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Statistics Sweden

Environmental Protection Expenditure – new data collection and additional information:

- **Environmental protection in Agriculture**
- **Energy related investments**
- **Environmental Barometer**

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Preface

This report has been prepared on commission from Eurostat. The European Commission through DG Eurostat has contributed financially to the project. Nancy Steinbach (project leader and editor), Mats Eberhardson (chapter 3 and 5) and Martin Villner (chapter 2), the unit for Environmental Accounts and Natural Resources and Staffan Berge Holmbom (chapter 4) the Method Unit for Enterprise, Organisations, Real estate and Environment Statistics at Statistics Sweden, have carried out the study and are responsible for the report.

The aim of the work on environmental accounts at Statistics Sweden is to develop a system of physical accounts that are linked to the production and consumption activities described in the national accounts. In practice this means developing a system of environmental and natural resource statistics that can be linked to the industry, product and sector categories used in the national accounts. According to the UN, a system of environmental accounts should in principle cover:

- Flows of materials through the economy, e.g. energy and chemicals, together with the emissions and waste to which these flows give rise. Within the EU, many countries have opted to use the NAMEA system[1] to describe these flows.
- Economic variables that are already included in the national accounts but are of obvious environmental interest, such as investments and expenditure in the area of environmental protection, environment-related taxes and subsidies, and environmental activities and the employment associated with them.
- Natural resources. Environmental accounts should make it possible to describe stocks and changes in stocks of selected finite or renewable resources. They should deal both with questions related to the monetary valuation of this natural capital and qualitative aspects that do not have any market or other defined monetary value, e.g. the value of outdoor life and biodiversity.

The project would like to thank following persons for their assistance:
Chapter 2 Agricultural issues: Lovisa Forsell from the unit of Energy, Transport and Agriculture SCB, the expert group on agriculture: The Swedish Board of Agriculture, Swedish University of Agricultural Sciences and The Federation of Swedish Farmers and Carina Jonsson (questionnaire development and design) from the Process Department, SCB. The project would also like to thank the Netherlands, Austria, Slovenia and Hungary with past experience of EPE statistics for the agriculture sector that responded to our questions.
Chapter 3 Energy issues: Malin Lagerqvist from the Swedish Energy Agency.
Chapter 4 Environmental Barometer: Pernilla Gluch Chalmers university, Andreas Femrell The Board of Swedish Industry and Commerce for Better Regulation, Carina Jonsson (Internet based questionnaire and design) and Claes Jonsson (database development) from the Process Department, SCB.

[1] NAMEA stands for National Accounting Matrix including Environmental Accounts. In principle this is a Social Accounting Matrix (SAM) supplemented by environmental accounts data on, e.g., emissions to air and waste, linked to the Use and Supply Matrices that a SAM is constructed around..

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Summary

This report consists of three different sub-projects: i) developing a methodology for the collection of environmental protection expenditure (EPE) in agriculture, ii) to further develop a definition and guidelines on energy economising investments and iii) to further develop and analyse the underlying understanding of the statistics on environmental protection expenditure in industry currently being conducted at Statistics Sweden.

The first part, to develop a methodology to collect EPE statistics was a straight forward procedure. The foundation, the work of Eurostat in the 1990'is and mid-2000's along with the experience of Statistics Sweden gave the development an easy path forward. Definitions are already existing that could be applied in this project and the classification is well developed to cover agricultural issues. Also already available at Statistics Sweden through the existing survey on EPE in industry is a questionnaire and a brochure, or a handbook on how to correctly fill the questionnaire. The outset of the project was to perhaps include some new questions in an existing questionnaire directed at agricultural enterprises. However, through discussions with the agricultural unit at Statistics Sweden as well as input from an expert group it was decided that the best approach for a pilot would have to be a specific questionnaire. That way there would be a focus on EPE and it would be possible to evaluate the results purely on the basis of existing measures and developed material.

