounting matrix (NAM) is a set of input-output tables as compiled in national accounts and the environmental accounts (EA) consist of tables containing environment statistics that are arranged consistently with national accounts principles (industry breakdown plus households, residency principle). In NAMEA framework, the NAM could be extended with almost all kinds of environment related data, expressed either in physical (as it is mostly the case) or in monetary units (e.g. environmental taxes).

In this section, the NAMEA-type accounts include physical data only. They cover several environmental domains: air emissions and energy, water (flows and emissions), solid waste, as well as chemical products. The studies that deal with taxes broken down by industries are included in the above-section (3.1.3) dedicated to environmental tax accounts.

3.3.1 Air emissions and energy

Air emission accounts is the most advanced module within the NAMEA related area. Eurostat prepared 2 compilations of pilot applications (Eurostat, 1999b and 2001d) and started collecting air emission accounts for NAMEA in 2000 in a systematic way with the help of standardised tables. Since then the set of standard tables has been revised twice and the most recent collection of NAMEA-air data occurred in 2006. A compilation guide, of which a draft version was circulated a few years ago (Eurostat, 2003a), is currently being finalised, especially in order to consider the changes resulting from the NACE Rev. 2.

As indicated above (chapter 1), 24 countries have either started working on air emission accounts for NAMEA or compile such accounts on a regular basis (in table 3.4 the highest total is 20 since 3 countries: Estonia, Lithuania and Switzerland, have compiled it once for different years from 2002 onwards and the latest year for Luxembourg is 1998). Some 13 of them preceded the regular compilation of NAMEA-air accounts by EU-funded pilot applications (12 of these countries carried out the corresponding study (or studies) from 2000 onwards).

Table 3.4 also shows that the EU-funded pilot studies resulted in the compilation of time series for a majority of the countries engaged in the compilation of air accounts (only 3 counties have worked on a single year: Estonia; Lithuania and Switzerland), either directly (12 countries, including preliminary versions) or indirectly by providing a valuable step stone for the implementation of a regular production afterwards (11 countries, including 6 countries already counted above). Only 2 countries (Netherlands and United Kingdom) produce NAMEA-air accounts on an annual basis since 1990 from their own resources.

Table 3.6 below illustrates with NAMEA-air (CO_2)[28] how important the incremental approach adopted by Eurostat is for the development of environmental accounts (i.e. succession of studies progressively improving the accounts as regards the most difficult principles to implement). For several countries (e.g. Belgium and Italy) the table enables to follow the estimates' refinement resulting from the successive pilot studies.

For Belgium the process started before 2000 with "preliminary" accounts that did not comply with all NAMEA principles. The comparison with the data reported to the UNFCCC enables to show the improvement as regards the residency principle (we also know from the examination of the reports that Belgium improved in parallel the allocation of emissions from transport as ancillary activity across industries, see section A.3.1.1). The process appears less clearly for Italy, although the reports examined describe a similar progressive improvement (also, several studies were made before 2000).

[28] - Carbon dioxide (CO_2) has been chosen for this illustration given its relative importance among greenhouse gases emissions.

And Norway, of which two pilot studies dedicated to the compilation of NAMEA-air were included in the present study's review, already implemented the residence principle before 2000.

Also, like for MFA, the situation of the Czech Republic and Greece, two countries of which the figure in the Eurostat's dataset results from estimation prepared to make up for the lack of data reporting in 2006, tends to remind how important countries' studies are.

Generally speaking, table 3.2 shows that a good deal of work has been made with the pilots studies carried out from 2000 onwards in order to arrive at the level reached in 2006. However, NAMEA-air accounts cover other variables than CO_2, and require the compliance with other principles than the residency principle and one of the greatest interests of such accounts consist in the industry breakdown that is not dealt with in table 3.6.

The 2006-NAMEA-air data collection revealed considerable remaining data gaps regarding coverage of the 29 countries, 19 parameters (13 air pollutants, 2 energy uses, 4 economic variables) and time (9 years: 1995-2003). Further, there are considerable data gaps regarding the breakdown of industries (Moll, 2007).

Table 3.5 – Time coverage of pilot applications and regular production of air accounts for NAMEA

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Country code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	number of years
BE	1				1	1	1	1	1	1	1	1	1				10
BG												1	1	1	1		4
CZ									1	1	1	1	1	1	1		7
DK	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		25
DE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		15
EE														1			1
EL	1	1	1	1	1	1	1	1	1	1	1	1					14
ES	1					1	1	1	1	1	1	1	1	1			10
FR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		25
IE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		15
IT	1	1	1	1	1	1	1	1	1	1	1	1	1	1			14
CY																	0
LV																	0
LT																1	1
LU						1	1	1	1								4
HU											1	1	1	1	1		5
MT																	0
NL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
AT	1	1	1	1	1	1	1	1	1	1	1	1	1	1			24
PL						1	1	1	1	1	1	1	1	1	1		10
PT						1	1	1	1	1	1	1	1	1	1		10
RO																	0
SI											1	1	1	1			4
SK																	0
FI				1		1		1	1	1	1	1	1	1	1		10
SE		1		1	1	1	1	1	1	1	1	1	1	1	1		14
UK	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
Total EU	11	10	9	11	11	16	15	16	17	16	18	19	18	18	13	3	
NO		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
CH													1				1
Total	11	11	10	12	12	17	16	17	18	17	19	20	20	19	14	4	

: EU funded pilot applications carried out from 2000 onwards
: EU funded pilot applications carried out before 2000
: pilot applications without EU funding
: prepared on a regular basis or as official statistics at national level
: overlap between pilot application and regular production

Note: the table focuses on the period from 1990 onwards, but for a few countries the series starts in the 1980ies (see the number in the last column).

Table 3.6 - Comparison NAMEA-air total from countries' reports and dataset prepared for Eurostat

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Country code	CO_2 emissions									
	Countries' studies before 2000 (0)	(1) study nbr	Countries' studies since 2000 (1)	Eurostat dataset (2)	UNFCCC (3)	Difference: Countries' studies since 2000 minus Eurostat dataset		Difference: Countries' studies since 2000 minus UNFCCC		Year
	A		B	C	D	(B - C)		(B - D)		
	Mt		Mt	Mt	Mt	Mt	%	Mt	%	
BE	122 444	42a	125 218	129 884	123 658	-4 666	-3.6%	1 560	1.3%	1995
	na	53a	129 884	129 884	123 658	0	0.0%	6 226	5.0%	1995
CZ	128 859	--	na	132 125	132 125	na	na	na	na	1995
	na	74	131 384	128 075	128 075	3 309	2.6%	3 309	2.6%	2003
DK	79 727	45	79 673	78 597	61 542	1 076	1.4%	18 131	29.5%	1995
DE	905 777	46	903 165	913 622	921 190	-10 457	-1.1%	-18 026	-2.0%	1995
EL	90 250	22	90 250	87 426	87 426	2 824	3.2%	2 824	3.2%	1995
ES	248 829	*	248 905	253 656	255 585	-4 751	-1.9%	-6 680	-2.6%	1995
IE	36 873	*	36 374	36 374	37 139	0	0.0%	-765	-2.1%	1996
IT	na	47	473 559	464 413	459 386	9 146	2.0%	14 172	3.1%	1999
	460 991	50	436 154	na	434 782	na	na	1 372	0.3%	1990
	na		450 720	450 462	445 712	258	0.1%	5 008	1.1%	1995
	na		469 585	464 413	459 386	5 171	1.1%	10 198	2.2%	1999
LT	na	127	na	14 961	12 939	na	na	na	na	2002
HU	na	76	79 751	79 656	58 931	95	0.1%	20 819	35.3%	2000
AT	62 427	48	62 500	63 607	63 661	-1 107	-1.7%	-1 161	-1.8%	1995
PT	65 097	--	na	57 822	53 077	na	na	na	na	1995
	na	51	65 257	70 078	64 766	-4 821	-6.9%	491	0.8%	1999
SI	na	75	15 229	15 106	16 234	123	0.8%	-1 005	-6.2%	2000
SE	63 542	43	na	61 893	58 043	na	na	na	na	1995
NO	na	44	53 579	55 121	40 998	-1 542	-2.8%	12 581	30.7%	1997
	49 599	30b	49 160	48 573	37 810	587	1.2%	11 349	30.0%	1995
	na		55 371	55 121	40 998	250	0.5%	14 372	35.1%	1997
CH	na	52	48 790	48 095	43 797	695	1.4%	4 992	11.4%	2002

na : not available or not relevant
(0) Eurostat (2001d)
(1) Report examined for the present study (the number refers to the list in annex 3
(2) Data reported by the countries to Eurostat in 2006
(3) Data submitted to the UNFCCC in 2007, http://unfccc.int/ghg_emissions_data/ghg_data_from_unfccc/time_series_annex_i/items/3814.php
* ES: website of the Spanish statistical office; IE: annual publication

The above mentioned NAMEA-air compilation guide identifies 2 main approaches for the compilation of air emissions accounts. One is mostly based on energy accounts that are combined with energy carriers' emission factors (additional information is necessary for non-energy related emissions). Another one consists in distributing process-oriented air emissions inventories across economic activities. The attribution of air emission data to industries is based either on economic information available in the inventories or with the help of energy statistics. Therefore energy data plays a significant role in the compilations of emission accounts and a preliminary energy table that distinguished energy carriers was tested by a few countries before being included in the second version of the NAMEA-air set of standard tables (Eurostat, 2003b). In the *NAMEA-air emissions questionnaire 2006*, only the total emission-relevant energy use and total energy consumption by economic activity and households was requested.

However, energy accounts could be prepared for themselves, i.e. not for the compilation of air emission accounts but for the development of certain types of analysis like the structural decomposition analysis (see section 3.5.1 below).

Table 3.7 – Time coverage of pilot applications and regular production of energy accounts for NAMEA

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Country code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	number of years
BE	1				1	1	1	1	1	1	1	1	1				10
BG																	0
CZ																	0
DK	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	36
DE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
EE																	0
EL	1	1	1	1	1	1	1	1	1	1	1	1					12
ES													1				1
FR						1	1	1	1	1	1	1	1	1	1		10
IE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		15
IT			1														1
CY																	0
LV																	0
LT																	0
LU																	0
HU																	0
MT																	0
NL	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
AT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	36
PL																	0
PT																	0
RO																	0
SI																	0
SK																	0
FI																	0
SE				1	1	1	1	1	1	1	1	1	1	1	1		12
UK	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
Total EU	8	7	8	8	9	10	10	10	10	10	10	10	10	8	8	5	
NO		1	1	1	1	1	1	1	1	1	1	1	1	1	1		14
CH																	0
Total	8	8	9	9	10	11	11	11	11	11	11	11	11	9	9	5	

: EU funded pilot applications carried out from 2000 onwards
: prepared on a regular basis or as official statistics at national level
: EU funded pilot applications carried out before 2000
: overlap between pilot application and regular production
: pilot applications without EU funding

Note: the table focuses on the period from 1990 onwards, but for a few countries the series starts in the 1980s or 1970s (see the number in the last column).

The survey conducted within the present study has identified 13 countries that have already compiled energy accounts for NAMEA, either as a pilot application or as regular statistical production (table 3.5). Some 7 of them developed such energy accounts within pilot applications that benefited from EU funding. And 5 of them prepare their air emission accounts mostly from energy accounts, of which 4 publish annual energy accounts at least from 1990 on their own resources (however, as shown above, 3 of them benefited from EU financial support for the development of their energy-based air emission accounts). Norway has been producing its energy accounts especially to compile air accounts and does not publish them.

Most of the energy accounts related pilot applications carried out from 2000 resulted directly or indirectly in the production of annual time series.

3.3.2 Water (flows and emissions)

The Task Force dedicated to water accounts that was set in the mid 1990s adopted a NAMEA-type framework regarding the description of the water economy and direct interactions between economic and water systems. In the 2003 ESEA, NAMEA-type water related accounts include water flows and emissions to water. The former cover physical flows of water and wastewater within the economy and between the economy and the environment (abstraction, distribution, use of water as well as collection and returns of wastewater to the environment) in physical as well as in monetary units (Eurostat, 2003b)[29].

After several years of work, a compilation of pilot applications by European countries was prepared (Eurostat, 2002b). This publication also included the presentation of a set of standard tables that resulted from the discussions within the Task Force on water accounts. The standard tables were sent out to the countries in 2003 for data collection.

Until now, 15 countries have compiled water accounts for NAMEA either as pilot applications or for a regular/official statistical production, of which 10 are working on water flow accounts and 10 on water emission accounts (table 3.8). Of these, 5 countries have worked both on water flows and water emissions (Belgium, Bulgaria, Germany, Netherlands and Sweden).

Among the 9 countries that have carried out EU-funded pilot application(s) since 2000, 5 have directly or indirectly developed time series (Denmark, Germany, Spain, Italy and Netherlands). In general, only 4 countries have so far implemented official water accounts production, all of them focusing on water flows, i.e. excluding emissions to water from their regular production (Denmark, Germany, Spain and Netherlands and Sweden).

Following the Water Framework Directive (WFD) adopted in 2000[30], water policy in Europe should be implemented at the river basin level. Since then, the Netherlands – which introduced the concept of NAMEA and initiated the work on water accounts for NAMEA – and Sweden have started investigating the question of the compilation of water accounts at river basin level.

At its latest meeting in March 2007, the UNSD Statistical Commission approved the *System of Environmental-Economic Accounting for Water* (SEEAW) manual, of which 3 chapters dealing respectively with physical water supply and use tables, water emission accounts and hybrid accounts for water related activities and products have a direct connection to the European NAMEA framework (UN, 2007). Therefore, in addition to the need resulting from the WFD, the UNSD's decision should stimulate the production of water accounts by European countries.

[29] - Water quality and quantity (stocks) are classified in the ESEA area dedicated to natural resources accounts.
[30] - Directive 2000/60/EC of the European Parliament and the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, Official Journal of the European Communities of the 22 December 2000, L 327/1-72.

Table 3.8 – Time coverage of pilot applications and regular production of water accounts for NAMEA

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Country code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Nbr of years F	Nbr of years E
BE								E	E	F	E						1	3
BG															F	E	1	1
CZ																	0	0
DK					F	F	F	F	F	F	F	F	F	F	F		11	0
DE		E	F	E	F	E	F	E	F	E	F	E	F	E	F	F	14	8
EE																	0	0
EL	F	F	F	F	F	F	F										9	0
ES								F	F	F	F	F	F	F	F		8	0
FR											E						0	1
IE																	0	0
IT										F	F	F	F	F	F	F	7	0
CY																	0	0
LV																	0	0
LT																	0	0
LU																	0	0
HU																	0	0
MT																	0	0
NL		E	F								F	F	F	F	F	F	7	1
AT					E												0	1
PL																	0	0
PT									F								1	0
RO																	0	0
SI																	0	0
SK																	0	0
FI						E											0	1
SE						E	F				E	F					2	2
UK								E									0	1
Total EU / F		2	1	1	1	2	1	1	2	4	5	5	5	5	6	2		
Total EU / E		2	1	1	2	3	1	3	2	1	2	0	0	0	1	0		
NO						E	E	E						E			0	4
CH																	0	0
Total F		3	2	2	3	4	3	3	5	4	6	5	5	5	6	2		
Total E		2	1	1	2	4	2	4	2	1	2	0	0	1	1	0		

F and E stand respectively for water flow accounts and water emission accounts

: EU funded pilot applications carried out from 2000 onwards

: EU funded pilot applications carried out before 2000

: pilot applications without EU funding

: prepared on a regular basis or as official statistics at national level

: overlap between pilot application and regular production

3.3.3 Solid waste

While the Regulation on waste statistics (2002/2150/EEC)[31] was being developed, Eurostat did not wish to push for the development of specific waste accounts for NAMEA at European level. Only a few pilot applications related to waste accounts had been carried out by European countries and due to the absence of an agreed framework, the outcomes differed to a large extent (Pasquier, 2003).

Since then only few additional countries have worked on waste accounts for NAMEA. Therefore, 8 countries have already compiled NAMEA-type waste accounts (Denmark, France, Ireland, Hungary, Netherlands, Austria, Finland and Norway, see tables 2.2 and 2.3 in chapter 2) of which 6 of benefited from EU funding to develop pilot applications. However, only 2 produce such waste accounts on a regular basis: Netherlands, and Norway at rather aggregated level (e.g. 10-industry breakdown).

[31] - Regulation of the European Parliament and of the Council of 25 November 2002 on waste statistics, Official Journal of the European Communities of the 9 December 2002, L 332/1-36.

3.3.4 Other

Concerning physical flows for NAMEA, the category "other" covers works undertaken by Sweden, as well as Netherlands, on chemicals. Statistics Sweden pointed out the lack of knowledge about the amount of chemical included in products and the distribution of these products in society. However, the recent adoption of the European regulation concerning chemicals (REACH)[32] might stimulate the production of basic data EU-wide.

Since 2000, Statistics Sweden prepared 3 reports dedicated to the extension of the Swedish NAMEA to toxic substances. The Swedish basic data covers about 60 000 different chemical products that are classified according to their hazardousness. For the Swedish NAMEA, fossil fuels that represent approximately 50% of the amount of chemical products being labelled as "dangerous" were presented separately. The data presented in the latest report were broken down into 35 industries and covered the period 1996-2001.

Before 2000, Statistics Netherlands also worked on the extension of the Dutch NAMEA to toxic substances emitted to air, as well as soil and surface water[33]. Two indicators of toxic substances dispersion were intensively discussed (Part 1) and the database compiled then covered 1990 to 1998 (Part 2). It contained a complete overview of 56 toxic substances (such as heavy metals and dioxins) allocated to the industry classification adopted for NAMEA, plus 2 natural sources (soil and air).

[32] - Regulation (EC) No 1907/2006 of the European Parliament and the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, Official Journal of the European Union of the 30 December 2006, L 396/1-849.

[33] - Serger R., Verduin H. and Dijkerman H.-J., *Extension of the Dutch NAMEA with the dispersion of toxic substances*, Report for EU, DG XI, Statistics Netherlands (CBS), Voorburg, December 2000, Part I - "Indicators 31 p., Part II - "Database compilation" 62 p.

3.4 NATURAL RESOURCES ACCOUNTS

In the ESEA, natural resources accounts are broken into 8 modules that cover 6 domains: forest, subsoil assets, land, water, fish & fisheries and ecosystems. Some 3 of these domains (forest, land and water) include 2 modules. Forest accounts are split into timber accounts and accounts of forest recreational & environmental functions. Land accounts cover land use and complementary land accounts. In this context, water accounts deal either with water quality or water quantity (stocks).

Table 3.9 – Time coverage of pilot applications and regular production of natural resources accounts

Deleted: 3

Country code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Nbr of years Fo	Fi	L	S
BE										Fo	Fo	Fo					3	0	0	0
BG																	0	0	0	0
CZ																	0	0	0	0
DK	Fo S	Fo S	Fo S	Fo S	Fo S	Fo S	Fo S	Fo S	Fo S	Fo S	Fo S	Fo S	S	S	S	S	12	0	0	16
DE	L	L	L	L	L	L	L	L	L	L	L	Fo L	Fo L	Fo L	Fo L	Fo L	5	0	15	0
EE												Fo			Fi		1	1	0	0
EL																	0	0	0	0
ES						Fo	Fo	Fo	Fo	Fo	Fo						6	0	0	0
FR											Fo	Fo	Fo				3	0	0	0
IE																	0	0	0	0
IT	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	0	0	0	26
CY																	0	0	0	0
LV													Fo				1	0	0	0
LT																	0	0	0	0
LU																	0	0	0	0
HU	L										Fo L					Fo	2	0	2	0
MT																	0	0	0	0
NL	S	S	S	S	S	S	S	S	S	S	S	S					0	0	0	12
AT										Fo	Fo	Fo	Fo	Fo	Fo	Fo	7	0	0	0
PL																	0	0	0	0
PT	Fo Fi	Fo Fi	Fo Fi	Fo Fi	Fo Fi	Fo Fi	Fo Fi	Fo Fi	Fo Fi	Fo Fi	Fo Fi	Fo Fi	Fo Fi	Fo Fi	Fo Fi	Fo Fi	20	20	0	0
RO																	0	0	0	0
SI																	0	0	0	0
SK																	0	0	0	0
FI	Fo	Fo	Fo	Fo	Fo	Fo	Fo	Fo	Fo	Fo	Fo	Fo	Fo	Fo	Fo		25	0	0	0
SE	L			Fo		L					L						1	0	4	0
UK	S	S	S	S	S	S	S	S	L	S	S	S	S	Fi S Fi	S	S	0	2	1	26
NO		Fo	Fo	Fo	Fo	Fo	Fo	Fo									7	0	0	0
CH																	0	0	0	0
Total Fo	3	4	4	5	4	5	5	5	4	6	8	8	6	4	4	4				
Total Fi	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1				
Total L	2	1	1	1	1	2	1	1	2	1	3	1	1	1	1	1				
Total S	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3				

Fo, Fi, L and S stand respectively for forest, fish & ficheries, land and subsoil assets

: EU funded pilot applications carried out from 2000 onwards

: EU funded pilot applications carried out before 2000

: pilot applications without EU funding

: prepared on a regular basis or as official statistics at national level

: overlap between pilot application and regular production

Note: the table focuses on the period from 1990 onwards, but for a few countries the series starts in the 1980ies (see the number in the last column).

3.4.1 Forest accounts

Forest accounts are twofold: wood-related functions (*forest timber* accounts in the ESEA) and functions that are not covered in national accounts (accounts of *forest recreational & environmental functions* in the ESEA).

Within EPEA, forest accounts is one of the first modules being developed by Eurostat. The Task Force on forest accounting was created in 1995. Numerical results on the one hand, and methodological framework (the European framework for Integrated Environmental and Economic Accounting for Forests - IEEAF) on the other hand, were published a few years later (Eurostat, 1999a and 1999c). A test focusing on 4 countries was carried a bit later (Eurostat, 2000) and a collection of data was

launched based on standard tables focusing on wood-related functions of forest (Eurostat, 2002e). Results of pilot applications from a few countries were also published, one concerning recreational and environmental functions of forest that are not recorded in the system of national accounts (Eurostat, 2002f).

At the present stage, 13 countries have worked on forest accounts, either as pilot applications or as regular data production (table 3.7). Most of the work that has been done concerns wood-related forest functions. However, 6 of these countries (Germany, Estonia, France, Austria, Finland and Sweden) have done some research on forest environmental and recreational functions.

From 2000 onwards, 8 countries prepared pilot studies (Denmark, Estonia, Spain, Latvia, Hungary, Sweden and Norway, and including France that did it from its own resources) but none of them translated these experimental exercises into regular statistical production. The Finnish regular production was preceded by pilot applications carried out before 2000.

3.4.2 Other natural resources accounts

Only few countries have worked on the other natural resources accounts: 3 on fish and fisheries accounts (Estonia, Portugal and United Kingdom), 4 on land accounts (Germany, Hungary, Sweden and United Kingdom) and 4 on subsoil assets (Denmark, Italy, Netherlands and United Kingdom). The development of fish and fisheries accounts, which are potentially relevant for more than 3 countries, might have been limited by methodological difficulties. Subsoil asset accounts that actually cover oil and gas are actually relevant for a few European countries only. Land accounts that concern all countries have not yet been envisaged as a priority in the development of EA in Europe.

3.5 EA-BASED ANALYSES AND INDICATORS

The ESEA Task Force (Eurostat, 2003a) identified a series of orientations for environmental accounts in order to make them able to respond to the current policy needs that can be summarised as follows:

- Problems that require longer-term attention (e.g. climate change) need regular observation of structural changes over time (e.g. energy use, eco-efficiency), including sectoral developments (e.g. technological changes).
- In this context, the concepts of *decoupling* (both decoupling resources use from economic growth and decoupling environmental impact from resource use), *eco-efficiency* or *resource productivity* (i.e. the efficiency with which natural resources and environmental services are used to meet human needs) receive an increasing attention.
- Sustainable development policy requires integrated data-sets that link the economic, environmental, and social dimensions.
- The development of integrated datasets also intends to respond to an increasing demand for theme-specific reporting (transport and environment, waste and natural resource use, etc.).
- Integrated Product Policy and related indicators, analysis of the impacts of international trade (i.e. environmental burden displaced through imports and exports) intend to respond to the need resulting from new policy fields that focus on products.
- The assessment of policies also increases in importance, requiring cost – benefit analyses, as well as joint assessment of economic, social and environmental consequences of policies.

One can make the connection between some of these issues and the items according to which the studies are classified in the table 3.10 below. However, even though "*Standard analysis is recommended*" (p. 11) by the ESEA, no methods are listed in relation with the different EA modules. Only input-output analyses that can be developed mostly from NAMEA and MFA are mentioned.

As already observed earlier in this study (table 2.1), the number of pilot studies that are specifically dedicated to the use of EA and the development of EA-based analysis (25) is rather limited compared to the total number of pilot applications taken into consideration (153) in the present study. However, such presentation may be biased since EPEA and EW-MFA frameworks for instance contain analytical tools.

Table 3.10 – European reports dedicated to the use of EA and EA-based analysis

Deleted: 3

	EEA	MFA	NAMEA	Other	total	Numbers of the corresponding studies in the list (annex 2)
Decomposition analysis of changes over time			5		5	n°25, 33b, 45b, 120, 135
Households' environmental impact			3		3	n°23, 49, 104
Indicators (including SDI)			3	1	4	n°103, 105, 111, 98
Integration of EA (combining several areas)	1	1		1	3	n°69, 19, 20
International trade embodied environmental pressure		1	2		3	n°56, 99, 121
Other		2	2	3	7	n °80, 81, 53b, 67b, 79, 91, 95
Total	1	4	15	5	25	

Source: Eurostat and countries statistical offices or environmental agencies (annexe 2)

A majority of the analysis-oriented studies are related to NAMEA. A few of them are related to MFA, but they were carried out by consultancies and not by countries' statistical offices. Only one study is mostly based on EEA.

However, this is sometimes not totally relevant to attribute analysis-oriented studies to one area only since they refer to several areas of EA (a few empty cells of table 3.10 are coloured in grey to indicate the areas referred to in the studies included on the corresponding row). This is particularly true when the study aims at combining data from different areas, for instance in order to connect monetary and physical EA (study n° 19), or when it is intended to describe different types of uses that can be developed from a specific area or the entire data-set available (n° 53 and 95). Also, the German working paper actually refers both to MFA and NAMEA (n° 91) and the report to the Nordic council

(n°69) primarily deals with environmental taxes, but the question raised implies a connection with physical data, actually NAMEA-air data.

One should also note that two studies were dedicated to environmentally adjusted macoeconomic indicators, despite this does not enter into the scope of the ESEA. In 2003, the ESEA Task Force considered that environmentally adjusted national accounts aggregates (e.g. green GDP) as well as valuation and monetisation of environmental damages were not the task of statistical offices because of the difficulties to achieve robust monetisation results. However, it accepted that statistical offices could provide environmental accounts datasets to hept the development of experimental estimates or modelling exercises in this domain.

The first study (n°98) presents the results of academic research that especially offer a classification of two broad families of environmentally-adjusted GDP for a national economy. The first one is based on change in the accounting system boundary, i.e. an enlargement of the scope of national accounting in order to include specified categories of environmental assets. The second indicator type is based on hypotheses of adjustment of the economy itself, i.e. an adjusted economy with a new pattern of production processes, levels of production and consumption activity, technologies employed, etc., which respects specified environmental performance standards.

The second study (n°67b) deals with adjusted macroeconomic aggregates was commissioned by the Polish Central statistical office and dedicated to the assessment of the index of sustainable economic welfare (ISEW) for Poland. The idea of ISEW is to provide a reliable monetary indicator of welfare and sustainability by adding values of categories that increase welfare (e.g. public health or education expenditure) and subtracting values of categories that decrease welfare (including pollution abatement expenditure or depreciation of environmental assets). Such an index also takes distribution aspect into account.

3.5.1 NAMEA

One of the main interests of NAMEA, which represents in many respects a continuation of the work initiated by Leontief regarding the combination of monetary input-output tables and environment related physical data (De Haan, 2004), consists largely in the input-output analyses (IOA) this framework makes it possible to establish. The SEEA 2003 presents this methodology as one of the possible uses of NAMEA-type accounts or *hybrid accounts* according to the United Nations' terminology (UN, 2003). Environmental IOA based on the re-attribution of environmental pressures to final demand components (final consumption, investment and exports) is now a well-documented standard analytical method that enables to assess which products or groups of products induce the greatest direct and indirect environmental pressures, either domestically of globally, through the production chain (Moll et al., 2007). The structural decomposition analysis was included more recently in the NAMEA-based IOA toolbox as a technique intended to time series analysis (i.e. estimating how much of a total change is due to specified causes), even though it is also possible to develop decomposition analysis without IOA.

Three items in table 3.10 are approached on the basis of IOA when it comes to NAMEA: households' environmental pressure, environmental pressure embodied in international trade flows, and structural decomposition analysis. Also, three studies are directly related to the production of indicators.

The environmental pressures associated to final demand components are commonly calculated thanks to IOA. Many European countries (e.g. Denmark, Germany, France, Netherlands, Finland, Sweden, and Norway) perform routinely such calculations at least for energy or/and air emissions. Based on this approach, it is therefore to focus on **households' environmental pressure**. Following studies undertaken before 2000 (e.g. Bergstedt et al. 1999; Schoer, 1999), two reports from Sweden and one from the United Kingdom among the reports examined for this study, are dedicated to such an issue.

The first Swedish study (n°23) intended essentially to link Household Budget Data and environmental accounts. Three components of households' emissions (direct emissions, indirect emissions related to the production of Swedish goods and services and indirect emissions related to the production of imported goods) were considered and distributed by income deciles, geographically by county, by type of dwelling. Also, preliminary comparisons were made between households' productions (cleaning,

children's care, cooking, and transport) related air emissions and similar market production and emissions (restaurant, repair, trade, other private services versus cooking, cleaning/washing, maintenance, child care, and shopping etc.). In the second Swedish study (n° 104) the integrated product policy related indicators (IPP-indictors) by product groups proposed then correspond to the direct plus indirect energy use and CO_2 emissions broken down across a 50-NACE-based classification and split into private and public consumption.

In the report from United Kingdom (study n° 49), direct and indirect emissions of household final demand as well as indirect emissions embedded in imports, which are both considered as a whole and split by type of emission sources (energy use, transport and final demand for other goods), were also broken down by Regions, using the relevant statistics on regional household expenditure (i.e. assuming that purchasing parity is the same throughout the country).

Given the increasing globalisation of the economy and environment related international agreements, like the Kyoto Protocol for climate change, there is a growing interest for the assessment of environment pressure embodied in **international trade** flows. The use of the environmental IOA to deal with this issue is also well established, especially in the context of energy use and related air emissions (De Haan, 2002; Ahmad and Wyckoff, 2003; Moll et al; 2007; Shoer et al., 2007; Van der Veen, 2007). However, in this context, the *pollution haven hypothesis*[34] – i.e. the transfer of polluting activities from countries with strict environmental regulations and monitoring to countries where environment has lower political attention – remains controversial (see also section 3.5.2 below). The more so as the simplest model led to assume that imports are produced with the same technology as if they were produced by the national economy.

Among the reports examined here, two studies respectively carried out by the United Kingdom (n° 99) and Sweden (n° 121) tested different methods designed to estimate air emissions arising from the domestic consumption of imported good and services - i.e. produced and generating environmental pressure abroad. Compared to the basic method, which assumes that domestic emission intensities apply to trading partners (i.e. as if the trading partners had the same emission intensities), it is proposed to use either the relevant foreign countries' fuel use statistics or their environmental accounts when available. A refinement would consist in using the foreign countries' domestic emission coefficients of final demand that result from input-output calculation. Statistics Sweden compared estimates of it in so-called *environmental balance of trade* for air emissions (i.e. emissions attributed to exports less emissions attributed to imports) resulting from the different abovementioned methods.

The reports concluded in favour of the last two methods that require a general development of NAMEA-type accounts in European countries' trading partners, anticipating on recommendations made at the latest Conference of the directors-general of the national statistical institutes[35] (Shoer et al., 2007; Van der Veen, 2007).

Since the 1980s, IOA has developed as major analytical tool in order to study the dynamics of economic changes over time. Therefore, when time series are available, NAMEA enable to track down different causes of changes in environmental pressures (De Haan, 2001), that can be decomposed into scale, structural and efficiency effects. In the case of air emissions, for instance, the evolution can be decomposed into the following factors of changes: the intensity of energy use, the energy intensity of output, the structure of the intermediate consumption (input-output model), the composition of the final demand, and the volume of the final demand. However, there are two categories of **decomposition analysis**, actual *structural decomposition analysis* (SDA) developed from the IOA and the *index decomposition analysis* (IDA) that is undertaken at a more aggregated level. Therefore, the SDA enables to take indirect effects into account, whereas the IDA is limited to direct effects.

Among the studies examined here, three countries performed SDA: Denmark (study n° 45b), Germany (n° 120), Netherlands (n° 82), and Sweden (n° 25). Actually, the German report, of which the first part is a didactical presentation of the different methodological approaches, and that was published later as a Eurostat Working Paper, includes both SDA and IDA.

Within its environmental accounts project, Statistics Norway (n° 33b) implemented an IDA of its air emissions. Initially, the authors intended to perform a SDA, but the time lag before the IO tables should be available prevented them to use the method previously applied by the research Department

[34] - Also spelled *pollution heaven hypothesis*.
[35] Known as DGINS as its French Acronyms.

of Statistics Norway (Bruvoll, Medin, 2000). Belgium, of which the report (n°53a) deals with several of the analytical possibilities that NAMEA enables, also adopted the IDA approach because of a lack of IOT.

One can also note that, in relation with international trade embodied environmental pressure dealt with above, SDA could also be implemented to decompose the environmental trade balance changes of a country into scale, structural and intensity effects (Shoer, 2007). It could also enable to investigate to which extend changes in environmental load in a country are explained by international trade (Wilting, Hoekstra, Schenau, 2006).

Also, two countries (Belgium, Sweden) reported on the air emissions **projections** they made using NAMEA-air. The Belgian federal planning bureau (study n° 53a) combined the Belgian NAMEA-air with its HERMES macroeconomic in order to calculate medium term projections (2002-2015). A set of 5 different scenarios were tested as regards technological evolution and changes in the emission intensities. Statistics Sweden (study n° 105) calculated CO_2 emissions changes resulting from 5 scenarios of which the variables were the domestic private consumption (increase), the emission intensities (improvement), the substitution of goods by services in household consumption, and the reduction of households' direct use of fuels.

Some of the European countries use NAMEA data to prepare **indicators** designed to monitor environmental or sustainability performances (see section 2.5.1). Among the 15 reports dedicated to NAMEA-based analysis, 3 focus on sustainable development indicators (SDI), 2 by Statistics Sweden and 1 by Statistics Denmark (n°111).

The main objective of the first Swedish report (n° 103) was to compile social accounts to be combined with the Swedish NAMEA (and Swedish environment industry accounts). On the long run, Statistics Sweden wishes to perform analyses linking social and environmental dimensions, like Statistics Netherlands with its social accounting matrix (SAM).

The second report by Statistics Sweden (n°105), which aimed at providing initial considerations about the EA-based statistical framework that could underpin the implementation of SDI, actually refers to analyses developed in previous Swedish studies. Regarding NAMEA, the report refers to the structural decomposition analysis (n°25) and the IPP-indicators (n°104).

The Danish report (n°111) argues in favour of SDI derived from a unique statistical system where all data share the same classifications and concepts. Therefore, the system of economic and social accounting matrices and extensions (SESAME) is introduced as a relevant example (illustrations come from the, Dutch example since the social accounting matrix (SAM) was lacking then in the Danish statistical system). According to Statistics Denmark, the SESAME presents the great advantage of combining data that cover the 3 dimensions of sustainable development and offers the same possibilities for further analysis as NAMEA.

The connection between social and environmental data in the same framework or in comparable frameworks seems to respond to the preoccupations of the European Union regarding the links between the social and environmental pillars of sustainable development (European Council, 2006)[36] and those of the OECD about distributional aspects of environmental policy (Serret, Johnstone (2006).

3.5.2 MFA

The main purposes of the EW-MFA are to (Eurostat, 2001a):

- provide insights into the structure and changes over time of the social metabolism of economies;
- derive aggregated indicators for resource use, resource productivity and eco-efficiency, as well as material intensity of life styles;
- and enable analytical uses, including estimation of material flows and land use induced by imports and exports, as well as decomposition analysis.

[36] - The European Commission, DG Employment, Social Affairs and Equal Opportunities recently launched a *Study on the links between the social and environmental pillars of sustainable development* (call for tender N°VT/2006/0004).

The countries' MFA reports examined within this study (section 3.2.1) were specifically dedicated to the compilation of the accounts, although some of them contain analytical elements (comparison across countries, evolution over time etc.) based on the set of indicators included in the MFA framework. Therefore, only four MFA-related reports are here identified as being specifically dedicated to EA-based analysis or the use of EA (table 2.1 and table 3.8). Three of these reports were not prepared by European statistical offices, but by consultancies commissioned by Eurostat.

Two of these reports (n° 80 and 81) were published as Eurostat working papers at the very beginning of the period under review, i.e. before the Task Force on MFA was set up with the objective of developing a harmonised framework and the corresponding methodological guide (Eurostat, 2002). They dealt respectively with the policy relevance of MFA and the implication resulting from the adoption of an *industrial metabolism*-based approach. These reports concluded on recommendations that have mostly been implemented afterwards, since they invited Eurostat to identify a common set of indicators, to encourage and support the standardisation of national MFA, to collect MFA data EU-wide and publish the resulting material accounts and indicators.

In the third MFA report (n° 20) dedicated to analysis, the German statistical office compares both different PIOT-based input-output analysis, i.e. with and without throughput materials, and PIOT-based analysis with results obtained with other of types of input-output tables (IOT): traditional monetary IOT, and extended monetary IOT (NAMEA-type including MFA by industry), as well as time IOT. The different above-mentioned tables are compared regarding the implementation of the input-output analysis technique inspired by the traditional Leontief approach[37].

The fourth MFA-based analysis report (study n° 56) is composed of 3 parts dedicated respectively to the methodological development of MFA by economic branch that enable IOA, to a cross-country comparisons of MFA in Europe as well as outside Europe, and to a MFA-based analysis of the European communities/European Union (EC/EU) foreign trade from 1976 to 2000. In the third part's findings, one can note that EC/EU has increasingly shifted environmental burden on to low income and newly industrialised countries, especially in the form of *ecological rucksacks* (indirect material flows) related to the imported raw materials they need.

In a Wuppertal Institute working paper covering the same period and the same countries, is stated that EC/EU has also been increasingly imported environmental pressures (e.g. air and water emissions) intensive productions from newly industrialised or developing countries and that most of the European material requirements from foreign resources have served as input for the production of their own exported goods (Schütz H., Moll S., Bringezu S., 2004).

Given the relative importance of imports and exports related amounts of materials, especially when indirect flows are taken into account, the economy-wide material flow analysis is traditionally interested in the international trade related environmental impacts, including investigations on the hypothesis of ecologically unequal exchanges between developing and industrial economies (Giljum, 2003; Giljum, S., Eisenmenger N., 2004). Nevertheless, the physical trade balance approach would not be sufficient to support the hypothesis of unequal international trade both for empirical end theoretical reasons and the IOA based on PIOT would be preferable (Weisz, 2007). However, the compilation of PIOT is resource-consuming and only 4 European countries have developed such accounts so far (see section 3.2.2).

3.5.3 EEA

The analytical purpose of EPEA is twofold: firstly, assessing the economic response of society to reduce pollution; secondly estimating the economic consequences of the corresponding expenditure. As stated in the SERIEE-EPEA compilation guide (Eurostat, 2002c), "*The main objective of the EPEA is to assess* […] *the economic resources actually used in order to prevent degradation or to restore the environment. This expenditure* […] *presented by the sectors of the economy and by environmental domains* […] *provides indicators of the response of society to reduce pollution*" (p. 15). "*The objective*

[37] - One can note that there is currently a debate on the reasons that explain discrepancies when comparing outcomes obtained using either PIOT or NAMEA-types accounts, some arguing that they result from the treatment of waste in PIOT, others considering that they are caused by different assumptions regarding unit prices. See Giljum et al. (2002) and Weisz, Duchin (2005).

of environmental expenditure accounting is […] *who is financing the use of these resources and which are the consequences in terms of production, employment, exports and imports and competitiveness for firms due to the environmental protection cost burden*" (p. 16). Some points of the second objective are even more relevant when one focuses on environmental industry (OECD/Eurostat, 1999).

None of the EPEA reports examined for this study was specifically dedicated to analytical purposes. There are two reasons for that. Firstly, as indicated earlier (section 3.1.1), more than half of the EPE related pilot studies carried since 2000 dealt with data collection instead of EPEA compilation. Secondly, environmental expenditure alone has actually no normative value as regards environmental performance (n° 132). "*Linking expenditure with physical data is the only way to assess the efficiency of environmental protection policies*" (Eurostat, 2002c, p. 22). Concerning the economic impact resulting from EPE, no specific analysis other than the one that directly results from the numerous tables of the EPEA framework was proposed in the reports examined.

A report carried out by the Nordic countries (n° 69) investigated whether the energy tax burden in the late 1990s in Denmark, Finland, Norway and Sweden followed the *polluter pay principle*. This investigation was conducted thanks to the connection established between energy tax accounts on the one hand and energy/emissions accounts on the other hand, all broken down by economic activity. This study showed that, although the energy sectors and energy uses differed then among the Nordic countries, their energy tax systems did not. They all had similar exemptions and refund mechanisms that led to reduce the tax burden of the actors that were responsible of the most significant proportions of energy use and related air emissions, which is a real problem in particular for CO_2 emissions, given the dramatic reductions required for climate change mitigation (Palm, Larsson, 2007).

Statistics Sweden previously dealt with this question on the connection between environmental taxes and air emissions in a report (study n° 19) dedicated to analysing more broadly the links between monetary and physical data of the Swedish EA, i.e. EEA (taxes and EPE) and NAMEA (air emissions) variables respectively, with a focus on mining and manufacturing industries. However, the availability of Swedish EPE data was too limited to enable conclusive results. The investigations were undertaken both at macro and micro-economic levels. The combinations of EPEA, environmental tax accounts and other EA appear as a promising way to investigate and it should receive a greater attention in the future development of EA-based analysis (Vandille, 2006).

4 Environmental accounting in non-European countries

4.1 OVERVIEW

A review of relevant applications of EA by non-European countries has been made.. The selection of countries taken into consideration covers non-European industrialised countries (Australia, Canada, Japan, New Zealand, and the Unites States of America) and three of the largest emerging economies (Brazil, China, and India).

The table 4.1 below provides an overview of the areas in which the selected non-European countries have developed or are developing EA over the period of reference. The classification adopted here is similar to the one used in the present study for the European countries that was inspired by the ESEA, except the two approaches classified under the category *Damage valuation, Green GDP*. Some of non European countries do not refer to the terminology used at Eurostat or even in the SEEA (UN, 2003). However, the classification under one or the other area is based on the similarity with the European environmental accounting frameworks. However, this general picture is likely to not be totally complete, since the countries have not been surveyed. The information comes from the literature available on the relevant statistical offices websites

Table 4.1 –Areas of the environmental accounts by some non European countries since 2000

Deleted: 4

Country name	Economic Environmental		Material Flow Accounts		NAMEA (physical and monetary supply-use tables)				Natural resources				Damage valuation, Green GDP
	EPEA	eco-industry	economy-wide	PIOT	air	energy	water	waste	forest	land	Fish	subsoil	
Australia	c				?	?	c		?			n	
Brazil			c		n		n		?				na
Canada	n	c			n	n	n		?			n	
China			c		?	?			?				na
India									c/n	c/n			na
Japan	c		c		c	c	?	?					
New Zealand	n			na	c	c			?		na	n	
USA			na c		n								
Total	**4**	**1**	**4**	**1**	**7**	**5**	**4**	**1**	**6**	**1**	**1**	**3**	**na**

: prepared by statistical offices, environment agencies or other environment-related public/governmental bodies.
: study by academic research centres or other research institutes.
c Consistent or with Eurostat's approach
n Not consistent with Eurostat's approach
na : not available or irrelevant

Table 4.1 synthesises the situation of the non-European countries taken into consideration as regards the areas covered, the institutional context (official statistical production or non-governmental initiative) and, as far as possible, the consistency with the methodology recommended by Eurostat for European countries. This consistency/inconsistency depends on the definitions (e.g. Canadian definition of EP activities), the sectors covered (e.g. New Zealand's EPEA focusing on public sector or Brazil and USA's air emission accounts focusing on manufacturing industries), and the classification used (e.g. Canadian EPEA that do not refer to the CEPA). For India' forest and land accounts, the answer is dual (c/n) since the physical accounts are compatible with the European framework, whereas the monetary accounts are not. In a few cases the examination of the consistency was not relevant given that no European framework is actually recommended (e.g. fishing accounts or green GDP). However the documents consulted did not systematically enable us to conclude on this point (remaining question marks).

Table 4.1 shows some similarities with European countries (see tables 2.2 and 2.3 in chapter 2). This is especially the case with the very high proportion of countries for which works have been engaged for NAMEA-type air emission and energy accounts. This is also true in the material flow accounts domain as regards the contrast between EW-MFA and PIOT in terms of countries involved, although the investigation conducted in the field of EW-MFA are almost totally undertaken out of national

statistical offices or other relevant public bodies. Like in Europe too, forest is by far the most advanced module in the area of natural resources.

However, one can note some differences. For instance the EPEA module is not as developed as NAMEA-air in terms of countries involved. Also, there is higher number of countries working on forest accounts[38] than on EPEA or MFA, whereas forest accounts are behind these two modules in Europe in terms of countries involved. Finally, in the three emerging economy included here, work on the valuation of environmental damage or environmental assets' degradation, and two of them are interested in calculating a *green GDP* from such valuations.

Generally speaking, such a situation seems to translate the existence of a European influence in the implementation of EA world-wide beyond Eurostat's contribution to the development of the SEEA. This is particularly true for NAMEA and to a lesser extent for MFA. Internventions in international conferences and publications in scientific journals probably played a determining role in this influence. NAMEA and MFA are the two modules of which the results were the most disseminated through that sort of media and, regarding these modules, non-European countries mostly refer to such scientific document.

4.2 REVIEW BY COUNTRY AND AREA

4.2.1 Australia

In Australian, environment accounting is a national objective since the 1992 national strategy for ecology and sustainable development (ESD). The ESD encourages the development of environmental accounting within Australian national accounts. Australian environmental accounts are developed in coherence with the UN integrated environment and economic accounting framework.

EPEATrewin D. (2004), *Environment Expenditure, Local Government, Australia, 2002-03*, Australian Bureau of Statistics, Commonwealth of Australia, Canberra, 2004, 44 p

http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4611.02002-03?OpenDocument

Vernon B. (2000), *Producing National Estimates of Environmental Protection Expenditure – The Application of PAC and SERIEE in Australia*, Australian Bureau of Statistics / Environment & Energy Statistics Section, Paper presented to the subregional Workshop on Environmental Statistics, Bangkok, May 2000, 32 p.

http://www.unescap.org/stat/envstat/stwes-16.pdf

Australian Bureau of Statistics (ABS) began producing environment protection expenditure statistics for Australia in the 1990-91 financial year guided by the OECD's PAC (Pollution and Abatement Control) framework. In 1995-96 the data collection framework was changed from PAC to SERIEE (European system for the collection of economic information on the environment). The paper discusses the scope coverage and methodological issues related to these frameworks as regards the Australian experience, as well as data collection problems and plans Australia had then concerning the development of this collection.

The 2004 publication presents the estimates of the expenditure and revenues related to environment protection (solid waste, wastewater, biodiversity, soils, cultural heritage and other) and natural resources management (land management, water supply and other) by local government authorities of Australia. The data is collected using an adaptation of the SERIEE. This was the fifth time this survey had been conducted in Australia. Revenues from environment related activities amounted to 13% of total revenues of Australian local government. Around 80% of the environment related expenditure of Australian local government was dedicated to services and 20% to investment.NAMEA

[38] - About forest accounts, the information taken into account here comes partially (Australia, Brazil, and China) from the Food and Agriculture Organisation's (FAO) *Manual for environmental and economic accounts for forestry* (Lange, 2004).

Energy and air emissions

Trewin D. (2001), *Energy and Greenhouse Gas Emissions Accounts, Australia, 1992-93 to 1997-98*, Australian Bureau of Statistics, Commonwealth of Australia, Canberra, May 2001, 124 p. + Excel spreadsheet tables.

http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4604.01992-93%20to%201997-98?OpenDocument

Australian Bureau of Statistics (2004), *Energy use by industries, 2001-02*, Excel spreadsheet tables.

http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4648.0.55.0012001-02?OpenDocument

The 2001 publication presents sets of data on energy split into industries plus households, as well as the greenhouse gases (GHG) stemming from the combustion of these energy resources from 1992-93 to 1997-98 (including data from the earlier edition). It also contains experimental estimates of indirect energy use/GHG emissions – i.e. energy/emissions embodied in goods and services produced in Australia. The most recent energy accounts available on the ABS website are distributed across a 34-industry breakdown.

Water

Lenzen M (2004), *Nature, Preparation and Use of Water Accounts in Australia*, Cooperative Research Centre for Catchment Hydrology, Technical Report 04/2, Victoria, March 2004, 44p.

www.catchment.crc.org.au/pdfs/technical200402.pdf

Trewin D. (2006), *Water Account, Australia, 2004-05*, Australian Bureau of Statistics, Commonwealth of Australia, Canberra, 2006, 155 p.

http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4610.02004-05?OpenDocument

Vardon M., Lenzen M., Peevor S. and Creaser M. (2007), "Water accounting in Autralia", *Ecological Economics*, Vol. 61, No 4, Special Issue: *Environmental Accounting: Introducing the System of Integrated Environmental and Economic Accounting 2003*, Marsh 2007, pp. 650-659.

Thomson R., Vardon M. and Comisari P. (2007), "An Experimental Monetary Water Account for Australia, 2003-04", Centre for environment and energy statistics, Australian Bureau of Statistics, *Research Paper*, n° 4610.0.55.004, February 2007, 28 p. (Paper pre sented at the 11th London Group meeting held the 26-30 March 2007 in Pretoria, South Africa.)

http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4610.0.55.0042003-04?OpenDocument

In Australia, water accounts have been development in parallel to other satellite environmental accounts following the UN environmental accounting framework and aiming at integrating them into NAMEA-type tables. Water accounts is of key importance in Australia which is a very dry continent experiencing highly variable rainfall across regions and over time and where agriculture is an important economic activity. Preparation of water accounts is a step towards meeting the requirement of the 2004 Intergovernmental Agreement on National Water Initiative (NWI).

Accounts for 1994-95 and 1996-97 presented in the 2004 report result from a pilot application, some assumptions led to significant uncertainties. The 2006 publication (which is the 3rd edition of the ABS Water accounts) presents 2004-05 data on supply and use of water in the Australian economy in accordance with the SEEA 2003 (Australia plaid a leading role in the development of the draft UN (2007) *Environment and Economic Accounting of Water* handbook – SEEAW). Water accounts are shown for Australia as whole as well as for each of its different regions (New South Wales, Victoria, Queensland, South Australia, Western Australia, Tasmania, Northern Territory and Australian Capital Territory). The data are split up into a 30-industry breakdown (including 10 categories of production under the item agriculture) plus households. The compilation of the Australian water accounts is based on a range of ABS surveys and data from State, territory and local government agencies, water authorities, as well as industry organisations.

In 2004-05, 93% of the water providers belonged to the water supply industry (NACE 41) and supplied 98% of the distributed water in Australia. 80% of the water extracted returned to the environment as regulated discharge almost entirely from the hydro-electricity generation. Agriculture represented 65% of the Australian water consumption. Reuse of water made up less than 5% of total water supply.

Recently, the Australian Bureau of Statistics compiled pilot monetary water accounts in the context of the development of the water accounts by the UN Statistics Division (UN, 2007). This pilot exercise focuses on the supply of distributed water and wastewater collection & treatment services (i.e. excludes self-supply of water and wastewater treatment) and refers to the fiscal year 2003-04. The supply accounts of water related services (sales) were compiled for each State from a great variety of data sources. The accounts of water use related expenditure were compiled at national level and presented according to a 14-industry breakdown plus households. The distribution by State/territory was carried out for households only.

The comparison between physical and monetary accounts shows that households had the highest expenditure (59% of the total) despite they consumed only 23% of total water distributed. On the other hand, agriculture spent less than one-tenth of total water related expenditure whereas it consumed two-third of the distributed water. For the other industries the proportions are therefore 32% and 12% respectively.

Natural resources

Minerals

Australian Bureau of Statistics (2000), *Development of Mineral Accounts in Australia*, Australian Bureau of Statistics / Environment & Energy Statistics Section, Paper presented to the subregional Workshop on Environmental Statistics, Bangkok, May 2000, 13 p.

http://www.unescap.org/stat/envstat/stwes-10.pdf

Australia is one of the world leading producers of mineral: bauxite, diamonds, lead, mineral sand concentrates…The first *Mineral accounts, Australia 1996* was published in 1998 and a second edition was under development for mineral commodities of major economic significance. However, no publication is available on the ABS website.

4.2.2 Brazil

Except for forest accounting (see table 4.1 above), no institutionalised EA programme has been found for Brazil. However, works have been carried out as academic research and an international research project, especially relating to MFA and NAMEA when they refer to European works.

MFA

Machado J. A. da Costa, Fenzl N (1999), *A sustentabilidade do desenvolvimento e a demanda material da economia: o caso do Brasil comparado ao de paises industrializados*. Paper do NAEA, no. 155. Belém. Universidade Federal do Pará. Núcleo de Altos Estudos Amazônicos, 52 p.

http://www.gpa21.org/br/publicacao.php?CodPublicacao=22

Machado J.A. da Costa, Fenzl N. Mathis A. (2004), "The Sustainability of Complex Economic Systems. An Application of National Material Flow Analysis (MFA) to the Brazilian Economy", in *TripleC Cognition – communication – Co-operation*, Vienna University of Technology, Vienna, Vol. 2, No. 1, pp.1-5.

http://triplec.uti.at/files/tripleC2(1)_MachadoFenzlMathis.pdf

The investigation for the compilation of MFA for Brazil started as an academic research as part of a PhD thesis prepared at Institute of Advanced Amazonian Studies (NAEA) of the Federal University of Pará (UFPA) in Belem[39] and was continued as part an international research project (Amazonia21)[40] financially supported by the EU.

This first MFA compiled for Brazil covers the period 1975-1995 and led to the calculation of the standard input side economy-wide MFA indicators: direct material input (DMI), direct material consumption (DMC), and total material requirement (TMR). They were subsequently revised within the work undertaken for the Amazonia21 project using Eurostat methodological guide in order to be adapted to standard international conventions[41].

One of the main results of this exercise is that Brazil has been following the same (unsustainable) patterns as industrialised countries regarding material flows between 1975 and 1995.

NAMEA

Young C.E.F., Andrade Periera A., Rodriges Hartje B.C. (2000), *Sistema de contas Ambientais para o Brazil: estimativas preliminares*, Texto para discussão, IE/UFRJ n° 448, setembro 20 00, 60 p.

http://www.ie.ufrj.br/gema/pdfs/td448.pdf

Environmental accounting was also developed as part of academic activities at the Economic institute of the Federal university of Rio de Janeiro. The general objective is to estimate economic losses due to natural resources (subsoil and forest assets) depletion and depreciation, as well as their impact on the Brazilian economy. Concerning industrial pollution, the data are presented in sort of NAMEA-type accounts, referring to the original proposal by Statistics Netherlands (Keuning et al., 1999).

Physical accounts tables were compiled for the years 1985 and 1990-1996 covering air emissions (CO, CO_2, NO_2, particulates matter, SO_2, VOC) and emissions to water (DBO and suspended solids). However, these tables covered then only manufacturing industries plus electricity and hot water supply industry, i.e. excluding agriculture, forestry, fishing, mining & quarrying, trade, and services activities, as well as households.

4.2.3 Canada

Statistics Canada (2006), *Concepts, Sources and Methods of the Canadian System of Environmental and Resource Accounts*, Statistics Canada, Ministry of Industry, Ottawa, April 2006, 157 p. (Catalogue n° 16-505-GIE) [42].

http://www.statcan.ca/english/nea-cen/pub/env.htm

The Canadian system of Environmental and Resources Accounts (CSERA) has been developed in response to the demand of the Government of Canada under the auspice of the 1990 Canada's Green Plan. The CSERA has been build up as a set of satellite accounts to the Canadian system of national accounts (CSNA). The 2006 publication quoted above presents the state of the CSERA's development as of the autumn 1997 (this document was planned to be updated regularly).

[39] - Machado J. A. da Costa (1998), *A sustentabilidade do desenvolvimento e a expres-são energético material dos processos econômicos*. Belém. Universidade Federal do Pará. Núcleo de Altos Estudos Amazônicos. (Projeto de Tese de Doutoramento). Machado J. A. da Costa (1999), *A sustentabilidade do desenvolvimento e a demanda material do sistema econômico*. Belém. Universidade Federal do Pará. Núcleo de Altos Estudos Amazônicos. (Tese de Doutoramento).

[40] - http//www.amazonia21.org

[41] - Amann C., Bruckner W., Fischer-Kowalski M., Grünbühel C. (2002), *Material Flow Accounting in Amazonia – A Tool for Sustainable Development*, IFF Social Ecology Working Paper n° 63, Vienna, A pril 2002, 28 p.

[42] - Initially published in 1997 as *Econnections, Linking the Environment and the Economy – Concepts, Sources and Methods of the Canadian System of Environmental and Resource Accounts*, Statistics Canada / National accounts and Environment division, Ministry of Industry, Ottawa, December 1997.

The CSERA covers natural resources stocks accounts (NRSA, i.e. subsoil assets, timber and land), material and energy flow accounts (MEFA), and environment protection expenditure accounts (EPEA).

EEA

EPEA

Statistics Canada, *Environmental Protection Expenditures in the Business Sector 2002*, Ministry of industry, Ottawa, December 2002, 63 p. (Catalogue n° 16F0006XIE.)

http://www.statcan.ca/bsolc/english/bsolc?catno=16F0006X&CHROPG=1

Statistics Canada / Environment Accounts and Statistics Division, *Survey of Environmental Protection Expenditure 2004*, Questionnaire plus Guide to Definitions and Classification details, 16 p.

http://www.statcan.ca/english/sdds/00391ti.htm

The Canadian EPEA cover operating and capital expenditures made by primary and manufacturing industries in response to, or in anticipation of, Canadian or international regulation environmental regulations and conventions. Therefore they differ from Eurostat EPEA that cover all activities and actions of which environmental protection is the primary purpose.

The results are from the biennial Survey of Environmental Protection Expenditures (this survey also reports the use of environmental management processes and technologies including those used to reduce greenhouse gas emissions by Canadian businesses). They provide a measure of the cost to the industry of adopting pollution prevention and abatement technologies and other environmental protection practices.

Environmental industry

Statistics Canada (2007), *Environment Industry: Business sector 2002 (revised) and 2004*, Published by the Minister of Industry, September 2007, 57 p.

http://www.statcan.ca/bsolc/english/bsolc?catno=16F0008X

Statistics Canada' Environment industry survey refers to the OECD/Eurostat definition. The data collected cover environmental protection activities as defined in the CEPA (air protection, waste and wastewater management etc.), plus renewable energy & energy conservation. One can note that the Canadian environment industry accounts include goods and services dedicated to the reduction of greenhouse gases.

In Canada, the establishments undertaking environmental activities are found in a wide range of industries. The revenues from sales of environmental goods (including environment-related construction) and services are therefore presented according a 30-industry breakdown.

With this survey, Statistics Canada aims at collecting data on the revenues of environmental goods and services. These data are aggregated with information from other sources to produce official estimates of national and provincial economic activity of the environment industry. The abovementioned publication is prepared every second year.

NAMEA-type accounts

The MEFA developed since the early 1980ies as a set of hybrid accounts combining national accounts input output tables and material and energy flow accounts represents the second major component of the Canadian SERA. Statistics Canada explicitly compares its MEFA to the European NAMEA[43]. Physical flow accounts of the Canadian MEFA cover energy consumption, air emissions, water and solid waste.

[43] - Statistics Canada (2006), *Concepts, Sources and Methods*…, Op. cit., pp. 70-71.

Energy and air emissions

Harchaoui T, Kabrelyan D. and Smith R. (2002), "Accounting for Greenhouse Gas in Standard Productivity Framework", *Research Paper*, Statistics Canada / Micro-Economic Analysis Division, Ottawa, November 2002, 23 p.

http://www.statcan.ca/bsolc/english/bsolc?catno=11F0027M2002007

Harchaoui T (2003), "Greenhouse Gas Emissions in the Canadian Economy, 1980-2000", *Analytical Paper*, Statistics Canada / Micro-Economic Analysis Division, Ottawa, May 2003, 9 p.

http://www.statcan.ca/bsolc/english/bsolc?catno=11-624-M2003001

The Canadian set MEFA contains time series (starting in 1981) of annual energy consumption accounts (11 energy carriers, excluding biomass) by industries (161 at the most detailed level) plus government and households. The Canadian MEFA framework also includes air emission accounts: CO_2 (excluding emissions from biomass combustion), CH_4, N_2O and halocarbon compounds.

The 2002 paper that extends the Canadian productivity analysis framework to pollution that is considered as a by-product of economic activities, also presents the results of what is identified in Europe as a structural decomposition analysis of greenhouse gases emission changes. The authors analyse the extent to which the greenhouse gases (GHG) emission intensity of energy consumption (GHG emissions/unit of energy) and the energy intensity of output (energy consumption/unit of output), further decomposed into 2 elements: the energy intensity of all inputs and the intensity of inputs per unit of output, contribute to the evolution of the CO_2 emission intensity of output (GHG emissions/unit of output). Over the period 1981-1996, the GHG emission intensity of the Canadian output declined by 0.9% annually on average, thanks both to the slight decrease (-0.8% annually) of the GHG emission intensity of the energy consumption (change in the energy mix) and the decrease of the output energy intensity (-1.7% annually).

The Canadian annual greenhouse gases emission accounts seem to be produced with a 3-year delay; the 2003 paper presents the evolution of the Canadian greenhouse gases over the period 1981-2000 for at 17-economic sectors level (including government) plus households.

Water

Dachraoui K. and Harchaoui T (2004), "Water Use, Shadow Prices and Canadian Business Sector Productivity Performance", *Research Paper*, Statistics Canada / Micro-Economic Analysis Division, Ottawa, May 2003, 28 p.

http://www.statcan.ca/bsolc/english/bsolc?catno=11F0027MIE2004026

The Canadian MEFA framework includes water accounts (intake, use and discharge) that covered in 2004 the years 1981, 1986, 1991 and 1996. For the above-indicated study, the Canadian water accounts were downloaded in a model of Environment-KLEMS type (KLEMS stands for capital, labour, energy, material, and services) in order to test the impact of using free water input on productivity performance.

The results are presented for 36 industries, i.e. excluding services other than transport of the Canadian classification. However, 7 industries (utility, agriculture, paper, primary metal, chemical, mining, and refined petroleum) accounted around 95% on average of the overall water self-supplied. Free water intake increases the multifactor productivity of the largest water-using industries, leaving the aggregate business sector unchanged. Water re-circulating brings the shadow price of (free) water down, leading the difference to be seen as an indication of the willingness to pay for water recycling.

4.2.4 China

From 1998 to 2002, the Chinese National Bureau of Statistics (NBS) carried out a cooperation project with Statistics Norway on environment statistics (Alfsen et al., 2006) and started in 2004 a cooperation period with Statistics Canada on environmental statistics and accounting. The NBS has cooperated

domestically with the Chinese State Environmental Protection Administration (SEPA) from 2004 to 2006 for the development of environmental pollution accounting (wastewater and regulation cost accounting) and takes part in a project on China's forest resource accounting (physical accounting of woodland and timber, biological accounting and green GDP adjusted by forest resources), involving the State Forest Administration, China Academy of Forest, Beijing Forest University and Renmin University of China. Following UNSD suggestion, China has recently launched a research project on water accounting (resources, wastewater discharge and protection expenditure).

In the 2002, Chinese system of national accounts, physical accounts on natural resources (land, forest, mineral and water) were defined as satellite accounts. China translated diverse methodological materials, including the SEEA 2003 and the Eurostat 2002 handbook for forest accounting (IEEAF).

The NBS and the SEPA also investigated the area of the environmentally adjusted economic aggregates (Green GDP). In September 2006 they jointly published the *China Green National Accounting Study Report 2004* based on pilot projects carried out by a dozen of provinces or large cities. The preliminary results show that economic loss caused by environmental pollution (mostly water, air and waste) would have reached around 3% of the Chinese GDP in 2004; the report also estimates that China would have to spend as much as the equivalent of 1.8% of its GDP for the treatment of this pollution. However, the exact methodological details on the estimates have not been released yet[44].

MFA

Xu M. and Zhang T. (2007), "Material Flow and Economic Growth in Developing China", *Journal of Industrial Ecology*, Vol. 11, n°1, January 2007, pp. 121-140.

Recognizing the growing importance of the environmental impact resulting from rapid growth of China's economy since the early 1990s, the Chinese authorities launched a programme aiming at stimulating a *Circular Economy* (CE), an approach that resonates with the concept of *industrial metabolism*. In the research of the China's National Development and Reform Commission (NDRC) – to which the primary responsibility of the CE implementation was recently transferred from the SEPA – for relevant indicators, environmental accounting and particularly MFA presents great opportunities[45].

MFA does not take part as such of the recent official Chinese environmental accounting development. However, following preliminary research started in the early 2000s, a first economy-wide MFA of China has recently been carried out under the aegis of the Department of Environmental Science and Engineering (DESE) at Tsinghua University (China). This study refers to the methodology developed in Europe, including Eurostat's methodological guide. Its results cover the period 1990-2002 and deals both with the input and output sides (DMI, DMC, TMR, DPO and PTB). The main data sources are the China statistical Yearbooks (Steel industry, Non-ferrous metal industry, Energy and Environment), supplemented by data from the FAO.

The results show that the material consumption of China's economy has sharply risen over the period, despite a slump around 1998 (revision of the NBS industrial statistical framework), whereas the material intensity is divided into 3 period that nearly match the 8th, 9th, and 10th five-year plans (rapid growth, efforts to shift from extensive to intensive economic growth and domestic market-based development).

[44] - Zheng Y. and Chen M. (2006), "China promotes green GDP for more balanced development", The University of Nottingham – China Policy Institute, *Briefing Series - Issue 16*, December 2006, 14 p.
[45] - Pintér L. (2006), *International Experience in Establishing Indicators for Circular Economy and Considerations for China*, Report to the World Bank – East Asia Pacific Region –Environmental and Social Development Sector Unit, May 2006, 27 p.

NAMEA

Wang Y. (2005), *Compilation of Energy Accounts of China*, National Bureau of Statistics (NBS) – Department of National Accounts, Paper presented at the 15th International Conference on Input-Output Techniques, Renmin University of China, Beijing, June 27 to July 1, 2005, 8 p.

http://www.iioa.org/Conference/15th-downable%20paper.htm

As a result of the Sino-Norwegian cooperation, the Chinese NBS compiled energy accounts for the years 1987, 1995 and 1997. The Chinese set of energy accounts is composed of supply and use tables (expressed in physical terms) broken down by 33 sectors (including 23 manufacturing industries) plus 2 household categories (rural and urban) and covers 25 energy carriers (market and non market energy). In the late 2006, the NBS planned to update the Chinese energy accounts from the latest input output tables of 2002.

The Chinese energy accounts are based on data from divers NBS Departments: the energy balance prepared by the Department of industry and transport, the input output tables of the National Accounts and the Statistics Yearbook in China.

Based on these energy accounts, the Energy Emission subgroup of the Energy Accounting group compiled air emissions accounts for 8 pollutants.

4.2.5 India

In India the central statistical organisation (CSO) is currently developing a methodology aiming at systematically incorporating natural resources (land, water, air, and sub-soil assets) into national accounts. However, the CSO approach led so far to develop environmental accounts for some States and some economic sectors. Furthermore, CSO studies are still in progress (cf. Gundimeda, et al., 2007 below).

On the other hand, the NGO Green Indian States Trust (GIST) launched the *Green Accounting for Indian States & Union Territories project* (GAISP)[46] aiming to set up top-down environmental accounting models in order to estimate environmentally-adjusted national/State income (gross/net domestic product) both at national and State or Union Territory level (phase 1). The GAISP includes three sets of accounting and valuation:

- forest (timber, fuel-wood, non-timber forest products and carbon storage),
- bio-diversity (bio-prospecting, eco-tourism, and non-use value of keynote species),
- ecological services (augmenting water resources, mitigating soil erosion and flood damage).

A second phase of this project, it is planned to develop and implement State-specific methodologies in order to capture education and health investment, pollution cost, and loss of natural resources. Data collection and analysis would therefore happen at District-level. The ultimate objective of he GAISP is to adjust national accounts in order to estimate *genuine savings* as defined by the World Bank, i.e. including education expenditure as an investment (Blot et al. 2002).

Natural resources

Forest

Gundimeda H., Sanyal S., Sinha R. and Sukhdev P. (2005), *The Value of Timber, Carbon, Fuelwood, and Non-Timber Forest Products in India's Forests*, Green Accounting for Indian States Project (GAISP) – Monograph 1, project sponsored by the Green Indian Sates Trust (GIST), the Deutsche Bank, and the Energy Resources Institute, TERIS Press, New Delhi, 2005, 40 p.

[46] - http://www.gistindia.org

http://www.gistindia.org/publications.asp

Gundimeda H., Sukhdev P., Sinha R.K. and Sanyal S. (2007), "Natural resource accounting for Indian States – Illustrating the case of Forest resources", *Ecological Economics*, Special Issue: *Environmental Accounting: Introducing the System of Integrated Environmental and Economic Accounting 2003*, Vol. 61, No 4, March 2007, pp. 635-649.

In India, forest covers one-fifth of the territory and provides multiple benefits that are not translated into the national accounts. Forest products contribute only to 1.5% of the official GDP. Therefore, the objective of the GAISP is to incorporate forest resources into national/State accounts of India and Indian States and Union Territories following the SEEA recommendations. In this context, the set forest accounting framework for India is composed of physical and monetary accounts as well as a module for the calculation of *Environment adjusted State domestic product* (ESDP). To date, these accounts have been compiled for 2001-2003.

The physical forest accounts used within the GAISP are similar to those developed at Eurostat. However, as far as monetary valuation is concerned, GAISP and Eurostat approaches diverge. The GAISP adjust both unreported production (ESA/SNA consistent) and accumulation/depletion of forest (out of ESA/SNA) in order to adjust State domestic products, whereas the Eurostat decided to stick to the ESA/SNA principles and to not retain any alternative valuation methods such as "adjustments to gross/net domestic products, considering that they remain too controversial (Eurostat, 1999c).

In the GIASP physical accounts for forest cover the following product: timber, fuels-wood, and non-timber forest products (bamboo, sandalwood, honey, fodder, resin etc.), as well as carbon sink. The general structure of the accounts has the following format:

- Opening stocks
  - Changes due to economic activities
  - Other changes
- Closing stocks

In the monetary accounts, values for timber, fuel-wood have been derived using the *net price* method (quantities in the physical accounts multiplied by net prices or stumpage values). The calculation of the carbon sinks value was made so far from an estimate ($20/tC) based on a marginal social damage approach described in one of the authors' previous study. Non-timber forest products were valued using discounted values from the Indian statistical office for the corresponding products. For each case, the value of accumulation/depletion result therefore from the difference between the value of the opening stock and the value of the closing stocks.

The *environment adjusted national/State domestic product* calculated equals national/State domestic product plus accumulation of natural forests (non-produced assets) minus depletion of natural forests.

Land

Gundimeda H., Sanyal S., Sinha R. and Sukhdev P. (2005), *Estimating the Value of Agricultural Cropland and Pastureland in India*, Green Accounting for Indian States Project (GAISP) – Monograph 2, project sponsored by the Centurion Bank of Punjab, Green Indian Sates Trust (GIST) and the Deutsche Bank, TRIS Press / Energy Resources Institute, New Delhi, 2005, 52 p.

http://www.gistindia.org/publications.asp

In India, agriculture is the means of livelihood for almost two-third of the work force. Agricultural land covers more than half of the territory and agriculture contributed to one-fifth of the GDP in the early 2000s. However, since land is a non-produced economic asset, its degradation is not taken into account. Therefore, like with forest accounting above, the main objective of the GAISP is to develop an accounting framework that reflects the real economic contribution of agricultural land and pastureland, estimating the value of the stocks and flows of agricultural land and pastureland, incorporating into national accounts the loss caused by the depletion of these lands (soil erosion,

sedimentation of waterways and degraded lands), and estimating the impact of the sector on the degradation of the environment and thereby its effect on the economy.

The work was also organised in three steps: firstly the establishment of physical accounts, secondly the valuation of these accounts (land resource accumulation/depletion), and thirdly the calculation of the sectors' contribution to the economy.

The GAISP land accounts for India are similar to the land accounting framework in the SEEA: opening stock of land (surface) at the beginning of the accounting period and closing stock at the end. The value of agricultural land and pastureland related non-market assets/flows were calculated using different approaches (net present value of future benefits for change in assets accounts, replacement cost for erosion, maintenance cost for sedimentation and degraded land).

Based on these monetary land accounts, the GAISP ultimate objective was to adjust national accounts for the degradation of the environment due to land use for agriculture and grazing. Therefore, as for forest, the land accounting developed within the GAISP diverged from Eurostat approach, of which the land use and cover accounts are not intended to adjust national accounts aggregates.

4.2.6 Japan

In Japan, research on environment accounting and indicators started in the early 1990s based the cooperation of several government research institutes and researchers in universities and funded by the Ministry of the environment. In the earlier phase, the project focused on the environmentally-adjusted aggregates and first estimates were published in the later 1990s[47]. Later, the attention shifted to other component of the SEEA: environment protection expenditure and physical accounting, the National Institute for Environmental Studies (NIES) focusing on MFA and the Economic and Social Research Institute (ESRI) on NAMEA.

EPEA

ESRI (2000), *Secondary Trial Estimation of the Environmental Protection Expenditure Account and the Trial Estimation of the Waste Account in Japan*, Department of National Accounts of the Economic and Social Research Institute (ESRI), Economic Planning Agency, Japan, June 2000,

http://www5.cao.go.jp/2000/g/0620g-kankyou/0620g-kankyou-e.html

ESRI (2004), *New system of Integrated Environment and Economic Accounting (Trial Calculation on Hybrid Accounting System integrating Environmental Pressures and Economic Activities)*, Economic and Social Research Institute (ESRI), Department of National Accounts, October 12, 2004, 26 p.

http://www.esri.cao.go.jp/en/sna/sateraito/041012/kankyou.html

In parallel to the Japanese NAMEA (see below), the Economic and Social Research Institute (ESRI) developed environmental protection expenditure accounts (EPEA) in accordance with the SEEA 2003. So far, the ESRI compiled preliminary EPEA for the reference years 1990, 1995 and 2000.

The Japanese EPEA is composed of a supply and use table for the following environmental protection services: waste management, wastewater management, and pollution reduction (control and pollution prevention at corporate level). Economic actors include public and private producers (wastewater management is assumed to be totally undertaken by government producers). Concerning private enterprises, the Japanese EPEA cover primary, secondary and ancillary activities.

[47] - Oda K., Arahara K., Hirai N. and Kubo H., "Japan: The System of Integrated environmental and Economic Accounting (SEEA) – Trial estimates and remaining issues" in Uno K. and Bartelmus P. (ed.) (1998), *Environmental Accounting in theory and Practice*, Kluwer Academic Publishers, pp. 35-61.

MFA

Ariyoshi N. and Yuichi Moriguchi Y. (2003), *The Development of Environmental Accounting Frameworks and Indicators for Measuring Sustainability in Japan*, OECD Meeting on Accounting Frameworks to Measure Sustainable Development, Organisation for Economic Cooperation and Development, Paris, 14-16 May 2003, 19 p.

http://www.oecd.org/dataoecd/19/51/2715344.doc

Moriguchi Y. (2006), *Policy-relevant use of Material Flow Analysis – Experience and ongoing activities in Japan and beyond*, National Institute for Environmental Studies (NIES), Research Centre for Material Cycles and Waste Management, Presentation made at the meeting of the OECD Woking Group on Environmental Information and Outlooks, 6-7 December 2006 at Bruges (Belgium).

In the late 1990s,the (Japanese) National Institute for Environment Studies (NIES) contributed to the World Resources Institute's joint international publications on economy-wide material flow accounting (Adriaanse et al. 1997; Matthews et al., 2000). In these books, Japan presented time series of annual MFA covering the years 1975 to 1994 (input) / 1996 (output). The presentation made in 2006 at the OECD meeting, shows that the series had been extended then to 2002. Now, the compilation of MFA comes within the scope of the Japanese 3R strategy (reduce, reuse and recycle) towards a Sound Material-Cycle Society (SMS).

NAMEA

ESRI (2004), *New system of Integrated Environment and Economic Accounting (Trial Calculation on Hybrid Accounting System integrating Environmental Pressures and Economic Activities)*, Economic and Social Research Institute (ESRI), Department of National Accounts, October 12, 2004, 26 p.

http://www.esri.cao.go.jp/en/sna/sateraito/041012/text.pdf

Ariyoshi N. (2006), *The development of Japanese NAMEA*, Paper prepared for the International Workshop for Interactive Analysis on Economy and Environment, Cabinet Office, the Government of Japan, 4th Mach 2006, 20 p.

http://www.esri.go.jp/jp/archive/hou/hou020/hou20-2a-1.pdf

Ariyoshi N. (2006), *The Development of Japanese System for Integrated Environmental and Economic Accounting: Japanese SEEA and Japanese NAMEA*, Paper prepared for the 2006 Intermediated Input-Output Conference, July 26-28 2006, Sandai (Japon), 19 p.

http://www.iioa.at/Conference/intermediate2006-downable%20paper.htm

The Japanese NAMEA – or HASEPEA (hybrid accounting system integrating environmental pressures and economic activities) – has been designed following the Dutch proposal, introducing only a few adjustments (government consumption, stock accounts, natural resources accounts) that do not change the general structure. Until 2006, the ESRI had been compiled NAMEA for 1990, 1995 and 2000[48] (ESRI also developed in parallel a supply and use table for environmental protection services). The physical flow accounts for the Japanese NAMEA should cover air emissions, wastewater, solid waste, natural resources, land use as well as hidden flows (unused material resulting from economic activities, e.g. excavation of soil for construction works).

Data on air emissions (greenhouse effect and acidification) presented in the 2004 document are distributed across a breakdown of around 25 industries plus households. In this context, the ESRI proposed to examine the connection between environmental pressures (EP, e.g. CO_2 emissions) and

[48] - A NAMEA based on 1994 data is presented in Ike T. (1999), "A Japanese NAMEA", *Structural Change and Economic Dynamics*, vol. 10, n°1, March 1999, pp. 123-149.

their corresponding driving forces (DF, e.g. economic production) through an environmental efficiency improvement index (EEII): 1 - (EP/DF)/(DF/EP)*100 (when EEII>0 or = 0, the environmental efficiency is improving and when EEII<0, it is deteriorating).

A pilot study of Regional NAMEA was launched in 2005.

4.2.7 New Zealand

Statistics New Zealand started developing environmental and resource accounts in the early 2001. Since then, it has already released many pilot applications that cover a wide range of EA areas: EPE, PIOT, energy and air emission NAMEA-type accounts, and natural resource accounts including forest, fishing and subsoil assets.

EPEA

Statistics New Zealand (2002), *Environment Protection Expenditure Accounts for the public sector – Year ended June 2001*, Prepared by the Regional and Environmental Statistics Division and published by the Publishing and Library services Division of Statistics New Zealand, Environmental Accounts Series, July 2002, 25 p.

Statistics New Zealand (2005), *Environment Protection Expenditure Accounts for the public sector – Years ended June 2001 to June 2003*, Prepared by the Environment Statistics team and published by the Publishing services Division of Statistics New Zealand, Environmental Accounts Series, July 2005, 25 p.

http://www.stats.govt.nz/environment/environmental-accounts/environmental-protection-expenditure.htm

Statistics New Zealand released a first experimental set of environmental economic accounts (EEA) for 2000/01. The 2005 publication revised the original estimates for 2000/01 and expanded the dataset with estimates for the fiscal years ended in June 2003 and 2003 respectively.

