Statistisk sentralbyrå
Statistics Norway

# Environmental Accounts

# Environmental Goods and Services Sector, NAMEA Air and Environmental Related Taxes

## 2009 Final Technical Implementation Report to Eurostat

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# General introduction

The ***NOR***wegian ***E***conomic and ***E***nvironmental ***A***ccounts (NOREEA) project is established as a cooperative project between the Division for Environmental Statistics and the Division for National Accounts at Statistics Norway. This report describes the results from the NOREEA project that ran from 1 January 2009 until 31 December 2009. The work was partially funded through Eurostat Grant Agreement No 50304.2008.001-2008.337. The purpose of the project of 2009 has been to further develop the Norwegian Environmental and Economic Accounts (NOREEA). The project was divided into three main work areas:

***Part I: Environmental goods and service sector***
The first part covers the attempt to expand the statistics for the environmental goods and services sector by covering two more environmental domains (air/climate (CEPA 1) and soil, groundwater and surface water (CEPA 4)).

The objective was to identify the population of producers of EGSS within CEPA 1 (air/climate) and CEPA 4 (soil/groundwater/surface water), and to compile turnover and employment figures.

The methodology of combining information sources with the business register, without doing any survey provided suitable for CEPA 4. However, in Norway suppliers of EGSS for CEPA 1 consists mainly of large corporations which produce environmental technologies as a minor part of their business. We conclude that a survey seems appropriate to understand this fragment of the population.

***Part II: NAMEA-air***
The second part deals with timeliness of the NAMEA-air data, which is part of Eurostat's core priority areas.

The objective was to improve the timeliness of NAMEA air statistics by setting up a system for compiling such statistics 4.5 months after the reference year

Documentation of exact data sources used for the current preliminary emissions statistics proved hard to find. We concluded that until such exists we will stick to a 1-digit level NACE aggregation for the NAMEA t+1 statistics.

***Part III: Environmental related taxes***
The third part covers the attempt to expand the statistics for the environmental related taxes by developing time series and improving the timeliness. This part relates to Eurostat's second priority area.

The objective was to develop a method and input-data to extract environmental related taxes by industries for the time period 1995 – 2004, and to improve the actuality of the data by developing a method for dividing environmental related taxes by industries based on the provisional national accounts.

As a result of this project Statistics Norway has time-series for environmental related other taxes by production for the period 1994-2006. All necessary input data needed to establish a technical solution for environmental related taxes on products by industries for the time period 1995 – 2004. The concept of an IT-solution has been developed according to the requested needs, however the actual programming needed was more extensive than first assumed, therefore requesting more resources than first expected. Based on the solid work undertaken as part of this project, the further work with the IT-solution will be undertaken by the costs of Statistics Norway, and results are expected to be available by mid April 2010.

For the estimating of preliminary environmental related taxes by industries based on the provisional annual national accounts, the industry-distribution methodology did not work as expected. It was revealed that the actuality of the statistics currently being produced could be published 6 months prior to what is planned.

For a summary of the project, please read the separate Final Technical Implementation Reports for Environmental goods and service sector (Part I), Namea-air (part II) and Environmental related taxes (part III) included in this document.

# Part I:
# THE ENVIRONMENTAL GOODS AND SERVICES SECTOR

# – Case study on CEPA 1 (air/climate) and 4 (soil/groundwater)


**Summary part 1:**

The objective of the project was to identify the population of producers of EGSS within CEPA 1 (air/climate) and CEPA 4 (soil/groundwater/surface water), and to compile turnover and employment figures. The methodology of combining information sources with the business register, without doing any survey provided suitable for CEPA 4. However, in Norway suppliers of EGSS for CEPA 1 consists mainly of large corporations which produce environmental technologies as a minor part of their business. We conclude that a survey seems appropriate to understand this fragment of the population.

# 1. Introduction

## 1.1 Background

Environmental Goods and Services Sector (EGSS) is an area in development, for which we can expect reporting to Eurostat in the near future. Besides the interest from the EU side, there is increasing national interest especially for the environmental technology sector. Therefore, Statistics Norway has carried out several small projects in this area since 2006, to test out different methodologies, definitions and data sources.

In 2006, a first attempt was made to define the environmental goods and services industry in Norway. The project was based on existing statistical data sources and used primarily standard classification systems and official statistics. This approach successfully identified a number of enterprises in the then so-called "core" environmental industry. Some initial estimates for figures for the core industry were presented.

In autumn 2007, Statistics Norway undertook a project financed by the Norwegian ministry of environment concerning environmental technology. The ministry was interested in an estimate of the turnover, employment and export of Norwegian environmental technology. As the resources and time available was limited, we agreed on a case-study, estimating turnover, employment and export from producers of technologies that reduces pollution in the areas of wastewater and from producers of water purification technologies. We estimated data for the technology-part of these environmental domains. In addition, we already had data on the services part from existing structural statistics and national accounts. This covered the domains of water and wastewater all together, both technology producers (goods) and providers of services. The results were published in Smith (2008).

Although this project's aim was to estimate certain figures for the water and wastewater domains, it also served as a pilot project for identifying the population of the environment industry. In this pilot project we identified most water and wastewater technology producers in Norway. They were identified through different secondary sources like: green business networks, relevant environmentally related websites, business magazines, yellow pages etc. Some expert evaluations regarding the final population list (of companies) was then done in order to check that the list we had developed was not excluding important actors. All companies on the list received an e-mail questionnaire, and the reported data formed the basis for the figures estimated in the project.

However, as part of the project we also wanted to test the "Swedish methodology." This methodology makes use of data already available in the business register. The work then consists of identifying the population/the companies producing environmental goods and services. The companies are assigned a code according to whether environmental activity is their principal or secondary activity, and also a code according to the main environmental domain they work within. As we had established a list of companies, including organisation number, we could easily derive turnover and employment data from the business register. We used data from the questionnaire to categorise the companies as primary or secondary producers of environmental technology. The estimates resulting from using business register data were then compared to estimates based on the questionnaire data. We concluded that the business register can be used as a data source for turnover and employment with good results. This could simplify our task on establishing environment industry statistics, by avoiding additional surveys.

In 2008, we estimated economic variables (mainly turnover and employment) for the renewable energy sector in a similar Eurostat project. We used the same methodology as described above (the

business register or "Swedish methodology") for parts of the project, supplemented with some other methods and estimation techniques. We converting ancillary energy production statistics for the manufacturing industry into monetary values using shadow prices (from the electricity statistics). Identification of small and medium heating plants, including ancillary production within agriculture, was done through access to applications systems of two main government agencies providing investment grants. The estimated production capacity in the applications was then converted into turnover values using annual average prices for district heating.

Hence, although our overall plan has been to use the "Swedish methodology" as far as possible, we did find it necessary to use some other estimation techniques for part of the renewable energy sector. One problem with these techniques was that, although they give better estimates for turnover, they don't provide any opportunity to estimate employment.

Through these different projects and sub-projects we had by the end of 2008 compiled turnover estimates for the following environmental domains:

- Wastewater management (CEPA 2)
- Water management (CReMA 10)
- Renewable energy (CReMA 13A)

Employment and export was only partially covered, as we lacked input data for some sub-sectors.

## 1.2 Purpose of this project

The main objectives of this project were to:
1) establish the populations; and
2) compile turnover and employment for the following environmental domains:

- *Protection of ambient air and climate* (CEPA 1); and
- *Protection and remediation of soil, groundwater and surface water* (CEPA 4).

Our plan was to use the same methodology as in earlier case studies, i.e. "The Swedish methodology", learned from Statistics Sweden (SCB, 2006). They make use of already existing data sources and registers within SCB to compile their statistics. Our objective was to develop this methodology further by identifying the environmental shares of each environmental company. This activity turned out to be the most difficult part of the project (see chapter 3).

We also wanted to look into the challenges related to maintaining the population of identified producers of environmental goods and services, and to decide which methodology or "rules" to use.

## 1.3 Concepts and definitions

### 1.3.1 Definition of the environmental goods and services sector

We have based the work in this project on the concepts, definitions and classifications proposed in the recent Eurostat (2009) handbook: "*The environmental goods and services sector."*

Eurostat uses the OECD/Eurostat (1999) definition of environment-related activities as a starting point. There, environment-related activities are defined as *"activities to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes cleaner technologies, products and services that reduce environmental risk and minimise pollution and resource use".*

Starting from this definition, the **environmental goods and services sector** is further described as consisting of

*"(..) a heterogeneous set of producers of technologies, goods and services that:*

> *Measure, control, restore, prevent, treat, minimise, research and sensitise environmental damages to air, water and soil as well as problems related to waste, noise, biodiversity and landscapes. This includes "cleaner" technologies, goods and services that prevent or minimise pollution.*
>
> *Measure, control, restore, prevent, minimise, research and sensitise resource depletion. This results mainly in resource-efficient technologies, goods and services that prevent or minimise pollution.*

Eurostat (2009: 29)

In addition, these technologies and products (i.e. goods and services) must satisfy *the end purpose criterion,* i.e. they must have an environmental protection or resource management purpose as their main purpose. However, the purpose is identified mainly on the basis of the technical nature of the activity, i.e. regardless of the intention of the producers or the users. For particular boundary cases, not solved according to the technical nature criterion, the producer's own intention should be applied. The intention of the user is, on the contrary, never to be taken into account in the EGSS context.

Relevant activities are classified according to their *characteristics and function* and grouped into the following categories:[1]

- environmental specific services
- connected products
- adapted goods
- end-of-pipe technologies
- integrated technologies

We have treated all five categories in our case study, but not all are covered extensively. This topic is explained further under chapter 2.3.

#### 1.3.2 Definition of environmental domains

We have used the standard Classification for Environmental Protection Activities and Expenditure (CEPA 2000)[2] for defining the two environmental domains we have concentrated on in this study:

***CEPA 1: Protection of ambient air and climate***

*Protection of ambient air and climate comprises measures and activities aimed at the reduction of emissions into the ambient air or ambient concentrations of air pollutants as well as to measures and activities aimed at the control of emissions of greenhouse gases and gases that adversely affect the stratospheric ozone layer.*

*Excluded are measures undertaken for cost saving reasons (e.g. energy saving).*

In practice we have only covered CEPA 1.1-1.3:
1.1 Prevention of pollution through in-process modifications;
1.2 Treatment of exhaust gases and ventilation air; and

[1] Hence, the categories adapted for the purpose of EGSS are closely linked to the ones defined for environmental protection expenditure purposes. Still there are some important differences. The major one being about integrated technologies. For EGSS purposes the whole turnover, employment etc. of the producer is counted. For environmental protection expenditure purpose, only the extra cost associated with the environmental part of the investment is counted.

[2] http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM&StrGroupCode=CLASSIFIC&StrLanguageCode=EN

1.3 Measurement, control, laboratories and the like.

CEPA 1.4: "Other activities," which includes regulation, administration, management, education etc. is for the most part public sector activities, and not dealt with in this case study.

***CEPA 4: Protection and remediation of soil, groundwater and surface water***
*Protection and remediation of soil, groundwater and surface water refers to measures and activities aimed at the prevention of pollutant infiltration, cleaning up of soils and water bodies and the protection of soil from erosion and other physical degradation as well as from salinisation. Monitoring, control of soil and groundwater pollution is included.*

*Excluded are wastewater management activities (see CEPA 2), as well as activities aimed at the protection of biodiversity and landscape (see CEPA 6).*

In practice, the compiled figures only covered CEPA 4.1, 4.2 and 4.5:
4.1 Prevention of pollutant infiltration;
4.2 Cleaning up of soil and water bodies; and
4.5 Measurement, control, laboratories and the like.

No companies were found within the two CEPA categories 4.3 "Protection of soil from erosion and other physical degradation" and 4.4 "Prevention and remediation of soil salinity."

CEPA 4.6 "Other activities," which includes regulation, administration, management, education etc. is for the most part public sector activities, and not dealt with in this case study.

# 2. Identifying the population

Identifying the population was done based on the same approach as we have used in earlier case studies. This process consists of two main steps. We start by making use of all relevant sources to draft a first list of companies that might possibly be part of the population. This is usually the easiest part. Then second step is to "wash" the draft list. This is a much more demanding process, including closer studies of each company to find out whether they should be included or not. Usually the final list is dramatically cut compared to the draft list, the main reason being that they are retailers or import companies, or not specialised in environmental services.

## 2.1 Information sources for draft population list

To identify the population, we made use of several specialised web-sites as well as general search sites and the official business register in Norway. We also made use of some specialised branch magazines and the few other case studies which has been carried out in this field in Norway. These were the main sources used:

Web-sites:

- Norwegian Trade Portal: http://www.nortrade.com/index.php?cmd=branch&send_branch=139
- Norwegian Environmental Technology: http://norwayonline.no/environmental-technology
- Norwegian Energy and Environment Consortium: http://www.norway.cn/News_and_events/Business/Energy/
- The global directory of environmental technology: http://www.eco-web.com/ini/index.html
- Green business Norway: http://www.greenbusiness.no/

- Miljøringen (Network for contaminated ground): http://www.miljoringen.no/
- Exhibitors at the Norwegian Green business conference 2009: http://www.greenbusiness.no/conference/
- Norwegian research council: http://www.forskningsradet.no/
- The EPA web-site: http://www.sft.no/miljoteknologi
- The official Norwegian business register (Brønnøysund)
- Yellow pages
- General internet sites like: Internettkatalogen, Internett, Yahoo

Magazines:

- Business magazines (”Prosessindustrien,” ”Norsk energi,” ”Teknisk ukeblad,” ”Moderne produksjon,” ”FDV”)
- Research magazine (“Gemini”)

Other studies:

- Case studies on the EGSS sector in Norway (Menon (2009), Rogalandsforskning (1997))

As experienced in earlier eco-industry projects, this approach provided a long list of companies in the first phase, which was then dramatically cut when checking each company more closely. Many companies were deleted from the list simply by checking the NACE-codes given in the business register (e.g. sales/import companies). Others were deleted after gathering information from the companies' own web-sites. Usually a lot of companies are import, sales and distribution companies which are excluded according to Eurostat's operationalisation of the EGSS for statistical purposes (see Eurostat (2009), chapter 2.2).

## 2.2 Testing new information sources

The OECD is working on setting up a patent database that can be used to estimate eco-innovation. For our project we had been in contact with the OECD about using information from their patent database to identify producers of environmental goods. The OECD had extracted information on companies having declared to be registered in Norway for patent applications deposited either at the Norwegian or the European Patent Office. The list we used was grouping companies with environmental patents related to “Air.” We wanted to test whether this source of information could be an easier way or give additional information in establishing the population.