The two other sub-projects, the development of energy economising statistics in the second part and the environmental barometer conducted in the third part unexpectedly provided a broader information basis to the overarching project.

The second part of the project, to develop a definition and guidelines for energy economising investments in industry took much help from a current development within the Swedish Energy Agency. They currently have a programme called *Programme for energy efficiency in energy intensive industry* (PFE). The objective of PFE is to increase the energy efficiency in Swedish manufacturing enterprises which have a large consumption of energy. Their work show that very low amounts of money spent can create a large amount of savings of TWh of energy. This helped understanding some of the result in the third part of the project where Swedish manufacturing enterprises were asked about their environmental work and implemented measures in a qualitative fashion. In return the so called Environmental Barometer provided input to the work on establishing a definition and guidelines for energy economising measures. The PFE programme does not cover changes and investments in logistics which was an important measure that enterprises declared in the Environmental Barometer.

The results of the Environmental Barometer was also analysed on the basis of the information available through the EPE statistics. This was done to increase the understanding of why certain decisions are made to invest or not. What the analysis

could not capture was that the most important area of environmental concern for the Swedish industry is energy use as the EPE statistics does not cover that information.

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1. Introduction

So far, the main efforts in Sweden have been focused on the survey on environmental protection expenditures (EPE) for industry. By only accessing parts of the economy unbalanced analysis are inevitable. It has also come to light that several users in Sweden ask for better information related to investments in energy efficiency and heat recovery measures.

Statistics Sweden has through Eurostat grant agreement 50304.2008.001-2008.340 started a three part project with the following components:

1. *Establish a working method for the collection of EPE statistics in agriculture*. Until now Eurostat has developed methodologies, handbooks and standard practises for EPE in industry and for the government and specialised producers. As a response to these activities, Statistics Sweden has produced the EPE statistics accordingly. In order to capture more of the economy in Sweden several sectors are still in need to have their EPE statistics developed. In 2008 Statistics Sweden produced a first pilot of the full Environmental Protection Expenditure Accounts. It was clear that the EPEA would be missing data; for the agriculture sector, for services and for households to mention a few. In the search for alternative sources both within Statistics Sweden and elsewhere it was within the agriculture sector at Statistics Sweden that there was an interest in the topic outside the environmental accounts group. It therefore seemed to be a logical next step to take, to develop EPE statistics for this particular sector. It is also an interesting sector to start working with due to the increasing attention that is brought to the environmental pressure that food production is under and the development of organic farming.

2. *Further develop the existing variables in the EPE survey for the industry connected to renewable energy and heat recovery*. For many years the Swedish survey on EPE in industry has included two questions related to energy efficiency and heat recovery. These questions were included to improve the quality of EPE statistics as many respondents saw this as environmental investments. The EP definition is clear on the exclusion of these types of investments. However, it is a fact that a large part of the environmental work in the industry is to reduce the use of energy. In 2008 the Scientific council at Statistics Sweden (consisting of a number of experts in statistical matters from a variety of universities across Sweden) discussed the lack of information on economics related to energy investments. They concluded that it would be of great interest to see Statistics Sweden further develop this type of statistics.

3. *Include a qualitative questionnaire investigating the reasons behind EP investments in the EPE survey for the industry for 2010.* For some years now Statistics Sweden has collected EPE statistics in industry. With each new survey questions arise to why the respondents invest in the way they do. In 2007 DG Environment published a study "Sectoral costs of environmental policy". Part of this study was dedicated to investigating the environmental policy implications (legislations, directives and such) to enterprises. The study had a broad approach covering several EU directives and the viewpoints of the enterprises. The consulting office conducting this study (VITO, Brussels) mentioned that the majority of the respondents to their questionnaire were Swedish. An interest was therefore woken to partly being able to further analyse the Swedish EPE statistics but also to see if we could get similar results as the study of the European Commission.