EEA have been produced both for environmental protection (EP) activities (waste and wastewater management, pollution abatement etc.) and natural resource management (inland water, land and other resources management). As concerns EP, Statistics New Zealand refers to the CEPA recommended in SERIEE. However, it has focused so far on public sector (central and local government) and did not use the SERIEE set of tables.

MFA (physical input-output table)

McDonald G., Patterson M. (2006), *Development of a New Zealand Physical Input-Output table*, Paper presented at the Intermediate Conference on Input-Output Techniques, July 2006, Sandai (Japon), 32 p.

http://www.iioa.org/Conference/intermediate2006-downable%20paper.htm

In New Zealand, a PIOT of the agro-food sectors of the New Zealand economy was constructed by on of the authors in the 1980s, and the PIOT presented in this paper resulted as part of an academic research carried out by the other author[49]. This paper describes the development of the PIOT compiled for the New Zealand economy for 1997/98 according a 48-sector breakdown. Estimates compiled both at national and regional level.

This project benefited from research funding granted by the Foundation of Science, Research and Technology (FRST). The national and regional works falls respectively under the *Ecological Footprint Plus* and the *Sustainable Pathways* Programmes in which representatives from several governmental

[49] - McDonald, G.W. (2005). *Integrating Economics and Ecology: A Systems Approach to Sustainability in the Auckland Regions*. PhD Thesis, Massey University, Palmerston North, New Zealand.

research institutes and private sector companies are involved. Researchers from these organisations have provided physical data, validated the calculations, and expanded the number of commodities included.

The authors state that the PIOT prepared for New Zealand compares favourably with the national PIOTs compiled in Europe. However, they considered that improvement were need regarding the total mass balance at sector level and estimates of commodity flow internal to the economy.

NAMEA

Air emissions and energy

Statistics New Zealand (2006), *Energy, Economy and Emissions 1993 to 2005*, Prepared by the Regional and Environmental Statistics Division and published by the Product Development and Publishing business unit of Statistics New Zealand, Environmental Accounts Series, June 2006, 33 p.

http://www.stats.govt.nz/analytical-reports/natural-resource-accounts/energy-natural-resource-accts.htm

Statistics New Zealand (2007), *Energy and the Economy: 1997 to 2005*, Prepared by the Geography, Regional and Environment business unit and published by the Product Development Publishing business unit of Statistics New Zealand, Environmental Accounts Series, June 2007, 24 p

http://www.stats.govt.nz/analytical-reports/energy-economy-1997-2005.htm

The 2006 report covered both the demand of energy products (8 types of fuel plus electricity) and air emissions resulting from their use by New Zealand's households and intermediate consumers (government and businesses). The energy demand includes non-energy use of energy products, international transport (business units resident to New Zealand) and refinery intermediates and residues. Primary energy products (coal and gas) used for electricity transformation and direct use of wood and geothermal were excluded in order to avoid double counting with electricity. Air emissions accounts include greenhouse gases and ozone precursors (CO_2, CH_4, N_2O, CO, NMVOCs, and NO_x). Both energy and air emission accounts were presented according to a 25-industry breakdown based on the New Zealand national accounts industry classification, plus a category for households.

The 2007 publication is an update of the abovementioned report *Energy, Economy, and Emissions 1997 to 2003* regarding energy demand. No emission data are presented in this second publication, since, new calculation methods were underdevelopment and planned to be implemented for the next publication.

Natural resources

Forest

Statistics New Zealand (2002), *Physical Flow Accounts for Forestry Resources in New Zealand 1995-2000*, Prepared by the Regional and Environmental Statistics Division and published by the Publishing and Library Services Division of Statistics New Zealand, Environmental Accounts Series, October 2002, 67 p

http://www.stats.govt.nz/NR/rdonlyres/0AC772B3-29CB-47C4-BFE0-48E95EDEC721/0/ForestryMonetaryFlowAcc.pdf

Statistics New Zealand (2003), *Monetary Flow Accounts for Forestry Resources in New Zealand 1995-2000*, Prepared by the Regional and Environmental Statistics Division and published by the Information and Publishing services of Statistics New Zealand, Environmental Accounts Series, April 2003, 57 p.

http://www.stats.govt.nz/NR/rdonlyres/0AC772B3-29CB-47C4-BFE0-48E95EDEC721/0/ForestryMonetaryFlowAcc.pdf

Statistics New Zealand (2004), *Forestry Monetary Stock Accounts 1995-2000*, Prepared by the Environment Statistics team and published by the Information and Publishing services Division of Statistics New Zealand, Environmental Accounts Series, November 2004, 23 p

http://www.stats.govt.nz/NR/rdonlyres/A8D2366C-D233-4428-952B-1B31A4B1BC0F/0/ForestryMonetaryStocks.pdf

Statistics New Zealand published a series of reports on forest accounting, dealing respectively with physical stock and flows of wood in New Zealand and their monetary value

The 2002 report provided physical information on the flow of forestry products in New Zealand from 1995 to 2000. This work is linked to the forestry physical stock account, which was published earlier this year by Statistics New Zealand. The main tables in the report were presented in physical unit (cubic metres of roundwood equivalent). The flow account also estimates the further processing and consumption flows of harvested wood. The New Zealand's physical forest accounts did not included then carbon balance for woody biomass.

The 2003 report introduces monetary information for the first time to complement the physical information previously provided in the abovementioned *Physical Flow Account for Forestry Resources in New Zealand*. This report provides monetary and physical information on the flow of forestry products in New Zealand from 1996 to 1999. Only physical data were available then for the year 2007.

The 2004 report presents a pilot monetary stock account of New Zealand's forestry resources. The account was restricted then to standing timber available for wood supply from exotic forests. The structure of this account included opening and closing stocks, and stock change valuations. The data covered then the years 1995–2000. Standing timber has been valued using the net present value approach adapted to compensate the lack of concordance between stumpage price and physical data sets.

Subsoil

Statistics New Zealand (2004), *Mineral Monetary and Physical stock account 1994-2000*, Prepared by the Environment Statistics team and published by the Information and Publishing services Division of Statistics New Zealand, Environmental Accounts Series, September 2004, 20 p.

http://www.stats.govt.nz/environment/environmental-accounts/interpretation-of-the-mineral-stock-account.htm

This report provides information on the asset value, and physical quantity, of minerals stocks in New Zealand (coal and mineral petroleum stocks are excluded as they are evaluated in the *Monetary Energy Stock Account;* Statistics New Zealand planned to combined energy and minerals estimates into a single report). Mineral stock and flow accounts are based on the SEEA.

The methodologies used to assess minerals stock levels are consistent with those used to assess energy resources and other natural resource monetary stock estimates. Environmental information is collected under a framework that allows for adjustments to conventional calculations of GDP to reflect environmental depletion.

4.2.8 United States of America

In the USA, the Bureau of Economic Analysis (BEA) started developing integrated environmental and economic satellite accounts (IEESA) in 1992. In 1994, the Congress asked the BEA to stop its investigations in this area and a panel of experts was setup under the aegis of the National Research Council's Committee on National statistics in order to examine the objectivity, methodology, and application of IEESA. The panel concluded that the development of environmental and natural resource accounts was an essential investment for the USA, but it must not come at the expense of

national accounts programme[50]. However, since the Congress restriction has been lifted in 2002, no funding has been dedicated to the resumption of the BEA's work on environmental accounting.

In October 2007, the Government Accountability Office and the National Academy of Science[51] convened a forum dedicated to the future development of environmental accounts in the United States. The participants that included US federal agency officials and national and international statistical, energy, environment, and natural resources experts, generally agreed on the strategy to be followed: understand the other countries' experiences, develop economic case (economic impact resulting from environmental changes), focus on accountability and performance (assessing the performance of environmental programmes), identify relevant supporters (policy makers, technical experts etc.), identify and solicit the help of environmental experts, use an incremental approach, and take the time necessary to develop accounts of good quality. The participants to the GOA/NSA forum also agreed that the first priority should be given to pollution and material flow accounts (including broken down by industry) and identified accounts of natural resource assets and environmental expenditure as high priorities.

However, between 2000 and 2007, different initiatives were engaged relating to MFA as well as air emission accounts by industry.

MFA

Committee on Material Flows Accounting of Natural Resources, Products, and Residuals / Committee on Earth and Resources / National research Council (2004), *Material Count – the Case for Material Flow Analysis*, The National Academy Press, Washington D.C., 145 p.

http://www.nap.edu/catalog.php?record_id=10705

This study, jointly funded by the Department of Energy, the National Science Foundation, the Environment Protection Agency and the US Geological Survey, was approved by the Governing Board of the National Research Council. The report was prepared based on deliberations and discussions among the members of the Committee that has been set up for this study and was reviewed by individuals chosen for their expertise and diverse perspective.

The report examines first the MFA state of the art in the early 2000s (existing definitions and structure from difference sources, including Eurostat), the uses and usefulness of such MFA before focusing on the USA's situation (data availability as regard the above mentioned definitions, implementation process and strategy). The United States has not yet established formal MFA and no single federal agency has the responsibility for all MFA data. However, it has a long tradition of tracking mineral and energy flows through a wide range of institutions and parts of the relevant information are available in varieties of sources (the US Geological Survey, the Energy Information Administration of the Department of Energy, the US Forestry Service, the National Agricultural Statistics Service for the US Department of Agriculture, the US Environmental Protection Agencies as well as the Bureau of Economic Analysis of the US Department of Commerce…).

However, the Committee pointed out significant gaps or inadequacies that impede the compilation of a complete set of MFA and recommended that a national-level effort be initiated to institutionalize the MFA press based on a partnership approach. The 3 last chapters of the report are dedicated to this approach and the strategy that should be implemented.

[50] - Nordhaus, Edward, Kokkelenberg (ed.) (1999), Nature's Numbers – *Expending the National Economic Accounts to Include the Environment, National Research Council*, National Academy of Science, Washington D.C., 1999, 250 p.

[51] - GAO/NAS (2007), *Measuring our nation's natural resources and environmental sustainability*, Highlights of a Forum Jointly Convened by the Comptroller General of the United States and the National Academy of Science (NAS), Government Accountability Office (GAO), October 24, 2007, 38 p.

Wernick I.K. and Irwin F.H.. (2005), *Material Flow Accounts: A Tool for Making Environmental Policy*, World Resources institute, Washington DC, 49 p.

http://www.wri.org/business/pubs_dataset.cfm?PubID=3881

The World Resources institute (WRI) project *Materials Flow III: Statistical analysis and indicators research* started in the late 2002 by developing a MFA database for the US in cooperation with several US agencies. This phase of the project formalised WRI's past MFA workand led to refine the methodology. The WRI's objective is to improve MFA data compilation and analysis in a way that it can be implemented by agencies of the U.S. government.

The WRI has developed this MFA database and associated protocols for collecting, analyzing, and presenting material flows data. The database systematically categorizes materials flowing through the U.S. economy, emphasizing transparency in documenting data sources and any assumptions made in estimating the flows. The ultimate goal of the WRI is to see that the periodic compilation and dissemination of U.S. MFA shifts from civil society to become an established function of the federal government.

The database is structured around a list of the primary commodities that drive the U.S. economy, covering five principal resource sectors: agriculture, forestry, non-renewable organic materials (e.g., fossil fuels), metals, and minerals. More than 190 commodities are included. The list of commodity, a glossary and the tables of data are accessible on the website reached thanks to the above hyperlink.

NAMEA

US Environment Protection Agency (2001), *Statistical Methodology for Assigning Emissions to Industries in the United States: 1970 to 1990*, EPA 240-R-01-002, January 2001, 116 p.

US Environment Protection Agency (2001), *Statistical Methodology for Assigning Emissions to Industries in the United States: Revised estimates 1970 to 1997*, EPA 240-R-01-003, January 2001, 127 p.

http://yosemite.epa.gov/ee/epa/eerm.nsf/vwSER/B1EEEF18F81C1B61852569D2007249A0?OpenDocument

The USA's environment protection agency (EPA) developed a methodology to assign air emissions to the 20 two-digit international standard industrial classification (ISIC) codes industries. The resulting USA's air emission accounts covers manufacturing industries, i.e. excluding primary industries (agriculture, forestry, fishing and mining é quarrying), services, as well as households.

The times series presented in 2001 covered almost 3 decades from 1970 to 1997. The EPEA does not refer to the NAMEA framework.

5 General conclusion

The objective of the study was firstly to assess the progress made by EU members as well as Norway and Switzerland in the compilation of environmental accounts (EA) thanks to the pilot applications (co-financed or not by the European Commission) carried out by from 2000 onwards The project also included a review of the implementation of EA in a selection of relevant non European countries. Secondly, in connection to the reactivation of the Task Force on the European strategy for environmental accounting (ESEA), the study aimed at contributing to the reflection on further development of EA in Europe towards 2010.

A series of recommendations for the development of EA in Europe in the short term are therefore listed after the summary of the results by area.

5.1 STATE OF THE ART OF ENVIRONMENTAL ACCOUNTS

In European countries

Some 20 EU countries plus Norway and Switzerland have a programme for EA, of which 6 have a legal basis. However the lack of resources (human and financial) appears as the main barrier encountered by European countries in the development and the compilation of EA. So far, EA in Europe has rather followed a *supply driven* development process, Eurostat's priorities and methodological support being the most determining factors on the countries' decision to develop one module or another, users' need and demand being among the least influential factors.

In terms of years covered, it is estimated that, on average, around 43% of the total EA data produced since 2000, were prepared within studies financially supported by the European Commission. Also, still on average, 46% of the countries that have implemented regular production of EA, whatever the area, have prepared before at least one pilot application financially supported by the European Commission. This proportion is even higher (57%) when there is no limit on the date of the pilot studies taken into consideration.

However, the situation differs a lot across EA areas as well as across the modules within each area. Given the lack of resources declared by most countries, priorities were made, coinciding with the orientations adopted in the course of the period for the European strategy for environmental accounting (ESEA).

- The success of the air emission accounts for **NAMEA** results from a combination of factors: the growing importance of the air pollution issue and particularly climate change, the availability of basic data resulting from international agreements, and also probably the relative simple framework adopted at Eurostat level compared to the initial fully fledged Dutch NAMEA. Energy accounts did not receive the same attention despite their close connection to air emission accounts. The implementation of water accounts for NAMEA was not stimulated as expected by the Water Framework Directive because of a relative lack of basic data or the difficulty to mobilise them.
- Within the **MFA** area, the economy-wide MFA have been attracting an increasing interest for a few years. This recent success is likely to be due to some extent to the relative flexibility of the MFA framework that enables countries to start implementing such accounts using mostly existing official statistics, as well as to its easy-to-use set of standard indicators. On the other hand, the implementation of PIOT remains very limited, probably because it is too resource-consuming.
- Concerning the **economic** environmental accounts, several reasons might explain the relatively limited success in the implementation of EPEA: the comprehensiveness of the framework that needs to mobilise data from a large number of sources, the coexistence of two different systems of EPE (the OECD/Eurostat Joint Questionnaire and the SERIEE), despite

the efforts undertaken for bridging them, and the relative lack of users' demand probably played a non negligible role too. Environmental tax accounts have been progressing without many EU financially supported pilot applications, except for the development of NAMEA-types accounts, whereas environment industry accounts remained behind, i.e. a result that does not match the expectations of this sector in terms of business potential.

- **Natural resources** remained incipient. Most of the methodological work done in the late 1990s for the development of forest accounts has not been translated into a regular implementation EU-wide. Only a limited number of countries are concerned by subsoil asset accounts (oil and gas). Land accounts have not been envisaged yet as a priority in the development of EA in Europe.

In the short term, the European countries' future plans should reinforce the current situation. Once the plans will be implemented, NAMEA-air, EW-MFA and EPEA would remain the most investigated modules that would be implemented then by almost all EU countries plus Norway and Switzerland. The 3 modules (environmental taxes, forest and NAMEA-energy) that were just behind in terms of number of countries involved would also keep a similar position, but would be joined by environmental industry.

So far, the use of EA is not well established all over European countries. Monitoring environmental and/or sustainable performance and research activity are the main two types of uses identified in their country by the national experts. In this context, monitoring performances consists mostly in the calculation of indicators, especially based on MFA and, to a lesser extent, NAMEA data. Research activities are mostly undertaken externally by universities or research institutes; only a few European statistical offices develop their own EA-based research. A limited number of national statistical offices are aware of the use of EA for policy assessment. Some regret the lack of feedback from governmental institutions they provide with EA data and for others EA are yet not elaborated enough to be used for policy assessment.

In a selection of non-European countries

The review of a selection of non-European countries carried out for the present study revealed a European influence in the implementation of EA world-wide beyond Eurostat's contribution to the development of the SEEA. It seems that this influence, which is especially true for NAMEA and MFA, results from the dissemination of outcomes through scientific media (journals, conferences).

5.2 RECOMMENDATIONS

The recommendations formulated here concern successively the compilation of the EA (prioritisation of the modules), the use of these accounts (analysis), and organisational aspects.

Concerning the compilation of the accounts, the first priority should consist in filling the remaining gaps for the most advanced modules (EPEA, EW-MFA and NAMEA-air) as regards both the coverage in terms of countries involved and the methodological compliance.

- EPEA: only 6 EU countries have not worked on this module and 2 of them have already planned to do so in the short term. However, for the countries already involved in this module, further investigations need to be carried out as regards the methodological compliance, since only a dozen countries actually used the EPEA framework.
- Economy-wide MFA: 12 EU countries are not yet engaged in this module, but 8 of them have already planned to start working on it in the short term. Furthermore, since most of the countries already involved have focused on the input side, additional efforts need to be dedicated to the output side.
- Air emissions accounts for NAMEA: only 5 EU countries have never worked on this module and 2 of them have planned to do it in the short term. However, all other countries do not produce air accounts on a regular basis and some methodological gaps remain (residence principle, detail of the industry breakdown…).

Among the other modules, the priority might be given to those that offer the greatest potential in terms of development and improvement of analytical possibilities, as well as to those modules that should benefit from a recent institutional progress or economic development.

- Environment-industry accounts should deserve a greater attention, given the high potential of economic development (one of the sustainable development pillars) that is currently expected for environmental goods and services activities.
- Almost a dozen countries have recently developed environmental taxes by industry, with a focus on energy-related taxes in relation with NAMEA for air emissions. The effort engaged should be promoted and stimulated in order to enlarge both the group of countries involved and the domains covered (pollution, resources and transport taxes). Such environmental tax accounts by industry reinforce the analytical possibilities of EA thanks to a better connection with physical accounts.
- Energy use is a domain in which statistics are usually rather well developed. The countries that have not yet developed NAMEA-type energy accounts should be encouraged to investigate how they can take profit of these statistics. Such accounts might be used to improve NAMEA-air accounts and they improve the possibilities for decomposition analysis of air emissions structural changes.
- Also for analytical purposes, the development of economy-wide material input accounts by industry should be encouraged in order to be exploited in connection with NAMEA-based analysis.
- Following the recent adoption of the *System of Environmental-Economic Accounting for Water* (UN, 2007), the implementation of NAMEA-type water accounts (flows and emissions) should be reactivated.
- In relation to the implementation of the 2002 regulation on waste statistics, countries might be encouraged to investigate the impact on the feasibility of NAMEA-type waste accounts.

Also, the development of EA-based-analysis should be encouraged too in several possible directions, like the connection between different EA modules, the connection between EA and social statistics and the contribution of EA to sustainable impact assessment (SIA) of EU international trade policy. Countries should be invited to report on the use of EA at national level more systematically.

- The integrated approach of EA – especially the connection between monetary and physical data, like for instance energy taxes by industry and NAMEA-air/energy –, needs to be reinforced in order to assess the efficiency of environmental protection policies. Even though the question of what is an *integrated* approach is still a matter of debate, the SEEA 2003, recognised such a connection as one of the possible and promising orientations.
- The connection between social and environmental data in the EA framework appears as a response to the EU preoccupations regarding the links between the social and environmental pillars of sustainable development. Such a connection would enable to investigate the distributional effects related to the environment and in particular the distributional aspects of environmental policies.
- So far, one of the most developed domains of MFA and NAMEA-based analysis deals with some of the international trade related environmental issues. Therefore, EA might be promoted as a relevant tool to contribute to the regular commissioning of the SIA by the EU concerning its agreements with its trading partners.

Finally, Working subgroups or Task Forces composed of countries facing the same difficulties (e.g. new EU members) or sharing common characteristics (e.g. Nordic countries), as well as bilateral collaboration, might be encouraged and developed more than it currently is.

Also, more systematic information on countries' works on EA and dissemination of the resulting reports would be profitable.

Annex 1 Additional references to the reports examined

Adriaanse A., Bringezu S., Hamond A., Moriguchi Y, Rodenburg E., Rogich, Schütz H. (1997), *Resources Flows: The material basis for industrialised economie*s, World Resources Institute (USA), Wuppertal institute (Federal Republic of Germany), Netherlands Ministry of Housing, Spacial Planning and Environment (Netherlands), National Institute for Environmental Studies (Japan), 72 p.

Alfsen K., Hass J., Tao H. and You W. (2006), *International experiences with "green GDP"*, Report jointly prepared by the National Bureau of Statistics of China (NSB), the State Environment protection of China (SEPA) and statistics Norway, and financed by the Royal Norwegian Embassy of Beijing, Statistics Norway, Reports n° 2 006/32, Oslo, October 2006, 43 p.

Ahmad N., Wyckoff A. (2003), *Carbon Dioxide Emissions Embodied in International Trade of Goods*, DSTIDOC(2003)15, OECD, Paris, 65 p.

Bergstedt E., Eriksson M. and Wadeskog A. (1999), *Environmental accounts Households*, Statistics Sweden, January 1999, 52 p.

Blot K., Matete M., Clemens M (2002), *Manual for calculating Adjusted Net Savings*, World Bank, Environment Department, Washington, DC, September 2002, 23 p.

Bruvoll A., Medin H. (2000), *Factoring the Environmental Kuznets Curve, Evidence from Norway*, Discussion Paper n° 275, Statistics Norway (Researc h Department), Oslo, June 2000, 34 p.

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Annex 2 – Summaries of reports on EA prepared by European countries

A 2.1 Economic environmental accounts (EEA)

A 1.1.1 Environmental protection expenditure accounts (EPEA)

Belgium

Current environmental protection expenditure by the Belgian industry (1999), pilot survey, *Environment Office*, Report to Eurostat and DG-Environment (grant agreement n° 200071700002), *Bruno Kestemont – Statistics Belgium*, December 2001, 39 p. (study n°1)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/epe_in_bepdf/_EN_1.0_&a=d

This report does not deal with EPEA but with EPE data collection through the structural business statistics (SBS).

The study aimed at testing the introduction of questions on current environmental expenditure in the SBS questionnaire (3 questions on environmental investment were already included). The objective of the study was threefold: testing the comprehension of questions by the companies, assessing the feasibility to introduce them in the regular questionnaire as well as familiarised companies with the standard definitions of environmental protection activities.

After a short description of the survey, the report deals respectively with the quality of the answers (air soil and noise are more subject to interpretation than waste and water), statistical correlations, the processing of non-responses and default factors, before presenting the results (the major part of the current EPE is dedicated to wastewater and waste management; current EPE is on average higher than investment EPE and there is no systematic link between the two). The questionnaire is provided in annexe 1. Annex 2 contains a paper dealing with the factors affecting quality statistics on environmental expenditure by Belgian companies. The detailed data by industry (NACE 3-digit) and environmental domain are given in annexe 3.

In the conclusion the author stresses that the facultative character of the survey implies important costs for Statistics Belgium and that current expenditure are more difficult to evaluate than investments. For the future it will be necessary to improve the questionnaire (i.e. by some concrete examples added between brackets after the question). Finally to have an estimation of current environmental expenditures for the whole of the companies it is necessary to include a sample of the smaller companies.

Coverage
Companies classified under NACE 1 to NACE 41 employing at least 20 persons or a turnover of at least 200 billion BEF (4.96 billion euro). On a total of 3 373 questionnaires sent, 3 298 (97.8%) were used for this study, but due to the facultative character of the survey, only 7% of the companies answered to all questions. More than 2 500 companies have been contacted by telephone in order to improve the quality and the quantity of the answers and at the end 17% of the respondents answered to all questions.

The questionnaire covered 5 environmental domains as defined the CEPA protection of ambient air and climate, wastewater management, waste management, protection (and remediation) of soil and groundwater, noise and vibration abatement, plus a category other.

Methodology
As indicated above, this study deals with statistics and not (environmental) EPEA compilation.

Environmental protection expenditure accounts for Belgium – 1997, Report to Eurostat (grant agreement 2004 412 00018), François Lannoy, Guy Vandille of the Federeal Panning Bureau, February 2002, 46 p. (study n°6)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/epea_belpdf/_EN_1.0_&a=d

This report was the second step in the process of developing a SERIEE-based EPEA for Belgium (the first report was a feasibility study[52]). The Authors referred to the 1994 version of the Eurosat SERIEE manual and the draft compilation guide that was then under development. The report also informs that Belgium planned to complete its EPEA and produce later a time series, aiming also to combine EPEA and NAMEA data for the assessment of the Belgian environmental policy.

The report is split into 2 chapters. The first chapter briefly reviews the EPEA concepts (referring to the SERIEE methodology) before presenting the Belgian organisation as concerns environmental policy. The second chapter is actually dedicated to the data compilation and the presentation of preliminary results.

In 1997, half of the total EPE services of the Belgian administration was dedicated to waste management and almost a fifth to wastewater treatment. A quarter of the national EPE by the Belgian public administrations is used for capital formation (acquisition of equipment and the building of installations). More than 40% of the national EPE services by the Belgian public administrations are financed by the Regions and more than two third by households.

Coverage (years, domains, sectors and components of expenditure)
This pilot application, base on 1997 data, focuses on the environmental protection activities supplied by public administrations (private enterprises and NPISH are not included).

The Belgian EPE is distributed into 6 environmental domains (air/climate, wastewater, waste, soil, biodiversity, and radiation), that correspond to the CEPA classes 1 to 7, except noise and vibration abatement (CEPA 5) that is grouped together with research & development (CEPA 8) under the item "Other".

Methodology (approach, data collection and sources)
As indicated above, the Belgian EPEA intend to comply with the SERIEE's approach.

Concerning the production of EP services (table B in the SERIEE):

- Total amount of EP related current and capital transactions of the **Federal administration** (national accounts, function "05 Environment", without any further breakdown) is allocated to the CEPA domains on the basis the distribution of the federal budget across environmental protection programmes. The market output is estimated from the proportion of the total market output of the federal government.
- Total EP production for the 3 **Regions** (Brussels-Capital, Flanders and Wallonia) comes from national accounts. Data on EPE by environmental domains for the Flemish Region is estimated from the regional government's response to the OECD/Eurostat joint questionnaire on EPE. The difference is distributed across the environmental domains for Brussels-Capital and Walloon Region using proportions of their respective budget. The market output is estimated from the proportion of the total market output of the State governments.
- Data on the production of EP by the **local authorities** (10 provinces and 589 municipalities) results from the combination of local administrations' accounts split into 5 domains (biodiversity, soil, waste, water and category "other environmental domains") and national accounts (function "05 Environment"). Market output sums up sales of goods, refunding of maintenance woks (waterways) and local taxes considered as sales (waste management).

As far as the connection between output and uses (table B1 in the SERIEE), no imports and exports of EP services and goods by the Belgian public administration were identified; no non-deductible VAT or other taxes and subsidies were identified in relation with EP services provided by Belgian public administrations.

[52] - De Villers, J. (2000), *Vers une application d'un compte de dépense de protection de l'environnement en Belgique : présentation méthodologique et étude de faisabilité*, Bureau fédéral du plan, 144 p.

As concerns the uses of EP activities (table A in the SERIEE), final consumption of EP services by government units is directly extracted from national accounts (function "05 Environment"). Final consumption of EP services by households is estimated by deducting this government's consumption from the total production of EP services (connected and adapted products are not included).

About the financing of EPE (table C in the SERIEE), the final consumption of EP services by domains of the public administration is extracted from national accounts. By convention, the gross fixed capital formation is financed by the producers (here, the public administrations). Households' financing equals their final consumption of EP services (no adapted and connected goods are included).

Environmental Protection Expenditure Accounts for Belgium – 1997-2000, Report to Eurostat (grant agreement n° 2001.412.00103), François Lannoy, Guy Vandille of the Federeal Panning Bureau, November 2002, 196 p. (study n°8)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/epea9700belpdf/_EN_1.0_&a=d

This third EPEA study by the Federal Planning Bureau (FPB) for Belgium is a follow-up report of the previous document of February 2002 (see above). It extends the coverage of the Belgian EPEA as regards the years and institutional sectors taken into account.

The 2 chapters of the previous report (dealing on the one hand with the concepts and the institutional context and on the other hand with the compilation) were extended or amended when necessary and a 3rd chapter dedicated to the analysis was added. It shows in which way the data from the EPEA can be used in conjunction with other data sets. The detailed tables of data are provided in annex.

The report is split into 2 chapters. The first chapter briefly reviews the EPEA concept before presenting the Belgian organisation as concerns environmental policy. The second chapter is dedicated to the data compilation and the presentation of preliminary results.

Over the period under review, around 2/3 of the Belgian EP output has been resulting from waste management and 16 to 17% from wastewater management. Half of the national EPE was financed by corporations and around 1/3 by public administrations. The Belgian national EPE represents between 1.6% to a little more than 1.7% of the Belgian GDP; the EPE by households around 0.5% of total household consumption; the current EPE by public bodies from 1.2% to 1.4% of the public consumption and the investment EPE of public bodies ranges from almost 4% to 8% of total public investment. On average, the share of EP output in total output by industry ranges from 0.04% (NACE 26) to 1% (NACE 24-25) or 1.5% (NACE 40-41) and the share of EP investment in total investment from 0.7% (NACE 10-14) to 6.7% (NACE 27) or 7.6% (NACE 23). When comparing wastewater related EPE and physical data, the report shows that if a link can be made about investment this is not the case for current EPE.

The report concluded that rooms exited to refine the estimates.

Coverage (years, domains, sectors and components of expenditure)
This application presents the Belgian EPEA for the period 1997-2000 and takes environmental protection services (connected and adapted products are not taken into account.) supplied both by public administrations and the corporate sector (in comparison to the previous pilot study about 1997, the corporate sector has been added). NPISH and transfers in which these institutional units are involved, are excluded.

Like in the previous study, the Belgian EPE is distributed into 6 environmental domains: air/climate, wastewater, waste, soil, biodiversity, and radiation, based on the CEPA. Noise and vibration abatement and research & development are grouped together under the item "Other".

Methodology (approach, data collection and sources)
As indicated above, the Belgian EPEA intends to comply with the SERIEE's approach (only the table CA1 on the net cost of EP is not compiled).

Concerning the production of EP services (table B in the SERIEE), the methodology use for governmental bodies is the same presented in the previous report (see above). The production of EP

services by the corporate sector consists of 3 parts: EP production as primary (specialised producers), secondary (non-specialised producers) or ancillary activity (for own account).

- In the Belgian EPEA, specialised EP producers belong to the NACE 90. The main data source is the national accounts (intermediate consumption, compensation of employees, taxes on production capital fixed formation and capital use). The company register ("bel-first") is used to split the corresponding EPE between wastewater and (solid) waste management activities.
- EP production as secondary activity was identified only for land transport (NACE 60) and other business activities (NACE 74) in the latest Belgian supply table (for 1995) that was available then. The ratio of EP output to total output for 1995 was applied to the national accounts' output figures for the period 1997 tot 2000. The resulting EP output was split-up then between wastewater and waste domains thank the above mentioned "bel-first" register.
- EP production as ancillary activity was estimated for different NACE-based groups of manufacturing industries. 1999 data on the current expenditure extracted form a survey of the national statistical institute were extrapolated using the total output growth rate of the corresponding industries. The resulting figures were split-up between intermediate consumption and compensation of employees based on the corresponding distribution by industry in the national accounts. Investment figures were estimated on the basis of the average share of fixed capital consumption in total output for Austria, France, Germany and Netherlands.

As concerns the supply-use table (table B1 in the SERIEE), imports and exports of EP services were estimated applying to the domestic environmental market (EP services as primary and secondary activity) for the period 1997-2000 the ratios (respectively 8% and 4.5%) calculated from the Belgian 1995 supply table. The market output of the public administrations is assumed to be entirely sold on the domestic market. No non-deductible VAT or other taxes and subsidies were identified (in Belgium, the major part of EP activities is related to waste management by the municipalities and the related taxes do not include any VAT).

.The Belgian national EPE (table A in the SERIEE) is distributed across 7 groups of users: 4 groups of domestic producers (government, specialised, non-specialised producers non-characteristic producers), 2 groups of domestic consumers (households and government as a collective consumer), and 1 group for foreign users.

About the financing of EPE (table C in the SERIEE), in addition to table A (total EPE by users/beneficiaries), national and local accounts as well as federal and regional budgets were necessary to distribute environmental transfers across institutional sectors and environmental domains.

Environmental Protection Expenditure Accounts for Belgium – 1997-2002, Report to Eurostat (grant agreement n° 2004.714.01006), Guy Vandille, Federal Planning Bureau - Economic analyses and forecasts, December 2005, 167 p. (study n°17)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/epeabel9702pdf/_EN_1.0_&a=d

This report updates the previous Belgian EPEA (see above). The structure of the document remained the same. The major changes concern the coverage (extension of the series to 2002 and inclusion of earmarked environmental taxes) and the data sources (especially the supply table for 2000). Also, the analysis of the link between EPE and physical data on the environment is about air pollution, instead of wastewater management in the previous report.

Waste keeps representing more than 2/3 of the total EP output in Belgium. However, EP investment focuses on wastewater (2/3 of total EP investment). In 2002, Belgian corporations generated 2/3 of the EP output and financed 2/3 of the national EPE whereas the Belgian public administrations generated 1/5 of the EP output that was mainly financed by other institutional sectors (including households).

Coverage (years, domains, sectors and components of expenditure)
This 2005 study extended the Belgian EPEA time series that covered 1997 to 2002.

As regards the EPE components, earmarked environmental taxes were included. Except the total, this had an impact on the EP financing accounts (table C of the SERIEE).

Methodology (approach, data collection and sources)
The methodology remained basically the same. However improvement resulted from additional data sources (supply table for 2000 and 2001 data on EP production as ancillary activity). The latest supply table enabled the FPB to update the ratio of EP output to total output for non-specialised producers and led to extend the number of industries covered at this stage (table B of the SERIEE). The ratios used for imports and exports of were also revised thank to the new supply table (table B1 of the SERIEE).

Denmark

Survey of the possibilities of collecting questionnaire-based data on environmental protection expenditure for the manufacturing industry, Report to Eurostat prepared by Laban Koch Karlshøj, Statistics Denmark, May 2002, 26 p. (Study n°5)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/epe_in_dkpdf/_EN_1.0_&a=d

This report does not deal with the compilation of EPEA, but with the collection of EPE statistics.

The project aimed to study the possibilities for collecting data on EPE for the manufacturing industry (data availability, potential difficulties for the enterprises and the degree of reproduction). In 2002, Statistics Denmark conducted a small interview-based survey (21 enterprises among large and medium-sized enterprises in selected industries). The questionnaire elaborated then was inspired from a questionnaire of Statistics Sweden, as well as 2 previous surveys conducted by Statistics Denmark and the Danish ministry of Finance in 1994 en 2000, respectively.

After having presented the main results of the 2 previous survey (chapter 2), the report focuses on the feedback from the enterprises interviewed in 2002 (chapter 3). The latest survey pointed out some difficulties related to the definition of EPE (*primary purpose* versus impact), the estimation maintenance related current EPE and the estimation of the environmental share of integrated technologies (investment).

Pilot Survey of Environmental Protection Investments and Current Expenditure in the Manufacturing Industry, Report to Eurostat (grant agreement n°2002717000 08) prepared by Ulla Agerskov, Vibeke Terney and Preben Etwil, June 2004, 38 p. (Study n°12)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/report_expenditure/_EN_1.0_&a=d

This report does not deal either with EPEA compilation, but presents a pilot exercise carried out by Statistics Denmark to prepare the compliance with the amendment of the EU's Structural Business Statistics (SBS) regulation as regards its extension to EPE[53]. The report deals successively with the questionnaire (provided in annex), the statistical methods for grossing up the figures collected, the main results, and finally proposes an assessment of the survey.

The questionnaire developed by Statistics Denmark was based its experiences that resulted from the previous study (see above), as well as the Swedish and Norwegian experiences[54] and Eurostat's guidance for the collection data on EPE in industry.

Coverage (years, domains, sectors and components of expenditure)
The data collected for the year 2001 covers 4 environmental domains: protection of air/climate, wastewater management, waste management and other environmental protection activities.

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[53] - Regulation (EC) No 2056/2002 of the European Parliament and the Council of 5 November 2002 amending Council Regulation (EC, Euratom) No 58/97 concerning structural business statistics.
[54] - *The methodology work for environmental protection investment and current expenditure in manufacturing industry*, Report to Eurostat prepared by Hass J., Smith T of statistics Norway, January 2002, 25 p. (see below study n°3) .

Complying with the SBS regulation, EPE are divided into 3 categories[55]: end-of-pipe investments, integrated (cleaner) technology investments and current expenditure on EP (statistics on EP related investment are to be produced annually and statistics on EP current expenditure every three years).

The Danish survey covered manufacturing (NACE 15 – 37) plus energy and water supply industries (NACE 40 – 41). According to the SBS regulation, the data are presented at the NACE 2-digit level.

Methodology (approach, data collection and sources)
As indicated above, the report does not deal with EPEA.

Greece

Pilot survey for environmental protection investment and current expenditures in the manufacturing industry - Reference year 2001, Report to Eurostat (Agreement No 2002 717 00003), National Statistical Service of Greece, 31 March 2004, 20 p. (Study n°11)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/greece_reportmethpdf/_EN_1.0_&a=d

This report does not deal with EPEA compilation, but with EPE data collection in relation to the extension of the SBS Regulation to environmental variables (see above the second Danish pilot study). Therefore, the report focuses on the survey: questionnaire (provided in annex), sampling and grossing up procedure, analysis of responses, before presenting estimated EPE for the Greek industry. This presentation includes comparisons with previous surveys.

Coverage (years, domains, sectors and components of expenditure)
The data collected for the year 2001 (the report include comparison with 1995 and 1996) covers 4 environmental domains: protection of air/climate, wastewater management, waste management and other environmental protection activities (soil, noise, biodiversity and landscape).

EPE were divided into 2 categories: investments (no separation between end-of-pipe and integrated investments) and current expenditure on EP.

The Greek survey covered the quarrying (NACE 10 – 14) and manufacturing industries (NACE 15 – 37) plus energy and water supply industries (NACE 40 – 41). Companies with less than 10 employees were not surveyed.

Methodology (approach, data collection and sources)
As indicated above, the report does not deal with EPEA.

Ireland

The Applicability and Policy Relevance of Environmental Protection Expenditure Accounting, Barry C.P. Convery F.J. Environmental Studies Research Series (ESRS) Working Paper 01/04, Department of Environmental Studies, University College Dublin, September 2001, 20 p.[56] (study n°132)

http://www.ucd.ie/gpep/gpepinfo/publications/workingpapers/01-04.pdf

The authors intended firstly to test the applicability of EPE accounting for Ireland, secondly to examine its value in assessing the impact on competitiveness environmentally related business, and thirdly to verify the assumption according to which EPE data have very limited normative value regarding environmental policy design and execution.

[55] - The definitions of these 3 types of environmental expenditure come from the Commission regulation (EC) No 1670/2003 of 1 September 2003, implementing Council Regulation (EC, Euratom) No 58/97 with regards to the definitions of characteristics for structural business statistics and amending Regulation No 2700/98 concerning the definitions of characteristics for structural business statistics.

[56] - Also published as Barry C. P., Convery F. J. (2002), "Policy Relevance of Environmental Protection Expenditure Accounting", *European Environment*, Volume 12, Issue 5 , Pages 291 - 301

The paper starts (chapter 2) with a review of the different approaches: the SEEA 1993, the OECD pollution and abatement control expenditure (PACE), Eurostat's SERIEE methodology and the OECD/Eurostat joint questionnaire, and (chapter 3) an assessment of the best practices that were available then: Australia, Austria, Canada, Denmark, Italy, Netherlands and Sweden. The results (chapter 4) are presented both for Ireland as a whole and separately for the 4 sectors taken into consideration. Finally, the paper examines successively the competitiveness implications and the potential for the eco-industry (chapter 4), and the policy relevance of EPEA (chapter 6).

The paper concluded that it was worth investing the little amount of time and effort necessary to produce credible estimates of pollution abatement expenditure regarding the indication they provides on competitiveness implications and on the potential for the development of eco-industries. However EPEA is of little interest for environmental policy-making since they do not tell anything on the effectiveness with which environmental expenditure is mobilised.

Coverage (years, domains, sectors and components of expenditure)
The first ever EPE dataset for Ireland that is presented in this paper was prepared for the year 1998. It covered 4 sectors: general Government, industry, energy and agriculture, and included both capital and current pollution abatement control expenditure.

Total EPE for Ireland were distributed across the following environmental domains: air, waste water, solid waste, soil and other EP.

Methodology (approach, data collection and sources)
The authors adopted the OECD/Eurostat questionnaire methodology.

Data related the General Government came from the published records and interviews. Waste water treatment and solid waste collection and disposal that represent the dominant components of the public EPE, were not privatised in 1998

The study covered firms that were required to secure an integrated pollution control license (IPC) and therefore to report annually. A sample survey was also carried out.

Most of the EPE of the energy sector was spend by the Electricity Supply Board (ESB), which in 1998 had a monopoly of electricity supply in Ireland.

In the case of agriculture, most of the EPE was generated by subsidies distributed by the Department of Agriculture, Food and Rural Development.

Italy

The first Italian EPEA for waste and wastewater management, Report to Eurostat (Grant agreement N. 200141200027) prepared by Carolina Ardi and Federico Falcitelli, Istat – National accounts, income distribution, sector and satellite accounts, 2003, 37p., (Study n°9)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur&vm=detailed&sb=Title

This report presents the first pilot implementation of EPEA by the Italian statistical institute (Istat). After a detailed summary (chapter 2), the document focuses on the methodology: procedure followed and data sources, including an overview table showing the connection between the basic data and the SERIEE tables as well as the different interim outputs within this procedure (chapter 3) before providing the tables (chapter 4) and giving elements on Istat's plans on its future works as regards EPEA (chapter 5).

After having put in place the basis for the compilation of EPEA for wastewater and waste management, Istat planed then to work in the short-medium terms on the improvement of the estimates that were made and on the development of a time series. As concerns the basic data, Istat expected improvement both from the implementations of the NACE rev. 1.1 and the new SBS regulation.

On the longer terms, Istat planed to extend the scope of the Italian EPEA firstly by including EP as secondary activity and adapted & connected products and secondly by covering other EP activities

(CEPA classes). As regards the use of EPEA, Istat wished to investigate the possibility to connect monetary data and physical data from environmental accounts.

Coverage (years, domains, sectors and components of expenditure)
The first Italian EPEA was compiled for the reference year 1997 (the only year for which data on EP as ancillary activity were available) and covered 2 of the 9 classes of the CEPA: wastewater management and (solid) waste management (excluding the collection of refuse in litter-bins in public place as well as street cleaning).

This first application covers EP services and capital formation by specialised producers belonging to the general government and corporate sectors that are classified under NACE division 90 (actually the Italian sub-classes 90.00.1 – Collection and treatment of waste and 90.00.2 – Wastewater management and treatment, excluding 90.00.1 – Sanitation and similar activities). In Italy there is no NPISH in NACE 90 division. EP output and end-of-pipe investment by ancillary producers are also included. The production of EP services as secondary activity is excluded as well as EP production carried out by households for own use.

Methodology (approach, data collection and sources)
Istat applies the SERIEE methodology referring to Eurostat's corresponding documents. The 5 tables of the SERIEE have been produced for 1997 for CEPA classes 2 and 3 (plus the sum of the two classes).

The Italian EPEA has been implemented by exploiting existing data sources, mainly national accounts (production and generation of income, account, input-output tables (IOT), gross fixed capital formation by institutional sector, net capital stocks and consumption of fixed capital), but also business statistics (1997 intermediate census of industries, annual survey on business economic accounts).

As concerns EP output (table B), data on the production of EP services as primary activity is extracted from the national accounts (NACE 90) and divided into wastewater and waste management using business statistics (for the corporation sector, it is made proportionally to VA i.e. assuming the cost structure in the sub-classes is the same as for NACE 90 as a whole; for the government sector, waste management was identified as market output and wastewater management as non-market output). Data on EP as ancillary activity comes from business statistics collected with the 1997 census of industries

Concerning the use of EP (table A), EP provided by the government sector is distributed across purchaser sectors (households and corporate sector) in the national accounts. EP services provided by the corporate sector were assumed to be entirely used as intermediate consumption and therefore distributed across users (non specialised producer and specialised producers) using the IOT. EP services used by specialised producers were assumed to be purchased to sub-contracting companies. Capital formation of specialised producers was split up between waste and wastewater domains thanks to the distribution calculated earlier for the EP output.

For the estimation of the financing of the uses of EP services (table C), it was assumed that the different sectors finance their EP expenditure themselves, the only exception being the implicit subsidies which offset the negative net operating surplus (table B) of the specialised producers of market EP services (waste) belonging to the government sector. The information for the estimation of the net cost of EP (table C1) was not entirely available.

La spesa della Regione Lazio per la protezione dell'ambiente, Anni 1995-2001, *Methodological notes* (17 p.), *Analysis* (14 p.), Istat, 2005 (Study n°135)

http://www.istat.it/ambiente/contesto/ambientale/epeaguida.pdf

http://www.istat.it/ambiente/contesto/ambientale/epeaanalisi.pdf

For the first time, in this study, the time series concerning the Italian EPEA at regional level (Lazio region) are published. It is an update to the 2001 of the previous time series 1995-2000[57] and it is organised in two separated documents dealing respectively with the methodology and the analysis.

[57] Regione Lazio (2005), *Rapporto sullo Stato dell'Ambiente del Lazio 2004*, § 16.2 "Le spese ambientali della regione

In the methodological document, after a general summary (chapter 1), the Italian EPEA is presented, starting with the general description of the EPEA framework (chapter 2). The methodology used in order to establish the regional Italian EPEA (chapter 4) is described in 3 steps:

- Reclassification of publics balances under the economic and functional profile,
- An two stage-approach for the functional reclassification works of publics balances,
- The main instruments used by Istat for the functional reclassification of balances,

After a general summary, the analytical document deals successively with: public EP, total, EP by environmental domains (CEPA), and EP financing.

Three Excel files are annexed to the report:

- the list of the tables presented in the two other Excel files
- the time series for the period from 1995 to 2001, organised in 15 tables showing the data for the 9 classes of the CEPA
- the tables presented by year for the 9 classes of the CEPA (14 tables)

Coverage (years, domains, sectors and components of expenditure)
The first Italian regional EPEA was compiled for the period from 1995 to 2001 and covers the 9 classes of the CEPA.

Methodology (approach, data collection and sources)
The methodology is based on the budget analysis. The data obtained following this approach are consistent with international standards (definitions, classifications, EPEA framework and SEC95). The report does not provide great details on the data sources.

The document refers to the 2002 Eurostat EPEA compilation guide.

Latvia

Environmental Protection Expenditure accounts, Report to Eurostat (PHARE multi-beneficiary programme 2003, grant agreement n° 2004.19100.022), Prepared by Andra Lazdina and Ilva Zvirbule Central Statistical Bureau of Latvia, 2005, 17 p. (study n°65)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/epea_and_eia/lvdoc/_EN_1.0_&a=d

This report presents the first pilot compilation of EPEA by the Central Statistical Bureau (CSB) of Latvia according to Eurostat's SERIEE methodology.

The introduction of the document provides information on the coverage and the data sources. The core of the text is a review of the results table by table (tables of data by environmental domain are also available in Excel format). The summary placed at the end of the document gives information on the limits of this first application compared to the SERIEE methodology. It also stresses the lack of good quality basic data and the difficulties for users to understand SERIEE tables. The CSB planed then to compile EPEA on a regular basis but not annually.

From this first pilot EPEA, it resulted that 2/3 of the production of EP services in Latvia were market output in 2003. More than 40% of the Latvia's EPE was dedicated to wastewater management and 1/3 to waste management. More than half of the EP related investments were engaged by specialised companies and a fourth by governmental sector.

Coverage (years, domains, sectors and components of expenditure)
This first Latvian EPEA was prepared for 2003 and covered 5 environmental domains of the CEPA: air/climate protection, wastewater management, waste management, soil and groundwater protection (incomplete), protection of biodiversity and other EP activities (general administration, noise, radiation

Lazio – anni 1995-2000",

and other). It is not totally clear whether noise abatement is taken into account or not (contradictory information between the introduction and the summary).

The EPE taken into account are related to EP activities carried out by specialised producers operating either in the governmental or corporate sectors (mostly from NACE 90, plus NACE 41, see below), as well as secondary and ancillary producers (mostly wastewater treatment). These EPE cover current expenditure, capital formation, and taxes (environmental taxes on production were underestimated since information was available only for specialised producers). There was no EP related subsidies in Latvia. Adapted and connected products are not included.

Methodology (approach, data collection and sources)
The CSB that follows Eurostat's approach for EPEA, compiled 4 of the SERIEE tables: A, B, B1 and C (the table C1 on the not cots of EP was not prepared) that need further investigation[58].

The basic data sources used for this first application came from the annual EPE survey, the annual structural surveys, the household budget survey, the central and local government budget reports, and the "Environmental investment report 2003".

Concerning the production of EP service (table B), wastewater services by Riga's Water that belongs to NACE 41 has been accounted as primary production (i.e. by specialised producers) since it delivers 1/3 of Latvia's population, whereas the other companies of the NACE 41 has been counted as secondary producers. Secondary and ancillary productions of EP services are grouped together. Transfers from the rest of the world were allocated to *investment grants received*, instead of *current transfers* according to ESA95.

As concerns the financing of EP (table C), earmarked environmental taxes were assumed to be entirely paid by non-specialised producers because of the lack of detailed information.

Lithuania

Data Collection Project on Environmental Protection Expenditure, - Report to Eurostat (grant agreement n° 2004.19100.023) prepared by Danguole K repustuliene, Statistics Lithuania, 2005, Vilnius, 29 p. (study n°66)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/epea_and_eia&vm=detailed&sb=Title

The objective of the study was twofold: firstly improving the data collection on EPE by enterprises and municipalities and secondly identifying the gaps between the data available and the adjustment needed for the compilation of EPEA.

After a short introduction, the description of the work carried out (chapter 2) consists of a list of methodological documents (including the SERIEE manual and compilation guide) examined as a first stage and the announcement of the identification of the statistical sources (second phase of the study) that are presented in detail after (chapter 3). The results (chapter 4) deals with the compilation of EPEA (the SERIEE tables are available in Excel spreadsheets).

Coverage (years, domains, sectors and components of expenditure)
The first pilot EPEA for Lithuania has been prepared for the reference year 2004.

Both surveys on enterprises and municipalities (see below) covered the CEPA 9 classes environmental domains: air, surface water, waste, soil and groundwater, noise, biodiversity and landscape, radiation, research and development and other environmental protection activities. But for the compilation of the SERIEE tables, the corresponding data have been allocated to the following domains: pollution abatement, water resources management, waste management, biodiversity and

[58] - See Naguy M., Baud S., Eiseenmenger N., Kletzan D., Kratean K., Sekot W. and Weisz H. (2006), *Provision of Services for the Implementation of Sector Projects fort he "Multi-Beneficiary Statistical Co-operation Programme 2003", Volume 2 – Environmental Accounting*, Report to Eusrostat, (Contract N° 2004.19100.016) , Umweltbundesamt and ICON Public Sector, July 2006, pp. 29-30. In section 3.3 dedicated to EPEA, the points that need further investigation as well as errors of compilation are presented table by table for the relevant countries.

landscape, R&D and other activities. According to the report of the Umweltbundesamt and ICON, it is not clear, where wastewater management has been taken into consideration[59].

Specialised producers come from either from the corporate or the government sector (non market production is registered under the government sector). Non-specialised producers groups together producer that carry out EP as secondary and ancillary activities.

Methodology (approach, data collection and sources)
Most of the data used for the compilation of the SERIEE tables (excluding table C1 that is not presented) come directly from Statistics Lithuania. For the 2 first surveys below, the definition of EPE components is based on the OECD/Eurostat joint questionnaire.

- The annual survey on EPE by enterprises: sample survey for enterprises (with 5 or more employees) of the NACE 10-40 (excluding 37), 45, 60, 62 and 63; all enterprises belonging to the NACE 37, 41 and 90. This survey covers capital formation (end-of-pipe) and integrated investments), current EPE, receipt from by products, revenues from EPE services and subsidies received.
- The annual survey that covers the 60 municipalities in Lithuania that covers investment, current expenditure, receipts from by products, revenues from EPE services and subsidies paid. As concerned capital formation, only data on end-of-pipe investments are collected.
- The annual business survey provides data on the specialised producers (NACE 90): sales/turnover, intermediate consumption, compensation of employees, taxes, subsidies, capital formation.
- The household budget survey provides information on households' consumption expenditure related to wastewater and waste collection and treatment.

Statistics Lithuania compiles the entire general government sector by functions (COFOG), of which one is on environment protection, using the reports on revenues and expenditure of central and local governmental bodies that are provided by the Ministry of finance (the reports referring to 2003 were used). Other information on EP related investments comes from the Ministry of environment's report on Investment in EP (the report used for this study referred also to 2003).

The EP output (table B) presented was not complete. No data were reported for the compensation of employees, the consumption of fixed capital and the taxes on production of specialised producers remained empty, since the 2004 business survey was not timely available. As indicated above, secondary and ancillary outputs were not reported separately.

Table B1 is not balanced.

Table A (national EPE): no data reported under the use of pollution abatement services by the central government, i.e. as collective consumer.

Hungary

Towards Environmental Protection Expenditure and Environment Industry Accounts in Hungary, Report to Eurostat (PHARE Multi-Beneficiary Statistical Co-operation Programme in 2003, Technical Assistance), Prepared by Pál Aujeszky, Viktória Hajdú and Gábor Valkó, Hungarian Central Statistical Office, Budapest December, 2005, 35 p. (study n°64)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/epea_and_eia/epeahun_final_reportpdf/_EN_1.0_&a=d

The objective of this Hungarian study was threefold: compiling the first EPEA for 2001 and 2002, improving the quality of data on environment industry and reviewing the method to select the data providers for the environment industry data collection.

[59] - Naguy M. & al. (2006), *Op. Cit.* p. 26.

Chapter 2 gives a very brief description of the methodological background of the EPEA and environment industry accounts. Chapter 3 reviews the EP related statistics available in Hungary from 1990 to 2002. Chapter 4, which is announced as being dedicated to the compilation of the EPEA, gives a long description of the Hungarian statistical sources but does not actually provide much information on the preparation of the EPEA. The main problems encountered are enumerated in the chapter 5, before a brief conclusion (chapter 6). In addition to the list of tables (they were available in Excel spreadsheets), the annexes include a glossary and the reference (including the electronic address) of a regular (and bilingual) publication of the HCSO on EPE and environment industry[60].

Coverage (years, domains, sectors and components of expenditure)
The Hungarian EPEA presented in this report were compiled for 2001 only (and not 2002 as it was also expected), since the survey on environmental expenditure covered then for the first time the whole Hungarian economy.

They covered 3 environmental domains: air protection, wastewater and waste management plus a category other (environmental protection activities). The report does not explicitly refer to the CEPA.

They cover the EP services carried out by specialised and non-specialised producers (however, no EP production undertaken as secondary activity is recorded). Adapted & connected products were not taken into account.

Methodology (approach, data collection and sources)
The report states that the HCSO follows Eurostat's EPEA methodology. Concerning environment Industry, the first data collection was conducted following the OECD/Eurostat guidelines.

The 5 five SERIEE tables were prepared for each of the domains mentioned above, but some data were missing:

- Table B: no secondary EP output is reported; all output registered are market EP related output (no data on non-environmental and non-market output).
- Table A: there is no data for the general government as collective consumer and the rest of the world.
- Table B1: there is no non-market supply and use of EP services (cf. table A).

The main data sources used to compile the first Hungarian EPEA were:

- The surveys on environmental expenditure (non-specialised producers and EP industry respectively);
- Total amount of the governmental transactions related to the environment (old version of the COFOG),
- Annual wastewater statistics (physical data);
- The Hungarian national accounts (annual supply and use tables);
- The household budget survey.

According to the HCSO, the main problem found concerns the distinction between water supply and wastewater services by companies belonging to the NACE 41. It also indicate that, because enterprises with less than 5 employees are not covered, some organisations providing environmental services (e.g. environmental research and development, environmental consulting, environmental management system, and education, training) were not covered. Also, the HCSO anticipated on the difficulties related to the methodological changes in the Hungarian national accounts system (year 2002-2003) and the environmental data collection.

[60] - The report referred to *Környezetvédelmi Ráfordítások és környezetvédelmi ipar / Environmental protection expenditure and environment industry 2004*, Központi statisztikai hivatal / Hungarian Central statistical office, Budapest, 2005. Since then the 2005 version has been in 2006.

Austria

Environmental expenditure in industry – Improvement of existing methodology for data collection, report to Eurostat (grant agreement n° 200071700004) prepared by Alexandra Aichinger and Eva Milota, Statistics Austria, Directorate Spatial Statistics, 2002, 29 p. Document presented at the meeting of the Working Group on "Environment and Sustainable Development" - Sub-Group "Environmental Expenditure Statistics", 6 and 7 March 2003 [Doc. ENV-EXP/WG/008/03.6 (2003)] (Study n° 2)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/improvement_existingatpd/_EN_1.0_&a=d

In introduction, the authors state that the survey carried out by the Austrian Chamber of Commerce of which the EPA data were used so far for the compilation of the EPEA will not be available any longer. In this context, this study aimed at improving the distribution by environmental domain of the data on EPE collected thanks to the structural business statistics (SBS).

The reports presents successively the Chamber of Commerce survey, the SBS as well as a sample survey focusing on EPE in industry. The report concludes that it was not possible then to distribute the SBS data across environmental domains, but the impact of the amendment of the SBS regulation was to be done. However, since the distribution of EPE by environmental domain resulting from the sample survey is similar to the distribution of the Chamber of Commerce' survey, the authors conclude that the SBS can be used for the compilation of EPEA, sample surveys being carried out every third year in order to adjust the distribution. The annexes include:

- the data resulting from this sample survey for 1999 and 2000,
- a comparison between these results (total, i.e. not distributed by domain) and the EPE data of the SBS based on 1999 data,
- a comparison of the distribution of EPE by environmental domain between the sample survey and Chamber of Commerce's survey,
- 1999 EPE of the Austrian industry extrapolated from the sample survey,
- the questionnaire of the survey on EPE in industry.

Poland

Environmental Protection Expenditure Account in Poland, Report to Eurostat (grant agreement n° 2004 .19100.024), by Elżbieta Broniewicz (ed.), Wydawnictwo Ekonomia i Środowisko / Fundacja Ekonomistów Środowiska i Zasobów Naturalinych, Wydawnictwo Ekonomia I Środowisko (ISBN 83-88771-69-8), Warsaw / Bialystok 2005, 56 p. (study n° 67)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/epea_and_eia/final_angielskapdf/_EN_1.0_&a=d

The report is split into 2 parts dealing respectively with EPEA compilation and the estimation of the index of sustainable economic welfare for Poland (study n° 67b in the section dedicated to EA-based analysis).

Part 1 of the report stars with a brief description of the EPEA, before presenting the work carried out by the Foundation of Environmental and resource economists for the Polish Central statistical office (CSO): examination of the methodological document (especially the SERIEE manual and compilation guide) and the data source, the survey to specialised producers, the preparation of the SERIEE tables and their presentation. The tables by domain are provided in annex.

It is worth mentioning that, at this stage of a first pilot application, air/climate protection related expenditure was higher in 2002 than the amount dedicated to the waste management (25% and 16% of the national EPE respectively). So far, in most countries waste management expenditure largely exceeds air/climate protection expenditure.

Coverage (years, domains, sectors and components of expenditure)
The first Polish pilot EPEA has been prepared for the year 2002. They cover 8 of the 9 CEPA classes: air/climate, wastewater, waste, soil, biodiversity, noise, radiations and other (R&D is not taken into account).

All relevant sectors of the Polish economy have been taken into consideration. The specialised producers (corporations, government and large public NPISH, excluding small private NPISH) belong mostly to NACE 90. As concerns the non-specialised producers, secondary producers belong to the NACE 37, 40 and 41 and ancillary producers to the other economic sectors. The rest of the world was not taken into account.

For this pilot application, the Polish EPEA covered EP services and households' purchases of EP adapted & connected products (e.g. anti-noise windows, dust-beans…).

Methodology (approach, data collection and sources)
For his first pilot application 4 of the SERIEE tables A, B, B1 and C were compiled. As stress in the report of the Umweltbundesamt and ICON[61], despite some gaps (e.g. the lack of separate figures for wastewater and waste management in the national accounts, or the fact that the COFOG was not yet implemented), the Polish EPEA contain much more data than the other countries (latest and next EU members) of which the environmental accounts were assessed then.

In table B, secondary output of non-specialised is split between NACE 37 and NACE 40-41. Ancillary output is presented broken into the NACE sections A, B, C, D, plus construction, trade and services grouped together. In table A, specific taxes were allocated to specific transfers.

Poland has a survey on investment expenditure for environment protection (since 1970) and a survey on current environment protection expenditure (since 1998). Both surveys are obligatory and cove public and business sector, specialised producers and households. The results are distributed across the CEPA domains. Large public NPISH are covered, not small private ones. The survey on EP related investment is conducted every year and the survey on current EPE every third year. For intermediate years, current EPE is calculated.

Due to the lack of data on compensation of employees and consumption of fixed capital, a survey to specialised producers (enterprises with 9 and more employees belonging to NACE 90) was conducted within the project. In addition, data on compensation of employees and consumption of fixed capital for NACE 15-36 and 40-41 was taken from the survey on current environmental protection expenditure for 2004.

The other data sources examined within the project (states budget, industry statistics…) proved to be inconsistent with the SERIEE

Portugal

Environmental protection expenditures - Implementation of data collection using webforms, Report to Eurostat (grant agreement n° 200271700006), Institu to Nacional de Estatística (INE), June 2005, 33 p. (Study n°14)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/report_20050726pdf/_EN_1.0_&a=d

This report does not deal with EPEA compilation, but with EPE data collection. The objective of the study was to implement a webform-based data collection for the statistics on environmental expenditure that the Portuguese INE has been preparing on an annual basis under the obligation of the regulation (n°58/97) on structural business st atistics.

The 4 first (short) chapters constitute a king of introduction. Chapter 5, which contains the text, focuses on the statistical methodology, the preparation of the questionnaire, the process followed for the data collection and validation, and the webform. No data on EPE are presented.

[61] - Naguy M. & al. (2006), *Op. Cit.* p. 35.

Romania

The satellite account on environmental protection expenditure, Report prepared by LDK S.A., University of Thessaly, IMAS A. and Promo A&F SRL within the project "Consolidation of Romanian Statistical System" (EuropeAid/119795/D/SV/RO), Component D1 "The satellite account on environmental protection expenditure", 2006, 102 p. (study n°110)

The main objectives of this study were to present the proposed methodology for Environmental Protection Expenditures according to SERIEE and the final results of the surveys on EPE carried out for the reference year 2005.

The report starts with a short presentation of the activities carried out since project start (December 2005) which were split into 3 main phases (inception, interim and final). The next section, which constitutes the main body of the report, provides details about the implementation of the final phase in particular,

1.) the organisation of a new, specialised survey among the General Government and the Fishery and Forestry sectors - ROMSILVA subordination, 41 units/country branches and Appele Romana sub-ordination, 11 main branches and respective 41 country branches), including details on the design of the sampling approach and of the IT application developed for data entry and processing,

2.) the compilation of EPEA tables with presentation of results for 2005 and conclusions by type of expenditure and NACE branch. The last part of this section is devoted to conclusions from the participation of Romania to a 2-day conference on "Consolidation of the statistical systems of EU candidate countries" which took place in September 2005 in Greece.

Final project conclusions suggest that some amendments to the existing questionnaires will be implemented as from the next survey to further increase the conformity of the data collected to Eurostat's requirements (see "Methodology" below). The tables announced in the report (annex VI) are not available in the report.

Coverage (years, domains, sectors and components of expenditure)
The data presented refer to the year 2005.

The study covers the specialised producers, i.e. primary and secondary producers (NACE 90 and NACE 37 respectively) and ancillary producers (NACE 10 to 75).

The environmental domains covered are: Air, Water, Waste, Soil and Groundwater, Noise and Vibration, Biodiversity and Landscape, and Other, by types of producers (Public Administration, Non-Specialised Producers and Specialised Producers).

Environmental protection expenditure is also presented by types of expenditures (Investments, Current expenditures, Subsidies paid, Other expenditures, lei without VAT) and types of producers.

Methodology (approach, data collection and sources)
EPEA tables B, B1, A and C have been compiled in accordance with SERIEE. However, the division of taxes into energy, pollution, transport and resources cannot be applied in the case of environmental taxes which are an important part in the presentation of table C1.

Main data sources used are the questionnaires carried out and National Accounts:

- Table B - Production table of Environmental Protection Services: The main data sources are the new General Government questionnaire, the survey of specialized producers and of non-specialized producers, as well as National Accounts. Some estimates were conducted namely for the percentage part of intermediate consumption and compensation of employees in the total internal expenditure.
- Table B1: Supply-uses of Characteristic Services. Romanian National Accounts provide the supply-use tables for specialized producers and specifically for NACE 90.1 and 90.2.
- Table A: National Expenditure by Users/ Beneficiaries. The results form the household budget survey will be used for estimating final consumption and the connected and adapted products by Prodcom code.

- Table C: Analysis of the financing of specific transfers, connected and adapted products. The typical data source for transfers is National Accounts however the current budgetary classification does not allow to identify financial flows. Therefore the greater part of the table was completed based on the questionnaire data (and a number of assumptions).

The compilation of EPEA tables is followed by proposals for improving future data sources. An analysis of the collected questionnaires of the survey on General Government demonstrated some inconsistencies in relations to the data collected. Moreover, the public sector questionnaire should be modified (in particular internal current expenditures should be broken down into 'personnel expenses' and 'intermediate consumption'). In the next survey, the non-specialized producers questionnaire should also be modified, to allow for calculation of personnel costs and intermediate expenditure. The current household survey could be improved in future to expand information about consumption of connected and adapted products from households and agricultural data could be improved through a survey on large units.

Slovak Republic

Environmental Protection Expenditure and Environmental Industry Accounts, Report to Eurostat (Grant PHARE 2003 n° 2004.19100.027), Statistical Office of the Slovak Republic, Bratislava, amended version: February 2006, 14 p. + annexes (study n°68)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/epea_and_eia&vm=detailed&sb=Title

The objective of this study conducted by the Statistical Office of the Slovak Republic was twofold: firstly, to develop or adapt the collection of EPE data in order to comply with Eurostat's requirement (especially the OECD/Eurostat joint questionnaire) and, secondly, to develop environmental industry accounts (they were eventually not elaborated within this project).

The report briefly presents the project, the former EPE data collection (including 2000-2003 time series), and the new questionnaires (chapter 1 to 4), before focusing on the data collected (chapter 5). The instructions for completing the questionnaires are provided in annexe.

The report concludes that the data collected enable to fill in table 1 (public sector) and table 2 (and business sector, excluding specialised producers) of the OECD/Eurostat questionnaire. Improvement in the EPE data collection should focus on small enterprises (with less than 20 employees) of specialised producers on the one hand (it was planned then to implement an every third year survey from 2007) and on households on the other hand. As recommended in the report of the Umweltbundesamt and ICON[62], further works were necessary to enable the Slovak Republic to compile the SERIEE tables.

Coverage (years, domains, sectors and components of expenditure)
The data presented refer to the year 2004.

The environmental domains covered: soil and groundwater, air, waste, wastewater, noise, biodiversity & landscape, and others (education, training and information to he public, and other EP activities that are not included in the abovementioned categories).

The surveys implemented cover the specialised producers, according the OECD/Eurostat joint questionnaire, i.e. primary and secondary producers (NACE 90 and NACE 37 respectively) and ancillary producers (NACE 01 to 93).

Methodology (approach, data collection and sources)
The tables of data presented are not consistent with the SERIEE.

Table 1 covers EPE and revenues of enterprises with 20 and more employees broken down by the environmental domains.

[62] - Naguy M. & al. (2006), *Op. Cit.* p. 25.

Table 2 presents EPE and revenues of enterprises with 20 and more employees broken down by the NACE-based groups of industries: 37 and 90, 1-5, 10-14, 15-36, 40-41, 45-93 (excluding NACE 90; NACE 37 is not indicated as excluded from this last group, but it should be excluded).

Table 3 concerns EPE and revenues of municipalities broken down by the environmental domains.

Surveys carried out within the project, covering private companies (employing at least 20 people) and municipalities respectively.

Sweden

Refined Environmental protection expenditures in Sweden, Report prepared for Eurostat (Contract n°2002717000067) by Nancy Olsson, Statistics Sweden , 25p. Document presented at the meeting of the Working Group on "Environment and Sustainable Development" - Sub-Group "Environmental Expenditure Statistics", 6 and 7 March 2003 [Doc. ENV-EXP/WG/012/03.6 (2003)] (Study n°4)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/epe_in_sepdf/_EN_1.0_&a=d

The report doe not deal with EPEA compilation, but with EPE data collection. The main objective of the report was to examine whether the Swedish questionnaire designed for the survey on "EPE for enterprises 2001" complied with the new definitions approved under the aegis of Eurostat[63]. The second objective was to incorporate these suggestions in the Swedish EPE statistics.

The report stars with the questionnaire and the quality of the data collected (chapter 2), before examining the suggested extension of the SBS (chapter 3) and the NACE breakdown (chapter 4). The tables of data and the questionnaire were provided in annex.

Statistics Sweden planned then (chapter 5), for the next survey, to present data on the NACE 24 at a finer level of detail (larger sample) and to record radioactive waste management under the CEPA 7 on the protection against radiation (nuclear electricity producers needed to be asked to separate there corresponding data).

Coverage (years, domains, sectors and components of expenditure)
The survey carried out referred to the data of the year 2001.

The data presented were distributed across 6 environmental domains: air protection, wastewater management, waste management, soil and groundwater protection, biodiversity and landscape, and other EP activities. However, the author stressed that such a distribution proved difficult. It should be noticed that nuclear waste management were counted for as waste management activity instead of protection against radiation as requested by the CEPA.

In accordance with the SBS, the Swedish survey on EPE covered NACE sections C to E, i.e. mining & quarrying industry, manufacturing industry (excluding recycling, NACE 37), electricity & gas supply and water supply (i.e. it does not cover EP services specialised producers). The data were mostly presented at NACE 2-digit level. Regarding the suggested extension to NACE groups, data on NACE 21 could be presented at a finer level, but not those of NACE 23 and 24.

Following the suggested extension of the SBS, the survey covered EP investment for both pollution treatment and prevention, internal current EPE, and purchased EP services.

Methodology (approach, data collection and sources)
The report does not deal with EPEA.

[63] - *Definitions and guidelines for measurement and reporting of company environmental protection expenditure*, Eurostat Task Force "Environmental Protection Expenditure – Industry Data Collection", Joint Meeting of the Working Group "Statistics of the Environment" and the Working Party "Economic Accounts for the Environment", Joint Eurostat/EFTA group, Meeting of 19, 20 and 21 September 2001, 42 p. [Doc. ENV/01/3.6A].

Public environmental protection expenditures and subsidies in Sweden, Report prepared to Eurostat by Maja Larsson and Annika Mårtensson, Statistics Sweden, 2005, 55 p. (Study n°15a)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/subsidies_2005sepdf/_EN_1.0_&a=d

The objective of this study was twofold, intending to develop the data collection methods both for the public EPE and environmentally motivated subsidies in Sweden (for the second objective, see below the section dedicated to environmental taxes). As concerns public EPE in Sweden, the previous report dated back to 1997.

After having given the definition of the EPE taken into account (referring to the SERIEE) in the introduction, the report provides a rather detailed presentation of the different data sources and the way they were used (chapter 2), before presenting the results of the compilation (chapter 3). The report also offers a brief international comparison. For the future (see chapter 6), Statistics Sweden wishes to make in-depth international comparison and therefore planned to apply the method developed in this study for years prior to 2004. It would also like to take county councils into account (probably by contacting each of them individually).

Coverage (years, domains, sectors and components of expenditure)
The EPE data compiled for this study refer to 2004. Statistics Sweden initially intended to compile data back to 1993, but it had to focus on 2004 because of the work load.

As concerns EPE, this study focused on Public expenditure, i.e. by the government, the county administration boards (central authority at regional level) and municipalities. County councils were not taken into account because of the lack of data source.

The data compiled were broken down into the 9 CEPA classes. However the distribution across CEPA classes proved difficult for the public sector. On top of regulation and information related activities, a number of environmental activities cover several domains, e.g. when they intend to be transverse and integrated with each other.

Methodology (approach, data collection and sources)
The report refers to the SERIEE, but the corresponding tables were not used for the presentation of the results. The total Swedish public EPE resulting fro this study are presented broken down by CEPA classes and type of expenditure (current, investment and transfers) or split up into central government and municipalities.

Concerning EPE, the study mostly consisted in the compilation of different data sources.

- 2/3 of the central government's EPE come from the examination of the central government budget (investment, consumption and transfers classified under the COFOG division 5).
- The examination of the annual reports of central authorities that are in charge of following up environmental policy enables to identify EPE that are unidentified in the government budget. It also helps to split some of the budget line into different domains.
- Statistics Sweden also conducted a small survey to the 240 central authorities that have implemented environmental data management systems (the corresponding EPE represent only 4% of the central government's EPE and 1% of the total public EPE).
- Municipal EPE (66% of the 2004 Swedish public EPE resulting from this study) come from the examination of the annual accounts for municipalities (i.e. aggregated accounts of the individual municipalities' final accounts).

United Kingdom

Environmental protection expenditure by the UK general government sector 1996/97 to 2000/01, Report to Eurostat prepared by Rocky Harris (ONS) and Heike Mall (formerly ONS), Office for National Statistics (ONS), 2002, 56 p. (Study n°7)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/1996_2000_01pdf/_EN_1.0_&a=d

This project aimed to estimate of the public EPE in the UK and to examine how it evolved in the late nineties-early two thousands. This was the first systematic survey carried for the UK in this domain; the approach of the initial assessment conducted in 1993[64] differs to a large extent (a comparison between the two is nevertheless proposed in the report).

The report starts with the scope the study: EPE definition, EP activities, general government sector (chapter 2) and the organisation of the general government sector EP activities in UK (chapter 3) before presenting the data sources and compilation method (chapter4). As concerns the results, they are presented firstly (chapter 5) in terms of net expenditure: outlays (staff and other running cost, capital expenditure, transfers) less income (sales, grant received) by EP and compared to the 1990/91 data compiled in the abovementioned 1993 study; a comparison is also made with EU15 countries in terms of EPE as a percentage of GDP. Secondly (chapter 6), the data collected are used to compile tables of the SERIEE (detailed tables of the basic data are provided in annexe).

The authors stress that, since some estimates had to be made, the totals given are rough orders of magnitude, but they consider the changes in the levels as more reliable. Also the update is regarded as relatively easy and the integration into the full account as reasonably straightforward, even improvement in the estimates of the other sectors EP activities was still necessary.

Coverage (years, domains, sectors and components of expenditure)
The data collected cover the period 1996/97 to 2000/2001 (financial years).

Since this study focused on the public EPE in UK, it covered the EP activities of the general government sector, i.e. the central government, the government agencies, as well as the local authorities (whether or not the actual service is contracted out to the private sector) of the 4 countries (England, Northern Ireland, Scotland and Wales). Expenditures of two public corporations, the Scottish Water Authorities and the Water Services Agency for Northern Ireland, are nonetheless excluded since they are financed by charges to customers. However, the investment grant from the Northern Ireland Department of Environment is included.

Current expenditure (intermediate consumption, purchase of EP related goods and services, compensation of employees), capital expenditure (land, durable goods), current and capital transfers to other sectors. The EP related income taken into account covers sales, fees, and charges as well as grant income from EU.

This study adopted the structure of the CEPA 2000, with a minor adjustment: Administration (9.1) and Education (9.2) were excluded from the CEPA 9 and grouped together in a tenth class.

Methodology (approach, data collection and sources)
On of the objectives of the study was to transform the EPE collected into a set of tables consistent with the SERIEE-based EPEA. Adapted version of the 3 principals tables (A, B and C) were compiled for the whole period.

For the calculation of the government output (table B), operating costs (compensation of employees and intermediate consumption) came directly from the EPE data collected. Because of the insufficient information on the stock of capital, the consumption of fixed capital was calculated as a proportion of the operating cost: 30% for wastewater management, 15% for waste management, and 5% for the other activities. Taxes on production were assumed to be zero. Most of the government sector output is assumed to result from non-market activities. However waste management and rural sewage were regarded as market services (calculated as receipts, fees and charges).

The public national EPE (table A) is composed of the government sector non-market output, its capital formation and land acquisition, and the transfers to domestic producers (current and capital transfer) and households (subsidies on products and services, capital transfers) and the net transfers to the rest of the world.

The financing table (C) is relatively similar to the expenditure table (B) since government spending is identified as collective consumption. No distinction is made between central and local government since the emphasis has been on avoiding double counting instead of collecting all data available.

[64] - Ecotec Research Consulting Ltd (1993), *A review of UK environmental expenditure*, Report to the Department of the Environment, London, HMSO.

The first ONS public EPEA has been compiled using the following data sources:

- The national accounts. The COFOG 5 on environmental protection covers all activities by the Environment Protection Group at the Department for Environment, Food and Rural Affairs (DEFRA) whether or not they fall within the definition of EP. On the other hand, EP activities of other departments are not covered. The COFOG classification used by the UK does not provide any detail about the environmental issue that the expenditure is aimed at.
- The annual report and accounts of relevant departments and agencies. Since expenditure items cover both environmental and non-environmental objectives, the ONS also used policy documents describing the objectives of spending programmes, as well as detailed budgets from some accounting divisions, and personal communications with experts within the relevant organisations.
- The budgets of local authorities (published summaries of revenues and capital expenditure) and additional unpublished information directly obtained from data collection Departments responsible.

Also, data had to be extrapolated back- or forward when data was not available for the whole period surveyed. Estimates were also made for some of the devolved administrations by reference to the costs of similar services elsewhere in the UK.

Norway

Methodology work for environmental protection investment and current expenditures in the manufacturing industry, Statistics Norway, Report to Eurostat (grant agreement n°200071700005) prepared by Julie L. Hass and Tone Smith, Statistics Norway, 31 January 2002, 25p. Report published by Statistics Norway, *Documents n° 2002/3* , March 2002 and presented at the Meeting of the Working Group "Environment and Sustainable Development" - Sub-Group "Environmental Expenditure Statistics", 6 and 7 March 2003 [Doc. ENV-EXP/WG/009/03.6 (2003)] (Study n°3)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/epe_in_norwaypdf/_EN_1.0_&a=d

The report does not deal with EPEA compilation. It is about methodological issues related to the collection of EPE data from companies that belong to the manufacturing industry. This study intended to identify and evaluate the different options and approaches that Statistics Norway could use in the future.

As background information, the report gives a brief history of the EPE statistics in Norway (chapter 2). A focus is made on the definition of EPE and the information potentially available from companies in Norway (chapter 3), before dealing in detail with the questionnaire (provided in annex in Norwegian) prepared by Statistics Norway (based on a 1999 pilot study) and its evaluation (chapter 4). This evaluation involved statistical experts from Scandinavian countries, representatives of enterprises and industry organisations. Also, a methodological working group was set up at statistics Norway.

Concerning the questionnaire, the report concludes that requesting a brief description (as in Sweden) of the investment would help the statisticians as regards the distribution across environmental domains. A list of investment types would be helpful for the respondents in the enterprises. About the organisation, the survey should be coordinated with the annual industry survey and electronic reporting needed to be developed further. Finally, a wider focus rather than only EPE activities needed to be considered, i.e. including resource management related expenditure.