In general, the OECD list seemed much more comprehensive than the population lists we had drafted from the sources listed above. The OECD “air” list alone includes 117 companies. For our use it was problematic that there are many private persons registering patents on technologies, while they do not produce the technology itself. It was also not easy to find out who the producers were (if any). Some of the private persons run small one-man companies usually registered as consulting companies, for which it was not possible to find any further information on the internet (i.e. they had no web-site). Another problem was that we didn't know the technology/patent in question, as this is not specified in the OECD list.

Also, several large companies have registered technologies without this helping us to identify the exact environmental share of the total turnover. When it comes to large companies, most of the companies and patents were anyway already known to us through other information sources.

Hence, where a company had been bought by another or had been split, we didn't know which company to count, if we didn't already know the technology in question. Hence the OECD list was then not of much additional help.

In conclusion, the OECD information source was therefore much less helpful than we had hoped. Nevertheless, on our final population list, a couple of the companies had been identified via the OECD database. Hence, although we cannot use the patent list directly as a population list, it was a valuable source, among others, to set up the final population list.

## 2.3 Challenges encountered

In establishing the population list, we encountered several challenges. The greatest challenge has been to demarcate the companies to be included. Company structure presents one of the major challenges. A common way to organise a business is as a corporation with many subsidiaries. In this case it can be a challenge deciding which subsidiary/establishments to include in our list, as the corporation often do not explain on their websites in what exact establishment technologies of our interest are being produced. This gets even more complicated when patents and technologies are passed to new companies through mergers etc.

Another challenge is of course to know when the list is exhaustive. As a previously uncharted field, there exists no complete overview, hence there is no way of knowing whether, or even how exhaustive our population is. We do, however, assume that most companies active in "green businesses" are part of green networks and/or try to market themselves under this label in different registers. Therefore, the possibility is reasonably good that we have been able to identify most of the companies we are interested in. However, we still have a few more options available for intercepting any potentially left out companies. One option, is to check out all companies that report investment in environmental technologies as part of the research and development statistics. Another option would be to make use of the German list of Prodcom codes provided as an annex in the Eurostat handbook.

We could also confer with experts in the pollution reduction technologies for their expert opinion, before making use of these population lists for statistical purposes. This might pose some challenges, though, as Statistics Norway have confidentiality rules to follow. This issue has to be looked further into.

We had decided to delimit the study by focusing on environmental technologies (end-of-pipe and cleaner/integrated technologies). However, as the project progressed, we found that we wanted to include both producers of connected products and environmental specific services, since we anyway came across them from the same information sources. We therefore also included some specialised connected services, like construction, engineering etc. For the same reasons, we did not exclude measurement and specialised consulting activities at this stage, although that was the original plan.

Adapted goods, however, is a more tricky area. Although, many examples are mentioned in the Eurostat handbook, they did not provide the needed guidance for many of the areas where Norway claims to be among the most environmentally friendly producers world-wide. Strong environmental regulations, parts of which have been specific for Norway, has been one of the driving forces behind the development of environmental technologies now sold to the world market. Most of these have been developed within traditional Norwegian industries such as wood processing, ferro-alloys, aluminium, inorganic fertilisers, shipping and petroleum. Therefore, in traditional industries there is often a close link between emissions reduction, cleaner products and development of new products (bi-products). Norway is today leading in many areas like aluminium, silicium, nickel etc. However, as long as there exists no eco-labelling for such products, it seems premature to identify them as adapted products. Still, these products may have increasing significance for Norway in the future with increased interest in cleaner products.[3]

[3] Also more widespread compilation of consumption related statistics, which is being prepared for Europe, might help shed light on such cleaner products.

# 3. Estimating environmental shares

## 3.1 Techniques employed

The second objective of the project was to compile data. An important step in the process, before we can compile such figures, is to estimate the share of environmental activities within the identified companies. We also planned to elaborate it further by identifying the environment part of the activity for companies which are not pure environment industries. We planned to use the companies' own web-sites or annual reports for identifying or estimating the environment part of companies' activity.

To define if a company should be "declared" 100 per cent environmental was an easy task. For this purpose the companies' own web-sites definitely proved to be important. In this study about half of the final 37 companies where considered to have environmental activities as their main and only activity.

To decide on an environmental percentage for other companies, we used different techniques. As there are seldom or never any economic information to identify this, one has to make estimates based on other sources. The most common way in this project has been to count the number of main business areas of the company, and divide the number of environmental areas by the total number of activity areas. This is of course a very rough way to do it, and in many cases it might result in figures deviating grossly from reality.

We tried to find more accurate data by reading the annual reports of the companies in question, but this was not any more successful. We seemed to find even less of the information we were looking for in these reports. In addition, some companies don't even have annual report for the Norwegian part of their activities.

We tried to call some of the companies to see whether we could get the information we needed directly from the companies themselves. However, it was not easy to find the right person to answer such a question ("what is the environmental share of your activities?"). It also seemed – not surprisingly – that this was not the kind of information they necessarily wanted to share over an informal phone call.

## 3.2 Challenges encountered

CEPA 1 (air/climate) turned out to be a difficult case. As explained under chapter 2.3, many of the Norwegian environmental technologies now sold to the world market, where developed and are produced within traditional industries, as a side activity.

We needed to set an environmental share for most of the bigger companies on our population list. We did consider that for companies with environmental technology are their secondary, third, forth etc. activity, we could set the environmental share to 49 per cent if we did not get hold of any further information to set a more precise environmental share. However, due to what we explained above, we ended up not assigning any environmental share at all for some of the largest companies. For some others we put it very low (1-2 per cent).

This was a very rough method, and we concluded that we cannot really compile statistics for this category based on our current method. We need additional information. This can be gathered in different ways, but all choices will imply more work from our side, and will also include more response burden on the companies. If we decide to do that, the best place to start will probably be to link up to the structural business statistics survey. What would be the best solution would have to be investigated further: to include questions in the SBS survey, to add some indicator questions about

environmental technology or to send a separate survey with the SBS survey. Anyhow, we assume that for further statistical purposes, a combination of a survey and information sources already tested out will be the best solution.

# 4. Preliminary results

## 4.1 Turnover and employment

Based on the identified population lists and the estimated environmental shares (presented in chapter 2 and 3), we have compiled estimates for the two CEPA categories we wanted to cover with this case study:

- CEPA 1: Protection of ambient air and climate
- CEPA 4: Protection and remediation of soil, groundwater and surface water

The results are shown in table 1. While CEPA 4 is considered to be a reasonable estimate, CEPA 1 must only be taken as a rough and preliminary estimate.

**Table 1. Environmental goods and services. CEPA 1 and CEPA 4. Norway. 2007. Preliminary figures.**

| | CEPA 1* | CEPA 4 |
|---|---|---|
| No of companies | 24 | 13 |
| Turnover (mill NOK) | 947 | 604 |
| Employment (no of employees) | 352 | 145 |

*Turnover and employment figures for CEPA 1 are very rough and preliminary estimates.

The companies in the population are spread across a wide number of industries. The following main industry groups are covered:
C – Manufacturing
E – Water supply; sewerage, waste management and remediation activities
F – Construction
G – Wholesale and retail trade; repair of motor vehicles and motorcycles
H – Transportation and storage
M – Professional, scientific and technical activities
O – Public administration and defence; compulsory social security

However the number of companies is too small to show employment and turnover broken down by both CEPA group and main industry group.

## 4.2 Comparison with other statistics

Some other statistical sources exist, which cover parts of the same field as an EGSS statistics. Such sources can be used as rough check of the quality of the results presented in table 1.

One such source is the trade statistics, where certain environmental products can be identified via HS codes. One such product of particular interest for CEPA 1 is HS 85213900 - *Apparatus for filtering or cleaning of gases*.

We carried out the following check:

IF export (HS 85213900) > turnover (CEPA 1) then our calculation must be wrong

Figure 1 shows the development in imports and exports for apparatus for filtering or cleaning of gases for the period 1999-2007. Generally the imports seem to grow steadily, while the export are fluctuating around 100 million NOK. The value of Norwegian export for this HS product was 109 million NOK in 2007. This amounts to about 10 per cent of the roughly estimated turnover presented for CEPA 1 above. This seemed a bit lower share than expected, when we know that a lot of the environmental technology produced in Norway gets exported. On the other hand, many of the technologies concerned are integrated technologies (e.g. more efficient motors or burning chambers) and are hence not categorised as apparatus. Therefore the estimate in table 1 might be reasonable.

**Figure 1. Import and export of HS 85213900: apparatus for filtering or cleaning of gases. 1999-2007.**

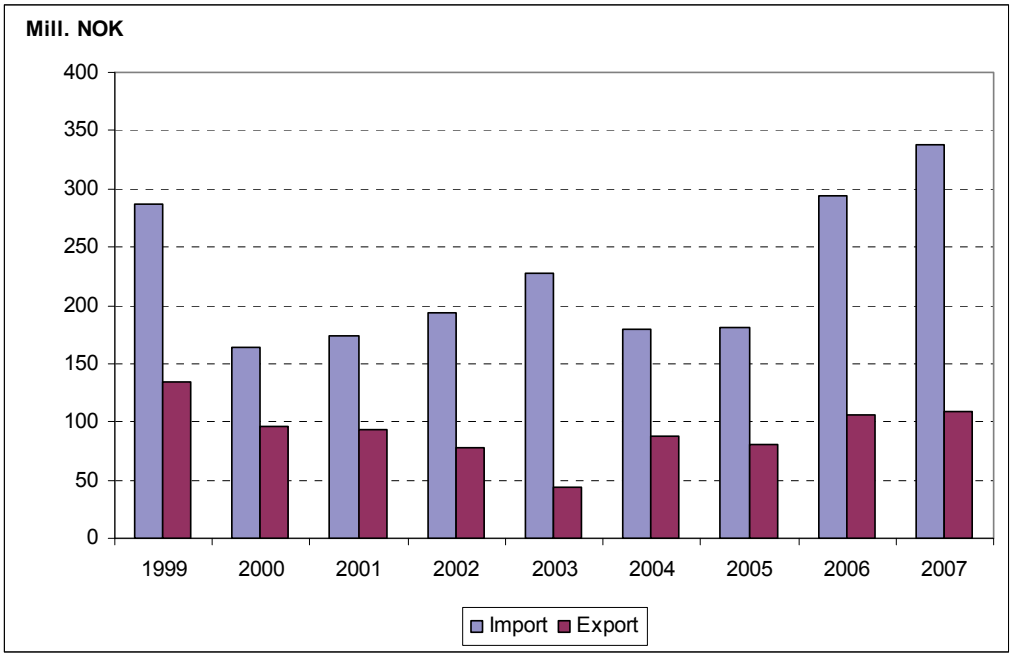
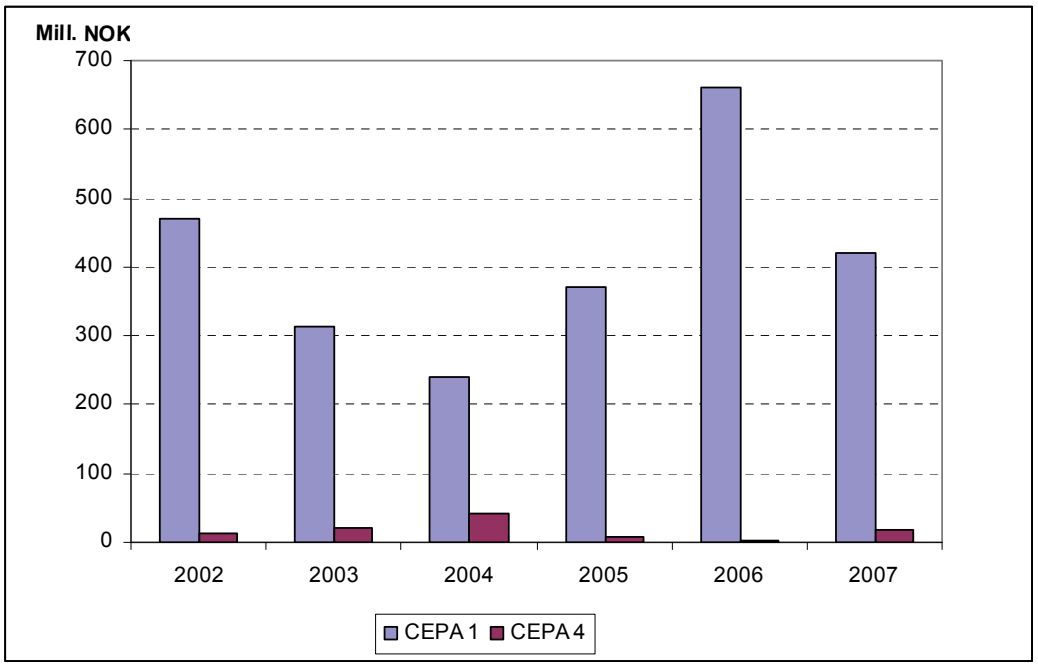



Figure 2 shows the development in environmental protection investments within the manufacturing and quarrying for CEPA 1 and CEPA 4 during the period 2002-2007. We see that expenditure for CEPA 4 are minimal compared to CEPA 1. We did another check against environmental protection expenditure statistics:

turnover (CEPA 1) + import (HS 85213900) - export (HS 85213900)
should be > investments (CEPA 1)

The value of Norwegian production (turnover) for CEPA 1 + imports and exports of *apparatus for filtering or cleaning of gases* amounted to 1176 million NOK in 2007. Manufacturing and mining industry invested 421 million NOK for air/climate purposes. There seems to be a reasonable relation between these two numbers as other sectors than manufacturing might also have bought some of these products. In addition, we know that while the producer counts the whole turnover of a cleaner technology sold, the user only counts the environmental part of the investment. Therefore environmental protection expenditure for cleaner investments will always be lower that the value calculated from the supply side.

**Figure 2. Environmental protection investements, CEPA 1 and CEPA 4. 2002-2007. Mill. NOK:**




# 5. Maintenance of the population

The last objective was to look into the challenges related to maintain the population of identified producers of environmental goods and services and to decide which methodology or "rules" to deal with this issue.

We can look at this issue from two different angles. The first perspective would be to do a yearly check of all companies on our population list against the business register and to update the list according to companies which have been bought, closed down or merged.

When it comes to environmental shares, these will probably not change much from year to year using the rough method we have outlined in chapter 3 to estimate the shares. Therefore, as long as companies don't merge or split, the shares wouldn't need to be checked or updated that often.

New companies are more difficult to pick up, without going through the same tedious process as establishing the first population list. Since this is a big job, it cannot be done every year. Every second year might be a reasonable alternative. To not have to do all the check for companies who look like they are environmental, but which should be excluded according to our criteria, it is important to record and save the information about companies which are excluded from the list.