2. Method for collecting EPE statistics in agriculture

2.1 Summary of the activity

In order to develop a method to collect Environmental Protection Expenditure (EPE) data in agriculture the project started by looking into the definition of what EP would mean in the agriculture sector. Discussions with sector experts landed with the acceptance of the existing definition used today for the industry in Europe, i.e. reducing the environmental pressure of the own production. With the help of the same expert group that discussed the definition a list of examples of investments and current expenditures in the agriculture sector was developed.

Three approaches were considered in means of collecting expenditure statistics. the first looked into adding questions to an existing survey, the second to add the information to the regular book keeping systems and the third to develop a separate questionnaire and a separate survey. The result became a separate questionnaire that was based on the existing questionnaire on EP for industry. The new questionnaire was altered so as to correspond to the important environmental domains of the agriculture sector. Finally a short handbook that describes the practicalities for the assistance to the respondents was produced.

2.2 Background

Until now Eurostat has developed methodologies, handbooks and standard practises for EPE in industry and for the government and specialised producers. As a response to these activities, Statistics Sweden has produced the EPE statistics accordingly.

In order to capture more of the economy in Sweden several sectors are still in need to have their EPE statistics developed. In 2008 Statistics Sweden produced a first pilot of the full Environmental Protection Expenditure Accounts. It was clear that the EPEA would be missing data; for the agriculture sector, for services and for households to mention a few. In the search for alternative sources both within Statistics Sweden and elsewhere it was within the agriculture sector at Statistics Sweden that there was an interest in the topic outside the environmental accounts group. It therefore seemed to be a logical next step to take, to develop EPE statistics for this particular sector. It is also an interesting sector to start working with due to the increasing attention that is brought to the environmental pressure that food production is under and the development of organic farming.

2.3 Objective

Today the overall framework of EPE statistics is covered by SERIEE 1994 published by Eurostat in 1994. Until now there has been a focus on the mining, quarrying an

manufacturing industry with regards to data collection, methods and harmonisation. There is today also a European Regulation, the Structural Business Statistics 58/97 that collects statistics on EPE. For the agriculture sector there has been no European initiative to harmonise the statistics produced as of yet. The objective of this part of the project is therefore to develop a method to collect EPE for the agriculture that can be used by Sweden and other EU countries.

The project consists of three parts:

- Defining EPE in agriculture
- Produce a questionnaire and a practical handbook for respondents to use
- Describe diffrent methods to collect EPE data

2.4 Defining EPE in agriculture

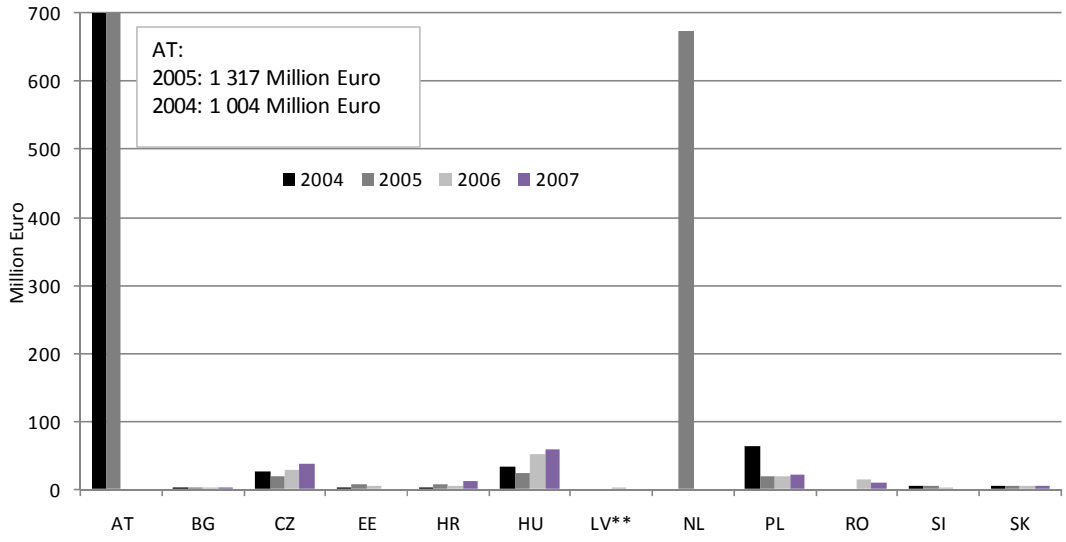
In order to develop a method to collect EPE data in agriculture the starting point was to clarify the definition and to investigate the specificities of EPE related to agriculture. The reason for questioning the existing European definition on EP mostly relates to the fact that this project could not find any study or person that had documented the applicability of the definition to the agriculture sector. There are many studies looking into the industry but (within the scope of this project) nothing similar had been found.