Coverage (years, domains, sectors and components of expenditure)
No data were collected within this study. The survey in preparation anticipated on the changes that were expected then in the structural business statistics (SBS) regulation (see above Denmark and Sweden).

In this context, the survey was planned to cover EPE related investment and current EPE of enterprises/establishments belonging to the manufacturing industry (NACE 15-37). However,

according to the authors, oil extraction industry (NACE 11) and electricity supply industry (NACE 40) needed to have special consideration in Norway.

The EPE were to be distributed into 4 domains: air/climate protection, wastewater management, waste management, and other EP. Because of a strong national interest in reducing energy use, the corresponding expenses were included as long as they have a positive impact on air/climate protection.

Methodology (approach, data collection and sources)
As indicated above, the report does not deal with EPEA compilation.

"Work related to 'Environmental expenditure accounts' for Joint Questionnaire (JQ) reporting in 2004", Chapter 5 in *Norwegian Economic and Environmental Accounts (NOREEA) Project 2003*, Report to Eurostat (grant agreement n° 200241200013) prepared by Julie Hass and Knut Sørensen (ed.), Statistics Norway, March 2004, pp. 78-96. (study n° 30d)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/noreea-final-report-2003/_EN_1.0_&a=d

Chapter 5 of the NOREEA 2003 is mainly report on the improvements of the EPE data in order to fill in the JQ by Statistics Norway, especially as regards the public sector. However, it includes preliminary EPEA estimates related to the central government.

The chapter starts with the major improvements in the public EPE data in Norway since the previous report (5.1). This section also includes the abovementioned EPEA data for the central government. The next section (5.2) deals with the calculation method used to fill in of the JQ tables related to the public EPE (compared to the previous reporting with the JQ, Statistics Norway split the public sector from the public specialised producers). This section also includes an overview table of the data sources by type of EPE categories in the JQ and an adapted table 1 of the JQ showing the public EPE in Norway by type of public government unit (central, country, and municipality) and by EP activity. Concerning the completion of the JQ2004 (5.3), the report provides the EPE data availability for the different JQ tables (2001 and 2001 data were available for the whole table 1 on the public sector; they were mostly available concerning the mining & quarrying and manufacturing industries).

In the conclusion (5.4), Statistics Norway briefly discusses the advantages (exhaustiveness, consistence with SERIEE) and disadvantages (necessity to split public specialised producers from public sector, distribution across CEPA classes and the estimation of EPE from non-homogeneous expenditure) of adopting a method directly based on national accounts to produce the JQ-data.

Coverage (years, domains, sectors and components of expenditure)
The EPE by central government presented then referred to 2001 and were distributed across the 9 CEPA classes plus an additional class for the EPE that could not be allocated to CEPA classes.

The report does not indicated whether both EP services and connected & adapted products were taken into accounts.

Methodology (approach, data collection and sources)
The EPEA data for the central government are not presented in adapted SERIEE tables.

EPE data by local government sector come from the KOSTRA system to which all municipalities have to report their financial accounts since 2002. Concerning environmental activities, the new accounts definitions correspond well to the CEPA. Statistics Norway acknowledged that there were some EPE in municipal accounts they have not been able to identify then, but the corresponding expenditure were expected to be of minor importance.

Most of the public specialised producers (excluding publicly owned liability corporations) are also required to report their accounts to the KOSTRA system, since 2001 or 2004 depending on their judicial form of organisation. However, local public units with separate financial accounts (municipal enterprises, inter-municipal corporations, publicly owned foundations etc.) were rarely reporting to the KOSTRA systems. An investigation carried out in collaboration with the Division of Public Finances showed that the KOSTRA system covered then only a very narrowly defined municipal sector.

The budget analysis implemented by Statistics Norway showed that the COFOG-based EPE underestimates the actual EPE by central government. Only the environment ministry was included in the environmental COFOG codes.

Environmental Protection Expenditure - 2002 data for Manufacturing, Mining and Quarrying, and Steam and Hot Water Supply; Methodological work for the Oil and Gas Extraction Industry (NACE 11) and preliminary figures for 2002, Report to Eurostat (grant agreement n°200271700007) prepared by Julie L. Hass (ed.), S tatistics Norway, December 2004, 73 p. (Study n°13)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/manufacturing_quarrying/_EN_1.0_&a=d

This does not deal with EPEA compilation either, but with the EPE data collection for the 3 industrial domains for which surveys needed to be adapted to the new reporting requirements of the SBS regulation regarding EPE in enterprises[65].

The report is composed of 3 parts. The first part (chapter 2) presents a short description of the work undertaken in the mining and quarrying and manufacturing industries. Results from the EPE survey are presented in summary tables (detailed industry level data are provided in the appendix). The second part (chapter 3) briefly describes the work done and the results concerning the steam and hot water supply industry. The third part of the report (chapters 4 and 5) deals with the petroleum and natural gas extraction industry. It starts with an overview of the environmental challenges this industry faces in Norway, before presenting of the preliminary results for the end-of-pipe investment from the 2002 census survey and examining other countries and industry organisations' approach. Due to the lack of statistical data (Ministry of petroleum and energy) and the high cost of such a survey, an alternative model-based approach is presented as the focus for the future development.

The report concludes that despite some gaps, major proportion of EPE statistics in Norway complied then with SBS regulation requirements. Only oil and gas extraction industry deserved additional development work.

Coverage (years, domains, sectors and components of expenditure)
The data presented in the report refer to the year 2002 for industries that are covered by the SBS regulation:

- For the manufacturing industry (which is defined in Norway as NACE 10 and 12 to 37), Statistics Norway carried out a sample survey, of which the results were not but not grossed up at this stage (this needed further work[66]). The results that covered both capital (end-of-pipe and integrated technologies related investments) and current EPE were presented at NACE 2-digit en finer level of detailed (appendices).
- For the steam and hot water supply industry (NACE 40.3), the data on end-of-pipe investment only came from an annual census survey. The electricity and gas supply industries (NACE 40.1 and 40.2) were not included since their EPE should not be as significant in Norway (mostly hydroelectricity and almost no commercial gas supply).
- The end-of-pipe investment data presented for the petroleum and natural gas extraction industry NACE 11 resulted from the industry survey, of which the standard questionnaire included environment related questions.

Most of the EPE data were distributed then into 5 environmental domains: air/climate protection, wastewater management (including cooling water for NACE 11), solid waste management, biodiversity and landscape protection (except for NACE 11) and other EP (including noise abatement, R&D, management systems, etc.).

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[65] - Regulation (EC) No 2056/2002 mentioned above concerning Denmark and Sweden.
[66] - Grossing up methods that were tested in order to evaluate what was the further work needed, as well as a comparison of the surveys' results for 2000, 2001 and 2002, are presented in Hass J. (2004), *Compilation of data on expenditure in Environmental protection by businesses*, Report to the European Commission DG Environment, Statistics Norway, Documents n° 2004/15, November 2004, 71 p.

Methodology (approach, data collection and sources)
As indicated above, the report does not deal with EPEA compilation.

"Work related to environmental protection expenditure accounts for central government" Chapter 7 in Pilot studies for the development of environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Report to Eurostat (grant agreement n° 200241200013) prepared by Julie Hass and Knut Sørensen (ed.), Statistics Norway, May 2006, pp. 47-57. (study n°33d)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/norway_2005_noreeapdf/_EN_1.0_&a=d

This chapter of the NOREEA 2005 reports deals with the latest development about the EPE of central government (CG) that are dedicated to the Norwegian EPEA. The work on this point has focused on the improvement of the previous budget analysis methodology.

The chapter starts with the improvements in the budget analysis methodology (7.1): the split of non-homogeneous CG expenditure items, the distribution into CEPA classes, and the avoidance of double counting related to transfers to other CG units. Concerning the methodology for establishing times series (7.2), it was decided to carry out a budget analysis every year because of the possible changes in the organisation of some ministries. The comparison between COFOG-based statistics EPEA (7.3) shows that these 2 data sources were not yet consistent. Total EPE resulting from the budget analysis was more than twice as the COFOG-based estimate (the difference was even larger for local government EPE). The COFOG codes were used then mainly for activities of the environment ministry, excluding therefore EP activities carried out by other ministries.

However, the conclusion (7.4) of the chapter was that it would be ideal if in the future the COFOG-based statistics would provide the relevant EPEA data as regards the general government (central, regional and local). This would therefore imply a number of major changes, including for the distribution across CEPA classes.

Coverage (years, domains, sectors and components of expenditure)
The EPE by central government presented then referred to 2001 and 2002 and were distributed across the 9 CEPA classes (the category 'unallocated to CEPA' was suppressed). These data were considered of good enough quality to be presented as official statistics.

The report does not indicated whether both EP services and connected & adapted products were taken into accounts.

Methodology (approach, data collection and sources)
The EPEA for the central government are presented similarly as for the NOREEA 2003. Compared to the previous estimation the overall result increased by 36% due to a better identification of EPE in non-homogeneous public expenditure. The major change concerned the category 'other EP activities' that almost doubled.

The data presented resulted from budget analysis. When the budget figures are not detailed enough, EPE are estimated from non-homogeneous expenditure items, either from the text-part of the budget or using proportions of employees working with environmentally related issues. Concerning the distribution across EP domains, almost all EP records in the CG accounts a CEPA 4-digit code. The changes operated to avoid double counting related to transfers to other CG units resulted in higher EP related subsidies compared to environmental SNA identified in chapter 8 of the report (see the section on taxes and subsidies).

Switzerland

Dépenses de protection de l'environnement des entreprises – Résultats de l'enquête 2003, Jacques Roduit, Office fédéral de la statistique (OFS), Neuchâtel, décembre 2006, 43 p. (ISBN 3-303-02097-3) (study n°16)

http://www.bfs.admin.ch/bfs/portal/fr/index/themen/02/22/publ.html?publicationID=2459

This publication of the OFS (Swiss federal statistical office) presents the results the survey on EPE by enterprises in 2003. Preliminary results were previously published in an 8-page publication[67].

The report starts with a brief methodological presentation (chapter 2), before focusing on the results (chapter 3). Some of the documents in the annexes provide both additional statistical information (sampling, questionnaire) and detailed results (by industry).

From the results presented, one can remember that, in 2003, the Swiss industry (NACE 10-41, excluding NACE 37) dedicated 1.4% of its value added to environment protection, which was a similar proportion to the EU countries' average. This year, 40% of the overall EPE by the Swiss enterprises taken into account (NACE 10-74, excluding NACE 37) were dedicated to waste management, 29% to wastewater management and 19% to air and climate protection.

Coverage (years, domains, sectors and components of expenditure)
The OFS's survey of which the data are presented in this publication refers to the year 2003. Some comparisons are made with the 1993 data.

The publication covers economic activities from mining & quarrying to other business activities (NACE 10-75), excluding recycling (NACE 37). The detailed data provided in annex are broken down into 16 NACE-based industries (as concerns industries, the industry breakdown was almost compatible with the SBS regulation requirements). The OFS excluded specialised producers form its investigation, considering that their EP services are purchased by enterprises from the other industries.

The EPE taken into account cover investment (end-of-pipe and integrated technology) and current expenditure related to the purchase of EP services municipal wastewater and solid waste management fees.

The EPE are distributed across 4 CEPA-based activities: air and climate protection, wastewater management, waste management, and other EP activities (noise abatement, protection of biodiversity and landscape, soil and groundwater protection, R&D, and other EP activities)

Methodology (approach, data collection and sources)
This publication does not deal with EPEA, the OFS referring to the OECD/Eurostat joint questionnaire.

A 1.1.2 Environmental industries

Belgium

The Belgian environment industry (1995-2005), Report to Eurostat (grant agreement n°71401.2005.001-2005.288) prepared by Lies Jansse n and Guy Vandille, Federal Planning Bureau, 2007, 62 p. (study n°112)

This report presents the economic importance of the environment industry in Belgium together with the evolution of its size, specifying the involved industries and which are the most important environmental domains.

The report is organised in four main sections. The first one, the introduction, concerns the definition of the environment industry (in this study, the definition of the OECD/ Eurostat Informal Working Group - 1996, has been used) and the classification of the Belgian environment industry (here classified in three categories: the "Pollution management group", the "Cleaner technologies and products group" and the "Resource management group").

In the second section it is described the scopes and the objectives of the study and the methodology used in building the Belgian database of the environment industry.

[67] - *Dépenses de protection de l'environnement des entreprises – Premiers résultats*, Jacques Roduit, Office fédéral de la statistique (OFS), Neuchâtel, Juillet 2005, 8 p. (this publication is also available in German).
http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/lenvironnement_resultats/_EN_1.0_&a=d

The third section (results) analyses the structure of the environment industry in Belgium, focusing on the "demography of the environment industry" (number and size of firms, distribution according to the NACE classification and the environment industry according to the environmental classification) and on "the Economic impact of the environment industry" (production and employment).

The fourth section (conclusions) outlines that in the reporting period (1995-2005) the number of firms increased by 50%. In 2005 the environmental Belgian industry represented the 0.33% of the total number of Belgian firm (of which 60% were small firms, 30% medium sized firms and 10% large firms). It has also outlined that the Belgian environment industry output, at current prices, increased by 67% in the period between 1995 and 2005 ant its share in total Belgium output increased from 2.34% to 2.52%.

The annexes contain the classifications used (CPA, NACE) and the tables of data

Coverage (years, domains, industries, variables)
The data presented in the report refers to the period from 1995 to 2005.

The Belgian database of environment industry covers all organisations which conducted environment activities during the period 1995-2005 (including non-governmental organisations and associations, e.g. non-profit institutions). For each of them, the information concerns the production, the employment, the activity according to the NACE and the environmental activity according to the environmental classification. The following areas of the Belgian environment industry are assessed: the industry structure (number and size of firms), the industry structure according to NACE branch, the industry structure according to environmental domain, the contribution to Belgian production and the contribution to total employment in Belgium.

Methodology (approach, data collection and sources)
The *supply side approach* has been used. It is based on the production data of environmental goods and services providers for principal and secondary activities, augmented with demand side data for ancillary activities.

Data concerning ancillary activities is obtained from the Belgian Environmental Protection Expenditure Accounts (for the period 1997-2002 and mainly concerning manufacturing industries).

The Belgian database of environment industry includes all types of legal entities and all organisations with an administrative seat in Belgium and in possession of a VAT number and the database of the National Accounts provided the information on the NACE classifications for each company and for each year of activity in the environment industry.

All companies from the divisions 37 and 90 were extracted from the Register for Enterprises of the National Bank of Belgium (NBB) for the years 1995 to 2005 and added to the environment industry database after a check of their activities. The inquiry into the NBB database was based on the NACE-BEL[68] categories, the economic classification for the classification of Belgian enterprises.

As regards the enterprises involved in environmental activities, not belonging with NACE 37 or NACE 90 divisions, the following sources were used to identify the firms:

- Flemish Government
- Walloon Government
- Brussels-Capital Government
- EMIS: Energy and Environment Information System
- OVAM: Public Waste Agency of Flanders
- Coberec: Belgian Recycling Federation.
- FEBEM/FEGE: Federation of Enterprises active in Environmental Management
- AGORIA: Multisector Federation for the Technology Industry

[68] - NACEBEL: Belgian version of the NACE, with a five-digit classification. Three versions of the NACEBEL were used in this study: NACE-BEL 1996, NACE-BEL 2000 and NACE-BEL 2003.

- FEBELAUTO: This organisation coordinates the interests of all firms playing a part in the recycling of cars.
- VVS : This non-profit institution groups all processors of building and dismantling debris

The Crossroad Bank of Enterprises of the Federal Public Service Economy and the Central Enterprises Database of Flanders of the Flemish Community was used in order to examine their activities. The economic data on the enterprises was collected from other sources (e.g. the database of the Central Balance Sheet Office). The Crossroad Bank of Enterprises of the Federal Public Service Economy and the Central Enterprises Database of Flanders of the Flemish Community was used in order to examine their activities.

France

Environmental employment in France, methodology and results 1996-1998, Report prepared for the DG Environment and Eurostat by the French environment institute (Ifen), Eurostat Working Paper n°2/2000/B/7, 15 May 2000, 54 p. (study n ° 89)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp00fei_pdf/_EN_1.0_&a=d

This report is the fourth of a series of Eurostat 4 Working Paper released in 2000 presenting the outcome of pilot exercises dealing with environment industry and/or environment-related employment that were undertaken by Dutch, French, Portuguese and Swedish relevant statistical bodies.

The report is split into 3 parts that are respectively dedicated to the definition of environmental employment (the definition adopted is compared with other definition and a chart show what is the coverage of the Ifen's estimate), the methodology adopted and the presentation of the results (detailed tables showing the data by environmental domains and either by type of jobs – environmental services, production of goods and facilities or by sectors – private environment industry, public services, ancillary producers; a new version of the abovementioned chart is presented including the corresponding data).

The methodology presented in this study was published later in *Dossier* that accompanied the publication of the 2000 French environmental accounts[69]. Since then, the updated series on environmental employment in France is included in the French annual environmental accounts.

Coverage (years, domains, industries, variables)
The estimations presented cover the period 1996 to 1998.

Like the above Dutch report, the French 2000 Eurostat Working Paper focuses on environment-related employment (i.e. the number of jobs that are directly connected with environmental activities) and cover both the environment industry (private specialised producers, 57% of the jobs in 1998), the governmental sectors (public specialised producers and environmental administration) as well as ancillary producers (environmental jobs for internal use).

However, unlike Statistics Netherlands, the Ifen's estimate covered EP services and the production of EP equipment and facilities, i.e. it did not include the jobs connected with the manufacture of adapted products or facilities.

Concerning the environmental activities, the Ifen report covered both EP activities (air protection, wastewater and waste management, soil and ground water remediation, noise abatement, measurement and monitoring) as well as resource management activities (water supply, recovery, conservation and biodiversity) plus living environment, transversal activities and R&D.

Methodology (approach, data collection and sources)
The Ifen's estimate of environmental employment was based on a definition of environment which was consistent with the definition used for the estimation of the French national EPE, except 2 little

[69] - *Emploi et environnement*, Rapport de la commission des comptes et de l'économie de l'environnement, Institut français de l'environnement (Ifen)/ Ministère de l'écologie et du développement durable, Lavoisier Tec&Doc, juin 2002, 112 p.

differences. Adapted products were regarded as not providing specific jobs and sol remediation was included even though this activity was not yet covered by the French EPEA.

Each type of expenditure is linked to production which is broken down between national production (which creates domestic jobs) and imported production. For each type of expenditure, imports were deducted and exports (which provide domestic jobs) were added.

Once the environment related production is calculated, different ratios (number of jobs / turnover) are then applied to the various types of productions. A stressed by the authors, the underlying assumptions are rather strong: average ratios were used for any category of products or services, when necessary even more general ratios were used (e.g. professional capital equipment), and the same ratios were used for private and public services.

The French approach relied on the various data sources used for the compilation of the French EPEA, and employment ratios from the statistical service of the ministry of industry (SESSI) and the national statistical office (INSEE).

Netherlands

Environment-related *Employment in the Netherlands, 1997* - Prepared for DG Environment and Eurostat by Egon Dietz, Rob Kuipers and Rob Salomons, Statistics Netherlands, Eurostat Working Paper n°2/2000/B/3, 17 March 2000, 16 p. (study n°85).

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp00nlei_pdf/_EN_1.0_&a=d

This report is the first of a series of 4 Eurostat Working Paper released in 2000 presenting the outcome of pilot exercises dealing with environment industry and/or environment-related employment that were undertaken by Dutch, French, Portuguese and Swedish relevant statistical bodies.

After a short introduction, the report starts by describing the project: objective, method, and data quality (chapter 2). The next chapter entitled 'Results' (chapter 3) presents actually the data sources for each component of the estimation and the results are provided in the concluding chapter (4) in which an overview table that includes the data by industry, indicators of the data quality, and information on the availability of the corresponding data.

Coverage (years, variables, domains, industries)
Like the above French report, the Dutch 2000 Eurostat Working Paper focuses on environment-related employment (in principle the number off people registered, including temporary workers, the 31 December; for some of the sources, e.g. professional organisations, the data provided corresponded to the current situation when they were contacted).

Statistics Netherlands did not focus on environment industry. In addition to the specialised producers (NACE 37, 51.57, 90, and 45), the estimation presented in this document covers also other private enterprises undertaking environment-related activities for own account (within NACE 10-41) as well as and governmental sectors (within NACE 73, 75, 80 and 90).

The Dutch estimation covered both the production of services (including environmental engineering and consulting) and equipment related to air & climate protection, wastewater and waste management (including recycling), soil and ground water protection, noise abatement, biodiversity & landscape. It also included governmental sectors' activities like environmental policymaking/law enforcement, education/information, and research and development.

Methodology (approach, data collection and sources)
Statistics Netherlands referred then to the 1999 OECD/Eurostat manual.

The methodological adopted consisted in six principal tasks:

- creating an indicative database of the potential relevant enterprises;
- examining the existing statistics (available at Statistics Netherlands as much as possible): production statistics (specialised producers), environmental expenditure (ancillary producers),

municipal waste collection statistics, costs and financing of environmental control, Statistics on water quality control, Statistics on public finance, Statistics on R&D;

- using the business register (which was a very important source) and connecting the register to abovementioned database on potential relevant enterprises;
- using annual accounts or budgets of governments (governmental sectors);
- contacting industries' organisations and ministries and comparing sources: Association contractors Noise Abatement Projects (AGHP), Dutch Industrial Cleaners Association (DICA), Association of Noise Abatement enterprises (VOG), Technical and Vocational training Council (HBO-Raad), Dutch Association of Soil Cleansing Companies (NVPG), Association of firms of consulting engineers (ONRI), Association of the sewer branch (RIONED), Dutch association of suppliers of environmental equipment and technology (VLM);
- Confronting and compiling the sources.

As stress by the authors the results were to be considered as preliminary since some of the estimations were not robust enough, some data were available only at aggregated level, and some of the sources referred sometimes to different years.

Economic indicators for the Eco-Industries in the Netherlands, 2003, Report prepared for Eurostat (grant agreement n° 71401.2005.001-2005-298) and Statistics Netherlands (NAMEA, National Accounts) by Maarten van Rossum and Sjoerd Schenau, Statistics Netherlands, 2006, 48 p. (study n°128)

This report prepared by Statistics Netherlands analyses the possibilities of supplying information on Eco industries in the future and the compilation of standard tables using the *supply side approach*.

The study, organised in six chapters, starts with an introduction presenting an overview of the pilot study (introduction and background, objectives and Methodology and structure of the report)

In chapter 2 the theoretical framework (general definition, classification of Eco Industries and supply side approach) is presented. Chapter 3 describes the methodological framework. Chapter 4 is dedicated to the results. Chapter 5 presents the conclusions and the recommendations. The standard tables of the eco-industries (turnover, the value added and the employment), excluding the resource management category, are presented in a 6th chapter.

Coverage (years, variables, domains, industries)
The study refers to the year 2003.

Two groups of eco-industries were identified:

- The private eco-industries (further sub-divided in 3 groups: principal, secondary, and ancillary producers): pollution management and cleaner technologies.
- The public eco-industries: pollution management and research & development.

The variables investigated are turnover, value added and employment (the authors stated that it was difficult to collect data on eco-industries exports).

The following *core Industries* are included:

Recycling (NACE 37), Wholesale of waste and scrap (NACE 51.57) and Sewage and refuse disposal, sanitation and similar activities (NACE 90). Retreading (NACE class 2512) is not included due to confidentiality problems (only one company in the Netherlands).

The following Non-core Industries are included:

- NACE 74303 (Environmental monitoring and analysis)
- NACE 742 (Industrial Cleaning)
- NACE Engineering and consulting

Methodology (approach, data collection and sources)
Statistics Netherlands refer to the 1999 OECD/Eurostat manual. The *supply side approach* has been used, based on:

- New directed surveys of the environmental producers
- Use and combination of existing sources of information
- Producers statistics, 2-digit level (recycling and environmental services), as well as 4 and 5-digit level
- Environmental Statistics
- R&D (expenditures) Statistics
- Product classifications (using PRODCOM codes and HS codes)
- Budgets of governments
- Database of environmental related producers by identifying individual producers (Constructing a so-called indicative database):
- Using the Business registers (Algemeen Bedrijfs Register)
- Business associations
- Internet search with use of keywords
- Yellow pages

The authors stated that in the supply side approach, there is a problem concerning the non-core industries due to the difficulty in splitting the environmental related activities performed by the industry and consultancy and engineering branch into specialised activities or non-specialised activities.

Concerning the estimation of **secondary activities**, the following three methods have been developed by Statistics Netherlands:

- the PRODCOM-approach (excluding the construction sector);
- the ABR-approach (excluding exports data)
- and the demand side approach.

Concerning the **ancillary activities** in the private sector, data on employment and value added is calculated using economic assumptions. Information on costs is only available for the manufacturing industry and not for the services industry.

Austria

Improvement of data quality in Environmental Expenditure Account as well as in Eco Industry – Sample survey at service industries, Report to Eurostat (grant agreement n° 71401.2005.001-2005.285) prepared by Sacha Baud, Statistics Austria, Vienna 2006, 51 p. (study n°113)

The Austrian report deals both with **environmental service industries** and **environmental protection expenditures of service industries**. The study is based on two surveys carried out by Statistics Austria.

Chapter 1 present the objectives and expected results of the project. The current data status and the timetable of the activities are presented in chapter 2 and 3 respectively.

The methodology is presented in chapter 4, including the description of the two surveys (selection of the branches, sample, and the execution). The questionnaires are presented in the annex together with information related to the compilation. In addition, due to a very low response rate of the survey on environmental service industries, a non-response analysis was also carried out through another survey (questionnaire annexed to the report). Chapter 5 shows some of survey's results on environmental service industries and chapter 6 deals with the main problems related to the survey (including the proposals for the future).

Coverage (years, variables, domains, industries)
The report covers years 2003 and 2004.

The branches covered by the survey on **environmental service industries** (referring to the previous Austrian studies and to the recommendations of the Eurostat Task Force on Environment Industries) and classified using the ÖNACE (NACE 6-digit) are the following:

502004: Electrical repair of motor vehicles
502005: Other maintenance and repair of motor vehicles
504002: Maintenance and repair of motorcycles
515701: Wholesale of metal waste and scrap
515702: Wholesale of other waste and scrap
641200: Courier activities other than national post activities; only bicycle couriers
652200: Other credit granting
731000: Research and experimental development on natural sciences and engineering
741100: Legal activities
741401: Business and management consultancy activities (except public relations consultancy)
742001: Architectural activities
742002: Engineering activities and related technical consultancy
743000: Technical testing and analysis
747002: Chimney cleaning
747004: Cleaning of tanks and boilers
751200: Regulation of the activities of agencies that provide health care, education, cultural services and other social services, excluding social security
751300: Regulation of and contribution to more efficient operation of business
804200: Adult and other education n.e.c.
913300: Activities of other membership organizations n.e.c.
925200: Museums activities and preservation of historical sites and buildings
925300: Botanical and zoological gardens and nature reserves activities

Information about companies dealing with renting out of mobile toilets for different uses was also collected in the following branches:

514602: Wholesale of orthopaedic appliances and medical and surgical equipment
672000: Activities auxiliary to insurance and pension funding
713400: Renting of other machinery and equipment n.e.c.
714002: Renting of sports equipment
714005: Renting of other personal and household goods n.e.c.
923300: Fair and amusement park activities
927200: Other recreational activities n.e.c.
930500: Other service activities n.e.c

The survey on **EPEA of the service industries** covered trade and service industries, including public administration, defence and compulsory social security.

Methodology (approach, data collection and sources)
For the **environmental service industries**, the report refers to the 1999 OECD/Eurostat manual.

The questionnaire on environmental services industries concerns the following topics: main activity (according the 2-digits ÖNACE code), kind of environmental activity offered, services description, environmental management systems implemented, number of employees in the reporting period, revenues and incomes in the reporting period, expenditures in the reporting period, investments in the reporting period, environmental turnover of Austrian enterprise units by sales market. The remaining

questions deal with R&D activities, patents, concessions, industrial property rights and similar rights as well as licences derived out of it.

The response rate of this survey was very low (20%). Therefore a non-response analysis was also carried out through a specific survey (questionnaire annexed to the report)

For **EPEA of the service industries**, he report refers to the Eurostat's 1994 SERIEE manual and 2002 compilation guide.

The questionnaire on environmental protection expenditure of the service industries concern the following topics: main activity, number of employees, revenues and total investments in the reporting periods; use of, bought or self-performed activities for environmental protection in the reporting periods or not (YES/NO question); expenditures for environmental protection activities. A brief description of the carried out environmental activities and information about the environmental management systems implemented (i.e. EMAS, ISO 14001) are also requested. The response rate of this survey was also very low (21%), most of enterprises answering that they have no EPE.

The results (chapter 5) concern only the survey on (selected) environmental services industries. In this chapter the following variables are showed: turnover, employees in environmental activities, kind of service, environmental management systems, environmental turnovers by sales markets, research and development; patents, concessions, industrial property rights and similar rights as well as licences derived out of it.

Portugal

Environment Industry and Employment in Portugal, 1997, Prepared for DG Environment and Eurostat by Nuno Romao, Instituto Nacional de Estatistica do Portugal, Eurostat Working Paper n° 2/2000/B/4, 7 April 2000, 25 p. (study n°86).

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp00pei_pdf/_EN_1.0_&a=d

This report is the second of a series of 4 Eurostat Working Paper released in 2000 presenting the outcome of pilot exercises dealing with environment industry and/or environment-related employment that were undertaken by Dutch, French, Portuguese and Swedish relevant statistical bodies.

The study presents the results obtained on measuring the environment industry and environment-related employment together with the methods developed for estimating environmental employment. Results of a specific survey of private specialised environmental business enterprises are also presented. This survey presents the volume of turnover broken down by environmental domain according to the activity. A specimen of the questionnaire is provided in annex.

Coverage (years, variables, domains, industries)
The present study refers to the year 1997.

The study covers both the core environment industries: Recycling (NACE 37), Wholesale of waste and scrap (NACE 5157) and Sewage and refuse disposal, sanitation and similar activities (NACE 90) and non-core environment industries (renewable energy production, architecture and miscellaneous).

The data are classified according both to the European classification of environmental protection activities (CEPA) and the NACE-based Portuguese industry classification (CAE Rev. 2).

Methodology (approach, data collection and sources)
The main data source is the INE *Eco-enterprise survey*. The response rate of this survey was 80% (424 enterprises) of all enterprises (526 enterprises) surveyed, representing around 60% of the total survey universe. The population of units surveyed corresponds to the concept of specialist producers set out in the SERIEE Manual (§ 2021).

Sweden

The Environment Industry in Sweden, 1999, Prepared for DG environment and Eurostat by Lena Tängdén and Peter Svensson of Statistics Sweden, Eurostat Working Paper n° 2/2000/B/5, 14 April 2000, 44 p. (study n°87).

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp00sei_pdf/_EN_1.0_&a=d

This report is the third of a series of Eurostat 4 Working Paper released in 2000 presenting the outcome of pilot exercises dealing with environment industry and/or environment-related employment that were undertaken by Dutch, French, Portuguese and Swedish relevant statistical bodies.

The objective was to continue the work engaged for a previous report[70] making a database of enterprises and establishments. The work was implemented in five phases:

- the identification of the enterprises/establishments (OECD/Eurostat definition of environment industry);
- the identified enterprises/establishments were classified by environmental industry classes and status;
- these enterprises/establishments were matched with the Swedish Business Register (enterprise/establishment numbers).
- a database on environment industry was compiled, split into enterprises and establishments.
- each enterprise/establishment number is linked with the Register for value added tax (VAT) in order to produce data about turnover and export- import figures and a database with data about education of the employees (LOUISE-database).

In the section on future work, the authors state that even if an Environment Industry database was created by this study, it needed further improvement in order to get it as complete as possible. This improvement could be realised carrying out additional survey studies.

Another improvement in the existing information should be the availability of a description of activity for all enterprises also in the Swedish business Register, being this information only available in some of the used sources. New areas of interest, as well as ethic enterprises, are not easy to be analysed by the mean of the ordinary registers. In addition, the growing market of eco-labelled products entails the inclusion of these producers into the Environment Industry database. Finally for future studies, the environment industry should be further analysed according to turnover, export, education and unemployment.

Coverage (years, variables, domains, industries)
Employment data of the environment industry refers to the years 1997 and 1998. Data on environmental industry's activity covers the years 1997. The data collected on environmental certification systems ISO 14 000 / EMAS covered the years 1998 and 1999.

Industries are classified following the NACE rev. 1 and the environment industry statistical framework developed by Eurostat together with OECD.

Methodology (approach, data collection and sources)
The main sources used for the inventory/identification of environmental enterprises/establishments were (from the previous work) were the Statistics Sweden Business Register, the Swedish EnviroNet, the 1997 report to Eurostat and the DG Environment[71], manufacturing statistics, the Telephone directory and the energy statistics.

The following additional sources were investigated:

[70] - Tänghén T, Nyman M. and Johansson U (1999), *The Environmental Industry in Sweden*, Eurostat Working Paper 2/1999/B/3, June 1999, 50 p.
[71] Ecotec, BIPE and IFO (1997), *An estimate of Eco-Industries in European Union 1994*, Eurostat Working Paper n°2/1997/B1, 25 March 1997, annex 2 – Detailed countries profiles.

- Internet databases ”Business calendar” and ”Företagsfakta”;
- Internet databases PAR/Bizbook;
- Swedish EnviroNet;
- Eco-Tech exhibition and Ecology 99;
- Survey of waste management (Statistics Sweden);
- The Swedish Ecotourism Association;
- The Swedish Windpower Organisation (SVIF);
- Solar Energy Association of Sweden – SEAS;
- Newspaper articles, Internet and Television;
- KRAV and DEMETER;
- The Forest Stewardship Council (FSC)
- The Pan European Forest Certification (PEFC);
- Environmental certification systems (EMAS and ISO 14 001).

The Environment Industry in Sweden, 2000 - Employment and economic data for enterprises primarily producing environmental goods and services, Prepared for DG environment and Eurostat by Lena Tängdén, Ulf Johansson, Madeleine Nyman and Peter Fränngard of statistics Sweden – Eurostat Working Paper n°2/2000/B/10, 12 Decembe r 2000, 60 p. (study n°92)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp00sei00_pdf/_EN_1.0_&a=d

This application is a continuation of the *The Swedish Environment Industry in 1999* (see above) and shows the results obtained on measuring the environment-related employment and the environment industry in Sweden. As regard to the employment, the report gives a detailed description of its structure in the environment industry. Moreover, it covers other several aspect of employment as the geographical distribution, age, sex, level and orientation of education, income and former unemployment. On the other side a detailed economic description of the enterprises, involved in producing environmental goods and services, is presented (number of enterprises, private and public ownership, turnover and exports and with a section on SMEs).

In this report, new sources of information regarding exports have been used (foreign trade statistics – Intrastat). The financial information on environment industry is presented using the operating profit, the annual result, the value added and the gross investment. Small and medium-sized enterprises (with less than 50 employees), representing the 97% of the total of environment enterprises, have also been investigated.

In the section on future work, the authors reiterated the conclusion of the previous report (see above) according to which further work was necessary in order to make it as complete and correct as possible, even if the environment industry database has been improved. In addition, the introduction of a specific survey concerning a selection of environment industry enterprises was considered as useful in order to improve the database. Another important remark was about the Swedish Business Register. Finally, new areas of interest (ethical enterprises and eco-labelled producers) were not easy to examine using the ordinary registers.

Coverage (years, variables, domains, industries)
The turnover of the environment industry in Sweden was estimated for the year 1999. Evolution of the turnover and the number of enterprises in the core environment industries was presented for the period 1996-1999 and 1996-2000 respectively.

The study covered both the core environment industries: Sewage and refuse disposal (NACE 90), Recycling (NACE 37), as well as Retreading and rebuilding of rubber tyres (NACE 25.12) and secondary producers.

Methodology (approach, data collection and sources)
The main data sources used for the compilation of this report were:

- Employment Register
- Environmental Protection Expenditure Survey
- Foreign trade statistics (Intrastat)
- Structural Business Statistics Survey
- Environment industry database
- Swedish Business Register
- VAT Register

Environmental goods and services sector in Sweden 2002-2005, Report prepared to Eurostat (grant n°71401.2005.001-2005-301) by Brolinson H., Cederl und, Eberhardson M. (study n°107)

http://www.scb.se/statistik/_publikationer/MI1301_2005A01_BR_MIFT0702.pdf

Statistics Sweden has been working on environmental industry accounts for years (see the two reports above) and has developed a database dedicated to enterprises and their establishments that that are active in the environmental goods and services sector. The objective of this study was threefold. The main purpose was to further improve the methodology of the abovementioned database regarding the identification of the relevant establishments and the presentation of data for 2002 to 2005. The second objective was to investigate whether the database could be complemented using a product-oriented approach. Thirdly, the project included an international review of eco-industry accounts in Europe.

The report starts with the methodology behind the environmental sector database is described as well as the sources used (chapter 2). Based on the establishment perspective, chapter 3 to 6 are respectively dedicated to the number of establishments, employment, turnover and exports of the Swedish environmental sector for the period 2002 to 2005. Chapter 7 examines the possibilities of expanding the coverage from a product/good perspective and of developing a environmental goods database. A brief international review is presented, covering United Kingdom, the Netherlands, Hungary and Germany (chapter 8). The report ends up with a detailed concluding chapter (9) that includes discussion on the future work.

Coverage (years, variables, domains, industries)
Employment data are presented for 2002 to 2004. Data on turnover and exports cover the period from 2002 to 2005.

Statistics Sweden makes the distinction between *primary* and *secondary* environmental activity-related establishments. The former dedicate more than 50% of their production to environmental activities and the latter less than 50% (this separation is to be distinguished from the national accounts' concepts of principal, secondary and ancillary activities applied to enterprises).

The data presented are systematically broken down by

- Domains: pollution management (air pollution control, waste and wastewater management etc.) and resource management (water supply, recycled material, renewable energy etc.), as well as clean technology products before 2005,
- Industry (6 groups of industries NACE 10-37, 40, 50-52, 74, 41+90 and other industries),
- and Swedish regions (NUTS 2).

Methodology (approach, data collection and sources)
The establishment approach is divided into 3 steps. Step 1 consists of identifying establishments belonging to the environmental sector (automatically for the establishment belonging to the core environmental industry and manually for the other). During step 2 these establishments are classified under the different environmental domains and separated into primary and secondary environmental establishments). And step 3 aims at adding supplementary information (business register, foreign trade and labour statistics) necessary for the accurate estimations of the abovementioned variables.

The product perspective is based on foreign trade statistics classified under the Combined Nomenclature (NC). Since the examination of the NC codes at the 8-digit level was not possible within this study, preliminary investigation was carried out at an aggregated level in order to identify high level of exports in certain activities that could be detailed further later on. This investigation consisted of exploring already existing lists of supposed environmental goods, namely the OECD (Organisation of Economic co-operation and Development) and APEC (Asian-Pacific Economic Cooperation) lists.

Norway

Pilot studies on economy-wide material flow accounts and the eco-industry for Norway, Report o Eurostat (grant agreement n° 71401.2005.001-2005-29 9) by Julie L. Hass, Mr. Knut Ø. Sørensen (co-project leaders), with contributions from: Kristine Erlandsen Kolshus, Marit Sand, Mahari Tikabo, Statistics Norway, 31 January 2007, Part 2, "Environment industry in Norway, pp. 66-95. (study n°108b)

The objective of the second part of the project was to initiate the development of official statistics on eco-industry activities, which is a new area for statistic Norway. The work presented mostly relate to the methodology (activity to include and estimates) and data availability.

This report start with the definition of eco-industries, before describing the 3 methodologies tested to identify them in the official statistics. Preliminary resulted are presented for portions of the eco-industries selected. Finally, a brief international comparison is proposed. The conclusion includes information on the future works planned by Statistics Norway in this area.

Among the possible next steps, Statistics Norway identified then the finalisation of the identification of the business to include, the question whether publicly-owned eco-activity should be ignored or not?, estimation of employment and turnover for environmental goods and services produced as a secondary activity.

Coverage (years, variables, domains, industries
Preliminary results are presented on "core" environmental industries relating both to pollution and natural resources management.

Pollution management:

- re-treading and rebuilding of rubber tires (NACE 25.12)
- recycling (NACE 37)
- Wholesale of waste and scrap (NACE 51.57)
- Sewage and refuse disposal, sanitation and similar activities (NACE 90)

Natural resource management:

- production of electricity (NACE 40.101) more than 95% hydroelectricity in Norway)
- Collection, purification and distribution of water (NACE 41)

The data presented include the number of establishments, the number of employee, the turn over and the production value. However, the authors stated that the lack of consistence of the data compiled so far prevent them to provide totals for turnover or production value of environmental industry as a whole in Norway.

Methodology (approach, data collection and sources)
When statistics Norway's project was initiated the definition proposed by the Task Force in connection with the drafting of the compilation guide was still under review. Therefore, Statistics Norway referred to the 1999 OECD/Eurostat manual on environmental goods and services industries.

Statistics Norway chose to focus on the supply side approach, especially. Concerning the "core" environmental industries, the data collection was based on the use of NACE codes in the official statistics (business register, Structural statistics, and national accounts). For "non-core" eco-industries three approached were tested: external sources (green business network, environmental organisation

publications, Internet sources, Norwegian research council, ministry of trade and industry…), Harmonised coding system for international trade statistics, and the business register.

Switzerland

Le secteur éco-industriel en Suisse – Estimation du nombre d'emplois et du chiffre d'affaires en 1998, Etude réalisée par Gonzague Pillet (Ecosys S.A) pour l'Office Fédéral de la Statistique, Neuchâtel, 2000, 50 p. (ISBN 3-303-02057-4) (study n°18)

http://www.bfs.admin.ch/bfs/portal/fr/index/themen/02/05/blank/key/arbeitsplaetze_im_bereich_umwelt.ContentPar.0004.DownloadFile.tmp/Le%20secteur%20éco-industriel%20en%20Suisse%201998.pdf

This study provides an overview of employment and turnover in environmental industry in Switzerland in 1998. To some extent, the structure, evolution, and regionalisation of these variables are presented also, but exports, value added and investments figures were not available. It is the first time that estimates of the importance of the Swiss environmental industry were made available, through the current report.

The report starts with an overview of the main developments in the Swiss work in the field of environmental expenditure/industry since the early 90s and a presentation of the scope of the current study (chapter 1) while the next chapter (chapter 2) lists some of the main statistical studies about environmental industry carried out abroad (Europe/EEA, USA, Canada). The report then presents the methodological approach (chapter 3), followed by figures about employment in « pure » and « partial » environmental industries (chapters 4 and 5) and about turnover (chapter 6). Chapter 7 is an analysis of these results.

Coverage (years, variables, domains, industries)
Data is available for two economic variables, employment (1991-1999 for core environment industry and 1998 for the secondary producers) and turnover (1998 for both types of producers).

The NACE rev. 1-based Swiss industry classification (NOGA) was introduced in 1995 which sometimes leads to problems of comparison over time.

Core eco-industries refer to: Recycling (NACE 37), Wholesale of Waste and Scrap (51.57), Sewage and Refuse Disposal, Sanitation (NACE 90). Some secondary producers (environmental good and services produced as secondary activity) have also been considered as pilot accounts, including 17 activities (their contributions to employment and turnover have been estimated based on coefficients picked up from foreign studies – Sweden and France mainly – the accuracy of which within the Swiss context could not be tested).

Together with secondary producers, 3 *ecoproducts* and *ecoprocesses* have been selected as illustration, based on foreign studies: Manufacture of wood and wood products (NACE 20), Manufacture of pulp, paper and paper products (NACE 21) and Manufacture of chemicals and chemical products (NCE 24). Moreover, organic farming has been chosen as an *ecoprocess* for agriculture (NACE 01).

Methodology (approach, data collection and sources)
The main data source for economic data is the National Accounts ; these are complemented by the results of specific surveys from e.g. specialised institutes or professional associations.

A 1.1.3 Environmental taxes and subsidies

Belgium

Environmental Tax Accounts for Belgium (1997-2002), Report for the European Commission, GD Environment and Eurostat (grant agreement n°. 20047 1401006) by Guy Vandille, Federal Planning Bureau Economic analyses and forecasts, December 2005, 33 p. (study n°31)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/envirtaxbel97-02pdf/_EN_1.0_&a=d

The aim of this study was to identify environmental taxes in Belgium and who is paying them.

This pilot study is structured in three chapters. The chapter 1 deals with the methodology (data sources and type of existing federal tax). Environmental tax data were allocated to industries and household in NAMEA-type accounts. Total Belgian environmental taxes were compared with Eurostat data and some discrepancies are found, in particular concerning transport taxes exceeding at least 25%. When all taxes are taken together, environmental tax accounts data exceed Eurostat data by about 5%.

Chapter 2 shows how, for the period 1997-2000, the environmental taxes evolved, which types of environmental taxes were predominant, and which economic agents paid these taxes.

In chapter 3 the environmental tax data are combined with data from the EPEA in order to investigate whether any evidence can be found of an interrelationship between environmental taxes and spending on environmental protection.

The tables of data are annexed to the report.

Coverage (years, variables, domains, industries)
Data covers the period from 1997 to 2002.

All taxes are allocated in four categories following the Eurostat's guidelines on environmental tax:

- Energy taxes: Inspection fee on domestic fuel oil, Levy on energy, Excise duty on mineral oils, Excise compensating tax and Exceptional charge on electricity producers;
- Transport taxes: Eurosticker, Road tax, Additional road tax, Tax on the entry into service and Extra charge on car insurance premiums;
- Pollution taxes: Ecotaxes, Flemish manure tax, Flemish tax on waste dumping and burning, Flemish waste water charge, Flemish water pollution tax, Walloon tax on waste collection and Walloon waste water charge;
- Resource tax: Flemish groundwater tax.

The Belgian environmental tax data were provided using a table based on the proposition made at the 2003 NAMEA Task Force meeting, i.e. using the industry classification of the former NAMEA-air standard tables, and splitting households' activity into transport, heating and other.

Methodology (approach, data collection and sources)
Tax data can be found on the Belgostat website of the National Bank of Belgium, under National Accounts, Government Accounts, Taxes and real social contributions according to type. This tax database does not classify the taxes by function. For this reason, it was established which of the taxes in the database could be marked as environmental taxes. This was done by consultation of the OECD/EEA database on instruments for environmental policy and natural resources management[72].

For the distribution to industries, most of the allocations keys came from the tables of taxes and subsidies in the supply and use tables for 2000. The distribution of transport related taxes to industries was based on the data on investment in road vehicles for 2000 was used.

Denmark

Danish NAMEA 1996 with environmental taxes and subsidies, Report prepared for the DG Environment and Eurostat by H. Hornum, Statistics Denmark, Eurostat Working Paper n°2/2000/B/12, December 2000, 26 p. (study n°94)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp00dktax_pdf/_EN_1.0_&a=d

[72] http://www2.oecd.org/ecoinst/queries/index.htm (version of December 2005).

This report deals with the expansion of the Danish NAMEA with data on environmental taxes and subsidies. The report shows how the information on taxes in the supply and use tables can be disaggregated to cross-classify environmental taxes by industry and product. The estimation method makes good use of the available information and the results are clearly presented in tables. This approach also highlights the flexibility of the NAMEA framework.

The report begins with a presentation of taxes and subsidies in Denmark (chapter 2, tables 1 and 2). Chapter 3 and 4 (table 3 and 4) explain how the estimates are made. Chapter 5 of the report discusses what this type of analysis can say about the impact of the taxes and subsidies and what effect they have on pollution.

It is pointed out that transport is the area most affected by environmental taxes and subsidies. 45% of the environmental taxes are transport taxes and 81% of the environmental subsidies are transport subsidies.

The types of analysis that one can do based on these data alone might be limited (additional information on price elasticity of demand for the products and pricing behaviour, i.e. how much of the tax is being passed on to buyers would be need; the report refers to OECD publication on this topic). However, the data can be useful as part of a larger dataset.

Coverage (years, variables, domains, industries)
The definition of environmental taxes is from the EU/OECD statistical framework, with focus on the tax base. A similar definition is used for environmental subsidies: “In order to be an environmental subsidy it has to reduce the use of one or more physical units that has proven specific negative impacts on the environment.” This includes subsidies for public transport, electricity from windmills and refuse disposal.

Table 1 shows a list of the environmental taxes and subsidies, with revenue data for 1996. They are grouped into the four categories used in the Statistics in Focus on Environmental Taxes in the EU (pollution, energy, transport and resources). The duty on CO_2 is classified as a pollution tax and not as an energy tax as in the Statistics in Focus. The table also includes the national accounts tax and subsidy classification. All the taxes, except motor vehicle weight duty, are taxes on products. Hunting and fishing licences are classified as compulsory fees, but grouped with Taxes on wealth etc.

Table 2 compares environmental taxes and subsides with the main tax and subsidy aggregates and GDP. Environmental taxes are 4.7% of GDP in 1996, and most of this is taxes on products. Environmental subsidies are 0.9% of GDP.

Table 3 consists of the Danish aggregated NAMEA (8 industries and 5 final demand categories) where the above-mentioned data on environmental taxes have been put together with emissions to air and stocks and flows of oil and gas. In this NAMEA, taxes (net) which are usually shown in a single row have been disaggregated with focus on the four groups of environmental interest (pollution, energy, transport, and resources) plus other (non-environmental) taxes. Taxes and subsidies are shown separately for each of these main categories.

Table 4 uses the same industries and final use categories as table 3, but shows all environmental taxes and subsidies separately.

All information is broken down into the 130 industries and final demand categories usually used for the Danish NAMEA. The Appendix shows a table with the four main categories of taxes and subsidies classified by all 130 industries, as well as 12 categories of private consumption. The major part of environmental taxes and subsidies is levied on private consumption.

Methodology (approach, data collection and sources):
The starting point is the detailed supply and use tables of the Danish national accounts, with 2 750 products, 130 industries and 80 final use categories. The standard tables include information on net taxes on products classified by product and user, and other net taxes on production classified by industry. The main data sources for taxes and subsidies are the tax authorities and the government accounts. For each product tax and subsidy, an initial distribution by user and product is made. Then, all taxes and subsidies on each product are aggregated before final adjustments are made during the balancing process. Other taxes and subsidies on production are also aggregated by industry before they are entered in the tables.

The estimates for the report involve going back to the detailed input data and adding a separate code for each tax and subsidy. The data are aggregated and compared to the results of the balanced supply and use tables. Adjustments are made to the detailed tax data so they are consistent with the final, balanced, national accounts figures. The result is supply and use tables with an extra dimension for the type of tax/subsidy.

Austria

Eco-taxes integrated with NAMEA, Report to Eurostat (grant agreement n° 2001412000 24) Susanne Gerhold, Statistics Austria, Directorate Spatial Statistics, 2002, 39 p. (study n° 102)

Over the last few years, Austria has developed NAMEA for air emissions, waste, water and wastewater. Further modules have been added, including the 1999 material use and energy consumption and the amount of waste and environmental protection expenditure by economic sectors. The main goal of the present project is to extend this work to integrate a module on environmental taxes.

After a short introduction about Austria's work on NAMEA since 1997 (chapter 1) and an overview of the implementation of eco-taxes in Austria from 1997 to 2000 (chapter 2), the report focuses on environmental taxes by NACE branches (chapter 3): methodology and a set of tables (2 methods – bottom-up versus top-down – were tested for the distribution of the data across industries). The two following chapters are dedicated respectively to a preliminary analysis of the data compiled (chapter 4) and the integration of the taxes accounts in the Austrian NAMEA framework. The annexes provide some background data (final energy consumption, intermediate consumption, investment…).

Coverage (years, variables, domains, industries)
The sectoral data is available for the year 1999 while broad categories are presented for 1997-2000.

The types of taxes considered include: Tax on Mineral Oils, Tax on Energy, Special Tax on Mineral Oils, Duty on Vehicles based on Fuel Consumption, Levy on Dangerous Waste, Land Tax (except farm land), Motor Vehicle Tax 1, Road Transport Duty, Motor Vehicle Tax 2, Hunting and Fishing Duty, Landscape Conservation and Nature Protection Charge, Landfill Site Rate. In accordance with Eurostat recommendation, they were classified as energy, pollution, resource, and transport taxes.

The distribution across branches was mostly based on the NACE 2-digit.

Methodology (approach, data collection and sources):
The main data sources are National Accounts and Energy Balances. To estimate the share of private households, information was taken from the results of the 1991 building census.

The latest input-output tables available then for Austria were to old (1995) to be use for the distribution of the environmental taxes across industries and households 'consumption. Therefore 2 approaches were tested. The bottom-up approach consists estimating the tax amount by using quantitative data, tax rates and exceptions. A top-down estimate was tested using the energy balances that contain the energy consumption of every single energy source in physical dimension. The tax on mineral oils (most important eco-tax) was calculated this way. The results of these calculation methods were surprisingly similar.

Sweden

Environmental Taxes and Environmentally Harmful Subsidies in Sweden, Prepared for DG environment and Eurostat by Mårten Sjölin and Anders Wadeskop of statistics Sweden, Eurostat Working Paper n° 2/2000/B/11, 14 December 2000, 66 p. (study n° 93)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp00stax_pdf/_EN_1.0_&a=d

The main purposes of this project were:

- to identify and report on the taxes in Sweden that come under the OECD and Eurostat definitions of environmental taxes;
- to estimate tax subsidies and discuss ways of producing such estimates, including how to determine tax norms;
- to investigate the possibilities of producing industry-level running statistics on environmental taxes and environmentally harmful subsidies;
- to study the data sources and methods that are needed in order to produce running statistics on environmental taxes and subsidies;
- to test out various different ways of presenting these data, either in isolation or in conjunction with other parts of the environmental accounts, e.g. data on emissions or consumption.

The report is organised in 6 chapters. After the introduction (chapter 1) focusing on the tax definition and on its purpose, chapter 2 is dedicated to the environmental taxes and chapter 3 investigates the question of the potentially environmentally harmful tax subsidies included in carbon dioxide and energy taxation and the different methods used in determining tax norms are described. An example of a possible breakdown of the tax subsidies by industry is presented. The two following chapters deal respectively with the environmentally harmful subsidies (chapter 4) and reciprocally the economic impact of environmental taxes and subsidies (chapter 5). Chapter 6 takes up the different areas of use for these statistics as well as the possibility of linking these statistics with other data in the environmental accounts.

The tables provided in annex present detailed data by industries for environmental taxes only.

Coverage (years, variables, domains, industries)
The environmental taxes in Sweden by type of tax and the potentially environmentally harmful direct subsidies are presented for the period 1993-1998

The Swedish environmental tax accounts and environmental harmful subsidies accounts by industry plus households were compiled for the years 1993 and 1995.

The environmental taxes identified were classified following Eurostat's recommendations:

- Taxes on energy: Energy tax (total), Production taxes on electricity, Carbon dioxide tax;
- Pollution taxes (air, land and water): Sulphur tax, Environmental tax on air traffic, Tax on fertiliser, Tax on pesticides
- Transport taxes: Tax on motor vehicles, Sales tax on vehicles, Kilometre tax on diesel fuel
- Resource tax: Natural gravel tax

Environmental taxes are presented (annex) according to a 26-indutry breakdown compatible with the 2003 NAMEA-air standard tables (i.e. mostly based on NACE 2-digit for manufacturing industries and more aggregated branches for trade and services industries) plus private and public consumption. The data on subsidies by industry that are shown in the text are distributed into a breakdown of 9 groups of industries.

Methodology (approach, data collection and sources):
The main data sources used for the compilation of this report were:

- Statistics Sweden, i.e. the National Accounts and the Environmental Statistics.
- Tax Administration and the Special Tax Office in Ludvika
- Swedish Environmental Protection Agency

Tax subsidies are calculated by the Ministry of Finance and are published annually as an appendix to the Budget Bill. Transport support is administered by the Swedish National Board for Industrial and Technical Development. The industry-level data on transport support in this report is taken from the Swedish National Board for Industrial and Technical Development.

Public environmental protection expenditures and subsidies in Sweden, Report prepared to Eurostat by Maja Larsson and Annika Mårtensson, Statistics Sweden -, 2005, 55 p. (Study n°15b)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/environmental_expenditur/subsidies_2005sepdf/_EN_1.0_&a=d

The objective of this study was twofold, intending to develop the data collection methods both for the public EPE and environmentally motivated subsidies in Sweden (for first objective, see above the section dedicated to EPEA).

Coverage (years, variables, domains, industries)
The results are presented for 2000-2004, by domain (Emission-reducing, Energy-related, Resource-related, Transport-related), kind of subsidy (SNA or other) and receiving country (Sweden or not).

Methodology (approach, data collection and sources)
The definition of environmental subsidies goes beyond that used in the SNA (ESA 1995, §4.30) which covers Governmental financed transfers and only those to producers in the economy (thus excluding capital transfers, such as investment subsidies (D.92) and current transfers from the Government to households in their role as consumers (D.75)), by including also investment subsidies (labelled "capital transfers" in SNA), subsidies, both SNA and for investment, paid to households (labelled current transfers" in SNA), to municipalities, organisations, EU countries etc ; subsidies are thus payments from Government to producers, individuals, organisations, non-profit-making associations, municipalities and county councils as well as to EU countries and international activities. Included are transfer payments with the purpose to be used both in the production and for investment. Statistics Sweden started to collect data on environmentally-motivated subsidies in 2003 and has since then updated the data every year.

The data which before was collected from a number of authorities handling environmental subsidies has been compared to the new data collected in this study from the Swedish National Financial Management Authority (ESV). The data were similar enough. However, the comparison of the old and current method comparing show that the current method enables to consider more "other subsidies" (subsidies outside the SNA definition) as environmentally-motivated.

United Kingdom

Review of Environmental Taxes in the UK Environmental Accounts, Report to Eurostat (grant agreement n°. 71401.2005.001-2005.302) by Perry Francis and Ian Gazley, Office for National Statistics, August 2006, 59 p. (study n°34).

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/environmental_environmen/_EN_1.0_&a=d

This study aimed at reviewing the UK's environmental taxes. This study identified three environmental taxes which were not already included in the Environmental Accounts and identified further three taxes that appear incorrectly classified under environmental taxes.

This report starts by the description of taxes in national accounts that, following the European System of Accounts 1995 (ESA95), are classified under three main categories: Taxes on production and imports (denoted as D.2), Current taxes on income, wealth, etc (D.5), and Capital taxes (D.91). **Chapter 2** focuses on the definition of an environmental tax (tax whose base is a physical unit such as a litre of petrol, or a proxy for it, for instance a passenger flight, that has a proven specific negative impact on the environment) and on the different types of this tax (Energy taxes, Transport taxes, Pollution taxes and Resource taxes). **Chapter 3** describes in more detail the environmental taxes and UK government policy, presenting the UK government's approach to environmental taxation and the policy measures to ensure that policy-making reflects the integrated goals of sustainable development. **Chapter 4** concerns the UK environmental taxes in the period from 1993 to 2005. This overview starts showing the "Government revenues from environmental taxes". In the breakdown by tax type, the energy taxes represents approximately the 80% of al environmental taxes, followed by transport taxes with 15-17 % of all environmental taxes. In 2003 the environmental taxes broken down by industry and household, shows that UK households allocation was about £17.5 billion (representing 52% of all

environmental taxes) followed by transport and communication industry with £6.5 billion or 19 % of all environmental taxes. **Chapter 5** looks at the various tax instruments operated by the UK Government and assess whether they meet the internationally agreed definitions of an environmental tax. It also discusses the proposed National Accounts treatment of the United Kingdom Emissions Trading Scheme and the European Union Emissions Trading Scheme. In **chapter 6** authors identify the payers of environmental tax. Households are the largest source of energy tax revenue (£13.1 billion in 2003) and of transport tax revenue (£4.3 billion in 2003). Other services industries, which paid £242 million in 2003, are the largest sources of landfill tax revenue and mining and quarrying industry pay the 99% (£338 million in 2003) of the resource tax. In the **last chapter** an international comparison of environmental taxes, as a percentage of total taxes and social contribution, is presented.

Environmental taxes data have been sourced from the Eurostat website. Information regarding the particular taxes levied in individual countries has been taken from the OECD website. UK have one of the highest level of environmental taxes as percentage of total taxes and contribution in the EU-15.

Some proposals are suggested about the treatment of emission trading schemes in the National Accounts.

Coverage (years, variables, domains, industries)
The rapport covers the UK's environmental taxes by tax for 1993 to 2005.

As recommended by Eurostat, they were classified in the following categories: energy, pollution, resource and transport taxes.

Somme data are presented according to an aggregated industry classification. For the method to allocated environmental taxes by industry, see below the study n°77.

Methodology (approach, data collection and sources):
The main data sources used for this report were the UK's environmental accounts. In order to identify taxpayers of environmental taxes the following sources were used:

- UK supply-use tables
- Environmental Accounts energy consumption data
- International Passenger Survey data
- Driver and Vehicle Licensing Centre data

For the international comparison, the ONS used the Eurostat and OECD data.

Industrial analysis of environmental taxes, Paper prepared by Emily Lin and Francis Perry, Office for National Statistics, United Kingdom, *Economic Trends* n° 609, August 2004, pp. 54 59. (study n°77)

http://www.statistics.gov.uk/articles/economic_trends/ET609Lin.pdf

This article is dedicated to UK's environmental taxes broken down by industry plus households. It provides detailed explanations on the different types of environmental taxes and the methodology used in compiling the breakdown. The paper deals successively with the evolution of environmental taxes by category, environmental taxes by industry, and the methodology (distribution across industries and data sources).

In 2003, duties on energy products account for approximately 80% of all environmental taxes in UK and transport taxes for 14%. In 2001, households were estimated to have paid 54% of the total environmental taxes levied, transport services industry 20% and wholesale & trade sector and financial intermediation 7.2% and 5.4% respectively, before manufacturing industry that paid only 5%.

The industrial breakdown of environmental taxes presented was considered then as in its early stage of development. ONS intended to create a time series of such accounts in order to publish them biannually.

Coverage (years, variables, domains, industries)
Time series of UK's environmental taxes, divided into 4 categories as recommended by Eurostat/OECD (energy, transport, pollution, and resources taxes), covers the decade from 1994 to 2003

The environmental tax account was compiled for the year 2001 and included energy, transport and pollution taxes. In this paper, the data are presented according to a 13-industry classification plus households.

Methodology (approach, data collection and sources):
The methodology used to allocate the environmental taxes across industries is based on the ONS input-output framework, as well as the energy accounts by industry and the ONS publication *Travel Trends*.

Information is provided on non-residents paying environmental taxes in UK and on UK residents paying environmental taxes abroad that would enable to comply with residency principle.

Norway

"NAMEA work related to environmental accounts integration for environment-related taxes" chapter 4 in *Norwegian Economic and Environmental Accounts (NOREEA) Project 2003*, Report to Eurostat (grant agreement n° 200241200013) prepared by Julie Hass and Knut Sørensen (ed.), Statistics Norway, March 2004, pp. 39-77 (study n° 30c)

This study aimed at expanding the energy taxes by industry prepared within a Nordic countries' project (study n° 69, presented below in section A.5.1.1). In the Longer term, Statistics Norway planned to prepare and publish annually environmental tax accounts by industry plus households.

This chapter of the NOREEA 2003 first describes the method used to calculate and distribute environmental taxes across industries and allocate them to the different types of final uses, and the key challenges encountered, before presenting the data. The final section is dedicated to the integration of environmental taxes into the NAMEA framework, referring to the suggestions made at the 2003 NAMEA air Task Force meeting (application of the Eurostat/OECD/IEA categories, accrual basis, NACE 2-digit classification plus households). The detailed tables are provided in annex.

The comparison presented between the distribution of environmental taxes and the corresponding physical data (CO_2 emissions, electricity consumption) showed that CO_2-tax and tax on electricity did not follow then the polluter pays principle in Norway.

Coverage (years, variables, domains, industries)
The times series of total environmental taxes as a whole covered then the period from 1991 to 2001. The detail breakdown by industry has been calculated the years 2000 and 2001.

The data presented cover three categories (energy, transport, and pollution taxes) of the environmental tax classification recommended by Eurostat/OECD (resource taxes were nil). Both CO_2-tax and SO_2-tax were included among energy taxes, since it was not possible to separate the latter from the former before 1999 in Norway. In accordance with Eurostat environmental taxes statistical guide, car re-registration and tax on aircraft were included despite they were exclude from the OECD list of Norwegian environmental taxes.

Environmental taxes by industries were reported at NACE 2-digit level with some additional breakdown at 3-digit level. It indicated that households' environmental taxes could be divided into transport, heating and other purposes.

Methodology (approach, data collection and sources):
Statistics Norway developed a specific procedure to calculate environmental taxes by industry, since taxes on product were not specified by type of purpose in the Norwegian national accounts.

In the Norwegian national accounts, the taxes are allocated to the different products. The taxes are therefore distributed across industries plus households proportionally to the use of these products (excluding exempted industries). The exempted industries and the percentage of exemption are listed

for each product. The calculations were carried out then using Excel spreadsheets, but it was planned to implement these calculations in the Norwegian national accounts' computer programme.

Problem related to the use of energy consumption statistics: monetary unit, changes in the list of industries exempted from one year to another, both taxes on products and production (the latter are not published in detailed). Also, since environmental tax accounts by industry are based on final national accounts (impossible to use the preliminary national accounts), they are published with a 3-year delay (Marsh N+3).

"Work related to environmental expenditure regarding environmental subsidies" Chapter 8 in *Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005*, Report to Eurostat (grant agreement n° 200241200013) prepared by Julie Hass and Knut Sørensen (ed.), Statistics Norway, May 2006, pp. 58-63. (study n°33e)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/norway_2005_noreeapdf/_EN_1.0_&a=d

This chapter compares two different approaches dedicated to estimate environmental subsidies, since unclear areas remained then regarding their definitions. Therefore, it successively deals with definitions, preliminary estimates, and conclusions advocating for similar investigation in Europe before establishing environmental subsidies as an official statistical area at European level.

Coverage
Beyond the coverage of national accounts (that exclude fees, deposit systems, taxes and grants), Statistics Norway intended to cover all environmental related subsidies. Environmentally harmful subsidies were not taken into account.

The calculations presented were based on central government accounts, i.e. excluding transfers from local government, from Norway (year 2001) as well as Sweden and Denmark (year 2000).

Norway's environmental motivated subsidies on production are presented according a 10-industry breakdown.

Methodology (approach, data collection and sources):
One approach is to use the definition of the EPEA: subsidy or transfer having environmental protection as its main motivation (environmentally motivated subsidies). Another approach is to use a definition similar to that of environmental taxes: subsidy or transfer having a (proven) positive effect environmental effect (environmentally relevant subsidies).

Therefore, Statistics Norway raised the question of the classification. Should environmental subsidies be categorised according to the CEPA (air protection, water and waste management etc.) or like environmental taxes (energy, transport, pollution and resources taxes)?

Transportation related subsidies appeared as the main source of difference between the two approaches.

"Work related to environmental expenditure regarding environmental taxes" Chapter 9 in *Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005*, Report to Eurostat (grant agreement n° 2002412000 13) prepared by Julie Hass and Knut Sørensen (ed.), Statistics Norway, May 2006, pp. 63-71. (study n°33f)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/norway_2005_noreeapdf/_EN_1.0_&a=d

This chapter gives a progress report on the development of environmental tax accounts in Norway and includes in annex a paper ("Environmental taxes in Norway 1991-2004", by Tone Smith) based on the recent work done in this area that was published in November 2005.

This paper shows that, In Norway, the proportion of tax revenues from environmental taxes has been decreasing since mid 1990s, despite the increase of the value of environmental taxes' revenues. In

2004, the proportion of environmental taxes of total taxes in Norway was no longer higher than the EU15 average. Energy and transport taxes remained the most important categories, raising together around 95% of the environmental taxes' revenues.

Coverage
Statistics Norway uses the OECD/Eurostat definition (tax of which the base is physical unit of something that a proven negative environmental impact) and include only taxes defined as such in national accounts (i.e. excluding fees or part of deposit schemes).

The paper in annex present an updated version of the time series on total environmental taxes divided into energy, transport and pollution taxes, covering then the period 1991-2004. The 2001 data on environmental taxes by industry come from the NOREEA 2003 (see study 30c above).

Methodology (approach, data collection and sources):
No change in the methodology is indicated. Environmental tax accounts as a whole are updated on a yearly basis. This did not apply yet for environmental tax accounts by broken down by industry plus households.

A 1.1.4 Economic instruments (permits)

Denmark

Integrated Environmental and Economic Accounts for Tradeable Carbon Dioxide Emission Permits Denmark 2005, Report to Eurostat (grant agreement n° 71401.2005 .001-2005-292) prepared by Thomas Olsen, Statistics Denmark, December 2006, 37p. (Study n°122)

The purpose of this project is to establish economic environmental accounts for CO_2 emission permits in Denmark. The report describes both the physical and monetary aspects linked to the use of the permits as economic instruments.

After a general introduction of the project (chapter 1), the report gives an overview of the theoretical background (chapter 2) and legal basis (chapter 3) for the introduction of a system with tradeable CO2 emission permits. Then the structure of the allowance system (size of the market, responsible authorities etc.) and the different types of permits are outlined (chapter 4). The next 2 chapters (chapters 5 and 6) present sources and methods for describing the physical and monetary flows of permits through the economy, with some results (complete tables being presented in the Appendix). Finally, the prospects for describing the tradeable permits market in the National Accounts framework are presented (chapters 7-9).

In spite of discussions held at Eurostat and at Statistics Denmark, there does not seem to be any clear recommendations on how to treat emission allowances.

Coverage (years, domains, sectors and components of expenditure)
Data on initial allocation of the tradeable permits broken down by 52 industries is available for 2005-2007 (allowances and tonnes CO_2):

All other data are available for 2005, by sector:

- Allocated permits, verified emissions and surrendered permits (allowances and tonnes CO_2) for households and 52 industries
- Verified emissions, total emissions and total consumption of energy (tonnes CO_2) for households and 52 industries
- Under surrendered permits and payment of fines (euro) for households and 52 industries
- Value of the permits and value of the surrendered permits for households and 52 industries

Methodology (approach, data collection and sources)
Physical flows: The data sources are the Danish Energy Authority (DEA) and the Danish Environmental Protection Agency (DEPA) which is responsible for the operation of the CO_2 allowance

register. In accordance with the EU and Danish legislations, only aggregated data and data on that part of the emissions trading scheme in which the companies are legally obliged to be part of are accessible from the allowance register. In order to have a breakdown by sector, information from the register was combined with information from the Danish central business register (CVR), using the so-called CVR-numbers. In some cases, some adjustments were necessary (for instance, some public district heating plants turned out to be registered under *Public and personal services*, but should have been registered under *Electricity, gas and water supply*.) Moreover, the data do not inform about the conditions in which the allowances have been traded.

Monetary flows: The overall method for establishing the monetary account is to multiply the amount of allowances by their observed market price. Unfortunately, there is no information on the extent to which companies make use of financial instruments like price contracts in order to provide against a rise in the future allowance price. Therefore, the allowances are valued at the average spot price in 2005 (around 17 euro). This is made for both allowances sold by companies and the Government to industries.

Another way of presenting the use of allowances could be the value of the surrendered allowances broken down by type of energy. As there is no access to the specific use of energy by the companies affected by the emissions trading scheme, it could be resorted to the Danish energy accounts on which the Danish air emissions accounts are founded (based on censuses in which companies report by type of energy). The breakdown of the value of the allowances by type of energy would provide an extra price level that can be added to the regular energy accounts, which are already used as input in macroeconomic models.

National Accounts: The System of National Accounts 1993 (SNA) and the Handbook on National Accounting on Integrated Environmental and Economic Accounting 2003 (SEEA) treat emission permits as assets. However, it is still not clear whether the revenue from the Government's auctioning or sale of allowances should be treated as a tax. Treating CO_2 allowances as they are defined in the European emission trading scheme, as taxes, leads to asymmetries and inconsistencies due to the fact that companies not only receive or buy allowances from the domestic Government but also abroad from other businesses or Governments or they get allowances from the use of the flexible mechanisms. Furthermore, the companies may choose to sell allowances to foreigners. Therefore, there is not necessarily a connection between the amount of allowances issued by the Government and the amount or the tax payment the Government can expect to receive again in the future.

Moreover, in addition to the problems connected with the asymmetries and inconsistencies, the permits, because the allowances from 2008 and onwards are valid for an infinite number of years, would have to be treated as prepaid taxes, but because the allowances are tradeable it does not seem to make much sense to let the industries trade prepaid taxes with each other, and furthermore, trade across countries with taxes is not easy to interpret either. In addition, because the allowances are pooled, it is not clear how it could be possible to identify those allowances, which are to be treated as taxes and how this part of the allowances should be valued if they are traded to a third part (i.e. how to relate to that a part of the value of the assets that are prepaid taxes?)

A 2.2 Material flow accounts (MFA)

5.2.2 Economy-wide MFA

The Czech Republic

Economy-wide material flow accounts, PHARE Multi-beneficiary Statistical Co-operation Programme 2003 Eurostat (Grant Contract No. 2004.19100.019), Project coordinated by Eva Krumpova

and Katarína Markošova, Czech statistical Office (CZSO) – Environment statistics Department, Prague, 28 November 2005, 17 p. (Study n°71) [73]

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/mfa&vm=detailed&sb=Title

Within a project of the Czech Environment Ministry, the Charles University Environment Centre (CUEC) compiled the first series of economy-wide-material flow accounts (MFA) for the Czech Republic (1990-1999 and 2000-2003)[74] following Eurostat's methodology. For the needs of the environmental accounting project under Eurostat's PHARE statistical programme, the Czech statistical Office (CZSO) developed a close methodological cooperation with the CUEC as concerns MFA, before taking the production MFA over from the CUEC. CZSO benefited also from the expertise of the Forestry and game management research institute about the data on biomass (VÚLHM).

After having briefly presented the planning and the objectives of the project – following up on the CUEC's work and revising the 1993-1999 series (i.e. the Czech Republic independence), collecting updated data to extend the series and secure the annual compilation of MFA –, the chapter dedicated to the implementation, which is the most important part of the report, mainly deals with the data sources.

Coverage and indicators

The time series presented covers the years 1993 to 2004, focusing on the input side.

Therefore, the indicators calculated are: the domestic material input (DMI), the domestic material consumption (DMC) and the physical trade balance (PTB), plus DMI/GDP both in kg/CZK and kg/US dollar.

Types of material included and classifications

Consistently with Eurostat's methodology, the material flows taken into account for the Czech MFA are classified as follows:

Domestic non-renewable resources:

- Fossil fuels (coal, lignite, oxihumolit, crude oil, natural gas);
- Non-ferrous metal ores (uranium and complex ores);
- Industrial minerals (fluorspar, graphite, natural, precious stones, moldavite stones, kaolin, clays, bentonite, feldspar, feldspar substitutes (fonolite), silica raw (quartz), natural sands (glass and foundry sand) - silica sand, abrasives, wolastinite, mica, cast basalt, diatomite, limestone, cement correcting raw materials (clay limestone), dolomite, gypsum) and construction minerals (stones, sand, gravels and loams).

Domestic renewable resources:

- Biomass from agriculture (cereals, roots and tubers, pulses, oily crops, vegetables, fruits, fodder plants, agriculture by-products and biomass from agricultural animals' grazing);
- Biomass from forestry (wood and biomass from gathering: mushrooms, blueberries etc.);
- Biomass from fishing (inland waters) and hunting;

External trade (imports and exports):

- Primary raw materials (from biomass, fossil fuels, metallic mineral and non-metallic minerals) and secondary raw materials;

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[73] - The results were published in ČSÚ (2006), *Selected environmental accounts on macroeconomic level in the Czech Republic (NAMEA for air emissions in 1998, 1999, 2003 and MFA in 1993-2004)*, Czech Statistical Office (ČSÚ/CZSO), code 2006-05, Prague, January 2005, 58 p. (bilingual version Czech and English)

[74] - Kovanda, J. (2004), "Economy-wide material flow indicators for the Czech Republic for 1990-2002", Results of the R & D projects of the Czech Ministry of the Environment. In: Ritschelova I. Scasny, M. (eds.): *Environmental accounting: Current situation and future development in the Czech Republic*. Compendium from a seminar held within the R & D project 1C/4/17/04 of the Czech Ministry of the Environment, Jan Evangelista Purkyně University, Usti nad Labem.
Scasny M., Kovanda J. and Hak T. (2003),"Material flow accounts, balances and derived indicators for the Czech Republic during the 1990s: results and recommendations for methodological improvements", *Ecological Economics*, 2003, vol. 45, issue 1, pages 41-57.

- Semi-finished and finished products (from biomass, fossil fuels, metallic mineral and non-metallic minerals);
- Other products, including an *unspecified* category introduced because of the lack of data from *Intrastat* (external trade statistics within the European Union);
- Packaging materials.

Residence (rather than territory) principle
The report does not say anything on the residence principle that should mainly concern the use of fossil fuel related to international transport activities: Czech residents bunkering abroad are to be included and non resident units purchasing fuel on the Czech territory are to be excluded (the CZSO made estimates for the needs of the air emission accounts dedicated to the Czech NAMEA).

Data sources and periodicity
Data on fossil fuels and minerals that were initially provided by the Ministry of industry and trade are delivered by the Ministry of the Environment (Geology committee) since 2005 (2003 as reference year). Data on renewable resources (biomass) come from the agriculture statistics division of the CZSO and Czech University of agriculture (1993-2002 series were revised with the help of the VÚLHM). External trade statistics are obtained from the Czech Statistical Office from the Foreign trade Application (grossing-up needs to be made for non-response and thresholds values related to *Intrastat* data).

The potential for regular update (yearly basis) is high according to the 2006 report of the Umweltbundesamt and ICON[75].

Denmark

Economy-wide Material Flow Accounts for Denmark 1993-2002, Report to Eurostat (grant agreement n°2004 714 01007), Ismir Mulalic, Statistics Denma rk, December 2005, 44 p. (study n°61)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/material_accounts/mfa-action1-grant2004pdf/_EN_1.0_&a=d

In 2002, Statistic Denmark compiled a first set of MFA for the years 1981, 1990 and 1997 on pilot-project basis. The objectives of this report were firstly to implement a regular production of MFA and secondly to establish a MFA database covering the 1993-2002 time series available then. The Danish production system implemented focuses on the input side (excluding air and water). The Danish system enable to breakdown the indicators calculated by final demand categories, industries (130) and types of materials.

The report starts by reminding the basic thermodynamic concepts and to the input side related MFA definitions (chapter 3, the table of content and the introduction are numbered respectively 1 and 2), before focusing on the data sources (chapter 4) and the compilation method (chapter 5). A brief presentation of the Danish database is also provided (chapter 6). The results are presented in detail for the direct flows (chapters 7) and indirect flows (chapter 8) respectively.

The compilation of the Danish MFA starts by the construction of material balances for the industries and households. Annual product balances are prepared in monetary terms for the supply and use system of the Danish national accounts. The physical flows are calculated combining these balances with corresponding information on physical quantities. External trade statistics in physical terms are "matched" with the supply and use system of national accounts (external trade flows are distributed across industries assuming that imported and Danish commodities are applied in the same proportion for all uses). Indirect flows (IF) that are estimated by multiplying actual (direct) flows by existing IF factors and assigned to the same industries as the actual flows (the report shows that using unique IF factor whatever the origin of the flows leads to under estimate IF).

[75] - Naguy M., Baud S., Eisenmenger N., Kletzan D., Kratean K., Sekot W. and Weisz H. (2006), *Provision of Services for the Implementation of Sector Projects fort he "Multi-Beneficiary Statistical Co-operation Programme 2003", Volume 2 – Environmental Accounting*, Report to Eusrostat, (Contract N° 2004.19100.016) , Umweltbundesamt and ICON Public Sector, July 2006, pp. 8-10.

The Danish MFA-database has five dimensions: indicators, time, final demand categories and industries, products and foreign trade classification. It includes aggregation procedures that enable the calculation of aggregated indicators.

Results are presented based on hybrid aggregations: 12 products and industries, 6 categories of final demand and 6 regions (the text announces that he results are presented on a 60-products/industries level in CD-Rom attached to the report (the CD-Rom is missing and apparently not available on Statistics Denmark Website).