# 6. Conclusions and further work

The main objective of this part of the project has been to identify the population of companies producing environmental protection technologies related to the environmental domains air/climate (CEPA 1) and soil, groundwater and surface water (CEPA 4). We then tried to compile turnover and employment figures for the environmental part of these companies activity. Unexpectedly, this turned out to be difficult, and showed that the methodology used so far for the water and wastewater areas and for producers of renewable energy was not good enough for CEPA 1. The plan was to enable

Statistics Norway to expand the coverage of environmental domains for which we can produce environment industry statistics. However, we will not publish the CEPA 1 figures from this project, even not as estimates, as they are considered too rough.

The advantage of the "Swedish methodology" is that once we have established the populations and environmental shares, we can derive the data directly from the business register. It is a cost-effective method, and has the additional advantage that it doesn't increase the response burden (since we reuse already existing data). Most work is needed in the initial stage, for identification of the population. Still, we have concluded that for CEPA 1, we will probably have to carry out some kind of survey to get reliable data, at least in the initial phase.

As described in chapter 3, the characteristics of the Norwegian technology sector concerning air emissions reduction technologies has so far been closely linked to stringent emission regulations and has often been developed for ancillary use before being commercialised. It is therefore difficult to identify the small part of this activity within the companies concerned and we therefore concluded that a specific survey will be the only way to get proper data on this environmental domain.

For CEPA 4, however, the Swedish methodology is considered to give good results. If we decide to continue to build up EGSS statistics, we can therefore make continued use of this methodology. We assumed that less work is needed for the maintenance of the population, something we explored in this project. We have suggested some ways to update and maintain the population lists which do not require too much input.

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# Part 2:
# NAMEA-air: Improve timeliness of publication


## Summary part 2:

The aim of this project was to improve the timeliness of NAMEA air statistics by setting up a system for compiling such statistics 4.5 months after the reference year, e.g. at the same time as other preliminary emissions statistics are published by sector and source. Documentation of exact data sources used for the current preliminary emissions statistics proved hard to find. We concluded that until such exists we will stick to a 1-digit level NACE aggregation for the NAMEA t+1 statistics.

# 1. Introduction

## 1.1 Background

Statistics Norway has published NAMEA-air data annually and reported these data to Eurostat since 2002. The NAMEA-air statistics are broken down by detailed industries (45 industries and NACE 2-digit[4]), and include greenhouse gases, acidification precursors, ozone precursors, heavy metals and particulates for the period since 1990.

Data have since the first publication been published at t+2 (where t = the reference year). The emissions by industry are final in February t+2, while the economic variables based on quarterly national accounts are still preliminary at this stage (they are not final before November t+2). Therefore, the derived emissions intensities are also preliminary. In t+3, we then publish final figures for national accounts variables and emissions intensities.

Preliminary emissions data and national accounts are published in t+1. Preliminary emissions statistics are published 5 months after the reference year and the first preliminary (quarterly) national accounts are published only 2 months after the reference year. However, while preliminary national accounts are available by detailed industry already at this stage, this is not the case for emissions data. Hence, to be able to publish t+1 NAMEA-air data, we need to do more work on the emissions data side.

During 2008 and 2009, the system of compiling NAMEA-air statistics was modified, and a complete new SAS-based system was developed. The aim was to set up a system which facilitates an easier and more convenient compilation of data. The new system ensures an automatic compilation of data every year hereafter, as compared to a substantially more manual working process before. We assumed that the same system could be used for compilation of the t+1 data, if the input data proved to be of a sufficient quality and detail.

## 1.2 Purpose of the project

Due to national and international interest in more timely data for environmental accounts, we wanted to look into possible methods for making use of preliminary basic data to compile preliminary emissions by industries and preliminary emissions intensities.

The objective of this project was to develop a method for improving the timeliness in publication of the NAMEA-air data, to enable Statistics Norway to publish statistics for emissions intensities and emissions by standard industry groups (NACE) one year earlier than what is currently the case (t+1 instead of t+2).

In developing such a methodology we wanted to examine the detail of t+1 emissions data and sources used. We also wanted to make use of insights into existing ways of compiling preliminary data e.g. the quarterly national accounts methodology or the use of emission coefficients.

We have focused on greenhouse gases in developing the methodology, but have commented on other emissions when routines are different from the greenhouse gases.

Originally, we had planned to examine the emissions data for 2006 or 2007, as we would have both t+1 and t+2 data available for these years. Technically, it turned out to be easier to use the automised compilation system. This programme reads directly from a file including the latest data published.

[4] We can not give full details on A60+. No detailed 2-digit breakdown is given for "Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods" and "Financial intermediation." In addition, emissions are not estimated for "Extra-territorial organizations and bodies."

Therefore, the final data testing was done on preliminary and final 2008 figures instead, and these are the ones presented in this report.

# 2. Current t+1 emissions statistics

The t+1 emissions statistics are mainly calculated in order to give preliminary figures for national (territorial) emissions. The final emissions figures are produced in order to serve several purposes. The main objective is to report the official Norwegian emissions data to the UNFCCC and EMEP. Another objective is to produce emissions data by industry as input to NAMEA-air accounts. The final emissions statistics are therefore broken down both by detailed industry (following national accounts definitions) and by source and sector (as needed for international reporting purposes to different emissions conventions/protocols).

## 2.1 Breakdown of published t+1 figures

We started the project by mapping the details of breakdown for the preliminary emissions figures. The data published in the StatBank in May 2009 were broken down by the following types of emissions:
- stationary combustion
- process emissions
- mobile combustion

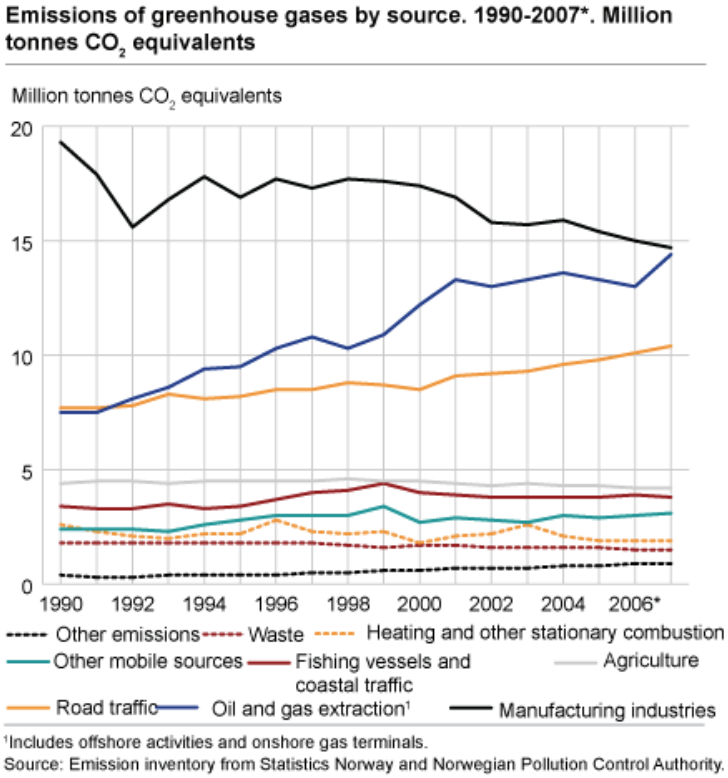
In addition, an aggregate breakdown of sources (see table 1) was presented in the article accompanying the publication of greenhouse gases.

**Table 1. Emissions of greenhouse gases, by source 2008*. Million tonnes $CO_2$ equivalents.**

| | 2008* |
|---|---|
| **Total** | **53.8** |
| Manufacturing industries | 14.1 |
| Oil and gas | 14.3 |
| Road traffic | 10.4 |
| Other mobile sources | 6.8 |
| Agriculture | 4.3 |
| Other emissions | 3.9 |

2009 was the first year absolute figures for preliminary emissions by source had been presented in a table. In earlier years, some absolute figures and volume changes were given in the text. Also a graph showing sector breakdown had been presented (se figure 1), but no joint presentation of the absolute figures were given. The first time preliminary figures were published in this way was in February 2003 with preliminary data for 2001, i.e. with at time lag of 14 months as opposed to 4.5 months today. Before that time, only per cent change or change in each green house gas was shown.

**Figure 1. Emissions of greenhouse gasses by source. 1990-2007.* Million tonnes of CO2 equivalents.**




We were a bit surprised to find that the details given for the current t+1 emissions are actually quite few. We had initially thought that the preliminary data were published on detailed sector and source, and that mainly the information necessary to do the industry breakdown was missing. Looking further into how the preliminary data were calculated, we found that this was not the case. The detailed underlying data sheet is the same, but the low breakdown given for the preliminary emissions are due to the limited data sources updated that early in the year. Becoming aware of this situation, we asked ourselves whether it makes sense to publish such detailed preliminary data as we had planned (45 industries), when those in charge of the whole basic data sheet (Emissions inventory group) do not published more detailed data themselves.

At this stage, we decided to continue as planned to look into the difference between t+1 and t+2 data sources. At the same time we outlined a more realistic possibility, which was to publish t+1 emissions by industry at a 1-digit NACE level (9 industries + households).

## 2.2. Data sources and estimation techniques

Table 2 shows a comparison between preliminary (t+1) and final (t+2) emissions statistics since t = 2001. The number of decimals varies for the preliminary numbers. Since 2006, numbers are given in millions of tonnes of $CO_2$ equivalents with one decimal in the overview table. In the article itself, one decimal is sometimes given. Final figures are always given with one decimal. As the table shows, the preliminary emission figures have generally been of very good quality. 2003 was the only year where there was a certain difference. The last years the preliminary statistics have proven very accurate.

In interpreting table 2 one has to take into account that the differences between t+1 and t+2 figures do not only depend on input data, but also changes in methodology effects the result. We have not been able in this project to decompose the difference into different categories.

**Table 2. Green house gas emissions. Comparing t+1 and t+2 statistics. 2001-2008. Millions of tonnes of $CO_2$ equivalents.**

| | t+1 figures | t+2 figures | Difference (%) |
|---|---|---|---|
| 2001 | 56 | 55.1 | -1.6 |
| 2002 | 55 | 55.4 | 0.7 |
| 2003 | 56.5 | 54.8 | -3.0 |
| 2004 | 55.5 | 55.1 | -0.7 |
| 2005 | 54 | 54.0 | 0.0 |
| 2006 | 53.7 | 53.5 | -0.4 |
| 2007 | 55.0 | 55.1 | 0.2 |
| 2008 | 53.8 | 54.0 | 0.4 |

As already mentioned, the t+1 emission figures are published only 4.5 months after the reference year. At this point in time, fewer and different data sources are available, and hence input data are fewer, than when compiling final emissions figures. The data sources used for the t+1 emissions statistics are the following:

1) the petroleum sales statistics; and
2) direct reporting on energy use/products for some of the larger companies (i.e. in the fertiliser, ferro-alloy, aluminium and oil/gas industries) (those that contribute most to the total emissions)

In addition to updating those input data, new or revised emission factors which have been developed since the last publishing, is also incorporated in the t+1 emissions statistics.

The spread sheet forming the basic data file for t+1 and t+2 has the same set-up. It is based on the energy accounts/balances data and hence forms input for both the emission inventory and the emission accounts. Those cells which are not updated through new input data, get the same value as last years data.

We tried to examine the t+1 emissions data in more detail in order to reveal what areas of the emissions statistics which could be directly (if possible) transferred to the industry breakdown of the NAMEA-framework and for what areas this might be more difficult. We had hoped that we would be able to set up a list containing industries where emissions can be identified by using various existing data sources and a list containing industries where this is not possible. However, this turned out to be a very extensive job, as overview or summary documentation existed to show which cells are updated in t+1 as compared to t+2 data sets. The existing documentations of the calculations and updates are done directly in the data spread sheets.

Despite several meeting with the Emissions inventory group, we found this documentation job to be too extensive for this project. We also found that it is more reasonable that they themselves make such documentation. Plans are now set up within the Emissions inventory group to produce such documentation as a part of the t+1 (Feb) and t+2 (May) compilations.

# 3. Setting up a system for NAMEA t+1 figures

## 3.1 Compiling t+1 by 1-digit NACE

We wanted to conduct a test where we produced emissions data by 1-digit NACE by directly using the underlying data sheet for the present t+1 figures. We found that it would require very few changes in the already existing SAS-programme, to make use of it for producing t+1 figures. However, a couple of problems arose. One was related to fluorine gases, and the other was related to missing data for international air and international shipping.

The fluorine gases are manually prepared and loaded into the SAS-system. The input files by industry are set up manually, and hence are not automatically updated when the rest of the emissions inventory data are updated. We tested out a simple estimation technique. This worked well for 2008. This consisted of manually putting the total of each fluorine gas (HFK, PFK and SF6) into the input sheet. The total was then distributed to industries by using the ratio from 2007 (one year earlier).

Although this ratio technique worked well for 2008, it did not work for 2007. The reason was the drop in SF6 within the basic metals industry, from 120077 to 0 tonnes of $CO_2$ equivalents between 2006 and 2007. Therefore there is a need for communication with experts responsible for the fluorine gas data, to check whether they are already aware of any big changes at this point in time. If this is the case, we will have to make some manual adjustments in the fluorine gas sheets.

By estimating fluorine gases based on the technique described above, and by keeping international shipping and international air out of the calculations (for the time being), we could compile emissions by 1-digit NACE based on the t+1 input file and compare with the calculations based on the t+2 data file. The results and the comparison are presented in table 2.

**Table 3. Greenhouse gas emissions, territorial definition. By aggregate industries. Preliminary and final emissions data. 2008. 1 000 tonnes of $CO_2$ equivalents.**

| | Based on preliminary data sheet (t+1) | Based on final data sheet (t+2) | Difference % |
|---|---|---|---|
| **Total for Norway (territorial emissions)** | **53 848** | **54 064** | **0.4** |
| Agriculture, forestry and fishing | 5 884 | 6 194 | 5.3 |
| Mining and extraction | 15 163 | 15 310 | 1.1 |
| Manufacturing | 14 222 | 14 148 | -0.5 |
| Energy and water supply and construction | 2 630 | 2 562 | -2.6 |
| Transport | 8 452 | 8 129 | -3.8 |
| Wholesale, maintenance, hotels and restaurants | 643 | 682 | 5.9 |
| Services | 683 | 670 | -2.0 |
| Education, health and social work | 805 | 795 | -1.3 |
| General government | 154 | 155 | 0.3 |
| Households | 5 212 | 5 419 | 4.0 |

For the reference year t = 2008, we got very small differences between t+1 for 1-digit NACE and t+2 figures for the same aggregate industries (table 3). That the technique proved successful, is not very surprising at this aggregate level. Given that the emissions inventory statistics publish the figures by 6 (earlier 9) sectors, the NAMEA figures are not much more detailed. It is only the standard aggregation which is a bit different.