The main issues are to identify what types of environmental protection investments and current expenditure for environmental protection are executed in the agriculture sector. In order to do so several steps was taken. An Internet search of EPE for the agriculture was done to see if other countries/organisations are working in this area that could be useful for the project. The search started with the data collected by Eurostat through the OECD/Eurostat Joint Questionnaire. This questionnaire is to date the only data collection tool available to capture environmental economics (both expenditures and revenues) from the entire economy in Europe. The second step was to discuss with an expert group on agriculture in Sweden to hear their opinions about this type of statistics and how they could see the definition being applied.

2.4.1 International work in the field

An overview was quickly established of the situation in Europe. Out of EU27, EFTA and accession countries only a handful of countries report any data related to either expenditure or income. Figure 1 show the 12 countries that report any data on total EPE for the Agriculture, forestry and fishery sector (NACE rev 1.1 A-B). Two countries have reported data higher than any of the others. Austria and the Netherlands are reporting higher amount of EPE, Austria with expenditure well of a billion Euros.

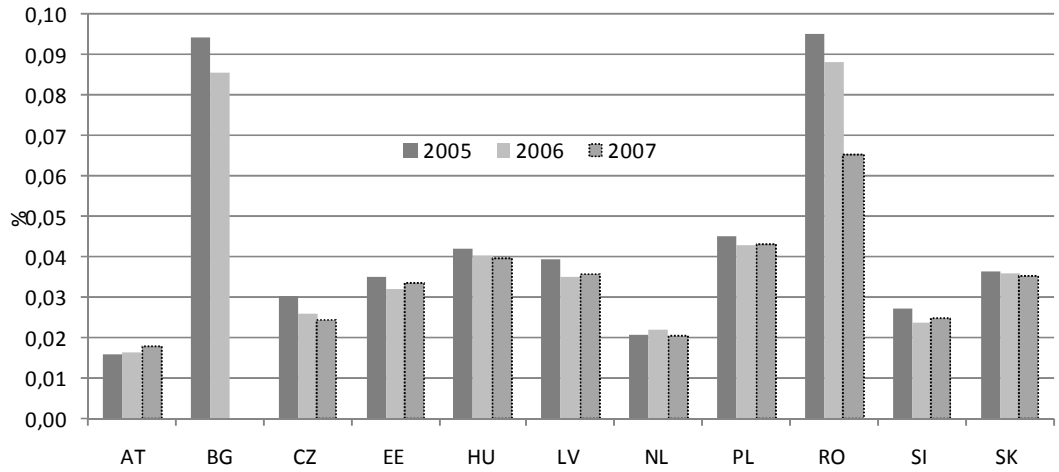
Figure 1: Total EPE in NACE rev.1.1 A+B, million Euros



**LV most recent year available 2003.
Source: Eurostat, Joint OECD/Eurostat Questionnarie extraction date November 2009

A check with the National Accounts at Eurostat show that on average the share of gross value added in NACE A and B to total gross value added does not explain the phenomenon in Austria and The Netherlands. On the contrary, Romania and Bulgaria have a much larger agricultural sector then the rest (Figure 2).