Despite the limited number of observations, the author estimated an inverted U-shape environmental Kuznets curve with the turning point of 230 thousand DKR per capital (i.e. until this point, DMC increases as GDP per capita grows and after, DMC decreases).

Coverage and indicators
The time series presented covers 1993-2002 and focuses on the input side.

Therefore, the following indicators are calculated: domestic material input (DMI), domestic material consumption (DMC) and physical trade balance (PTB).

Indirect flows are calculated both for Danish domestic extractions and imports. However, total material input and total material requirement are not calculated.

Types of material included and classifications
Following Eurostat's methodology, the Danish material inputs cover domestic extraction and imports.

Domestic extraction is split into 3 main groups of resources:

- Fossil energy (crude oil, natural gas from the North Sea),
- Mineral materials (stone, gravel, sand, clay, lime, peat and shells from land and sea)
- Biomass (from agriculture, forestry and fishing) expressed in dry weight.

Imports cover all goods interring in Denmark, including for re-export. Reciprocally, exports cover all goods leaving the country, whether processed or not on the territory (physical trade balance). The purchase of fuel by Danish ships and aircrafts bunkering abroad is added to the above imports (see below the residence principle). External trade statistics are adjusted as regards packing materials.

On top of the above mentioned material flow categories, the Danish MFA use internationally accepted classifications: CPA-based products, NACE-based industry classification and the EU Combined Nomenclature for international trade.

Residence (rather than territory) principle
The amount of fuel purchased by Danish ships in foreign harbour (that is rather significant) and Danish aircrafts bunkering in foreign airports are included in the Danish environmental accounts.

Data sources and periodicity
Most of the basic data for the Danish MFA comes from Statistics Denmark (energy, agriculture, resource extraction statistics), Danish Directory of Fisheries (landings of fish in Denmark and abroad). In Denmark, official statistics cover non market biomass resources like wood harvested by households for own use, small-size enterprises and land excavation for construction purposes.

Indirect flows' factors used by statistics Denmark come either from foreign countries, international institutions and Danish statistics. German factors are used for mineral resources and the Wuppertal Institute' factors concerning the soil excavation related to construction activities. Factors from the Danish EPA are used for dredging. Estimates of unused straw, felling loss in forestry and deposited soil come beets come from diverse Danish statistics (agriculture, forestry and waste). Estimates of fish discards are based on data from the FAO.

Germany

Umweltökonomische Gesamtrechnungen: Materialkonto (Translation: Green accounting: Material account), Report to Eurostat (Contract n° 2002 412 00005) prepared by Stefan Schweinert, Statistisches Bundesamt, March 2004, 141 p. (Study n° 58)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/material_accounts/materialkontopdf/_EN_1.0_&a=d

This study aims at removing conceptual differences between German and European material flow accounts and shows some further possibilities of application of MFA. The study is based on Eurostat 2001 economy-wide material flow accounts methodological guide, but goes beyond it (methodological adaptations and « extensions », and increased harmonisation based on proposals made by Wuppertal Institute). The study was expected to form the basis for future improvements of the accounts (longer time series, etc.) and analysis of raw material indicators used in the German sustainable development strategy.

The study consists of 4 parts:

1.) Development of a national compilation guide for MFA according to the European guidelines. This guide shows the differences with the former German MFA concept;

2.) Compilation of data according to the newly developed national manual for the whole time series from 1991 to 2001 for Germany and for comparing purposes also for the years 1960, 1970, 1980, 1990 for the former territory of the Federal Republic of Germany;

3.) Analysis of the processed data including compilation and interpretation of selected indicators;

4.) Compilation of supply and use tables for primary material for the years from 1993 to 2000 as a tool for further and more detailed analyses of material flows, of which analyses for homogenous production branches and analyses of indirect material flows are most important. The latter actually are not part of the given project for Eurostat but will be carried out on national level after the conclusion of the study presented here.

Coverage and indicators

The data presented cover the period from 1991 to 2001 for following indicators: direct material input (DMI), domestic material consumption (DMC); Physical trade balance (PTB), domestic prossed output (DPO), and net additional to stocks (NAS).

For DPO and NAS, data on waste landfilled for the years 1991, 1992, 1994 and 1995 are estimates.

Raw material indicator of national sustainable development strategy (Index 1991=100) : Raw material productivity, Raw material extraction and imports, GDP ;

Types of material included and classifications

As regard the type of material taken into accounts, the German statistical office follows Eurostat methodological guide.

Input:

- Biotic materials (products from agriculture/Hunting, forestry and fisheries);
- Energy carriers (coal, lignite, oil, natural gas, LPG);
- Mineral raw materials (ores, iron and Manganese ore, other mineral raw materials, natural stones, not crushed, limestone, karstenite, anhydrite binder/karstenite, chalk, dolomite, clay-schist, gravel, sand, crushed natural stones, clay and kaolin, chemical mineral fertilisers, stones and earths / non-metallic minerals;
- Peat for gardening activities/purposes.

Output:

- Air emissions (CO_2, CO, NO_x, SO_2, N_2O, NH_3, CH_4, CFCs, particulate matter, and NMVOC);
- Emissions to water;
- Dissipative use of products (organic fertilisers, mineral fertilisers, plant protection products, seeds, road salt, dissipative losses, contribution from other gases, water from Combustion processes, water Evaporation from Biomass).

Residence principle
In the German handbook, material flow categories are characterised according to 2 dimensions:

- Territorial Dimension: this dimension shows the origin and utilisation of material flows. A differentiation is made here between domestic origin and the rest of the world ;
- Product dimension: this dimension shows whether the material flows concerned enter the economy (resulting in use/utilisation of the materials). A differentiation is made here between used and unused materials.

In line with Eurostat guidebook, the territory concept is applied by Germany; the conceptual differences resulting from energy supply and CO_2 emissions are quantified to guarantee the consistency of the MFA with national accounts. Transboundary material flows (such as air emissions from the rest of the world) are in general not included in the material accounts.

Data sources and periodicity
The data source is the German statistical office, environmental accounts (Statistisches Bundesamt, Umweltökonomische Gesamtrechnungen), based on various. Some estimates have been made too.

Ireland

Material Flow Accounts (MFAs) – Demonstrations for Ireland (2001-EEO/DS-(11/)), Report prepared for the Environment Protection Agency of Ireland by Eileen O'Leary and Dermot Cunningham, Clean Technology Centre, Cork Institute of Technology, August 2004, 222 p. (study n°133)

http://www.epa.ie/downloads/pubs/research/waste/epa_material_flow_accounts_ertdi45_synthesis.pdf

http://www.epa.ie/downloads/pubs/research/waste/epa_material_flow_accounts_ertdi45_final.pdf

This study was prepared under the aegis of the Irish Environment Protection Agency (EPA), the Central Statistical Office (CSO) merely providing data on request.

The study starts (chapter 2) with a methodological review at European level (EEA and Eurostat) and in European countries (Germany, Austria, Netherlands, United Kingdom, Sweden and Finland), before presenting the methodology adopted (chapter 3), which is based on Eurostat' guidelines. This methodology was applied firstly to national fossil fuel flows (chapter 4) and to regional water flows (chapter 5). The initial estimates carried out of the total MFA for Ireland includes an assessment of the data available (chapter 6). The authors recommended (chapter 7) to produced MFA on a regular basis at several levels (national, regional and sites), using Eurostat's methodology concerning national level.

In the appendix, the report presents a review of MFA software. They were classified into 2 categories: those that perform calculation and illustrate results and those that illustrate results only.

Coverage and indicators
The nation fossil fuel accounts for Ireland were compiled for 1990, 1996 and 2000.

Regional water flows were estimated for the South Eastern River Basin District (SERBD).

The national MFA was estimates for the year 2000.

Types of material included and classifications
Domestic extraction and hidden flows: biomass, fossil fuels, mineral.

Imports and exports

: fossil fuels, all other material and products and waste.

Inflows and outflows of unused domestic extraction: fossil fuel extraction, mineral mining and quarrying, harvesting losses, soil excavation and dredging.

Outflows of used material: air emissions, landfill, water, dissipative product use.

Residence principle
Nothing is said on the residence principle.

Data sources and periodicity
The MFA at national level was carried out following Eurostat's methodology. However, DMI and DMC calculated by the Irish EPA were 50% higher than those estimates by the Wuppertal Institute[76]:

- domestic extraction of biomass was corrected to standardised water content of 15%;
- additional minerals that were excluded from CSO statistics because of confidentiality were included;
- data on fossil fuels from the Department of communications, Marine and Natural Resources (DCMNR), was utilised (see below) whereas the Wuppertal Institute used the CSO statistics only.

Most Input side data comes from the central statistical office (CSO), except imports of fossil fuels and data on packaging. Data on fossil fuel imports was provided by the Department of communications, Marine and Natural Resources (DCMNR) and the data on packaging are by Repack, the Ireland's first voluntary initiative between industry and the Department of the Environment designed to meet industry's producer responsibility obligations under the EU directive on packaging and packaging waste.

Hidden flows associated with Irish domestic extraction (peat and gas) were calculated using factors from foreign countries (ConAccount workshop paper). Hidden flows of imports were calculated combining statistics of the DCMNR, the breakdown of countries of origin in CSO statistics and factors from the Wuppertal Institute's databse.

As concerns the output side, data on the outflows of used material to environment (emissions to air, water, landfill, sewage sludge, dissipative products and losses) are available at the Irish EPA. Exports of material, finished and semi-finished products come from the CSO, except fossil fuels and packaging, of which the data comes from the DCMNR and Repack respectively.

Italy

A Material Flow Account for Italy – 1988, Report prepared by Femia A., Italian Statistical Institute (Istat), Eurostat Working Paper n°2/2000/B/8, Luxe mburg, June 2000, 26 p. (study n°90)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp00imfa_pdf/_EN_1.0_&a=d

This report presents the first application of MFA by the Italian Statistical Institute (Istat). This application focuses on the input side and, due to limits in the data availability it does not take domestic unused extraction and indirect flow of imports into accounts. However the main result of 11 tons for the DMI per capita was considered as consistent (taking account of the limited coverage of this first application) with estimates available then for some industrialised western European countries.

Coverage and indicators
This first application deals with the material input side of the Italian economy in 1988.

The results provided covers domestic material inputs (excluding unused materials) and material inputs directly imported.

Types of material included and classifications
Domestic material inputs are classified as follows:

- biomass from agriculture, forestry and fishing (there is no data on hunting);
- Fossil fuels: coal and crude brown coal, petroleum and crude oil, GPL, methane, asphalt and bituminous rock;

[76] - The Irish EPA compared then its results with the estimates prepared by the Wuppertal Institute (Moll, 2003) for the European Environment Agency' third environmental assessment report, so called *Kiev Report* (EEA, 2003).

- Endogenous steam;
- Minerals (mostly non-energy minerals).

Foreign trade statistics on imports of material and goods are classified as energy source, non-energy minerals or biomass (inputs under the category "non-classifiable" represent less the 5% of total imports taken into account).

All material inputs are assigned to the economic branches (NACE 1970) plus households that use them either as an intermediary or final consumption.

Residence principle
Nothing is said on the residence principle.

Data sources and periodicity
The report does not provide great details on the data sources, except in the annex that deals with the method used to estimate the production of quarries and some of the imported goods.

1980-1998 Material-Input-Based Indicators Time Series and 1997 Material Balance of the Italian Economy, Report to Eurostat (grant agreement n° 2001.412.0 0026), coordinated by Aldo Femia (with contributions from Barbiero G., Camponeschi S., Femia A., Greca G., Macrì, Tudini A. and Vanozzi M), Italian Statistical Institute (Istat), Roma, Mach 2003, 50 p.
(study n°54)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/material_accounts&vm=detailed&sb=Title

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Update of the Economy-wide material flow indicators time series for Italy and Italian Physical Input Output Table feasibility study, Report to Eurostat (grant agreement n° 2002.717.0 0011), Femia A. (ed.), Italian Statistical Institute (Istat), Roma, February 2004, 61 p. (study n°59a)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/material_accounts/report-femiamfapdf/_EN_1.0_&a=d

In the report of 2003, chapter 2 (chapter 1 is the introduction) is dedicated to the material input time series of the Italian economy (results and methodology: data sources and compilation method). Chapter 3 deals the material balance.

In the report of 2004, the first part presents the extension of the Italian material input time series to 2001 (part II is dedicated to the feasibility of an Italian physical input out put table).

The Italian MFA time series shows a domestic material input (DMI) more or less stable from 1980 to 1997 whit a rising dynamic in 1998-1999 resulting mostly from the domestic extraction (DE). The comparison with the monetary data shows a trend of relative decoupling between GDP and DMI (although DE actually parallels GDP instead of DMI that includes imports). The comparison between DMC and the corresponding monetary data (GDP plus imports minus exports) also shows relative decoupling. Over the same period, the increase of the total material requirement (TMR) of the Italian economy is primarily due to indirect flows associated to imports, i.e. an increasing pressure of the Italian economy on the environment abroad. As a result of the value added by the Italian economy to its imported materials, its physical trade balance (PTB, excluding indirect flows) is in deficit whereas it is the contrary in monetary terms. The Italian PTB including indirect flows highlights the "ecological deficit" of the Italian economy (imports related flows are largely higher than exports related flows).

Coverage and indicators
As concerns the material inputs of the Italian economy, the 2 pilot studies cover the period 1980-2001. The material balance (input and output) is prepared for the year 1997.

For the period 1980-2001, Istat calculated on annual basis the Italian domestic material input and consumption (DMI and DMC), total material requirement and consumption (TMR and TMC), as well as the Italian physical trade balance (PTB), both excluding and including indirect flows.

As a result of the compilation of the material balance, Istat calculated for 1997 the Italian domestic processed output (DPO) and net additional stocks (NAS), both including and excluding memorandum items.

Types of material included and classifications
Domestic material inputs are classified as follows:

- biomass from agriculture, forestry and fishing (there is no data on hunting);
- Fossil fuels;
- Minerals (metal ores, industrial and construction minerals).

Imports of materials are split between materials plus semi-manufactured products (intermediate consumption) and finished products (final use). Within both of these categories, materials flows are classified as biomass, fossil fuel, mineral or composite products. Materials of the packaging containing the imported products are not taken into account.

Unused materials cover minerals (mining & quarrying overburden), biomass (harvesting losses) and soil (excavated for construction activities).

Memorandum items for balancing cover oxygen (combustion and respiration), nitrogen (combustion), air (natural decomposition and other industrial processes) and drinking water for livestock.

At the different levels of the Italian MFA framework, the material flows are classified according to the European nomenclatures: CN (external trade), EWC (waste), NACE (industries), and PRODCOM (production).

Residence (rather than territory) principle
The report does not deal with the residence principle.

As suggested in Eurostat's methodological guide, the most important difference between residence and territory principles results from fuel use (and the corresponding air emissions) related to international transport activities (including tourism). In its NAMEA air emissions report of June 2004 (i.e. delivered 4 month after the latest MFA report), Istat presents its method for the adjustment of transport emissions of industries (i.e. excluding households) to the residence principle. It could be implemented later for MFA.

Data sources and periodicity
Data on **domestic extraction of fossil fuels and minerals**, except for marine salt (Ministry of finance) and construction minerals (see below), come from Istat's survey (published in the Italian statistical yearbook), that are combined with data from the Ministry of industry. Estimates of the domestic extraction of construction minerals are based both on a joint Istat-Ministry of industry's survey on quarries (and peat fields, incomplete set of data) and the PRODCOM survey (from data on 1998), as well as information of the Italian environment agency (ANPA) on the reuse of soil excavated.

Data on **domestic extraction of biomass** mostly come from Istat's surveys that are published in either in specific Italian statistical yearbooks (agriculture and forestry, including none market gathering) or in the general statistical yearbook (fishing). No data are available on hunting.

As concerns **unused domestic material**, coefficient for mining and quarrying energetic resources (oil and natural gas) were calculated from 1997 to 1999 data on drilling related waste provided in the 2001 annual report of the Italian energy company ENI. Waste statistics reported by the Italian companies combined with production data from PRODCOM survey (for NACE 13 and 14) were used to estimate unused non energetic material. Estimates of unused material resulting from biomass (dry weights, except for fishing residues) were made using either coefficients found in the scientific and technical literature (agriculture), data on residues (on 1991 and 2000) provided by Istat's survey (wood removal) or Wuppertal Institute's coefficients (fishing). As concerns excavated soil (excluding dredging), estimates are on based Istat's survey plus data from a research centre on the construction market (building); data from the national railway companies and the national companies for roads maintenance (excluding motorways), as well as on ANPA's waste statistics (proportion of material reused for construction purposes).

Indirect flows associated to international trade are calculated thanks to coefficients provided by the Wuppertal Institute.

The material input time series of the Italian economy is updated on a yearly basis.

Output side of the material balance.

Latvia

Economy-wide natural Resources Assessment, Latvian environment Agency, Ministry of Environment of the Republic of Latvia, Riga, December 2004, 87 p. + annexes (study n°119)

This study analyses the economic development related to natural resources flows, in order to identify how the environment state (land areas that are used for production, waste volume) and the pollution (emission to air, water), the production and the consumption are affected by natural resources flows.

The report starts by describing the material flows, focusing on: classification of resources, accounting scheme for natural material flows, economy-wide material flow indicators and extraction, production, and consumption.

The description of the methodology presented in the chapter 1, refers to the 2001 Eurostat methodological guide. However, data are not presented exactly according to Eurostat standard tables (cf. survey). The authors point out that water and air have not been considered in the flow balance and that estimations were used in several categories.

The study continues by reviewing all different resources taken into accounts. A chapter is then dedicated to the indicators and an analysis of waste is presented in the last paragraph of the report concerning Non-hazardous and Hazardous Waste and Used Packaging.

Coverage and indicators
This study covers the year 2002.

The following indicators are calculated: direct material input (DMI) and direct material output (DMO), direct material consumption (DMC)

The DMI indicator includes resources extraction and import (hidden flows are excluded). The DMC indicator is calculated as the difference between import and export and, as the previous indicator, does not include hidden flows.

Types of material included and classifications
Extraction

- Fossil fuel: peat;
- Minerals: sand-gravel, dolomite, sand, clay, limestone, gypsite and peat;
- Biomass from agriculture (harvest statistics): cereals, roots and tubers, pulses, oilcrops, vegetables, fruits, nuts, fibre crops and other crops;
- Biomass from agriculture as a by-product of harvest: crop residues used as fodder, depasturing of livestock, biomass from forestry, wood,coniferous (round) wood , non-coniferous (round) wood, raw materials other than wood, biomass from fishing, the baltic see fish catch, marine fish catch, inland waters (freshwater) fish catch, other (shrimps and squids), biomass from hunting, biomass from other activities (honey).

Imports

- Unprocessed resources: Fossil fuels (petroleum products, coal, oil shale, natural gas and coke), Minerals (metals, non-metallic minerals), Biomass (agricultural biomass, forestry biomass and fish);
- Semi-manufactures products: from fossil fuels, from minerals, from metals, from non-metallic minerals and from biomass (forestry);
- Finished: predominantly from fossil fuels, predominantly from minerals predominantly from metals, predominantly from non-metallic minerals and predominantly from biomass (forestry);

- Other products: abiotic origin products, biotic origin products (agricultural plant products, agricultural animal products, animals as products

Exports:

- Unprocessed resources: Fossil fuels (anthracite and crude oil), Minerals (metals and non-metals), Biomass (agricultural biomass, forestry biomass and fishes);
- Semi-manufactures products: fossil energy resources, minerals (metals and non-metals) and biomass;
- Finished products: main component-fossil energy resources, main component-minerals (main component-metals, main component - non-metals) and main-component–biomass;
- Other products: abiotic origin products, biotic origin products (products from agricultural plants, products from agricultural animals, animals as products) and other biotic origin products.

Residence principle
The report does not refer to this principle.

Data sources and periodicity
Fossil Energy Resources: Central Statistical Bureau;

Mineral Resources: State Geological Survey and the Central Statistical Bureau; data about the waste from mineral resources is obtained from the data basis of the Latvian Environment Agency;

Peat Resources: State Geological Survey;

Wood Resources: from the forest resource department of the Ministry of Agriculture and the Latvian Environment Agency; data about waste from wood pulp is taken from the data basis of the Latvian Environment Agency;

Game Animal Resources: State Forest Service;

Fish resources Latvian Fish Resources Agency, and the Central Statistical Bureau of Latvia; data about the waste from fish procession is obtained for the data basis of Latvian Environment Agency;

Land Use: State Land Service.

Hungary

Material flow accounts (MFA) in Hungary, Report to Eurostat (Phare Multi-beneficiary Statistical Cooperation Program in 2003 – Technical Assistance) prepared by Enikő Drahos, Lajos Kaposi, Gábor Szilágyi, Hungarian Central Statistical Office (HCSO), 35 p., (Study n°72)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/mfa/finalreport_hupdf/_EN_1.0_&a=d

The report presents the first implement of MFA at the Hungarian Central statistical office (HCSO) that had no experience in this domain[77]. Therefore, one of the main objectives of the project was to find the appropriate data sources and assess the reliability and accuracy of the corresponding data.

The HCSO, which explicitly adopted Eurostat's methodology, gives a brief description of the methodological background (chapter 2), referring to the 2001 Eurostat guide (*Economy-wide material flow accounts and derived indicators*). However, at this stage, the HCSO focused on the input side of the framework. The report includes also a short description of the data sources (chapter 3) (chapter 4 is dedicated to the classification of input that is used), focusing on the presentation of the results (chapter 5, 21 pages out of 35), before providing a timetable of the future work of the HCSO in the area of MFA (chapter 6). The tables of data re provided in annex.

[77] - A material flow analysis of Hungary had been carried out a few years before within the IIASA in Austria, but it was mostly based on international statistical sources. Hammer M., Hubacek K. (2003), *Material Flows and Economic Development – Material Flow Analysis of the Hungarian Economy*, International Institute for Applied System Analysis (IIASA), Interim report approved by Günter Fisher, Laxenburg (Austria), February 2003, 46 p. This study covers the period 1993 – 1997.

Coverage and indicators

For it first implementation of MFA, the HCSO focused on the input side and direct flows, i.e. domestic extraction and imports (unused and hidden flows are not taken into account), but included exports. As suggested in the Eurostat's methodological guide on MFA, air and water flows (as memorandum items used for balancing) were excluded.

Therefore, 3 direct material flow indicators were derived from the data set compiled then:

- Direct Material Input (DMI);
- Domestic Material Consumption (DMC),
- Physical Trade Balance (PTB).

They are both presented in tonnes and in tonne per capita in order to ensure international comparability. The results obtained by Hungary for the above mentioned indicators are also compared with results in EU-15 countries for the year 2000.

Also, the rations of resource productivity (GDP/DMI and GDP/DMC) are calculated based on GDP at constant price to enable comparison over time. As expected in the project, this pilot application resulted in the compilation of a short time series that covers the years 2000 to 2003.

Types of material included and classifications

The classification of materials used by the HCSO is consistent with the classification suggested in Eurostat methodological guide.

Domestic extraction:

- Fossil fuels: coal, lignite, crude oil, natural gas and bituminous crude materials;
- Minerals: metallic (ferrous and non ferrous) ores, industrial minerals; construction minerals;
- Biomass: agriculture (harvest and by-products), grazing of animals, forestry, fishing, hunting; and biomass from other activities.

Imports and exports:

- Raw materials: fossil fuels; minerals (metallic and non metallic), biomass (from agriculture, forestry and fishing), secondary raw materials;
- Semi-manufactured products: from fossil fuels, from minerals (metallic and non metallic), from biomass (forestry);
- Finished products: predominantly from minerals (metallic and non metallic), and other products (biotic and abiotic kinds), animals as products; other products n e c.

Residence principle

The report does not refer to this principle.

Data sources and periodicity

The first Hungarian MFA is based both on the HCSO's statistics and administrative data sources, especially in the field of fossil fuels and minerals.

Domestic extraction:

- Concerning **fossil fuels**, the main data source is the Hungarian Geological Survey (HGS), which is compulsory survey. It is complemented by data from the Mining Bureau of Hungary (MBH), which is the supreme authority of mineral prospecting and mining activity. These sources are comprehensive administrative databases. Additional information comes from the Industrial Statistics Department (HCSO), as well as the annual reports of enterprises.
- For **minerals**, the main data source is the database of the HGS. Additional data come from the MBH and the HCSO's Industrial Statistics Department;
- According to the authors, the data on **biomass** can be derived from agricultural statistics (farm structure survey and agricultural balances), like the detailed annual statistics of the HCSO on the farm structure that follow Eurostat's requirement.

Data on **imports** and **exports** come from the annual external trade statistics Department of the HCSO that has the responsibility of external trade statistics since 2002 (before it shared this task with the ministry of economy and transport).

Austria

Material Flow Accounts, Material Balance and Indicators, *Austria 1960-1967*, prepared for the DG Environment and Eurostat by Susanne Gerhold and Brigitte Petrovic, Statistics Austria, Eurostat Working Papers, N° 2/2000/B/6, Luxembourg, April 2000, 25 p. Including in Annex – *Material flow account for Austria, 1960 to 1997*, translation of an article published in *Statistische Nachrichten* (n° 2/2000) by Schandl H. and Weisz H. of the IFF and Brigitte Petrovic of Statistics Austria (ÖSTAT). (study n° 88).

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp00amfa_pdf/_EN_1.0_&a=d

In Austria, the IFF social ecology (Institute for Interdisciplinary Research and Continuing education that), which was on of the first institute in Europe to develop economy-wide material flow accounting, produced the first Austrian material flow account (MFA) for 1988, and the one for 1992 was included in the National Environment Plan. The IFF published in 1994 the first material inputs time series of the Austrian economy that covered then 1970 to 1990. In 1998 Statistics Austria produced its first material balance in cooperation with the IFF. MFA are implemented since 2003 in the environment statistics working programme at Statistics Austria, which is still in close contact with the IFF (since 2005 the Faculty of Interdisciplinary Studies of the University of Klagenfurt) as regards methodological issues.

The introduction stresses on how Austria was precursor in the domain of MFA. The chapter on the methodology consists of a brief reminder of the social metabolism approach recommended by Eurostat. The chapter dedicated to the data sources focuses of the 1997 material balance whereas the following chapter presents detailed material balances (graphs) by type of input (biomass, minerals and fossil fuels) and deals with the evolution of the input-based indicators over the period examined. The presentation of the material inputs time series provided in annex is actually the translation of paper published earlier in 2000. This paper provides a detailed presentation of the data sources.

Over the 1960-1997 period, the material productivity of the Austrian economy (GDP/material input) increased significantly (decrease of the material intensity: material input/GDP), however, the Austrian material consumption per capita in 1997 was almost three times higher than it was in 1960. Comparing the evolution of the Austrian GDP and the corresponding material input, the authors identified 4 phases: almost parallel expansion of the GDP and material input (1960-1975), slowdown of both the GDP and material input (1975-1981), decoupling of the material input and economic growth (1981-1993), come back of the parallel trends between economic growth and material input (1993-1997). In 1997, fossil fuels counted for 80% of the overall material input of the Austrian economy and almost 90% of this total material input imported.

Coverage and indicators

The Austrian material inputs (used material only) time series presented in the report covers almost 4 decades, from 1960 to 1997. The material balance is produced for the year 1997.

Since unused materials are not taken into account, Statistics Austria's examination focuses domestic material input and consumption (respectively DMI and DMC) evolution, as well as the Austrian material productivity (GDP/DMI and GDP/DMC).

Material balance (DPO)

Types of material included and classifications

Material inputs (domestic and imports) are split up into the 3 following categories:

- Biomass (agriculture and forestry);
- Minerals (ore, salt, industrial minerals, clays, natural stone, sand and gravel);
- Fossil fuels (coal, petroleum and natural gas);

A forth category *chemicals and other products* is used for imports only.

Material balance (outputs)

Residence (rather than territory) principle
The report stresses that the annual material input is calculated in line with national accounts. However, nothing is said on the compliance with the residence principle and the Austrian NAMEA-air data reported at the same time did not fulfil the residence principle. The 2003 Austrian report on NAMEA-air stresses that further investigations are needed as regards road transport (trucks and tourists' cars crossing Austria), which is likely to be the main source of difference between residence and territory-oriented data sets.

Data sources and periodicity
Data are derived mainly from internal sources, such as agricultural surveys and analyses, short term economic and energy statistics, as well foreign trade statistics. Further sources are for example the Federal Environment Agency or the Austrian Forest Report (Österreichischer Waldbericht) of the Federal Ministry of Agriculture, Forestry, Environment and Water Management, the Mining Manual (Montanhandbuch) of the Federal Ministry of Economics and Labour, and the Federal Waste Management Plans (Bundes-Abfallwirtschaftspläne).

This study demonstrated the feasibility for a regular (annual) production of economy-wide MFA for Austrian.

Romania

Environmental accounting - Data Collection Project, Report to Eurostat (grant agreement n° 2004.19.100.025) prepared by the National Institute of Statistics of Romania, November 2005, 32 p. plus annexes and Excel spreadsheets. (study n°73)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/mfa/ro_interim_mfadoc/_EN_1.0_&a=d

The study undertaken by the National Institute of Statistics of Romania (INS) aimed to compile the first MFA for Romania. As listed in the introduction of the report, the objectives of the project were to:

- Identify the data sources and availability (harmonise the information for the MFA);
- Define national priorities within the MFA framework (among the different accounts);
- Set up a national method for the regular compilation of MFA (data collection and processing);
- Calculate of MFA-based indicators (national use and reporting to Eurostat).

The INS follows the European standards in MFA[78]. The description of the methodology (chapter 2) is directly extracted from the 2001 Eurostat publication Economy-wide MFA methodological guide. The results are presented (chapter 3) before the data sources (chapter 4). The conclusion stresses that most material flows are estimates thanks to official statistics. However, additional data collection was necessary especially in the extraction sector. Two directions were then identified for the future development of MFA in Romania: the quality of the data and the compilation of a PIOT.

A first series of tables annexed to the report show for each item of the MFA the corresponding code(s) in the relevant national or international classification and nomenclature. The questionnaire to the mining and quarrying sector is also annexed to the report. The data compiled are provided in Excel sheets tables.

Coverage and indicators
The first series of MFA for Romania covers the period 1994 - 2003 and deals with the input side only (plus exports), including direct and unused flows. Hidden flows are not taken into account.

[78] - the report refers especially to the manual Eurostat, *Economy – wide material flow accounts and derived indicators – a methodological guide*, Luxembourg, 2001; to one of the Italian report presented earlier in this study: Femia A. (coordinator), *1980 -1998 Material – Input – Based Indicators Time Series*, Istat, Roma, 2003; and to a study prepared for Eurostat by the IFF-Social Ecology, *Development of material use in the EU-15: 1970-2001*, Vienna, 2004.

Therefore, the following indicators are calculated: domestic material input (DMI), domestic material consumption (DMC) and physical trade balance (PTB). The indicated presented as total material requirement (TMR) is not total consistent with the standard definition since hidden flows are missing. All these indicators are presented in tonnes and tonne per capita, as well as in tonne per unit of surface (national territory).

Material intensity indicators (DMI/GDP and DMC/GDP) are calculated based on GDP at constant price to enable comparison over time.

Types of material included and classifications
Following the European standards, the MFA for Romania include fossil fuels (coal, oil and gas) and minerals (industrial, i.e. metallic and non-metallic ores, and construction minerals) and biomass from agriculture, forestry and fishing.

All the data are compiled using the international nomenclatures and classifications as regards products (CPA), economic activities (NACE) and international trade (HS until 1994) and CN since then). In the tables provided in annex, domestic minerals and fossils fuels items are identified according to their code in the national industry statistics; biomass items are identified by New Cronos codes and imports/exports according to HS/CN and CPA/NACE nomenclatures.

Residence (rather than territory) principle
The report does not refer this principle.

Data sources and periodicity
Most data on the direct **domestic material flow**s come from Romanian official statistics or databases that can easily be consulted. There are not data on unused extraction in the official statistics in Romania. Therefore, representative companies of the extraction sectors were surveyed.

- **Fossil fuels**: most data on direct flows come from the industry statistics (PRODROM survey) published in the Romanian Statistical Yearbook. Unused flows were estimated either from the difference between gross and net extraction (coal) or extraction and use (gas).
- **Minerals**: data on direct flows of industrial mineral mainly come from the industry statistics that results from the PRODOM survey. Concerning construction minerals, estimates were made thanks to a comparison between industry statistics and results of the survey on the construction sector. Unused flows were mostly estimated, for each type of minerals, from the difference between the quantity extracted and the amount of waste generated. Information had to be collected from relevant companies.
- **Biomass**: as concerns the direct flows of biomass (products and by-products from agriculture, forestry, hunting and gathering) most data come from official statistics, on agriculture and forestry that are published in the Statistical Yearbook. Estimates were undertaken for the consumption of biomass by reared animals and additional information from technical documentation was used for the transformation of wood cubic meters in tonnes. Fish catches were ware calculated from the administrative data of the ministry of agriculture, forestry and rural development. Unused flows from agriculture correspond to a share of the by-products estimated for the direct flows. In the case of forestry, estimates ware based on coefficients provided y the Forest Research and Arrange Institute. For fishing, the coefficient came from a technical report on the EEA (*Total material requirement of the European Union*) published in 2001.

Data on **imported and exported** material flows were extracted from foreign trade statistics of the National Customs Authority (NCA) database, including the imports data that are collected by the INS (goods transported by pipelines and a part of crude oil) before being transmitted to the National Customs Authority which validation and processing. Data on waste imported/exported for final treatment and disposal were obtained from the Statistical Application on import and export of waste. Data were not available yet on packaging materials associated to the products exchanged (a specific survey was planned).

Slovenia

Material Flow Accounts (MFA) in Slovenia, Report to Eurostat (grant agreement n° 71401.2005 .001-2005-300) prepared by Vida Butina, Statistical Office of the Republic of Slovenia, Ljubljana, December 2006, 26 p. + annexes. (study n° 129)

The objective of this pilot study was to develop and compile the input side of MFA for Slovenia for the period from 2000 to 2005. This study was therefore the starting point for the future work concerning the MFA.

After a brief introduction, the study continues with the description of the methodological background (chapter 2). Eurostat's recommendations were studied and the parts applicable to the Slovenian economy were taken into account (air and water flows as memorandum item were excluded from this study). Chapter 3 describes the data sources and in chapter 4 the "table structure" is in fact the list of input taken into accounts for calculating DMI and DMC. Chapter 5 presents the results. The tables of data were also provided in Excel spreadsheets.

Coverage and indicators
The time series compiled covers the period from 2000 to 2005.

For this pilot study the DMI and the DMC were calculated.

Types of material included and classifications
The report states that statistics Slovenia followed Eurostat's methodology where it was applicable. The material flows taken into account are classified as follows:

- Fossil fuels (hard coal, lignite), crude oil, petroleum products and natural gas;
- Minerals (raw materials for manufacturing, raw materials for mining and quarrying and raw materials for construction);
- Biomass (excluding hunting, data on hunting are not available in tonnes);
- Import and export

Residence (rather than territory) principle
Nothing is said on the residence principle.

Data sources and periodicity
The following sources were used for this pilot study:

Fossil fuels: energy statistics

Minerals: Report on Mineral Raw materials 2004 by the Surveying and Mapping Authority of the Republic of Slovenia.

Biomass: agricultural statistics based on detailed agricultural data compilations and surveys for example the Farm Structure Survey.

Domestic production in forestry (input): data for removals by tree species by the Slovenian Forestry Service.

Import and Export: external trade statistics (Customs Administration of the Republic of Slovenia)

FAO and Eurostat data was also used.

Finland

Material Flow Accounts – TMR, DMI and Material Balances for Finland 1980-1997, Report for DG Environment and Eurostat, prepared by Jukka Muukkonen, Statistics Finland, Eurostat Woking Paper n°2/2000/B/1, 29 February 2000, 40 p. (study n°83)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp00finmfa_pdf/_EN_1.0_&a=d

This report that has been circulated as Working Paper by Eurostat in 2000 had been carried out before the European MFA methodology was totally stabilised. However, it deals mainly with data availability and not with theoretical issues on MFA. This report presents the results of the first study on economy-wide MFA undertaken under the aegis of Statistics Finland.

The objective of the study (chapter 1) was three-fold: clarify the possible uses of existing MFA studies in Finland, identify the needs and possibilities for a regular production of MFA, to combine all the statistics available as a basis for material flow balances. A special focus was on the on the distribution of material flows across industries (a preliminary material input account by sectors is provided in annex).

The report presents successively the data sources in Finland: material input, energy and air emission accounts[79], waste statistics (chapter 3), the way from material flow data to material balances (chapter 4), and the further work needed for material flow balances in Finland (chapter 5). The conclusion stresses on connection between data on material flows and national accounts, including through NAMEA-types accounts (Chapter 6). All the data compiled for the study are provided in annexes.

Coverage and indicators

The study covers input and output sides of MFA. As regards inputs, direct, unused and hidden flows are taken into account. Output data covers mainly air emissions and waste.

Therefore, the standard MFA indicators were calculated: domestic material input (DMI), total material input (TMI), and total material requirement (TMR), as well as material resource intensity indicators (DMI/GDP, TMR/GDP, DMI/capita and TMR/capita), as regards the input side, and domestic processed output (DPO), the total domestic output (TDO), the net addition to stock (NAS) and the total material output (TMO), as concerns the output side.

The input data covers the period 1980-1997 and the material balance (input and output) the years 1987, 1992 and 1997.

Types of material included and classifications

The direct inputs (more than 400 product groups) are classified according to the CPA that links them with the economic classification of industries.

As indicated earlier, the European methodology for MFA was not yet standardised when the data included in the first MFA for Finland was prepared. The list of materials taken into account in the report is divided into minerals (energy, metallic and non metallic minerals, construction minerals) and biomass (from agriculture, forestry and fishing) for both domestic resources and imports. Only less significant flows like hunting and gathering are not included.

The hidden flows are classified as direct flows for minerals. For agriculture it is soil erosion and for forestry, logging residues and erosion.

The preliminary input account by sector prepared for the year 1995 is presented for a breakdown of 38 NACE-based industries.

Concerning waste statistics, the text says that industries are divided into 30 groups and wastes into 37 groups, hazardous waste being presented separately. However, the waste statistics provided in annex

[79] - The time series announced then for energy and air emission accounts by industries (covering respectively 1980 – 1997 and 1992 - 1998) do not match with the series identifies under NAMEA chapter in the present report.

covered both waste generation and waste treatment, for 22 types of waste, but were not distributed across industries.

Residence (rather than territory) principle
The report does not deal with the residence principle.

Data sources and periodicity
The compilation of the TMR time series that resulted from a research project untitled *Eco-Efficiency in Finland* undertaken by a consortium coordinated by the Thule Institute (University of Oulu). Direct input were derived from information collected directly from published basic statistics and converted into tons by conversion coefficients. Hidden flows were estimated thanks to the Wuppertal Institute's coefficients that were adapted to Finland.

The energy, air emission and waste accounts, the statistics on agriculture, forestry, industry, and construction, as well as foreign trade statistics are prepared by Statistics Finland. Statistics made by several industry associations were also used.

Sweden

Material flow accounts - DMI, DMC for Sweden, 1987-1997, Report prepared for the DG environment and Eurostat by A. Isacsson, K. Jonsson, I. Linder, V. Palm, A. Wadeskod, Statistics Sweden, 15 March 2000, Eurostat Working Paper No. 2/2000/B/2, 45 p. (study n°84)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp00smfa_pdf/_EN_1.0_&a=d

Statistics Sweden has developed physical environmental accounts since 1993. A previous study on construction mineral was published as Eurostat Working Paper[80]. Main purpose of the study was to calculate the total national input of raw materials of the Swedish economy. The results were preliminary and the authors gave indications on the necessary further investigations.

In the methodological information given in introduction (chapter 1), the report refers to what has been suggested then internationally[81]. The methodological guide developed at Eurostat was not yet available. The core of the text is dedicated to raw materials inputs, including data sources (chapter 2). Output data from the environmental accounts (air emissions and waste) are also provided and an attempt is made to couple environmental pressure as recorded in the environmental accounting system through a monetary input-output analysis (chapter 3). The next 3 chapters give a brief discussion of the results (chapter 4), the conclusions (chapter 5) and the references. The main results are presented in 4 Appendices.

Coverage and indicators
This report focuses on the direct material flows input side of the economy-wide MFA framework, i.e. it does not include hidden flows. A time series of direct material input (DMI) is compiled for the period 1987 – 1997[82]. Exports are nevertheless taken into consideration in order to estimate direct material consumption (DMC) for the same period. DMI and DMC are also calculated per capita and split between the different input categories (fossil fuels, Ores, etc.) for the sake of international comparison.

Total metal ores were included as a direct input before the authors noticed at the end of the study that only *concentrates* were considered as direct material flows in other international studies. It is said that, in future work, the difference between total ores and concentrated will be move to hidden flows (it is now designated as *unused materials* in the European methodology, *hidden flow*s being specifically associated with imports).

[80] - Bergstedt E. and Linder I. (1999), *A Material Flow Account for Sand and Gravel in Sweden*, Report for DG Environment and Eurostat prepared by Statistics Sweden, Eurostat Working Paper No 2/1999/B/4, October 1999, 27 p.
[81] - Adriaanse A., Bringezu S., Hammond A., Moriguchi Y., Rodenburg E., Rogich D., Schütz H. (1997), *Resource flows : The material basis for industrial economies*, World Resource Institute (USA), Wuppertal Institute (Federal Republic of Germany), Netherlands ministry of housing, special planning and environment, National institute for environmental studies (Japan), April 1997, 72 p.
[82] - A paper covering the period 1987-1998 was published in 2003: Palm V., Jonsson K. (2003), "Material Flow Accounting in Sweden: Material Use for National Consumption", *Industrial Ecology*, Winter 2003, Vol. 7, No. 1, pp. 81-92.

Air emission accounts for NAMEA and data on waste from manufacturing industries are also presented in the report.

Types of material included and classifications
The list of materials taken into accounts is rather similar (although it is less detailed) to the classification that will be proposed later in the Eurostat methodological guide.

The classification of material in the first Swedish economy-wide MFA is as follows:

- Fossil fuels (solid, liquid, gaseous) used either as energy or materials;
- Ores (iron ore and non-ferrous ores);
- Industrial minerals (including peat for agricultural use);
- Construction mineral (sand and gravel, crushed stone, morain, limestone for cement natural stones and slab stone);
- Renewable materials (raw materials for food production), products from fishing (commercial) and forestry (logging), as well as hunting and wild berries.

Residence (rather than territory) principle
The report does not explicitly deals with the residence principle in general. However, as regards fishing resources for instance, fish landed abroad by Sweden residents are included (although there are not registered in the regular exports statistics) and fish landed in Sweden by non residents are included in imports.

Data sources and periodicity
Since the first economy-wide MFA for Sweden focused on direct input material flows, most of the basic data came from official statistics, like the energy statistics of Statistics Sweden (fossil fuels, except peat), the Geological Survey of Sweden (domestic extraction of metal ores and minerals) or statistical yearbooks (agriculture and forestry), industrial statistics (wood and related by-products), as well as Statistics Sweden's foreign trade statistics.

For some biological flows, the data came from additional official sources, like the national Board of Fisheries (commercial fresh water fisheries), the National Board of Agriculture (data collected from the Swedish Association for Hunting and Wildlife Management).

A few estimates were made, e.g. concerning the raw materials for food production, combining data of the Swedish university of Agriculture Science (tables of feed consumption) and livestock's statistics (statistical yearbook of agriculture), or the yield of cereals that resulted from statistics Sweden's harvest estimates.

Material Flow Accounts and Policy for Sweden, report prepared for DG Environment and Eurostat by Annica Carlson, Anders Wadeskog, Viveka Palm and Frederek Kanlén, Statistics Sweden, December 2006, 73p. (Study n°106)

http://www.scb.se/statistik/_publikationer/MI1301_2004A01_BR_MIFT0701.pdf

Since June 2006, Statistics Sweden has been commissioned by the Government to develop national MFA on a regular basis. This report is based on former experience (see above) and Eurostat's methodology. The authors also had contacts with colleagues at Statistics Denmark and the Federal Statistical Office Germany.

The 2006 Swedish MFA study aimed to: compare MFA data on 2004 with earlier MFA time series for Sweden and other European countries, compare waste statistics and data on recycling, search for key hazardous substances, and analyse resource productivity by material flow and by industry.

The study is split into 2 main parts, focusing respectively on the method, including the data sources (chapter 3), and the results, including the comparison both to the previous Swedish MFA (cf. above)

and to other European countries[83] (chapter 4). After the conclusions (chapter 5), the report provides a detailed presentation of the future development plan of MFA in Sweden (chapter 7). The detailed data as well as the classifications and their interconnections are annexed to the report.

Coverage and indicators

This report presents the economy-wide MFA for Sweden in 2004 and focuses on the raw materials and does not include data on semi-finished or finished products related material flows. As announced in the previous Swedish report in MFA (see above), the estimation of the domestic input of mineral ores was calculated from concentrates and not totally including the ores as for the 1987-1997 time series.

However, some the output side is partially covered by data on waste (the report benefited from the data recently reported to EU according to the regulation on waste statistics[84]), but neither the balancing items (air in combustion process and water vapour resulting from the combustion) nor water or erosion process were included. No accumulation of materials in stock was accounted for.

Therefore, the standard economy-wide MFA indicators are calculated by category of materials: domestic material input (DMI), domestic material consumption (DMC), as well as the physical trade balance (PTB). For the sake of international comparisons, they are both presented per capita and per unit of GDP. Productivity or resources (value added/DMI) was also calculated per industry. Indirect DMI allocated to the final demand have been calculated from the traditional input output approach (i.e. combining environmental accounts in physical unit and input output tables in monetary unit).

Types of material included and classifications

Since the MFA for Sweden was designed to be integrated into the Swedish environmental accounts, they are based on the national accounts' internationally harmonised classifications. All the data were collected at a very detailed level (8-digit Combined Nomenclature (CN), and aggregated afterwards to the MFA categories. In order to define the relevant MFA categories, the CN codes were mapped into CPA codes as well as the NACE coding used in the most detailed supply/use tables in the national accounts. The CPA codes were used to link the materials to the MFA categories and the NACE categories where they are used to define materials used by industries (indirect flows corresponding to the domestic material input per industry) and for final demand (a table showing the CN code corresponding to each CAP codes taken into account is provided in annex).

The input material flows (domestic extraction and imports) are distributed between the material categories biomass (crops, hunting, wood, fish), fossil fuels (hard coal, lignite, peat, petroleum, natural gas), and minerals (uranium and thorium, iron, non-ferrous metals, sand and clay, chemical and fertiliser minerals, salt, other mining and quarrying products). The DMI data are presented according to a 25-industry NACE-based classification.

Flows of waste (reported in EWC-stat codes) and of chemical products (NACE 24.1, NACE 26 and NACE 21 mainly) have been given extra attention in order to search for key hazardous substances, classified as very toxic (T+), toxic (T), corrosive (C), Harmful (Xn) and Irritant (Xi). Data for key substances are considered per industry (NACE) and, when possible, connected to their field of application (e.g. manufacture of paints for production of solvents).

Residence (rather than territory) principle

The report refers to the 2004 Finnish study (see below in the section on PIOT) about the activity of the economy (and the related material flows) that may cross the national borders and states that to some extent this is covered for Sweden by foreign trade data.

Data sources and periodicity

One the main conclusion of the study is that, for the majority of the material flows, it is possible to compile MFA for Sweden from existing sources of Swedish statistical system.

Foreign trade statistics have been used for data on imports and exports of materials. Domestic extraction of materials is based on statistics on commodities and industrial services (and not the

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[83] - Weisz H. (coord.), Krausmann F., Eisenmenger N., Amann C., Hubacek K. (2005), *Development of material use in EU-15: 1970-2001, Material composition, cross country comparison, and material flow indicators*, Report for Eurostat prepared by the IFF-Socail Ecology (Vienna), Ready to print version, February 2005, 110 p.

[84] - Regulation of the European Parliament and of the Council of 25 November 2002 on waste statistics, Official Journal of the European Communities of the 9 December 2002, L 332/1-36.

Geological Survey of Sweden that was used for the previous study). Data on agricultural production comes from agricultural statistics and statistics on biomass from forestry from the Swedish Forestry Agency. Statistics on fishing catches come from the Swedish Board of Fisheries. Data on flows of waste have been collected from the national reporting on waste statistics to the EU. Key substances of hazardous chemicals have been identified by using data from the National Chemical Inspectorate in Sweden.

The United Kingdom

UK Material flow review, Report to Eurostat (grant agreement: 200241200010) prepared by Ian Gazley and Perry Francis, Office for National Statistics, January 2005, 48 p. Annexes (Study n°57)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/material_accounts/material_reportpdf/_EN_1.0_&a=d

The UK MFA were originally compiled by the Wuppertal Institute on behalf of the Department for Environment, Transport and Regions now the Department for Environment, Food and Rural Affairs (Defra). Now the Office for National Statistics (ONS) prepares and publishes annual economy-wide MFA as part of the United Kingdom environmental accounts. However, the ONS considered then that a number of areas could be improved. The purpose of the report was to investigate these areas in order to help ONS producing more accurate MFA.

The introduction (chapter 1) stresses that this objective was in line with recent OECD recommendation that invite member countries to engage in the improvement of their material flow information[85] and announces the 5 issues that have been reviewed: completeness, timeliness, international comparability, policy relevance and the accuracy and coverage of the indirect and hidden flows. Before this review, the report starts with a precise presentation of the concepts and definitions that are taken from Eurostat's methodological guide (chapter 2). The core of the text is structured alongside the above 5 items for review (chapter 3 to 7). The next chapter is devoted to the recommendations that resulted from the review (chapter 8). The bibliography is detailed and includes electronic links. Annex A presents the data coverage and sources (with links) of the UK MFA. Annex B contains a review of the UK indirect flow coefficients (domestic unused materials and imports related hidden flows) carried out in 2003 for the ONS at the University of Manchester[86].

The main recommendation proposed for each of the 5 issues dealt with:

- Completeness: ONS will seek to use data available to compile output indicators,
- Timelines: it was estimated that the optimum publication date November of each year,
- International comparability: it will be necessary to develop the current data set on imports in order to fulfil Eurostat standard tables' requirement,
- Policy relevance: additional analysis of reuse and recycling will give indication of domestic extraction or material imports avoided,
- Hidden flows: no question on hidden flows will be included in the questionnaire of the UK annual mineral inquiry; it was proposed to set up a database on hidden flow at Eurostat.

Coverage and indicators

Until this report (which was not dedicated to the presentation of the UK MFA time series), the ONS has been focusing on the input side of the MFA for UK, publishing therefore estimates for domestic material input (DMI), domestic material consumption (DMC) and total material requirement (TMR). No estimate has been made for output indicators because of the insufficient data quality for publication.

[85] - OECD (2004), *Recommendation of the Council on Material Flows and Resource Productivity*, Endorsed by Environment Ministers on 20 April 2004, Adopted by the OECD Council on 21 April 2004, 4 p.
[86] - Lawson N., Waghorn D., Ravetz J. and Douglas I. (2003), *UK Material Flow Accounts: Review of Indirect Flow Coefficients*, Report to the ONS, University of Manchester/School of Geography, November 2003, 40 p.

The MFA for UK deviate from the Eurostat guide in the treatment of the water content of timber. Adding 15% for water content, as recommended in the guide, would increase domestic extraction by just over 1 million tonnes (0.2%) and direct material consumption by 4 million tonnes (0.6%).

Types of material included and classifications
The classification of the materials taken into accounts is consistent with the classification of Eurostat's methodological guide (see below the data sources).

Residence (rather than territory) principle
The principle is presented in chapter 2 that is dedicated to concepts and definitions. However, the report does not say how the MFA for UK fulfils this principle, especially as regards international transport activities.

Data sources and periodicity
Annex A gives a complete list of the data sources used for the compilation of the MFA for UK.

- Data on the domestic resources from biomass (agriculture), as well as agriculture related dissipative flows (manure, mineral fertiliser, pesticides and seeds), comes mainly form the UN Food and Agriculture Organisation (FAO) statistics.
- Data on the domestic mineral and ore resources domestic fossil energy carriers come from the UK Mineral Yearbook.
- Data on emissions to water that was initially provided by the Centre for Environment, Fisheries and aquaculture Science comes from the Environment Agency since 1998 (reference year).
- Air emissions data are prepared by the National Environment Technology Centre (NETC).
- Different sources are used for waste related data on construction and demolition (Office of the Deputy Prime Minister and Defra), industrial and commercial activities (Environment Agency/Defra) and municipal waste (Defra and relevant National environment organisation for Wales, Scotland, and Northern Ireland).
- Import and exports data come from the HM Customs and Excise statistics.

Norway

Pilot studies on economy-wide material flow accounts and the eco-industry for Norway, Report o Eurostat (grant agreement n° 71401.2005.001-2005-29 9) by Julie L. Hass, Mr. Knut Ø. Sørensen (co-project leaders), With contributions from: Kristine Erlandsen Kolshus, Marit Sand, Mahari Tikabo, Statistics Norway, 31 January 2007, Part 1 "Economy wide material flow accounts (MFA) for Norway", pp. 8-65. (study n° 108a)

Part 1 of the Norwegian report presents the first economy-wide MFA for Norway that is estimated by statistics Norway. Previous attempts were made by the Wuppertal Institute (covering the period 1992-1999). The objective of the project was to assess national sources of data and to calculate the standard economy-wide MFA for the longest time series possible. The report was prepared following Eurostat's guidance, i.e. methodological guide and proposed standard reporting tables for MFA

The report start with the methodology, i.e. the European economy-wide framework (chapter 4) and the scope and limits of this Norwegian study (chapter 5). The detailed presentation of the data sources is spit between domestic extraction (chapter 6) and foreign trade (chapter 7). The presentation of the results (chapter 8) is complemented by comparisons both with previous estimates by the Wuppertal Institute (chapter 9) and other European countries (chapter 10). The report concludes on methodological perspectives and future work on MFA in Norway (chapters 11 and 10). In the references, electronic links to the official sources used are provided. Appendices contain the MFA time series, the detailed data and the correspondence table between SITC codes and the MFA).

The report shows that the Norwegian DMI is composed mainly of fossil fuels (68% in 2004) and minerals (25 %), biomass representing only 6%. Since the fossil fuel extracted is mostly exported, the DMC is mainly composed of metallic ores and non-metallic minerals (56%), fossil energy carriers and biomass counting respectively for 27% and 16%. The PTB shows that in Norway exports (mainly

petroleum products and natural gas) are higher than imports. During the period 1999-2004, the GDP increased by 11%, the population by 3% whereas DMC decreased by 5%. For the same period, the DMC per capita decreased by 7%, whereas the DMI and PTB per capita increased respectively by 3% and 9%.

Coverage and indicators

This first MFA estimates by Statistics Norway focused on the input side i.e. there has been no attempt to compile any material balance. Also Non hidden flows are considered (unused domestic extraction and indirect flows of exports). Water is excluded (except water content of materials, like wood), even thought it plays a significant role in electricity production in Norway.

The standard economy-wide MFA indicators are calculated for the period 1999-2004: domestic material inputs (DMI), domestic material consumption (DMC). The physical trade balance (PTB) is presented for the period 1988-2004.

Types of material included and classifications

In the calculation of the net material inputs, the domestic extraction used includes biomass (from agriculture, forestry, fishing, hunting and other activities), minerals (metal ores and non-metallic minerals), and fossil fuel (hard coal, oil and natural gas).

Concerning metal ores and non-metallic minerals (including construction minerals), Statistics Norway used the Eurostat categories but they aggregate the metal ores and non-metallic ores into one category labelled "minerals".

Statistics Norway used correspondence table established by Eurostat MFA Task Force between the SITC codes and the MFA standard tables (table annexed to the report).

Residence (rather than territory) principle

The residency principle is dealt with in the chapter on future work. According to the report, 2 issues are particularly relevant for Norway as regard this principle: the bunkering of ships abroad and the landing of fish by foreign vessels.

Concerning the bunkering of Norwegian ships abroad, the fuel purchases need to be included in the MFA, but the report indicate that this must be checked.

The fish landed by foreign vessels were included in the domestic extraction, even though it may be more appropriate to consider this amount of fish as imports. However, statistics Norway need to check that there is no double counting between fishery statistics and import statistics.

Data sources and periodicity

The main data source concerning biomass is Statistics Norway. Additional data come from the Agricultural Budget Committee for animal grazing, biomass from other activities (honey), and for the figures for honey.

Data from Statistics Norway is also used for fossil fuel domestic extraction. The comparison started with the Norwegian Petroleum Directorate's data would need to be further investigated before the MFA for Norway could become official statistics. Further work would also be necessary concerning the conversion from tonne oil equivalent to metric tonnes for natural gas (the report note the absence of guidance in the MFA literature).

Since 1999, the data on mineral products comes from the Norwegian industrial minerals, mining and quarrying industry report which is published annually by the Geological Survey of Norway (NGU).

Hard Coal data are available from Statistics Norway Svalbard statistics.

Data concerning imports and exports, statistics comes from the foreign trade database of Statistics Norway. Additional investigation were necessary to estimates the tonnage of ships, of which the building and trade are important economic activities in Norway.

The comparison with previous MFA for Norway showed that, if the over all estimates by the Wuppetal Institute the Wuppetal were lower than those of Statistics Norway, it is the opposite for biomass from forestry and fishing. The consistency between these 2 data sets is also to be improved.

Switzerland

Flux de matières en Suisse - Utilisation de ressources et efficacité matérielle - Premiers résultats, Actualités OFS, Office fédéral de la statistique, Neuchâtel, Janvier 2005, 8 p. (study n°62)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/material_accounts/premiers_resultatspdf/_EN_1.0_&a=d

Flux de matières en Suisse – Consommation de ressources par l'économie suisse entre 1990 et 2005, Publication préparée par Mayerat Demarne A.-M., Kolher F., Office fédéral de la statistique, Neuchâtel, 2007, 26 p. (study n°63)

http://www.bfs.admin.ch/bfs/portal/fr/index/themen/02/05/blank/key/materialflusse/00.html

This publication of the Swiss federal statistical office (OFS) is a short presentation of the results of the first MFA for Switzerland. Only a very brief description of the methodology is provided at the end of the document. A recent publication that presents the results of the second OFS study on MFA for Switzerland[87], gives further information on the data sources.

As concerns the methodology the OFS followed the Eurostat's guidance and the OECD recommendations.

In Swiss most part of the DMI is represented by the construction materials (51%), follows biomass (22%), fossil products (15%) and industrial minerals (5%). Imports represented 36% of the DMI in 1981 and 43% in 2001, thus Swiss depends more and more on external trade it materials needs. The international comparison shows that the DMI and DMC of this country are similar to those of the European countries.

Coverage and indicators
The first report covers the years 1981 to 2001 and second publication 1990 to 2005.

The Swiss MFA focuses on the input side, including unused and indirect flows, and the following standard corresponding indicators are calculated: the domestic material input (DMI) and the total material requirement (TMR), as well as the domestic material consumption (DMC) and the physical trade balance once exports are also taken into account. DMI and DMC are calculated per capita in order to compare Switzerland with other European countries.

Types of material included and classifications
The MFA for Switzerland includes fossil fuels, industrial minerals, constructions materials, biomass and other products, in accordance with the classification proposed by Eurostat.

Residence (rather than territory) principle
The report does not deal with the residence principle.

Data sources and periodicity
Data on the direct flows of biomass comes from the OFS satellite accounts for the primary sector (128 products). The amount of industrial minerals (8 products) is calculated by a consultancy company using branches of industries' associations and data collected from individual enterprises.

About the unused flows, Eurostat (Wuppertal institute) coefficients are used concerning biomass. For industrial minerals, the OFS carries out estimates with help of data from industries and companies. The amount of soil excavated is extrapolated from statistics on a few local communities (canton).

Foreign trade statistics comes from the Custom general directorate (3000 product).

[87] - Mayerat Demarne A.-M., Kolher F., (2007) *Flux de matières en Suisse – Consommation de ressources par l'économie suisse entre 1990 et 2005*, Office fédéral de la statistique, Neuchâtel, 2007, 26 p.
http://www.bfs.admin.ch/bfs/portal/fr/index/themen/02/05/blank/key/materialflusse/00.html

5.2.3 Physical input output tables

Denmark

Material Flows and Physical Input-Output Tables – PIOT for Denmark 2002 based on MFA. Report to the DG Environment (grant agreement n° 71401.2005.0 01-2005.292) prepared by Ismir Mulalic, Statistics Denmark, 15 February 2007, 40 p. (study n°123).

This study shows how the economy MFA indicators can be linked to the Physical Supply-Use Tables (PSUT) and to the Physical Input-Output Tables (PIOT).

After the introduction, the report continues (chapter 2) with a general description of the conceptual framework of MFA and referring to the SEEA 2003. Chapter 3 provides a general presentation of economy-wide MFA, focusing on the Danish MFA database: five-dimensional database: indicator (DMI, DMC, etc.), time, industries and final demand categories dimension, the products, and geographical dimensions (country of import and exports origin).

Chapter 4 describes the construction of the PIOT (according to the SEEA 2003 principles) using the extended PSUT. In particular extended PSUT are described together with their balancing method. Then it continues with the description of the construction of the PIOT (constructed from assumptions on the industries' market shares and production methods, the industry-technology assumption) from the balanced extended PSUT.

Chapter 5 shows the PIOT for Denmark for 2002. For all industries and for households, input is equal to output (column totals are equal to corresponding row totals). The Danish PIOT includes the flow of 2 300 commodities.

Chapter 6 shows the relationship between the EW-MFA approach and the detailed PIOT approach and presents two bridge tables for the input and output side of the economy system. The differences are analysed comparing the DMI (taking into account the bridge table for input side of economy system) and the DPO (taking into account the Bridge table for output side of economic system).

Last chapter contains the summary and some considerations concerning the MFA matrix and the detailed PIOT tables. These two approaches are linked but differ by level of detail and the data included.

Coverage and indicators
The report refers to the year 2002.

The indicators calculated are: domestic material input (DMI) and domestic processed output (DPO).

Types of material included and classifications
The Danish PIOT 2002 is based on the 130 industries of the Danish national accounts (reduced to 26 in this report) and the flow of 2 300 commodities.

The Danish classifications follow the CPA for product groups, the NACE for industry sectors and the EU Combined Nomenclature for international trade.

Residence (rather than territory) principle
The emissions from Danish ships bunkering abroad and emissions from other sources than combustion of fossil fuels are added.

Data sources and periodicity
The main sources used for the Danish resource extraction are Energy Statistics, Agricultural Statistics and Resource Extraction Statistics from Statistics Denmark. Supplementary information about landings of fish in Denmark and abroad by Danish fishing vessels is obtained from the Danish Directory of Fisheries. The waste statistics are based on the so-called ISAG system (Information System for Waste and Recycling).The sources of the statistics on air emissions and on water added to products is the Danish NAMEA system.

Germany

Physical input-output tables for Germany 1990, Report prepared for DG ENV/ESTAT y - Carsten Stahmer, Michael Kuhn and Norbert Braun, Statistisches Bundesamt, Eurostat Working Paper n°2/1998/B/1, 19 January 1998, 124 p. (study n°78)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp98dpiot_pdf/_EN_1.0_&a=d

This report prepared by the German Federal statistical office was circulated by Eurostat as a Working Paper since it presented the first complete macro-economic MFA in the form of an input-output table (it was to be considered as pilot application since the quality of the data was not up to the Federal statistical usual standards). Such Physical Input-Output Tables (PIOT) comprise the product flows of the traditional input-output tables in physical units, but also material flows between the natural environment and the economy.

As indicated in introduction, the compilation of the first German PIOT followed the recommendations of the 1993 System for Integrated Environmental and Economic Accounting (SEEA 1993) and relies on the conceptual basis of the material/energy balances developed since the 1970ies within the ecological economics. As far as products are concerned, the German PIOT is similar to the German monetary input output tables. Also the Federal statistical office received technical support from the Wuppertal Institute.

In chapter 2, the report starts with the methodology of PIOT according to the SEEA 1993 and before giving a brief presentation of the German PIOT. Chapter 3 provides detailed presentations of the calculation methods by types of flows (products, raw materials and residuals, biological) and the principles of compilation. Chapter 4 is dedicated to the main findings and presents an aggregated version of the PIOT (the detailed tables are provided in annex). Chapter 5, that briefly discuss the applications, distinguishes between internal use (checks the possible inconsistency in the economic and physical statistics and estimation of missing data) and external use (analysis of material efficiency, connection between monetary and physical dimensions, estimation of indirect material burden of production and consumption and modelling).

All the different tables prepared are provided in annex.

Coverage and indicators
This Working Paper presents the German PIOT compiled for the year 1990:

It includes direct materials flow (domestic and imported raw materials and products), unused materials (overburden from mining, excavated soil for building purposes), as well as water and oxygen (especially fro combustion) that will become later memorandum balancing items in the European methodology.

Types of material included and classifications
For practical and theoretical reasons (reconciliation of input and output tables, isolation of water flows), the input and output tables are split into 3 sub-tables focusing respectively on energy, water, and other materials. Two supplementary tables are also associated to this framework dedicated respectively on energy (compiled in in terajoule) and air emissions (CO_2, CO, NO_x, SO_2, PM, N_2O, VOC, CH_4, and 'Other').

The German PIOT is based on the 58 branches/products (former German industry classification) of the input output tables of the German national accounts, with an extra branch for external environmental protection services, and consumption activities of households. However, the most important addition made to the national accounts is the inclusion of natural assets as source of raw materials and sink for residuals (raw materials appear as output of non-produced natural assets in the output table and as an input of the branch mining for the production of mining products in the input table, biological input is estimated on the basis of biomass increase and waste put into controlled landfills as an accumulation of economic assets).

The German 1990 PIOT singled out the net accumulation of man made assets: consumer durable goods, changes in stocks, controlled landfills, buildings, machinery & equipment, and produced natural (agricultural and forestry products) assets. It also included a category of non produced natural assets.

Residence (rather than territory) principle
The report does not deal with the residence principal. It is indicated that this first PIOT cover the territory of the former Federal Republic of Germany.

Data sources and periodicity
Since then, the German Federal statistical office has compiled another PIOT for Germany for the year 1995.

The first German PIOT is to a large extent based on official statistics on production, international trade, and consumption, as well as energy and the related air emissions and waste generation.

Concerning the **material flows of products**, a major part of the statistics on manufacturing industries was available in tonnes for enterprises with more than 19 employees. For the other products, physical units, like pieces, litre, square or cubic meters were converted in tonnes thanks to conversion factors. The latter mostly came from foreign trade statistics that provide data both in monetary and physical units (quantities and tonnes). Additional investigations were necessary for small enterprises (with les than 19 employees).

The 1990 PIOT of Germany included services related material flows, of which the most important was related to the food consumed in restaurants and canteens. The material flows of the environmental protection services, of which the branch was singled out in the first German PIOT, was compiled thanks to a combination of waste and wastewater statistics with the environmental protection expenditure accounts of the Federal statistical office.

The increase in biomass is calculated from data in physical units from the agriculture and forestry statistics on harvest quantities and stocks of plants and animals and from information from agronomics.

The weight of the new buildings was estimates from the inputs of building materials for the branches construction and installation and building completion works.

As concern **raw materials and residuals**, statistics on the output of the mining industry are available in weight. The report does not say how unused material (mining overburden and building activities related soil excavation) are estimated. The basic data on water extraction (except in agriculture) and distribution and on waste generation came from the Federal statistical office's publication on *Water Supply and Waste Disposal*. (1991 were adjusted since data for 1990 were not available). Further adjustments were also necessary to match with the PIOT concepts. The air emission accounts were mostly based on the Federal statistical office's energy supply and use tables combined with emission coefficients (additional estimates were made for non-energy air emissions).

Rough estimates of the **biological metabolism** (animals and plants, humans) were made combining physiological information with food consumption statistics. Two research projects carried out by consultancy companies (Wittlich and Wuppertal Institute) produced rough estimate of the consumption of food in restaurants and canteens or the withdrawal of water by agriculture.

Italy

Update of the Economy-wide material flow indicators time series for Italy and Italian Physical Input Output Table feasibility study, Report to Eurostat (grant agreement n° 2002.717.0 0011), Femia A. (ed.), Italian Statistical Institute (Istat), Roma, February 2004, 61 p. (study n°59b)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/material_accounts/report-femiamfapdf/_EN_1.0_&a=d

Part 2 of the report is dedicated to a feasibility study of a physical input out put table (PIOT) for Italy. This work was developed from a previous project that included the compilation of an economy-wide material flow balance (EW-MFB) for 1997 (study n°5 4 above).

This part of the report starts with the models (chapter 2), classification and system boundaries (chapter 3). The two following chapter are dedicated to the sources of data which can be used in order to fill in the Supply (chapter 4) and Use (chapter 5) tables respectively. The estimation of the missing items (chapter 6) shall be done in strict connection with the derivation and balancing of the Material Integration table (the symmetric PIOT properly said) (chapter 7). The elaborations that have already been performed are described in connection with the items they are relevant for.

On the basis of the data collected and their analysis, the report concluded that it was worthwhile going one and Istat set-up a working group dedicated to supervise the additional investigations that were planned then.

Coverage and indicators
As indicated above, this study is a continuation of the economy-wide material flow balance compiled earlier for 1997. Given the data availability on material flows in Italy, 1997 was planned to be used a pivot year.

Types of material included and classifications
See study n°54 above

Residence (rather than territory) principle
No reference to this principle in this part of the document (see study n°59a above).

Data sources and periodicity
The main data sources that could be mobilised for the **Supply** table are:

- PRODOCOM (5-digit level like for the 1997 EW-MFB) the domestic industrial products,
- The energy balance Domestic energy products,
- International trade statistics (8-digit level of the Combined Nomenclature),
- Physical accounts for NAMEA should be used as far as they are available (at emission accounts at that time) and other environmental statistics (e.g. waste) for the residuals.

The main data sources that could be mobilised for the **Use** table are:

- 1992 Istat' survey on production structure (monetary and physical data),
- Istat's annual business survey in agriculture,
- Official forestry statistics,
- PRODOCOM.
- Statistics of specific branches etc.

Finland

Waste flows in frameworks of physical input-output tables and material flow accounting, Prepared by Ilmo Mäenpää and Mika Pirneskoski of Thule Institute and Jukka Muukkonen of Statistics Finland, 28 February 2003, 29 p. (study n°55)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/material_accounts/mfa_finlandpdf/_EN_1.0_&a=d

The second Finnish report on MFA that was prepared by Statistics Finland in collaboration with the Thule-institute (University of Oulu), focuses on waste within the material flow accounting framework of Finland.

After a short introduction (objective, contents), the report gives a brief presentation the general structure of the Finnish material flow accounting framework, including its physical input output table (PIOT) and how waste flows are taken into consideration in this PIOT (chapter 2). The same chapter includes a preliminary version of the Finnish material balance by industry for 1999 (the final version is presented in the third Finnish report on MFA presented below). The next is dedicated to the classification of waste, examining the connection between the European Waste Catalogue (EWC) and

the Classification of Products by Activity (CPA). The core of the report presents the method that enable to adapt the basic statistical information in on waste in Finland to the PIOT (chapter 4).

Coverage and indicators
This application covers year 1999.

In the chapter where the Finnish PIOT is presented, the standard MFA indicators (DMI, TMI, DPO, TDO and NAS) are provided for the year 1999. However, it is not the main purpose of the report that focuses on the compilation of waste accounts (see below the data sources).

The compilation of the Finnish PIOT followed then the approach presented in draft SEEA. Therefore, crops were considered as an economic input (agricultural input from the environment is estimated as the difference between earth materials consumed by the plants and economic input like seed, fertilizer etc.) and waste put into landfill sites as accumulation to capital stock (i.e. not an output to the environment). These two points will be modified in the in the next report in order to comply with the Eurostat's guide (see below).

Types of material included and classifications
The compilation of the Finnish PIOT, including it part on waste, is based on the European standard classification of product (CPA), economic activities (NACE) and waste (EWC). The 30 NACE-based industry breakdown is provided in annex 1.

Residence (rather than territory) principle
The report deals with the difference between the accounting boundaries of the national territory and those of the national economy, when presenting the structure of the Finnish PIOT (chapter 2), stressing that international transport activity is the main source of differences. The adjustment from territory statistics to the national economy boundaries is carried out for energy consumption and related air emissions (the corresponding data are presented in the relevant tables in annex).

Data sources and periodicity
Data on waste in the Finnish PIOT comes from many different sources: either official sources (statistics or administrative registers) or estimates based on modelling or technical coefficients that all can be updated on a regular basis.

The amount of waste from agriculture (manure) is estimated thanks to metabolic modelling. For forestry (wood scrap and sawdust), coefficients used by types of trees (non wood waste are not taken into account). A general coefficient applied to the total fish catch.

Data on waste from the mining comes from the mining statistics that is based on the Ministry of industry's register of mines. Concerning quarrying, the data comes from the register of the Finnish environment institute.

Industrial statistics, foreign trade statistics and data from the pollution control VAHTI register are combined to compile waste account for industries. As concerns packaging, only those that are used by industries had been included then.

For services activities where output does not consist of materials, it is assumed that intermediated consumption ad packaging end up as waste. Specific estimates are made for hotels and restaurant and sewage and refuse disposal.

Waste generation of households was deducted on by groups of consumable goods to which specific coefficient are applied.

Physical flow accounts Finland 1999, Report to Eurostat (grant agreement n° 2002412000 09) prepared by Ilmo Mäenpää, Thule Institute / University of Oulu, 30 June 2004, 120 p. (study n°60)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/material_accounts/finpiot99enpdf/_EN_1.0_&a=d

The third Finnish report to Eurostat on MFA is dedicated to the compilation of a physical input output table (PIOT) for Finland. The development and compilation work has been carried out by the Thule Institute in close collaboration with Statistics Finland that provided most of the statistical data.

In the introduction (chapter 1) the author states that the physical flow accounts of Finland is based on the SEEA framework, despite few adjustments (compared to the previous report, see above) suggested by the European experience on MFA, referring then to the Eurostat methodological guide (as explained at the end of chapter 3, agricultural lands and landfill sites were defined as belonging to the nature, implying to count crops as raw materials and final waste as flow from economy to nature; the report summaries the differences the two approaches for both sources of discrepancy).

The report starts with a methodological presentation of physical flow accounting, of which a rather detailed description of the compilation process of a PIOT and a section on the methods to estimate *unobservable* material flow, i.e. those that are not captured by official statistics (chapter 2). The results are also presented in detail, including the different tables prepared for the compilation of the PIOT: supply table, use table, use table of domestic products, imports as basic inputs, use table of imports and the input-output table, as well as air emissions and energy accounts (chapter 3). The summary of the physical accounts for Finland provided at the beginning of the chapter is the final version of the preliminary material balance presented in the previous Finnish report on MFA (see above).

The three Annexes contains respectively the classifications used (NACE, CPA, as well as waste classes and energy sources and corresponding CAP codes), the main data sources, and a more detailed presentation of the calculation methods used for unobservable flows.

Coverage and indicators

The Finnish PIOT is compiled for the year 1999 and the standard MFA indicators are calculated: direct material inputs (DMI), total material input (TMI), domestic processed output (DPO), total domestic output (TDO), total material output (TMO) and net addition to stock (NAS).

Types of material included and classifications

The Finnish PIOT is compiled for 151 NACE-base industries and 718 products mostly based on the CPA (ten categories of waste have added). The tables presented in the report are structured on a 30-industry/product breakdown.

Residence (rather than territory) principle

In the methodological presentation (chapter 2) the report deals with the residence principle. The difference compared to the territory approaches come mostly from international transport activities. The related energy consumption is estimated thanks to national accounts' data on imports and export of bunker fuel and energy statistics bunker oil in Finland.

Data sources and periodicity

As already indicated in the first Finnish report on MFA, the data sources mostly rely on regular statistics (converted into tons by conversion coefficients):

- Statistics Finland: yearbook of farm statistics, statistical yearbook of forestry, energy statistics, PRODCOM statistics, household consumption survey, as well as foreign trade statistics (in which data are directly provided in terms of weight) and national accounts (see above the residence principle);
- Other public sources: Finnish Environment Centre, pollution control VAHTI register of the Regional Environmental Centres, mining statistics of the Ministry of trade and industry;
- Official statistics from the private sector: Game and Fishery Research Centre, packaging industry, Finnish electrical industry association, Environment report of Finnair Oy.

Only a few pieces of data result from modelling (Research Centre of Agriculture and Food Economy for the intermediate input of agriculture).

Hidden flows (indirect inputs of imports) are estimated thanks to the Wuppertal Institute's coefficients that are adapted to Finland.

Air emissions, waste generation and discharges to water are based on the NAMEA-types accounts prepared by Statistics Finland.

A 1.1 NAMEA (Physical flow accounts)

5.2.4 Air emissions

Belgium

The NAMEA Air for Belgium (1994-1998), Guy Vandille, The Belgian Federal Planning Bureau, Brussels, February 2002, Part I, 59 p. (Part II is dedicated to NAMEA Water). (Grant Agreement n°200041200017) (Study n°42a)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air/namea2001belpdf/_EN_1.0_&a=d

As indicated in the general introduction, the 2002 Belgian NAMEA report consists of 2 parts (dedicated to NAMEA-Air and NAMEA-Water respectively) that can be read separately as individual reports. This document is a follow-up report to two earlier studies carried out in 1999 and 2000 by the Federal Planning Bureau (FPB) on the Belgian NAMEA.

Both NAMEA's (air and water) have been constructed as part of the European environmental accounts programme. They were constructed according to the guidelines contained in the first Eurostat's set of NAMEA standard tables: *NAMEA Q2000 for air emissions manual (draft version 3)*. Since the Belgian input-output table for 1995 was not yet available when this study was under preparation, this led to present a simple version of NAMEA that limits interpretation possibilities.

The report starts with and discussion over some methodological issues (NAMEA principles) before presenting the data sources and compilation methods. The report examines the evolution and the distribution of air emissions (using 3 environmental theme indicators: greenhouse effect, acidification, and photochemical pollution, plus carbon monoxide pollution) and economic data separately, before analysing the economic sectors' "relative eco-efficiency" (share of the sector in industries' total air pollution / share of the sector in total valued added, similar ratios were calculated based on employment data) and its evolution.

Data coverage:
The Belgian air emission accounts include 12 pollutants:

- carbon dioxide (CO_2), carbon monoxide (CO), methane (CH_4), Nitrogen oxides (NO_x), ammonia (NH_3), nitrous oxide (N_2O), sulphur dioxide (SO_2), non-methane volatile organic compounds (NMVOCs) for the period covering 1994 to 1998;
- and hydrofluorocarbons (HFCs), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and sulphur hexafluoride (SF_6) from 1995.

Industry classification and households
The air emissions data are provided at level of detailed compatible with the former standard tables.

Data on industries are classified according to the NACE rev.1 two-digit-level, with some aggregation of several two-digit categories(NACE 50-52, NACE 65-67 and NACE 70-74) and extra breakdowns to the three-digit level (NACE 23, 24, 26, 27, 40, 60, 61), and even three-digit level for 75.22 (defensive activities). Parallel economic data are available at NACE two-digit.

Household emissions fall into three categories: transport, heating and others.

Residence (rather than territory) principle

Households' road transport emissions are calculated on the basis of distances driven for the different types of vehicles registered in Belgium. Consequently the emissions respect the residence principle: (emissions by foreign tourists or foreign transport companies are not included; emissions by Belgian households abroad are included). As concerns the Belgian **trucks** and **buses**, emissions are calculated on the basis of the distances covered on Belgian territory and their emissions abroad are consequently lacking.

Concerning **air transport**, Belgium considers that emissions resulting from take-off and landing by foreign air carriers on Belgian airports should be excluded and attributed to the airports that supply the landing and take-off service. Reciprocally, it thinks that emissions of Belgian companies bunkering abroad should be excluded since they have to pay for this service. According to Belgium the same reasoning applies for **water transport**.

A specific survey has been conducted later on this issue (see the 2006 report).

Ancillary activity

Transport emissions by industries are distributed across NACE categories thanks to the preliminary version of the use table for 1995 (use of gasoline and diesel by the different sectors), compiled by the National Accounts Institute, and extended by the input-output team of the FPB.