The second problem we faced was that data for international air and international shipping were missing from the t+1 input file. These two industries are kept out for historical reasons. The input file was set up for the purpose of the emissions inventory, and not for the purpose of emissions accounts. We therefore needed to find out about the basic data sources for these two industries, and whether preliminary data would exist for use in the May t+1 publication. Emission figures for international shipping are based on energy figures from the energy accounts. These energy figures in turn are based on a combination of bunkering statistics from the national accounts and some ratio factor. As quarterly national accounts are available already in February t+1, the original data source for international shipping emissions is available for use for the May t+1 publication. In the project it proved difficult to get hold of these data as they are not published, but are only used as input to the preliminary quarterly national accounts. We therefore decided to test whether we could make use of t-1 data instead. This proved to be a reasonable way to estimate international shipping, and is quite similar to what is being done for international shipping in the quarterly national accounts. The results from using this

estimation technique is shown in table 4. It should, be noted that emission figures for international shipping are very uncertain in general, and show large fluctuations from year to year.

**Table 4. Greenhouse gas emissions, economic definition of Norway. Estimated and final emissions data. 2008. 1 000 tonnes of $CO_2$ equivalents.**

| | Based on preliminary data sheet (t+1) | Based on final data sheet (t+2) | Difference % |
|---|---|---|---|
| **Total for Norway (economic definition)** | 68 321 | 68 240 | -0.1 |
| Total territorial emissions | 53 848 | 54 064 | 0.4 |
| International air transport | 1 316 | 1 095 | -16.8 |
| Ocean transport | 13 157 | 13 083 | -0.6 |

International air transport emission at t+2 are based on direct reporting from the flight companies. These figures are not available for the t+1 statistics. National air transport figures are therefore estimated based on a combination of petroleum sales statistics for year t and the ratio of bunkering/petroleum sales statistics for t-1. In table 4, the same methodology is used to calculate preliminary emissions from international air transport. The difference between preliminary and final data is quite high – more than 10 per cent. These industries are difficult to estimate, and the difference between preliminary and final figures was even bigger for national air transport. However, these details will not be shown in the publication of data anyway, but be aggregated together in the industry group "Transportation."

These solutions for publishing preliminary emissions by industry put the production line of NAMEA air more in harmony with the regular preliminary and final emissions inventory data. Publishing these two statistics at the same time means that the NAMEA-data can be used to inform and explain the emissions inventory.

## 3.2 The cost-effectiveness of regular t+1 production

We consider it feasible to use the method presented above for compiling t+1 NAMEA air figures. The costs associated with compilation of such preliminary NAMEA statistics for aggregate NACE groups would be negligible. It would make use of the data set prepared by the Emissions inventory group. The compilation of the data tables is easy with the newly developed SAS-based system. Most of the work hours needed to publish such preliminary data will therefore be related to the publication process: writing an article to follow the data, preparing tables for down load to the StatBank, etc. We assume this would amount to around one month of work.

# 4. Conclusions and further work

The need or demand for more timely data on issues covered by environmental accounts have been stressed in several EC documents recently, like Beyond GDP, Strategy for environmental accounts and in grant proposals. What exactly is needed on a more timely basis, is however not defined. This became a central issue to us as we were working with the possibilities for more timely publishing of NAMEA-air data. Is the demand about total figures nationally or with a full 2-digit NACE breakdown? Is it enough to publish more timely data for some aggregate industries where we can make reasonable estimation at an early point in time?

In documents concerning more timely data, now-casting is often mentioned as a way to get around the time-lag often seen in international statistics. In Statistics Norway however, the first preliminary

figures for emissions are published 4.5 moths after the reference year. Therefore now-casting should not be needed, as we produce preliminary emissions statistics based on a combination of earlier years' data, petroleum sales statistics and some direct reporting.

In this project we have explored the detail in breakdown of currently published t+1 emissions statistics. This statistics is based on the emissions inventory set up, and does not include a standard industry classification (NACE). In this project we have outlined a technique which will allow us to produce t+1 figures by 1-digit NACE in addition to the already existing breakdowns. The plan is therefore to publish preliminary NAMEA-air figures for 2009 in May 2010.

The project further identified the need for a better documentation of data sources used in t+1 and t+2 compilations. Such documentation will allow for easier explanation of the differences between the two compilations. In addition, it might allow for a more structured examination of the quality of different sources and industries at t+1. A consequence of doing such an examination might be that one can decide to expand the level of detail at t+1. Although a full industry breakdown is not feasible at this point in time, one might envision a more detailed breakdown on 2-digit level for some NACE groups.

# Part 3:

# Environmental related tax account for NAMEA:

# Possibilities for developing time-series
# &
# improving timeliness


**Summary part 3:**

The aim of this project was to develop time-series and to improve the timeliness of the environmental related tax statistics. As a result of this project Statistics Norway has time-series for environmental related other taxes by production for the period 1994-2006. All necessary input data needed to establish a technical solution for environmental related taxes on products by industries for the time period 1995 – 2004. The concept of an IT-solution has been developed according to the requested needs, however the actual programming needed was more extensive than first assumed, therefore requesting more resources than first expected. Based on the solid work undertaken as part of this project, the further work with the IT-solution will be undertaken by the costs of Statistics Norway, and results are expected to be available by mid April 2010.

For the estimating of preliminary environmental related taxes by industries based on the provisional annual national accounts, the industry-distribution methodology did not work as expected. It was revealed that the actuality of the statistics currently being produced could be published 6 months prior to what is planned.

# 1. Introduction

## 1.1 Background

Statistics Norway finalized in 2008 the work with a method developed to compile environmental related tax accounts for NAMEA (Næss and Smith, 2009).

The new method for incorporating taxes on products into the national accounts is now a standard part when compiling final National accounts figures (from 2005 and following years). With this new method, the input data for the national accounts concerning taxes on products is being incorporated into the national account system at a more detailed level than before, allowing for environmental related taxes to be identified by industry.

However, the work in this area has so far only comprised the final national account for 2005 - 2006 (t-3). We experience an increasing national interest in environmental relevant tax data (as well as on other economic instruments). Managing to develop time series backwards and improve actuality of the data is important in order to be able to report to Eurostat complete tables for environmental related tax accounts for NAMEA and for improving the basis for analyses.

## 1.2 Objectives

The objective of part 3 of the Eurostat project is to calculate time series for environmental related tax accounts for NAMEA, and to develop a method for improving its timeliness.

If successful, this will enable Statistics Norway to have environmental related tax accounts back to 1995, as well as improving the timeliness from t-3 to t-2 and eventually t-1. In addition, environmental relevant taxes will be published in an article at Statistics Norway's internet site (in both Norwegian and English) and will also be made available as official statistics in the Statistics Norway's statistical databank (StatBank).

The work has been carried out in two sub-projects:

*a) Develop time-series for environmental relevant tax accounts for NAMEA.*
In order to achieve this objective, all environmental related taxes for the years 1995- 2004 have to be identified, the various input-files have to be revised according to the new method for incorporating taxes into the national accounts. Since the years 1995 – 2004 already are final national accounts, it is not possible to calculate these years with the same SAS-program in use when balancing the national accounts. Therefore, a side-program to the existing SAS-program for the period 1994 – 2004 has to be developed.

*b) Improve actuality of the environmental relevant tax accounts for NAMEA*
In order to achieve this objective, the publication routines, sources and implementation of taxes in the final and provisional annual national accounts have to be examined, as well as performing trial calculations for possible estimation techniques for distributing taxes by industries based on the provisional annual national accounts (based on the quarterly national accounts).

However, the work with the two sub-projects has revealed some challenges not foreseen when this work was planned during the spring in 2008 and when preliminary reports were written in June 2009. The challenges common for the two sub-projects will be further elaborated in chapter 2, while the challenges specific for each of the two sub-projects will bee further elaborated together with the descriptions of the work related to these two sub-projects in chapter 3 and chapter 4.

## 1.3 Definitions

This work must be seen in connection to previous projects on environmental relevant taxes undertaken by Statistics Norway and partly funded by Eurostat. See annex 3 for definitions and categorisations related to environmental relevant taxes

In this report, the terminology
- *environmental taxes* is used when referring to the Pigovian tax definition,
- *environmental related taxes* is used when referring to the OECD/Eurostat/IEA definition
- *environmental relevant taxes* is used in order to embrace all taxes having impact on the environment and used in order not to favour either of the two previous mentioned definitions.

# 2. Why still no publication of environmental relevant taxes?

## 2.1 Considerations made

When Statistics Norway in 2008 after several years managed to develop a method of extracting environmental related taxes by industry based on the National accounts, it was expected that the data would be published by Statistics Norway's web site at the same time as data were reported to Eurostat.

Although data for environmental relevant taxes by industries now will be available for several years, data is still not published by Statistics Norway. This is due to internal discussions regarding the definition of an environmental tax, implementation of it and the coherence of the data with other statistics on detailed industry level.

The first argument raised concerning this issue was in 2008 and is related to definitions and classifications of environment related taxes vs. environmental taxes and the categories of the environmental relevant taxes. In addition, questions related to the coherence of the energy taxes with other statistics on a detailed industry level have been raised as an issue due to activities undertaken in 2009.

In April 2008, when the Grant Application was submitted to Eurostat, we were not aware of these considerations which should be made. By the end of 2008, internal discussions regarding the definition and categories of environmental relevant taxes and the implementation of them started, while in the autumn 2009 questions related to the coherence of the data were raised.

When new statistics is developed, one cannot foresee all challenges that might appear. In spite of challenges and delays, the discussions and work as part of overcoming the challenges will finally make the overall quality of this statistical area better than without them.

## 2.2 How to define and classify taxes affecting the environment?

Discussions continued during 2009 regarding what taxes to include when publishing statistics of taxes related to environmental issues, and what terminology to use when referring to these taxes in general. See Næss and Smith (2009) and Bruvoll (2009) for detailed elaborations of this issue.

The concrete challenges discussed has been whether the statistics published should include all taxes related to environmental issues, i.e. the Eurostat/OECD/IEA definition, or if a narrower definition of an optimal environmental tax, or a Pigovian tax, should form the basis for the taxes presented.

Since all statistics published on a regular basis by Statistics Norway automatically is regarded as Norwegian Official Statistics, it is an important matter of principle what definition to use when publishing environment relevant taxes in Norway.

The advocates for using the Pigovian tax definition have given arguments for their view in a discussion paper published by Statistics Norway in 2009 (Bruvoll, 2009).

According to Bruvoll, *"the purpose of environmental taxes is to correct the market when it fails to take environmental damages into account, i.e. to internalize the Pigovian element. In addition, fiscal taxes are levied on both polluting and clean goods, which may follow the Ramsey principle. […] This mixture complicates the calculation of the extent and the evaluation of the effects of environmental taxes. Eurostat, OECD and IEA include all taxes related to energy, transport and pollution, and most resource taxes in their international measurement of environmentally related taxes. Consequently, numerous fiscal taxes are added together with the environmental taxes. The revenues following the Eurostat et al. statistical basis deviate significantly from the revenues from the environmental taxes defined on the basis of theory. Steps should be taken to harmonize the international statistics of environmental taxes with economic tax theory* (Bruvoll, 2009 p.1).

Bruvoll also points at the OECD/Eurostat/IEA framework creating misleading interpretation to the users of their tax data. While the term environmentally related taxes is used in their original definition, only the term environmental taxes is used in reports of the international statistics (Bruvoll, 2009 p. 17-18).

Given the methodology in use today, calculating total environmental taxes according to the Pigovian definition is not straight forward. This is due to some taxes[5] comprising both an environmental and a fiscal element. Only extracting the environmental part of these taxes and divide these by industries is not possible based on the current methodology in use. For these specific taxes[1], some estimates to remove the non-environmental part exist. But these estimates are based on special research projects within these areas, and the estimates are not examined in order to see if they can form the basis for possible regular statistics.

Although the economic literature advocates the Pigovian definition, it can still for some users be of interest to use a more extended definition of taxes that can be seen as environmental related, as defined by the OECD/Eurostat/IEA framework. For example, the fiscal *Annual Vehicle Tax* is defined as an environmental related tax according to the OECD/Eurostat/IEA framework but it is not regarded an environmental tax according to the Pigovian tax definition. This tax is included as part of the OECD/Eurostat/IEA environmental related taxes due to the use of the tax base – the vehicle – which has a negative effect on the environment. Such considerations could though be made for several tax bases – but OECD/Eurostat/IEA in their manual (Eurostat, 2001) has given a list of tax-bases that are regarded as having a negative impact on the environment, on the other side as all taxes on transport and energy are per definition regarded as environmental relevant ones.

In order to please all user needs, our idea is to develop a tax database of environmental relevant taxes by industries, where the user can extract those taxes (also for those taxes possible to define according to the Pigovian definition) in accordance to definitions and analytical needs of the user[6].

The division for environmental statistics has, based on the Ministry of Finance, prepared a suggestion for classification of environmental relevant taxes that will further be discussed as part of work in 2010

[5] In 2007, three taxes consisted of one non-environmental and one environmental element: the petrol tax (ytart 41361), the diesel tax (41345) and the tax on final treatment of waste (no ytart since it is defined as an other tax on production).

[6] This has not yet officially been discussed, but a project is planned for 2010 where one of the objectives is to find a solution with regard to the publication of taxes relevant for the environment.

(see table 1). In the operating plan of Statistics Norway for 2010, one objective is to come to a conclusion regarding whether environmental relevant taxes are to be published as official statistics and how this will be realised.

***Table 1: Suggestion for a national classification of environmental relevant taxes***

| **Environmental relevant/related taxes** | **Total mill NOK year 1** | **Total mill NOK year 2** |
|---|---|---|
| Total environmental taxes $\left( \sum_{i=1}^{n} Xi \right)$ | | |
| X1 | | |
| X2 | | |
| Xi | | |
| Total energy related taxes* $\left( \sum_{i=1}^{n} Yi \right)$ | | |
| Y1 | | |
| Y2 | | |
| Yi | | |
| Total taxes affecting the environment $\left( \sum_{i=1}^{n} Zi \right)$ | | |
| Z1 | | |
| Z2 | | |
| Zi | | |
| Total environmental relevant/related taxes = $\left( \sum_{i=1}^{n} Yi \right) + \left( \sum_{i=1}^{n} Yi \right) + \left( \sum_{i=1}^{n} Zi \right)$ | | |

Source: Ministry of Finance (http://www.regjeringen.no/nb/dep/fin/tema/skatter_og_avgifter/saravgifter/dagens-gronne-skatter.html?id=439338)
* The definition of "Energy related taxes" will differ from the Eurostat and SEEA definition of "energy taxes". See appendix 3

A conclusion regarding what taxes to include when publishing statistics of taxes related to environmental issues, categories and what terminology to use when referring to these taxes in general is not yet reached. The main reason for this discussion not being closed in 2009 was the work revealing problems with the coherence of the CO2-tax estimates.