Figure 2: Share of GVA in NACE rev.1.1 A+B in total GVA



Source: Eurostat, National Accounts extraction date November 2009

Other variables of interest for the agriculture sector are subsidies. However, here even fewer countries report data. Figure 3 shows the 6 countries that reported data through the most recent data collection. Again, Austria and the Netherlands are showing higher subsidies to the agriculture sector then the rest. Interesting to see is that Poland has reported negative subsidies.

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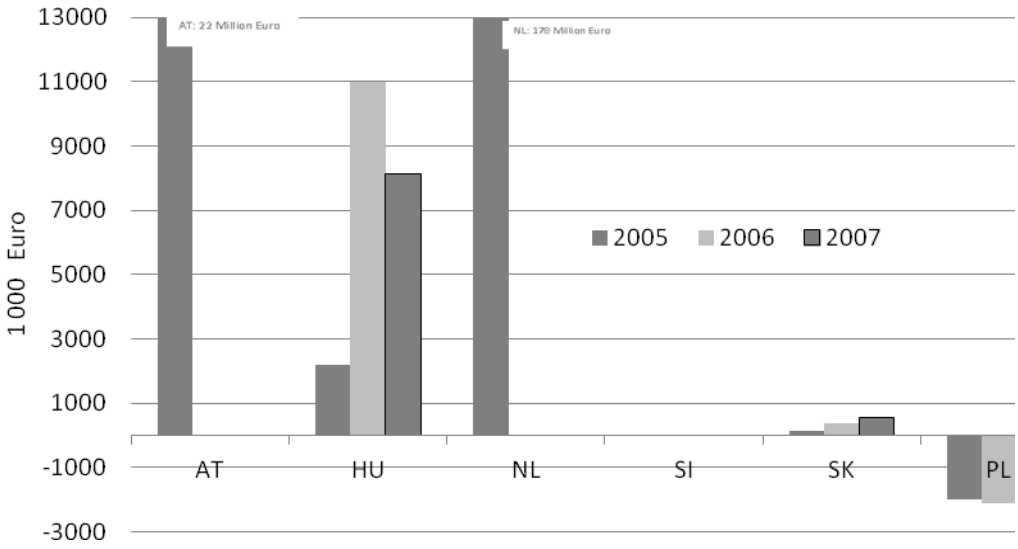
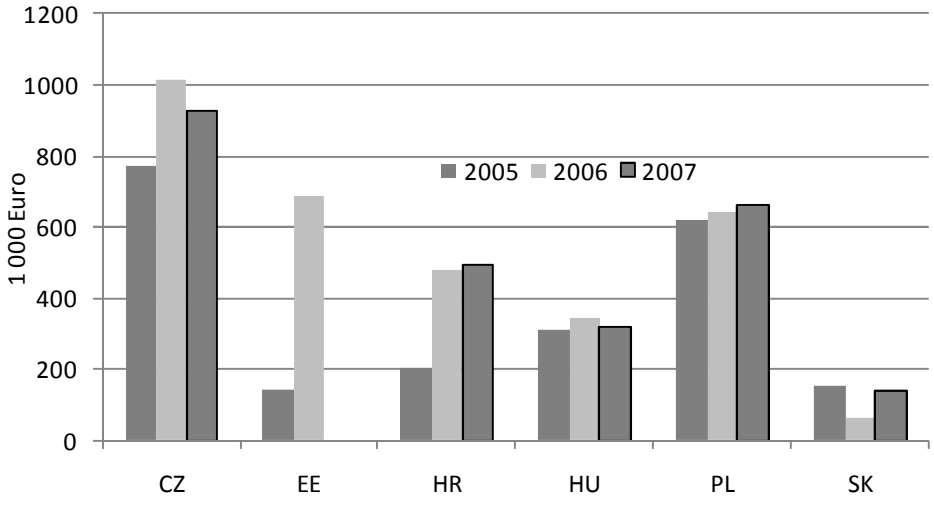
Figure 3: Total EP subsidies in NACE rev.1.1 A+B



Source: Eurostat, Joint OECD/Eurostat Questionnarie extraction date November 2009

The third variable of interest was receipts-from-by products. However, without accompanying methodological information it is hard to evaluate what this variable actually mean.