Data source and periodicity

In Belgium, unlike economic data, environmental statistics are not systematically gathered at national level since environmental issues belongs to the Regions, and not systematically following the same methodology.

In Belgium, some environmental data are gathered at regional level and each region does it according to their own methodology. The data from the three regions are combined in order to obtain the Belgian emissions. Transport data are treated separately.

The data source for emissions of CO_2, CO, CH_4, NO_x, NH_3, N_2O, SO_2 and NMVOCs depends of the region:

- For Brussels and Wallonia, air emission accounts are largely based on CORINAIR, complemented with regional energy balances for SNAP categories of which the link to NACE is not straightforward, as well value added in few case for Wallonia;
- For Flanders, CORINAIR have been used for 1994, afterwards the annual companies' emission reports required under the Flemish environmental permits regulation are manly used. In order to distribute air emission data across industries, the emissions of the companies that are not individually registered, the Flemish Institute of Technology (VITO) developed a specific method in collaboration with the Dutch Organisation for Technological Research (TNO) and the SGS EcoCare based on the regional energy balances.

The emission inventory of ozone depleting substances is gathered at national level by the Vlaamse Milieumaatschappij as of 1995. These emission data were distributed across industries using both the 1995 use table prepared by the National Bank and the investment table compiled by the input-output team of the FPB.

The emissions by road transport activities were calculated with the Copert methodology for the three regions (except for Brussels' 1994 data), but using different versions (Brussels: Copert III (except for the 1994); Flanders: Copert II, and Wallonia: Copert III for 1998 and a former version for 1994 to 1996 and 1997 interpolated). Emissions of passenger cars are split between household and industries using propellant fuel consumption calculated (at national level) in the Hermes model of the FPB, and emissions from industries were distributed across NACE categories thanks to the preliminary version of the 1995 use table of the Belgian economy (shares in total of gasoline and diesel consumption expenditure calculated separately).

The NAMEA air for Belgium (1990/1994-2002), Report to Eurostat (grant agreement n° 2 004 714 10006), Sébastien Gilis and Guy Vandille, Federal Planning Bureau, Brussels, February 2006, Parts I to V, pp. 2-45. (study n° 53a)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/energy9094-02bepdf/_EN_1.0_&a=d

The pilot application presented in this report was dedicated to the extension of the Belgian NAMEA air time series and it revision in order to fully comply with Eurostat methodology (residence principle and own accounts transport emissions).

Part I of the report presents the data sources and compilation for environmental and economic data (last section provides information on the quality of emission data) and part II air pollutants' evolution aggregated under 3 environmental themes (greenhouse effect, acidification and photochemical pollution). Like in the report of 2002, part III of this report examines the "eco-efficiency" of economic sectors and households and its evolution over time.

The 3 following parts of the report present different NAMEA-based analysis: traditional input-output calculations (Part IV); scenarios and projections (Part V); and decomposition analysis of the changes (Part VI). (For the summary of these analysis-oriented Parts of the report see section A.5.1.3 below).

Data coverage:
This report covers 3 additional pollutants compared to the previous report: PFCs (that are not distributed across economic activities), particulate matter (PM_{10}) and lead (Pb).

Data covers years 1990 and 1994 to 2002.

In relation with the last section of part I, annexe 2 provides the authors' assessment on the quality of the emission data by pollutant and industry/households' consumption.

Industry classification and households
Like for the previous report, air emission data on industries are available that mostly at NACE Rev.1 two-digit level are compatible with the former standard tables, and Household's emissions are subdivided in the three categories: transport, heating and others.

Residence (rather than territory) principle
All Belgian transport emissions to air were adjusted to the residence principle. This adjustment resulted from a work carried out by the FPB in collaboration of the national statistical Institute[88].

Concerning road transport emission, according to the report of 2002, only the emissions of trucks and buses were to be adjusted.

As concerns air transport, a specific survey was conducted by the FPB on the Belgian air transport companies in order to collect data on the use of kerosene for 1990 to 2001. Data for 2002 were extrapolated on the basis of value added, since the survey could not be repeated this year.

Sea transport CO_2 emissions (Flemish inventory) were adjusted to the resident principle on the basis of the Flemish energy balances that contains an item on international sea transport bunkers and a rough estimate of the share used by Belgian companies. (It is not clear whether Belgian ships bunkering abroad are actually included).

Ancillary activity
Own account transport by enterprises were distributed into industries using the Belgian 1995 use table (expresses in monetary terms) for the entire period. Data availability for the 2000 use table was not sufficient enough yet to update the distribution across industries.

The report does not indicated anything concerning emissions from the production of electricity and heat for own account. However, the report on the Belgian NAMEA-energy indicated own account electricity and heat related emissions should be attributed the relevant industries.

[88] - Vandille G. and Zeebreock B. (2004), *The NAMEA air for Belgium (1990/1994-2001)*, Federal Planning Bureau, Brussels, January 2004, 117 p.

Data source and periodicity

As indicated in the previous reports, In Belgium, environmental data are mostly collected at regional level and the three Regions (Brussels-Capital, Flanders and Wallonia) usually do not apply the same methodology. Some changes occurred since the previous report of 2002.

Except transport emissions:

- For **Brussels-Capital**, energy related data on CO_2, N_2O, CH_4, NO_x, SO_x, NMVOCs, CO and Pb are based on the combination of the regional energy balance and emission factors (the emissions calculated were compared with the regional CORINAIR) provided by the Brussels Institute for Environmental Management, except for coal. The emission factors for coal are mostly from the IPCC (revised 1996 Guidelines for National Greenhouse Gas Inventories) except for CO_2, of which the factor used comes from the National Statement to the UN Climate Commission. Process emissions of NO_x, SO_x, NH_3, CO, NMVOCs and Pb are based on the Regional CORINAIR available for 1990, 1995 and 2002-2002. PM_{10} emissions were estimated applying Flanders' emission intensity per unit of value added.
- For **Flanders**, the CO_2 emissions data (except households, agriculture and fishery emissions) are based on the Flemish energy balances with some further breakdowns based on gross value added for NACE 28-35 and NACE 20,25,36-37,45, and on the basis of employment for the service industries. CO_2 emissions from households, agriculture and fishery are based on the Flemish inventory as well as emissions data on N_2O, CH_4, NO_x, SO_x, NH_3, NMVOCs, CO, PM_{10} and Pb.
- For **Wallonia**, data on CO_2, N_2O, CH_4, NO_x, SO_x, NH_3, NMVOCs, CO and Pb are still based on the CORINAIR and distributed across industries thanks to the regional energy balance. As for Brussels, emissions of PM_{10} were estimated applying Flanders' emission intensity per unit of value added.

For the three regions, the emission inventory of ozone depleting substances (CFCs, HFCs, HCFCs, PFCs, and SF_6) is gathered at national level by Econotec for the Federal Department of the Environment and the Vlaamse Milieumaatschappij as of 1995. These emission data were distributed across industries using both the 1995 use table prepared by the National Bank and the investment table compiled by the input-output team of the FPB.

As concerns transport emission:

- Brussels-Capital and Wallonia kept using Copert model to calculate road transport emissions, while Flanders switched to the TEMAT model (Flemish data were updated for entire period).
- Air transport emissions are mostly based on a survey to the Belgian companies that was specifically carried out fro NAMEA (see above the residence principle).
- Water transport emissions are based on the regional emission inventories and energy balances (adjusted to the residence principles in the case of Flanders, see above)

Czech Republic

A. NAMEA air emissions account, PHARE Multi-beneficiary Statistical Co-operation Programme 2003 Eurostat (Grant Contract No. 2004.19100.019), Project coordinated by Katarína Markošova and Eva Krumpova, Czech statistical Office (CZSO) – Environment statistics Department, Prague, 28 November 2005, 40 p. (study n°74) [89]

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/namea-air/ce3732en_nameaair/_EN_1.0_&a=d

[89] - The results were published in ČSÚ (2006), *Selected environmental accounts on macroeconomic level in the Czech Republic (NAMEA for air emissions in 1998, 1999, 2003 and MFA in 1993-2004)*, Czech Statistical Office (ČSÚ/CZSO), code 2006-05, Prague, January 2005, 58 p. (bilingual version Czech and English)

In 1998-1999 a report for the Czech Ministry of Environment investigated how to produce air emissions accounts for NAMEA in the Czech Republic[90]. Now the Czech statistical Office (CZSO) proceeds in accordance with the international methodology standardized by Eurostat in its *NAMEA for Air Emissions Compilation Guide*. CZSO also used Eurostat NAMEA-air standard tables (version from 2002). The compilation data for the Czech project on NAMEA for air emissions results from the cooperation between the CZSO and the Czech Hydrometeorological Institute (CHMI) – which is the central institution as concerns air pollution in the Czech republic –, as well as between different Departments of the CZSO (Agriculture, forestry and environment; National accounts; Industrial, construction and energy, Services; Households).

Chapter 2 (Chapter 1 is the introduction) that describes the methodology implemented, the data sources and the account prepared is structured like the Eurostat NAMEA-air standard tables:

- Table 1a – Economic data by industry
- Table 1b – Households consumption
- Table 1bt –Transport air emissions by industries
- Table 2a – Air emissions by industries
- Table 2b – Households air emissions
- Table 3 – Bridge table between NAMEA and UNFCCC/CLRTAP.

The Czech air emissions accounts are mainly based on the national Register of Emissions and Air-Pollution Sources (REAPS) used by the CHMI to prepare the Czech annual air emissions inventories. In the REAPS, emission sources are divided into 4 categories – 3 for stationary sources (extra large and large, medium, and small) and 1 for the mobile sources – to which correspond individual databases (REAPS 1 - 4). Air emissions are assigned to NACE-based categories using several methods, depending on the type of sources and pollutants or whether it is a combustion process or not: e.g. companies' identification number for the large and medium sources, CZSO data on the structure of residential building according to NACE for the small combustion sources (heating of residential buildings), experts estimates and the structure of the Selected Nomenclature for sources of Air pollution (SNAP) for emissions stemming from the use of solvents… Additional statistics and documentations are also used, like the Common Reporting Format prepared for the UNFCCC as regards specific processes (carbonates breakdown in cement, lime or glass manufacturing and electricity production, municipal waste incineration or enteric fermentation of livestock), the IPCC guidelines for fluorinated greenhouse gases (HFCs, PFCs, and SF_6) or agricultural statistics for NH_3.

Data coverage:
The Czech air accounts cover most of the pollutants included in Eurostat standard tables: CO_2, CO_2 from biomass, N_2O, CH_4, NO_x, SO_2, NH_3, NMVOC, CO, PM_{10}, Hg, Pb, Cd, As, Zn, Cr, Se, Cu, Ni HFCs, PFCs and SF_6 (ozone layer depletion gases – CFCs and HCFs – are not monitored by the Czech Republic). A limited number of relevant pollutants are taken into consideration for the table on transport emissions: CO_2, N_2O, NO_x, SO_2, NMVOC, CO, PM_{10}, Pb.

Data covers years 1998, 1999 and 2003.

Industry classification and households
Data on industries are available at NACE Rev.1 two-digit level. Data on households are divided into transport and heating activities, as well as other sources of air emissions (use of solvents and raising livestock).

Residence (rather than territory) principle
In the Czech Republic, the principle of residence does not play a major role. However, separate estimates were made for road and air transport in order to supplement the territory-oriented data of the Czech Association of Petroleum Industry and Trade (CAPIT). These estimates are due to be reported in the table 3 of the standard tables. No investigation is necessary for railway transport and data are not sufficient enough as concerns the impact of international inland water transport. .

[90] - Eurostat (2001), *NAMEAs for air emissions - Results of pilot studies*, Office for Official Publications of the European Communities, Theme 2: Economy and finance – Collection: Detailed Tables, Luxembourg, 2001a, (Catalogue number: KS-39-01-093-EN-N), pp. 48-49.

As concerns road transport, estimates are based on CZSO statistics on foreign visitors and Czech residents going abroad. Assumption are made on the time spent abroad and the distances covered by the Czech residents abroad. Estimates for emissions by residents and non residents companies engaged in international air transport activities are based on data from the Czech Ministry of transportations (TRC Brno) and the Czech Airport Authority (CAA). It is assumed that the amount of emissions of resident companies abroad is identical to their emissions over the national territory.

Ancillary activity
The CZSO implemented a specific methodology elaborated under the aegis of the TRC Brno in order to distribute road transport across the responsible industries (transport as principal and secondary activity by the transport industry and own account transport, i.e. ancillary activity, by the other industries), using annual fuel statistics by industries, data reported under the Convention on Long-Range Transboundary Air Pollution (CLRTAP) (mobile off-road emissions from agriculture and forestry machinery) and results from the survey on energy use by households energy (ENERGO 2004). (Railway, water and air transport is entirely carried out by air transport companies i.e. that belong to the transport industry). The resulting data have been prepared to be reported in the table dedicated to transport emissions (1bt) in set of Eurostat NAMEA-air standard tables. The methodology implemented

Data source and periodicity
The national Register of Emissions and Air-Pollution Sources (REAPS) that record annual basic data on air emissions is the main source of information for the compilation of the Czech air accounts for NAMEA. However, many other data sources are used: air emission inventory reported to the UNFCCC, IPCC guidelines, energy statistics from different institutions (CZSO, TRC Brno), and economic statistics, that are mostly available on a yearly basis.

Economic data comes from the CZSO Annual National Accounts Department. The data for 2003 is semi-definitive.

NAMEA-air data were planned to be produced in a short term on a yearly basis (from 2007 onwards).

Denmark

Analysis of Change in Air Emissions in Denmark – Time series, Bridge table, Decomposition analysis, Report to Eurostat, Peter Rømose Jensen and Thomas Olsen, Statistics Denmark, June 2003, 109 p. (grant agreement 2004 412 00007) (study n°45a)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air/emissions_2001pdf/_EN_1.0_&a=d

As indicated in the title, the report has 3 objectives: presenting a new set or data (time series), explaining the difference in the air emission total between NAMEA type accounts and the national air emission inventory (bridge tables), and analysing the changes that occurred in the Danish air emissions over the nineties. In addition, the last chapter deals with the impact of a modification in the assumption usually made on the Danish imports of electricity.

In the core of the text, the results are presented for households and 8 groups of industries (the link with the 130 industry classification is provided in annex). In the results presented, emissions stemming from Danish bunkering abroad (see below about the residence principle) are singled out. From 1980 to 2001, both CO_2 and NO_x emission total in the Danish NAMEA increased, whereas the total excluding Danish ships bunkering abroad has declined (CO_2 emissions from households and industries has declined). In the case of SO_2, total NAMEA emissions went sharply down (-30%) despite emissions from Danish ships abroad more than doubled over the period. A part from water transport, the report shows how electricity production played a significant role in the evolution of the total Danish emissions (see also the end of the summary).

Data coverage:
The report deals with emission accounts of carbon dioxide (CO_2), sulphur dioxide (SO_2) and nitrogen oxides (NO_x). The data presented, as well as the analysis undertaken, cover the period from 1980 to 2001.

Industry classification and households
The preparation of the Danish air accounts for NAMEA is based on a 130 industry classification. In the appendix 1 of the report, the data are presented broken-down into 52 industries plus households (the links with the 130 industry level is given in appendix 4). The Danish 52 industry classification is consistent with the NACE-2-digit level.

Residence (rather than territory) principle
Danish air accounts are consistent with the residence principle. Chapter 3 of the report is dedicated to the presentation of tables bridging the gap between the total in air accounts for NAMEA and total in the Danish national air emission inventory reported to the UNFCCC. Consistently with the national accounts, NAMEA type air accounts cover emissions stemming from national residents (emissions caused by economic activity in the Danish national accounts), i.e. including residents abroad excluding non residents on the national territory. In the case of Denmark, the main difference comes from national ships bunkering abroad: 21% of CO_2, 90% of SO_2 and 67% of NO_x NAMEA total in 2001. Another difference with air inventory comes from road transport (see *Ancillary activity* below)

After an introduction to what is the *bridge table*, the report presents a series of summary (similar to the bridge table included in the former Eurostat's set of NAMEA-air standard tables) and full bridge tables (base on 2001 data in the core of the text and covering 1999 to 2000 in appendix 2), including a table bridging energy data related respectively to the Danish air accounts and inventory, as well as a bridge table for household emissions.

Ancillary activity
In the Danish air account road transport emissions are allocated to the actual propellant fuel consumer, i.e. partly to transport industry when transport carried out as a principal economic activity, but also to other industries when they undertake transport for their own account. The same applies for households using their own car.

Data source and periodicity
Annual air emission accounts for the Danish NAMEA are mostly based on energy accounts (40 different types of energy carriers and 130 industries plus households). The emission factors provided by the National Environment Research Institute (NRI) are generally the same as in the European CORINAIR (COordination of Information on AIR emissions) database. Additional information is used especially as concerns road transport emissions (Statistics Denmark's *car system*: 189 categories of vehicles differentiated by fuel, type and age), non-energy related emissions (from the NRI, except on-field burning straw), as well as, sea water transport (in the Danish Energy Authority (DEA) statistics, water transport fuel consumption are split between national and international activity). Because of changes in the format of basic statistics, bridge tables cannot easily be produced on a yearly basis.

Chapter 4 of the report deals with the (NAMEA-based) decomposition analysis of changes in air emissions over time (see below the section dedicated to NAMEA-based analysis).

Germany

Energieverbrauch und Luftemissionen des Sektors Verkehr nach Verkehrsträgern und Produktionsbereichen/Privaten Haushalten (translation: *Energy consumption and air emissions in the transport sector broken down according to modes of transport and production sectors/private households*) Report to Eurostat (grant agreement n°200141200008) prepared by Claire Grobecker, Statistisches Bundesamt, January 2003, 63 p. (study n°46)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air&vm=detailed&sb=Title

The aim of this project was to devise a method of identifying the fuel consumption and air pollutant emissions produced by the different modes of transport and break them down according to the economic activities (production sectors and private households) and passenger and goods transport from which they stem.

Part I of the report describes in detail the objectives of the project and outlines the underlying methodology. Part II describes how the database was set up, describing such aspects as preliminary data, calculation methods and results. Part III deals with the analyses conducted on the basis of these results (e.g. calculation of input-output analysis-based indirect). The report ends with a short summary looking ahead to what still needs to be done.

It turned out that, unlike the services sector, the manufacturing sector generated far more indirect emissions than direct emissions, and indirect emissions were on the rise. Including indirect emissions, transport, messenger services, other services (including trade) and manufacturing industry contributed approximately equally to the fuel consumption of the production sector. The main changes seen during the 1995-1999 period were the increasing role played by manufacturing industry and a decline in the prominence of the mining sector

Data coverage:
This report focused on transport related fuel consumption and air emissions (CO_2, CO, NO_x, N_2O, NMVOC, particulates, and SO_2) cover the period from 1991 to 1999.

Industry classification and households
All the results are shown in a 70-industry breakdown plus households. The results were planned to be used to fill in the table dedicated to transport related emissions in the Eurostat NAMEA for air emissions set of standard tables.

Residence (rather than territory) principle
The difference between the territoriality concept and the national accounts concept (residence principle) is not very great on the whole (approximately 6% in terms of fuel consumption), but of considerable relevance to air transport and inland shipping.

Ancillary activity
Energy consumption and related air emissions of transport carried out for account are attributed to the industries responsible as well as households.

Data source and periodicity
The benchmark values are calculated in accordance with the method devised by the Institute for Energy and Environmental Research (Institut für Energie- und Umweltforschung) in Heidelberg on behalf of the Federal Environment Agency. In accordance with the energy balance sheet, fuel consumption for railways, inland shipping, coastal shipping and air transport is converted into the relevant delimitations on the basis of operational and transport performance and divided between goods and passenger transport.

Emissions are deduced from fuel consumption. The emissions and fuel consumption of road traffic, broken down according to production sectors, are determined using a top-down approach, with the emissions and fuel consumption calculated by the Environment Agency first being divided between production sectors and private households using the existing technical classification and then converted into the environmental accounts delimitation. A distribution key for this is developed by determining the number of vehicles and number of journeys according to technical classes and production sectors/private households.

The methodology needed to be further developed and supplemented in the following directions:

- Integration of the results of the data-gathering that was undergoing then (more detailed information on travel performance for different categories of vehicles and owner groups).
- Estimation of consumption of energy sources and emissions for rail electrification. As electricity accounted for approximately 70% of the energy consumption of the rail sector in 1999, the (indirect) emissions allocated to the rail sector must be correspondingly higher so that traffic-related emissions can be determined in full.
- Further efforts to differentiate and improve the data relating to traffic flows of domestic units abroad and foreign units in the country (residence principle).

Greece

Natural Resources Accounts and Environmental Input-Output tables for Greece 1988-1998. Nikos Mylonas in co-operation with M. Economakou, N. Frankoupoulos, A. Krasadakis, K Molfetas, N. Stromplos, P. Vlachos (National Statistical Services of Greece) and D. Koutentaki (Athens National Observatory). Institute of Computer and Communication and Operational Research at the National Technical University of Athens (ICCS/NTUA), Report to Eurostat (grant agreement n° 200041200012/GA), December 2001, 94 p. + annexes (including Greek and English versions). (study n°22)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies&vm=detailed&sb=Title

This report is the continuation of the previous reports respectively delivered to Eurostat in 1998 and 2000, on the Greek natural resources and environmental accounts. These accounts are mostly dedicated to NAMEA framework, for which the compilation of air emission accounts occupies a significant share of the data reported. The report also talks about the flows of natural resources, forest accounts and environmental expenditure and taxes. Like in the previous report, much data provided in annex also show input-output tables, as well as technical coefficients and *Leontief inverse* matrices, for all years of the time series.

Data coverage:
The air emissions accounts, which take seven pollutants (CO_2, N_2O, CH_4, SO_2, NO_x, CO, and NMVOC) into account, cover 1990 to 1998.

Industry classification and households
In the tables provided in annex, the air emission accounts are reported according to the 25-industry classification used for the previous report (most of the sub-totals added to the NACE 2-digit in the standard tables and an extra grouping for NACE 29-37). They also contain an attempt to allocate the data to a 62-industry classification compatible with the 2002 NAMEA-air standard tables.

Residence (rather than territory) principle
The Greek air emission accounts presented in this report were not consistent with the residence principle. Emissions related to Greek ships (of which the fleet is relatively important) and air planes bunkering abroad were not calculated.

Ancillary activity
It stated that road transport emissions were "*for the most part allocated to the unit producing the transport services*" using data from energy balances. In this report, emissions from transport industries are significantly lower than transport data reported under the UNFCCC, however, emissions such as CO_2, NO_x, which are mostly related to the use of propellant fuels, allocated to transport industries are higher in the new data set.

Data source and periodicity
Basic air emission data come from the latest inventory of the Athens National Observatory and the Ministry for the Environment that covers 1990 to 1999 (preliminary data for 1999) and that is consistent with the Revised 1996 IPCC guidelines. These revised CORINAIR data are presented according to the SNAP-97 classification. The process for attributing CORINAIR data to the NACE based categories has also been revised, extensively using data of the National Observatory of Athens.

France

Water resources accounts data preparation calculation module as "pilot development of water resources accounts", Report to Eurostat (grant n° 200141200030) by pre pared by Philippe Crouzet, French environment institute (Ifen), June 2003, 24 p. (study n°37)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/water_accounts/accounts_francepdf/_EN_1.0_&a=d

This report does not actually deal with water accounts compilation, but with the development of the French NOPOLLU system, which is a computer-based model dedicated to process the data relating to emissions to water, i.e. including for the compilation of water emissions accounts. However, the report states that no water emission account was available then for France and the format of the accounts was still to be finalised.

Italy

Italian NAMEA: air emission accounts for the year 1999, Istat final report, Angelica Tudini, Giusy Vetrella - Roma, September 2003, 14 p. (study n°47)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air/namea_emissions/_EN_1.0_&a=d

The main purpose of the work is the implementation of NAMEA air emission accounts with reference to 1999 (the previous pilot applications cover the years 1990 to 1992).

The second section (section 1 is the introduction) describes in detail the data sources used and the methodology applied to build the air emission accounts. The methodology is basically the same as for the 1990-1992 air accounts. However some improvements were introduced thanks to the Working Group composed of experts from Istat (coordinator), the National Agency for Environmental Protection and Technical Services (APAT) and the Ministry of productive activities (additional improvements were still to be introduced, as well as revisions of the air emission accounts already available in order to produce a consistent 1990 – 2000 time series, see below the 2004 report).

Paragraphs 2.2 and 2.3 describe in detail the activities carried out in order to shift from the CORINAIR process-based inventory (based on the Selected Nomenclature for sources of Air pollution – SNAP) to the NAMEA economic activity-based classification (based on NACE rev. 1, plus households' consumption), namely:

1) the analysis of the qualitative link between each SNAP 97 process and NACE industries or group of industries, i.e. the identification of the NAMEA activities in which a process takes place (§ 2.2). The report provides a full list of this links (SNAP code that are not relevant for Italy are listed earlier in the report);
2) the allocation of the emissions of each SNAP 97 process to the related NAMEA activities (§ 2.3). For some of the SNAP code, emissions are entirely attributed to a unique NACE base category of the NAMEA or to households, whereas, emissions of some SNAP codes are distributed into several NACE industries or groups of industries, using either data on fuel consumption, activity-related CORINAIR background or employment data. For each of the relevant SNAP code, a table indicates the method used.

For the 1999 Italian air accounts for NAMEA, some changes have been made since to the second pilot application:

- the 2 processes coded 1111 and 1112, respectively referring to "Managed broadleaf forests" and to "Managed coniferous forests" are now excluded in agreement with the notes of the Eurostat 2002 standard tables (they were included in the Italian 1990-1992 NAMEAs consistently with the guidelines laid out in the Eurostat NAMEA 2000 manual).
- NACE 15 (manufacture of food and beverage) and 16 (tobacco) are no longer grouped together.
- For some of the SNAP-based emissions to be distributed to several economic activities (especially transport emissions), a specific method was devised to split the 1999 energy data by function (road and off road transport, heating, other energy uses and non-energy use).

The tables mentioned in section 3 are not included in the report.

Data coverage:
Pollutants covered are: CH_4, CO, CO_2, N_2O, NH_3, NMVOC, NO_x, SO_x, Pb and PM_{10} with reference to 1999.

Industry classification and households
Data are broken down by economic branches and households consumption purposes according to the format set in the Eurostat 2002 NAMEA-air standard tables.

Residence (rather than territory) principle
During the redaction of this report Istat was finalising a method to shift from the national territory related CORINAIR transport emissions to the NAMEA framework based on "resident units". This method should be applied for the compilations of the 1990-2000 air accounts time series.

The 1999 air accounts presented in this report does not comply with the resident principle. Total NAMEA transport emissions equals total CORINAIR transport emissions.

Ancillary activity
As indicated in the table showing the links between SNAP code and NACE-based categories for NAMEA, road transport emissions (SNAP 07) are distributed into all NACE industries plus households thanks to energy data.

Data source and periodicity
NAMEA air emission accounts produced by Istat use as main input the Italian CORINAIR air emission data classified according to the process-based SNAP 97 classification. Data are supplied by the Italian National Agency for Environmental Protection and Technical Services (APAT, formerly named ANPA). Ista also uses national accounts data on energy use (industries and households) and the National Energy Balance, as well employment data for the distribution of SNAP-based emissions into several NACE-based categories. Technical information is also used as far as transport is concerned.

Italian NAMEA: 1990 – 2000 air emission accounts, Istat - Final report, Angelica Tudini, Giusy Vetrella - Roma, June 2004, 21 p. (study n°50)

http://circa.europa.eu/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air&vm=detailed&sb=Title

This report concerns the construction of a set of consistent Italian NAMEA air emission accounts for the years 1990 – 2000. It is the 4th report prepared by Italy on NAMEA air accounts after pilot application dedicated to the compilation of accounts fro 1990, 1991-1992 and 1999 respectively.

Main achievements of the project are:

1) Improvements in the methodology;
2) Compilation of accounts for the years that were previously lacking (1993-1998 and 2000);
3) Revision of 1990 – 1992 and 1999 accounts (harmonised time series for 1990 to 2000).

The methodology used by the Italian statistical office (Istat) is basically the same as for the previous pilot application: distribution of CORINAIR emissions into economic activities (cf. the summary above, the tables on the links between SNAP code and NACE based categories plus households have been updated). The main change introduced in this report concerns the consistency with the residence principle (see below) in relation with international transport related emissions.

Data coverage:
Pollutants covered are: carbon dioxide (CO_2), sulphur oxides (SO_x), nitrogen oxides (NO_x), nitrous oxide (N_2O), ammonia (NH_3), methane (CH_4), carbon monoxide (CO), Non-Methane Volatile Organic Compounds (NMVOC), lead (Pb) and particulate matter (PM_{10}).

The time series dealt with in the report covers years 1990 to 2000 (in the NAMEA air data currently available on the Istat website, the time series is extended to 2001 and 2002). The tables are available on the Istat website.

Industry classification and households
For each year data are broken down by economic branches and households consumption purposes according to the format set in the Eurostat 2002 NAMEA standard tables.

Residence (rather than territory) principle
As stressed in the report, concerning air emissions, the adjustment to the residence principle is needed for economic activities performing international transport. For the Italian air emissions accounts the adjustment is made only for industries (i.e. excluding households). The report describes in detail the method used by Istat to adjust emissions related respectively to road, air and water transport.

- As concerns road passenger transport services, estimates of non residents on the Italian territory (to be excluded) are based on annual propellant fuel consumption statistics; emissions of Italian travelling abroad (to be included) are calculated assuming that the their propellant fuel consumption abroad represents the same proportion of their total expenditure abroad as for the non residents on the Italian territory. Emissions from road transport of goods are adjusted using transport statistics from New Cronos.
- As concerns air transport, Istat uses air transport statistics and assumes that the proportion of flights by Italian companies out of total international flights equals the share of international incoming flights by Italian companies out of total flights.
- The share of resident companies out of total domestic maritime transport is assumed to be proportional to the weight goods transported. In the case of the Italian ships operating abroad, emissions are derived from the combination of CORINAIR experts' data on total international sea transport with Italy as origin and destination (i.e. by Italian and non Italian ships) and the proportion of goods (weight) transported by Italian ships engaged in international transport.

Istat produces a table that bridges the gap between CORINAIR and NAMEA air total (available on Istat website).

Ancillary activity
As indicated in the table showing the links between SNAP code and NACE-based categories for NAMEA, road transport emissions (SNAP 07) are distributed into all NACE industries plus households thanks to energy data.

Data source and periodicity
NAMEA air emission accounts produced by Istat use as main input the Italian CORINAIR air emission data classified according to the process-based SNAP 97 classification. Data are supplied by the Italian National Agency for Environmental Protection and Technical Services (APAT, formerly named ANPA). The NAMEA 1990-2000 data use the 2003 CORINAIR time series. Ista also uses national accounts data on energy use (industries and households), National Energy Balance and employment data (distribution of SNAP-based emissions into NACE-based categories), as well as technical information (transport), statistics on propellant fuel consumption, and international transport (residence principle).

Consistently with the requirements of the standard tables, economic and emissions data are filled in according to the most disaggregated level for which both economic and emission data are available.

Thus, although, for each year, emissions data are available for 52 economic activities (industries), data are provided at the (lower) level of detail that matches the breakdown of economic data. Moreover, due to differences in the breakdown of available economic data, for 1990 and 1991 data are more aggregated than for the years 1992-2000.

Now on, Italian NAMEA air accounts seem to be compiled on a yearly basis (in data currently available on the Istat website, the time series is extended to 2001 and 2002).

La NAMEA per la regione Lazio, Anno 2000, *Methodological note*, (6 p.) and *Analysis* (17 p.), Istat (Roma), 2005. (study n°136)

http://www.istat.it/ambiente/contesto/ambientale/nameaguida.pdf

http://www.istat.it/ambiente/contesto/ambientale/nameaanalisi.pdf

This study is the first one concerning the Italian NAMEA at regional level (Lazio region). It is organised in two separated documents: the methodology and the analysis. The methodological document presents the Italian NAMEA starting with the general description of the NAMEA framework. The regional NAMEA for the Lazio region is consistent with the NAMEA at national level (it includes the value added and the employment but does not include the production value because this information is not available at regional level). From the point of view of the pressure, this application is limited to air emissions and does not include the removal of natural resources.

The document dedicated to analysis starts by presenting shortly the pilot study (context and aim) and continues analysing the air emissions of economic activities and households.

The data are available in Excel spreadsheets.

Data coverage:
The data in the report covers the year 2000 at regional level (Lazio region) for the following atmospheric polluants: CO_2, N_2O, CH_4, NO_X, SO_X, NH_3, NMVOC, CO, PM10 and Pb. The economic variables included are added value (current and constant prices) and employment.

Industry classification and households
The NAMEA-air for Lazio is based on a 24-industry breakdown.

Households' emissions are split into transport, heating and other as in the Italian NAMEA-air. However, *Other* household consumption at regional and national level are not comparable due to the lower level of detail level of the regional data.

Residence (rather than territory) principle
The emissions due to the transport activities (via road, water and airplane) of the residents units who operate outside the territory are not included. The emissions of transport activities of non resident units who operate on the territory are also excluded.

Ancillary activity
Not referred to.

Data source and periodicity
Regional air emissions data is based on CORINAIR, and in order to compare emissions data to economic data, emissions from natural phenomena are excluded from the calculations of the total emissions. CORINAIR data at regional level, that are supplied by the Italian National Agency for Environmental Protection and Technical Services (APAT, formerly named ANPA), are available for the years 1995, 2000 and 2005.

Lithuania

Pilot project on environment statistics and accounts – NAMEA-Air, Report to Eurostat (grant agreement n° 71401.2005.001-2005-297) prepared by A niceta Sapoliene (project manager), Statistics Lithuania, April 2007, 12 p. (study n° 127)

http://www.dta.cnr.it/dmdocuments/pubblicazioni/volume_clima_07/AT_07/7-30_mazzanti.pdf

The report provides short methodological information about the implementation of the NAMEA Air emissions pilot project by Statistics Lithuania. The main objective of the project was to produce harmonized standard tables of NAMEA Air for 2004. After a short introduction to NAMEA and presentation of the project implementation by the statistical office, the report mainly focuses on the data sources used (economic, household expenditure and environmental data) and the production of the accounts**,** before presenting some conclusions (problems encountered and suggestions for the future).

Data coverage
Eurostat standard NAMEA tables have been produced for 2002 and 2006. The tables are not annexed to the report.

Industry classification and households
Emissions from the process-oriented database (in CORINAIR SNAP and CRF format) were allocated to NACE Rev. 1 plus private households. Some activities are shown together for data confidentiality (economic data) or availability (energy use) reasons or due to problems of conversion from SNAP to NACE (emissions).

Data on household final consumption expenditure is broken down by COICOP-based categories: heating, transport and other purposes.

Residence (rather than territory) principle
Differently from NAMEA Air methodology, the data on energy used in the fishing industry and fuel delivered to fishing ships of all flags do not include national residents abroad and do not exclude foreign vessels within the territory. Data on fuel used by transport do not include national residents abroad either nor exclude foreign transport companies operating on the national territory.

Ancillary activity
The enterprises are classified by activities according to their principal activity. The secondary and ancillary activities are not separated.

Data source and periodicity
The Ministry of Environment has overall responsibility for the preparation of yearly Greenhouse gas and Pollutants emissions inventory.

GHG emissions: The main data providers are Statistics Lithuania, State Forest Survey Service and Environmental Protection Agency. The inventories are compiled in accordance with the methodology recommended by the Intergovernmental Panel on Climate Change (IPCC) in its *Good Practice Guidance.* Emission factors used are either country specific (used for Energy sector, except fugitive emissions) or internationally recommended default factors, mainly those provided in *IPCC Good Practice Guidance* and in *EMEP/CORINAIR Emission Inventory Guidebook*.

Pollutant emissions: The main sources are the activity data provided by Statistics Lithuania, Institute of Road Transport, Register of Transport (State enterprise "Regitra") and the data collected by the Environmental Protection Agency and the Ministry of Environment using the annual questionnaires from the large point sources. Emission factors used are either country specific (used for Energy sector, except Road transport) or internationally recommended default factors, mainly those provided in *EMEP/CORINAIR Emission Inventory Guidebook*.

Energy use: The main source was the annual energy balances (based on annual enterprise surveys).

Hungary

A NAMEA on Air Emissions in Hungary, Multi-beneficiary statistical cooperation programme in 2003 – technical assistance ("The action"), Final Report by Orsolya Bálint, Hungarian Central Statistical Office (HCSO), Budapest, November 2005, 21 p. (study n°76)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/namea-air/nameahun_reportpdf/_EN_1.0_&a=d

The main objective of the sub-project was to compile NAMEA-type air emission accounts for the years 2001 and 2003, extending the existing 4-year time series to a 6-year time series (despite the change of methodology, see below). The report prepared by the Hungarian Central Statistical Office (HCSO) presents the time series covering 2000 to 2003. NAMEA-air was one of the three items included in the environmental accounts chapter of the two year bilateral cooperation between the HCSO and the Dutch Central Bureau of Statistics (CBS). The author of the report also visited NAMEA experts at the Italian statistical office (Istat).

The report starts (chapter 1) by describing the main objective and the main points which were needed to improve the Hungarian NAMEA: to share responsibility with the Ministry of Environment, to investigate the basic data and to establish the methodological basis. Follow the presentation of the methodology (chapter 2) and the structure of the Hungarian NAMEA (chapter 3). The current

Hungarian NAMEA tables are identified as a "light version" since no input output tables (matrix) are provided. Air emissions data are connected to linear (column) national accounts variables: gross output, value added, intermediate consumption, as well as employment data (number of employees).

Chapter 5 is focused the air accounts showing emissions by industries and total households' emissions. The corresponding economic data are not presented in the report. The report says that the results have been provided in Excel tables that assure traceability of the connections between final and basic data (the tables are missing).

The first series of air accounts for the Hungarian NAMEA have been compiled distributing CORINAIR emissions economic activities. In 2004, HCSO changed methodology. Energy related emissions are now estimated from energy statistics (energy Centre) and emissions factors. Non-energy related emissions are calculated using specific statistics and relevant emission coefficients.

Data coverage:
The air emission accounts presented include 7 pollutants: CO_2, N_2O, CH_4, SO_2, NO_x, NH_3 and NMVOC and cover the years 2000-2003.

Industry classification and households
The air emission data presented in the report are distributed in a 17-NACE-based industry breakdown plus households' emissions (the most aggregated level of detailed offered in the Eurostat NAMEA-air standard tables) in order to avoid inconsistency between economic and emission data. Air emission data have been distributed into homogeneous branches for the sake of international comparison, despite Hungarian national accounts data were available then for non-homogeneous industries (HCSO planned to develop national accounts based on homogenous branches).

Residence (rather than territory) principle
Nothing is said on the residence principle. In the case of Hungary this should mainly concerns road and air transport activities.

Ancillary activity
The report says that (all) transport emissions have been reallocated across industries using the distribution of output. This is not consistent with Eurostat's requirement as concerns own account transport emissions. Firstly, transport undertaken as an ancillary activity concerns almost exclusively road transport; secondly, in the case transport emissions related to other industries than transport would be initially attributed to the transport industry, is apportionment across industries would not depend on the distribution of output.

Data source and periodicity
HCSO uses the Energy Centre statistics on the use of fossil fuel, industry statistics and technical data as well as experts' estimates.

HCSO seems to be able to produce air emissions accounts on a yearly basis. In a 2006 publication available on the HCSO website[91], the series has been extended to 2004.

Austria:

NAMEA – Air Emissions: Time Series 1980-2001, Umweltbundesamt (Federal environment Agency – Austria), October 2003, 41 p. (grant agreement 2004 412 00020) (study n°48)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air/namea-report_austriapdf/_EN_1.0_&a=d

The report prepared by the Federal Environment Agency – Austria presents the time series covering 1980 to 2001 on air emission accounts for the Austrian NAMEA. The report also includes (the annexes are missing) some macroeconomic data from statistics Austria (production, value added and employment).

[91] - Hungarian Central Statistical Office, *Air pollution of the economic activities 2000-2004*, Budapest 2006, 51 p. (bilingual presentation).

The report starts with the presentation of the Austrian air emission inventory (*Österreichische Luftschadstoff-Inventur*, OLI). The core of the document consists in the presentation of methodology used to allocate the emissions from the inventory (mostly process-oriented SNAP categories) to economic branches (NACE-based classification) and households as well as in the presentation of the results: trends by emission types and for the main economic sectors (Agriculture, manufacture of basic metals, electricity and other economic activities) plus households. Road transport emissions correspond to the CORINAIR category (see below)

The methodology applied is nearly the same as the methodology used in the previous NAMEA studies, except modifications imposed by less detailed energy data (see ancillary activity below). The OLI is a source-oriented inventory based on the CORINAIR methodology. Emissions that are initially classified according to the SNAP (large stationary sources of pollutants) are distributed to NACE industries plus households either directly (from 75 to 100% of the total of emissions by pollutants) or using energy balance from Statistics Austria.

The report does not refer to the most recent Eurostat's documents that include methodological information: NAMEA-air standard tables & accompanying manual, draft NAMEA-air guide and compilations of pilot studies (1999, 2001). It does not refer either to any other EU members' report.

Data coverage:
The Austrian air emission accounts include 8 pollutants:

- greenhouse gases included in Kyoto protocol: carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4);
- acidifying emissions: sulphur dioxide (SO_2), nitrogen oxides (NO_X) and ammonia (NH_3);
- and 2 other local air quality pollutants: carbon oxide (CO), non-methane volatile organic compound (NMVOC).

The time series presented in the report covers 1980 to 2001.

Industry classification and households
In relation with absence of compliance with the residence principle, it is indicated that the standard tables were not filled in. The tables presented in the annexes are missing. The annexe untitled "SNAP-NACE-allocation" should enable to see whether the industry classification used for the most detailed data is compatible with the standard tables or not.

Residence (rather than territory) principle
The report points out that the Austrian NAMEA-air data presented do not fulfil the residence principle, stressing on the further investigations needed as regards road transport (trucks and tourists). Nothing is said on the residence principle in relation to air traffic emissions.

Ancillary activity
Unlike the previous Austrian NAMEA-air data set, it was not possible to split road transport emissions between transport industry, own account transport carried out by the other industries and households.

Data source and periodicity
The Austrian air emission inventory (OLI) is produced annually by the Federal Environment Agency (Department of Air Emissions) to fulfil different international obligations (especially to the UNECE/CLRTAP and the UNFCCC; the report is based on data reported in 2003). The energy balance is not produced annually. The Austrian NAMEA-air time series is based on annual data.

Portugal

NAMEA 1999 – Air emissions, Report to Eurostat, Ana Margarida Claro, Instituto Nacional de Estatística – Portugal, 2004, p.40 (study n°51)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air/namea1999-english-report/_EN_1.0_&a=d

The report focuses on the presentations of the data. It does not provide any explanation on the method used and the data sources. The bibliography indicates that the Instituto Nacional de

Estatística (INS) kept using the CORINAIR-based national air emission inventory as main data source for the compilation of the air emission accounts of the Portuguese NAMEA[92]. It also refers to the first set of Eurostat NAMEA-air standard tables (*NAMEA 2000 for air emissions*).

The report starts by presenting the distribution of air emissions across large categories (Agriculture, Hunting, Forestry and Fishing; Mining and Quarrying; Manufacturing industry, Wholesale and Retail Trade; Hotels and Restaurants; Electricity, Gas and Water Supply; Construction; Transport, Storage and Communication; Other Services and Households) and analyses then separately and in more details the emissions of households, manufacturing industry and transport services industry. These data are presented aggregated according to two themes indicators: the Global Warming Potential over 100 Years (GWP_{100}) and the Potential Acid Equivalent (PAE). Finally economic and environmental data are combined: the ratios of total emissions (of one or more pollutants) per unit of gross value added (emissions/VAB) and the variation of these ratios (which is presented as environmental efficiency) are calculated.

Data coverage:
The Portuguese air emission accounts include 8 pollutants: methane (CH_4), carbon monoxide (CO), carbon dioxide (CO_2), ammonia (NH_3), non-methane volatile organic compounds (NMVOC), nitrous oxide (N_2O), Nitrogen oxides (NO_x), Sulphur oxides (SO_x)

The report presents results from 1999, as well as evolution from 1997 or 1998 to 1999.

Industry classification and households
The level of detail of the NACE-based industry classification used for the table presented for two above mentioned indicators on greenhouse effect and acidification is compatible with standard table. It is even more detailed concerning trade and services industry.

Emissions of households are subdivided in transport, heating and others as requested in the standard tables.

Residence (rather than territory) principle
No information on whether the residence principle is taken into consideration or not.

Ancillary activity
There is no information on how the ancillary activities are treated (in the second set of air accounts, INS allocated own account transport across industries responsible[93]).

Data source and periodicity
No information on data source and their periodicity is given.

It is said that the data of the employment, VAB and production were obtained from the Table 1a of NAMEA and the data of the emissions from the Table 1b. Theses tables are not part of the present document.

[92] - The INS revised its method for the second set of NAMEA-type air accounts (1993 and 1995) prepared in 1999. See Eurostat (2001), *NAMEAs for air emissions - Results of pilot studies*, Office for Official Publications of the European Communities, Theme 2: Economy and finance – Collection: Detailed Tables, Luxembourg (Catalogue number: KS-39-01-093-EN-N), p. 38.
[93] - Ibidem.

Slovenia

NAMEA for air emissions in Slovenia, Report to Eurostat, Vida Butina - Statistical Office of the Republic of Slovenia, Ljubljana, March 2006, 20 p. (study n°75)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/namea-air/nameasloveniafinalreport/_EN_1.0_&a=d

The pilot application carried out by the Statistical Office of the Republic of Slovenia (SORS) aimed at compiling NAMEA-type air emissions accounts for the period 2000-2003. SORS cooperated with the Environment Agency of the Slovenian Republic (EARS) concerning air emission data and benefited from Norway's expertise through a visit at Statistics Norway.

The chapter dedicated to the methodology (chapter 2, the introduction is numbered chapter 1) gives a long presentation of the input output tables required for a full fledged NAMEA, before focusing on the compilation of the Slovenian air emission accounts. What is called the structure of the Slovenian NAMEA (chapter 3) correspond to the Eurostat standard tables filled in by the SORS. In the summary of the work process (chapter 4), it is said that results have been presented in Excel files in order to enable traceability (the tables are note available with the report).

The compilation of the Slovenian NAMEA air emission accounts is mainly based in the Intergovernmental Panel on Climate change (IPCC) data (direct and indirect greenhouse gases) and the CORINAIR inventory. Consequently, for the distribution of emissions across economic activities (industries and households), IPCC/CORINAIR processes are split into two groups[94]:

- Some processes are attributed to a unique economic category;
- Other processes are split into several economic categories using additional data (e.g. economic or energy statistics).

Data coverage

The report indicated that the Slovenian air accounts cover 15 pollutants, direct and indirect greenhouse gases: CO_2, CH_4, N_2O, HFCs, PFCs, SF_6, NO_x, SO_2, CO, NMVOC, plus NH_3, PM10, and 3 heavy metals: Hg, Pb, Cd.

The NAMEA-air standard tables were prepared for the years 2000 to 2003 (data on households consumption expenditure are provided for 1996 to 2004).

(the tables listed as annexes to the report are missing).

Industry classification and households

According to the report, the Slovenian NAMEA-air data are reported using Eurostat standard tables. However, since the tables are missing, it was not possible examine at which level of detail the data are actually available.

The Slovenian input output table is compiled at a 60-industry level and published at a 30-industry level.

Residence (rather than territory) principle

Slovenian NAMEA-air accounts that resulted from this pilot application did not comply with the residence principle. Statistics Norway advised Slovenia to investigate this point focusing on emissions stemming from (international) transport activities.

Ancillary activity

Nothing is said in the report on emissions from own account transport emissions. In the NAMEA 2002[95], all IPCC transport emissions were attributed to the transport industry (NACE 60-62).

[94] - See Statistical Office of the Republic of Slovenia (2005), "NAMEA air emissions, Slovenia, 2002", *Rapid report, n°125* , May 2005, 23 p. Table 9 is dedicated to the connection between IPCC categories and NACE-based economic industries or groups of industries.

[95] - Statistical Office of the Republic of Slovenia (2005), "NAMEA air emissions, Slovenia, 2002", *Op. cit*.

Data source and periodicity
As concerns direct and indirect greenhouse gases, IPCC database is the main source for the Slovenian air emission accounts. CORINAIR inventory is used for the other emission types. In this context, Slovenian seems to be likely to be able to produce air emission accounts on a yearly basis.

As required by ESA 1995, Slovenia produces a symmetric input output table every five years.

Sweden

Increasing the timeliness of environmental accounts carbon dioxide emissions data, Report to Eurostat, Report prepared by Viveka Palm with contributions from Anders Wadeskog, Helena Rudander, Mårten Sjölin, Statistics Sweden, 2002, 21 p. (study n°43)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air/emissionsrev_2002pdf/_EN_1.0_&a=d

The purpose of the report was to investigate the possibility for devising a method that would enable Statistics Sweden to increase the timeliness of air emissions accounts by estimating short term forecasts (preliminary air accounts) based both on quarterly economic data and energy statistics. Tests were undertaken on CO_2 emissions as a starting point.

Chapter 2 gives a brief description of the method used by Sweden in order to produce it air emission accounts (i.e. not preliminary).

Coverage
The report focuses on the carbon dioxide (CO_2). However, Swedish air accounts for NAMEA cover carbon monoxide (CO), methane (CH_4), nitrogen oxides (NO_x) and ammonia (NH_3). The report covers CO_2 data from 1994 to 1998.

Industry classification
The classification used for the report is mostly based on NACE 2-digit level, except additional groupings for mining and quarrying (10-14), manufacture of food and beverage (15-16) textile and leather (17-19) motor vehicle and transport equipment (34-35), and other manufacturing and recycling (36-37), as well as trade (50-52) and services industries (65-67, 71-74, 80+85 and 90-95). This classification is almost compatible with the former standard tables.

Residence (rather than territory) principle
Air emissions accounts for the Swedish NAMEA are consistent with the residence principle. Emissions from ships and aircrafts bunkering abroad are estimates from fuel consumption statistics. For Sweden, CO_2 emissions from residents bunkering abroad (especially the shipping transport sector) represent 25% of transport emissions in NAMEA.

Ancillary activity
The report shows a separate set of CO_2 emissions stemming from mobile sources (road vehicles, ships, aircrafts, trains and working machines). Therefore, emissions from transport as ancillary activity are allocated to the responsible industries.

Data sources and periodicity
Swedish air emission accounts are mainly based on energy data. Statistics Sweden uses emission factors provided by the Swedish Environment Protection Agency (EPA). Road transport emissions are calculated with a model of the Swedish Road transport Administration that takes numerous parameters (vehicles types, distances, types of fuels, modes of driving, etc.) into accounts. Data on air and water transport emissions come from report of the relevant national authorities to the Swedish EPA.

The methods tested
Chapter 3 presents the methods tested and the results. The feasibility of preliminary air emission accounts is investigated comparing both historical emission and energy data from Swedish environmental accounts with both emission data and energy statistics foreseen as basic material for the preliminary estimates. Four methods are tested in the report as regards the improvement of CO_2 accounts timeliness:

- Estimates based on economic data (emission intensity of the previous year).
- Comparison between totals (by sources) reported to the UNFCCC and in the air accounts.
- Emissions from stationary data based on quarterly energy statistics.
- Emissions from mobile sources based CORINAIR data.

For the first approach actual data of the air emission accounts are compared with estimates based on emission intensities of the previous year. Calculations are made both with production and value added emission intensities by industries. The report does not conclude whether production or value added-based intensities are preferable. Differences seem to be rather large (mostly more than 10% for total stationary sources, but much more industry by industry). The report stresses that some of the emission intensities are rather sensitive to the weather condition in Sweden (temperature and pluviometry) where a significant share of electricity is based on hydro power.

The second approach is a comparison by type of sources (mobile, stationary in NACE 10-37, industrial processes) of total emissions reported to the UNFCCC and total in the air accounts. Both for 1994 and 1996, NAMEA total is 10% higher because of the residence principle (around 25% for mobile sources, mainly because of ships). UNFCCC total is higher for stationary sources.

Another possibility would be to use yearly sums of quarterly energy accounts. The comparison undertaken at this stage focuses on emissions from stationary sources (split by energy products) for the years 1996, 1997 and 1998; differences range from 4 to 8% as regard total energy use. Statistics Sweden does not consider the result as totally conclusive.

Concerning mobile sources, estimates were tested using CORINAIR data. Several methods were tested based on different weighting (considering the vehicles registered and distances of journey). The differences between total emissions from mobile sources in the Swedish CO_2 accounts and in the Swedish CORINAIR based inventory range from 3% to 9% between 1994 and 1998.

The report concludes that none of the data sources reviewed for the study is sufficient enough to serve a basis for preliminary estimates of air accounts. Therefore the method based on emission intensities will have to be used until the differences shown by the report are more thoroughly investigated. However, it stressed that emission intensities should be used with caution and, if necessary “adjusted” from one year to another, because of their variability with weather condition, as well as prices variations, in Sweden.

According to the authors, many questions remain so far unsolved about variations in the basic data collected at establishment level (large energy companies and chemical industries). Further investigation will be made on this point. Statistics Sweden also plans to investigate specific statistical methods that could help to combine the different sources and methods reviewed.

Norway

Norwegian Hybrid Accounts: NAMEA for air emissions, Technical Report to Eurostat, Hass Julie.and Sørensen Knut, Statistics Norway, Oslo, April 2002, 58 p. (study n°44)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air/namea_report_2000pdf/_EN_1.0_&a=d

The development of hybrid accounts – NAMEA-type accounts – linking national and environmental accounts, in this case air emissions accounts represent the third part of the NOREEA (Norwegian Economic and environmental accounts) that also deal both with monetary value of natural resources and environmental expenditure. After a few pages on the use of NAMEA data: industry profiles and coupling/decoupling of economic and emission trends (chapter 2) and a brief presentation of the NAMEA framework (chapter 3), the report focuses on the construction of the Norwegian NAMEA with air emissions (chapter 4), including briefly description of how input-output calculations are made using the inverse (Leontief) matrix approach.

Chapter 5 is dedicated to the conversion factors into environmental (greenhouse and acid rain) themes equivalent. Chapter 6 shows the timetable for the publication of NAMEA-air. The complete

NAMEA should be available with a 2.5 years delay. Headlines of the future work on NAMEA are presented in chapter 7 (consistency of air emissions with energy data and national accounts, comparability with other countries, development of indicators and input-output analysis, extension to solid waste). Very aggregated data, 8-industry level supply and use table extended to acidifying pollutants plus selected total by industry for the other pollutants, are shown in Chapter 8. Chapter 9 summarises the Norwegian data sources necessary for filling the table 3 of the first version of the standard tables (kind of bridge table). Chapter 10 shows the table about the aggregation of HFCs and PFCs into "equivalents" sent by Eurostat as addendum to the first version of the standard tables. SAS programs for extracting data for NAMEA from the air emissions and the national accounts databases are given respectively in Chapter 11 and 12.

Coverage

The air emission data presented in the report cover carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), carbon oxide (CO), non methane volatile organic compounds (NMVOV), Chlorofluorocarbons (CFC), Hydrofluorocarbons (HFCs), Sulphur hexafluoride (SF_6), particulate matter P(M), lead (Pb), cadmium (Cd). The Norwegian NAMEA also includes data on sulphur dioxide (SO_2), nitrous oxides (NO_x) and ammonia (NH_3).

The report deals with the NAMEA-air time series that covered then 1991 to 1998 (it was indicated that preliminary data were also available for 1999 and 2000). No detailed data were provided with the report. They were to be reported to Eurostat with the standard tables (revised version).

CO_2 emissions from biofuels were excluded from the Norwegian NAMEA. Other emissions resulting from biofuels are included (consistence with IPCC guideline). However, since in NAMEA all emissions should be counted for no matter the fuel used, CO_2 emissions from biofuels will possibly be taken into account in the future, for the sake of international comparability. No carbon sequestration is estimated.

Industry classification and households

The report does not show the data at the most detailed level, but only for 8 industry groupings plus households. However air accounts of the Norwegian NAMEA were based then on NACE rev.1 industry classification (mostly at 2-digit level) and reported to Eurostat through the standard tables.

Although emissions related to electricity production are rather low, they are actually attributed to NACE 40.1. In Norway, electricity production is mostly based on hydropower plants.

In the Norwegian NAMEA, emissions from landfill sites are partly attributed to the waste management industry (NACE 90). They are also partly allocated to the public administration (NACE 75), since a large number of municipalities own landfill sites. Consistently with NAMEA principles, emissions estimated correspond to the emissions of the current year. Despite air emissions of landfills come from accumulated solid waste that has deposited over the time, no attempt is made to assign current year emissions to previous years based on when the waste was deposited.

Only economic related emissions are taken into account (i.e. excluding emissions from natural sources). However, Norway raised then the question on whether it is actually best excluding carbon storage into biomass from NAMEA or not. On the other hand, the fact that emissions from natural sources such as cultivated forest are excluded may be seen as shortcoming of NAMEA.

Emissions from household consumption are divided into the three categories: transport, heating, and other as proposed in the standard tables. Transport covers all emissions related to the use of fuel for road transport directly carried out by households no matter the vehicle – i.e. car, motorcycles and mopeds. Emissions stemming from the use of pleasure boats and snowmobiles are allocated to the category other. Heating includes emissions related to the combustion of all kinds of fuel by households for heating as well as for cooking (furnaces and ovens)

Residence (rather than territory) principle

In the Norwegian emission model, emissions of resident units abroad are directly identified for both air and water transport (different codes in the inventory). For Norway, the difference between national territory-oriented and national economic activity-oriented totals is mostly due to national boats bunkering abroad when engaged in international transport (estimates of Norwegian fishing vessels' emissions are based on the fuel they purchase in Norway and abroad). No estimates were made to deduct foreign vessels within the Norwegian territory and air transport emissions of non-resident companies operating over the Norwegian territory (they are considered as negligible). For road

transport it is assumed that emissions of foreigners on within the territory are the same as emissions of Norwegian driving abroad.

Ancillary activity
The report indicates that all data required in Norway, to estimate own account road transport emissions (fuel type, average fuel use by distance, type of vehicle) and to attribute them to the relevant industries (ownership) are available.

Data sources and periodicity
In Norway, the annual emission inventory is prepared by Statistics Norway in collaboration with the Norwegian Pollution Control Authority. The Norwegian emission model is as a five-dimension database including 14 pollutants (6 greenhouse gases, 3 acid rain precursors, NMVOC, CO, PM, Pb and Cd), 34 technical sources (furnaces, vehicles, process), 32 emission carriers (i.e. fuels), 131 economic sectors and 435 territorial units. Also, some emissions are either calculated separately, e.g. for road transport and landfill sites, as well as a few emission types (HCFCs, PFC, SF_6 and NH_3) or directly reported from large industrial plants before being loaded in the general model (inventory). The Norwegian air accounts are mostly based on energy accounts that follow national accounts principles, taking energy use in Norwegian economic activities into account regardless their location. However, the energy balance, which follows energy flow with Norway, separates out energy used for transport that are not identified as such in energy accounts.

Economic data for the Norwegian NAMEA comes from the annual national accounts that are consistent with SNA93/ESA95. The industry-by-industry input-output tables used for NAMEA, which are initially compiled for 180 industries and 1200 products, are in fact based on homogenous units (branches). Such tables correspond to the demand by Norwegian users and require weaker assumptions that the ones needed for product-by-product tables.

Household consumption data reported referring to (old) COICOP categories are also reported in current and constant prices. They do not include only fuel related consumption. In addition to gasoline and oil expenditure, expenses dedicated to spare parts, insurance, repairs at garage as well as parking are also included in the category transport. For the category heating, electricity is taken into account additionally to solid and liquid fuel consumption.

"NAMEA-air emission accounts" chapter 3 in *Norwegian Economic and Environmental Accounts (NOREEA) Project 2003*, Report to Eurostat (grant agreement n° 2002412000 13) prepared by Julie Hass and Knut Sørensen (ed.), Statistics Norway, March 2004, pp. 30-38
(study n°30b)

This chapter is a follow-up report on the development of NAMEA-type air accounts in Norway that were already implemented on a yearly basis. It presents information successively on the modifications relating to the industry breakdown, to the improvement in the reporting and the publication, on the accessibility of the latest data on Statistics Norway's website. A focus on the improvement in the NACE detail for HFCs, PFCs and SF_6 is made in the last section.

Coverage
The report informed that the Norwegian air emission accounts for NAMEA would be expanded to heavy metal and particulate mater emissions.

Industry classification and households
The report informed that the same improvement as in national accounts relating to the detailed values for shipping could not be made on the emission side. However, emission data were already available at NACE 2-digit level (division 61 for water transport).

Data on petroleum refineries (NACE 23) had to be grouped together with chemical industry (NACE 24) because of confidentiality (2 companies only).

Residence (rather than territory) principle
No modification in the implementation of the residency principle (c. study n°44 above).

Ancillary activity
No modification either concerning compliance of the Norwegian air accounts as regards the recording of ancillary activity (c. study n°44 above).

Data sources and periodicity
Between 2002 and 2004, the publication of the Norwegian NAMEA-air had been by nearly 4 month thanks to the improvement in the publication of quarterly national accounts. Data on the year N were then published at the end of Mach N+2.

Switzerland

Emissions de gaz à effet de serre par branche économiques – NAMEA pilote pour la Suisse en 2002, Jürg Füssler, Guido Beltrani and Oliver Schelske (Ernst + Partner), Bernhard Oettli, Daniel Sutter, Jürg Helstab (Infras), avec la collaboration de Jacques Roduit et Klaus Leemann (OFS) et Paul Filliger (OFEV), Office fédéral de la Statistique (OFS), Neuchâtel, 2005,72 p. (study n°52)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air/emissions_2002pdf/_EN_1.0_&a=d

The report presents the first Swiss NAMEA on greenhouse gases (GHG); it was prepared by the Office Fédéral de la Statistique (OFS) in collaboration with of the Office Fédéral de l'Environnement (OFEV). The report underlines that the study has to be considered as an exploratory investigation and its results as provisional. In addition to the presentation of the results, the Swiss publication aims to point out the usefulness of NAMEA-type accounts as official statistics for environmental policy makers.

The report starts with a presentation of the structure of the NAMEA and its usefulness. It follows on with an explanation on the method used to compile the Swiss NAMEA-GHG and points out the differences between the GHG emission accounts for NAMEA and GHG emission inventories. In the 4th chapter dedicated to the results, the report presents in detail the results for the year 2002 in Switzerland, before comparing the data for 2002 both with Swiss data for previous the years (1990 and 1995) on a very aggregated level (primary, secondary and tertiary industry) and at with six other countries. The report ends up with a discussion on the interpretation of these results and on the possible development and improvement of the Swiss NAMEA.

The report states that data were calculated in accordance with the Eurostat methodology and refers to the *NAMEA for Air Emissions Compilation Guide* (draft version, 2003).

Data coverage:
The Swiss NAMEA-air focuses on the 6 greenhouse gases included in the Kyoto protocol: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and Sulphur hexafluoride (SF_6). This first pilot application has been prepared for the year 2002

A preliminary analysis of changes over time is presented based on aggregated data for 1990 and 1995.

Industry classification and households
The 35-industry NACE-based classification used for the Swiss NAMEA is compatible with second set of Eurostat NAMEA-air standard tables (36iest category *Not allocated* is included for economic data).

Household emissions are split into stationary sources and transport.

Residence (rather than territory) principle
The report states that the Swiss air emission accounts comply with residence principle and indicates that a *Bridge table* was prepared as requested in Eurostat standard tables. This bridge table is not present in the report.

Ancillary activity
Emissions stemming from own account transport activities are distributed across industries (a table dedicated to transport emissions is provided in annexe).

Nothing is mentioned on the emissions of own accounts electricity production.

Data source and periodicity
The Swiss air emissions inventory based on the IPCC recommendations. The emission data were distributed across industries using energy data from the Swiss supply-se table (tableau entrées-

sorties, TES) for 1995, as well as transport and employment statistics. Two tables provide the authors' opinion on the reliability of CO_2 and non-CO_2 emission data respectively by group of industries plus households. These tables also sum up the data sources and the method used for the distribution across industries plus households.

As indicated in the last chapter of the report, the Swiss NAMEA-GHG will be published on a regular basis (ideally on a yearly basis).

5.2.5 Energy

Belgium

The NAMEA Energy for belgium (1990/1994-2002), report to Eurostat prepared by Sébastien Gilis, Lies Janssen, and Guy Vandille, Federal Planning Bureau, February 2006, 71 p, (Grant Agreement n°200471401006) (Study n°35)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/energy9094-02bepdf/_EN_1.0_&a=d

This report presents the first compilation of NAMEA-energy for Belgium. The energy use table prepared in the context of the NAMEA-air was used as the starting point. Belgium developed its own framework, saying that no Eurostat standard tables existed yet[96]. The resulting Belgian energy accounts consist of supply and use tables in both physical and monetary terms.

Part 1 of the report deals with the methodology: firstly the construction of the tables and secondly the data sources (includes an assessment of the data reliability). The part 2 of the report is dedicated to the results, i.e.: energy use and energy supply over the period under review. This part also assesses to what extent Belgium is able to cover its own energy use. Part 3 of the report links the energy data to the economic data available in the NAMEA-air in order to investigate the level and the evolution of the energy efficiency of the Belgian economy and its different components.

Data coverage
Seventeen different types of fuel are distinguished:

- 7 combustible primary energy carriers (lignite, coal, natural gas, wood, other bio-fuels, peat and other, and waste);
- 8 combustible secondary energy carriers (coal coke, coke gas and other gases, fuel oil, diesel oil, motor gasoline, LPG, jet fuel and kerosene, and other petroleum products);
- 2 air emission-free energy forms (electricity, and heat & hot water).

As for the 2006 NAMEA-air report, the Belgian NAMEA-energy presented here covers the years 1990 and 1994 to 2002

Industry classification
The industry breakdown coincides with the air emission accounts breakdown that is itself compatible with Eurostat standard tables. The household consumption category is subdivided into transport, heating and other consumption.

Residence (rather than territory) principle
For the purpose of the NAMEA-air compilation (see above the report of 2006), the adjustment to the residence principle of all Belgian transport related energy use resulted from a study carried out by the FPB in collaboration of the national statistical Institute[97].

[96] - A proposition of standard tables was presented in the Draft version of the *NAMEA for Air Emissions Compilation Guide* that Eurostat circulated from June 2003.
[97] - Vandille G. and Zeebreock B. (2004), The NAMEA air for Belgium (1990/1994-2001), Federal Planning Bureau, Brussels, January 2004, 117 p.

Ancillary activity
Own account **transport** by enterprises were distributed into industries using the Belgian 1995 use table (expresses in monetary terms) for the entire period. Data availability for the 2000 use table was not sufficient enough yet to update the distribution across industries.

According to the description of the data sources, information seems to be available in order distribute own account **electricity** to the relevant industries. However, this point is not clearly treated in the report.

Data sources and periodicity
The data are mainly based on regional energy balances that were adjusted to the NAMEA format, as indicated also in relation to the decomposition analysis undertaken by the FPB (see above the Belgian NAMEA-air).

For **Brussels-Capital**, the following tables extracted from the set of yearly energy balances are:

- the energy balance for the manufacturing industry including construction,
- the energy balance for the high tension services industries,
- the energy balance for the low tension services industries,
- the global energy balance,
- the energy bill.

For 1990, since only the global energy balance is available, data for 1991 were used for the distribution across industries.

The data for **Flanders** mainly come from the global energy balances, complemented by succinct energy balances used to achieve more details as concern the industry breakdown. All these energy balances were available for 1990 and 1994 to 2002.

For **Wallonia**, the following tables extracted from the set of yearly energy balances are used:

- the (energy) transformation balance,
- the detailed (energy) balance for the manufacturing industry including construction,
- the energy balance for the high tension services industries,
- the global energy balance,
- the energy bill.

Norway

"NAMEA-work to further developing NAMEA energy accounts" Chapter 4 in *Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005*, Report to Eurostat (grant agreement n° 2002412000 13) prepared by Julie Hass and Knut Sørensen (ed.), Statistics Norway, May 2006, pp. 11-23. (study n° 33a)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/norway_2005_noreeapdf/_EN_1.0_&a=d

This chapter of the NOREEA 2005 summarises all work done by Statistics Norway since it has been decided in 2002 to expand Eurostat's NAMEA-air standard tables to energy use relevant for air emissions. The discussion presented is largely based on the first draft NAMEA-energy tables proposed then by Eurostat.

After a section reminding the context, this chapter examines what to report in the NAMEA-energy tables (types of energy, industry classification, data sources) and provides a review of the data reported by Statistics Norway. Following sections aim at contributing to the discussion on the development of energy accounts for NAMEA (purpose, accounting principles and format).

Data coverage
The report reminds that, in 2002, Statistics Norway reported to Eurostat draft NAMEA-energy tables filled out with 1999 data as test of the table that was intended to be included in the set of NAMEA-air standard tables. This table covered primary energy combusted (coal, gas, bio-fuels, and waste), secondary energy forms combusted (coke, petroleum products), and air emission-free energy use (electricity, other).

The issues on whether leakages from gas distribution and oil extraction flaring should be recorded, and if yes how, is discussed. Statistics Norway expressed it preference to include both of them, whatever the category, i.e. as an energy use or not.

Industry classification
Whatever the way energy data are to be reported in relation with NAMEA-air – either in a table like the one developed in 2002 or focusing total emission-relevant energy use/total energy consumption – the same economic classification as for NAMEA-air is used. It is mostly based on NACE 2-digit for industries and split between transport, heating and other purposes for households.

The 1999 data reported in 2002 by Statistics Norway were presented at this level of detailed.

Residence (rather than territory) principle
The report reminds that, like for air emissions, the energy accounts for NAMEA must comply with the residency principle i.e. include energy use of resident abroad (bunkering abroad) and exclude energy use of non-resident on the national territory.

Ancillary activity
Own account energy production (auto-production) is not recorded in national accounts, but include all energy products used as intermediate consumption in the corresponding process. Therefore NAMEA-energy should not cover such energy auto-production.

Energy use related to transport carried out for own account should be distributed across the responsible industries.

Data sources and periodicity
Statistics Norway does not publish energy data as required for NAMEA and therefore had to investigate whether other institutions were producing the relevant data. The report presents a systematic review of all energy items of the 2002 draft NAMEA-energy tables were systematically: data source, corresponding energy goods and unit in Norway's energy statistic, conversion factor used, and compliance wit NAMEA standards.

5.2.6 Water

Belgium

The NAMEA Water for Belgium (1998), Guy Vandille, The Belgian Federal Planning Bureau, Brussels, February 2002, Part I, 61 p. (Part I is dedicated to NAMEA Air). (Grant Agreement n°200041200017) (Study n°42b)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air/namea2001belpdf/_EN_1.0_&a=d

As previously mentioned in the section on air emission, the 2002 Belgian NAMEA report consists of 2 parts (dedicated to NAMEA-Air and NAMEA-Water respectively) that can be read separately as individual reports. This document is dedicated to water accounts for NAMEA and should be considered as a pilot application; a previous report by Federal Planning Bureau (FPB) investigated the feasibility of a NAMEA for Belgium[98]. Like NAMEA-air, the Belgian NAMEA-water has been developed as part of the European environmental accounts programme.

[98] - van den Berghe S. (2000), *NAMEA Air Belgique et Etude de faisabilité NAMEA Eau*, Rapport préparé pour Eurostat, Bureau Fédéral du Plan.

After the introduction (chapter 1), the Belgian NAMEA-water is presented in details (format of the tables, data sources and estimates) in chapter 2 that is dedicated to methodological issues. The water accounts prepared for this report follow the provisional guidelines discussed during the Eurostat Workshop on water satellite accounting organized in 2001[99] The data that were compiled then: both environmental accounts and the corresponding economic data (results), are presented as regards their distribution across industries (chapter 3), before being combined and analyzed (chapter 4) using two types of indicators:

- "pollutiveness": share of the industry i in total discharges of water pollution p / share of industry i in total wastewater discharges (a ratio higher than one indicates that the industry i has a higher amount of discharges of p than the country's average);
- relative eco-efficiency: share of the industry i in total discharges of pollutant p by industries / share of sector i in total value added (the author stress that such an indicator is to be used for comparison over time despite water accounts were compiled then for 1998 only).

Coverage
For this pilot application, the data compiled refers to the year 1998.

As requested in the above mentioned preliminary set water accounts standard tables, the Belgian water accounts prepared then cover both monetary and physical supply and use of water (drinking and non drinking water) and related products (sewage removal and water treatment) as well as emission accounts to water.

The report focuses on emissions of pollutants and covers thirteen different kinds of water pollution or indicators including biochemical oxygen demand (BOD), chemical oxygen demand (COD), suspended solids, phosphorous, nitrogen and heavy metals. The heavy metals considered are arsenic (As), cadmium (Cd), mercury (Hg), copper (Cu), chromium (Cr), nickel (Ni), lead (Pb) and zinc (Zn).

On one the hand water flows and emissions that can be traced to economic activities are considered. On the other hand, flows of water and pollutants within nature that are influenced by human activities and often results of diffuse source pollution (indirect emissions by urban runoff, acid rain, or indirect pollution by fertilisers and pesticides from agricultural fields) are also considered and allocated to the industries or household category when it is possible, although they were not yet included in the standard tables proposed by Eurostat's Water Satellite Accounting Task Force in 2001.

Industry classification
The industry breakdown used is based the two-digit-level of NACE rev.1. The NACE 90.001 (sewage removal and treatment) forms a separate category.

Residence (rather than territory) principle
Where recalling the principles, the report indicates that emissions into foreign water bodies by Belgian transport companies should be included, while emissions by foreign transport companies into Belgian water bodies should be excluded.

Ancillary activity
No mention to ancillary activities was found.

Data sources and periodicity
The main data source for the compilation of the **water supply and use** tables (both monetary and physical) is the annual *Structural Business Survey* carried out by the National Statistical Institute. The FPB also used the supply and use table of the national accounts (compiled every 5 years, the latest available referred to 1995). Physical data on water use are distributed across industries on the on the basis of their respective share in the total value of the intermediate consumption of water (assuming therefore that all industries pay the same price).

The report underlines that the administrative simplification project of the current government which includes modification to the Structural Business Survey will make the construction of the NAMEA Water more difficult in the future.

[99] - Eurostat (2001), "Revision of the tables proposed by Eurostat Task Force on Water Satellite Accounting", Background document n°3 discussed at the Workshop on Water Sa tellite Accounting, Luxembourg, 14 – 15 June 2001, 10 p.

Concerning the **emissions of pollutants**, environmental issues being regional competences, the data for Belgium as whole result from the combination of the data of three regional relevant organisations in charge of waste water taxation:

- the Vlaamse Milieumaatschappij (VMM) for Flanders,
- the DGRNE (Directorat Général des Ressources Naturelles et de l'Environnement) for Wallonia,
- the IBGE-BIM (Institut Bruxellois pour la Gestion de l'Environnement - Brussels Instituut voor Milieubeheer) for Brussels-Capital.

For this pilot application, the FPB did not receive the data expected from the IBGE-BM. Water emissions for Brussels-Capital were therefore estimated on the basis of the Flemish data, adjusted by means of demographic and employment data.

Emissions from household and small enterprises (Flanders: annual consumption < 500 m^3 or own abstraction < 5 m^3/hour; Wallonia: enterprises having less than 7 employees) are mostly estimated on the basis of average emissions per unit of water consumption combined with volumes of water consumed. In Wallonia, the service sector, which is included in the domestic sector, was separated using Flemish data for the tertiary sector.

Emissions of manufacturing enterprises are either directly measured or estimated thanks to tax rate by sector established on the basis of sectors emission profiles. In Flanders, most companies choose the sector tax rate system, but the amount of emissions stemming from enterprises of which emissions are measured count for about 80% of total waste water emissions by the manufacturing industry. In Wallonia, data of the DGRNE that are rather aggregated are distributed across industries using the Flemish distribution. In Brussels-Capital, until recently, all emissions were estimated with the emissions profiles approach.

Diffuse water pollution from agriculture is calculated using a mathematical model in Flanders. In Wallonia, since data are lacking, all diffuse water emissions registered that were not identified as originating from households were attributed to agriculture.

Bulgaria

Pilot Study on Statistics on Water Flows and Emissions to Water, Report to Eurostat (grant agreement n°71401.2005.001-2005-289) prepared by Stoyanka Ma stikova and Stefan Tsonev, National statistical institute of Bulgaria, Sofia, 2006, 29 p. (study n°116)

This study aimed at initiating the work on water accounting in Bulgaria and resulted in the establishment of a systematic process that enable to fill in the Eurostat water accounts set of tables finalised in 2003.

The report is split into 6 chapters dealing respectively with the institutional context of water related activities in Bulgaria (1), the data sources (2), methodological notes provided table by table (3), the presentations of the results based on the draft UN physical water accounts tables (4), the difficulties encountered (5), and the benefits that result from the study (6). The completed Eurostat Excel spreadsheets are provided din annex.

Coverage
This first set of water accounts prepared for Bulgaria refers to the year 2004.

They cover both physical and monetary data relating both to water and wastewater related activities and emissions of pollutants to water. the data have bee reported in all the 13 tables of the Eurostat water accounts standard tables have been filled in.

Industry classification
The data on industries were therefore reported according the NACE-based 33-industry breakdown, plus a category for households, of the water accounts standard tables.

Residence (rather than territory) principle
No reference to this principle which has no significant impact for water.

Ancillary activity
Self-supply of water and wastewater treatment (table 4) were estimated using the price by quantity approach and *implicit prices* of water related industries (value of the supply of non-drinking water/volume of non-drinking water). This needs the assumption that water and wastewater related activities have the same cost as the water related industry (NACE 41).

Data sources and periodicity
The compilation of the first water accounts for Bulgaria required many different sources of which the principal were:

- The data about water use at the National statistical institute (NSI).
- The Control information System about Wastewater (CISWW) of the he Executive environment agency (ExEA) that covers the point source of emissions (enterprises discharging more than 99 m^3/per day to water bodies).
- The survey on water supply and wastewater purification services (NACE 41 and NACE 0141).
- Water users' survey (enterprises that discharge more 99 m^3/day).
- The annual reports of non-financial enterprises.
- The Governmental units: central, local and social security (budget by institutional units).
- The households budget survey

In the Bulgarian water accounts, the distribution into NACE category is made according to the enterprises' principal activity (i.e. industries, and not homogeneous branches).

In the chapter 3, methodological information is provided table by table following the structure of the Eurostat questionnaire, from which one can note several things.

For the economic data on the supply of water (table1), it was difficult to distinguish between drinking and non-drinking water. As concerns physical data on water use (table 6), it was assumed that there was no transfer of water between public water supply companies, whereas transfers are common within water self-supply enterprises. There is not estimation regarding the water incorporated in products and the water removed from products (table 9).

As concerns water emissions (tables 11 to 113), two sources were compared: the NSI and the ExEA. Significant discrepancies were observed, because of difference in their objectives and their calculation methods. It was decided to use the NSI as main source and the ExEA as complementary source of information.

Denmark

1997 Water Accounts Related to NAMEA, Report prepared with the European Commissions' financial assistance by Lene Aagaard Pedersen and Christian Tronier, Statistics Denmark, April 2001, 50 p. (study n°40)

http://circa.europa.eu/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/water_accounts/water-action2-grant2004p/_EN_1.0_&a=d

This report results from the 3rd project of Statistics Denmark related to the water accounts that benefited from EU funding, after a feasibility study of water emission accounts for NAMEA and preliminary elements on the implementation of monetary water accounts)[100].

After an introduction to the (physical, monetary and full) NAMEA in Denmark, the report contains two main chapters, one for the physical accounts and the other for the monetary accounts, each chapter dealing successively with the data sources, calculation method and presentation of the results. The

[100] Jørgensen L.A. (1999), *Investigation of NAMEA Water Pollution Data Availability*, European Community Project (DG XVI ERDF file n°97/01/57/009), Statistics Denmark, Apr il 1999, 14 p.;
Bie T., Simonsen B. (1999), *NAMEA with water extraction and use*, European Community Project (DG XVI ERDF file n° 97/01/009), April 1999, 63 p.

appendices present regional data on ground water use, structured alongside the nomenclature of the Geological Survey of Denmark and Greenland (GEUS). A table bridging the GEUS categories to the NACE is given.