## 2.3 The coherence of the energy related taxes needs to be checked.

Coherence reflects the degree to which data are logically and mutually consistent, i.e. the degree to which they can be successfully brought together with other statistical information within a broad analytical framework and over time.

*Coherence within a data set*
Coherence within a data set implies that the elementary data items are based upon compatible

concepts, definitions and classifications and can be meaningfully combined.

Environmental related tax accounts are part of environment satellite accounts (NAMEA) that allows the analytical capacity of national accounting to be expanded for such area as for example pressures on the environment stemming from human activities. NAMEA brings together economic and environmental information in a common framework. Because of this, it has been of huge importance when developing a method for estimating environmental related tax accounts, that the results should be consistent and coherent with the tax information present in the national accounts.

*The coherence between data sets*
The coherence between data sets will be ensured if all data sets from different statistics are based on the common concepts, definitions, classifications etc. and as long as any differences are explained and can be allowed for.

One of the main objectives of establishing environmental related tax accounts is to incorporate this information with other environmental and economic aspects such as emissions statistics and national accounts statistics in order, for example, to analyse the "polluter pays principle" and the average tax level facing various industries.

Problems with the coherence across data sets with the estimates for CO2-taxes by industries was revealed after comparing tax- and emissions data to estimate average tax levels/emissions to air divided by industries. The result was surprising. For some industries, the estimated average level of CO2-tax/CO2-emissions was higher than the maximum average level of CO2-tax/CO2-emissions possible for the industries.

The main question turned out to be related to the coherence between the national accounts and the energy statistics with regard to how energy use by industries are estimated in the two respective statistics.

*Compilation of energy taxes*
The energy tax-figures from the national accounts are based on paid taxes received from the Ministry of Finance/ Directorate of Customs and Excise. The total accrual tax is in the national accounts distributed by energy products levied with the tax. Then the tax levied on a product is proportional distributed by those industries' use (in monetary values) of the taxed product. Industries exempted from the tax and reduced tax rates are accounted for.

*Compilation of emissions to air*
The official emissions to air figures are to a huge extent based on the industries' use of energy products (in physical values) in the basic energy statistics. Emissions are estimated based on an industries' use of energy products causing emissions to air multiplied with (industry) specific emission factors (Aasestad, 2008). In addition, emissions from some of the large manufacturing industries are based on these industries' own reporting of emissions to the Climate and pollution agency (KLIF).

*Sources of energy use data*
Different methods and sources are in use when calculating energy use in monetary values in the national accounts and in physical values in the basic energy statistics. This means that for one specific industry when comparing energy use data in monetary value from the national accounts and physical value from the energy statistics, the correct price is not necessarily the connecting link. This is a very relevant challenge in particular for those industries in the national accounts and the energy statistics where the energy use data are of poor quality. The other way around, for areas where the quality of the data is good, for example for the manufacturing industries, better correspondence between energy use in monetary, physical and price values will be expected.

The division for energy statistics, the division for national accounts, the division for environmental statistics and the research department in Statistics Norway will in 2010 engage in a project which objective is to improve the coherence between the energy statistics and the national accounts.

## 2.4 What breakdown of industries and taxes to use when publishing data?

Neither taxes on products nor other taxes on production are published at a detailed tax level as part of the regular publications of the national accounts figures. Only total tax levels for hence taxes on products and other taxes on production is published.

When nationally publishing environmental relevant taxes by industries, it has to be decided on what breakdown of industries to use, what definition of environmental relevant taxes to use and what categories of taxes to use. These decisions have to be taken together with the division for national accounts.

So far, a request to the division for national accounts related to publishing taxes has so far only included a question regarded a permission of publishing environmental related tax-figures by industries from the national accounts according to the Eurostat tax categories needed for the annual Eurostat reporting (i.e. energy-, pollution-, transport- and resource taxes). Publishing the separate environmental taxes by "ytart" and divided by industries will therefore not be included in this report.

This issue will be discussed further when national publishing of environmental relevant taxes will be discussed in 2010 and *if* the need for such detailed information is seen as useful by the users or for analytical purposes in Statistics Norway and *if* the quality of the data allows for such a detailed level of publication.

## 2.5 Conclusion and further work with regard to publication of data.

The sound discussions of definitions, classifications and quality/coherence aspects as part of the project related to possibilities of establishing and reporting figures for environmental relevant taxes by industry will finally make the overall quality of this statistical area better than without them. The considerations made in this chapter has so far not resulted in changes in the method developed to extract taxes by industry from the national accounts according to the OECD/Eurostat/IEA framework definitions of defining environmental related taxes and categories.

The figures for environmental related taxes reported to Eurostat are related to NAMEA, which implies that the definitions and framework of the national accounts are to be followed. It is important that the various statistics published by Statistics Norway are harmonised. Because of this, the planned work related to timeliness and actuality continued as planned, despite of the considerations described in chapter 2. During the work process of the two sub-project, we stressed the advantage of having a robust method based on tax-figures from the national account. Further work will rather look at possibilities to improve the input data for the years covered by our statistics for the energy taxes, if this is seen as necessary, rather than changing the method used.

One planned project for 2010 will hopefully also help improving the work with environmental relevant taxes. The project is related to the harmonisation of the energy data in the energy accounts, emission inventories and the national accounts, and is a co-operation between the division for national accounts, division for energy statistics, division for environmental statistics and the research department at Statistics Norway. The project has high priority. Successful results in this project is expected also to reduce the coherence problems facing energy taxes and therefore improve the quality of the environmental related taxes at industry levels.

# 3. Possibilities for developing time-series for environmental related taxes (sub-project a).

## 3.1 Background

The new structure and method developed in 2008 for incorporating taxes on products into the national accounts is now a standard part of the compilation of final national accounts figures. Final environmental related taxes by industries for the year 2005 was for the first time compiled in 2008.

For the years previous to 2005, the national account system still consists of the old structures and input-files related to taxes on products, making it impossible to retrieve data on detailed taxes on products by industries.

## 3.2 The objective of sub-project a)

The objective of this sub-project is to prepare input-data for detailed taxes on products and other taxes on production in order to develop environmental tax accounts for NAMEA for the period 1995–2004.

*Taxes on products and other taxes on production need to be treated differently.*
To achieve the objective for taxes on products, the information in the input-files related to taxes on products for the period 1995–2004 needs to be split in a more detailed way than is done today.

To achieve the objectives for taxes on production, the information already present in the input files in the national account system needs to be systematized and categorized according to the needs of the environmental tax accounts for NAMEA.

Technical assistance is needed from the IT-development division attached to the national accounts compilations. Crucial for the project is the development of a side model to the existing SAS system in order to develop a program that can "run" the national account system for the years 1995 – 2004 with new input files for taxes (and subsidies) without disturbing the other information in the national accounts.

## 3.3 How to realize the plans in sub-project a)

As it is now, the method developed to distribute the taxes by industries is first and foremost developed in order to give figures for taxes by industries as part of upcoming compilations of final annual national accounts (i.e. for 1995-figuress and onwards).

The first part of this sub-projects consisted of discussions with representatives from the division for national accounts and the IT-development division in order to figure out how to realise the theoretical plans made for the development of time-series for environmental related taxes, i.e. the particular question discussed was how backward revisions of environmental related taxes could be performed when no backward revisions of the annual national accounts were planned for 2009.

The introduction of more detailed input files for the taxes on products will have an effect on the balancing process of the national accounts. Total tax revenues will not be affected, but for those taxes that operate with different tax rates and exception rules for different industries, the new way of distributing taxes by industries could affect the amount of each tax levied on the different industries obliged to pay the tax.

For this project it was not a solution to revise the existing final national accounts for 1995 – 2004 with new detailed tax input files. This would have required every year to be balanced again. A side model

to the existing SAS system therefore had to be developed.

Different solutions for taxes on production and taxes on products were suggested:

*Other taxes on production*
The input-files for other taxes on production has not been changes in order to withdraw information on other environmental related taxes on production divided by industries.

No additional work was regarded necessary related to methodological or IT-technical assistance in order to revise time-series. The method used in order to identify and classify environmental related other taxes on production is not an integrated part of the national account system. However, input-files with information about detailed other taxes on production divided by industries from the national accounts are used as the starting point when organising the data according to the environmental related tax accounts for NAMEA. The results are therefore harmonised with the national accounts figures. The national accounts only publish total other taxes on production, but publication according to the four Eurostat tax categories (energy, pollution, transport and resources) was agreed upon.

Further development of time series for environmental related other taxes on production to include also the period 1991 – 1994 was not considered relevant due to difficulties calculating taxes on products by industries for these years.

*Taxes on products*
The IT-development division responsible for the SAS-system running the National Account balancing process concluded that it technically was possible to make a side-system allowing for the inclusion of new detailed input files for taxes and subsidies that did not mess up the original balanced annual national accounts for the years 1995 – 2004.

It was concluded that since the total tax revenues are not changed and the original input files for taxes are aggregates of the new detailed input files for taxes, main economic variables in the annual national accounts should in theory not be affected by the introduction of new detailed input files for taxes.

However, in order to check for possible "side-system-solutions" it was decided that the input files for all taxes and subsidies had to be revised in a more detailed version, not only the information regarding environmental related taxes. Also scripts transforming the national industry codes to the NACE rev 2 industries in the Eurostat reporting tables were developed.

It was also decided that only the years 1995-2004 would be covered if a solution for the backward calculations of environmental related taxes are found. This is due to the national accounts being compiled due to different IT-technical solutions prior to 1995. If the period 1991 – 1995 was to be included, an extra side model only for this area had to be developed.

## 3.4 Producing input-files for other taxes on production

*Description of the input-files and the revision process*
In the national account system, taxes (and subsidies) on production are distributed by industry and thus influence the size of operating surplus of the industries (but not value added of the industries) (SSB, 2009).

Other taxes on production are mostly estimated from the central government accounts (the fiscal accounts) and other central government accounts (government funds etc.).

The input files (flat files) used in the national accounts does not need further processing in order to give information on the industry breakdown for each of the taxes. They already consists of the

following information:
- references to chapters and posts in the fiscal accounts and governmental funds for all taxes defined as other taxes on production (see table 2)
- references to codes usable in the national account system
- a distribution of the different taxes by industries
- total sum for each tax and divided by industries

The distribution of the different taxes by industries is done by the division for national accounts. For a majority of the taxes, the distribution by industries is updated annually using supporting statistics and/or information published by Statistics Norway or other organisations.

For the other environmental taxes on production, the break down by industry is already done when including this information into the national accounts system. However, there is no information about what taxes can be regarded as environmental ones. As part of the 2008 Eurostat grants an evaluation of the 2005 (final national account figures) data for other taxes on production was undertaken in order to develop a method to identify the environmental taxes (Næss and Smith, 2009). This method, basically an analysis of the parts of the final national fiscal budget that is identified as other taxes on production, has been used to calculate the time series for the period 1995–2004.

One input file (flat files) was received from the National accounts division for each of the years for the period 1995-2004. The same method as described in Næss and Smith (2009) annex 1 was used in order to identify the environmental related taxes, classify them according to the Eurostat tax categories and to classify them according to NACE rev.1.

## 3.4 Results related to other taxes on production

#### 3.4.1 Identification of environmental related other taxes on production 1995-2004

The identification of environmental related other taxes on production for the time period 1995 – 2004 is shown in table 2.

**Table 2: Identification of environmental related *other taxes on production.* 1995 – 2004.**

| Name of the tax | Time-period | Eurostat tax categories | Tax classification by the Ministry of finance | Accruals/cash values | Chapter/post in the fiscal accounts |
|---|---|---|---|---|---|
| $CO_2$ Tax on the Petroleum Activity on the Continental Shelf | 1991- | Energy tax | Environmental tax | Cash values | 5508/70 |
| Annual Vehicle Tax[7] | 1993- | Transport tax | Taxes affecting the environment | Cash values | 5536/72 |
| Annual weight based tax on motor vehicles | 1993 | Transport tax | Taxes affecting the environment | Cash values | 5536/73 |
| Re-registration tax on motor vehicles | 1956- | Transport tax | Taxes affecting the environment | Cash values | 5536/75 |
| Tax on Pesticides | 1992- | Pollution tax | Environmental tax | Cash values | 5545/71 |
| Tax on Final Treatment of Waste | 1999- | Pollution tax | Environmental tax | Cash values | 5546/70 |
| Tax on Trichloroethene | 2000- | Pollution tax | Environmental tax | Cash values | 5547/70 |
| Tax on Tetrachloroethene | 2000- | Pollution tax | Environmental tax | Cash values | 5547/71 |
| Tax per driven km by diesel vehicles | 1959-1999 | Transport tax | | Cash values | 5536/74 |
| Tax on artificial fertiliser | 1992-2000 | Pollution tax | | Cash values | 5545/70 |

1) Classifications only include taxes existing in 2009

### 3.4.2 Total revenues for environmental related other taxes by production 1995-2004

The total revenues from environmental related other taxes by production for the time period 1995 – 2004 is shown in table 3.

[7] Only annual vehicle taxes paid by industries are included here. Annual vehicle tax paid by households are defined neither as tax on products or other tax on production, but considered an environmental related tax, and therefore added to the data when total results are presented. This is done by adding the difference between the book value of the annual tax (in the national accounts) and the value received from the basis numbers.

**Table 3: Revenues from environmental related *other taxes by production*. 1995 – 2004. Mill NOK**

| Type of tax: | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|---|---|
| $CO_2$ Tax on the Petroleum Activity on the Continental Shelf | 25591 | 27872 | 30434 | 32289 | 32615 | 30466 | 28616 | 30121 | 30561 | 33093 |
| Annual Vehicle Tax[8] | 32245 | 34030 | 36876 | 42466 | 44422 | 46361 | 53480 | 55827 | 57802 | 69637 |
| Annual weight based tax on motor vehicles | 2927 | 3154 | 2706 | 2141 | 2262 | 2728 | 3421 | 3141 | 2995 | 2928 |
| Re-registration tax on motor vehicles | 10996 | 12293 | 13075 | 13479 | 14016 | 14102 | 15950 | 15981 | 17962 | 18196 |
| Tax on Pesticides | 189 | 218 | 210 | 241 | 354 | 529 | 349 | 561 | 654 | 854 |
| Tax on Final treatment of waste | 0 | 0 | 0 | 0 | 4425 | 4839 | 4723 | 4977 | 5010 | 5537 |
| Tax on Trichloroethene | 0 | 0 | 0 | 0 | 0 | 36 | 66 | 41 | 36 | 44 |
| Tax on Tetrachloroethene | 0 | 0 | 0 | 0 | 0 | 8 | 19 | 16 | 17 | 15 |
| Tax per driven km by diesel vehicles | 9 | 139 | 36 | 14 | 79 | 7 | 0 | 0 | 0 | 0 |
| Tax on artificial fertiliser | 1672 | 1717 | 1706 | 1650 | 1083 | 20 | 0 | 0 | 0 | 0 |

#### 3.4.3 Industry breakdown of environmental related other taxes by production 1995-2004

Environmental related other taxes on production divided by industries will not be published separately (see chapter 2.4). They will be summarised together with environmental related products taxes. Total environmental related taxes by industries divided into energy, transport and pollution taxes will the be the final result. The industry breakdown is NACE A65 (see annex 1).

## 3.5 Producing input-files for taxes on products

*Description of the input-files and the revision process*
In the national account system, taxes on products are one of the variables included when Gross Domestic Product (measured in market prices) is calculated using the production approach:

GDP = Output (basic price) - Intermediate consumption (purchaser price) + Taxes on products - Subsidies on products.

The total revenues for the taxes on products are mostly received from monthly fiscal accounts, and the total values included in the input-files in the national account system consists of total accruals values

for each of the taxes (or tax groups). Total revenues for a minor number of taxes on products are received from the central government accounts (the fiscal accounts), and these taxes are included in the input-files as cash-values (see table 4).

The input data for taxes on products are divided into two main groups:
1) The total value of the taxes on products divided by the products levied with a tax.
2) Industries exempted from paying the taxes.

For the period 1994 – 2004 there is no information in these input files about individual taxes on products.

The method planned to be used to make the input files more detailed is different for the two groups of input data. The information needed to split the input data of group 1) is easily accessible. This information exists in pre-systems of the national accounts and we only have to systematize this information differently from today. The information needed to split the input data of group 2) does not exist in any pre-systems of the national accounts. Detailed information about what industries that have special exceptions from the general rules of each specific tax have to be collected from various relevant laws (i.e. regulations about $CO_2$ tax on mineral products, excise on petrol etc.).

Due to changes in the tax system from year to year, it is not possible to use the same input files for the whole time series back to 1995 (and 1991). Input files have to be specific prepared for each year.

All input-files have to be revised according to the new method in use (the 2005-data). The new method basically split group 1) and 2) into several subgroups of taxes ("ytart"). Each "Ytart" corresponds to one type of tax (i.e. the $CO_2$ tax on mineral products, excise on petrol etc.).

In the national accounts, the total revenues from all taxes on products are allocated to the different products charged with tax. This has used to be included in an input-file listing ***Product-code X value in mill NOK***, where one product in the catalogue could be charged with several different taxes and there were no possibilities of identifying the individual taxes.

The new method allows for the total revenues for each of the taxes on products to be allocated to the different products charged with these taxes. The result is input-files listing: ***Ytart X products X tax in mill NOK***. The old input-files now being revised, only lists ***Products X tax in mill NOK***, where one product in the input-file can be charged with several different taxes. Among the energy taxes especially, there are many taxes with different rules of exemptions levied on the same products, as well as the different energy taxes operate with differentiated tax rates depending on the industry using the charged energy products.

In the SAS-program in use when balancing the Norwegian national accounts the tax levied on a product is proportionally distributed among the users of that product. The industries exempted from tax are not included in the proportionally distribution.

The industries exempted from tax when using a charged product are defined in an input-file listing ***Ytart X products X exempted industries X 0.*** Zero indicates that nothing of the mentioned industries' use of the catalogues corresponding product is part of the proportional distribution of the tax levied on this product. The old input-files now being revised, only lists ***Products X exempted industries X 0 or a percent*** (old system explained in 2003 Final Report to Eurostat, Contract N$^{o}$. 200241200013).

The revision of all input-files for taxes and subsidies on products have been undertaken by the Division for environmental statistics due to the division of national accounts had to priorities other tasks more crucial for the regular work and upcoming revision of the national accounts. In this process, all original input-files related to taxes and subsidies in the national accounts have been made

available for the work in the division for environmental statistics.
The same method as described in Næss and Smith (2009) annex 1 was used in order to identify the environmental related taxes, classify them according to the Eurostat tax groups and to classify them according to NACE rev.1.

## 3.6 Results related to taxes on products

### 3.6.1 Identification of environmental related taxes for the time period 1995 – 2004

The identification of environmental related taxes on product for the time period 1995 – 2004 is shown in table 4. Each of the "Ytart-codes" shown in the table, as well as the ytart-codes for the taxes and subsidies in annex 1 not defined as environmental ones, has now been included in the tax input-files according to the definition referred to earlier in chapter 3.3. These input files cannot be included in this report due the information in the input-files being too detailed compared to the level of publication agreed upon in Statistics Norway (i.e. Eurostat-reporting of NAMEA tax data).

**Table 4: Identification of environmental related *taxes on product*. 1995 – 2004.**

| Name of the tax | Ytart | Time-period (1) | Eurostat tax groups | Tax classification (Ministry of finance)(2) | Accruals/ cash values | Chapter/post in the fiscal accounts |
|---|---|---|---|---|---|---|
| Petrol tax | 41361 | 1933- | Energy taxes | Environmental tax | Accruals value | 5536/76 |
| Tax on mineral products, total | 41343 | 1970 - 1999 | Energy taxes | | Accruals value | 5542/70 |
| Tax on production of electricity | 41343 | 1993 - 1997 | Energy taxes | | Accruals value | |
| Electricity consumption tax | 41342 | 1993- | Energy taxes | Energy related taxes | Accruals value | 5541/70 |
| Diesel tax | 41345 | 1993- | Energy taxes | Environmental tax | Accruals value | 5536/77 |
| Tax on coal and coke | | 1993-1998 | Energy taxes | | Cash value | |
| CO2 tax (on mineral products | 41364 | 1999- | Energy taxes | Environmental tax | Accruals value | 5543/70 |
| Sulphur tax (on mineral products | 41365 | 1999- | Energy taxes | Environmental tax | Accruals value | 5543/71 |
| Tax on mineral oils | 41346 | 1999- | Energy taxes | Energy related taxes | Accruals value | 5542/70 |
| Tax on lubricating oil | 41347 | 1989- | Pollution taxes | Environmental tax | Cash value | 5542/71 |
| Tax on beer packaging | 41368 | -1999 | Pollution taxes | | Cash value | T.o.m. 1999: 5526 p 74 ((F.o.m. 2000 5559/72/73/74)) |
| Tax on wine- and liquor packaging | 41367 | -1999 | Pollution taxes | | Cash value | T.o.m. 1999: 5526/73 (F.o.m. 2000 5559/71/72/73 /74) |
| Tax on packaging on carbonated beverages | Part of 41369 | -1999 | Pollution taxes | | Cash value | T.o.m. 1999: 5556/71 + 5558/71 (F.o.m. 2000 5559/71/72/73 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | /74) |
| Taxes on still soft beverages | Part of 41369 | -1999 | Pollution taxes | | Cash value | |
| Base tax on disposable beverage packaging | Part of 41367 41368 41369 | 1994 - 1999 | Pollution taxes | Environmental tax | Cash value | T.o.m. 1999: 5526/75 F.o.m 2000: 5559/70 |
| Tax on plastic beverage containers | Part of 41367 41368 41369 | 2000- | Pollution taxes | Environmental tax | Cash value | 5559/72 |
| Tax on metal beverage containers | Part of 41367 41368 41369 | 2000- | Pollution taxes | Environmental tax | Cash value | 5559/73 |
| Tax on glass beverage containers | Part of 41367 41368 41369 | 2000- | Pollution taxes | Environmental tax | Cash value | 5559/74 |
| Tax on paper beverage containers | Part of 41367 41369 | 2000- | Pollution taxes | Environmental tax | Cash value | 5559/71 |
| Tax on greenhouse gases HFC and PFC | 41341 | 2003- | Pollution taxes | Environmental tax | Cash value | 5548/70 |
| Motor vehicle registration tax | 41351 (-2000) 41352 (2001- | 1955- | Transport taxes | Taxes affecting the environment | Cash value | 5536/71 |
| Tax on air traffic passengers | 41379 | - April 2002 | Transport taxes | | Cash value | 5580/72 |

(1) See (Norwegian toll customs (http://www.toll.no/default.aspx?id=3&epslanguage=EN)
(2) Classification only includes taxes existing in 2009

**3.6.2 Input-files for taxes on products 1995-2004**

Due to confidentiality reasons, the "S-catalouges" and the "U-catalouges" cannot be attached to this report. The input-files consist of the following:

*"S-catalogues"*
The S-catalouges are showing the total value of the taxes (and subsidies) on products divided by the products levied with a tax. For each of the "ytart" listed in Annex 2 "S-catalogues" have been produced.

*"U-catalogues"*
The "U-catalogues" are showing the industries exempted from tax (subsidy) when using a charged product. For each of the "ytart" listed in Annex 2 "U-catalogues" have been produced.

*"Coding-files"*
Various coding files have been made:
- Lists identifying the environmental related taxes (ytart) for each year 1994-2004 (see annex 2).
- Lists identifying the various categories of environmental related taxes (see annex 2).
- Lists showing correspondence between national industry codes vs. NACE industries (A60).

#### 3.6.3 Industry breakdown of environmental related taxes on products 1995-2004

At the latest stages of sub-project a), it became clear that the possibilities of successfully completing time-series for the period 1994-2004 was not possible within the scope of this project (see 3.6).

## 3.6 Conclusions related to time-series

Developing a system of calculating environmental relevant taxes by industries integrated as part of the standard national accounts routines gives a robust platform for NAMEA tax accounts.

Time-series for the period 1995 – 2004 for *Other taxes on production* has successfully being made. But, at the latest stages of sub-project a), it became clear that the possibilities of successfully completing the side-model necessary to develop time-series for the period 1994-2004 for environmentally related taxes on products divided by industries, was not possible within the time frame of this project.

However, as a result of this project Statistics Norway has developed all necessary input data in order to establish a technical solution for estimating environmental related taxes on products divided by industries for the time period 1995 – 2004. These input-files are in coherence with the National accounts tax figures. The concept of the IT solution has been developed according to the requested needs, however the actual programming needed was more extensive than first assumed, thus more resources than earlier assumed was requested. Based on the solid work undertaken as part of this project, the programming work will be finalised. Further programming of the IT-solution will be undertaken by the costs of Statistics Norway, and results are expected to be available by mid April 2010.

# 4. Possibilities for improving timeliness of environmental related taxes (sub-project b).

## 4.1 Background

Today's method for compiling environmental related taxes by industries is based on final national account figures and covered in 2009 the period 1995 to 2006, i.e. t-3 figures. In this sub-project we will study methods for distributing preliminary environmental tax accounts for NAMEA for t-1 and t-2 (where t = current year).

Due to national and international interest in more timely data environmental economic instruments, we wanted to look into possible methods for making use of preliminary basic data to compile preliminary environmental relevant taxes by industries.

## 4.2 The objective of sub-project b)

The objective of this sub-project is to examine the possibilities of improving timeliness of the environmental tax accounts for NAMEA. Compiling environmental related taxes by industries based on quarterly national accounts will enable Statistics Norway to publish this statistics by standard industry groups (NACE) two years earlier than what is currently the case.

In developing such a methodology we wanted to examine in detail the way taxes are presented in the quarterly national accounts and sources used. We also wanted to make use of insights into existing ways of compiling preliminary data e.g. the quarterly national accounts methodology.

## 4.3 Publication routines for the final and provisional annual national accounts

Since the national accounts are compiled in different versions, each with slightly different methods on how to incorporate taxes and various levels of details presented. There are versions according to present status - **final or provisional** - detailed or less detailed, adjusted or unadjusted. The provisional annual accounts are based on the quarterly national accounts and are published in a less detailed way than the final national accounts. It was early in the process a need to clarify when the various figures from the final national accounts and the provisional national accounts were published.

Annual aggregated accounts are normally compiled in three consecutive provisional versions and a final one, and occasionally main revisions later on (SSB, 2009) (see table 5).

The methods and calculating system used to calculate the quarterly national accounts are also used to compile the first three versions of the annual national accounts. The first version of the annual accounts is compiled by simply adding up the four quarters of the ordinary quarterly national accounts (in February). In the two subsequent versions (published at the end of May and November respectively), annual statistics and other information available at the time are also utilised. The third annual version of the national accounts then remains unchanged in one year until final figures are compiled based on detailed annual statistics and methods for compilation of annual national accounts for publishing in November one year later (see table 5).

***Table 5: Publication routines for the aggregated national accounts, ex. figures for 2006***

| **Annual accounts for year t** | **Publication of figures for year t** | **Time lag in number of months** |
|---|---|---|
| **First** provisional annual version, quarterly based (**figures for 2006**) | End of February (in 2007) | + 1 ¾ months |
| **Second** provisional annual version, quarterly-based (figures for 2006) | Beginning of June (in 2007) | + 4 ¾ months |
| **Third** Provisional annual version, quarterly based (**figures for 2006** – will not be revised until publication of final figures in November 2008)<br><br>+<br><br>*Final annual version, detailed basis (figures for 2005).* | End of November (in 2007)<br><br>*End of November (in 2009)2007* | + 11 months<br><br>*+ 23 months* |
| **Final** annual version, **detailed basis** (**figures for 2006**).<br><br>+<br><br>*Third Provisional annual version, quarterly based (figures for 2007 – will not be revised until publication of final figures in November 2009)* | End of November (in 2008)<br><br>*End of November (in 2008)* | + 23 months<br><br>*+ 11 months* |

When the final national accounts are published at the end of the year, figures for t-2 are published (i.e. figures for 2006 published in November 2008). These figures are used when setting up the statistics for environmental related taxes by industries, which (until recently) have been calculated in connection with other NAMEA-figures in the spring the following year – and these figures then turn out to be t-3 figures (i.e. 2006- figures for environmental related taxes by industries for in May 2009).

As a result of this project, we found that improving timeliness from t-3 to t-2 can be done only by hasten the planned time of publication for environmental related taxes by industries. Figures for t-2 will still be based on the already existing method based on the final national accounts, i.e. environmental related taxes can be presented by detailed NACE industries. Hasten the publication to November instead of May the following year, means that links between the environmental related taxes and the NAMEA-air data have to be done based on aggregated industry levels. This is due to the NAMEA-air data not being published by detailed NACE-levels in November t+2 (see part 2 of this Eurostat-project).

Because of this, if further improvements of the timeliness is asked, it is a need to establish methods for provisional figures for environmental related taxes by industries for t-1 based on the provisional (quarterly) national accounts, counted at the period in time when national account figures are

published (i.e. provisional figures for 2007 in November 2008).

It was concluded that in order to try to keep the estimated t-1 figures coherent with other national accounts data, provisional annual national accounts based on the quarterly national accounts should form the basis for the work with further improvement of the timeliness of environmental related taxes by industries.

The main task will be to examine general methods of compiling t-1 figures in the quarterly national accounts, to evaluate and consider this used as a method for distributing preliminary environmental tax accounts by industries for NAMEA.