Four other chapters deal respectively with sewage payment (estimation of NACE 90 activity of which the payments are collected together with the payments related to the service provided by NACE 41), implicit water prices (water payments excluding/including fixed payments divided by the quantity of water used), the full Danish NAMEA-types water accounts (including a 1-digit NACE level full NAMEA), and inter-temporal analysis (1995 to 1997).

Coverage
Both physical and monetary accounts were compiled for the year 1997. The physical tap water balance is available for 1995-1997.

Concerning water use, the Danish water flow accounts are split into 4 categories of water (ground, surface, sea, and tap water). Concerning the outflows, 3 destinations are taken into accounts: water added to products, discharge to sewer and other discharge (including fields watering and evaporation).

A focus is made on a selection of very water-consuming industries (agriculture, electricity and water supply, collection and distribution of water) as well as households, for which the purposes of water use (production processes, cooling, watering, domestic animals, sanitary purposes, electricity, hot water, etc.) are taken into consideration.

The tap water balance presented included the quantity of tap water used and the following tap water related monetary data: water price, fixed payments, and connection fees.

Net payment of tap water taxes were calculated for the years 1995-1997 for 127 the industries plus households.

Industry classification
The Danish water accounts were based then on the Danish national accounts' 127-industry breakdown plus a category for households.

Residence (rather than territory) principle
Not mentioned.

Ancillary activity
Extraction of water for own account are identified (see above ground, surface and sea water) including households' own drilling of ground water.

Data sources and periodicity
Physical water accounts: the main source of data for water extraction is the Geological Survey of Denmark and Greenland (GEUS). The data available at Statistics Denmark are the second main data source (publication *The Use of Drinking Water*, raw material census, Central Business Register). The Danish Commerce and Companies Agency provides data on extraction of ground water, surface water and sea water from a sample of companies (those with a total extraction of ground water of more than 50.000 m^3) while data from the *Monitoring reports* from South Jutland County, Ribe County, Viborg County and North Jutland County is used for total extraction in these regions. For households' consumption, the percentage distribution comes from a research reports.

Monetary water accounts: the Danish Water Supply Association (DVF) provides detailed data at the level of municipalities (extraction and consumption of water on own site by private households, industry, institutions and losses, fixed and variable water taxes, sewage taxes for private households, and information on investments in new plants). Totals for the category private households, for losses and for the total use of tap water were available in the publication *Forbruget af drikkevand 1997* (Consumption of Drinking Water) by Statistics Denmark. Further information about distribution by industries comes from the reimbursement data on water taxes from companies which are entitled to reimbursement; when the specific industries (or other such as hospitals, schools) do not qualify for reimbursement of their water taxes, employment data is used.

Integrated environmental Economic Accounts for Water and Waste Water – Denmark 1999 – 2003, Report to the DG Environment (grant agreement n° 20 04 714 1007) prepared by Thomas Olsen, Statistics Denmark, December 2005, 90 p. (study n° 130)

http://circa.europa.eu/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/water_accounts/water-action2-grant2004p/_EN_1.0_&a=d

This report results from the 4th Statistics Denmark's project related to the Danish water accounts that benefited from EU funding (see the study n° 40 above). Since, in the Danish water accounting system, the physical accounts of water flows was the most far advance area, the main purpose of the project was to develop the existing monetary water accounts and to establish waste water accounts (both physical and monetary). However, the report presents a full set of water and waste water flow accounts.

The report is divided in 2 parts that are respectively dedicated to water accounts (abstraction and use) and wastewater accounts. Each part is itself divided into 2 sections, one for the physical accounts and the other for the monetary accounts. Each section deals successively with the data sources, the method of compilation and the presentation of the results. The most detailed version of the accounts (13 industries) is provided in the appendices.

Coverage
The Danish set of physical water accounts has 3 dimensions: the type of water by origin (tap water), groundwater and surface water; economic agents (industries plus households) and the regional dimension (municipalities).

The physical water accounts are presented for 2003. The monetary water accounts and both physical and monetary accounts were compiled for the period covering 1999 to 2003.

Industry classification
The Danish water accounts, like the other environmental accounts for the Danish NAMEA, are available at a 130-industry level – compatible with NACE divisions and groups (respectively 2 and 3-digit codes) – plus a category for households.

Residence (rather than territory) principle
Not mentioned.

Ancillary activity
Extraction of water and waste water treatment for own account need to be estimated separately.

Data sources and periodicity
For the **physical water flow accounts**, the 2 main data sources are the Danish water and wastewater association (DANVA) that cover almost all tap water distributed by the water supply industry and the geological survey of Denmark and Greenland (GEUS) that cover most of the own account water abstraction. Statistics Denmark uses both the firms' green accounts and its survey on the purchase of raw materials in the manufacturing industry to estimate the own account water abstraction that is not included in the GEUS.

Data of the DANVA are divided into 3 categories: industries, institutions and households. The latter matches the national accounts' category households. Statistics Denmark distributes the quantity of water of the 2 other categories across industries using VAT statistics (each VAT-paying company is assigned a NACE code; the amounts of taxes reimbursement are translated into quantities of purchased tap water) and employment statistics as well as complementary data (e.g. patients for hospitals and pupils for schools).

For the **physical wastewater accounts**, the quantity of wastewater is estimated from the water use (by industry) that needs to be adjusted. Cooling water (assumed to be free of pollution) and water evaporated or incorporated in products (e.g. agriculture) are deducted whereas waste water resulting from the transformation of food product (e.g. like beets or fish) are be added as well as rain water collected from runways (e.g. dirtied with fuel residues in airports) and sent to wastewater treatment plants.

About agriculture and fish farming, estimates are based on the consultation of Danish institute of agricultural science experts. Concerning manufacturing industry, steam and hot water production and distribution, Statistics Denmark uses both a 1994 study of the Danish Environment protection agency

(EPA) and green accounts from enterprises of the industrial sector. As concerns households, estimates are based on Statistics Denmark's own assumptions. Own discharge of waste water by industries is based on EPA data collected thanks to the compulsory reporting by companies undertaking wastewater treatment for their own account (NACE codes are available for most EPEA data on industries).

Germany

Pilot Study on Statistics on Water Flows and Emissions to Water, Report to Eurostat (grant agreement n° 2000 4120 0010) prepared by Christine Flachmann, Federal Statistics of Germany, November 2002, 32 p. + tables (study n°131)

The project described in this report was carried out by the Federal statistical office of Germany after extensive preliminary work. Within this project, the German statistical office aimed firstly at developing a procedure to estimate water and waste water quantities by industries plus households for years for which no primary statistics were available in Germany. The second objective consisted in produce a time series of water accounts from 1991 onwards.

The report starts a presentation of water flow accounts as part of material and energy flow accounts (chapter 1)[101] and the concepts of water-flow accounts: volume of water and waste water as well as flows of pollutants (chapter 2). The 2 following chapters are dedicated respectively to the data bases (chapter 3) and the calculation methods (chapter 4). The German statistical office planned then (chapter 5) to implement the method developed within this study to update soon the time from 1998 to 2001.

Coverage

The study covered the period from 1991 to 1998. The water accounts were compiled firstly for the years 1991, 1995 and 1998 for which water statistics water available. The other years (1992-1994, 1996 and 1997) were estimated afterwards using coefficients calculated from the first set of accounts (water flows divided by the most appropriate economic variable: production, value added, employment; and water emissions divided by the corresponding amount of wastewater).

The **water flows** taken into account covered water consumption and (waste) water discharge. As concerns water consumption, the study distinguished purchased to another economic unit from direct withdrawal from the environment. Water discharge was split into wastewater sent to the public wastewater network and direct discharge to the environment.

The following variables were considered within this study as regards emission of **pollutants** to water: biological demand of oxygen (BDO), chemical demand of oxygen (CDO), absorbable organic halides (AOX), phosphorus (P), ammonia nitrogen (NH_4-N) and total nitrogen (N).

Industry classification

In the tables provided in annexes, water flows are broken down both by industries and homogeneous branches. In the latter situation, used for the German EA, secondary activities, like e.g. sale of electricity by a firm of which the main activity is not electricity production, are separated to be allocated to the relevant branch (NACE 40 in the example of electricity sale). 1991 data initially compiled with the former industry classification were converted to the NACE rev. 1 based classification at the 4-digit level.

1998 water emissions data were distributed across the most important groups of industries. It was not possible to use the same detailed breakdown as for water flows.

Residence (rather than territory) principle

Not referred to.

[101] - This chapter is based on a paper published earlier: Schoer K., Flachmann C. (2001), "Water-flow accounts as part of material and energy-flow accounts in Germany", *International Journal of Water*, Vol. 1, n°2, pp. 179-1999. This paper presents national-economy aggregates of water-flow accounts for 1960 to 1995 and detailed water flows broken down by homogeneous economic branches for the year 1995.

Ancillary activity
Ancillary activities (including e.g. power generation or transport for own account) are not separated from the principal or secondary activity to which they belong.

Data sources and periodicity
The most important sources for **water consumption** were the results of survey of public water supply and waste water discharge and the survey of water supply and waste water discharges in mining, manufacturing and energy supply by enterprises with 20 or more employees.

The total amount of water purchase by the remaining branches (agriculture, services) and enterprises (with less than 20 employees) was estimated as the difference between the total supply from the public network and the amount of water received by the enterprises covered by the abovementioned water statistics. For mining and manufacturing small enterprises, total amount was distributed using ratios of water consumption per unit of turnover. Concerning construction and services industries the distribution into branches was based on the number of employees.

Agriculture's water consumption was calculated separately. Irrigation was estimated thanks to the data of the Federal association for agricultural irrigation that were available from 1998. Water consumption related to livestock farming was estimated combining ratios on animals' average demand for drinking water provided by the Committee for technology and construction in agriculture and livestock statistics.

Water abstraction by households was estimated on the basis of data on the number of households that were not connected to the public network and average water consumption of the households connected.

As concerns **water discharge**, water indirectly discharged was provided by the statistics of public waste water discharge and direct discharge was estimated and distributed across branches similarly to water consumption.

Evaporation and losses, on the one hand, and water incorporation and water removal, on the other hand, were estimated for a few branches, like agriculture and food industry.

The 2 main statistical sources for **emissions of pollutants to water** were the waste water disposal statistics and the thresholds provided by the General framework waste water administrative regulation. The main emphasis was placed on direct discharge from mining and manufacturing industries. However an attempt was made to estimate their indirect discharge. The report stresses that estimates based on the threshold method, which assumes that enterprises completely exhaust the thresholds allowed, might have led to overestimation direct discharge of mining and manufacturing industries. Direct discharge of households was estimated from the literature.

Spain

Water Satellite Accounts for Spain 1997-1999, Report prepared by Félix Alonso Luengo and Fátima Escribano Morales, Instituto Nacional de Estatistica, Eurostat Working Paper n° 2/2001/B/6, 15 September 2001, 54 p. (study n°100)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp01ewat_pdf/_EN_1.0_&a=d

The principal objective of the Spanish statistical institute (Instituto Nacional de Estatistica - INE) in this project was to compile water accounts in accordance with the NAMEA type framework proposed by Eurostat Task Force on water accounts. The report does not explicitly refers to Eurosat documents, however the set tables presented clearly refers to the proposition of standards tables discussed at the June 2001 NAMEA Workshop dedicated to water satellite accounts[102]. In addition, another objective was to break down some of the monetary and non-monetary tables by Autonomous Communities (NUTS II) in order to quantify the different uses and prices of water at a territorial level below the national one.

[102] - Eurostat (2001), "Revision of the tables proposed by Eurostat Task Force on Water Satellite Accounting", earlier mentionned.

As concerns methodological aspect, the report presents successively the NAMEA framework for water accounts (chapter 4), the classifications (water related products and economic activities) and definitions used (chapter6), and the above mentioned proposition of standards tables (chapter 6). Concerning Spanish data, the report reviews the different statistical sources used by type of economic activity/agent (irrigation system, abstraction/distribution of water, services by public administration and waste water treatment services), but it does give much details on the contents of these sources and the accounts compilation process (e.g. the distribution across industries).

The report ends up by expressing the intention of Spain to compile such water accounts on a regular basis, but stresses the need for time and resources. The tables are given in annexes. The time series which is now available on the INE's website covers the period 1997 to 2001 (the accompanying methodological material provided is based on this report).

Coverage

The water accounts for Spain cover water flows from water abstraction to discharge back to nature. The core of the accounts is confined to water which is produced and channeled through supply networks, to the exclusion of water in a state in which it cannot be used for human activities. The emissions of pollutants are not included (but only the pollution removed by economic activities) nor natural flows of water.

In the 2001 report, the Spanish water accounts cover most of the tables (supply and use of water both in monetary and physical terms, economic accounts and expenditure related to water activities, total abstraction, pollution removed and averages prices) of the above mentioned preliminary set of standard of standards tables[103]. Only the table 8 (water abstraction for drinking water), as well as tables 10 and 11 (water discharged either into the sewage network or into the water bodies) were not included.

Data are gathered for the use and supply of different water related products classified according to the National Classification of Products by Activities 1996: the irrigation services, the distributed water (natural water, drinking water, non-drinking water and water distribution services) and the waste water treatment services.

Almost all data (water related economic activities and physical data on water flows) cover 1997 to 1999. Data on pollution subtracted by economic are give for one year only (the reference year is no indicated). The (subtracted) pollutants recorded are expressed in terms of BOD, COD, heavy metals (total amount), phosphorus, and nitrogen.

Industry classification

Three types of economic units are considered:

- The economic activities relating to water (water distribution and waste water collection and treatment): these activities are irrigation operations; collection, purification and distribution of water; administrative services for water supply and drainage systems; waste water collection and treatment activities.
- The economic activities that are intermediate consumers of water: these are classified according to the National Classification of Economic Activities 1993 (mostly two-letter level of NACE-93). The 25-industry level used by the INE is compatible with the level of details adopted for the preliminary standard tables for most activities (agriculture, mining and quarrying, manufacturing industries, electricity supply, water supply and construction). Only the service industries were grouped together in a unique category, except the public administration and defence and the waste water collection and treatment industry.
- The final consumers: these include households, general government and private non-profit institutions.

Residence (rather than territory) principle

Not mentioned.

[103] - See also Eurostat (2002), *Water Accounts – Results of Pilot Studies*, Theme 2 – Economy and finance, Office for Official Publications of the European Communities, Luxembourg, pp. 201-213.

Ancillary activity
Expenditure (intermediate consumption) engaged in relation to water related activities undertaken for own accounts (ancillary activity) presented separately isolated (table 4). The corresponding physical data concern water abstraction (table 7) and pollution removal (table 12), activities that are undertaken by most industries.

Data sources and periodicity
For **irrigation data**, the main statistical source used is the INE's survey on the use of water in the agricultural sector (*Encuesta sobre el uso del agua en el sector agrario*). This survey provides an estimate of the economic variables and non-monetary data, aggregated in accordance with the accounting rules of the System of National Accounts SEC-95.

This source was complemented by information from the INE's structural survey on agriculture (*Encuesta de estructuras agrarias*)*;* the statistical yearbook of the Ministry of agriculture, and the annual reports of the *Confederaciones Hidrográficas* of the Ministry of the Environment.

The INE's survey on enterprises supplying and treating of water (*encuesta de empresas de suministro y tratamiento del agua*) is the main source for both **abstraction, purification and distribution of water** and **waste water treatment services**.

Concerning **water abstraction and distribution** of water, supplementary information was also found in from the following INE's documents: the survey on the use of water in industry (*encuesta sobre el uso del agua en la industria*), the survey on industrial enterprises (Encuesta de Empresas Industriales), and the survey on the use of water in service activities (*encuesta sobre el uso del agua en servicios*).

In the case of **waste water treatment**, additional information came from the survey on sewage and refuse disposal *(encuesta de saneamiento público*), as well as the survey on enterprises of the service sector (*encuesta de empresas de servicios*), and the above mentioned survey on the use of water in industry. The results were checked tanks to a study on industrial waste water (entitled *Aguas residuals industriales*) carried by the COTEC Foundation (*Fundación par la innovación tecnológica*).

Ancillary activities related to water (water abstraction and removal of pollutants for own use) were estimated using the data from the survey on the use of water in industry and services.

For the **services by public administration,** the annual reports of the Directorate-General of Hydraulic works and Water Quality and the Directorate-General of Rural Policy Yield were used for estimating the main economic and employment variables.

Netherlands

Dutch Waterflow Accounts – With preliminary results for 2003 and 2004, Report prepared by Cor Graveland, Statistics Netherlands, Voorburg, December 2006, 63 p. (study n°117)

Statistics Netherlands introduced its so called NAMWA (national accounting matrix including water accounts) in the late 1990s[104]. The NAMWA consists of 3 different accounts: economic accounts, emissions to water accounts, and water flow balance accounts. The objective of the 2006 report was to develop a new method to produce a water balance that covers supply and use of water in the Dutch economy, since the data sources previously used were not available any longer.

After the introduction and the objective of the study, the report presents the water accounting methods referring to the SEEA 2003 (the SEEAW was not yet available) and the previous Dutch water flow accounts (chapter 3). The following chapters give a long description of the data sources (chapter 4) and the compilation methods (chapter 5) respectively. The resulting water accounts are provided in the chapter 6. The conclusion/recommendation recapitulates the difficulties encountered and the improvement expected.

Coverage
The preliminary estimates presented in this report cover 2003 and 2004.

The report focuses on water flows: extraction and use, as well as wastewater discharge. In the water accounts resulting from this study, the flows of water supply are split into tap water, ground water and surface water. Flows of water dedicated to cooling purposes are singled out.

Industry classification
The water flow accounts tables presented in the report are based on a 30-industry breakdown plus two categories for households (transport and other).

Residence (rather than territory) principle
Not mentioned.

Ancillary activity
The Dutch water accounts include self extracted water by industries.

Data sources and periodicity
For the first Dutch water flow accounts, most data came from the CBS survey on enterprises of 20 employees and more in the extracting & quarrying, manufacturing and electricity production sectors. The water flow accounts compiled for this study were based on the following sources:

- Statistics of the Association of Dutch Water companies (VEWIN) that cover almost all drinking water;
- Environmental annual reports of the Dutch enterprises (EARs);
- National accounts, of which the data come from the survey on industries' output, including water supply industry;
- Central government data (ground water extraction tax);
- Provinces data (rules and methods were significantly different across the 12 provinces);
- Estimations of water consumption by agricultures resulted from modeling of the Dutch Agricultural economic institute (LEI).

As indicated in conclusion, data collection on water was due to change again in Netherlands, because of a new water act that should transfer water competences from provinces to the water boards

[104] - De Haan M., (1997), *Water accounts in the Dutch NAMEA: a "NAMWA" for 1991*, Paper presented et the 4th meeting of the London Group on Natural Resources and Environmental Accounting, in Ottawa, Statistics Netherlands, Voorburg, May 1997, 17 p.

Austria

The Austrian Emission Register (EMREG) as data source for NAMEA Water Emissions – Recommendations for a regular update of emissions of the manufacturing industries and households, Report to Eurostat (grant agreement n°71401.2005 .001-2005.286) prepared by the Umweltbundesamt, May 2007, 34 p. (study n°114)

In 1999, the Austrian statistical office prepared a previous report to Eurostat concerning NAMEA-water, but the data available were then from many different sources. The main objective of this study was to develop a methodology that enables to compile regular water emission accounts for industries using the Austrian emissions register (EMREG) developed under the requirement of the water framework directive (WFD, 2000/60/EC) as principal data source. However, since the data were not available yet, the methodology had to be tested using data from other sources.

After having described the objectives of the study and reminded the shortcomings of the 1999 study (chapters 2 and 3), the report comes to the presentation of the EMREG (chapter 4) and a detailed description of the method of estimation of emissions by industry (chapter 5), including the calculation of net emissions and the grossing up (chapters 6 and 7). The conclusion reminds that different sources and approach need to be implemented for agriculture (modeling), trade and service industries (emissions factors and full-time employment or other additional sources).

Coverage
No water account was compiled.

The EMREG covers *significant* point source emitters in the manufacturing and electricity & hot water supply industries. Sources were defined as *significant* either because their permit load exceeds a certain thresholds because they have reporting obligations.

Industry classification
The test of calculation presented was developed at NACE 2-digit level.

Residence (rather than territory) principle
Not mentioned.

Ancillary activity
The report does not mentions the situation of wastewater treatment for own account.

Data sources and periodicity
Within the Water Information System Austria (WISA) to connect the different databases relating to water, the EMREG was intended to be dedicated to emission data relating to the *significant* point sources. In this database, each producer has to be identified with a NACE code and is link to a unique wastewater treatment plant (WWTP). According the general method, gross emissions of *significant* sources are estimated by multiplying the maximum concentration with the daily maximum volume of water (excluding cooling water) and utilization factors (proportion of days at maximum concentration in a year) established per NACE division.

The report emphasized that it is important to clearly distinguish gross and net emissions. Net emissions of a particular industry equals to the sum of direct emissions of the economic units plus the proportion of emissions of the corresponding WWTP that is reallocated this unit, i.e. the proportion of the pollutant load discharged to the environment by the WWTP of which the economic unit was responsible in the first place.

The report states that the link between the EMREG and the business register is not satisfying preventing to know the proportion of the population covered. However, it is estimated that more than 80% is covered. Since Statistics Austria does not store data on water use by industry, emission estimates should be grossed up using value added statistics.

Sweden

Water Accounts 2000, Report to Eurostat prepared by Brånvall G., Eriksson M., Fränngård P., Statistics Sweden, 37 p. [Published under the title *Water Accounts 2000 – With desegregation to sea basins*, Miljöräkenskapaper n°2003:2, 46 p]. (study n°1 09)

In Sweden, the first set of set of water accounts for NAMEA referred to the year 1995 and included both physical and monetary data[105]. Following the adoption of the European Water Framework Directive (2000/60/EC), it was decided in Sweden to investigate how to split up the water accounts by river basin districts.

The report starts (chapter) with a description of the main flows of water within the Sweden economy. Chapter 2 is dedicated to the presentation of the data sources (physical and monetary data) and different methods for the distribution of the data across the 8 Swedish river basins districts are discussed in chapter 3. The results are presented both for Sweden as a whole (chapter 4) and by basin (chapter 5). The detailed tables announced in the table of content are missing.

Coverage
The water accounts presented in this report refer to the year 2000.

Physical data includes water abstraction, water use, and wastewater discharged. Monetary data covers expenditure for water supply and wastewater treatment.

Industry classification
The data presented in the report are distributed across a 15-industry breakdown based on NACE sections (letter codes).

Residence (rather than territory) principle
Not mentioned.

Ancillary activity
In Sweden water is mostly abstracted for own account. Information on investment and current expenditure related to water abstraction and wastewater treatment for own account is available from the compulsory survey on EPE for manufacturing industry.

Data sources and periodicity
Concerning the water market producers, the **physical data** comes from the Swedish water and wastewater association (Svensnkt Vatten AB) that surveys all municipalities. The survey was interrupted in 19898 and was expected to resume in 2003. Industries (quarrying, manufacturing and electricity & hot water supply) were surveyed in 1995 and 2000. The data used for irrigation came from an old survey of 1985 and were updated thanks to a study carried out in 1991.

Establishments of which the activity needs a permit under the Swedish law (about 2000) are also required to report annually their wastewater emissions to the supervisory agency. Also, the Swedish EPA conducts a special survey on the most water-intensive industries (75 plants). Environmental reports that must be established by the firms of which the plant(s) are designed for more than 2000 persons were also used.

The **monetary data** accounts result from a combination of several sources: municipal accounts, business statistics, national accounts, municipal tariff for water and waste water.

The **distribution across river basin districts** was made using a combination of 4 methods. The first method consists in distributing municipalities (289) thanks to geographical information (199 in one basin only and 165 split into 2 basins using the population shares). The second method concerns drainage basins (114) that can easily attributed to river basins. The third method relies on geographical information, like in the real estate register. The fourth method is based on distribution keys, e.g. water related expenditure of manufacturing industries was distributed with the help of physical statistics on wastewater.

[105] - Brånvall G., Eriksson M., Johansson U, Svensson P. (1999), *Water Accounts – Physical and monetary data connected to abstraction, use and discharge of water in the Swedish NAMEA*, Report to Eurostat, Statistics Sweden, December 1999, 41 p.

Norway

"Work related to further environmental expenditure accounts for water" Chapter 6 in Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Report to Eurostat (grant agreement n° 200241200013) prepared by Julie Hass and Knut Sørensen (ed.), Statistics Norway, May 2006, pp. 38-46. (study n° 33c)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/norway_2005_noreeapdf/_EN_1.0_&a=d

This chapter starts by acknowledging that Statistics Norway was not able to report any data (physical or monetary) in the 2003 Eurostat set of water accounts tables. Also, it was found out that national accounts included then only local government water production (NACE 41), i.e. excluded privately owned waterworks.

This chapter provides a description of the structure of the drinking water industry in Norway based on the data available. The second section briefly refers to the international reporting: SEEA-water tables (since Eurostat took part in their elaboration) and OECD/Eurostat questionnaire in inland waters.

Coverage
This study did no aim at compiling water accounts. The only data presented relate to the structure of the drinking water industry (number of waterworks and individuals supplied, and income fees by type of ownership: municipal, inter-municipal and private supplier) over the period 1998-2004.

Industry classification
No data distributed by industries are provided in this study.

Residence (rather than territory) principle
Not mentioned.

Ancillary activity
Own account water supply was not in the scope of the study

Data sources and periodicity
The main data source used for this study on the structure of water supply industry was the Norwegian Institute of Public Health that collects the data and maintains the register relating to all waterworks supplying 20 households or more.

In Norway, municipalities and publicly owned enterprises are request to report their accounts to statistics Norway using an electronic reporting system (KOSTRA). Now, KOSTRA is able to provide most of the monetary information relating to the production/purifying of water and the distribution of water: salaries and social contributions, purchase of material, transfer, financing expenses, income from sales and fees.

Statistics on Environmental Accounts: Water Use by Industries, Report to Eurostat (Agreement No. ESTAT 200471401002) by Jørn Kristian Undelstvedt, Anne Vedø and Håkon Skullerud, Statistics Norway, May 2006, 31 p. (study n° 41)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/water_accounts/accounts_norwaypdf/_EN_1.0_&a=d

This project is a part of Statistics Norway's work on the quantitative description of water stocks and flows in Norway; the Division of Environmental statistics has a long-term goal of producing data for water which will also include water accounts. However, the Norwegian water statistics were not sufficiently developed to enable Statistics Norway reporting to Eurostat standard tables. Data was particularly lacking as regards water use by the manufacturing industries (a previous pilot collection of data had been carried out in 1999, but, according the authors, the data quality was not sufficiently assessed nor was the data revised in satisfactory manner).

Therefore, the general purpose of this report was twofold: firstly, the development of a sample survey methodology that could be used on a regular basis and, secondly, the development of calculation

methods to be used for the years in between surveys, both aiming at establishing annual water use statistics by industries. After a brief presentation of the background (chapter 1) of the project, the report starts (charter 2) with the description of the sample survey conducted in 2004 (the relevant part of the questionnaire is provided in annex). It continues (chapter 3) with the method developed to define water-use coefficients for the different manufacturing industries, before presenting the statistical results of the survey (chapter 4). In the conclusion (chapter 5) the report ends up with the perspective and needs for future work.

Coverage
The 2006 Norwegian study on water accounts focuses on industries: mining & quarrying, and manufacturing industries (NACE 10-37). (The authors indicate that a parallel study had been carried out covering trade and services activities, NACE 50-99).

The data used for this study a survey referred the year 2003.

As concerns water abstraction, the flows are divided into *public supply* and *self supply* (abstracted for own accounts). For public supply, the source is considered to be fresh water, both surface water and ground water, but no information on the distribution between the two sources was available then. For self supply water, it is specified whether the water source is surface water, ground water or marine and brackish water.

The different water uses considered are: sanitary water, processing-water (chemically or physically contaminated water from processes, e.g. in the paper industry), cooling water, water in products (e.g. soft drinks or ready-cooked meals) and others use of water. The Norwegian data also takes leakages and evaporation into account.

The report does not cover the emissions pollutants to water.

Industry classification
The industries investigated (mining, quarrying and manufacturing) are classified according NACE rev.1 two-digit-level, i.e. a higher level of detail compared to the 2003 version of the Eurostat's standard tables.

Residence (rather than territory) principle
Not mentioned.

Ancillary activity
As indicated above, the self supply water abstraction by industries is isolated.

Data sources and periodicity
The data presented in the report come from the above mentioned survey. The sample size was 1 800 establishments and was stratified in 6 groups as regards the number of employees.

Two approaches were tested concerning the calculation of sanitary water use coefficients (amount of sanitary water use per employee). The average coefficient approach led to overestimate the total amount of water use compared to the industry-specific-coefficient approach (ratios by NACE 2-digit industries).

Statistics Norway also engaged the development of a set of industry-specific coefficients dedicated to enable to distribute the total amount of water use industry by industry across the different uses.

The report concluded that for 2004 and subsequent years, the survey should be done yearly but could be simplified: it was necessary only to collect four variables on water abstraction and supply in the manufacturing industries. These variables would then be extrapolated using factors with 1999 and 2003 as reference years.

For the years 2004 and 2005, questions on water abstraction has been included in the yearly sample survey on environmental protection expenditure.

5.2.7 Waste

Denmark

Waste Accounts for Denmark 1999, Report to Eurostat (Grant agreement n°. 200241200 012) prepared by Ole Gravgård Pedersen, Statistics Denmark, March 2004, 66 p. (study n°39)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/water_accounts/accounts_1999pdf/_EN_1.0_&a=d

The objective of the report was to show how to produce NAMEA-type waste accounts for Denmark. Since the existing Danish waste statistics do not provide detailed information on the industries responsible, additional information need to be used for the distribution of the data across industries.

The report starts up with the existing Danish waste statistics (chapter 2). The reports follows up with the material flows and waste generation calculation method (conversion of monetary supply and use table by product into physical quantity) that is used later for the distribution of waste data across industries (chapter 3), before presenting PIOT for each of the nine general waste fractions identified in the Danish waste statistics (chapter 4). The waste generation accounts by industries plus households are presented for the year 1999 (chapter 5). The report also introduces a very preliminary PIOT for Denmark, aiming at bridging NAMEA and MFA approaches (chapter 6). The least chapter is dedicated to brief presentation of the waste sector, including a table of the payment by industries plus households, as well as by final demand categories, to the Danish waste sector (collection and treatment).

In the Danish approach, the construction of the PIOT by waste fraction or material serves to calculate waste generation by industries plus households (total input minus total output equals material surplus that is, under specific conditions, assumed to represents waste generation). The resulting material surplus is compared (if necessary adjusted) to the total of the corresponding fraction in the waste statistics. When this method was not applicable, the total amount of the waste fraction concerned was split into industries plus households on the basis of the distribution of corresponding waste PIOT.

Environmental data coverage

The report deals with waste generation and does not cover waste treatment. Flows related to recycling are included in the present accounts only to the extent that inter-industry recycling is involved, i.e. production of recycling materials in one industry and the use in one or more industries different from the producer. Flows related to Internal recycling of waste are not visible.

The PIOT presented in chapter 4 cover each of the following waste fraction or materials: paper and cardboard, glass, plastic, food products, iron and metal products, rubber, wood products, lubricating oil, and miscellaneous products.

The waste generation accounts provided in chapter 5 include both the 9 above mentioned fractions and the 9 following fractions, that are also found in the Danish waste statistics: cleansing agents, detergents; organic chemicals; inorganic chemicals; other oil and chemical waste; other hazardous waste, clinical waste, CFC's; concrete, cement, bricks, asbestos and other construction waste; slag, flying ash; sludge; garden waste, soil.

The report was developed from 1999, since it was then the latest year for which necessary national accounts data were available. The data on the payment by industries and households to the waste industry is provided for the years 1999 to 2000.

Industry classification

The classification of industries in the product balances used to calculate the PIOT is based on the 130-industry/product level of detailed of the Danish national accounts. Thus, the PIOT tables were constructed for 130 industries.

However, the above mentioned PIOT by waste fraction are presented for 8 aggregated groups of NACE –based industries (agriculture, fishing and quarrying; manufacturing; electricity, gas and water supply; construction; trade; transport; financial services and public services) because of the lake of reliability at more detailed level. The material balances resulting from each of these PIOT (total input

minus total output equals material surplus) are nonetheless provided at a 26-industry level (based on the NACE) plus households.

Therefore the NAMEA-type waste generation accounts are presented for the above mentioned 26-industry breakdown plus households and 18 waste fractions. The same industry break down is used both for the overall PIOT and the table on the payments to the waste industry (NACE 90).

Residence (rather than territory) principle
The imported material is considered as national input and the exported material is considered as output.

Ancillary activity
Not relevant as far as waste treatment activities are not covered by the report.

Data sources and periodicity
The product balances (supply and use tables) of the Danish national accounts are established in monetary terms (1000 DKK) on a yearly basis for approximately 3 000 products. They are converted into PIOT by product on the basis of various additional information sources: production statistics, foreign trade statistics, specific coefficients etc.

The Danish Information System for Waste and Recycling (ISAG) as implemented in 1993. The ISAG, which is managed by the Danish environmental protection agency (EPA), relies on registrations and information from the Danish waste industry. The EPA's annual publication untitled Waste Statistics (*Affaldsstatistik*) deals both with waste generation and waste treatment: reuse, recycling, incineration and deposal. Now the ISAG is based on a classification of 9 general types of waste, subdivided into 37 waste categories and 84 types of waste, that are generated by 6 different sectors (households, institutions, manufacturing industries, construction, sewage treatment plants and other). The ISAG also considers 7 types of waste treatment.

In addition to the ISAG, statistics Denmark uses the EPA waste generation statistics on slag, soil from sugar beet manufacturing and sludge, as well as net exports of metallic scrap in order to get a full coverage of the waste generation (including net imports) in Denmark.

Netherlands

Waste Accounts in a NAMEA framework, Report prepared by Roel Delahaye, Statistics Netherlands, Voorburg, March 2007, 25 p. (study n°118)

http://www.cbs.nl/NR/rdonlyres/B52A8B80-5DA6-45ED-B0D7-F62EE56C627C/0/2007wasteaccountsinanameaframework.pdf

The objective of this study is to compile physical supply and use tables for solid waste residuals for the year 2003 in conformity with the recent European Waste Statistics Regulation (n° 2150/2002) The survey presents practical solutions for converting waste registration data into accounting data.

Chapter 1 gives a short introduction of the Dutch environmental accounts and discusses relevant accounting principles. In chapter 2 the state of the current Dutch waste accounts is discussed in more detail and shortcomings are presented. Chapter 3 discusses developments on waste account frameworks suggested by Eurostat. Chapter 4 provides an overview of the data requirements of the extended waste accounts. Chapter 5 gives an overview of the usefulness of the available data sources for the waste accounts. In chapter 6 the available data are presented through physical supply and use tables for 2003. In chapter 7, possible future developments are discussed. Chapter 8 provides definitions (derived from EIONET).

Environmental data coverage
About 75 different waste types, divided into hazardous and non-hazardous waste, are distinguished. The categorization of waste types is according to the 2002 European waste regulation. Main categories include: Compound waste (01), Chemical preparation waste (02), Other chemical waste (03), Health care and biological wastes (05), Metallic wastes (06), Non-metallic waste (07), Discarded equipment (08), Animal and vegetable wastes (09), Mixed ordinary waste (10), Common sludge (11), Mineral waste (12), Solidified, stabilized and vitrified wastes (13).

Industry classification

On the basis of this survey, the NAMEA waste accounts have been extended from about 40 to 58 NACE categories plus Households (see Annex 2):

Residence (rather than territory) principle
The residence concept is applied. This creates problems because data comes from inventories in which all emissions within the boundary of a country are considered (i.e. whether by residents or non-residents). To be in line with national account principles, waste emissions by residents living on the national territory and in the rest of the world are thus added up while emissions by non-residents in the Netherlands are deducted.

Ancillary activity
No reference to the ancillary activity is made.

Data sources and periodicity
Physical and monetary data are available from different sources. One major source is Statistics Netherlands, another one SenterNovem (AOO, 2004a), an agency of the Dutch Ministry of Economic Affairs for implementing policies on innovation, energy, climate and environment and spatial planning which manages a database that contains physical data on waste flows from different sources from 2002 onwards. A third source is the WAR (Werkgroep Afvalregistratie – i.e. working party on waste registration, AOO (2004b)).

Austria

NAMEA – Waste Time Series 1996-2002, Report to Eurostat (grant agreement n° 2002717000 10), Brigitte Karigl (project manager), Umweltbundesamt, July 2004, 44p. (study n° 38)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/water_accounts/200271700010_wasteatpdf/_EN_1.0_&a=d2.1.2.

The main objective of the report of the Austrian federal environment agency (*Umweltbundesamt*) was the preparation of a time series of waste accounts for the Austrian NAMEA. Concerning the methodology, only little information is provided and the report refers to the previous NAMEA-waste study prepared by the Austrian statistical office[106], indicating that only some slight modifications were made due to a deterioration of the energy balance in Austria.

After a brief introduction on NAMEA in general, the chapter 2 untitled “Calculation method” deals in fact with the connection between the former and current Austrian classification of economic activities necessary to establish the time series. The next chapter gives a brief description of the economic data (no input output tables are available) taken into account (chapter 3) and the context of the Austrian waste network (chapter 4). The presentation of “The Austrian NAMEA waste in the European context” (chapter 5) is directly extracted from a Eurostat paper presented in 2003[107], especially on the contribution of the EU regulation on waste statistics for the development of waste accounts for NAMEA. The report also briefly deals with the possible use of NAMEA-waste data, mentioning a Workshop recently organised in Austria (chapter 6). Finally, in a presentation of the Austrian federal waste management plan, the report lists of the statistical sources available. (The tables of data announced in annexes were messing).

Environmental data coverage
The previous report in 1998 was an attempt to allocate physical data on both hazardous and non-hazardous wastes to industries. The focus was on 1994 for hazardous waste, but the data sources used covered a range of years from 1991 to 1996 for non hazardous waste. Two different data sources were used. About hazardous waste, data on primary waste only came from the Provincial

[106] - Wolf M.E., *NAMEA Abfall 1994*, Projektbericht an die Kommission der Europäischen Gemeinschaften, Österreichisches Statistisches Zentralamt, Dezember 1998, 11 p.
[107] - Eurostat (2003), *Waste Statistics and the development of waste accounts for NAMEA*, Paper prepared by Jean-Louis Pasquier, Presented at the Meeting of the Working Group "Statistics of the Environment" – Sub-Group "Waste", Joint Eurostat/EFTA group, Luxembourg, 9 and 10 April 2003, 16 p.

Governments to which they were reported. Data (often estimates) for all types of waste came from the Government waste Plans (BAWP) for the years from 1993 to 1996 (covering data for 1991 to 1996).

The time series presented in the 2004 report covers the generation of five different types of hazardous waste: halogenated solvents, non halogenated solvents, paints and varnishes, waste oil and other hazardous waste. Non hazardous waste accounts are not available for the whole time series. Firstly, non hazardous data are rarely available for the industry breakdown adopted for the Austrian NAMEA. Secondly the years of reference are often a combination of data from several years and no estimates could reasonably be undertaken for the interim years.

The time series announced in the report covers the period 1996 - 2002.

Industry classification
According to the presentation made in chapter 2, the Austrian waste accounts are structured on 60-industry breakdown compatible with NACE Rev. 1 plus a category for households.

Residence (rather than territory) principle
The report does not refer to this principle.

Ancillary activity
Since the Austrian waste accounts did cover then waste treatment, but waste generation only, no reference to the ancillary activity was necessary.

Data sources and periodicity
The main data source is the Austrian Waste Data Network that was established at the Austrian Federal Environment Agency for the purpose of monitoring hazardous wastes. It is based on:

- The obligation to notify their production of hazardous wastes by the relevant producers,
- The requirement of an authorisation for waste collection and treatment operators,
- The obligation to submit consignment notes to the relevant province governorate when handing over hazardous wastes.

The report list also a number of other potential sources that were available then:

- Surveys conducted both by the federal and Land governments, as well as by chamber of commerce and associations;
- Specific studies;
- Waste collection and treatment operators;
- Administrative documents;
- National reporting obligations (e.g. concerning waste landfill sites).

If it seems possible for Austria to update its hazardous waste accounts annually, non hazardous waste accounts could best be produced for every five year.

Pilot study on waste accounts, report to Eurostat (grant agreement n° 71401.2005 .001-2005-286) prepared by Milla Peltoniemi and Brigitte Karigl, Umweltbundesamt, Vienna, 2007, 112 p. (study n° 115)

The main objective of this report was to assess and improve the existing methodology for the compilation of NAMEA-type waste accounts, taking into account the requirements of the Waste Statistics Regulation (2150/2002/EC) in order to maximize the synergies between waste accounts and waste statistics.

The report starts with an introduction of the project objectives, followed by a review of the developments in NAMEA at European and Austrian levels (which includes a presentation of the possible synergies between the requirements from the Waste Regulation and the establishment of NAMEA-type Waste accounts, based on assumptions by Pasquier, 2003). The report then reviews possible and future data sources for Austria and makes an assessment of experience gained by Austria in NAMEA-type waste accounts, on the basis of which it has been tried to develop a new, improved structure of NAMEA tables. The next 2 sections of the report focus on the methodological

approach adopted for the updated time series on waste generation by industries and households compiled in a NAMEA-type format up to 2003-2004 and the physical pilot accounts of waste treatment by industry compiled for 2004 which are presented in annex to the report through a set of graphics and some tables. The report then comes back in more detail to the synergies between waste statistics according to the Waste Regulation and NAMEA Waste accounts before ending with considerations about the use of NAMEA Waste accounts illustrated through graphics of various types (pie charts, bar graphs etc.) and analysis of several cases. The results of the project are presented in Annex.

Environmental data coverage
Preliminary waste NAMEA-waste accounts have been compiled for 2004, covering both non-hazardous and hazardous waste.

Industry classification
The industry breakdown adopted for this study comes from the regulation on waste statistics (Annex 1, section 8).

Residence (rather than territory) principle
The report does not refer to this principle.

Ancillary activity
The report does not refer to this principle

Data sources and periodicity
Statistics Austria compiles, on behalf of the Federal Ministry of Agriculture, Forestry, Environment and Water Management, annually integrated NAMEA tables including several environmental variables inclusive of waste data. The NAMEA waste tables rely on data provided in the context of the Waste Statistics Regulation (2150/2002/EC), in particular for the provision of data on both waste generation (categorized by economical activity) and on waste recovery and disposal (categorized by recovery and disposal operation).

In future, an electronic data transfer and management system (EDM) for administrative data will be set up that will include all waste collectors and conditioners. Moreover, a new ordinance is expected to come into force in 2007 which will require that waste balances be reported annually starting in 2009, with the first balance period 2008.

Finland

Correcting coefficients for register-based data on waste, water and emissions to air by branches of industry, report to Eurostat, Jukka Muukkonen, Statistics Finland, 27.08.2004, 9 p.
(study n°28)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/coefficients_registerfip/_EN_1.0_&a=d

The objective of this study was to improve the use of data on solid wastes, as well as on waste water and emissions to air, in the Finnish frameworks of material flow accounting and balances, physical input-output balances and the physical part of the NAMEA[108]. The method adopted by statistics Finland was to investigate whether is was possible to calculate *correcting coefficients* that would be applied to register-based data on waste (as well as waste water and emissions to air) in order to enhance the data to represent the total amounts by branches of industry (NACE). The study focused on economic branches that produce significant amount of solid waste.

The report gives first a presentation of the data sources (environmental and economic) before providing an explanation on the methodological approach adopted. The results are then presented and in the conclusion the author comes down favour of the continuation of this work instead of additional waste data collection for industry, even though the combination of register-based

[108] - Another Finnish report, which is classified under the chapter MFA, deals with waste accounts broken down by industries: *Waste flows in frameworks of physical input -output tables and material flow accounting*, Ilmo Mäenpää, Jukka Muukkonen, and Mika Pirneskoski, Thule Institute / Statistics Finland, 28 February 2003, 29 p. (study n°55).

environmental data and economic variables did not give direct correction coefficients that could be applied as such to existing data on waste generation.

Environmental data coverage
The basic physical data in this study is the total amount of generated waste (fresh weight tonnes) for the year 2000. No division is made across the types of waste or between non-hazardous and hazardous waste.

Industry classification
The investigation undertaken in this study is based on the NACE at the two-digit level.

The study focuses on industries (other mining and quarrying; manufacturing industries; electricity, gas and steam supply). Concerning the other industries: agriculture, forestry and fishing (NACE 01-05); mining of metal ores (NACE 13), water supply (NCE 41), construction (NACE 45), and sewage, refuse disposal (ACE 90), the author states that corrections of waste data based on economic statistics would not bring remarkable additional information, since waste statistics are of rather good quality for them.

Residence (rather than territory) principle
The report does not refer to this principle.

Ancillary activity
The report does not refer to this principle.

Data sources and periodicity
The environmental data come from the register of Finnish Regional Environment Centers and Environment Institute (environmental administration). Concerning waste, the VAHTI register covers waste generation, transportation, collection, disposal, recovery, storage and delivery for disposal or recovery elsewhere. And when the report was prepared, it took into account data from plants whose environmental permit is granted by a regional environment centre or an environmental permit authority. Smaller plants (less tan 5 000 tons of non hazardous waste per year) of which the permits are granted by municipal environment protection officials were no included, but planned to be added in the future.

The economic data comes from the structural business statistics and business register.

In the VAHTI register of the environmental administrations the reporting unit is *customer*, which may consist of several establishments, whereas the above economic data are registered by establishment. The connection between VAHTI customers and NACE codes were clear for 57% of the establishments within the relevant industries (from NACE 14 to NACE 37, plus NACE 40).

5.2.8 Chemicals

Sweden

Including chemical products in environmental accounts - The magnitude of chemical product use in different industries in Sweden 1996-1999, Viveka Palm and Kristina Jonsson, Statistics Sweden, Eurostat Working Paper No. 2/2001/B/7, 22 October 2001, 34 p. (Study n°101)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp01scem_pdf/_EN_1.0_&a=d

This Working Paper describes the experience with the use of dangerous chemical products in environmental accounts data sets undertaken by Statistics Sweden.

The report is in two parts: an explanation of methodological issues and the presentation of the results of the NAMEA chemical of Sweden. The first part defines the indicators used for the presentation of the results, describes the method used to separate fossil fuel products and the method used for the allocation of Product Register data to industries.

Environmental data covered
The report covers chemical products included in the Product Register for the years 1996 to 1999.

The declaration requirements of the register are based on the customs tariff codes, so they apply to all chemical products (substances and preparations). *However, it exempts products that come under legislation on foodstuffs and medical products from mandatory declaration*. The duty to declare products to the product registers does not apply to cosmetic products.

These products are aggregated for the presentation of the result. Two different aggregation methods are suggested and indicators are defined:

- The broadest method starts with labelling of inherent properties (LIP) in chemical products, based on the EU-classification of substances and preparations. It sorts out those chemical products that are labelled as very toxic (T+), toxic (T), corrosive (C), harmful (Xn) or irritant (Xi).
- The second method is based on the risk labelling of products (CMSR), according to the risk for chronic diseases. The Risk-phrases that were sought for R40 and R46 (mutagenic risks), R42 and R43 (sensitizing risks), R45, R49 and R340 (cancer risks) and R60 to R63 (reprotoxic risks).

The chemical products have been divided into two groups, the fossil fuels and the rest. This is due to the fact that the fossil fuels are so dominating that other chemical products almost disappear when the two groups are shown together.

Blast furnace gas (by-product of the reduction process for iron, consumed as a fuel in heat production for dwellings) is not included since it is not reported regularly.

Industry classification and households
The industries are classified according to the NACE two digit-level. Some two-digit level categories are aggregated. The NACE 24 (Manufacture of chemicals and chemical product) is breakdowned into six three-digit level categories. There are a total of 36 categories. An “export” category is added for the other chemical than fossil fuel data and a “private consumption” category is added for the fossil fuel data.

Residence (rather than territory) principle:
Import of chemical product is included in each sectoral data.

Export of chemical products is not accounted for by industries, but is included as an own sector (at the same level as NACE category) in the end of the tables.

Ancillary activity
Nothing is mentioned about ancillary activities.

Data source and periodicity:
Key data sources are the Swedish Chemical Product Register and the energy accounts that are part of the Swedish environmental accounts. The latter gives a more detailed picture on which actors do use the fossil fuels, based on other statistical sources than the Product register.

The companies that report to the register are mainly importers or producers of chemical products. The register contains chemical information of the registered products as well as quantities used. Earlier, the register has only been available for one year at a time. Now, a database with all years has been constructed, so that it is possible to work with time series.

Chemical product and substance indicators in the SEEA - health and environment, Report to Eurostat prepared by Viveka Palm, Statistics Sweden, 2003, 38 p. (Study n°26)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/chempbtrepfinaldraftpdf/_EN_1.0_&a=d

This report presents the chemical product use as a part of the material flow information in the System of Economic and Environmental Accounts (SEEA) of Sweden. It is a follow up a previous report (study n°101 above). The aim of the present study is to c omplement the data for the two previously defined indicators (lip and CSMR, cf. below) for the year 2000, to study the possibilities of introducing a new

indicator PBT linking the use of environmentally hazardous substances (as a complement to the use of chemical products) to industries through the Persistence/Bio accumulating/Toxic (PBT) criteria, the introduction of environmental criteria in the risk labelled indicator and finally the calculation of intensities (amount of chemical products per value added or by production volume, per industry).

This report presents first the three indicators used for the result restitution. The data obtained for the indicators are then presented by industries for the years 1996 to 2000. The environmental data are finally combined to economic data to calculate the intensities (chemical products per value added or by production volume, per industry of non-fossil chemical products) for the two first indicators for the year 1996 to 1999. The report ends up with a discussion on PBT (cf. below) dominating substances.

The report mentions that the Swedish data on intensities could be used as an approximation for chemical use when other data is lacking for other nations but the usefulness of the data in this respect has yet to be tested.

The references list includes, as methodological documents, previous report done by Sweden on NAMEA chemical.

Environmental data covered:
The report covers chemical products. The chemical products considered are the one included in the Products Register of Sweden, which means:

- The declaration requirements are based on the customs tariff codes, they apply to all chemical products (substances and preparations).
- They exempt products that come under legislation on foodstuffs and medical products from mandatory declaration.
- The duty to declare products to the product register does not apply to cosmetic products.

For the two first indicators, the chemical products have been divided into two groups, the fossil fuels and the rest. Some of the chemicals in the 'non-fossil' grouping will be of fossil origin, but not used for fuelling purposes. The report presents the non-fuel part of the search only.

The report states that since a substance per substance approach would be overwhelming due to the number of products involved, aggregation methods based on indicators are used:

The indicators based on European labelling standards are the following.

- Labelled inherent properties (lip) of chemical products:
- It focuses on direct inherent properties, sorts out those chemical products that are labelled as very toxic (T+), toxic (T), corrosive (C), harmful (Xn) or irritant (Xi), according to Directive 67/548/EC (Classification and labelling of dangerous substances). The label Dangerous for the environment (N) has also been included in the aggregation.
- Risk for long term effect, CSMR or CSMRE (cancer, sensitising, mutagenic, reprotoxic, environmental criteria):
- It focuses on chemical products that are labelled as being able to cause cancer, sensitisation either by inhalation or by skin contact, as well as those with documented mutagenic and reproductive hazardous properties. It is mentioned that the directive 67/548/EC contains many more risk-phrases than those chosen for the second aggregation method.
- Persistant, bioaccumulating and toxic substances (PBT).
- It is a new aggregation method based on inherent properties of substances rather than on chemical products. For this project a list of 'possible' PBT-substances has been used (see annex 1).

Industry classification and households:
The report considers only the industry, they are classified according to the NACE two digit level, some two digit level categories are aggregated. The NACE 24 (Manufacture of chemicals and chemical product) is broken down into six 3-digit level categories. There are a total of 36 categories

Residence (rather than territory) principle
Import of chemical products is included in each sectoral data.

For the LIP indicator, the report mentioned that the direct export of chemical products is not included. A separate category at the same level as NACE categories or export of chemical products is added for the CSMR indicator data.

Ancillary activity:
Nothing is mentioned about possible ancillary activities.

Data source and periodicity:
The environmental data used come from the Product Register of Sweden. The register was constructed mainly as a tool for the superintendence of importing and manufacturing companies, but it also contains chemical information on the registered products as well as quantities used.

Since the environmental accounts give a more detailed picture on which actors do use the fossil fuels, based on fuel statistics, that information complements the Product Register.

Chemical product indicators by industry – fossil fuels, cement and other chemical products classified as hazardous to health or environment 1996-2001, Report to Eurosta prepared by Viveka Palm and Annica Carlsson, Statistics Sweden, 41 p. (Study n°27)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/indicators_040328sepdf/_EN_1.0_&a=d

The study is based on two former studies (studies n° 101 and 26 above) on the introduction of chemical use into national environmental account, in which the methodology of chemical indicators was developed. Its aim is to further develop that methodology by also considering the chemicals field of application: it wants to identify not only the amount of chemicals that are used in the production process but in particular the amount of chemicals that are included in products which means the amounts that follow the goods after production. The second aim of this study is to express the information as intensities, i.e. relate the use of chemicals to the value added of different industries. The intensities provide an opportunity to use the results as basis for chemical indicators in other environmental system analyses studies, such as environmentally extended input-output analyses and LCAs.

The report first get onto methodology issues: the chemical indicators used are defined and the intensities calculation is explained. The chemical indicator data obtained are then presented by industries. Chemicals used for synthesis are subtracted from these data. Assuming that chemicals used for synthesis are not included in the final product but are consumed during the production process, it generates a measure of the quantity of chemical products that will end up in final products. The report follows up with the identification of the three quantitatively largest products used per industry and ends up with the presentation of the intensity data (not including chemicals that are used for synthesis) per industry categories.

Environmental data covered:
The chemicals covered are the chemicals registered in the Product Register of Sweden which contains data about over 60 0000 [600 000?] different chemical products. The data registered has been reported from about 2500 companies. The data presented cover the period 1996-2001

For result presentation, two kinds of system for classification of hazardous chemical products are used on the data and indicators are defined on this basis:

- The first one focuses on direct inherent properties, sorts out those chemical products that are labelled as very toxic (T+), toxic (T), corrosive (C), harmful (Xn) irritant (Xi) or Dangerous for the environment (N)
- The second one focuses on the chemical products that are labelled with risk phrases for cancerogenic, sensitisation (allergy) either by inhalation or by skin contact, mutagenic and reproductive toxicity properties and with risks-phrases environmental damage.

Fossil fuel products and other chemical product are both covered by the study but presented separately.

The labelled 'N' being new and the company not being obligated to report R50-59 products, the labelling is not reliable at the moment and data of products labelled 'N' or 'R50-59' are presented separately.

Industry classification and households:
The classification of industries is based on the Swedish Standard Industrial Classification (SNI), which is harmonized with NACE. They are classified according to the two-digit level with some aggregation of several two-digit categories and the extra breakdowns into 4 three-digit level for NACE 24 (manufacture of chemicals and chemical products). It results in a total of 34 categories plus an export and a private consumption category.

Residence (rather than territory) principle
Import of chemical product is included in each sectoral data.

Export of chemical products is not accounted for by industries, but is included as an own sector (at the same level as NACE category) in the end of the tables.

Ancillary activity:
Nothing is mentioned about ancillary activities.

Data source and periodicity:
The results presented are based on data from the Product Register at the National Chemical Inspectorate in Sweden and from energy statistics.

In the Product Register each manufacturer of chemical products or importer that exceeds the amount of 100 kilo annually is obligated to report. Use, trade description and classification of harm for health and environment are some of the parameters that have to be reported.

A 1.1 Natural resources accounts

Forest accounts

Denmark

Danish Forest Accounts 1990-2001, Report to the GD Environment and Eurostat (grant agreement n° 200241200006) prepared by Ismir Mulalic, Statistics Denmark, March 2004, 48 p. (Study n°29)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/accounts_2001pdf/_EN_1.0_&a=d

This study presents the possibility of building up a system for annual forest accounts. A carbon balance for standing timber is also presented as well as the changes in the stored carbon in the forest ecosystem. In addition forests and other wooded land with protective functions and the recreational functions of Danish forests are examined.

After the introduction, section 2 starts with a presentation of the Danish forest area, looking at the development in the forest area and showing a physical balance sheet for forested area in Denmark. Section 3 presents physical and monetary accounts for the volume of standing timber and in section 4 total forest value for Denmark is calculated. Section 5 shows accounts for carbon binding presenting the carbon storage in standing timber. In section 6, accounts for recreational areas of Danish forests are presented. Section 7 presents accounts for forest protective function looking at the relationship between forests and groundwater protection and protection from erosion. Section 8 presents the most important results following the IEEAF tables for 1999 which are to be reported to Eurostat on a regular basis. In the last section data availability is checked as well as the possibility to produce the tables presented in this report on annual basis.

Coverage
This report covers the period 1990-2001 and studies the forest land, standing timber, total forest value, carbon binding, recreational areas of forests, forests and protective functions. IEEAF tables presented refer to the year 1999.

Classifications
The following industries are represented in this report (following NACE classification)

Forestry and logging	02	02
Manufacturing of wood products	20	20.1, 20.2, 20.3, 20.4, 20.5
Manufacturing of pulp and paper		21.11, 21.12, 21.2
Printing	22	22.1, 22.2

The following products are represented (following CPA classification)

Standing timber	02.01.5
Wood in the rough	02.01.11 to 13
Saw logs	02.01.14
Fuel wood	02.01.15
Pulp wood	
Wood and wood products	20.1 to 20.5 (except20.4) 20.52
Paper pulp	21.11
Paper	21.12 (except 21.12.6) 21.2
Wood waste as a product	20.10.4
Paper waste as a product	21.12.6
Other wood products	

Data sources
The most important sources used in this report are:

- The Forestry Census of 1990
- The Forestry Census of 2000
- Danish Forest and Landscape institute
- Statistics Denmark
- Danish Forest and Nature Agency

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Estonia

Integrated Environmental and Economic Accounting for Forests, Report to Eurostat produced under the Framework of Phare 2003 "Data collection projects" (contract No.2004.19.19100.020), prepared by Kaia Oras, Statistical Office of Estonia, December 2005, 77 p. (Study n°70)

http://circa.europa.eu/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/forest_accounts&vm=detailed&sb=Title

This study is based on the European Framework for Integrated Environmental and Economic Accounting for Forests. It focuses mainly on forest area and volume of standing timber as well as on the development of the supply use tables consistent with national accounts principles, both in physical and monetary units.

After a brief introduction, the summary describes the methodology used in compiling the IEEAF tables. The next section enumerates the data sources used in the study and the fourth section describes the comparison of the definitions between the National Forest Inventory (NFI) and TBFRA2000. The section five details the methodology used in compiling IEEAF tables and the related data. The last section reports comments on the results concerning mainly the inconsistency between the physical and monetary supply use tables due to the different data sources, the split between the forestry and logging, the improvement needed in the area of forestry accounts and the identification of the wood and other resource use.

Coverage

The following IEEAF tables in Excel format are available together with the report:

Table 1a Forest balance: area of wooded land	(year 1999)
Table 1b Forest balance: value of wooded land	(year 1999)
Table 2a Forest balance: volume of standing timber	(year 1999)
Table 2b Forest balance: value of standing timber	(year 1999)
Table 2c Defoliation (% of sample trees)	(year 1999)
Table 3a Output related to wooded land by industry and type of output (million national monetary units)	(year 2001)
Table 3c Economic accounts for forestry and logging	(year 2001)
Table 4a Supply-Use physical table: use	(year 1999)
Table 4b Supply-Use physical table: supply	(year 1999)
Table 5a Supply-Use monetary table: use	(year 2001)
Table 5b Supply-Use monetary table: supply	(year 2001)
Table 6a Material balance of wood content (1000 tonnes of dry matter): use table	(year 1999)
Table 6b Material balance of wood content (1000 tonnes of dry matter): supply table	(year 1999)
Table F1 Carbon balance for woody biomass (1000 tonnes of carbon)	(year 2001)
Table F2 Carbon balance for the forest ecosystem (1000 tonnes of carbon)	(year 2001)

Classifications

The classifications used in compiling tables are NACE rev.1 and CPA1996. The concerned products are:

Products of forestry and logging	**CPA 1996**
Natural growth	02.01.5 Standing timber 02.01.6 Forest trees nurseries services
Wood in the rough	02.01.1 Wood in the rough
Other forestry products (1)	02.01.2 Natural gums 02.01.3 Natural cork, raw or simply prepared 02.01.4 Other forestry products
Forestry and logging-related services	02.02.1 Services incidental to forestry and logging
Afforestation and reafforestation	Part of 02.02.1
Other forestry contract work	Part of 02.02.1
Forests inventories and evaluation	Part of 02.02.1
Protection of forest against fires, etc.	Part of 02.02.1

Other products related to wooded land	**CPA 1996**
Agricultural products growing in forests	Part of 01.12.13 Other vegetables n.e.c. (includes mushrooms). Part of 01.13.23 Other fruit, locust beans (includes berries). Part of 01.13.24 Olives and other nuts
Growing of animals in forests	Part of 01.25.10 Other live animals
Meat, fur, skin from hunting and trapping	Part of 01.5 Hunting, trapping, game propagation and related services.
Recreational services in forests	Part of 01.5 Hunting, trapping, game propagation and related services. Part of 92.53.12 Nature reserve services, including wildlife preservation services. Part of 92.62.13 Other services related to sports events n.e.c. (Includes services of hunting guides).
Other products	Part of 10.30 Peat 24.14.72 Wood charcoal

The concerned industries are:

Industries	**NACE rev.1**
Forestry and logging	02
Manufacture of wood products	20
Manufacture of pulp	21.11
Manufacture of paper	21.12 & 21.2
Printing	22
Recycling and waste management	37.2 & 90 part
Other	All other positions of NACE rev.1

Data sources
The main data sources are:

Institutions:

- Centre of Forest Protection and Silviculture – CFPS
- Estonian Forest Survey Centre - EFSC
- Ministry of Environment – MoE
- State Forest Management Centre – SFMC
- Estonian Statistical Office – SO
- Estonian Forest Industries Association – EFIA
- Tartu University – TU
- Tartu Observatory – TO
- Land Board – LB

Data:

- National Forest Inventory – NFI
- SO database Prodcom2001 – PRODCOM
- SO database Foreign Trade –
- Structural Business Statistics - SBS

Latvia

Integrated Environmental and Economic Accounting for Forests (IEEAF), Final Report to Eurostat (grant agreement n°. 71401.2005.001-2005.296) prepared by Andra Lazdiņa, Central Statistical Bureau of Latvia in collaboration with Ministry of Agriculture and other specialised institutions, 2007, 60 p. (Study n°126)

This report is the result of joint work between the Central Statistical Bureau of Latvia (CSB), experts from the Ministry of Agriculture (MA) and other institutions with specific knowledge and skills in the forestry field.

After a short introduction to the political background of the project (in particular, adoption of the Forest Law) and presentation of current work organisation and of previous work carried out in the area of forest statistics/indicators (first attempts to make joint Baltic forestry statistics, using only physical indicators as standing volume, m^3, etc. and Manual for the evaluation of Natura 2000 sites in economic terms - Baltic Environmental Forum, 2000), the report focuses on the set of IEEAF tables presented, each of which is accompanied by information about the methodological approach and data sources.

The report contains 3 annexes: 1.) 11 IEEAF tables in Excel format (same as in Word file), 2.) Annex I: Survey on timber purchase, 11/2006 (the template of the questionnaire carried out by CSB twice a year), 3.) Annex II: Survey on forest management expenditures, 11/2006 (the template of the annual questionnaire carried out by CSB).

Coverage
The data used in the IEEAF tables presented in the report cover 2003 (with the exception of table 1a): Tables F1 Carbon balance for woody biomass (1000 t. of carbon) and F2 Carbon balance for the forest ecosystem (1000 t. of carbon) are not included.

The terms, definitions and nomenclatures/classifications used are in line with the European Framework for Integrated Environmental and Economic Accounting for Forests ("IEEAF" manual), with some differences for Tables 1a and 5b:

Data sources
The most important data sources used in this report are:

- State Register of Forests (SRF) from the State Forest Service (SFS);
- Central Statistical Bureau of Latvia (CSB) for data from annual structural business survey, foreign trade and other ;
- Ministry of Agriculture (MA, Forest resources department).

Hungary

"Forest account" Part 1 in *Land and Forest Accounts (Action 1), Report*, report to Eurostat (grant agreement n° 71401.2005.001-2005.295) prepared by P ál Bóday, Lajos Kaposi, Gábor Valkó, Hungarian Central Statistical Office (HCSO), Péter Kottek, András Pluzsik, András Rónai, State Forest Service (SFS), Gergely Maucha, Institute of Geodesy, Cartography and Remote Sensing, February 2007, pp. 8-60 (Study n° 125a)

This report is the result of work carried out for the period January-December 2006 for the project: Environment Statistics and Accounts – Land and forest accounts (Action 1) and Material Flow accounts and NAMEA Waste (Action 2).

The main objective of Action 1 was the compilation of the land accounts and forest accounts for Hungary according to the EU requirements.

This report summarises the work done in the 2 fields of environmental accounts. This project has been the first attempt in Hungary to elaborate 1.) a methodology and 2.) compile sets of accounts for both land and forest accounts. The report consists of 2 main parts respectively dedicated to forest accounts and land accounts (see the section below)

In a separate HTML document, information on the development of the methodology for estimating non-surveyed and non-registered data needs for forest accounts is provided.

This section deals with Part A. Forest accounts. It is based on the European Framework for Integrated Environmental and Economic Accounting for Forests (IEEAF).

Coverage
The data covers the years 2000 and 2005 (IEEAF tables). The reasons for choosing these years were that the year 2000 was a benchmark year for both SFS and HCSO and that 2005 is the last year when all data are available.

The tables mentioned in the report include (but not available in the report itself, see p. 22-25)

The terms and definitions of the UN-ECE/FAO TBFRA-2000 are used as a basis for the IEEAF tables, with some differences

Data sources
The most important data sources used in this report are:

State Forest Service (SFS):

- Hungarian Forest Inventory / District Forest Planning (yearly sample survey on 1/10 of total forest area),
- Yearly data collection on forestations and final cutting,
- Yearly data collection on primary forest product,
- ICP Forest (yearly or bi-annual sample survey).

Hungarian Central Statistical Office (HCSO):

- Inputs of producers of agricultural and forestry products (yearly sample survey),
- Statistical survey on agricultural and forestry service (yearly),
- Statistical survey on land use (yearly sample survey),
- Annual Institutional Labour Statistical Survey (full scope survey),
- Labour Force Survey,
- Input-Output tables.
- Other sources include:

National Land Fund (valuation of forest land and valuation of standing timber)

Hungarian Energy Office (data on consumption of fuel wood).

Land accounts

Hungary

"Land account" Part 2 in *Land and Forest Accounts (Action 1) Final Report,* Report to Eurostat (grant agreement n° 71401.2005.001-2005.295) prepared by P ál Bóday, Lajos Kaposi, Gábor Valkó, Hungarian Central Statistical Office (HCSO), Péter Kottek, András Pluzsik, András Rónai, State Forest Service (SFS), Gergely Maucha, Institute of Geodesy, Cartography and Remote Sensing, February 2007, pp.61-82 (Study n° 125b)

This report is the result of work carried out for the period January-December 2006 for the project: Environment Statistics and Accounts – Land and forest accounts (Action 1) and Material Flow accounts and NAMEA Waste (Action 2).

The main objective of Action 1 was the compilation of the land accounts and forest accounts for Hungary according to the EU requirements.

This report summarises the work done in the 2 fields of environmental accounts. This project has been the first attempt in Hungary to elaborate 1.) a methodology and 2.) compile sets of accounts for both land and forest accounts. The report consists of 2 main parts: Part A. Forest accounts (see section A.4.1.1 above), Part B. Land accounts

Coverage
The data in this part covers the year 2000 and/or the change 1990-2000.

The tables presented include:

- Land cover of Hungary, 2000 (CLC50, CLC2000 and LUCAS 2002): Total, Agricultural land (EA312), Forest and other semi-natural areas (EA313)
- Land cover by ecosystems (EA.3. in SEEA 2000), 2000
- Land use by industry and households (EA.2 Land and surface water) by Industries (ISIC) and households, 2000

Land cover change:

- Most important changes within the main categories, 1990-2000
- Land-cover change matrix, 1990–2000 (EA3.)
- Land-cover types of changes in stock and land cover account for Hungary (EA3), 1990-2000

The classifications used are CLC for land categories and ISIC for industries.

Data sources
The "direct" data sources used are:

- CLC-50 and CLC-2000 (EU's CORINE Land Cover project – CLC)
- LUCAS project (Land Use/Cover Area Frame Statistical Survey, Eurostat).

Some complementary data sources were used also:

- Land use statistics by HCSO (data on productive land area, i.e. land used for agricultural and forestry production)
- Agricultural Plot Identification System (APIR) database by Agricultural and Rural Development Agency (ARDA): detailed data of those who apply for area-based subsidy
- Forest area by State Forest Service (SFS): register of areas larger than 1500 m^2 with wood and shrub cover that are involved in forest management planning, including the so-called "territories with wood cover" which exclude clear-cuts, shrub vegetation and areas to be recovered by afforestation.
- Hungarian Roads Management Company: state and municipality road network (length, average width, area).

Ministry of Agriculture and Rural Development: area of inland waters that are narrower than 50 meters.

The report namely compares the results obtained using these different data sources for Land-cover : CLC-50, CLC-2000, LUCAS 2002, HCSO 2000, Other sources.

Sweden

Land Accounting, Report for DG Environment and Eurostat prepared by Veronica Skarborg, Marianne Eriksson and Leif Norman, Statistics Sweden, 2002, 35 p. (Study n°21).

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/landacsepdf/_EN_1.0_&a=d

This report presents the first attempt in coordinating the existent data sources for land use and land cover in order to compile land accounting for Sweden.

After the summary and the introduction, section 3 presents and analyses the results derived from the Eurostat table 4 'land use, stock and changes' concerning land under cultivation, built-up land, recreational land and other land. Section 4 describes the estimate of land value in Eurostat table 5.

Regional and quality aspects are analysed in section 5, namely the aspects concerning land use in urban areas, built-up land in coastal areas and areas undisturbed by noise. The changes in land use in urban areas between 1980-1990 and 1990-1995 have been examined in a random sample of 60 urban areas by studying aerial photographs and economic maps mostly in the scale 1:10 000.

Section 6 discusses some aspects of land accounts focusing on the data sources (for the aspect concerning the NACE classification) and on further development needed for the future.

Coverage

The report covers the years 1980, 1990 and 1995 and the following areas are considered:

- Under cultivation
- Built-up land
- Recreational land
- Other land

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In the nature conservation and protection class the following four categories are included:

- National parks
- Nature reserves
- Nature management areas
- Wildlife sanctuaries

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The following tables are included in the annexes of this report:

- Table EU1. Land cover stock and changes - summary (1000 ha)
- Table EU4. Land use stock and changes - summary (1000 ha)
- Table EU5. Land use - monetary value (SEK million), fixed prices
- Table EU6. Land use, detailed changes (1000 ha)
- Table EU8a. Land use by industries, area (1000 ha)
- Table R1. Land use in localities 1980-1995, hectares
- Table R2. Land use in localities, detailed changes in hectares

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Classifications
This report mentions that there are problems in classifying land use according to the NACE classification. Many different data sources are used for compiling land use statistics and it is not possible to link the real estate listings with the central enterprise and work place register at Statistics Sweden.

Data sources
Several data sources are used for compiling land use statistics. The main sources are:

- Banverket (National agency for the railroad network)
- National Statistics Office
- National forest inventory; Swedish University of Agricultural Sciences
- SCB 1992
- Swedish Environmental Protection Agency
- Swedish National Road Administration (SNRA)
- Swedish institute for transport and communications analysis (SIKA)
- Swedish national atlas
- Swedish Association of Local Authorities
- Swedish golf association
- The statistical yearbook of Forestry; National Board of Forestry

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Land use by industry 2000, Report prepared for DG Environment and Eurostat by Marianne Eriksson Annika Mårtensson and Viveka Palm, Statistics Sweden, November 2003, 34 p. (Study n°24)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/accounts_2003_sepdf/_EN_1.0_&a=d

The objective of this study is to improve the physical data on land use by industry in urban areas, developing a framework allowing the use of different data sources such as the Register of Real Estate Assessment (FTR), supplemented with the population register and the central enterprise and work place register. In addition the results from the project can contribute to calculations and analyses of the Indicators for Sustainable Development concerning Growth of built-up land.

After the presentation of the background, section 2 describes the two main sources used for the study: the Register of Real Estate Assessment (FTR) and Labour Statistics based on administrative sources (RAMS). In addition a specific paragraph defines how the aerial photos contributes to separate built up land from other types of land cover such as parks, agricultural land, forests and other open land.

Section 3, describes the methods used in linking workplaces to a real estate (RAMS, Geo reference register and FTR) and in the Estimation of area utilized by workplaces (FTR and RAMS).Section fourth shows the results from the study of land use in urban areas in 2000 based on aerial photos and the land use in urban areas based on real estate register and aerial photos in 2000.

Section 5 presents a comparison between countries with experience in land accounting (Canada, Germany, Netherlands and Norway).

Coverage
The study focuses on land use by industry for the year 2000.

Classifications
Industry has been aggregated to 35 NACE groups. This aggregation follows, with a minor exception, the standard aggregation used in the Swedish environmental accounts.

The minor exception concerns the public sector (it is disaggregated to the different activities), NACE 41 (Collection, purification and distribution of water) includes NACE 90.001 (sewage disposal), here NACE 90.001 is included in NACE 90 (Sewage and refuse disposal).

Data sources
The two main data sources are the Register of Real Estate Assessment (FTR) and Labour Statistics based on administrative sources (RAMS). Statistics on land use in urban areas are based on aerial photos.

Norway

"NAMEA-work related to land accounts" chapter 2 in *Norwegian Economic and Environmental Accounts (NOREEA) Project 2003*, Report to Eurostat (grant agreement n° 2002412000 13) prepared by Julie Hass and Knut Sørensen (ed.), Statistics Norway, March 2004, pp. 7-29 (study n° 30a)

The project dealt with in this chapter of the NOREEA 2003 aimed linking economic activities and land cover by developing NAMEA-type land accounts. The specific objective of the study presented was twofold: firstly, develop measures fro statistical expression of land take by NACE 2-digit; secondly, calculate a first estimate at national level, with of focus on manufacturing industries.

The major part of the chapter is dedicated to a detailed description of the data sources. The results presented were considered as rough estimates, due to the great variation in the quality of the geo-referencing of enterprises (lack of addresses and lack of information on ground property or flanking areas).

Therefore, Statistics Norway concluded that it was not possible then to give to produce good estimates of land accounts for manufacturing industries, both for status and change over time. It was planned then to connect the register of enterprises to the official addresses register by 2006, and mapping authorities and municipalities were expected to match maps and register on buildings in 2005.

Coverage
This chapter presents rough estimates for the surface of buildings and total land-take for the year 2002 and the change in land-take between 1983 and 2003.

Classifications
The data on surface of buildings and land-take were distributed across NACE divisions (2-difgit) for manufacturing industries and trade activities. The data on land-take change were presented at the level of NACE sections (letter codes) plus households (residential small/high houses, weekend and leisure, garages and annex to residential, missed residential and other, other build-up areas).

Data sources
Since point-sampling survey approach is rather expensive, the study focused on the use of geo-coded registers, map and map-derived register. However, Norwegian statistics on agriculture and forestry were not suitable for this bottom-up approach.

The Official Ground property Address and building register (GAB) needed to be connected to the Common Map Database (CMD). The CMD is a standard formatting and describing digital map database in Norway. The GAB contains information on the building types and NACE codes for economic activities. A part of the GAB is dedicated to flanking areas. However, the great majority of the buildings in the GAB lack economic activity code, partly because no economic activity is carried out in them.

In the Statistics Norway's own Central enterprises and Establishment Register (CBR) enterprises are geo-referenced by 17-digit address code and classified at NACE 5-digit level. Statistics Norway used the CBR to complement the GAB as regards economic activity codes.

Subsoil assets

Denmark

Handbook on mineral and energy asset accounting, A first outline For presentation at the 11th London Group Meeting Pretoria, South Africa 26-30 March 2007, prepared through grant awarded by Eurostat (N° 71401.2005.001-2005-292) by Ole Gravgård, Statistics Denmark, 63 p. (Study n°124)

The main purpose of this document is to give an overview of what the future handbook on mineral and energy asset accounting should look like and what it should include. The handbook itself is intended to give practical advice to how mineral and energy asset accounts can be set up and filled out through guidelines and showing actual examples of accounting from countries which have already implemented mineral and energy asset accounting according to the SEEA standards.

The present document is an outline which can be used for discussion and has been to a large extent inspired by and based on texts from SEEA 2003[109] and the Eurostat Guidelines[110], but also from UNFC (United Nations Framework Classification) guidelines on classification.

The handbook is split in 3 parts:

- Part I gives a description of the fundamentals of mineral and energy asset accounting including some theory and a listing of concepts.
- Part II is intended to be a practical guide to mineral and energy asset accounting.
- Part III contains actual examples of mineral and energy asset accounts and examples of their uses.

Coverage
N/A. No data is presented but the report suggests that an EXCEL file with templates for basic tables, etc. could be developed and attached to the handbook.

The classifications referred to include 1.) the so-called McKelvey box, a resource classification system which has been further developed by the United Nations Framework Classification (UNFC) for Energy and Mineral Resources, 2.) the SEEA 2003/2010 and SNA 93 rev.1 classifications of mineral and energy assets, 3.) ISIC (section C Mining and quarrying, divisions 10-14) or similar classification (NACE for the EU) for extraction industries.

Data sources
Physical data: Possible sources for the basic data on volumes are energy statistics departments, ministries, petroleum directorates, geological survey institutions or extraction companies.

Economic data: The national accounts are a good source for economic data.

Estimation of the resource rent: The data source is normally the national accounts data for the extraction industries.

Netherlands

Valuation of Oil and Gas Reserves in the Netherlands - Government appropriation of net resource rent for subsoil assets - An analysis for the Netherlands, André van den Berg and Peter van de

[109] - UN (2003), *Integrated Environmental and Economic Accounting 2003*, Final draft circulated for information before final editing, United Nations, European Commission, International Monetary Fund, Organisations for Economic co-operation and Development, World Bank, Series F, No 61, Rev. 1 (ST/ESA/STAT/SER.F/61/Rev.1), Chapter 8. (B) – "Subsoil resources", pp. 314-322.
[110] - Eurostat (2003), *Subsoil assets accounts for oil and gas – Guidelines for the set of standard tables*, Revised version, Office for Official Publications of the European Communities, Luxembourg, January 2003.

Ven, Statistics Netherlands, Eurostat Working Papers n° 2/2001/B/3, 2 July 2001 17 p. (Study n°97)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp01nlsubsoil_pdf/_EN_1.0_&a=d

This working paper presents the results of the study on estimation of expected net returns in relation to subsoil assets comparing the *Net Resource Rent Method* and the *Government Appropriation Method*.

Section 2, presents the methodology used for the calculation of 'net resource rent' and the results are presented in table 1(Table 1. Net resource rent, 1975-1998, million HFL, in current prices).

In section 3 the Dutch regulations on exploitation of oil and natural gasare examined.

Section 4 concerns the calculation of the government appropriation of the resource rent and the next section compare the 'Net Resource Rent Method' and the 'Government Appropriation Method' using three options. Section six presents the methodology used in" Valuation of gas and oil reserves in the Netherlands" (the obtained results are preliminary estimates) . The value of oil and gas reserves are calculated using the estimates of government appropriation of net resource rent.

Coverage

The study covers the period 1975-1998 with regard to the *Net resource re*nt and the *Government appropriation* (including corporate taxes on rent) and the period 1981-1998 for the *Government appropriation of net resource rent for subsoil assets*. Concerning the *Value of oil and gas subsoil assets*, the period between 1990 and 1998 is covered.