## 4.4 Main characteristics of the provisional annual national accounts

The purpose of the quarterly national accounts is to provide updated information about short-term developments in the Norwegian economy based on an overall, consistent accounting system. The provisional annual national accounts are completely harmonised with the quarterly national accounts.

The accounting structure of the quarterly national account is more aggregated than in the final annual national accounts. While the final national account consist of about 190 industry groups and 1 200 product groups, the quarterly national accounts consist of about 60 industry groups and 80 product groups.

The quarterly national account is not a balanced accounting system as the final annual national accounts. The compilation of the quarterly national account implies the use of the final annual national accounts data and comprehensive input data sets. These data series are mainly based on short-term statistics from Statistics Norway. In addition, some short-term information from other sources is used.

The main principle in the quarterly national account system is that the national accounts figures for the current quarter are computed based on short-term indicators for those areas covered by short term statistics or other type of information. The parts of the economy not covered by short term statistics are computed based and the current-price figures from the latest calculated final version of the annual national accounts (the base year). The method is the same for most common variables: The value in the base year is given the same growth rate (percentage change) as in the appropriate indicator, or a grouping of different relevant indicators.

For instance, there is a lack of information on the development of intermediate consumption in most industries. Furthermore, information is missing on gross fixed capital formation in machinery and equipment in all service activities except service activities produced by governments. Finally, the statistical information on household consumption of various services is not up to date.

## 4.5 Tax statistics in the provisional annual national accounts

Figures for total taxes in the quarterly national accounts are not estimated figures based on the latest calculated final version of the annual national accounts, but mainly based on actual cash payments registered by the Norwegian Government Agency for Financial Management (SSØ).

Monthly reports from the Norwegian Government Agency for Financial Management (SSØ) are received by Statistics Norway approximately 1 month after the tax payments have been paid. This implies that at the end of February each year (t + 1 ¾ months), Statistics Norway will have access to information on each of the taxes paid during the previous year. The total of each of these taxes are already at that time to be considered as final, and only small changes are expected to be undertaken to the totals of these taxes. Normally these changes are based on time-adjustments of the cash-payments or revised data from the Norwegian Government Agency for Financial Management (SSØ).

In some severe cases, tax budget figures from the Ministry of Finance are used when final only used when provisional annual national accounts. As part of the compilation of quarterly national accounts, budget figures from the Ministry of Finance are used. But, when the first provisional annual quarterly based national account is published in the end of February t+1, tax data from the Norwegian Government Agency for Financial Management (SSØ) have been received.

Accessible tax figures in the provisional annual national accounts are total figures for the individual taxes, making it possible for us to provide t-1 figures for total environmental related taxes by Ytart (see annex 2). Environmental related taxes on products by industries for t-1 is not possible to withdraw from the quarterly national accounts (as the case is for the final annual national accounts), and hence not as part of the provisional annual national accounts. Other taxes on production are accessible in the provisional annual national accounts with the same industry breakdown as the last final version of the annual national accounts. Therefore, only taxes on products have been studied.

## 4.6 Trial calculation for distributing t-1 taxes by industries

In order to evaluate the industry breakdown of taxes based on the provisional annual accounts, we treated the environmental related taxes by industry for 2005 as the base year (i.e. the latest final annual environmental related tax statistics) and estimated industry breakdowns of taxes for 2006 based on the provisional annual accounts. 2006 was chosen as the year for these trial estimations, since figures for 2006 also could be calculated based on final annual national accounts. In that way comparisons of the accuracy of the estimated figures based on the provisional annual national accounts could be checked against the final versions.

2006 figures for environmental related taxes by industries based on the final national accounts also had to be calculated. Previous only 2005 figures had been calculated (Næss and Smith, 2009). For the first time we now had two years of data for environmental related taxes by industries to be compared. We were a bit surprised to find that the industry breakdown of the taxes for some industries was quite different for those two years (see table 6). At the time of the activities undertaken in this sub-project, the work with the calculations of the time-series was still not finished, so we only had the figures from 2005 and 2006 to look at.

At this stage, we decided to continue as planned to look into the industry breakdown of t-1 data based on the provisional national accounts. At the same time, as with the work with improving timeliness of the NAMEA-air data, we outlined a more realistic possibility of possibly publishing data on a more aggregated industry level than the NACE A60.

### 4.6.1 Different estimation techniques

Since total figures for the various taxes existed, there was a need to find a method to distribute these detailed taxes on products by the proper industries levied with a tax. Different methods were discussed.

For all estimation techniques, potential changes in the tax system, for example introduction or cancelation of taxes, changed tax rates for specific industries or changed rules of exemption for specific industries should be adjusted for.

*The production-growth method*

The production-growth method means using figures for production and for each industry (or aggregated industry groups) calculate the growth from the annual national account (t-2) to the provisional annual national accounts (t-1). The growth between these two periods for each industry (or industry groups) could be used to compute the taxes levied on the industries in year t-2.

But, this method was abandoned when realising that further adjustments was needed in order to reach the total tax level already given by actual payments of each tax from the Norwegian Government Agency for Financial Management (SSØ).

*The industry-distribution method*
The industry-distribution method means distributing the total tax(es) of the actual year by industries using the breakdown of industries from last final annual environmental related tax statistics, which is based on the final annual accounts. This means that if a tax in the last final annual national accounts only is distributed to one industry, the total amount of this tax from the provisional annual national account will only be put on this same industry. Likewise, if a tax in the last final annual national account is distributed by three industries, the total amount of this tax from the provisional annual national account will be distributed among those three industries according to the same proportions as in the last final national accounts.

See chapter 4.6.2 for trial calculations

*Other supportive statistics*
A majority of the environmental related taxes are levied on the use of various energy products. The basic energy statistics was therefore looked into in order to see if use of energy products by industries existed for t-1. In December year t, provisional figures for the energy balance are published. The industry breakdown of the energy balance is not directly compatible to the NACE industries and to the national accounts definitions.

Figures for emissions to air distributed by emitting industries could also be a source for calculating distribution factors for the total t-1 tax figures. However, the preliminary emissions data does not operate with usable industry breakdowns for t-1 figures (see part 2).

#### 4.6.2 The industry-distribution method

It was decided to do some trial calculations trying to estimate t-1 figures for environmental related taxes by industries.

Calculations have been done both at a NACE A65 and a NACE A17 level for detailed ytart-levels. These calculations are based on no adoptions to correct for changes in exceptions or in tax rates. The results of these first calculations using the industry breakdown of taxes from the 2005-figures for the tax-totals of 2006 show that there are large differences in the results on a detailed level when compared to the “correct” industry breakdown of 2006-figures. Large differences also appear at aggregated level (see table 6). At first glance, this method therefore does not appear to be very useful.

*Table 6: Estimated figures for 2006 using the industry-distribution method compared with final figures for 2005 and 2006. Total environmental related taxes on products. Mill NOK and % change.*

| | | 2005_final | 2006_ estimate | 2006_final | 2005_final to 2006_estimate | 2006_ estimate to 2006_final | 2005_final to 2006_final |
|---|---|---|---|---|---|---|---|
| **NACE A17 + hh** | | **Mill NOK** | **Mill NOK** | **Mill NOK** | **% change** | **% change** | **% change** |
| | **Total industries and household** | 42942 | 47 358 | 47 358 | 9 % | 0 % | 9 % |
| **A** | Agriculture, hunting and forestry | 409 | 441 | 441 | 7 % | 0 % | 7 % |
| **B** | Fishing | 195 | 216 | 222 | 10 % | 2 % | 12 % |
| **C** | Mining and quarrying | 295 | 328 | 591 | 10 % | 80 % | 50 % |
| **D** | Manufacturing | 867 | 980 | 1 586 | 11 % | 62 % | 45 % |
| **E** | Electricity, gas and water supply | 273 | 289 | 256 | 5 % | -11 % | -7 % |
| **F** | Construction | 1761 | 1 953 | 1 580 | 10 % | -19 % | -11 % |
| **G** | Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods | 3880 | 4 205 | 3 379 | 8 % | -20 % | -15 % |
| **H** | Hotels and restaurants | 369 | 422 | 394 | 12 % | -7 % | 6 % |
| **I** | Transport, storage and communication | 6234 | 6 915 | 6 902 | 10 % | 0 % | 10 % |
| **J** | Financial intermediation | 748 | 860 | 1 321 | 13 % | 54 % | 43 % |
| **K** | Real estate, renting and business activities | 2059 | 2 327 | 3 269 | 12 % | 41 % | 37 % |
| **L** | Public administration and defence; compulsory social security | 501 | 530 | 533 | 6 % | 1 % | 6 % |
| **M** | Education | 346 | 360 | 324 | 4 % | -10 % | -7 % |
| **N** | Health and social work | 496 | 514 | 407 | 3 % | -21 % | -22 % |
| **O** | Other community, social, personal service activities | 750 | 793 | 1 181 | 5 % | 49 % | 37 % |
| **P** | Activities of households as employers of domestic staff | 0 | 0 | 0 | - | - | - |
| **Q** | Extra-territorial organizations and bodies | 0 | 0 | 0 | - | - | - |
| **hh** | Household consumption | 23758 | 26 226 | 24 972 | 9 % | -5 % | 5 % |

## 4.7 Conclusions and further work related to timeliness

The study of the publication routines of the national accounts showed us that there are possibilities of publishing environmental related taxes by industries earlier than what is planned to do. Two alternatives appear:

1) With the current method based on the final national accounts, we can together with the publishing of final national accounts figures for t-2 in November year t, also publish final environmental related taxes by industries for the year t-2. This will improve the actuality of the figures by 6 months. These figures can be coupled with provisional figures for emissions to air based on aggregated industries (see part 2 of this report).

2) Waiting with the publishing of environmental related taxes two months until February the following year, will in addition allow for the inclusion of total preliminary environmental related taxes for t-1. This will further improve the actuality of the time-series for this statistical area. Publishing of provisional environmental related taxes by industries for t-1 by the industry-distribution method or the production growth method will not be suggested.

Publishing in February will then be in combination with emissions intensities (t-2) and final detailed emissions to air data (t-2).

The current project on improving the timeliness of environmental related taxes has been the first steps towards breaking the total tax figures by industries based on the provisional annual national accounts. The method intended to use for this purpose turned out not to be suitable.

Ideally, a mix of different methods should be used according to the nature of the tax and available information. For some taxes, the industry-breakdown method and the production-growth method would probably be fine for estimating provisional environmental tax figures by industries, while for other taxes it would be more correct to use energy consumption figures for those areas where this is possible. This is though a resource demanding activity, and discussions have to be taken valuing the benefits of improving the timeliness to include t-1 data against the costs of achieving it.

# 5. Further work

The development of environmental related taxes as official statistics in Statistics Norway is part of the work with Norwegian Environmental and Economic Accounts (NOREEA).

Finalising the work with the side model in order to calculate environmental related taxes for the time period 1995 – 2004 is now the main focus of our work.

Although problems with coherence of data between the national accounts (taxes and energy use in monetary values) and the energy statistics (energy use in physical values) for some industries have been discovered, we still see the excess value of having the calculations of environmental related taxes by industries completely harmonised with the national accounts.

Coherence of the environmental related taxes with the national accounts, emissions to air inventories and energy accounts are of huge importance. Compiling statistics for these areas according to the same concepts and definitions, gives a solid background for performing analyses of the environmental impact of economic activities (i.e. production, intermediate use and the introduction of various economic instruments).

Future work will consist of evaluating the quality of the detailed statistics of environmental related taxes by industries, and come to an agreement regarding concepts and definitions in use when publishing this statistical area. The need of developing a mixed method for dividing total environmental related taxes by industries based on the provisional national accounts has to be seen in relations to its costs.

This detailed systematising of data makes it possible to study if the inclusion of taxes on products in the final national accounts is due to improvements or not. This will be very beneficial for the national accounts calculations in the years to come. There might be possibilities, if seen as very essential, for improvements in the input-files for the period 2002 – 2007 as part of the revision of national accounts figures in 2011 due to the introduction of revised NACE rev. 2. Minor possibilities for revisions are possible for the period 1995-2001.

# 6. References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# 7. Annexes

## 7.1 Annex 1: Total environmental related taxes by industries 1995 – 2004

| Industry classification | | | 1995 | … | 2007 |
|---|---|---|---|---|---|
| A 01 | | Agriculture, hunting and related service activities | | | |
| A 02 | | Forestry, logging and related service activities | | | |
| A 01-02 | | Agriculture, hunting and forestry | | | |
| B 05 | | Fishing, fish farming and related service activities | | | |
| A_B 01-05 | | Agriculture, hunting, forestry and fishing | | | |
| CA 10 | | Mining of coal and lignite; extraction of peat | | | |
| CA 11 | | Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction excluding surveying | | | |
| CA 12 | | Mining of uranium and thorium ores | | | |
| CB 13 | | Mining of metal ores | | | |
| CB 14 | | Other mining and quarrying | | | |
| CA 12 - CB 13 - CB 14 | | Mining of uranium and thorium ores; Mining of metal ores; Other mining and quarrying | | | |
| C 10-14 | | Mining and quarrying | | | |
| DA 15 | | Manufacture of food products and beverages | | * | |
| DA 16 | | Manufacture of tobacco products | | * | |
| DA 15 - DA 16 | | Manufacture of food products, beverages and tobacco products | | | |
| DB 17 | | Manufacture of textiles | | | |
| DB 18 | | Manufacture of wearing apparel; dressing; dyeing of fur | | | |
| DC 19 | | Tanning, dressing of leather; manufacture of luggage | | | |
| DB 17 - DB 18 - DC 19 | | Manufacture of textiles; manufacture of wearing apparel; dressing; dyeing of fur; tanning, dressing of leather; manufacture of luggage | | | |
| DD 20 | | Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials | | | |
| DE 21 | | Manufacture of pulp, paper and paper products | | | |
| DE 22 | | Publishing, printing, reproduction of recorded media | | | |
| DE 21 - DE 22 | | Manufacture of pulp, paper and paper products; publishing and printing | | | |
| DF 23 | | Manufacture of coke, refined petroleum products and nuclear fuel | | * | |
| of which | 23,1 | Manufacture of coke oven products | | * | |
| | 23,2 | Manufacture of refined petroleum products | | * | |
| | 23,3 | Processing of nuclear fuel | | * | |
| DG 24 | | Manufacture of chemicals and chemical products | | * | |
| of which | 24,14 | Manufacture of other organic basic chemicals | | | |
| | 24,15 | Manufacture of fertilizers and nitrogen compounds | | | |

| | | |
|---|---|---|
| DF 23 - D G24 | | Manufacture of coke, refined petroleum products and nuclear fuel; Manufacture of chemicals and chemical products |
| DH 25 | | Manufacture of rubber and plastic products |
| DI 26 | | Manufacture of other non-metallic mineral products |
| of which | 26,1 | Manufacture of glass and glass products |
| | 26,2 | Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic products |
| | 26,3 | Manufacture of ceramic tiles and flags |
| | 26,4 | Manufacture of bricks, tiles and construction products |
| | 26,5 | Manufacture of cement, lime and plaster |
| | 26,6 | Manufacture of articles of concrete, plaster, cement |
| | 26,7 | Cutting, shaping and finishing of ornamental and building stone |
| | 26,8 | Manufacture of other non-metallic mineral products |
| DJ 27 | | Manufacture of basic metals |
| of which | 27.1-3 | Manufacture of basic iron and steel and of ferro-alloys; other first processing of iron and steel |
| | 27,4 | Manufacture of basic precious and non-ferrous metals |
| | 27,5 | Casting of metals |
| DJ 28 | | Manufacture of fabricated metal products, except machinery and equipment |
| DK 29 | | Manufacture of machinery and equipment n.e.c. |
| DL 30 | | Manufacture of office machinery and computers |
| DL 31 | | Manufacture of electrical machinery and apparatus n.e.c. |
| DL 32 | | Manufacture of radio, television and communication equipment and apparatus |
| DL 33 | | Manufacture of medical, precision and optical instruments, watches and clocks |
| DL 30-33 | | Manufacture of electrical and optical equipment |
| DM 34 | | Manufacture of motor vehicles, trailers and semi-trailers |
| DM 35 | | Manufacture of other transport equipment |
| DM 34-35 | | Manufacture of motor vehicles and other transport equipment |
| DN 36 | | Manufacture of furniture; manufacturing n.e.c. |
| DN 37 | | Recycling |
| D 15-37 | | Manufacturing |
| E 40 | | Electricity, gas, steam and hot water supply |
| of which | 40,1 | Production and distribution of electricity |
| | 40,2 | Manufacture of gas; distribution of gaseous fuels through mains |
| | 40,3 | Steam and hot water supply |
| E 41 | | Collection, purification and distribution of water |
| E 40-41 | | Electricity, gas and water supply |
| F 45 | | Construction |
| G 50-52 | | Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods |
| H 55 | | Hotels and restaurants |
| I 60 | | Land transport; transport via pipelines |
| of which | 60,1 | Transport via railways |
| | 60,2 | Other land transport |

| | | |
|---|---|---|
| of which | 60,24 | Freight transport by road |
| | 60,3 | Transport via pipelines |
| I 61 | | Water transport |
| of which | 61,1 | Sea and coastal water transport |
| | 61,2 | Inland water transport |
| I 62 | | Air transport |
| I 63 | | Supporting and auxiliary transport activities; activities of travel agencies |
| I 60-63 | | Land transport; transport via pipelines; water transport; air transport; supporting and auxiliary transport activities; activities of travel agencies |
| I 64 | | Post and telecommunications |
| I 60-64 | | Transport, storage and communication |
| J 65-67 | | Financial intermediation |
| K70-Q99 | | Real estate, public administration, education, health and other social services activities |
| K 70-74 | | Real estate, renting and business activities |
| L 75 | | Public administration and defence; compulsory social security |
| of which | 75,22 | Defence activities |
| M 80 | | Education |
| N 85 | | Health and social work |
| O 90 | | Sewage and refuse disposal, sanitation and similar activities |
| O 91 | | Activities of membership organization n.e.c. |
| O 92 | | Recreational, cultural and sporting activities |
| O 93 | | Other service activities |
| O 90-93 | | Other community, social, personal service activities |
| P 95 | | Activities of households as employers of domestic staff |
| Q 99 | | Extra-territorial organizations and bodies |
| | | Households |
| n_r | | Non-residents |
| n_a | | Not allocated |
| Industry and services (excluding public administration; education; activities of membership organizations; private households; extra-territorial organizations) | | |
| TOTAL ECONOMY | | |
| *DA15+DA16 and DF23+DG24 will be published together due to confidentiality reasons | | |

## 7.2 Annex 2: Input-file: Description of taxes on products (YTART).

| YTART | | GYLDIG TOM | YTART category | YTART category txt_eng (Eurostat) | YTART category txt_(Eurostat) | YTART_txt_eng | YTART_txt_no |
|---|---|---|---|---|---|---|---|
| 41311 | 1991 | 1999 | 0 | no_env_tax | ikke_miljoskatt | Avg. på sildemel | Avgift på sildemel, fiskeolje og råstoff til prisreguleringsfondet for sild |
| 41312 | 1991 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Sukkeravg. | Avgift på sukker, sjokolade og sukkervarer |
| 41321 | 1991 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Avg.alkof drikke | Avgifter på alkoholfrie drikkevarer, kullsyre holdige drikkeverer frem til 2002 |
| 41322 | 1991 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Alko.avg. Øl | Avgift på øl og alkoholholdig drikke med styrke opptil 4,75 |
| 41324 | 1991 | 1995 | 0 | no_env_tax | ikke_miljoskatt | Alko.avg. str.vin | Avgift på brennevin, vin og vermut |
| 41325 | 1995 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Alko.avg. str.vin | Avgift på brennevin, vin og vermut |
| 41326 | 1991 | 1998 | 0 | no_env_tax | ikke_miljoskatt | Dr.ov.vin.pol | Driftsoverskudd i vinmonopolet |
| 41331 | 1991 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Tobakksavg. | Tobakksavg. |
| 41341 | 1991 | 9999 | 3 | ET1200_Pollution_taxes | Forurensningsskatter | Tax on greenhouse gases HFC and PFC | Avgift på Hydrofluorkarbon og Perflourkarbon |
| 41342 | 1991 | 9999 | 1 | ET1100_Energy_taxes | Energiskatter | Electricity consumption tax | Avgift på elekrisk kraft |
| 41343 | 1991 | 1999 | 1 | ET1100_Energy_taxes | Energiskatter | Tax on mineral products, total | Mineralojeavgift |
| 41344 | 1991 | 1999 | 1 | ET1100_Energy_taxes | Energiskatter | Tax on coal and coke | Avgift på kull og koks |
| 41345 | 1993 | 9999 | 1 | ET1100_Energy_taxes | Energiskatter | Diesel tax | Autodieselavg |
| 41346 | 1999 | 9999 | 1 | ET1100_Energy_taxes | Energiskatter | Tax on mineral oils | Avgift på mineraloje som ikke ommfattes av autodieselavg |
| 41347 | 1991 | 9999 | 3 | ET1200_Pollution_taxes | Forurensningsskatter | Tax on lubricating oils. | Avgift på smøreolje |
| 41348 | 2007 | 9999 | 1 | ET1100_Energy_taxes | Energiskatter | Tax on NOx emissions | NOX avgift |
| 41351 | 1991 | 2000 | 2 | ET1400_Transport_taxes | Transportskatter | Motor vehicle registration tax | Engangsavgift på motorvogner |
| 41352 | 2001 | 9999 | 2 | ET1400_Transport_taxes | Transportskatter | Motor vehicle registration tax. | Engangsavgift på motorvogner |
| 41361 | 1991 | 9999 | 1 | ET1100_Energy_taxes | Energiskatter | Petrol tax | Bensinavgift |
| 41363 | 1991 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Avg båtmotorer | Avgift på båtmotorer |
| 41364 | 1999 | 9999 | 1 | ET1100_Energy_taxes | Energiskatter | CO2 tax on mineral products | CO2 avgift |
| 41365 | 1999 | 9999 | 1 | ET1100_Energy_taxes | Energiskatter | Sulphur tax on mineral products | Svovelavgift |
| 41366 | 1994 | 9999 | 3 | ET1200_Pollution_taxes | Forurensningsskatter | Base tax on disposable beverage packaging | Grunnavgift engangseballasje |
| 41367 | 1991 | 9999 | 3 | ET1200_Pollution_taxes | Forurensningsskatter | Tax on wine and liquor packaging | Emballasjeavgift på vin og brennevin |
| 41368 | 1991 | 9999 | 3 | ET1200_Pollution_taxes | Forurensningsskatter | Tax on beer packaging | Emballasjeavgift øl og svakvin |
| 41369 | 1991 | 9999 | 3 | ET1200_Pollution_taxes | Forurensningsskatter | Tax on packaging on carbonated beverages. | Emballasjeavgift som inneholder alkoholfrie drikkevarer |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 41372 | 1995 | 2002 | 0 | no_env_tax | ikke_miljoskatt | Avg fjernsyn.mat | Avgift på fjernsynsmatriell og radioutstyr |
| 41373 | 1991 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Avg på kosmetikk | Avgift på kosmetiske toalettmidler |
| 41374 | 1990 | 1992 | 3 | ET1200_Pollution_taxes | Forurensningsskatter | Avg på batterier | Avgift på miljøskadlige batterier |
| 41375 | 1991 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Avg farm.s sp.pr | Avgift på farmasøytiske spesialpreparater |
| 41376 | 1991 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Avg tele | Avgifter i telesketoren |
| 41377 | 1991 | 2000 | 0 | no_env_tax | ikke_miljoskatt | Avg lydkass. | Avgift på uinspillte lydkassetbånd og uinnspillte videobånd |
| 41379 | 1991 | 2002 | 2 | ET1400_Transport_taxes | Transportskatter | Passasjeravg | Avgift på flyging av passasjerer |
| 41381 | 1991 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Ov.s. No.tipping | Overskudd norsk tipping |
| 41382 | 1991 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Totalisatoravg | Totalisatoravgift og rikstotalisatoravgift |
| 41383 | 1991 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Lotteriavg | Lotteriavgift |
| 41385 | 1991 | 9999 | 0 | no_env_tax | ikke_miljoskatt | Dokumentavgift | Dokumentavgift |
| 41391 | 2000 | 9999 | 3 | ET1200_Pollution_taxes | Forurensningsskatter | Avg PET og TRI | Avgift på Tektrakklorten og Trikkloreten |
| 41392 | 1993 | 1994 | 0 | no_env_tax | ikke_miljoskatt | Avg på utf.fisk | Avgift på utførsel av fisk |

## 7.3 Annex 3: Concepts and definitions for environmental relevant taxes

Definitions and categorisations of the statistics presented in this report follow guidelines given by the EU, the IEA and the OECD (Eurostat, 2001).

***The OECD/Eurostat/IEA framework:***

The definition of environmentally related taxes provided in Eurostat (2001) is the following:

*"A tax whose tax base is a physical unit (or a proxy of it) of something that has a proven, specific negative impact on the environment."*

According to these guidelines, *"all taxes on energy and transport are per definition environmentally related taxes. Value added type taxes are excluded from the definition."*[9]

The general definition of a tax used in this framework follows from the National Accounts, where the main point is that taxes are compulsory payments to the government, where the benefits provided to the taxpayer are not directly linked to the payment.

4 main categories of environmentally related taxes have been defined. These are:

*Energy taxes (including $CO_2$ and $SO_2$ taxes)*
This group includes taxes on energy products used for both transport and stationary purposes. The most important energy products for transport purposes are petrol and diesel. Energy products for stationary use include fuel oils, natural gas, coal and electricity. The $CO_2$ taxes are included in energy taxes rather than in pollution taxes due to several reasons. Often they are integrated with other energy taxes and cannot be separated in the national accounts. Another reason is that they may have been introduced as a substitute for other energy taxes.

*Transport taxes*
This group mainly includes taxes related to the ownership and use of motor vehicles. Taxes on other transport equipment (e.g. planes), and related transport services (e.g. duty on charter or scheduled flights) are also included here, when they conform to the general definition of environmentally related taxes. The transport taxes may be 'one-off' taxes related to imports or sales of the equipment or recurrent taxes such as an annual road tax. Taxes on petrol, diesel and other transport fuels are included under energy taxes.

*Pollution taxes*
This group includes taxes on measured or estimated emissions to air and water, management of solid waste and noise. An exception is the $CO_2$ taxes, which are included under energy taxes as mentioned above.

*Resource taxes*
Resource taxes are taxes on extraction of natural resources, except taxes on oil and gas that are meant to capture the resource rent. Taxes on resources pose some particular problems. There are differences in opinion on whether resource extraction is environmentally harmful in itself, although there is broad agreement that it can lead to environmental problems, such as pollution and soil erosion. Anyhow, in the Norwegian case there exist no taxes that can be defined in this category.

### *Pigouvian tax:*

An *environmental tax* or a Pigouvian tax (Pigou 1920) in this literature is a tax levied on a market activity to internalize the cost of negative externalities associated with this activity. In the presence of negative externalities, the social cost of a market activity exceeds the private cost. Then the market outcome is not efficient, i.e. the market tends to over-supply. An optimal environmental tax is equal to the marginal negative externality. When an optimal tax is imposed, the market outcome would return to efficiency.

### *Suggested classification of environmental relevant taxes:*

| **Miljørelaterte avgifter i Norge i 2009** | **Provenyanslag 2009. Mill. kroner** | **Introdusert** |
|---|---|---|
| Avgift på utslipp av $CO_2$ i petroleumsvirksomheten på kontinentalsokkelen | 2 400 | 1991 |
| Avgift på utslipp av $NO_X$ i petroleumsvirksomheten på kontinentalsokkelen, kr/kg | 0 | 2007 |
| Bensinavgift, kr/liter | 7 755 | 1933 |
| Autodieselavgift, kr/liter | 8 355 | 1993 |
| Avgift på smøreolje, kr/liter | 100 | 1988 |
| $CO_2$-avgift | 4 662 | 1991 |
| Svovelavgiften | 78 | 1970 |
| Avgift på sluttbehandling av avfall | 715 | 1999 |
| Avgift på helse- og miljøskadelige kjemikalier (TRI og PER) | | 2000 |
| Avgift på HFK og PFK, kr/tonn $CO_2$ -ekvivalenter | 270 | 2003 |
| Avgift på utslipp av $NO_X$, kr/kg | 50 | 2007 |
| Grunnavgift på engangsemballasje, kr/stk. | 780 | 1994 |
| Avgift på drikkevareemballasje | | 1973 |
| **Sum miljøavgifter** | **25 676** | |
| | | |
| Forbruksavgift på elektrisk kraft | 6 226 | 1951 |
| Grunnavgift på fyringsolje, kr/liter | 1 157 | 2000 |
| **Sum miljø- og energirelaterte avgifter** | **33 059** | |
| | | |
| Engangsavgift på motorvogner mv. | 19 700 | 1955 |
| Årsavgift | 7 950 | 1917 |
| Vektårsavgift | 358 | 1993 |
| **Sum avgifter som kan påvirke miljøet** | **61067** | |

Source: Ministry of Finance (http://www.regjeringen.no/nb/dep/fin/tema/skatter_og_avgifter/saravgifter/dagens-gronne-skatter.html?id=439338)