The following tables are included in this report:

- Table 1. Net resource rent, 1975-1998, million HFL, in current prices
- Table 2: Government appropriation including corporate taxes on rent, 1975-1998, million HFL
- Table 3: Government appropriation, 1975-1998, million HFL and as a percentage of the resource rent, in current prices
- Table 4: Government appropriation of net resource rent for subsoil assets, million HFL; rate of interest on long term government bonds (%)
- Table 5: Value of oil and gas subsoil assets
- Table 6: Valuation of subsoil assets, updated estimates vs. earlier estimates.

Data sources

Statistics Netherlands provides both methodological and data input.

Data on operating surplus, consumption of fixed capital and capital stock for the industry's extraction of crude petroleum and natural gas' is derived from the system of national accounts.

Water

France

Water quality accounts calculation module, Report to Eurostat (grant n° 200141200031) by pre pared by Philippe Crouzet, French environment institute (Ifen), June 2003, 20 p. (study n°36)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/water_accounts/quality_francepdf/_EN_1.0_&a=d

Despite this study was funded to finalise development of the Physical Water Quality Accounts (WQA) methodology, the report does not deal with compilation of accounts. It is rather computer-oriented.

The study aimed at developing further the software for the "simplified methodology" set up in 1999 by Ifen. The works carried out demonstrated the many defects of the river GIS legally in force in France, the D-Carthage. This GIS must be amended to enable full scale calculations on the main rivers systems.

The new facilities designed, developed and tested comprised:

- Implementing facilities to break down and process the rivers into calculation *reaches*. (elementary unit of river characterization in which both discharge and quality have a unique value for a certain calculation). Hence, a reach is the "pixel" of any water body, in the acceptation of the Water Framework Directive. Any elementary catchment main drain comprises several reaches.
- Calculating the discharge reference values for any statistical indictor (e.g., annual module, low flow reference, etc.) all along the *reaches* of all rivers to be considered.
- Managing the quality indexes library (computed thanks to the SEQ approach, extended), the basis for these calculations being the existing quality monitoring network used, for instance for the EuroWaternet reporting.
- Interpolating the quality indexes along the rivers, by reach, using the discharge reference or, if lacking, the change in catchment area as proxy.
- Managing the discharge and linear quality libraries so that linear quality can be broken down and re-aggregated s either by catchment or by administrative units, before computing the SRU values, The SRU data is the basis for any further use of the WQA.
- all previously developed steps, from SRU raw management to RQGI indexes and mapping are fully compatible with the former approach, based on the importation of existing quality maps. Ifen is currently doing its best to carry out full-scale calculations, on a limited set of quality assessments and a limited number of years, in line with the current budget restrictions.

A 1.2 Other

Transport module

Germany

Transport and the environment - Report module for the German Environmental Economic Accounts, Report to Eurostat Eurostat (grant agreement n° 200 1 412 0012) prepared by Walter Adler, Federal Statistical Office, December 2004, 52 p. (study n°134)

http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/EN/Content/Publikationen/SpecializedPublications/EnvironmentEconomicAccounting/Brieftreporttransportenvironment,property=file.pdf

The current need for information in the political arena on the topic of "Transport and environment" is shown, firstly, in the European and German sustainability strategies, each operationalising the topic of mobility by means of two indicators. Secondly, the European Union is looking for indicator-based integration of environmental interests in the individual sectoral policies. In order to cover the stated need for information there is a need of a detailed database within a consistent framework, as can be provided by accounts systems in particular such as National Accounts and Environmental Economic Accounting. In its Environmental Economic Accounting for relevant sectors and policy areas, the Federal Statistical Office therefore seeks to construct "sectoral report modules", which ideally should depict the complete spectrum of the environmental economic asset and flow accounts, restricted to the respective sectors. The transport sector as a starting point was favoured by its high political and socioeconomic status, as well as by its particular environmental relevance, which is expressed amongst other things by emissions of pollutants and use of area.

The characteristics selected for the database of the new reporting module take account of both the transport infrastructure, and of ongoing transport activities, and include both physical and monetary data. This database is used within the project on the one hand for analyses of time series and efficiency indicators. On the other hand, so-called indirect traffic-related environmental burdens are calculated that either emerge from the use of intermediate goods or that can be ascribed directly to the categories of final uses.

The outcomes of the new reporting module can not only produce the link between the figures internal to Environmental Economic Accounting and the data of external transport statistics, but also serve as a model for setting up further sectoral report modules. The following link provides a short version of the original project report of 2003.

Regional accounts

Denmark

Regional Environmental Accounts Denmark 2003, Report prepared for Eurostat (Grant agreement no. 200471401007) by Peter Rørmose Jensen and Thomas Olsen, Statistics Sweden, December 2005, 41 p. (study n°32)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/accounts-action3-grant20/_EN_1.0_&a=d

The main objective of this study was to investigate the possibility to establish regional environmental accounts in Denmark. Regional statistics were already available at regional level but they were not in a form coherent with the national environmental accounts.

Following an introduction presenting the regional structure of Denmark and few statistics on area and population, the Regional Energy Accounts chapter (the second one) describes the aggregated Danish energy account (supply and demand is balanced for every year since 1980).

The methodological approach used in this project is *top down* using the following methods (in order to obtain the equality between the sum of the regional accounts and the national accounts):

- disaggregation of the national matrix to the regional level by using appropriate indicators and keys;
- putting together relevant statistics at the regional level and then subsequently balance the sum of the regional matrices against the national ones to obtain a match.

Afterwards, the various sources of energy accounts are investigated in order to try to regionalize national data: Census on the use of energy in manufacturing industries, Census on energy producers, Survey on the use of energy in trade and service, Regional Economic Statistics.

A description of the method used for energy accounts (for each of the 6 groups of industries concerned, including households) is presented in order to distribute the national data to the 16 countries (plus 1 for the non-distributable data). The following results at regional level are presented: energy consumption by Danish industries (2003), consumption of natural gas in the industry "agriculture etc.", distribution of total energy consumption in Denmark (2003) by county, energy consumption by households (2003), per capita energy consumption in households and sources of heating in households.

The study continues with the analysis of the regional air emissions accounts. The methodology used in order to regionalize air emissions accounts is similar to the one used for the energy accounts. Only CO_2 emissions have been regionalised, due to its unchanged emission factors. The following results are presented: CO_2 emissions from energy use in Denmark 2003, per capita CO_2 emissions by households 2003 and households emissions of CO_2 by county.

As before, concerning the water accounting system, the last chapter analyses the data sources in order to regionalize national data and the used methodology for water accounts is carried out at eight industry level. In this context, the *"extraction of water by industry and by region"* (extraction of ground water and extraction of surface water) and the *"use of water by industry and by region"* (the VAT-paying companies' use of tap water, the entities' not paying VAT use of tap water, balancing the use of tap water and the use of water extracted for own use) are discussed.

The following results at regional level are presented: extraction of ground water (2003), extraction of surface water (2003),extraction and supply by the water supply industry (2003), use of tap water (2003), final use of water by region (2003), final use of water by region (2003), final use of water by region and industry (2003), final use of water per capita by region (2003), the industries' final use of water compared to employment by region (2003) and the industries' final use of water compared to gross value added by region (2003).

Environmental data covered
This study focuses on 3 modules of the NAMEA area: energy, air emissions and water accounts.

Industry classification and households
The classification used for grouping into 130 NACE-base industry classification of the Danish national accounts, plus households.

Data source and periodicity:
The best available statistical sources for generation of regional distribution keys for groups of industries and households are:

A 1.3 EA-based analysis

A 3.1.1 EEA

Nordic countries

Energy Taxes in the Nordic Countries – Does the polluter pays?, Report to Eurostat (grant agreement n° 200141200022) prepared by Klaus Balslev Pedersen of statistics Denmark, based on contribution from the National Statistical Offices of Norway, Sweden, Finland & Denmark, March 2003, 45 p. (study n°69)

http://www.scb.se/statistik/MI/MI1202/2004A01/MI1202_2004A01_BR_MIFT0404.pdf

This report result from the first study carried out following a 2001 decision of the Nordic countries (Denmark, Finland Norway and Sweden) to develop the implementations of the SERIEE in the different countries. This study focused on energy related taxes (taxes on propellant fuels, on electricity, CO_2 and SO_2 taxes).

The project had 3 main objectives: harmonisation of data across Nordic countries, presentation and analysis of the total revenues from the different taxes, and further analysis on whether the energy tax burden follows the *polluter pay principle*, thanks to the connection established between energy tax accounts on the one hand and energy/emissions accounts on the other hand, all broken down by economic activity.

After the introductory chapter (1), the report is structure as follows:

- the methodology (chapter 2): tax accounts, polluter pay principle, price of CO_2, industry classification and the different tax systems in Nordic countries;
- the results (chapter 3) dealing successively with energy, CO_2 and sulphur taxes for 1999;
- and the conclusion (chapter 4) that includes recommendations to the Nordic countries and more broadly Eurostat.
- Annexes provide detailed data: 1999 tax accounts by industry for each country, and figures in the graphic covering the period 1990 to 2001.

For all Nordic countries, energy related taxes accounts are determined on an accrual basis, since national accounts are used a source of basic information. Concerning the **distribution of energy related taxes by industry**, Norway uses a top-down approach (total revenue on a specific energy related tax distributed across industries plus households equally to the uses of energy products), whereas the Denmark, Finland and Sweden use a bottom-up methodology (energy uses multiplied by the relevant tax rate for the specific energy product, taking accounts of exemptions and refund mechanisms).

Although the energy sectors and energy uses differed across the Nordic countries, their energy tax systems did no. They all had similar exemptions and refund mechanisms that led to reduce the tax burden of the actors that were responsible of the most significant proportions of energy use and related air emissions.

In all Nordic countries, the **energy taxes** burden was not equally distributed due to exemption and refund mechanisms. On average, manufacturing industries as a whole consumed around 50% of the energy in 1999 and paid only 5% of the energy tax revenues, whereas households that consumed 20% of the energy paid around 50% of the energy tax revenues.

Nordic countries were very different regarding taxes on electricity. The disparities reflected differences both in exemptions and refund mechanisms and in the way electricity is produced. In Denmark and to a lesser extent in Finland it is mostly based on thermal power plants, whereas in Norway it is almost totally hydroelectricity and in Sweden mainly nuclear and hydroelectricity.

Based on 2 categories (industries and households) only, the report concluded the polluter pay principle was followed to a higher degree that for petrol tax.

The burden of the **CO_2 tax** was more closely connected to CO_2 emissions than in the case of energy use and energy taxes. However, within industries, the polluter pay principle is not followed. According the observation of effective tax rates (CO_2 emissions/CO_2 tax revenues), in general the more CO_2 intensive the industry is, the less it pays for CO_2 emissions.

The **sulphur tax** did not follow polluter pay principle, although the situations were quite different across the Nordic countries due to their differences regarding electricity production (see below) and ocean transport. In Norway and Sweden the service sectors (that includes the water transport services industry) emitted a significant proportion of SO_2 emissions (67% and 25% respectively in 1999) and paid a lower proportion of the sulphur taxes revenues (35% and 1% respectively).

As far as Nordic countries were concerned, it was recommended that energy tax accounts (by industry) should be published on an annual basis and that the work should extended to other environmental taxes. In general, it was recommended that energy related taxes should be net amounts as refund mechanisms were intensive. Also that data on energy should be net energy consumption and that emissions should follow the energy consumption, for the sake of comparability between monetary and physical data.

5.2.9 MFA-based analysis or indicators

Germany

Analytische Auswertung von physischen, monetären und Zeit-Input-Output Tabellen - Nutzungsmöglichkeiten für Wirtschafts-, Umwelt- und Beschäftigungspolitik (translation: *Analysis of physical, monetary and time input-output tables - Possible applications in the area of economic, environmental and employment policy*), Report to Eurostat (grant agreement n° 200041200003) prepared by Reiner Stägl in und Joachim Schintke unter Mitarbeit von Ingrid Ludwig, German Institute for Economic Research (DWI), Berlin June 2002, 100 p. (study n°20)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies&vm=detailed&sb=Title

Eurostat, commissioned the German Institute for Economic Research (*Deutscher Institut für Wirtschaftsforschung — DIW Berlin*) to study the possible applications of available input-output tables in economic, environmental and employment policy making.

The datasets compiled (chapter 2) by the German Federal Statistical Office and Osnabrück University comprised four types of input-output tables (IOT): physical IOT (or PIOT) with and without throughput materials, traditional monetary (MIOT), extended monetary IOT (NAMEA-type including MFA by industry) and TIOT. Data were also taken from material balances. All tables refer to reporting year 1990 and therefore to the territorial boundaries of the Federal Republic of Germany before reunification. Despite the use of different units (monetary, tonnes, hours) the tables all have a common structure based on 12 product groups and 89 production branches.

The different above-mentioned tables were compared as regards the implementation of the input-output analysis technique inspired by the traditional Leontief approach (chapter 3).

The first group of analyses (chapter 4) includes the results of the descriptive and model-based analysis of the aggregated input-output tables. This involves the analysis of two PIOT, two MIOT and one TIOT. The interpretation concentrated on selected important analysis results based either on individual IOTs or on a comparison of various table types.

The second group of analyses (chapter 5) comprises models design to answer questions raised by economic, environmental and employment policy (e.g. direct and indirect material inputs of final use by product, imports/exports-related material inputs). This analysis was carried out once with and once without water, in order to take account of the dominance of water within the input quantities.

Water as a natural resource is a major consideration in the analysis of the environmental aspects of the available data base (chapter 6). After looking briefly at energy sources as product inputs for final use, this section initially analysed the importance of withdrawal of water from the natural environment before looking at the release of water back into the environment as part of the analysis of waste and pollutant output. In both cases, specific material coefficients for water and for waste and pollutants are taken as the basis and these physical outputs are then included in final use.

Chapter 6 also examines carbon dioxide (CO_2) output, as regards both domestic emissions and the German *emission trade balance* (exports less imports related emissions), assuming that German production conditions applied to the production of the imported goods carried out abroad. CO_2 generated in Germany by German exports (204.4 Mt) was lower than that emissions induced by German imports in the rest of the world (215.2 Mt) and the resulting external trade balance represented therefore the quantity of CO_2 emission avoided in Germany through imports. NAMEA-type indicators were calculated for the 89 production branches.

The employment issues dealt with in the study (chapter 7) are no longer current, but are purely demonstrative in character. This was partly because the labour market data were obsolete, and partly because the data on employed persons and volume of work relate only to a single reference year. This means that the intertemporal comparisons which are so important for labour market analysis cannot be carried out and the analyses have to rely on determining work coefficients, direct and

indirect employment effects and quantifying the sectoral interdependencies of the final-use components.

The *Outlook* section of the study considers how the analytical possibilities of the input-output data demonstrated here can be targeted to specific policy making needs (chapter 8). This would require further development of methods and data, for which indicators are suggested. The study concludes with the hope that the analyses presented here will help politicians to pinpoint specific economic, environmental and employment issues to which the input-output methods can be applied.

Eurostat

The Policy Relevance of Material Flow Accounts, Prepared for Eurostat by Environmental Resources Management (ERM), Eurostat Working Paper n°2/1999/ B/1, 19 May 1999, 24 p. (study n°80)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp99ermmfa_pdf/_EN_1.0_&a=d

This report (like the study n°81 below) was publis hed before the Task Force on MFA was set up with the objective of developing a harmonised framework and the corresponding methodological guide. Its objective was to collect and analyse information on material-related policies, and develop scenarios for their evolution, i.e. whether there was justification for a more systematic approach to the collection and supply of material-related statistics, or whether an ad-hoc approach (as employed then) was sufficient. ERM focused its research on the views of the policy community, rather than the views of the academic and NGO community which has been most active, until now, in developing the concept of material flow accounting.

The report is structured as follows. It starts with general conceptual framework (policy and statistics, material flows in the economy and policy instruments) before focusing on material flow accounting (review of different national approaches available then: e.g. input-output analysis, trade balance analyses etc. and international experience: e.g. World resource Institute, ConAccount network). The three following chapters are dedicated to material flow-related policy that existed or were emerging then (case studies: agriculture, minerals, waste management etc.; UN and EC indicators programmes, key concepts: eco-efficiency, clean production, sustainable production and consumption).

ERM concluded that, since the primary driver influencing collection of statistics at a national and international level is government policy, MFA needed to be clearly justified in policy terms in order to make a robust case for allocating scarce resources to it. And despite considerable enthusiasm for the concept of *material efficiency*, ERM identified several factors that prevented it being unanimously adopted as an explicit policy objective or widely translated into actual policy measures:

- the lack of clear link with environmental impacts for the major part of material flows;
- the questionability of a significant environmental benefit resulting from material flow approach;
- the difficulty to allocate responsibilities and to break them down over time;
- the concern about the consistence with sustainable development.

Although ERM recommended a *wait and see* approach for the European Commission as concerns the implementation of MFA-based policy, it considered that in the meantime Eurostat could encourage activities aiming at standardising the national MFA which were being developed; prioritising material flows regarding their environmental impacts.

Industrial Metabolism – Concept and Implications for Statistics, Prepared for Eurostat by Frans Berkhout (IPRA), Eurostat Working Paper n°2/1999/B /2, 19 June 1999, 25 p. (study n°81)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp99ipramfa_pdf/_EN_1.0_&a=d

Like the study n°80 (above), this working paper was published before the Task Force on MFA was set up with the objective of developing a MFA harmonised framework.

This paper provides an assessment of the concept of *industrial metabolism*, and an analysis of its implications for statistics agencies. The conceptual basis for the industrial metabolism idea is set out and the relationship to other *throughput* theories of sustainability is discussed. It is argued that systems approaches are becoming more important to environmental policy, under the rubric of *integration*. This is explained by the complex and indirect nature of many important contemporary environmental problems, from climate change to solid waste management. However, sophisticated analysis of specific problems can also be a recipe for confusion, and a lack of direction. There is a parallel need for more simplified overview assessments and indicators which can be used to set targets, evaluate progress and in communication of basic messages to diverse stakeholders, from industry to the final consumer. National or regional materials accounts-based indicators can serve this purpose effectively.

Based on the literature, the paper proposes a number of possible materials-based indicators, and then applies them using data for four countries: Germany, the Netherlands, the United States and Japan. Data shows that industrialised economies have convergent per capita materials throughputs; are highly "linear"; have growing absolute throughputs; and slowly declining relative throughputs.

The authors recommended four actions by European statistics agencies to begin the process of instituting a system of materials-based accounts within the EU:

- Materials and energy efficiency need to be established as key goals in a sustainable development strategy.
- A common indicator set needs to be chosen at an EU level. There are a host of indicators initiatives within the EU today, including Eurostat's own Indicator Project. These initiatives need to be gradually harmonised, so that a common indicator set emerges which is useful, technically sound and allows comparability across the EU and outside it.
- Eurostat should, together with national statistics agencies, begin collecting and collating materials-based data which will be the basis of materials accounts and indicators. A proper assessment should be made of the effort involved in collecting data for different families of indicator sets.
- Eurostat should, together with national statistics agencies, begin to publish materials accounts and indicators, and play a role in facilitating greater understanding of their potential usefulness amongst policymakers and the private sector. There is a clear need for public policymakers to play a leadership role in promoting these new information instruments.

Economy-wide material flow accounts, foreign trade analysis, and derived indicators for the EU, Report prepared by Schütz H., Moll S., Steger S. of the Wuppertal Institute for the Commission of the European Communities and Eurostat-unit B1 (contract n° 200241200011), 28 December 2003, 230 p. (study n° 56)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/material_accounts/200241200011_wipdf/_EN_1.0_&a=d

This report prepared in 2003 by the Wuppertal Institute includes MFA data from the 15 EU member States (EU-15), the accession countries (AC-10) that were then about to enter in EU either in January 2004 or in January 2007, 2 EU candidates (Croatia and Turkey), and 2 EFTA countries (Norway and Iceland), as well as a few non European countries (Australia, Bolivia, Brazil, china, Egypt, Japan, USA and Venezuela). The analysis of the data covers the period from 1976 to 2000.

The report is composed of 3 parts dedicated respectively to

- the methodological development of MFA by economic branch,
- cross-country comparisons of MFA in Europe as well as outside Europe,

- and a MFA-based analysis of the European communities/European Union (EC/EU) foreign trade from 1976 to 2000.

Recommendations were formulated on each of these items both for Eurostat and the European Commission. As far as Eurostat is concerned, the authors recommended:

- the integration of material input accounts in the NAMEA framework and the development of water emissions and solid waste disposal accounts by industry consistent with the economy-wide MFA methodology in order to enable more in-depth analysis (input-output analysis, refined sector analysis);
- to encourage the implementation of economy-wide MFA, the revival of the MFA task force including cooperation with EEA and the drafting of a practical manual for a better comparability across EU countries as well as worldwide.
- to integrate the international trade MFA system developed in this study into regular activities and to support national statistical offices to do so in order to monitor the environmental effects of market integration and to analyse the possibility for reducing foreign trade imbalance.

Part 1 demonstrates, based on the German example, how economy-wide MFA (as referred in Eurostat methodological guide) could be distributed across economic branches. Only a few branches harvest (agriculture, forestry and fisheries) or extract (mining industries) raw materials (including unused materials) from the domestic environment in order to supply other economic units. The attribution of imports their related indirect flows to economic branches follows 2 steps. Firstly, the international trade statistics are converted from the combined nomenclature into a 60-product CPA-based classification. Secondly, for each product, weight/value-coefficients were calculated relating the physical import table available for 1995 to the corresponding monetary table. The coefficients were then used to compile the whole time series of "artificial" physical import from the monetary import tables for 1991 to 2000. The resulting domestic material input (DMI) and total material requirement) (TMR, i.e. including domestic unused flow and imports related indirect flows) accounts by economic branch are presented and analysed both as a whole and broken down by major material categories (fossil fuels, minerals and biomass).

Accounts of material output (emissions to air and water, and solid waste deposition) to the environment by economic sectors are compiled similarly as NAMEA-type accounts. However, A few differences exist between material output accounts (compiled after the methodology recommended by Eurostat for o economy-wide MFA) and accounts for NAMEA. Concerning air emissions, the major discrepancies occur for methane (CH_4) and nitrogen oxide (N_2O), since emissions from landfills and agriculture are not counted in MFA in order to avoid double counting with waste disposed of and fertilisers.

As pointed out about DMI and TMR, these types of MFA by economic branch (including output side accounts) may be used similarly as physical flows accounts for NAMEA for further input-output analysis [111].

Part 2 of the report offers a detailed cross-country comparison (see the list above) for DMI, DMC and TMR, both in terms of absolute value and productivity (GDP per DMI etc.). Also, for each of these three indicators, the report provides an inventory of the sources of MFA (Wuppertal Institute, Eurostat/IFF Social Ecology, countries' studies) including information on the differences as regards the compilation method or the basic sources and on the criteria that justified the choice on the source used for the study (consistence with Eurostat methodology, the breakdown by the major material groups, continuity of time series).

Among the numerous results presented, one can note a few of them. Domestic material input (DMI) per capita of EU-15 as a whole (19 t/cap in 1997) ranked in the midfield of the 43 economies studied and accession and candidate countries showed significantly lower ratio (12 t/cap for AC-10 and 10 t/cap for AC-14).

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[111] - In a report on NAMEA-based input-output analysis prepared for the European environment agency, the environmental accounts include DMI broken down by industry. Moll S., Vrgoc M. Watson D., Femia A., Gravgård O., Villanueva A. (2007), *Environmental Input-Output Analyses based on NAMEA data – A comparative European study on environmental pressures arising from consumption and production patterns*, Prepared for the European Environment Agency / European Topic Centre on Resource and Waste Management (Project manager: Kazmierczyk P.), ETC/RWM Working paper 2007/2, 153 p.

EU-15 ranked high as regards domestic material consumption (DMC) share of DMI (95%), indicating that most EU-15 DMI was dedicated to domestic consumption. the authors stressed that, due to its limited capability as an indicator for material management, DMC should not be used alone.

Among the 12 counties that reported on total material requirement (TMR), Finland had the highest TMR per capita (99 t/cap in 1999), above the USA (88 t/cap), Germany (72 t/cap), Denmark (70 t/cap) and the Netherlands (67 t/cap). Poland and Hungary (both 32 t/cap) had the lowest ratio, just below Italy (30 t/cap), the UK (44 t/cap) and Japan (45 t/cap). EU-15, of which the TMR per capita remains relatively constant from 1980 to 1997, ranked in the midfield with 51 tonnes per capita.

Most of the economies studies (except e.g. Japan) had a lower DMI productivity (GDP/DMI) than the EU-15. EU-15 and the accession/candidate countries as a whole had achieved a relative decoupling of DMI from economic growth in terms of GDP.

Part 3 of the report investigates the environmental effect associated with international trade of the EU over the period 1976-2000, dealing successively with the overall monetary and physical flows, the same flows with respect to their origin or destination, and the land use for imports/exports and domestic consumption of agricultural commodities.

Over the period, EC/EU constantly had a clear and increasing surplus of imports in physical terms (*physical trade balance, PTB*), whereas it had a surplus of exports in value. The same result was observed for the PTB of TMR, EC/EU has been requiring more physical resources than it has been providing to the rest of the world, material imports of EC/EU covering the requirement for resource that are not available domestically and that are not substituted by secondary resources (recycling).

Despite low income countries were playing a minor role as trade partner with EC/EU, their share of the TMR is significantly higher than their share of absolute imports. As concerns direct resources imported, newly industrialised countries increasingly took over the role of raw material providers, replacing the developing countries. Latin America was a significant source for imports and related TMR for EC/EU.

From 1995 to 2000, EU required constantly about 3 times more agricultural land for its imports than it provided to the rest of the world through its exports of agricultural commodities. The EU land use related agricultural imports were mostly located in Latin America (MERCOSUR), as well as North America and West Africa (APEC).

5.2.10 NAMEA-based analysis or indicators

Belgium

The NAMEA air for Belgium (1990/1994-2002), Report to Eurostat (grant agreement n° 2 004 714 10006), Sébastien Gilis and Guy Vandille, Federal Planning Bureau, Brussels, February 2006, Parts IV to VI, pp. 45-87. (study n°53b)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/energy9094-02bepdf/_EN_1.0_&a=d

The 3 last parts of the report present different NAMEA-based analysis:

- Part IV is devoted to traditional input-output calculations (allocation of emission to final demand of products, emissions embedded imports and export);
- Part V compares different scenarios (projections) using medium term forecast models;
- Part VI presents the decomposition analysis of CO_2 emissions changes in Belgium.

The Federal Planning Bureau (FPB) also carried out input-output NAMEA-based analysis using the traditional inverse (Leontief) matrix input-output approach:

- The authors started with the allocation of energy use[112] and air emissions to the final demand for products. The report identifies 5 products that play a leading role, both directly and indirectly, in Belgian energy use/air emissions: chemical products, iron and steel, non-ferrous metals, electricity and construction.
- They also calculated the direct plus indirect energy use and air emissions embedded Belgian exports and imports in order to determine whether international trade enables Belgium (a small open economy) to save on energy and air emissions or on the contrary induces extra energy use and related pollution. Such an approach implies to assume that national economy would be able to produce the goods that are imported and that imports are produced with the same technology as if they were produced by the national economy (see below the study n° 99 from the Unites Kingdom). In 2000, the Belgian industry used more (direct plus indirect) to produce goods for export than the energy saved thanks to imports of goods (i.e. that the Belgian industry did have to produce), despite Belgian exports were less energy intensive than its imports.

The authors combined the Belgian NAMEA air with the HERMES macroeconomic model of the FPB in order to calculate medium term projections (2002-2015) of air emissions. For policy relevance, the projections were calculated on a regional basis (aggregated at the A31 level because of economic data availability). The 1995-2001 NAMEA data-set (air emission intensity of output, value added and household consumption) resulting from the report prepared in 2004[113] was used as starting point and 5 different scenarios were tested as regards technological evolution and changes in the emission intensities.

Finally, the authors used the opportunity of the energy accounts they compiled for the FPB to undertake a decomposition analysis of CO_2 emissions changes in Belgium between 1990 and 2002. Referring to a recent Eurostat Working Paper on decomposition analysis (study n° 120 below), they chose for an index decomposition analysis (i.e. without input-output tables) by industry (34-industry level) and based on a year-by-year approach. For the Belgian economy as a whole, the positive impact (pull the emissions down) of emission intensity (emissions/energy use), energy intensity (energy use/value added) and, to a lesser extend, the economic structure (shares of the different industries) almost compensate the negative impact resulting from the economic growth (the higher the level of aggregation the higher the impact of the economic structure). The same kind of results is presented for three groups covering respectively primary, manufacturing and services industries as well as for the largest polluters.

Denmark

Analysis of Change in Air Emissions in Denmark – Time series, Bridge table, Decomposition analysis, Report to Eurostat (grant agreement 2004 412 00007), Peter Rømose Jensen and Thomas Olsen, Statistics Denmark, June 2003, 109 p[114]. (study n° 45b)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air/emissions_2001pdf/_EN_1.0_&a=d

As indicated in the title, the report has 3 objectives (for the 2 first objectives see above in the section dedicated to the summaries related to air emissions for NAMEA), of which analysing the changes that occurred in the Danish air emissions over the nineties. In addition, the last chapter deals with the impact of a modification in the assumption usually made on the Danish imports of electricity.

[112] - The Federal Planning Bureau compiled NAMEA-type energy accounts covering the same period as air emission accounts (see section A.3.1.2 above).
[113] - Vandille G. and Zeebreock B. (2004), *The NAMEA air for Belgium (1990/1994-2001)*, Federal Planning Bureau, Brussels, January 2004, 117 p.
[114] - An slightly updated version was presented at the International conference on Input-Output Techniques: Rømose P., Olsen T. (2005), *Structural Decomposition Analysis of Air Emissions in Denmark 1980-2002*, Paper presented at the 15th International Conference on Input-Output Techniques, Beijing (China), June 27 to July 1, 2005, 36 p

Structural decomposition analysis

Chapter 4 of the report deals with the (NAMEA-based) decomposition analysis of changes in air emissions over time. The chapter stars with a description of data required: input-output tables, air and energy accounts. In the methodological consideration, the report stresses on the difference between actual structural decomposition analysis (SDA), i.e. based on input-output calculations, and index decomposition analysis (IDA) undertaken at a more aggregated level (the report does not refer to the Eurostat Working Paper dedicated to the decomposition analysis prepared by Germany, see below study n°120). SDA, which is the method applied by Danish Statistics, enables to take indirect effects into accounts, whereas IDA is limited to direct effects. The report gives a detailed presentation of the data set used, before the presentation based on a selection of charts (additional charts are provided in appendix 3). The Danish decomposition analysis stresses how the final demand is the most significant determinant as regards CO_2 emissions increase; whereas energy intensity (manufacturing industry) and changes in the energy mix have a favourable effect. In the case of SO_2, the decline resulted mostly from the improvement of the emissions coefficients (sulphur content and filters) and the energy mix. As concerns NO_x, the main factor improvement is the decrease of the emission coefficients (catalytic converters on motor vehicles).

Imports related air emissions

Input output models are commonly based on the assumption that imports are produced with the same technology as if they were produced by the national economy. Therefore imports related emissions are estimated using national emission intensity (emissions that would be caused if the national economy had to produce the corresponding goods or services itself). Electricity imports make up a significant proportion of the Danish final demand. In this context the report shows how significant are the differences between the traditional approach and estimations based on foreign coefficients (coming from foreign environmental accounts) because of the respective breakdown of electricity production capacity in Germany (other thermal and nuclear), Norway (hydro) and Sweden (both hydro, nuclear and other thermal). In general, the traditional approach overestimated the actual Danish electricity imports related emissions (especially for CO_2 and NO_x).

Sustainable Development Indicators Based on National Accounts, Report prepared by Ismir Mulalic and Tomas of Statistics Denmark for the 23:e Nordiska Statistikermötet, Åbo, Finland, 18-21 August 2004, 16 p. (study n°111)

http://www.stat.fi/abo2004/foredrag/mulalic.pdf

The general idea of this short paper is to argue in favour of sustainable development indicators (SDI) derived from a unique statistical system where all data share the same classifications and concepts. The system of economic and social accounting matrices and extensions (SESAME) is introduced as a relevant example.

The paper starts (chapters 2 and 3) with an introduction to sustainable development (SD) from an economic perspective (briefly reviewing the different categories of environmentally adjusted national products – EANP), concluding that despite the number of indicators proposed in the economic literature, they are unlikely to used by national statistical institutes. Then, it presents the Danish set of indicators (chapter 4) and illustrated the relevance of EA-based indicators thanks to an example based on the Danish NAMEA (chapter 4). The paper finally introduces the SESAME framework, using Dutch illustrations, as the most relevant statistical system since it covers the 3 dimensions of SD (chapters 5 to 9, including the conclusion).

The example given in chapter 4 shows that IPCC-based CO_2 emissions compared to GDP (at 1995 price) has been decreasing continuously between 1996 and 2002, whereas the NAMEA-type CO_2 emissions compared to GDP has stopped decreasing in 2000 due to the international transport related air emissions that are excluded from the IPCC data set. In NAMEA both economic and environmental data share the same classifications (e.g. industry classification) and concepts (e.g. residence principle). Another advantage of that kind of statistical system comes from the possibility of further analysis of the underlying mechanisms and reasons for changes over time (e.g. investigation at a detailed level of industries). However, NAMEA does not cover the social dimension of SD and, in 2004, the social accounting matrix (SAM) was still lacking in the Danish statistical system.

According to the authors, the SESAME presents the great advantage of combining data that cover the 3 dimensions of SD and offers the same possibilities for further analysis as illustrated in the paper with NAMEA data. However, as note at the end of the text, the SESAME does not provide objectives of sustainability and does not indicate whether the country is on a sustainable path or not.

Germany

Decomposition analysis of Carbon dioxide-emission changes in Germany – Conceptual framework and empirical results, Report prepared by Steffen Seibel, Federal Statistical Office of Germany / Eurostat, Office for Official Publications of the European Communities, Working Paper and Studies, Theme 2: Economy and finance (catalogue N° KS-DB-03-002-EN-N), Luxembourg, February 2003, 35 p. (study n°120)

http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Content/Publikationen/Fachveroeffentlichungen/UmweltoekonomischeGesamtrechnungen/Decomposition,property=file.pdf

This paper describes the theoretical background of EA-based structural decomposition analysis of changes. It is split into 2 parts. The first part is a didactical presentation of the different methodological approaches (including the rationales behinds the German statistical office's choices). Part 2 is empirical and focuses on the method applied in the German environmental economic accounts (GEEA).

Part 1 starts with the basic principles of decomposition analysis: any decomposition analysis is an equation where variables of which the observed changes analysed is written as the products of factors considered as underlying causes (e.g. energy use of production (E) can be decomposed as the product of energy efficiency and the production (P): E = E/P*P) between 2 points in time (denoted here 0 and 1). The energy change (ΔE = E(1) – E(0)) can be decomposed in 2 different ways: either the *efficiency effect* is due to the change of efficiency (ΔE/P) with a production unchanged (P(0)) and the *volume effect* is cause by the development of the production (E/P(1)*ΔP+P(0)*ΔEP).) or it is the other way round (P(1)*ΔE/P+E/P(0)*ΔP). As stressed by the author, a choice has to be made by the analyst.

Referring to the literature, the paper lists different possible approaches:

- In the illustration above, the decomposition considers "isolated effects", i.e. there no "mixed effects" resulting from interacting changes,
- When considering the point in time, the coefficients (E/P and P) of the 2 effects (energy efficiency and volume) can be evaluated either at the initial point (Laspeyres index) or at the actual point (Paasche). The example performs a mix (E/P(0) and P(1) or E/P(1) and P(0)).
- If an approach with residual term is adopted, the analyst has also to choose how to apply it. The Paper enumerates 3 possibilities: it is so small that it is neglected, isolated effects and mixed effect are analysed separately, or the residual term is distributed across the different isolated effects.
- In order to analyse long time series, one can look at the starting and actual year or make a year-by-year analysis (and sum up the results),
- Finally, the analyst has to decide which level of detail to adopt regarding the sectoral breakdown (this decision depends of course on the data availability).

Dutch approach[115] that serves as a guiding model for the GEEA work on NAMEA-based decomposition analysis does not consider mixed effects and has no residual term. However such a decomposition analysis has no unique solution. The German paper makes then a focus on the Dutch methodological *extension* proposed in order to calculate the average of the existing solutions. The concept of "hypothetical emissions" arguing that the effect would have happened only if the factor

[115] - De Haan M. (2000), *Decomposing Annual Changes in Pollution according to their Causes: a NAMEA Time Series Analysis*, Report to Eurostat concerning the project entitled "The Further development of the NAMEA and its Application in the Netherlands", Module 2, Ref. n°98/562/2040/B4MM, Statistics Netherlands (CBS), Voorburg, August 2000, 16 p.
De Haan M. (2001), "A Structural Decomposition Analysis of Pollution in the Netherlands", *Economic Systems Research*, Vol. 13, n°2, June 2001, pp. 181-196.

under consideration had changed while all the other factors remained constant (*ceteris paribus*) is also mentioned, but it is not dealt with in the empirical part of the paper.

In **part 2**, the empirical work undertaken focuses on CO_2 emissions. Decompositions based on 4 models resulting from different combination of factors sets and approaches are examined and compared:

- Model A: extended method, IO-based factors (industry, households) and desaggregated level.
- Model B: simple method, IO-based factors.
- Model C: extended method, simple factors (non IO-based)
- Model D: simple method, simple factors (non IO-based).

5 factors are taken into consideration as follows for industries: emission intensity of energy (CO_2/E), energy intensity of output (E/O), intermediate consumption structure $(I-A)^{-1}$, final demand structure (C/Ctotal), final demand volume (Ctotal) that lead to the starting equation:

- $CO_2 = CO_2/E * E/O * (I-A)^{-1} * C/Ctotal * Ctotal$.

For households, of which housing activities (eating and cooking) and transport (with their own cars) are taken into consideration alternatively, the staring equations are as follows (where A is the surface of the living space, km the distance driven, P the number of persons and H the number of households):

- Housing : $CO_2 = CO_2/E * E/A * A/P * P/H * H$
- Transport :$CO_2 = CO_2/E * E/km * km/P * P/H * H$.

As regards the empirical results, the paper starts with a detailed presentation of the **model A**-based year-by-year decomposition of production-related CO_2 emissions in Germany between 1993 and 2000 (the table show the year-by-year results and the sum for the overall economy). The decline of emissions observed over the period resulted from (descendant order of importance) the improvement of the energy intensity, the change in the final demand structure, and in the intermediate consumption structure and emission intensity of energy use that compensated the growth of the final demand.

The report also demonstrates how the decomposition into the same 5 effect is affected by the level of detail of the industry breakdown adopted. The abovementioned results were obtained using a disaggregation by 70 branches. The same decomposition has been carried out for 58 and 12 industries respectively. When turning from 70 to 58 industries, the results were slightly changed compared to the 70-industry-based decomposition, but without changing the ranking of the effects. When further aggregating to a 12-industry level, intermediate consumption structure became the most powerful decreasing effect, replacing the energy intensity that then ranked 3. The report stresses that it is possible to disaggregate the results by industry (the illustration is based on the Dutch and UK's examples extracted from the draft SEEA).

For households, the decomposition analysis covers the period 1991-2000. Concerning housing it shows that the emission intensity has been the most powerful factor, before the energy intensity and household size that all together over-compensated the effect of the increase of the individual living space and the household number. Regarding transport, energy intensity, emission intensity and household size all together over-compensated the effect resulting from the increase of the individual mobility and the number of households.

With the same factors considered, but no calculation of the mean of all possible decomposition forms (**model B**), the overall magnitudes remained the same. However, the report shows that the procedure adopted for the calculations (bottom up or top down) could also provoke (small) changes.

When input-output tables are not available (**model C**), the relation between output and final demand cannot be modelled. Therefore the starting equation becomes as follows (where VA stands for value added and GDP for growth domestic product):

- $CO_2 = CO_2/E * E/VA * VA/GDP * GDP$

The results obtained show that the importance of the effect calculated depends heavily on the definition of the factors. The effect related to emission intensity, which is the only factors of which the

definition is the same for model A and B, remained almost the same. On the contrary, the effect of energy intensity (that changed from E/O to E/VA) and the structural effect (that is composed of $(I-A)^{-1}$ and C/Ctotal in model A and represented by VA/GDP in model B) changed very significantly (sharp increase for the first and the second turned to the opposite).

Like for the comparison between model A and B, when specific decomposition forms are calculated instead of the average of all possibilities, but without input-output tables (model C and D), the results are similar. However results of **model D** (like model B) depend on the procedure (bottom up or top down).

The German statistical office planned to implement decomposition analysis on a regular basis within the GEEA.

Netherlands

Decomposing Annual Changes in Pollution according to their Causes: a NAMEA Time Series Analysis, Report to Eurostat concerning the project entitled "The Further development of the NAMEA and its Application in the Netherlands", Module 2 Ref. n° 98/562/2040/B4MM, prepared by Mark De Hann, Statistics Netherlands (CBS), Voorburg, August 2000, 16 p. (study n°82)

One major goal of the Dutch project was the development of analytical tools that can support the presentation of NAMEA information in the annual CBS publication “De Nederlandse Economie” (the Dutch Economy) and in “Milieucompendium” (the annual environmental statistics publication) of RIVM (Government Institute for Public health and the Environment) and CBS.

The report starts (chapter 2) with a presentation of the data-set (environmental accounts and national accounts). The non uniqueness problem is discussed and a solution proposed in the following chapter (3). The results (chapter 4) are presented separately for the domestic environmental pressure only, and including imports related pressure.

This analysis is based on an input-output model where the annual change in pollution (amount of air emissions and solid waste) is described as a linear additive function of efficiency gains or losses (emissions per money unit), changes in the economic production and final demand structures, and the increase of the final demand volume.

The decomposition analysis of domestic pollution reveals dynamics in data that are not directly visible in a regular comparison between economic and environmental data. In all the three cases specifically investigated (CO_2, acid emissions, and solid waste) basically two major forces determine the development of emissions in time. On the one hand, increase of emissions is strongly related to expenditure growth. On the other hand, efficiency improvements lead to a downward movement of emissions. The structure effects (production structure and final demand composition), which are less strong and which have a rather negative impact on the amount of emissions, are most significant on the demand side (shift of final consumption to product with lesser emission intensity). For the acidification (and solid waste) case, efficiency gains and structural changes outweighed the volume increase, while the opposite occurred for CO_2 emissions.

Since in the analysis dealt with above, environmental pressures of imported goods end services are neglected, the substitution of high emission intensity productions for import could wrongly be seen as an improvement of the environmental performance of the domestic economy. Statistics Netherlands has started incorporating international trade related emissions by assuming (first approximation) that domestic production technology is representative for the emissions of competitive imports (ignoring imports that are not domestically produced).

Applied to CO_2 emissions, this analysis reveals a gap between the Dutch balance of trade and its related balance of emissions. In 1997, total imports measured in terms of money reached 88% of exports, while this ratio was only 74% in terms of CO_2 attributed respectively to imports and exports. This means that the Netherlands exports products with relatively high emission intensities compared

to its imports. This kind of analysis also shows the utility of compiling NAMEAs all over the EU in order to analyse intra-community trade related emissions.

Finland

The Economy, Energy and Air emissions, Report prepared for Statistics Finland by Ilmo Mäenpää, Thule Institute of the University of Oulu, Eurostat Working Paper n° 2/1998/B/2, 17 November 1998, 43 p. (study n°79)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp98finnam_pdf/_EN_1.0_&a=d

This publication is the English translation of a study financed by the energy department of the Finnish Ministry of trade and industry. It was one of the first Eurostat Working Paper dedicated to NAMEA-based analytical applications. The document presents an overview of how the structure of the economy correlates with the consumption of energy and emission of air pollutants.

After the presentations of the data taken into accounts: input-output table, 24 types of fuels and 3 air pollutants for 1993 (chapter 2), the document examines successively the energy and air emissions by industry (chapter 3), the energy and emissions coefficients by commodity, i.e. direct plus indirect emissions (chapter 4), the energy use and emissions of households (chapter 5), and the energy and emissions intensities by the economy as a whole, i.e. final demand components (chapter 6). Are provided in annex, the methods used to establish the energy and air emission accounts by industries, the input-output mathematic formulas, the industry classification and the basic tables.

The examination focuses on the amounts of energy consumed and energy-related air emissions (SO_2, NO_x and CO_2 separately from fossil fuels and biomass) generated by various industries. The different industries are compared with each other, industry's energy consumption and air emissions being proportioned to their value added. The energy consumption and air emissions relating to the commodities (direct, domestic indirect and imports related indirect energy use/air emissions) have been rendered comparable with each other by examining them in proportion to the industry's total value of production.

A further area of study is the distribution of the commodities' final use across the final demand components: private consumption, public consumption, capital formation and export. The research method used was the input-output model of the national economy (66-industy input-output table for 1993, aggregated into 58 industries), which describes how commodities flow between different industries and are divided between the main final product user groups and therefore shows what proportion of each industry's production has been tied up in the production process of each final product commodity. The total energy tied up in the final product commodities and the corresponding air emissions (direct plus domestic and imports related indirect energy/emissions) can then be established from this. Finally, the study also shows how the energy consumed in the production of the commodities is, in the final analysis, tied up with the structures of their final use.

Sweden

The Environmental impact of Swedish Trade, Report to Eurostat, prepared by J. Westin, A. Wadeskog, Statistics Sweden, Miljöräkenskapaper n° 2002:2, Stockholm, June 2002, 81 p. (study n°121)

http://www.scb.se/Statistik/MI/MI1202/2000I02/MI71OP0202.pdf

This report follows up the previous Swedish pilot study made on this subject and of which a 9-page summary was available in English[116] (results of the previous report are briefly given in introduction). The investigation made for these reports started from the idea that Sweden is a rather small country with a very open economy. A large proportion of the products consumed in Sweden are not elaborated

[116] - *The Environmental Impact of Swedish Trade – Results from a pilot study*, May 2000, Summary, 9 p.

domestically and the related environmental impacts affect Swedish trading partners. On the other hand, some of the Swedish industries are export-oriented and most of their polluting emissions are therefore driven by Swedish trading partners' final use.

This report firstly aimed at assessing methodologies to estimate the balance of imports and exports related air emissions for Sweden. 4 methods are compared; methods 1 and 3 used here are the same as those tested in UK (see study n°99 below).

- Method 1 is based on national emission coefficients (or emission intensity). Emissions attributed to Swedish imports are therefore calculated as if imported goods and services were produced as they are domestically.
- Method 2 consists in adjusting method 1 coefficients, using weighting factors (overall coefficient for Swedish imports / Swedish coefficient). The overall emission coefficient of imports is a weighted average of the national emission intensities (total emissions / GDP) of Sweden trading partners, taking into account their respective proportions in Swedish imports.
- Method 3 is based on the actual Swedish trading partners' emission coefficients or emission intensities of production (total emissions by industry / output by industry). This approach uses NAMEA-air data available then at European level[117].
- A 4th method was tested using Danish data. Method 4, which is presented as the original Swedish proposal, is supposed to be a refinement of method 3. The Swedish idea was to use its trading partners' emission intensities of final demand that result from input-output calculation. However, data were lacking and a preliminary investigation was undertaken using Danish data.

The report focuses on 3 air pollutants (CO_2, SO_2 and NO_x). The years 1995 and 1998 were studied for the first 2 methods, whereas NAMEA data had then a reasonable coverage for 1995 only. Basic calculations and results by country and, when it was possible, by industry are given in the annexes.

Results

With **method 1**, imports emissions were lower than exports emissions (positive *trade balance for air emissions*) for all the pollutants for 1995 and 1998 (decrease between 1995 and 1998). Emission intensities of imports were also systematically lower than exports' emissions. S*hares of emissions in other countries* were spread out from around 35% (CO_2 and NO_x) to almost 50% (SO_2) and all of them have been increased between 1995 and 1998.

According to **method 2**, the Swedish *air emission trade balance* was still positive for NO_x, but it became negative for CO_2 and SO_2. The significant increase of all imports' emissions between 1995 and 1998 lead to lower the *trade benefit* for NO_x emissions and pulled up the *trade deficit* for CO_2 and SO_2. Emission intensities of imports were higher than exports' emission intensities for CO_2 and SO_2 (the difference was wider in 1998) and lower for NO_x in 1995 (almost equal in 1998). Results about the *shares of emissions in other countries* differed to method 1 (e.g. with method 2, SO_2 emissions of imports represented around 80% of emissions driven by the Swedish final use).

Results of **method 3** (estimates produced only for 1995) were rather similar to those obtained with method 2. Results by industry and by country are given in annex.

At macroeconomic level, **method 4** gave rather similar totals of emissions related to imports from Denmark as those calculated using method 3 (especially for CO_2 and NO_x, the result was slightly lower for SO_2).

The authors conclude firstly that method 1 is clearly not sufficient enough. Method 3 shows the best overall coverage, especially thanks to EU-wide NAMEA data. Results of method 2 are rather close to those of method 3, but they do not make it possible an industry by industry analysis. Method 4 is foreseen as the best approach in order to estimate the real emissions of one country's trading partners' emissions, since it is based on final demand related emission instead of producers' emissions.

[117] - Eurostat, *NAMEAs for air emissions - Results of pilot studies*, Office for Official Publications of the European Communities, Theme 2: Economy and finance – Collection: Detailed Tables, Luxembourg, 2001, 231 p.

Analyses

Results from method 2 (for 1995 and 1998) were used to compare emissions related to the production of goods and services used domestically (designated as *indirect emissions*), emissions directly related to final use, like driving private cars and heating houses (*direct emissions*) and emissions of imports (*in other countries*). Such a comparison tends to show that a significant proportion of emissions related to the Swedish final use occur in other countries (more than 50% to 60% of SO_2 and around 30% for CO_2 and NO_x).

Trade adjusted environmental accounts based on estimates from methods 3 are presented for a selection of 8 industries or group of industries (the 29-industry classification is given in annex, table E, p. 61). *Traditional accounts* – i.e. air emission accounts prepared for NAMEA – are "adjusted" with the *net trade emissions* resulting from the difference between exports and imports' emissions (*trade balance for air emissions*).

Because of its exports of grain and forest products, Sweden shows higher exports than imports related emissions of NO_x (it is the other way around for CO_2 and SO_2) for agriculture and forestry (NACE 01-02). As far as manufacturing pulps and paper plus publishing and printing (NACE 21-22) are concerned, exports' emissions are largely higher than imports, except about CO_2 for which imports are almost as high as exports thanks to the extensive use of bio-fuel. Coke, refined petroleum and nuclear fuel (NACE 23) imports' emissions of CO_2 and SO_2 (NO_x are rather negligible) are significantly higher than the exports, apparently because of emission intensive imports from UK. The comparison between imports and export seems to show that basic metal and fabricated metal products industry is less SO_2 intensive in Sweden than in its trading partners (about CO_2 and NO_x, imports and exports are rather similar). Electricity, gas and water supply (NACE 40-41) represents a very small proportion in Swedish international trade, but related CO_2 and SO_2 emissions are not negligible. Although imported electricity mostly comes from Norway where the production is mostly based on hydro-power, imports' emissions are significantly higher than exports' emissions (the rest comes from Denmark and Finland). The Swedish production (and therefore exports) has also a very low emission intensity thanks both to hydro and nuclear power. Despite imports/exports of transport, storage and communication (NACE 60-64) are below 10% of total imports/exports, this industry represents a significant proportion of Swedish international trade related emissions (from 35% to 55% of exports and around 20% to 50% of imports). This is largely due to the extensive international shipping activity by Scandinavian countries.

The report also compares imports and exports related emissions to/from each of the Swedish trading partners (14 of the European countries included in the above mentioned 2001 Eurostat NAMEA-air compilation and a category grouping countries from the rest of the world). Swedish imports related emissions of CO_2 from all countries were larger than Swedish exports related emissions. It is the same for SO_2, except for Austria and France, but, as far as NO_x is concerned, it is the case for only half of the European countries taken into consideration.

Conclusion and further work

As far as CO_2 and SO_2 are concerned, Sweden shows a negative *trade balance for air emissions* (emissions attributed imports exceed emissions attributed to exports) due to the importance of its hydro and nuclear electricity and its extensive use of bio-fuel (Swedish final use causes more emissions than can be seen in the traditional *air accounts* for NAMEA). On the other hand, Sweden has a positive *trade balance for NO_x emissions*. Its exports are rather more NO_x intensive than its imports. On top of high transport emissions (especially water transport), the report raised the question of a possible lack of harmonisation among methods used to estimate NO_x emissions.

The report shows how the compilation of NAMEA data at the international level is important to produce relevant calculations (method 3) on imports/exports related emissions in order to estimate *air emission balance of trade* between trading partners. Moreover, NAMEA-based input-output calculations are needed for method 4 that is seen as even more appropriate than method 3.

Structural decomposition of environmental accounts data – The Swedish case, Report prepared by Anders Wadeskog and Viveka Palm, Statistics Sweden, December 2003, 25 p. (study n°25)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/swdecomp-finalpdf/_EN_1.0_&a=d

This study aimed at undertaking a structural decomposition analysis of Swedish AE data. The authors refer to previous reports prepared in Europe in this area, especially by Statistics Netherlands[118] and the German statistical office (study n° 120 above), on which the Swedish study is build, adopting however a more pragmatic approach.

The 2 different methods: structural decomposition analysis (SDA) and index decomposition analysis (IDA) (see above the study n° 45 of Statistics Denmark), as well as the choice of index (Laespeyres, Paasche…) are briefly reminded at the beginning of the report (chapter 2), before the presentation of the data set used and the types of calculation carried out (chapter 3). The results provided (chapter 4) deal respectively with the SDA of air emissions excluding and including fossil fuel energy use, and with IDA of air emissions with fuel use. Annexes contain a table comparing results from the different approaches used, the list of fuels included, and the 24-industry NACE-based classification adopted.

The decomposition analysis undertaken deals with air emissions (CO_2, SO_2, and NO_x) and fossil energy use. It was based on the Swedish air and energy accounts for 1993-1995 and 1997-1999 (a methodological change prevent the authors to use data fro 2000 onwards) and unofficial input-output (IO) tables developed within the EA Division from the supply and use tables of national accounts (no official time series of IO tables was available).

Approach 1 (SDA without energy accounts) enables to decompose the overall change of air emission into the 4 following factors: change of emission intensity (emission/output), change in IO structure (inverse Leontief matrix), change in volume of final demand, change in structure of final demand.

Approach 2 (SDA including fossil fuel use) theoretically enables to add 2 factors to the list above: change in emission factors (emission/energy use) and change in fuel mix. However, since the Swedish EPA has not updated emission factors over the period, this factor could be taken into account (Statistics Sweden expected to be able to include this factor for future studies).

For the **approach 3** (IDA, i.e. non-IO-based method, but including fossil fuel use) change in the composition of final demand and in IO structure cannot be taken into consideration. IDA estimates the direct effect only (SDA takes direct and indirect effect into accounts thanks to the IO tables). Also, the economic variable is value added, instead of output in approaches 1 and 2.

The study highlighted the importance of transport (a sector with increasing emissions) and foreign trade patterns (Swedish exports related emissions are singled out and imports related emissions estimated using the domestic production and energy structure). It also showed that the different versions of decomposition analysis can be used to assess the compilation process of air accounts (adjustments made in the calculation needed to be reviewed). Non-IO-based approach gives different results since it focuses on some of the factors. However this approach should be relevant for many countries that lack IO tables.

Households in the environmental accounts, Report prepared for DG Environment and Eurostat by A. Wadeskog and Marja Larsson, Statistics Sweden, December 2003, 73 p. (study n° 23)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies&vm=detailed&sb=Title

This study followed a previous report to Eurostat on households and environmental accounts[119]. Statistics Sweden aimed essentially at linking Household Budget Data and environmental accounts.

Chapter 2 is dedicated to the method (reallocation of emissions to final consumption and imports, decomposition of changes) and the data sources (air emission accounts for NAMEA, input-output tables, household budget survey (HBS) for 1991-2001). Chapter 3 provides a review of experiences from 3 European countries (Denmark, Germany and United Kingdom) and European HBS.

At macroeconomic level (chapter 4), 3 components of households' emissions are considered: direct emissions, indirect emissions related to the production of Swedish goods and services and indirect

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[118] - De Haan M. (2000), *Decomposing Annual Changes in Pollution according to their Causes: a NAMEA Time Series Analysis*, Op. Cit.; De Haan M. (2001), "A Structural Decomposition Analysis of Pollution in the Netherlands", *Op. cit.*

[119] - Bergstedt E., Eriksson M. and Wadeskog A. (1999), *Environmental accounts Households*, Statistics Sweden, January 1999, 52 p.

emissions related to the production of imported goods. Indirect emissions are routinely calculated by statistics Sweden using the common IO-based allocation of emissions to final demand components. In this report, these 3 components of households' emissions were distributed by income deciles, geographically by county, by type of dwelling.

The decomposition analysis of changes over times (chapter 5) is also incorporated in the routine work. For this report, a simple structural decomposition analysis (based on IO analysis, see study n° 25 above) was made, identifying 4 factors of changes: emission intensity by industry, structure of the economy (Leontief inverse), structure of private consumption, and the sum of private consumption. Similar distributions (by income deciles, by county and by types of dwelling) as in the previous chapter were also applied.

Households' emissions were also analysed focusing on the activities they performed (chapter 6). Households were therefore viewed as producing unit (producing cleaning, care, meals, repairs and transport). Households' productions and their related air emissions were compared to similar market production and emissions (restaurant, reparations, trade, other private services *versus* cooking, cleaning/washing, maintenance, child care, and shopping etc.). The authors stressed that data available then did not facilitate the type of analysis presented that should be seen as illustration of what could be done with proper data.

For future studies, the authors would like to develop further analysis from the income distribution survey, as well as considering additional transport variables (types of vehicles, transport volume, urban/rural driving etc.).

Social NAMEA with a coupling to Sustainable Development Indicators – including environment industry, Report to Eurostat prepared by Marja Larsson and Matin Villner, Statistics Sweden, February 2005, 64 p. (study n°103)

http://www.scb.se/statistik/_publikationer/MI1301_2005A01_BR_MIFT0603.pdf

The main objective of the study was to compile social data by sector together with the Swedish economic and environmental data, i.e. social accounts to be combined with the Swedish NAMEA (and Swedish environment industry accounts). On the long run, Statistics Sweden wishes to perform analyses linking social and environmental dimensions, like Statistics Netherlands with its social accounting matrix (SAM)[120].

The report starts with description of the data sources and method used (Chapter 2), before presenting the social statistics for 4 different areas: employment & education, environmental industry, working environment and health (chapter 3 to 6). All these 4 chapters have the same structure: a brief presentation of the source, the list of indicators, and profiles by industry presented in parallel for women and men (for the environment industry, the profiles are broken down by environmental activity's domains). Information on the 3 Swedish surveys dealing respectively with living conditions, the work environment and work-related disorders is provided in the annexes, as well as the 42 NACE-based industry classification adopted.

The main data sources used are the 3 above mentioned surveys, the *Labour statistics base on administrative sources* (RAMS) and the database of Statistics Sweden on environment industry (see the study n° 92 in the section dedicated to environ ment industry). The degree to which the industries could be broken down has been limited by the number of observations for each variable.

Chapter 4 is much more connected to environment industry accounts than NAMEA. Concerning environmental industries, Statistics Sweden aimed to include more social picture than what had been included so far in the corresponding reports that were usually focusing on economic variables (turnover, exports).

Chapter 7 of which the title announces the combination of "Environmental accounts and social statistics" actually focuses on social statistics. This chapter shows how social issues, once social

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[120] - About the compilation of a statistical system covering economic, environmental and social data together, see also the Danish study n°111 above.

statistics are broken down by industry, could be analysed liked environmental issues thanks to NAMEA (profile and coupling/decoupling by industry).

Statistics Sweden planned then to further investigate the reasons behind the results presented in the report. Also, the general idea was to develop a framework that can contribute to assess the implementation of sustainable development in Sweden.

Energy use and CO_2-emissions for consumed products. IPP-indicators for private and public consumption based on environmental accounts, Report prepared by A. Carlsson, V. Palm and A. Wadeskog, Statistics Sweden, February 2006, 49 p. (study n°104)

http://www.scb.se/statistik/_publikationer/MI1301_2005A01_BR_MIFT0602.pdf

The objective of study was both to propose a method that would enable to produce integrated product policy related indicators (IPP-indicators) from EA and to present such indicators based on the Swedish EA available then. The report focuses on energy use and CO_2 emissions, i.e. NAMEA-type energy and CO_2 emission accounts.

The report starts (chapter 1) by presenting what is IPP (a EU initiative aimed at reducing environmental burden of products and services throughout their life cycle), the situation of IPP in Sweden and a short presentation of the EA that are extensively used in this project. The Swedish project started from the idea that most suggestions regarding IPP-indicators made so far were based on LCA-perspective despite its drawbacks (data intensive and does not enable any aggregation and therefore any connection to the total consumption of products). Consequently, input-output-based analysis appears to be appropriate to develop IPP-indicators.

After a short reminder of the objectives of the study (chapter 2), the report comes to the method (chapter 3). Input-output (IO) tables are not compiled on a yearly basis; all the time series calculated was based on the 1993 symmetric IO tables. IO calculations are developed from the traditional Leontief equation. Imports related emissions were calculated using the Swedish domestic IO tables (second best) because of a lack of data at international level. Direct households' use of fossil fuel and related emissions were allocated to the petroleum products and households electricity use to the product electricity. Data on CO_2 emissions come from the emission accounts for the Swedish NAMEA.

The report includes an assessment of the data quality domain by domain (chapter 4). Energy use and CO_2 emissions were considered of good quality.

The chapter (5) dedicated to the results starts with the inventory carried out by Statistics Sweden on the NAMEA-air available in EU countries (detailed tables are provided in annex). The IPP-indictors by product groups presented in the report correspond to the 2002 (direct plus indirect) energy use and CO_2 emissions broken down across a 50-NACE-based classification and split into private and public consumption. Petroleum products (including direct household emissions and fossil fuel consumption) ranked first (respectively 31% of the total energy use and 35% of the total CO_2 emissions), before electricity and heat (17% and 13%) and food products (9% and 10%)

For the IPP-indicators for private consumption by purpose presented, 2002 direct plus indirect CO_2 emissions and energy use (fossil fuels and electricity) are distributed across a 38-COICOP-based classification. Heat energy represented 75% of total energy use for private consumption, whereas it contributed only to 4% of total CO_2 emissions thanks to an extensive use of biofuels in Sweden. Operation of vehicles (transport for own account) represented 31% of the total and electricity 9%.

The time series of CO_2 emissions, related both to public and private consumption, covering 1993 to 2002 are shown split into 3 categories: direct stationary emissions, direct mobile emissions and indirect emissions. An illustration of the possibility for more detail breakdown is given with CO_2 emissions related to food products that are distributed across 9 categories of products: bread, meat, fish, milk & cheese etc…

The report concludes (chapter 7 and 8) on the advantages of the EA-based IO analysis adopted: it enables to connect resource use and environmental pressure with the consumption of goods and services; national and environmental accounts on which it is based make regular updating possible. However, data were not sufficient enough at international level in order to correctly take imports

related environmental impact into account. According to the authors, 3 types of data source would therefore need to be improved: IO tables, environmental accounts and foreign statistics by country.

Sustainable development indicators based on environmental accounts, Report to Eurostat prepared by Mats Eberherdson, Viveka Palm and Martin Villner, Statistics Sweden, February 2007, 40 p. (study n°105)

http://www.scb.se/statistik/_publikationer/MI1301_2006A01_BR_MIFT0703.pdf

This study aimed at providing initial consideration about the (EA-based) statistical framework that could underpin the implementation of sustainable development indicators (SDI).

In the introduction (chapter 1), the report give a few pieces of information on the Swedish sustainable development strategy (the full set of indicators is provided in annex) and describes the ideal shape of this statistical framework referring to the European DPSIR-model (Driving forces, Pressure, State, Impacts and Responses), where EA could provide information both on the pressure (e.g. air emission accounts) and the response (e.g. environmental taxes). Main Swedish indicators (GDP, energy use, CO_2 emissions etc.) are presented for the period 1993-2003 as regards coupling/decoupling (chapter 2). When the report comes to analysis, it shows the results of 3 types of analysis based on NAMEA-air (the report focuses on CO_2) that were performed by statistics Sweden: structural decomposition analysis (SDA), including for indirect emissions of final demand components, product groups related emissions and scenario analysis (chapter 3). The response side (chapter 4) is dealt with as regards legislation, technology, economic incentives (taxes and subsidies) and cost of measures (health).

The decomposition of CO_2 emissions variation (effects resulting from the changes of the emission intensity, the IO structure, the volume of final demand and the final demand structure) presented extends to 2003 the SDA previously carried out by Statistics Sweden (see above study n°25). The results are presented for the overall domestic emissions and for stationary and mobile emissions respectively. The decomposition is also presented for a 6-industry-group breakdown (basic industry, manufacturing, wholesale trade/transport, energy, construction/resident, and services). The wholesale/transport sector, which was responsible for the largest part of the overall increase, is presented wit more detail. Statistics Sweden also carried out the SDA to indirect emissions of final demand components (public domestic demand, private domestic demand and exports).

The household emissions related to product groups for 2003 updated the calculations presented in detail in a previous report dedicated to IPP-indicators based on EA (see above study n°104).

Statistics Sweden also calculated CO_2 emissions changes resulting from 5 scenarios: 1) 4% increase of the Swedish private consumption in value; 2) Improvement in the emission intensities; 3) A substitution of goods by services in household consumption; 4) scenarios 1, 2 and 3 together; 5) scenario 4 plus 20% reduction of households' direct use of fuels.

Concerning the economic incentives, regarding the response side (cf. the abovementioned DPSIR), the report focuses on taxes and subsidies. It does not deal with environmental protection expenditure (EPE), which is another type of indicator of the response to environmental pressure (the use of EPE data in connection with the other EA for analytical purpose is dealt with in the Swedish study n°19, see below in the section on *Other analysis and indicators*).

In the conclusion, the authors mention another area that deserves further investigation. It is the distribution of households' emissions across different types of purposes, income groups etc. (see below the study n°23).

United Kingdom

Methodologies for estimating the levels of atmospheric emissions arising from the production of goods imported into the UK, Report to the DG Regional Policy and Eurostat, Rocky Harris, Office for National Statistics (ONS), London, July 2000, 69 p. (study n°99)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp01imuk_pdf/_EN_1.0_&a=d

The UK's project starts from the fact that trade forms a large proportion of EU countries national income and that productions and transport of traded goods and services give rise to environmental impacts (air emissions in this case). The ONS investigated how to estimate air pollutants arising from the UK's consumption of imported good and services - i.e. produced in other countries. Three approaches were tested:

- Method 1: assuming that UK emission intensities apply,
- Method 2: using other countries' fuel use statistics;
- Method 3: using other countries' environmental accounts.

Estimates using the 3 methods focus on direct emissions of CO_2. However, some calculations were made for a few other emission types and also estimates of "indirect" emissions resulting from electricity used for the production of imports.

Methodological approach and data sources

For the **method 1** (the simplest), the UK's emission rates were applied to imports into the UK – i.e. assuming that productions of imported goods and services into the UK show the same emission intensities as for the UK's industries. The same approach (assumption) was applied for estimating indirect emissions of electricity production related to imports into the UK – i.e. not the calculation of full indirect emissions based on the input-output analysis.

Method 2 tries to overcome the weakness of method 1 as regard the accounting of differences in emission intensity of foreign industries exporting to the UK. Air emissions are then estimated from fuel use of relevant industries. However, this approach can therefore be used only for estimating CO_2 emissions. This method was also applied for estimating "indirect" emissions of electricity imported into the UK – i.e. emissions related to the production of electricity by the countries from which it is imported. Data on the 10 selected countries (of which 5 EU countries) used for testing method 2 come from the 'Global Economy-energy-Environment' module of the COmprehensive Model for Policy ASSessment (COMPASS) developed by Keio University (Japan).

Method 3, which is supposed to be the most relevant, overcomes the main limit of method 2 since it applies for a wider range of pollutants than CO_2 only. Data on emissions associated to imports into the UK come directly from the environmental accounts of the UK's (major) trading partners. Such a method is possible for a few selected countries, but was applied solely to Denmark for this report. Indirect emissions related to electricity consumption were estimated using also Danish environmental accounts.

Results and limitations

Because of data availability, estimates were made for 1990. The comparison between the three methods was possible for 11-sector classification including agriculture, food production, textiles, wood products, paper and printing, chemicals, minerals products, iron and steel, non-ferrous metals products, machinery and transport equipment. Mining, petroleum and coke products, as well as 'other' category were excluded of the test since they were definitely really lacking consistency.

Although the assumption that the UK's emission intensities apply to imports into the UK (**method 1**) is unrealistic, resulting estimates have to be seen as a relevant starting point for further analysis. The report also points out that they are useful in order to be compared to the estimated emissions relating to the UK's exports, showing on this basis that the overall emission intensity of UK's exports is 10% higher than the emission intensity of the UK's imports.

Method 2 estimates of total (direct) CO_2 emissions resulting from the production of UK's imports are almost 10% lower than those that are based on method 1, but selected UK's trading partners cover around 60% of the UK's imports trade on average. Also, these countries are mostly OECD members and it is unlikely that they are actually representative of all the UK's trading partners. All the more, data from the COMPASS model does not entirely cover all emissions that are included in environmental accounts, but around 70 to 80% as far as CO_2 in concerned.

The detailed presentation of results by sector when using method 2 (estimates by country are annexed to the report) also points out some inconsistencies in the classifications underlying data sources that lead to some heterogeneity in emissions terms in the 11 sectors. It is especially the case for the 'chemical products' sector that cover a wide range of products (and for the 'mining, petroleum and coke products', which has eventually not been included for the results shown in the report).

"Indirect" CO_2 emissions from electricity imported estimated from method 2 were (in 1990) about 25% lower than emissions based on UK's emission intensity (method 1). The low emission intensity of the French electricity production due to its nuclear power plants has a significant impact.

Method 3 was only tested for Denmark (estimates for Sweden are only shown in annex because of a lack of reliability). Results confirm, firstly, that lower emissions (CO_2, SO_2 and NO_x) are associated to imports from Denmark than they would if the UK's rates were applied and, secondly, that the COMPASS model-based data (CO_2) underestimates emissions resulting from the production of imports into the UK.

Results suggest a lack of consistency between data sources. COMPASS data (method 2) are not totally consistent with environmental accounts' data (method 3 as well as method 1) as regards transport emissions. In COMPASS all transport emissions are in a transport sector while own account transport emissions are allocated to responsible sector

The report concludes that further work should focus on method 3. This implies the development of relevant environmental accounts in the UK's key trading partners. Finer details in the industry classification (compare to the 11-sector classification used in the report) would also be very welcome.

The impact of UK households on the environment through direct and indirect generation of greenhouse gases, Report prepared for Eurostat (grant agreement n° 200141200010) by Francis Perry, Office for National Statistics, May 2004, 72 p. (study n°49).

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/namea_air/draft_environmentpdf/_EN_1.0_&a=d

The objective of the Office for National Statistics (ONS) was to examine the UK households' environmental impact. The study focused on greenhouse gases (GHG) for the year 2001.

The report is structured as follows: it starts (chapter 3) with a review of the data sources (air emissions, regional households expenditure, national accounts…) en definitions (direct and indirect emissions of household final demand, emissions embedded in imports); the results are presented firstly (chapter 4) for the overall household emissions, before a detailed presentation (including methodological information) by type of emission sources: energy use, travel and final demand of other goods (chapters 5 to 7). Most results are broken down by Regions; they were distributed using the relevant statistics on regional household expenditure, assuming that purchasing parity is the same throughout the country.

Direct household **energy** related emissions result from heating, cooking and the used of the own vehicles. These emissions are recorded in the air emissions accounts. Only the emissions from non-travel related household activities were taken into account here as energy consumption related emissions, since the emissions stemming from private cars were included in the category transport and travel households activities (see below). Indirect emissions related to household electricity use have been estimated from the proportion of the total demand for electricity consumed by the domestic sector (this proportion was applied to the amount of emissions of the electricity production in the air accounts).

Household **transport and travel** related emissions cover direct emissions from the use of private cars and indirect emissions from the use of civil aviation and public transport (railways, tube, tram, buses, coaches, minicabs and taxis). All aviation emissions from UK resident operators have been allocated to UK residents, assuming that UK resident travelling on foreign airlines and non-residents travelling on UK airlines compensated each other.

Direct and indirect emissions from household **final demand for other goods** were estimated thanks to the traditional input-output (IO) analysis (the ONS IO analytical tables contain symmetric IO tables, Leontief inverse and other analytical tools). Imports could not be separated from the overall final demand. The results of the IO calculations carried out are presented in annex for a 91-industry breakdown.

For all Regions, indirect household GHG emissions (embedded in the products purchased: electricity, transport services and other goods and services) are greater than direct emissions (related to the consumption of fuel for heating, cooking and driving). The main source of indirect GHG emissions is

the household consumption of non-energy and non-travel goods & services (emissions generated through the production of goods & services consumed by households). In 2001, all Regions except Northern Ireland had higher direct gas related GHG emissions than direct emissions as well as indirect emissions from electricity. The exceptionally high levels of other fuel direct GHG emissions in Northern Ireland resulted from an extensive use of coal and oil for domestic heating. Londoner had then the greatest responsibility for public transport indirect GHG emissions, whereas households in the South East had the highest level of direct GHG emissions related to private transport. The largest proportion of direct plus indirect GHG emissions related to UK household final demand came from the purchase of food, drink & tobacco (indirect emissions related to the production of pesticides and to the consumption of fuel in agriculture are embedded in such type of product).

The ONS expected to carry out the same type of analysis for other air pollutants and other environmental domains (waste, material and water use). The authors concluded it report on the need for further regarding the identification of imports related emissions, although the ONS already dedicated a report on this subject a few years before (see above the study n°99).

Norway

"NAMEA-work related to decomposition analysis" Chapter 5 in Pilot studies for the development of environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Report to Eurostat (grant agreement n° 200241200013) prepared by Julie Hass and Knut Sørensen (ed.), Statistics Norway, May 2006, pp. 24-37. (study n°33b)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/norway_2005_noreeapdf/_EN_1.0_&a=d

Chapter 5 of the NOREEA 2005 was dedicated to NAMEA-based decomposition analysis. Initially Statistics Norway intended to use input-output (IO) methodology like Netherlands and Germany (see above study n°120), but the time lag before the IO tables should be available prevented the author to use the method previously applied the research Department of Statistics Norway[121].

The analysis carried out covered 3 greenhouse gases (CO_2, CH_4 and N_2O) for the period 1990 to 2003. It was based on the validated NAMEA-air data available then (t-2).

The chapter starts with a brief presentation of the NAMEA-air data available then in Norway (5.1) before dealing with the methodology used (5.2). The results of the decomposition are provided both for overall Norwegian economy (5.3) and by group of industries (5.4). Recommendations for future works are given at the end of the chapter (5.5).

As indicated above, the method used was based in the model presented by Bruvoll and Medin (2000) from the Research Department of Statistics Norway, but eliminating the factors related to energy use (energy intensity, energy mix, and combustion method) and population. Therefore, the pilot analysis carried out for the NOREEA 2005 decomposed air emissions into 3 factors:

- scale effect (economic growth),
- composition effect (production structure, but no IO structural effect is taken into consideration)
- other (non-energy) technological effect (energy efficiency, change in the intermediate consumption of energy, as well as change in taxes end regulation).

For the Norwegian economy as a whole, the technological change almost had the opposite impact of the scale effect (it is the same for all emission types), but even though changes in the composition of the production also lead to lower emissions, the increase of economic activity lead to an overall increase of the 3 greenhouse gases considered. The results were also presented for a 10-industry-group breakdown.

The scale effect was lead to higher emissions for all industry-groups but it was no evenly distributed: transportation, manufacturing and extraction sectors had the largest scale effect. Although the overall

[121] - Bruvoll A., Medin H. (2000), *Factoring the Environmental Kuznets Curve, Evidence from Norway*, Discussion Paper n°275, Statistics Norway (Research Department), Oslo, June 2000, 34 p.

effect of change in the production structure lead to lower emissions, the composition effect resulted in higher emissions for a few sectors (extraction, wholesale hotel & restaurant, other services) as well as household consumption. As regards reduction of emissions resulting from the improvement in the utilisation of inputs (most likely energy according to Bruvoll and Medin (2000) quoted above), transport played a significant role and to a lesser extent manufacturing and extracting sectors as well as households. For some industry-groups the technology effect was negative (lower emissions) for all 3 GHG considered, whereas it did not have the same direction for all of them (e.g. for manufacturing industry, it has been translated into higher CO_2 emissions and lower emissions for SO_2 and NO_x).

Statistics Norway expected then to be able to include this type of decomposition analysis (based on based on t-2 data) in the regular NAMEA publication. Sensitivity analyses were to be carried out as regards the potential impact of the level of aggregation of industries. Statistics Norway invited Eurostat to use this methodology for its own publications.

5.2.11 Other analyses or indicators

Poland

Environmental Protection Expenditure Account in Poland, Report to Eurostat (grant agreement n°2004 .19100.024), by Elżbieta Broniewicz (ed.), Wydawnictwo Ekonomia i Środowisko / Fundacja Ekonomistów Środowiska i Zasobów Naturalinych, Wydawnictwo Ekonomia I Środowisko (ISBN 83-88771-69-8), Warsaw / Bialystok 2005, 56 p. (study n°67b)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/phare_environmental/pilot_studies/epea_and_eia/final_angielskapdf/_EN_1.0_&a=d

The second part of the report is dedicated to the assessment of the index of sustainable economic welfare (ISEW) for Poland, despite the calculation of such an index does not enter into the scope of the European strategy for environmental accounts (ESEA) since, like for other environmentally adjusted national accounts aggregates, the ESEA Task Force considered this was very difficult to achieve robust monetisation results.

This study was carried out by an expert of the Foundation of environmental and resource economic (FERE) commissioned by the Central statistical Office of Poland with which he has been collaborating for years.

As recalled in the report, ISEW has been developed as a response to the lack of adequacy of GDP as an indicator of welfare and sustainability. The idea of ISEW is therefore to provide a reliable monetary indicator of welfare and sustainability by adding values of categories that increase welfare (e.g. public health or education expenditure) and subtracting values of categories that decrease welfare (road accidents, pollution abatement expenditure or depreciation of environmental assets), as well as taking distribution aspect into account (it is applied here to total ISEW value end not only to consumption expenditure as it is mostly done).

This part of the report starts by the methodology, listing the items taken into accounts (private EPE is not included), before presenting of the results (estimates of Poland over the period 1990-2003, comparison ISEW and GDP, by category of variables).

The study concludes for instance that the recent stagnation in IESEW, despite the increase of GDP, is due to the adoption of environmental un-friendly production and consumption patterns.

Sweden

Uses of environmental accounts in Sweden, Report prepared for DG Environment and Eurostat by Viveka Palm, Statistics Sweden, Eurostat Working Paper n° 2/2001/B/1, May 2001, 35 p. (study n°95)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp01suse_pdf/_EN_1.0_&a=d

This report deals actually both with the availability of EA-based data and their use in Sweden. The introduction also offers a brief history of the development of EA in Sweden in the early 1990s.

Chapter 2 presents a detailed review of the EA-based data available then at national scale in Sweden (about 40-industry breakdown, public and private consumption to be singled out). After a general overview (table in the section 2.1), these data are classified according to the following items (1 section by item):

- resource use (energy, materials, chemical, and water),
- residuals (air emissions, water emissions, and waste),
- employment (employment and environment industry),
- economic variables (value added, green taxes, environmental cost and environmentally harmful subsidies),
- resource accounts (water and forest accounts).

An additional section (2.7) is dedicated to specific EA-based analyses:

- Regional environmental analysis, including distributional aspects (project for Stockholm county financed by the Office of Regional Planning)
- Input-output analysis (see study n° 25 above in the section dedicated to NAMEA-based analysis)
- Households' contribution to the environmental pressure (households or consumers as component of final demand) (see study n° 23 below)
- International trade related environmental pressure (see study n° 121 above in the section dedicated to NAMEA-based analysis)
- International comparison (some studies have been carried out at the level of Nordic countries)

The Chapter 3 lists the main users and their use of EA that were identified by Statistics Sweden. Excluding Eurostat that uses EU members EA data, many institutions use EA for different purposes in Sweden:

- The National institute of economic research (KI) (medium term economic forecast model that includes environmental aspects, e.g. assessment of the economic impact of the Kyoto Protocol)
- The Ministry of finance (forecast based on the KI model)
- The Swedish environment agency (preparation of report and speeches)
- The Swedish government (analytical works commissioned by the Committee on environmental objectives, the Committee for growth and environment, and green taxes)
- The Environmental advisory council (material flow data for a headline indicator)
- The Swedish environmental Research institute (indicators on energy and air emissions for different industrial sectors in order to benchmark firms' performances)
- The Swedish delegation for sustainable technology (environment industry)
- The Swedish trade union conference (industries' environmental pressure)
- The Nordic Council of Ministers (studies on the comparability of data between the Nordic countries)
- Also journalists, universities, political parties, and writers.

Chapter 4 provides a list of the related reports published from 1995 to 2001, including reports with local (county) and regional (Nordic countries) perspective. Chapter 5 gives a list of the regular statistics resulting from Swedish EA and chapter 6 presents a short illustration.

Among the future works listed in the chapter, one can note the high priority given to input-output analysis (despite the lack of regular input-output tables), as well as modelling in order to investigate the couplings between different areas and to assess policy instruments. Chapter 8 (conclusions) include the overview table presented earlier at the beginning of the review of data (chapter 2).

Swedish Environmental Accounts Integration, Report to Eurostat prepared by Statistics Sweden, December 2002, 48 p. + tables of data (study n° 19)

http://forum.europa.eu.int/Public/irc/dsis/pip/library?l=/environmental_expenditur/country_studies/other_studies/report_swedenpdf/_EN_1.0_&a=d

The main objective of this report was to present and analyse the links between monetary and physical data of the EA, i.e. EEA (taxes and EPE) and NAMEA (air emissions) variables respectively. The study focused on mining and manufacturing industries (NACE 10-37).

The investigations were undertaken both at macro (chapter 2) and micro-economic levels (chapter 3). Also, despite the lack of EPE data, a statistical analysis was performed in order to examine the correlations between EPE dedicated to air protection and both air emissions and the corresponding taxes (chapter 4).

At **macro-economic level**, the analysis was conducted on CO_2 and SO_2 emissions from stationary sources, sulphur and CO_2 taxes for the years 1993 to 1999. EPE data were available for 1997 and 1999 only. Emissions and taxes were reallocated to final demand using standard input-output approach in order to examine the connection between final consumers' indirect emissions and indirect corresponding taxes.

In Sweden, industries with sulphur tax exemption (mining of metal ores, manufacture of pulp and paper, and manufacture of basic metals) emitted 40% of the total SO_2 emissions from stationary sources, whereas other mining and manufacturing industries emitted 30% of stationary SO_2 emissions and paid on average 20% of the total sulphur tax. Also, SO_2 emissions intensities of sulphur tax exempted industries were about 4 times as high as other mining and manufacturing industries, and they showed a smaller reduction (30%) than the other industries (60%) over the period.

Mining and manufacturing Swedish industries emitted about 50% of stationary CO_2 emissions and paid only 10% of the CO_2.taxes. Their CO_2 taxes more than doubled between 1993 and 1999 as a result of a lower CO_2 tax reduction, while their CO_2 emissions increased by 20%.

At the industry level, the correlation analysis resulted in low value concerning CO_2 emissions and EPE related to air protection, whereas it showed high correlations between air protection investment and CO_2 taxes. Correlations values obtained for SO_2 and air protection investment were higher at this level than at the enterprises level.

On the **micro-economic level**, the analysis focused on sulphur taxes and SO_2 emissions (except in the in the correlation section where CO2 emissions and taxes were taken into consideration). The emissions were calculated by Statistics Sweden, using fuel consumption data. At his stage, the study was divided into 2 parts: the first part was conducted on a panel of 120 enterprises for the period 1996-1999. The second part consisted in a detailed examination of 7 enterprises that reported large investments towards SO_2 emissions abatement.

Enterprises exempted from sulphur tax had also higher SO_2 emission intensities than other enterprises. They increased their SO_2 emissions by 25% (70% for the other industries) while both their sulphur tax and EPE dedicated to air decreased by 30% from 1996 to 1999. When the sulphur tax was introduced in 1991 it has the effect expected (stimulated air protection investment), whereas in the late 1990ies it affected Swedish enterprises only marginally.

The EPE data available then showed no correlation with air emissions. Slightly higher correlations were observed between CO_2 and sulphur taxes and EPE dedicated to air protection.

Eurostat

Towards a Typology of 'Environmentally Adjusted' National Sustainability Indicators, Report to Eurostat prepared by Martin O'Connor, C3ED (Centre d'Economie et d'Ethique pour l'Environnement et le Développement) Université de Versailles St-Quentin-en-Yvelines, Eurostat Working Paper No. 2/2001/B/4 7 September 2001, 55 p. (study n°98)

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/environment/environmental_accounts/wp01aaoc_pdf/_EN_1.0_&a=d

This Working Paper that presents the results of research conducted at the *Centre d'Economie et d'Ethique pour l'Environnement et le Développement* (C3ED) of the Université de Versailles Saint-Quentin-en-Yvelines, provides a summary of the main lines of thought in the *environmentally adjusted macro-economic indicator* debate and offers a typology of approaches.

Section 1 provides a simple structural perspective on sustainable development. Section 2 offers a classification of two broad families of *environmentally-adjusted GDP* for a national economy, based on two complementary adjustment concepts:

- The first one is based on change in the accounting system boundary, i.e. an enlargement of the scope of national accounting in order to include specified categories of environmental assets. This is the basis for construction of an *Aggregate Indicator of the Change, during the Current year, in the economic Assets of the Nation*.
- The second indicator type is based on hypotheses of adjustment of the economy itself, i.e. an *adjusted economy* with a new pattern of production processes, levels of production and consumption activity, technologies employed, etc., which respects specified environmental performance standards. The resulting indicators are called *greened economy GDP*.

In Section 3 introduce the distinction between the *costs born* by a national economy (that is, the depletion or degradation of natural capital taking place on its territory) and the *costs caused* by a nation (which may fall, in greater or lesser share, on other national economies).

In the last section (4) examines and compares these adjustment concepts as regards their policy implications. One can also note that this Working Paper also offers a first framework for analysing international environmental load displacement, e.g. via the emissions embodied in goods and services imported and exported or directly via the translocation of pollutants (cf. NAMEA-based analysis above).

Annex 1 – List of the studies examined

List following the ascendant numbering

N°	Area	Module	Country	Institution / Authors	Year	Title	Grant number
1	EEA	EPEA	BE	Statistics Belgium - Bruno Kestemont	2001	Current environmental protection expenditure by the Belgian industry (1999)	200071700002
2	EEA	EPEA	AT	Statistics Austria - Alexandra Aichinger and Eva Milota	2002	Environmental expenditure in industry – Improvement of existing methodology for data collection	200071700004
3	EEA	EPEA	NO	Statistics Norway - Julie L. Hass and Tone Smith	2002	Methodology work for environmental protection investment and current expenditures in the manufacturing industry	200071700005
4	EEA	EPEA	SE	Statistics Sweden - Nancy Olsson	2002	Refined Environmental protection expenditures in Sweden	2002717000067
5	EEA	EPEA	DK	Statistics Denmark - Laban Koch Karlshøj	2002	Survey of the possibilities of collecting questionnaire-based data on environmental protection expenditure for the manufacturing industry	
6	EEA	EPEA	BE	Federal Planning Bureau - Françoise Lannoy and Guy Vandille	2002	Environmental Protection Expenditure Accounts for Belgium – 1997	200041200018
7	EEA	EPEA	UK	Office for National Statistics - Rocky Harris (ONS) and Heike Mall (formerly ONS)	2002	Environmental protection expenditure by the UK general government sector 1996/97 to 2000/01	
8	EEA	EPEA	BE	Federal Planning Bureau - Françoise Lannoy and Guy Vandille	2002	Environmental Protection Expenditure Accounts for Belgium – 1997-2000	200141200103
9	EEA	EPEA	IT	ISTAT - Carolina Ardi and Federico Falcitelli	2003	The first Italian EPEA for waste and wastewater management	200141200027
10	EEA	EPEA	BE	Statistics Belgium - Bruno Kestemont	2004	Environmental expenditures by the Belgian industries in 2002 - Imputation techniques and results.	200271700002
11	EEA	EPEA	EL	National Statistical Service of Greece	2004	Pilot survey for environmental protection investment and current expenditures in the manufacturing industry - Reference year 2001	2002 717 00003
12	EEA	EPEA	DK	Statistics Denmark - Ulla Agerskov, Vibeke Terney and Preben Etwil	2004	Pilot Survey of Environmental Protection Investments and Current Expenditure in the Manufacturing Industry	200271700008
13	EEA	EPEA	NO	Statistics Norway - Julie L. Hass and various	2004	Environmental Protection Expenditure - 2002 data for Manufacturing, Mining and Quarrying, and Steam and Hot Water Supply; Methodological work for the Oil and Gas Extraction Industry (NACE 11) and preliminary figures for 2002	200271700007
14	EEA	EPEA	PT	National Statistical Institute of Portugal (INE)	2005	Final report - Environmental protection expenditures - Implementation of data collection using webforms	200271700006
15a	EEA	EPEA	SE	Statistics Sweden - Maja Larsson and Annika Mårtensson	2005	Public environmental protection expenditures and subsidies in Sweden	
15b	EEA	Subsidies	SE	Statistics Sweden - Maja Larsson and Annika Mårtensson	2005	Public environmental protection expenditures and subsidies in Sweden	
16	EEA	EPEA	CH	Office fédéral de la statistique - Jacques Roduit	2005	Dépenses de protection de l'environnement des entreprises en 2003 - Premiers résultats	no grant

N°	Area	Module	Country	Institution / Authors	Year	Title	Grant number
17	EEA	EPEA	BE	Federal Planning Bureau - Guy Vandille	2005	Environmental Protection Expenditure Accounts for Belgium : 1997- 2002	200471401006
18	EEA	Environment industry	CH	Ecosys for the OFS	2000	Le secteur éco-industriel en Suisse	no grant
19	Analysis	other	SE	Statistics Sweden - Jenny Westin and Peter Fränngård, Nancy Olsson, Viveka Palm, Anders Wadeskog	2002	Swedish Environmental Accounts Integration	
20	Analysis	MFA	DE	Deutsches Institut für Wirtschaftsforschung (DIW Berlin) - Reiner Stäglin und Joachim Schintke unter Mitarbeit von Ingrid Ludwig	2002	Analytische Auswertung von physischen, monetären und Zeit-Input-Output Tabellen - Nutzungsmöglichkeiten für Wirtschafts-, Umwelt- und Beschäftigungspolitik	200041200003
21	Natural resources	Land	SE	Statistics Sweden - Veronica Skarborg, Marianne Eriksson, Leif Norman	2002	Land Accounting	
22	NAMEA	Air	EL	Institute for computer and communications systems (ICCS) of national technical university of Athens (NTUA) - Dr. Nikos A. Mylonas and various	2002	Natural resources accounts and environmental input-output tables for Greece 1988 – 1998	200041200012/GA
23	Analysis	NAMEA	SE	Statistics Sweden - Anders Wadeskog and Maja Larsson	2003	Households in the environmental accounts	
24	Natural resources	Land	SE	Statistics Sweden - Marianne Eriksson, Annika Mårtensson, Viveka Palm	2003	Land use by industry 2000	
25	Analysis	NAMEA	SE	Statistics Sweden - Anders Wadeskog and Viveka Palm	2003	Structural decomposition of environmental accounts data – the Swedish case	
26	NAMEA	Chemicals	SE	Statistics Sweden - Viveka Palm	2003	Chemical product and substance indicators in the SEEA - health and environment	
27	NAMEA	Chemicals	SE	Statistics Sweden - Viveka Palm and Annica Carlsson	2003	Chemical product indicators by industry – fossil fuels, cement and other chemical products classified as hazardous to health or environment 1996-2001	
28	NAMEA	Waste	FI	Statistics Finland - Jukka Muukkonen	2004	Correcting coefficients for register-based data on waste, water and emissions to air by branches of industry	
29	Natural resources	Forest	DK	Statistics Denmark - Ismir Mulalic	2004	Danish Forest Accounts 1990-2001	200241200006
30a	Natural resources	land	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2004	Norwegian Economic and Environmental Accounts (NOREEA) Project 2003, chapter 2 “NAMEA-work related to land accounts”	200241200013
30b	NAMEA	Air	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2004	Norwegian Economic and Environmental Accounts (NOREEA) Project 2003, chapter 3 “NAMEA-air emission accounts”	200241200013
30c	EEA	Taxes	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2004	Norwegian Economic and Environmental Accounts (NOREEA) Project 2003	200241200013
30d	EEA	EPEA	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2004	Norwegian Economic and Environmental Accounts (NOREEA) Project 2003	200241200013

N°	Area	Module	Country	Institution / Authors	Year	Title	Grant number
31	EEA	Taxes	BE	Federal Planning Bureau - Guy Vandille	2005	Environmental Tax Accounts for Belgium (1997-2002)	200471401006
32	Other	other	DK	Statistics Denmark - Peter Rørmose Jensen and Thomas Olsen	2005	Regional Environmental Accounts Denmark 2003	200471401007
33a	NAMEA	Energy	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2006	Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Chapter 4 "NAMEA-work to further developing NAMEA energy accounts"	200471401002
33b	Analysis	NAMEA	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2006	Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Chapter 5 "NAMEA-work related to decomposition analysis"	200471401002
33c	NAMEA	Water	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2006	Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Chapter 6 "Work related to further environmental expenditure accounts for water"	200471401002
33d	EEA	EPEA	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2006	Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Chapter 7 "Work related to environmental protection expenditure accounts for central government"	200471401002
33e	EEA	Subsidies	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2006	Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Chapter 8 "Work related to environmental expenditure regarding environmental subsidies"	200471401002
33f	EEA	Taxes	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2006	Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Chapter 9 "Work related to environmental expenditure regarding environmental taxes"	200471401002
34	EEA	Taxes	UK	Office for National Statistics - Perry Francis and Ian Gazley	2006	Review of Environmental Taxes in the UK Environmental Accounts	71401.2005.001-2005.302
35	NAMEA	Energy	BE	Federal Planning Bureau - Sébastien Gilis, Lies Janssen, Guy Vandille	2006	The NAMEA Energy for belgium (1990/1994-2002)	200471401006
36	Natural resources	Water	FR	IFEN/MIM - Philippe CROUZET	2003	Water quality accounts calculation module	200141200031
37	NAMEA	Water	FR	IFEN/MIM - Philippe CROUZET	2003	Water resources accounts data preparation calculation module as "pilot development of water resources accounts"	200141200030
38	NAMEA	Waste	AT	Umweltbundesamt - Brigitte Karigl	2004	NAMEA – Waste Time Series 1996-2002 Final Report	200271700010.
39	NAMEA	Waste	DK	Statistics Denmark - Ole Gravgård Pedersen	2004	Waste Accounts for Denmark 1999	200241200012
40	NAMEA	water	DK	Statistics Denmark - Thomas Olsen	2001	1997 Water Accounts Related to NAMEA	
41	NAMEA	Water	NO	Statistics Norway - Mr. Jørn Kristian Undelstvedt, Ms. Anne Vedø and Mr. Håkon Skullerud	2006	Statistics on Environmental Accounts: Water Use by Industries	200471401002
42a	NAMEA	Air	BE	Federal Planning Bureau - Guy Vandille	2002	The NAMEA Air for Belgium (1994-1998) - The NAMEA Water for Belgium (1998)	200041200017

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42b	NAMEA	Water	BE	Federal Planning Bureau - Guy Vandille	2002	The NAMEA Air for Belgium (1994-1998) - The NAMEA Water for Belgium (1998)	200041200017
43	NAMEA	Air	SE	Statistics Sweden - Viveka Palm plus Anders Wadeskog, Helena Rudander and Mårten Sjölin	2002	Increasing the timeliness of environmental accounts carbon dioxide emissions data	
44	NAMEA	Air	NO	Statistics Norway - Julie L. Hass and Knut Ø. Sørensen	2002	Norwegian Hybrid Accounts:NAMEA for Air Emissions (National Accounts Matrix including Environment Accounts)	
45a	NAMEA	Air	DK	Statistics Denmark - Peter Rørmose Jensen and Thomas Olsen	2003	Analysis of Changes in Air Emissions in Denmark 1980 - 2001 - Time series · Bridge tables · Decomposition analysis	200141200007
45b	Analysis	NAMEA	DK	Statistics Denmark - Peter Rørmose Jensen and Thomas Olsen	2003	Analysis of Changes in Air Emissions in Denmark 1980 - 2001 - Time series · Bridge tables · Decomposition analysis	200141200007
46	NAMEA	Air	DE	Statistisches Bundesamt - Claire Grobecker	2003	Energieverbrauch und Luftemissionen des Sektors Verkehr nach Verkehrsträgern und Produktionsbereichen/Privaten Haushalten - Endbericht	2001 412 00008
47	NAMEA	Air	IT	Istat - Angelica Tudini, Giusy Vetrella	2003	Italian NAMEA: air emission accounts for the year 1999 - Istat final report	200241200008
48	NAMEA	Air	AT	Umweltbundesamt - Brigitte Karigl	2003	NAMEA – Air Emissions Time Series 1980-2001	2001 412 00020
49	Analysis	NAMEA	UK	Office for National Statistics - Francis Perry	2003	The impact of UK households on the environment through direct and indirect generation of greenhouse gases	200141200010
50	NAMEA	Air	IT	Istat - Angelica Tudini, Giusy Vetrella	2004	Italian NAMEA: 1990 – 2000 air emission accounts - Istat final report	200271700012
51	NAMEA	Air	PT	National Statistical Institute of Portugal (INE) - Ana Margarida Claro	2004	NAMEA 1999 Air emissions	
52	NAMEA	Air	CH	Bundesamt für Statistik (BFS) - Office fédéral de la statistique (OFS) - Ernst Basler + Partner AG, Zollikon: Jürg Füssler, Guido Beltrani, Oliver Schelske Infras AG, Zürich: Bernhard Oettli, Daniel Sutter, Jürg Heldstab	2005	Emissions de gaz à effet de serre par branche économique - NAMEA pilote pour la Suisse en 2002	
53a	NAMEA	Air	BE	Federal Planning Bureau - Sébastion Gilis, Guy Vandille	2006	The NAMEA Air for Belgium (1990/1994-2002)	200471401006
53b	Analysis	NAMEA	BE	Federal Planning Bureau - Sébastion Gilis, Guy Vandille	2006	The NAMEA Air for Belgium (1990/1994-2002)	200471401006
54	MFA	Economy-wide	IT	ISTAT - Aldo Femia and various	2003	1980-1998 Material-Input-Based Indicators Time Series and 1997 Material Balance of the Italian Economy	200141200026).
55	MFA	PIOT	FI	Thule Institute and Statistics Finland - Ilmo Mäenpää, Jukka Muukkonen, Mika Pirneskoski	2003	Waste flows in frameworks of physical input-output tables and material flow accounting	
56	Analysis	MFA	EU	Wuppertal Institute-Helmut Schütz, Stephan Moll, Sören Steger	2003	Economy-wide material flow accounts, foreign trade analysis, and derived indicators for the EU - "Resource use and material flow accounts"	200241200011
57	MFA	Economy-wide	UK	Office for National Statistics - Ian Gazley and Perry Francis	2005	UK Material flow review	200241200010

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58	MFA	Economy-wide/PIOT	DE	Statistisches Bundesamt - Stefan Schweinert	2004	Umweltökonomische Gesamtrechnungen:Materialkonto - Endbericht	2002 412 00005
59a	MFA	Economy-wide/PIOT	IT	ISTAT - Aldo Femia and various	2004	Update of the Economy-wide material flow indicators time series for Italy and Italian Physical Input Output Table feasibility study	200271700011
59b	MFA	PIOT	IT	ISTAT - Aldo Femia and various	2004	Update of the Economy-wide material flow indicators time series for Italy and Italian Physical Input Output Table feasibility study	200271700011
60	MFA	PIOT	FI	Thule Institute - Ilmo Mäenpää	2004	Physical flow accounts Finland 1999	200241200009
61	MFA	Economy-wide	DK	Statistics Denmark - Ismir Mulalic	2005	Economy-wide Material Flow Accounts for Denmark 1993-2002	200471401007
62	MFA	Economy-wide	CH	Bundesamt für Statistik (BFS) - Office fédéral de la statistique (OFS) - Anne-Marie Mayerat Demarne	2005	Flux de matières en Suisse - Utilisation de ressources et efficacité matérielle - Premiers résultats Information (Actualités OFS)	no grant
63	MFA	Economy-wide	CH	Office fédéral de la statistique	2007	Flux de matières en Suisse – Consommation de ressources par l'économie suisse entre 1990 et 2005	no grant
64	EEA	EPEA	HU	Hungarian Central Statistical Office - Pál Aujeszky, Viktória Hajdú, Gábor Valkó	2005	PHARE Multi-beneficiary Statistical Co-operation Programme 2003 - Environmental accounting - Towards Environmental Protection Expenditure and Environment Industry Accounts in Hungary – Final report –	
65	EEA	EPEA	LV	Central Statistical Bureau of Latvia - Andra Lazdina, Ilva Zvirbule	2005	PHARE Multi-beneficiary Statistical Co-operation Programme 2003 - Final report - Environmental Protection Expenditure accounts - Latvia	2004.19100.022
66	EEA	EPEA	LT	Statistics Lithuania - Danguole Krepstuliene	2005	Data Collection Project on Environmental Protection Expenditure - Final report	2004.19100.023
67a	EEA	EPEA	PL	Central Statistical Office – Foundation of Environmental and Resource Economists (FERE) – Elżbieta Broniewicz	2005	Environmental Protection Expenditure Account in Poland - Part 1 "Elaboration of the EPEA working tables for Poland for the reporting year 20002"	2004.19100.024
67b	EEA	EPEA	PL	Central Statistical Office – Foundation of Environmental and Resource Economists (FERE) – Elżbieta Broniewicz	2005	Environmental Protection Expenditure Account in Poland - Part 2 "Assessment of the Index of Sustainable Economic Welfare for Poland 1990-2003"	2004.19100.024
68	EEA	EPEA	SK	Statistical Office of the Slovak Republic -	2006	Final Technical Report - 5.1 Project on Environmental Protection Expenditure and Environmental Industry Accounts	2004.19100.027
69	Analysis	EEA	Nordic	Denmark, Finland, Sweden, and Norway	2003	Energy Taxes in Nordic Countries - Does the polluter pay?	200141200022
70	Natural resources	Forest	EE	Statistical Office of Estonia - Kaia Oras with various	2005	Final report of the pilot study - Integrated Environmental and Economic Accounting for Forests	2004.19.19100.020.
71	MFA	Economy-wide	CZ	Czech Statistical Office - Katarína MARKOŠOVÁ, Eva KRUMPOVÁ and others	2005	PHARE Multi-beneficiary Statistical Co-operation Programme 2003 - Task 2 – Data Collection: 5.1 Project on Environmental Accounting - B. Economy-wide material flow accounts - Final report - Period covered: November 2004 – November 2005	2004.19100.019
72	MFA	Economy-wide	HU	Hungarian Central Statistical Office - Enikı Drahos, Lajos Kaposi, Gábor Szilágyi	2005	Phare Multi-beneficiary Statistical Cooperation Program in 2003 – Technical Assistance, Environmental accounts - Material flow accounts (MFA) in Hungary – Final report –	
73	MFA	Economy-wide	RO	National Institute of Statistics	2005	Data Collection Project - Environmental accounting - Final Report	2004.19.100.025

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74	NAMEA	Air	CZ	Czech Statistical Office - Katarína MARKOŠOVÁ, Eva KRUMPOVÁ and others	2005	PHARE Multi-beneficiary Statistical Co-operation Programme 2003 - Final report - Period covered: November 2004 – November 2005	2004.19100.019
75	NAMEA	Air	SI	Statistical Office of the Republic of Slovenia - Vida Butina	2006	Multi-beneficiary statistical cooperation programme in 2003 – Technical assistance ("The action") - Final Report on NAMEA Air Emissions in Slovenia	
76	NAMEA	Air	HU	Hungarian Central Statistical Office - Orsolya Bálint	2005	Multi-beneficiary statistical cooperation programme in 2003 – Technical assistance ("The action") - Final Report on NAMEA Air Emissions in Hungary	
77	EEA	Taxes	UK	Office for National Statistics - Perry Francis and Ian Gazley	2004	Industrial analysis of environmental taxes	
78	MFA	PIOT	DE	Statistisches Bundesamt - C. Stahmer, M. Kuhn, N. Braun	1998	Physical input-output tables for Germany 1990	Working Paper No. 2/1998/B/1
79	Analysis	NAMEA	FI	Statistics Finland - Ilmo Mäenpää	1998	The Economy, Energy and Air Emissions	Working Paper No. 2/1998/B/2
80	Analysis	MFA	EU	Environmental Resources Management (ERM)	1999	The policy relevance of MFAs - Summary report	Working Paper No. 2/1999/B/1
81	Analysis	MFA	EU	IPRA - Frans Berkhout	1999	Industrial metabolism - concepts and implications for statistics	Working Paper No. 2/1999/B/2
82	Analysis	NAMEA	NL	CBS Netherlands Mark De Haan	2000	Decomposing Annual Changes in Pollution according to their Causes: a NAMEA Time Series Analysis	98/562/2040/B4MM
83	MFA	Economy-wide	FI	Statistics Finland - Jukka Muukkonen	2000	Material flow accounts - TMR, DMI and material balances, Finland 1980-1997	Working Paper No. 2/2000/B/1
84	MFA	Economy-wide	SE	Statistics Sweden - A. Isacsson, K. Jonsson, I. Linder, V. Palm, A. Wadeskod	2000	Material flow accounts - DMI, DMC for Sweden, 1987-1997	Working Paper No. 2/2000/B/2
85	EEA	Environment industry	NL	Statistics Netherlands - Egon Dietz, Rob Kuipers and Rob Salomons	2000	Environment-related employment in the Netherlands, 1997	Working Paper No. 2/2000/B/3
86	EEA	Environment industry	PT	National Statistical Institute of Portugal (INE) - Nuno Romao	2000	Environment industry and employment in Portugal, 1997	Working Paper No. 2/2000/B/4
87	EEA	Environment industry	SE	Statistics Sweden - L. Tängén and P.Svensson	2000	The environment industry in Sweden, 1999	Working Paper No. 2/2000/B/5
88	MFA	Economy-wide	AT	Statistics Austria - Susanne Gerhold and Brigitte Petrovic	2000	Material flow accounts - Material balance and indicators, Austria 1960-1997	Working Paper No. 2/2000/B/67
89	EEA	Environment industry	FR	IFEN	2000	Environmental employment in France, 1996-1998	Working Paper No. 2/2000/B/7
90	MFA	Economy-wide	IT	ISTAT - Aldo Femia and various	2000	A material flow account for Italy, 1988	Working Paper No. 2/2000/B/8
91	Analysis	other	DE	Statistisches Bundesamt - K. Schoer, H. Höh, A. Heinze and Chr. Flachmann	2000	Material flow analysis in the framework of environmental economic accounting in Germany	Working Paper No. 2/2000/B/9
92	EEA	Environment industry	SE	Statistics Sweden - L. Tängén, U. Johansson, M. Nyman and P.Fränngard	2000	The environment industry in Sweden, 2000 - Employment and economic data for enterprises primarily producing environmental goods and services	Working Paper No. 2/2000/B/10
93	EEA	Taxes	SE	Statistics Sweden - M. Sjölin and A.	2000	Environmental taxes and environmentally-harmful subsidies in Sweden	Working Paper No.

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				Wadeskop			2/2000/B/11
94	EEA	Taxes	DK	Statistics Denmark - H. Hornum	2000	Environmental taxes and subsidies in the Danish NAMEA 1996	Working Paper No. 2/2000/B/12
95	Analysis	other	SE	Statistics Sweden - Viveka Palm	2001	Uses of environmental accounts in Sweden	Working Paper No. 2/2001/B/1
96	MFA	Economy-wide	EU	Wuppertal Institute - Stefan Bringezu and Helmut Schütz	2001	Material use indicators for the EU, 1980-1997	Working Paper No. 2/2001/B/2
97	Natural resources	Subsoil	NL	Statistics Netherlands - André van den Berg and Peter van de Ven	2001	Valuation of Oil and Gas Reserves in the Netherlands - Government appropriation of net resource rent for subsoil assets - An analysis for the Netherlands	Working Paper No. 2/2001/B/3
98	Analysis	other	EU	C3ED, Université de Versailles - Professor Martin O'Connor	2001	Towards a Typology of 'Environmentally Adjusted' National Sustainability Indicators - Key Concepts and their Policy Applications	Working Paper No. 2/2001/B/4
99	Analysis	NAMEA	UK	Office for National Statistics - Rocky Harris	2001	Methods for estimating air emissions from the production of goods imported into the UK	Working Paper No. 2/2001/B/5
100	NAMEA	Water	ES	Instituto Nacional de Estatistica - Félix Alonso Luengo, Fátima Escribano Morales	2001	Water Satellite Accounts for Spain 1997-1999	Working Paper No. 2/2001/B/6
101	NAMEA	Chemicals	SE	Statistics Sweden - Viveka Palm and Kristina Jonsson	2001	Including chemical products in environmental accounts - The magnitude of chemical product use in different industries in Sweden 1996-1999	Working Paper No. 2/2001/B/7
102	EEA	Taxes	AT	Stat. Austria	2002	Eco-taxes integrated with NAMEA	200141200024
103	Analysis	NAMEA	SE	Stats. Sweden	2005	Social NAMEA with a coupling to SDI - including environment industry	2004-714-01003
104	Analysis	NAMEA	SE	Stats. Sweden	2006	Energy and CO2 -emissions for consumed products and services. IPP-indicators for private and public consommation based environmental accounts (1)	2004-714-01003
105	Analysis	NAMEA	SE	Stats. Sweden	2007	SDI based on Environmental Accounts	71401.2005.001-2005-301
106	MFA	Economy-wide	SE	Stats. Sweden	2005	Material Flow accounts and policy. Data for Sweden 2004	71401.2005.001-2005-301
107	EEA	Environment industry	SE	Stats. Sweden	2005	Environmental goods and services sector in Sweden 2002-2005	71401.2005.001-2005-301
108a	MFA	Economy-wide	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2007	Pilot studies on economy-wide MFA and Eco-industry for Norway	71401.2005.001-2005-299
108b	EEA	Environment industry	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2007	Pilot studies on economy-wide MFA and Eco-industry for Norway	71401.2005.001-2005-299
109	NAMEA	Water	SE	Statistics Sweden	2002	Pilot Study on Statistics on Water Flows and Emissions to Water	
110	EEA	EPEA	RO	LDK SA / University of Thessaly /	2006	The satellite account on environmental protection expenditure	EuropeAid/119795/D/SV/RO

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				IMAS SA / Promo A&F SRL			
111	Analysis	NAMEA	DK	Statistics Sweden	2004	Sustainable Development Indicators Based on National Accounts	none
112	EEA	Environment industry	BE	ICEDD - Namur	2007	The Belgian environment industry (1995-2005)	71401.2005.001-2005-288
113	EEA	Environment industry	AT	Stat. Austria	2007	Improvement of data quality in Environmental Expenditure Account as well as in Eco Industry – Sample survey at service industries	71401.2005.001-2005-285
114	NAMEA	Water	AT	Umweltbundesamt Austria	2007	The Austrian Emission Register (EMREG) as data source for NAMEA Water Emissions – Recommendations for a regular update of emissions of the manufacturing industries and households	71401.2005.001-2005-286
115	NAMEA	Waste	AT	Umweltbundesamt Austria	2007	Pilot study on waste accounts	71401.2005.001-2005-286
116	NAMEA	Water	BG	NSI Bulgaria	2006	Pilot Study on Statistics on Water Flows and Emissions to Water	71401.2005.001-2005-289
117	NAMEA	Water	NL	Statistics Netherlands	2006	Dutch Waterflow Accounts – With preliminary results for 2003 and 2004	
118	NAMEA	Waste	NL	Statistics Netherlands	2007	Waste Accounts in a NAMEA framework	
119	MFA	Economy-wide	LV	Latvian Environment Agency, Ministry of Environment of the Republic of Latvia	2004	Economy-wide natural Resources Assessment	
120	Analysis	NAMEA	DE	Statistisches Bundesamt - Claire Grobecker	2003	Decomposition analysis of Carbon dioxide-emission changes in Germany – Conceptual framework and empirical results	Eurostat Working paper
121	Analysis	NAMEA	SE	Statistics Sweden	2002	The Environmental impact of Swedish Trade	Miljöräkenskapaper n° 2002:2
122	EEA	instruments	DK	Statistics Denmark	2006	Integrated Environmental and Economic Accounts for Tradeable Carbon Dioxide Emission Permits Denmark 2005	71401.2005.001-2005-292
123	MFA	PIOT	DK	Statistics Denmark	2007	Material flow and Physical input-output tables - PIOT for Denmark 2002 based on MFA	71401.2005.001-2005-292
124	Natural resources	subsoil	DK	Statistics Denmark	2007	Handbook on mineral and energy asset accounting	71401.2005.001-2005-292
125a	Natural resources	forest	HU	NSI Hungary	2007	Land and Forest Accounts	71401.2005.001-2005.295
125b	Natural resources	land	HU	NSI Hungary	2007	Land and Forest Accounts	71401.2005.001-2005.295
126	Natural resources	forest	LV	Central Stat. Bur. Latvia	2007	Integrated Environmental and Economic Accounting for Forests (IEEAF)	71401.2005.001-2005-296
127	NAMEA	Air	LT	Stats. Lithuania	2006	Pilot project on Environment statistics and accounts - NAMEA	71401.2005.001-2005-297
128	EEA	Environment industry	NL	CBS Netherlands	2007	Economic indicators for the Eco Industries in the Netherlands, 2003	71401.2005.001-2005-298
129	MFA	Economy-wide	SI	Stat. Off. Slovenia	2006	Material Flow Accounts (MFA) in Slovenia	71401.2005.001-2005-300
130	NAMEA	water	DK	Statistics Denmark - Thomas Olsen	2005	Integrated Environmental and Economic Accounts for Water and Waste Water Denmark 1999 - 2003	200471401007,

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131a	NAMEA	water	DE	Statistisches Bundesamt	2002	Pilot Study on Statistics on Water Flows and Emissions to Water	200041200010
131b	NAMEA	water	DE	Statistisches Bundesamt	2002	Pilot Study on Statistics on Water Flows and Emissions to Water	200041200010
132	EEA	EPEA	IE	Environmental Studies Research Series (ESRS) / Department of Environmental Studies, University College Dublin		The Applicability and Policy Relevance of Environmental Protection Expenditure Accounting	no grant
133	MFA	Economy-wide	IE	Environment Protection Agency (Clean Technology Centre, Cork Institute of Technology)		Material Flow Accounts (MFAs) – Demonstrations for Ireland	no grant
134	Other	Other	DE	Statistisches Bundesamt	2004	Transport and the environment - Report module for the GEEA	20014120012
135	EEA	EPEA	IT	ISTAT	2005	La spesa della Regione Lazio per la protezione dell'ambiente, Anni 1995-2001, Methodological notes (17 p.), Analysis (14 p.),	None
136	NAMEA	Air	IT	ISTAT	2005	La NAMEA per la regione Lazio, Anno 2000, Methodological note, (6 p.) and Analysis (17 p.),	None

List of studies by area

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Environmental Economic Accounts (EEA)							
1	EEA	EPEA	BE	Statistics Belgium - Bruno Kestemont	2001	Current environmental protection expenditure by the Belgian industry (1999)	200071700002
2	EEA	EPEA	AT	Statistics Austria - Alexandra Aichinger and Eva Milota	2002	Environmental expenditure in industry – Improvement of existing methodology for data collection	200071700004
3	EEA	EPEA	NO	Statistics Norway - Julie L. Hass and Tone Smith	2002	Methodology work for environmental protection investment and current expenditures in the manufacturing industry	200071700005
4	EEA	EPEA	SE	Statistics Sweden - Nancy Olsson	2002	Refined Environmental protection expenditures in Sweden	2002717000067
5	EEA	EPEA	DK	Statistics Denmark - Laban Koch Karlshøj	2002	Survey of the possibilities of collecting questionnaire-based data on environmental protection expenditure for the manufacturing industry	
6	EEA	EPEA	BE	Federal Planning Bureau - Françoise Lannoy and Guy Vandille	2002	Environmental Protection Expenditure Accounts for Belgium – 1997	200041200018
7	EEA	EPEA	UK	Office for National Statistics - Rocky Harris (ONS) and Heike Mall (formerly ONS)	2002	Environmental protection expenditure by the UK general government sector 1996/97 to 2000/01	
8	EEA	EPEA	BE	Federal Planning Bureau - Françoise Lannoy and Guy Vandille	2002	Environmental Protection Expenditure Accounts for Belgium – 1997-2000	200141200103
9	EEA	EPEA	IT	ISTAT - Carolina Ardi and Federico Falcitelli	2003	The first Italian EPEA for waste and wastewater management	200141200027
10	EEA	EPEA	BE	Statistics Belgium - Bruno Kestemont	2004	Environmental expenditures by the Belgian industries in 2002 - Imputation techniques and results.	200271700002
11	EEA	EPEA	EL	National Statistical Service of Greece	2004	Pilot survey for environmental protection investment and current expenditures in the manufacturing industry - Reference year 2001	2002 717 00003
12	EEA	EPEA	DK	Statistics Denmark - Ulla Agerskov, Vibeke Terney and Preben Etwil	2004	Pilot Survey of Environmental Protection Investments and Current Expenditure in the Manufacturing Industry	200271700008
13	EEA	EPEA	NO	Statistics Norway - Julie L. Hass and various	2004	Environmental Protection Expenditure - 2002 data for Manufacturing, Mining and Quarrying, and Steam and Hot Water Supply; Methodological work for the Oil and Gas Extraction Industry (NACE 11) and preliminary figures for 2002	200271700007
14	EEA	EPEA	PT	National Statistical Institute of Portugal (INE)	2005	Final report - Environmental protection expenditures - Implementation of data collection using webforms	200271700006
15a	EEA	EPEA	SE	Statistics Sweden - Maja Larsson and Annika	2005	Public environmental protection expenditures and subsidies in Sweden	

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				Mårtensson			
15b	EEA	Subsidies	SE	Statistics Sweden - Maja Larsson and Annika Mårtensson	2005	Public environmental protection expenditures and subsidies in Sweden	
16	EEA	EPEA	CH	Office fédéral de la statistique - Jacques Roduit	2005	Dépenses de protection de l'environnement des entreprises en 2003 - Premiers résultats	no grant
17	EEA	EPEA	BE	Federal Planning Bureau - Guy Vandille	2005	Environmental Protection Expenditure Accounts for Belgium : 1997- 2002	200471401006
18	EEA	Environment industry	CH	Ecosys for the OFS	2000	Le secteur éco-industriel en Suisse	no grant
30c	EEA	Taxes	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2004	Norwegian Economic and Environmental Accounts (NOREEA) Project 2003	200241200013
30d	EEA	EPEA	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2004	Norwegian Economic and Environmental Accounts (NOREEA) Project 2003	200241200013
31	EEA	Taxes	BE	Federal Planning Bureau - Guy Vandille	2005	Environmental Tax Accounts for Belgium (1997-2002)	200471401006
33d	EEA	EPEA	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2006	Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Chapter 7 "Work related to environmental protection expenditure accounts for central government"	200471401002
33e	EEA	Subsidies	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2006	Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Chapter 8 "Work related to environmental expenditure regarding environmental subsidies"	200471401002
33f	EEA	Taxes	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2006	Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Chapter 9 "Work related to environmental expenditure regarding environmental taxes"	200471401002
34	EEA	Taxes	UK	Office for National Statistics - Perry Francis and Ian Gazley	2006	Review of Environmental Taxes in the UK Environmental Accounts	71401.2005.001-2005.302
64	EEA	EPEA	HU	Hungarian Central Statistical Office - Pál Aujeszky, Viktória Hajdú, Gábor Valkó	2005	PHARE Multi-beneficiary Statistical Co-operation Programme 2003 - Environmental accounting - Towards Environmental Protection Expenditure and Environment Industry Accounts in Hungary – Final report –	
65	EEA	EPEA	LV	Central Statistical Bureau of Latvia - Andra Lazdina, Ilva Zvirbule	2005	PHARE Multi-beneficiary Statistical Co-operation Programme 2003 - Final report - Environmental Protection Expenditure accounts - Latvia	2004.19100.022
66	EEA	EPEA	LT	Statistics Lithuania - Danguole Krepstuliene	2005	Data Collection Project on Environmental Protection Expenditure - Final report	2004.19100.023

N°	Area	Module	Country	Institution / Authors	Year	Title	Grant number
67a	EEA	EPEA	PL	Central Statistical Office - Foundation of Environmental and Resource Economists (FERE) - Elżbieta Broniewicz	2005	Environmental Protection Expenditure Account in Poland - Report on the Pilot Project	2004.19100.024
68	EEA	EPEA	SK	Statistical Office of the Slovak Republic -	2006	Final Technical Report - 5.1 Project on Environmental Protection Expenditure and Environmental Industry Accounts	2004.19100.027
77	EEA	Taxes	UK	Office for National Statistics - Perry Francis and Ian Gazley	2004	Industrial analysis of environmental taxes	
85	EEA	Environment industry	NL	Statistics Netherlands - Egon Dietz, Rob Kuipers and Rob Salomons	2000	Environment-related employment in the Netherlands, 1997	Working Paper No. 2/2000/B/3
86	EEA	Environment industry	PT	National Statistical Institute of Portugal (INE) - Nuno Romao	2000	Environment industry and employment in Portugal, 1997	Working Paper No. 2/2000/B/4
87	EEA	Environment industry	SE	Statistics Sweden - L. Tängén and P.Svensson	2000	The environment industry in Sweden, 1999	Working Paper No. 2/2000/B/5
89	EEA	Environment industry	FR	IFEN	2000	Environmental employment in France, 1996-1998	Working Paper No. 2/2000/B/7
92	EEA	Environment industry	SE	Statistics Sweden - L. Tängén, U. Johansson, M. Nyman and P.Fränngard	2000	The environment industry in Sweden, 2000 - Employment and economic data for enterprises primarily producing environmental goods and services	Working Paper No. 2/2000/B/10
93	EEA	Taxes	SE	Statistics Sweden - M. Sjölin and A. Wadeskop	2000	Environmental taxes and environmentally-harmful subsidies in Sweden	Working Paper No. 2/2000/B/11
94	EEA	Taxes	DK	Statistics Denmark - H. Hornum	2000	Environmental taxes and subsidies in the Danish NAMEA 1996	Working Paper No. 2/2000/B/12
102	EEA	Taxes	AT	Stat. Austria	2002	Eco-taxes integrated with NAMEA	200141200024
107	EEA	Environment industry	SE	Stats. Sweden	2005	Environmental goods and services sector in Sweden 2002-2005	71401.2005.001-2005-301
108b	EEA	Environment industry	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2007	Pilot studies on economy-wide m	71401.2005.001-2005-299
110	EEA	EPEA	RO	LDK SA / University of Thessaly / IMAS SA / Promo A&F SRL	2006	The satellite account on environmental protection expenditure	EuropeAid/119795/D/SVRO
112	EEA	Environment industry	BE	ICEDD - Namur	2006	The Belgian environment industry (1995-2005)	71401.2006.002-2006.104
113	EEA	Environment industry	AT	Stat. Austria	2005	Improvement of data quality in Environmental Expenditure Account as well as in Eco Industry – Sample survey at service industries	71401.2005.001-2005-285
122	EEA	instruments	DK	Statistics Denmark	2006	Integrated Environmental and Economic Accounts for Tradeable Carbon Dioxide Emission Permits Denmark 2005	71401.2005.001-2005-292

N°	Area	Module	Country	Institution / Authors	Year	Title	Grant number
128	EEA	Environment industry	NL	CBS Netherlands	2006	Economic indicators for the Eco Industries in the Netherlands, 2003	71401.2005.001-2005-298
132	EEA	EPEA	IE	Environmental Studies Research Series (ESRS) / Department of Environmental Studies, University College Dublin		The Applicability and Policy Relevance of Environmental Protection Expenditure Accounting	None
135	EEA	EPEA	IT	ISTAT	2005	La spesa della Regione Lazio per la protezione dell'ambiente, Anni 1995-2001, Methodological notes (17 p.), Analysis (14 p.),	None
Environmental accounts-based analysis							
19	Analysis	other	SE	Statistics Sweden - Jenny Westin and Peter Fränngård, Nancy Olsson, Viveka Palm, Anders Wadeskog	2002	Swedish Environmental Accounts Integration	
20	Analysis	MFA	DE	Deutsches Institut für Wirtschaftsforschung (DIW Berlin) - Reiner Stäglin und Joachim Schintke unter Mitarbeit von Ingrid Ludwig	2002	Analytische Auswertung von physischen, monetären und Zeit-Input-Output Tabellen - Nutzungsmöglichkeiten für Wirtschafts-, Umwelt- und Beschäftigungspolitik	unknown
23	Analysis	NAMEA	SE	Statistics Sweden - Anders Wadeskog and Maja Larsson	2003	Households in the environmental accounts	
25	Analysis	NAMEA	SE	Statistics Sweden - Anders Wadeskog and Viveka Palm	2003	Structural decomposition of environmental accounts data – the Swedish case	
33b	Analysis	NAMEA	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2006	Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Chapter 5 "NAMEA-work related to decomposition analysis"	200471401002
45b	Analysis	NAMEA	DK	Statistics Denmark - Peter Rørmose Jensen and Thomas Olsen	2003	Analysis of Changes in Air Emissions in Denmark 1980 - 2001 - Time series · Bridge tables · Decomposition analysis	200141200007
49	Analysis	NAMEA	UK	Office for National Statistics - Francis Perry	2003	The impact of UK households on the environment through direct and indirect generation of greenhouse gases	200141200010
53b	Analysis	NAMEA	BE	Federal Planning Bureau - Sébastion Gilis, Guy Vandille	2006	The NAMEA Air for Belgium (1990/1994-2002)	200471401006
56	Analysis	MFA	EU	Wuppertal Institute-Helmut Schütz, Stephan Moll, Sören Steger	2003	Economy-wide material flow accounts, foreign trade analysis, and derived indicators for the EU - "Resource use and material flow accounts"	200241200011
67b	EEA	EPEA	PL	Central Statistical Office – Foundation of	2005	Environmental Protection Expenditure Account in Poland - Part 2 "Assessment of the Index of Sustainable Economic Welfare for Poland 1990-2003"	2004.19100.024

N°	Area	Module	Country	Institution / Authors	Year	Title	Grant number
				Environmental and Resource Economists (FERE) – Elżbieta Broniewicz			
69	Analysis	EEA	Nordic	Denmark, Finland, Sweden, and Norway	2003	Energy Taxes in Nordic Countries - Does the polluter pay?	200141200022
79	Analysis	NAMEA	FI	Statistics Finland - Ilmo Mäenpää	1998	The Economy, Energy and Air Emissions	Working Paper No. 2/1998/B/2
80	Analysis	MFA	EU	Environmental Resources Management (ERM)	1999	The policy relevance of MFAs - Summary report	Working Paper No. 2/1999/B/1
81	Analysis	MFA	EU	IPRA - Frans Berkhout	1999	Industrial metabolism - concepts and implications for statistics	Working Paper No. 2/1999/B/2
82	Analysis	NAMEA	NL	CBS Netherlands Mark De Haan	2000	Decomposing Annual Changes in Pollution according to their Causes: a NAMEA Time Series Analysis	98/562/2040/B4MM
91	Analysis	other	DE	Statistisches Bundesamt - K. Schoer, H. Höh, A. Heinze and Chr. Flachmann	2000	Material flow analysis in the framework of environmental economic accounting in Germany	Working Paper No. 2/2000/B/9
95	Analysis	other	SE	Statistics Sweden - Viveka Palm	2001	Uses of environmental accounts in Sweden	Working Paper No. 2/2001/B/1
98	Analysis	other	EU	C3ED, Université de Versailles - Professor Martin O'Connor	2001	Towards a Typology of 'Environmentally Adjusted' National Sustainability Indicators - Key Concepts and their Policy Applications	Working Paper No. 2/2001/B/4
99	Analysis	NAMEA	UK	Office for National Statistics - Rocky Harris	2001	Methods for estimating air emissions from the production of goods imported into the UK	Working Paper No. 2/2001/B/5
103	Analysis	NAMEA	SE	Stats. Sweden	2005	Social NAMEA with a couplign to SDI - including environment industry	2004-714-01003
104	Analysis	NAMEA	SE	Stats. Sweden	2006	Energy and CO2 -emissions for consumed products and services. IPP-indicators for private and public consommation based environmental accounts (1)	2004-714-01003
105	Analysis	NAMEA	SE	Stats. Sweden	2007	SDI based on Environmental Accounts	71401.2005.001-2005-301
111	Analysis	NAMEA	DK	Statistics Sweden	2004	Sustainable Development Indicators Based on National Accounts	
120	Analysis	NAMEA	DE	Statistisches Bundesamt - Claire Grobecker	2003	Decomposition analysis of Carbon dioxide-emission changes in Germany – Conceptual framework and empirical results	Eurostat Working paper
121	Analysis	NAMEA	SE	Statistics Sweden	2002	The Environmental impact of Swedish Trade	
Material Flow Accounts (MFA)							
54	MFA	Economy-wide	IT	ISTAT - Aldo Femia and various	2003	1980-1998 Material-Input-Based Indicators Time Series and 1997 Material Balance of the Italian Economy	200141200026
55	MFA	PIOT	FI	Thule Institute and Statistics Finland - Ilmo Mäenpää, Jukka Muukkonen, Mika	2003	Waste flows in frameworks of physical input-output tables and material flow accounting	

N°	Area	Module	Country	Institution / Authors	Year	Title	Grant number
				Pirneskoski			
57	MFA	Economy-wide	UK	Office for National Statistics - Ian Gazley and Perry Francis	2005	UK Material flow review	200241200010
58	MFA	Economy-wide	DE	Statistisches Bundesamt - Stefan Schweinert	2004	Umweltökonomische Gesamtrechnungen:Materialkonto - Endbericht	2002 412 00005
59a	MFA	Economy-wide	IT	ISTAT - Aldo Femia and various	2004	Update of the Economy-wide material flow indicators time series for Italy and Italian Physical Input Output Table feasibility study	200271700011
59b	MFA	PIOT	IT	ISTAT - Aldo Femia and various	2004	Update of the Economy-wide material flow indicators time series for Italy and Italian Physical Input Output Table feasibility study	200271700011
60	MFA	PIOT	FI	Thule Institute - Ilmo Mäenpää	2004	Physical flow accounts Finland 1999	200241200009
61	MFA	Economy-wide	DK	Statistics Denmark - Ismir Mulalic	2005	Economy-wide Material Flow Accounts for Denmark 1993-2002	200471401007
62	MFA	Economy-wide	CH	Bundesamt für Statistik (BFS) - Office fédéral de la statistique (OFS) - Anne-Marie Mayerat Demarne	2005	Flux de matières en Suisse - Utilisation de ressources et efficacité matérielle - Premiers résultats Information (Actualités OFS)	no grant
63	MFA	Economy-wide	CH	Office fédéral de la statistique	2007	Flux de matières en Suisse – Consommation de ressources par l'économie suisse entre 1990 et 2005	no grant
71	MFA	Economy-wide	CZ	Czech Statistical Office - Katarína MARKOŠOVÁ, Eva KRUMPOVÁ and others	2005	PHARE Multi-beneficiary Statistical Co-operation Programme 2003 - Task 2 – Data Collection: 5.1 Project on Environmental Accounting - B. Economy-wide material flow accounts - Final report - Period covered: November 2004 – November 2005	2004.19100.019
72	MFA	Economy-wide	HU	Hungarian Central Statistical Office - Enikı Drahos, Lajos Kaposi, Gábor Szilágyi	2005	Phare Multi-beneficiary Statistical Cooperation Program in 2003 – Technical Assistance, Environmental accounts - Material flow accounts (MFA) in Hungary – Final report –	
73	MFA	Economy-wide	RO	National Institute of Statistics	2005	Data Collection Project - Environmental accounting - Final Report	2004.19.100.025
78	MFA	PIOT	DE	Statistisches Bundesamt - C. Stahmer, M. Kuhn, N. Braun	1998	Physical input-output tables for Germany 1990	Working Paper No. 2/1998/B/1
83	MFA	Economy-wide	FI	Statistics Finland - Jukka Muukkonen	2000	Material flow accounts - TMR, DMI and material balances, Finland 1980-1997	Working Paper No. 2/2000/B/1
84	MFA	Economy-wide	SE	Statistics Sweden - A. Isacsson, K. Jonsson, I. Linder, V. Palm, A. Wadeskod	2000	Material flow accounts - DMI, DMC for Sweden, 1987-1997	Working Paper No. 2/2000/B/2
88	MFA	Economy-wide	AT	Statistics Austria - Susanne Gerhold and Brigitte Petrovic	2000	Material flow accounts - Material balance and indicators, Austria 1960-1997	Working Paper No. 2/2000/B/67

N°	Area	Module	Country	Institution / Authors	Year	Title	Grant number
90	MFA	Economy-wide	IT	ISTAT - Aldo Femia and various	2000	A material flow account for Italy, 1988	Working Paper No. 2/2000/B/8
96	MFA	Economy-wide	EU	Wuppertal Institute - Stefan Bringezu and Helmut Schütz	2001	Material use indicators for the EU, 1980-1997	Working Paper No. 2/2001/B/2
106	MFA	Economy-wide	SE	Stats. Sweden	2005	Material Flow accounts and policy. Data for Sweden 2004	71401.2005.001-2005-301
108a	MFA	Economy-wide	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2007	Pilot studies on economy-wide m	71401.2005.001-2005-299
119	MFA	Economy-wide	LV	Latvian Environment Agency, Ministry of Environment of the Republic of Latvia	2004	Economy-wide natural Resources Assessment	
123	MFA	PIOT	DK	Statistics Denmark	2007	Material flow and Physical input-output tables - PIOT for Denmark 2002 based on MFA	71401.2005.001-2005-292
129	MFA	Economy-wide	SI	Stat. Off. Slovenia	2006	Material Flow Accounts (MFA) in Slovenia	71401.2005.001-2005-300
133	MFA	Economy-wide	IE	Environment Protection Agency (Clean Technology Centre, Cork Institute of Technology)		Material Flow Accounts (MFAs) – Demonstrations for Ireland	
National Accounting Matrix including Environmental Accounts (NAMEA)							
22	NAMEA	Air	EL	Institute for computer and communications systems (ICCS) of national technical university of Athens (NTUA) - Dr. Nikos A. Mylonas and various	2002	Natural resources accounts and environmental input-output tables for Greece 1988 – 1998	200041200012/GA
26	NAMEA	Chemicals	SE	Statistics Sweden - Viveka Palm	2003	Chemical product and substance indicators in the SEEA - health and environment	
28	NAMEA	Waste	FI	Statistics Finland - Jukka Muukkonen	2004	Correcting coefficients for register-based data on waste, water and emissions to air by branches of industry	
27	NAMEA	Chemicals	SE	Statistics Sweden - Viveka Palm and Annica Carlsson	2003	Chemical product indicators by industry – fossil fuels, cement and other chemical products classified as hazardous to health or environment 1996-2001	
30b	NAMEA	Air	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2004	Norwegian Economic and Environmental Accounts (NOREEA) Project 2003	200241200013
33a	NAMEA	Energy	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2006	Pilot studies for the development of Environmental Accounting: Norwegian Economic and Environmental Accounts (NOREEA) Project 2005, Chapter 4 "NAMEA-work to further developing NAMEA energy accounts"	200471401002
33c	NAMEA	Water	NO	Statistics Norway - Dr.	2006	Pilot studies for the development of Environmental Accounting: Norwegian Economic and	200471401002

N°	Area	Module	Country	Institution / Authors	Year	Title	Grant number
				Julie L. Hass and Mr. Knut Ø. Sørensen		Environmental Accounts (NOREEA) Project 2005, Chapter 6 "Work related to further environmental expenditure accounts for water"	
35	NAMEA	Energy	BE	Federal Planning Bureau - Sébastien Gilis, Lies Janssen, Guy Vandille	2006	The NAMEA Energy for belgium (1990/1994-2002)	200471401006
37	NAMEA	Water	FR	IFEN/MIM - Philippe CROUZET	2003	Water resources accounts data preparation calculation module as "pilot development of water resources accounts"	200141200030
38	NAMEA	Waste	AT	Umweltbundesamt - Brigitte Karigl	2004	NAMEA – Waste Time Series 1996-2002 Final Report	200271700010.
39	NAMEA	Waste	DK	Statistics Denmark - Ole Gravgård Pedersen	2004	Waste Accounts for Denmark 1999	200241200012
40	NAMEA	water	DK	Statistics Denmark - Thomas Olsen	2001	1997 Water Accounts Related to NAMEA	unknown
41	NAMEA	Water	NO	Statistics Norway - Mr. Jørn Kristian Undelstvedt, Ms. Anne Vedø and Mr. Håkon Skullerud	2006	Statistics on Environmental Accounts: Water Use by Industries	200471401002
42	NAMEA	Air	BE	Federal Planning Bureau - Guy Vandille	2002	The NAMEA Air for Belgium (1994-1998) - The NAMEA Water for Belgium (1998)	200041200017
42	NAMEA	Water	BE	Federal Planning Bureau - Guy Vandille	2002	The NAMEA Air for Belgium (1994-1998) - The NAMEA Water for Belgium (1998)	200041200017
43	NAMEA	Air	SE	Statistics Sweden - Viveka Palm plus Anders Wadeskog, Helena Rudander and Mårten Sjölin	2002	Increasing the timeliness of environmental accounts carbon dioxide emissions data	
44	NAMEA	Air	NO	Statistics Norway - Julie L. Hass and Knut Ø. Sørensen	2002	Norwegian Hybrid Accounts:NAMEA for Air Emissions (National Accounts Matrix including Environment Accounts)	
45	NAMEA	Air	DK	Statistics Denmark - Peter Rørmose Jensen and Thomas Olsen	2003	Analysis of Changes in Air Emissions in Denmark 1980 - 2001 - Time series · Bridge tables · Decomposition analysis	200141200007
46	NAMEA	Air	DE	Statistisches Bundesamt - Claire Grobecker	2003	Energieverbrauch und Luftemissionen des Sektors Verkehr nach Verkehrsträgern und Produktionsbereichen/Privaten Haushalten - Endbericht	2001 412 00008
47	NAMEA	Air	IT	Istat - Angelica Tudini, Giusy Vetrella	2003	Italian NAMEA: air emission accounts for the year 1999 - Istat final report	200241200008
48	NAMEA	Air	AT	Umweltbundesamt - Brigitte Karigl	2003	NAMEA – Air Emissions Time Series 1980-2001	2001 412 00020
50	NAMEA	Air	IT	Istat - Angelica Tudini, Giusy Vetrella	2004	Italian NAMEA: 1990 – 2000 air emission accounts - Istat final report	200271700012
51	NAMEA	Air	PT	National Statistical Institute of Portugal (INE) - Ana Margarida Claro	2004	NAMEA 1999 Air emissions	

N°	Area	Module	Country	Institution / Authors	Year	Title	Grant number
52	NAMEA	Air	CH	Bundesamt für Statistik (BFS) - Office fédéral de la statistique (OFS) - Ernst Basler + Partner AG, Zollikon: Jürg Füssler, Guido Beltrani, Oliver Schelske Infras AG, Zürich: Bernhard Oettli, Daniel Sutter, Jürg Heldstab	2005	Emissions de gaz à effet de serre par branche économique - NAMEA pilote pour la Suisse en 2002	no grant
53a	NAMEA	Air	BE	Federal Planning Bureau - Sébastion Gilis, Guy Vandille	2006	The NAMEA Air for Belgium (1990/1994-2002)	200471401006
74	NAMEA	Air	CZ	Czech Statistical Office - Katarína MARKOŠOVÁ, Eva KRUMPOVÁ and others	2005	PHARE Multi-beneficiary Statistical Co-operation Programme 2003 - Final report - Period covered: November 2004 – November 2005	2004.19100.019
75	NAMEA	Air	SI	Statistical Office of the Republic of Slovenia - Vida Butina	2006	Multi-beneficiary statistical cooperation programme in 2003 – Technical assistance (“The action”) - Final Report on NAMEA Air Emissions in Slovenia	
76	NAMEA	Air	HU	Hungarian Central Statistical Office - Orsolya Bálint	2005	Multi-beneficiary statistical cooperation programme in 2003 – Technical assistance (“The action”) - Final Report on NAMEA Air Emissions in Hungary	
100	NAMEA	Water	ES	Instituto Nacional de Estatistica - Félix Alonso Luengo, Fátima Escribano Morales	2001	Water Satellite Accounts for Spain 1997-1999	Working Paper No. 2/2001/B/6
101	NAMEA	Chemicals	SE	Statistics Sweden - Viveka Palm and Kristina Jonsson	2001	Including chemical products in environmental accounts - The magnitude of chemical product use in different industries in Sweden 1996-1999	Working Paper No. 2/2001/B/7
109	NAMEA	Water	SE	Statistics Sweden	2002	Water Accounts 2000	
114	NAMEA	Water	AT	Umweltbundesamt Austria	2007	The Austrian Emission Register (EMREG) as data source for NAMEA Water Emissions – Recommendations for a regular update of emissions of the manufacturing industries and households	71401.2005.001-2005-286
115	NAMEA	Waste	AT	Umweltbundesamt Austria	2007	Pilot study on waste accounts	71401.2005.001-2005-286
116	NAMEA	Water	BG	NSI Bulgaria	2006	Pilot Study on Statistics on Water Flows and Emissions to Water	71401.2005.001-2005-289
117	NAMEA	Water	NL	Statistics Netherlands	2006	Dutch Water Accounts With preliminary results for 2003 and 2004	
118	NAMEA	Waste	NL	Statistics Netherlands	2007	Waste Accounts in a NAMEA framework	
127	NAMEA	Air	LT	Stats. Lithuania	2007	Pilot project on Environment statistics and accounts - NAMEA	71401.2005.001-2005-297
130	NAMEA	Water	DK	Statistics Denmark - Thomas Olsen	2005	Integrated Environmental and Economic Accounts for Water and Waste Water Denmark 1999 - 2003	200471401007

N°	Area	Module	Country	Institution / Authors	Year	Title	Grant number
131a	NAMEA	water	DE	Statistisches Bundesamt - Stefan Schweinert	2002	Pilot Study on Statistics on Water Flows and Emissions to Water	200041200010
131b	NAMEA	water	DE	Statistisches Bundesamt - Stefan Schweinert	2002	Pilot Study on Statistics on Water Flows and Emissions to Water	200041200010
136	NAMEA	Air	IT	Istat	2005	La NAMEA per la regione Lazio, Anno 2000, Methodological note, (6 p.) and Analysis (17 p.),	None
Natural Resource Accounts							
21	Natural resources	Land	SE	Statistics Sweden - Veronica Skarborg, Marianne Eriksson, Leif Norman	2002	Land Accounting	
24	Natural resources	Land	SE	Statistics Sweden - Marianne Eriksson, Annika Mårtensson, Viveka Palm	2003	Land use by industry 2000	
29	Natural resources	Forest	DK	Statistics Denmark - Ismir Mulalic	2004	Danish Forest Accounts 1990-2001	200241200006
30a	Natural resources	land	NO	Statistics Norway - Dr. Julie L. Hass and Mr. Knut Ø. Sørensen	2004	Norwegian Economic and Environmental Accounts (NOREEA) Project 2003	200241200013
36	Natural resources	Water	FR	IFEN/MIM - Philippe CROUZET	2003	Water quality accounts calculation module	200141200031
70	Natural resources	Forest	EE	Statistical Office of Estonia - Kaia Oras with various	2005	Final report of the pilot study - Integrated Environmental and Economic Accounting for Forests	.2004.19.19100.020.
97	Natural resources	Subsoil	NL	Statistics Netherlands - André van den Berg and Peter van de Ven	2001	Valuation of Oil and Gas Reserves in the Netherlands - Government appropriation of net resource rent for subsoil assets - An analysis for the Netherlands	Working Paper No. 2/2001/B/3
124	Natural resources	subsoil	DK	Statistics Denmark	2007	Handbook on mineral and energy asset accounting	71401.2005.001-2005-292
125a	Natural resources	forest	HU	NSI Hungary		Land and Forest Accounts	71401.2005.001-2005.295
125b	Natural resources	land	HU	NSI Hungary		Land and Forest Accounts	71401.2005.001-2005.295
126	Natural resources	forest	LV	Central Stat. Bur. Latvia	2007	Integrated Environmental and Economic Accounting for Forests (IEEAF)	71401.2005.001-2005-296
Other							
32	Other	other	DK	Statistics Denmark - Peter Rørmose Jensen and Thomas Olsen	2005	Regional Environmental Accounts Denmark 2003	200471401007
134	Other	Other	DE	Statistisches Bundesamt	2004	Transport and the environment - Report module for the GEEA	20014120012

Annex 2 – Survey to the institutions in charge of environmental accounting at national level

A 2.1 Process

As proposed during the kick-off meeting (2 February 2007), KDR carried out a survey to the institutions in charge of environmental accounting at national level in EU countries plus Norway and Switzerland.

The questionnaire was elaborated by KRD in close collaboration with Eurostat and the DG ENV. Also, "personalised" versions (i.e. partially pre-filled in) were prepared, based on information already available from the pilot studies and Eurostat's meetings background documents, as well as the countries' individual responses to the UNCEEA's *Global Assessment of Environment Statistics and environmental-Economic Accounting* provided to Eurostat by the UNSD.

As announced at the meeting of the Working Group "Environmental Accounts" on 7th-8th May 2007, the survey was conducted combining email contacts and telephone interviews.

The questionnaire (see below) was circulated first by Eurostat on 25th May 2007 accompanied by a cover letter from Rainer Muthmann. KRD sent out individually the "personalised" versions on 30th June in order to prepare the interviews of the relevant experts

So far, 27 countries have responded to the questionnaire (including partially). 23 interviews were conducted from 4th June to 17th July (see the list of contacts below). Greece, Hungary, Poland and Romania provided there response by email only and Malta provide information on its current activity but did not filled in the questionnaire. The Slovak Republic was contacted by telephone during the first half of July and promised to send their response as soon as possible.

A 2.2 List of contacts

Country code	Country name	Name	Tel number	Email address	Interview
BE	Belgium	Lies Janssen Guy Vandille	32-2-277.72.13 32-2-507.73.65	lies.janssen@economie.fgov.be gv@plan.be	Monday 18 June Thursday 7 June
BG	Bulgaria	Stefan Stonev JaklinaTzvetkova	(+359 2) 9857 436 for the interview: (+359 2) 9857 761	stzonev@nsi.bg jtzvetkova@nsi.bg	Monday 18 June
CZ	Czech Republic	Jiri Hrbek Miloslava Veselá	420 472 706 157	Jiri.hrbek@czso.cz miloslava.vesela@czso.cz	(email 22 June) Thursday 28 June
DK	Denmark	Ole Gravgård Perdersen	4 539 173 488	ogp@dst.dk	Friday 29 (14:00)
DE	Germany	Ursula Lauber	49 611 75-2737	ursula.lauber@destatis.de	Friday 29 June
EE	Estonia	Kaia Oras Eda Grüner	372-62 59 234	kaia.oras@stat.ee eda.gruner@stat.ee	Thursday 14 June
EL	Greece	Panagiotis Vlachos	30-210-48 52 570	panvlach@statistics.gr	(email 11 July)
ES	Spain	Jorge Saralegui Marisa Edigo Martin	34.91.583.94.02	jsaralegui@ine.es maegido@ine.es	(email 11 June) Thursday 7 June
FR	France	Michel David Grégoire Devaud	02 38 79 78 86	michel.david@ifen.ecologie.gouv.fr gregoire.devaud@ifen.fr	Wednesday 20 June Idem
IE	Ireland	Mark Davis Pat Fanning	353-1-4984208 353-1-4984367	mark.davis@cso.ie pat.fanning@cso.ie	Thusday 28 June (email 25 June)
IT	Italy	Cesare Costantino	39 06 467 336 17	cecostan@istat.it	Thursday 6 July
CY	Cyprus	Pantelis Protopapas	357 22 602 167	pprotopapas@cystat.mof.gov.cy	Wednesday 20 June
LV	Latvia	Andra Lazdina	371 73 66 747	andra.lazdina@csb.gov.lv	Tuesday 17 July
LT	Lithuania	Danguole Krepstuliene	(+370 5) 236 49 51	danguole.krepstuliene@gov.stat.lt	(email 21 June)
LU	Luxembourg	Eric de Brabanter	352 478 684 2	eric.debrabanter@mev.etat.lu	Monday 25 June
HU	Hungary	Pàl Aujeszky	36 1 345 68 07	pal.aujeszky@office.ksh.hu	email (01 June)

Country code	Country name	Name	Tel number	Email address	Interview
MT	Malta	Cheryl Bonanno	35 625 997 641	cheryl.r.bonanno@gov.mt	(email 28 June)
NL	Netherlands	Sjoerd Schenau	31-70-337 404 1	sscn@cbs.nl	Monday 4 June
AT	Austria	Sacha Baud	43 1 711 28-7235	sacha.baud@statistik.gv.at	Tuesday 19 (9:00)
PL	Poland	Danuta Dzeil		d.dziel@stat.gov.pl	(email 04 June)
PT	Portugal	Isabel Quintela Nuno Sergio Bacelar Barros	351 21 844 04 87 (3612) 351 218 426 100	Isabel.quintela@ine.pt Mlurdes.melo@ine.pt	Tuesday 26 June
RO	Romania	Constantin Mindricelu	4021 317 779 4	constantin.mindricelu@insse.ro	(email15 June)
SI	Slovenia	Vida Butina Danica Bizjak	386 1 2340 778	vida.butina@gov.si danica.bizjak@gov.si	Tuesday 12 (14:30) Tuesday 12 June
SK	Slovakia	Alexander Pflüger	421 2 502 36 795	alexander.pfluger@statistics.sk	
FI	FI	Jukka Muukkonen	358 9 1734 3224	jukka.muukkonen@stat.fi jukka.muukkonen@tilastokeskus.fi	Wednesday 27 June
SE	Sweden	Viveka Palm	46 8 5069 4219	viveka.palm@scb.se	Tuesday 5 June
UK	United Kingdom	Ian Gazley	44 20 7533 5904	Ian.gazley@ons.gsi.gov.uk	Wednesday 13 (10:00)
NO	Norway	Julie Hass Kristine Kolshus	47 21 09 45 15 47 21 09 48 58	juh@ssb.no kre@ssb.no	Thursday 28 June same as above
CH	Switzerland	Anne-Marie Mayerat Demarne	41 32 713 67 40	anne-marie.mayerat@bfs.admin.ch	Tuesday 19 June

A 2.3 Questionnaire on environmental accounting activities

Accompanying letter by Eurostat

In 2002, after 10 years of development of environmental accounts, the Task Force on the European Strategy for Environmental Accounting (ESEA) proposed a list of modules and priorities for the implementation of Environmental Accounting at EU level. This strategy was endorsed by the Statistical Programme Committee (SPC) in 2003.

In early 2007, Eurostat – Unit E3 (Environment statistics) launched a study in order to assess the state of play and progress made and foreseen activities by EU Member States and partner countries in the compilation of environmental accounts (EA) .

This study includes among other tasks (examination of existing countries reports to Eurostat, publications on EAs, data available on websites, etc.) a survey on the present state of EA in European countries.

One purpose is to evaluate the role played by pilot applications and Eurostat methodological support in the development of environmental accounts. Another purpose is to get an impression of the barriers that countries encounter in developing and implementing environmental accounts. It will also investigate the use of EA results by policy makers and the communication tools for EA. Further Eurostat intends to use the results of the survey in the priority setting in connection to the renewed Task Force on the European Strategy on Environmental Accounting (ESEA)

The following questionnaire – as well as the examination of the above mentioned other documents – will serve as the basis for a phone interview to occur in June in order to assess the situation in your country.

We thank you in advance for the time spent in responding to the consultant undertaking the interview.

Eurostat
Unit E3 – Environment statistics

Rainer MUTHMANN

Questionnaire

Please provide your contact information

Name:

Organisation:

Phone:

E mail address:

Position:

Working on EA since:

1 In your country, is there any programme[122] of environmental accounting?

o Yes

Please give a short description:

- (legal) status
- main steps or implementation stages
- Institution(s) responsible for the implementation of the programme
  - Name:
  - Please specify the ministry/ies under which it is placed:

o No

o Planned for year .....

o If you experience barriers to the carrying out environmental accounting,

Please give a short description of why:

- Political decision
- No legal background
- No resources available (funding, expertise, etc.)
- Other (please specify):

o Could an EU regulation help your country in the compilation of environmental accounts?

2 Do other institutions (Ministries, Agencies etc.) compile any part or module of the environmental accounts or provide statistical data specifically prepared for the environmental accounts?

Rows can be added to the table

Name	Type of accounts / statistics	Comments

122 - For this questionnaire, an institution is considered having a programme on environmental accounting when the preparation of environmental accounts follows a planning that covers different phases from the development of pilot applications to the regular production of accounts.

3 Is the reporting on environmental matters to international bodies (European Environment Agency, European Commission, UN, OECD etc.) coordinated within your country?

o Yes

Please give a short description how the coordination is done:

- Institution responsible for the coordination:
  - Name:
  - Please specify the ministry under which it is placed:

o No

4 For which types of accounts – as identified by the ESEA Task Force[123] – is the work on environmental accounting already initiated?

Please fill in the relevant columns (Pilot application / Regular basis) of the overview table placed at the end of the questionnaire (Please click here to reach the table).

Could you explain the reasons that led your country to choose these modules?

o Particular relevance for your country

o Users need/demand

o Other (Eurostat methodological support and/or EU funding; or "supply" driven development…): please specify:

5 Were Eurostat's methodological materials used for the compilation of environmental accounts in your country?

Manuals or handbooks

o Yes – Please specify (SERIEE manual, MFA methodological guide…):

o No

Compilation of pilot applications

o Yes – Please specify (Forest 1999 or 2000, NAMEA-air 1999 or 2001, Water 2001…):

o No

Other countries report(s) disseminated as Eurostat Working Paper(s)

o Yes – Please specify:

o No

Other countries' reports on pilot applications (not disseminated as Eurostat Working Papers)

o Yes – Please specify:

123 - European Strategy for Environmental Accounting (ESEA), *The European Strategy for Environmental Accounting*, Report to the Statistical Programme Committee (SPC), as adopted by the SPC in 2003.

o No

Participation to Task Forces, Trainings (e.g. Work Shops) or Working Groups, international Groups like the UNCEEA, London Group, other UN City Groups (which years)

o Yes – Please specify:

o No

Additional information: Were methodological materials other than Eurostat's materials used for the compilation of environmental accounts in your country (e.g. from UN, London Group, OECD, research)?

o Yes – Please specify:

o No

6 Did your country benefit from EU funding for environmental accounting pilot application(s) during the years 2000 to 2006?

o Yes, - Please specify for which modules and whether your country would have undertaken the work in any case?

Environmental accounting modules	Year(s) covered	Was the module among your top priorities at national level? (Yes/No)

o No – Please could you specify?

- o No project was submitted – please specify the reason
- o The project(s) submitted was/were not selected – please specify the reason
- o The project received financial support by other organisations – please specify
- o Other – please specify

7 Is there any plan in your country to complement the set of environmental accounts modules according to the ESEA's or national priorities?

Please fill in the relevant column (Future development) of the overview table placed at the end of the questionnaire (Please click here to reach the table).

8 What is the use of environmental accounting in your country?

o Research activity (e.g. modelling, economic forecasts…)

- o Yes – Please specify
- o No

o Monitoring environmental/sustainable performance (i.e. indicators)

- o Yes – Please specify
- o No

- Policy analysis and assessment (e.g. regulation, taxes, international agreements…)
  - Yes – Please specify
  - No
- Public awareness
  - Yes – Please specify
  - No
- Other – Please specify

9 How does your country promote environmental accounting?

- Web site - please specify
- Publications – please specify (and provide an issue)
- Leaflets – please specify (and provide an issue)
- Conferences, presentation – please specify the subject and the audience

Overview table to be filled in as a response to questions 4 and 8

(Please click here to come back to question 5) (Please click here to come back to question 9)

ESEA priorities	Environmental accounting modules	Pilot application already available (reference years)	Regular basis (years already available)	Future development (schedule)	Comments (e.g. producer, specific area…)
Economic environmental accounts					
A	Environmental protection expenditure accounts (EPEA)*				
A	Environment industry*				
A	Environmental taxes				
C	Resource management expenditure (for water)				
C	Economic instruments (subsidies)				
D	Other resource management expenditure				
D	Economic instruments (permits)				
D	Natural and technological disasters expenditure				
	Other – please specify:				
Material flow accounts					
A	Economy-wide MFA				
B	Use of raw materials accounts (for selected materials)				
	Other (e.g. physical input output tables) – please specify:				
NAMEA (physical flow accounts, with national accounts data)					
A	Air emission accounts*				
A	Energy accounts*				
B	Solid waste accounts (including links to MFA)				
B	Water emission accounts				
D	Specific substances accounts (e.g. N, P, toxic chemicals)				
	Other – please specify:				
Natural resources accounts					
A	Water flow accounts (supply and use)				
A	Forest timber accounts				
A	Subsoil assets (gas and oil)				
B	Land accounts (land use and land cover)				
B	Water quality accounts				
C	Land accounts (complementary accounts)				
C	Fish and fisheries accounts				
C	Water quantity accounts				
D	Forest environmental and recreational functions				
D	Eco-system accounts				
	Other – please specify:				

A: Priority areas recommended for harmonised EU-wide reporting; **B**: Areas for short-term development and experimental implementation in volunteer countries; **C**: Areas for medium-term development and experimental implementation in volunteer countries; **D**: Areas for long-term development.

* Despite *EPEA* and *Environment industry* form a unique module in the ESEA, they are separated here since these accounts are not necessarily jointly compiled. The same applies for *Air emission* and *Energy accounts* for NAMEA.

(Please click here to come back to question 5) (Please click here to come back to question 9)

Annex 3 Acronyms and list of countries

Acronym	Detailed expression
CEPA	Classification of Environmental Protection Activities
EA	Environmental Accounts/Accounting
EEA	Economic Environmental Accounts (EPEA, environment industry, taxes etc.)
EGSS	Environmental Goods and Services Sector
EPE	Environment Protection Expenditure
EPEA	Environment Protection Expenditure Accounts
EPER	Environment Protection Expenditure and Revenues
ESA	European System of Accounts
ESEA	European Strategy for Environment Accounting
EU	European Union
EW-MFA	Economy Wide-Material Flow accounts/Accounting
IEEAF	(european framework for) Integrated Environmental and Economic Accounting for Forests
IOT	Input-Ouput Tables
IOA	Input-Ouput Analysis
JQ	Joint Questionnaire (OECD/Eurostat questionnaire on the state of the environment)
MFA	Material Flow accounts/Accounting
NACE	Nomenclature des Activités économiques dans la Communauté Européenne (Statistical Classification of Economic Activities in the European Community)
NAMEA	National accounting Matrix including Environmental accounts
OECD	Organisation for Economic Co-operation and Development
PIOT	Physical Input-Ouput Tables
SBS	Structural Business Statistics
SEEA	System for integrated Environmental and Economic Accounting
SNA	System of National Accounts
SERIEE	Système Européen de Rassemblement des Informations Economiques sur l'Environnement (European System for the Collection of Economic Information on the Environment)
UNCEEA	United Nations Committee of experts on Environmental-Economic Accounting

Country code	Country name
BE	Belguim
BG	Bulgaria
CZ	Czech Republic
DK	Denmark
DE	Germany
EE	Estonia
EL	Greece
ES	Spain
FR	France
IE	Ireland
IT	Italy
CY	Cyprus
LV	Latvia
LT	Lithuania
LU	Luxembourg
HU	Hungary
MT	Malta
NL	Netherlands
AT	Austria
PL	Poland
PT	Portugal
RO	Romania
SI	Slovenia
SK	Slovakia
FI	Finland
SE	Sweden
UK	United Kingdom
NO	Norway
CH	Switzerland