Figure 4: Receipts from by products, NACE rev.1.1 A+B



Source: Eurostat, Joint OECD/Eurostat Questionnarie extraction date November 2009

Establishing that there are some countries reporting EPE statistics thought the JQ, contacts were taken with some of these. For example, a contact was taken with Hungary's statistical office for information on how they collect data of EPE for the agriculture sector. However, little help could be given by them. They send the same questionnaire to the entire economy with no specific instructions to specific sectors. They also have no ability to check for example what types of technical investments

have been done, or what type of income they have related to by-products to verify the data quality.

2.4.2 The assistance of an expert group

It was decided to establish an expert group with representatives from SCB's agriculture unit, The Swedish Board of Agriculture, Swedish University of Agricultural Sciences and The Federation of Swedish Farmers to assist in this project. It was deemed necessary as the skills of these organisations are, in the field of agriculture, important to verify the quality of the work. To establish a methodology that are soundly based on real applications and can be considered of good quality is important for the success of this project.

The group met in spring 2009. During the meeting the meaning of EPE for the agriculture sector was discussed and a list of examples of environmental protection investments and current expenditure for environmental protection for the agriculture was outlined. With the help of the expert group the list of examples of investments and current expenditures in the agriculture sector for the different types of expenditures in the survey, e.g. type of investments (prevention, treatment), environmental area, internal expenditure (supervision, training) and purchased services and fees was then further developed after the meeting (See annex 1).

2.5 Outcome of the exercise

The definition of EP through the SERIEE and the Structural Business Statistics Regulation 58/97 has been tested on several occasions on the mining, quarrying and manufacturing industry and is today well established. The statistics produced with this definition is harmonised and of good quality.

After consulting the expert group on agriculture (see 2.3.2 above) it was decided that the definition that is used for EPE in the industry at European level should also be used for agriculture. The main reasons are that the definition appear to be very well suitable also for the agriculture sector and the international harmonisation of the issue would be a clear advantage.

The definition is therefore:

> Environmental protection is an action or activity where the **main purpose** is to collect, treat, reduce, prevent, or eliminate pollutants and pollution or any other degradation of the environment resulting from the operating activity of the company.
>
> Environmental protection expenditure is the sum of capital and current expenditure for the undertaking of environmental protection activities.
>
> Environmental protection expenditure may include activities which generate marketable by-products, results in savings or are financed by subsidies or capital allowances. In such cases, environmental protection expenditure should be reported gross of any such cost offsets. (Eurostat 2005)

2.6 Methods to collect EPE data

To date there are three different ways to implement the questionnaire.

The first option is to include the EPE questions to the existing data collection of Agriculture Economics. In Sweden this data collection is done through the Federation of Swedish Farmers by means of regular economic business accounting. It would in practise mean to include separate budget items in the system related to EPE. The business accounting system today is very detailed and is developed so as to respond to both legal requirements of budgeting but also to statistical compilations.

The second option is to include our questions to the existing survey on fertilizers. This is a survey conducted by Statistics Sweden by means of visits to the farmers. In practise this would mean to educate the interviewers so that they could collect the relevant data while conducting their visits. It would mean that two very different topics would meet, one dealing with physical amounts of fertilizers and the other related to economic information.

The third option is to perform a sample survey that stands alone, with a separate selection of farmers. It could be the preferred option in order to develop some pilot results. After an initial survey there could be of interest to move further and establish EPE statistics through book keeping accounts.

Through discussions with the agricultural statistical unit and the consultants developing the economic accounting system it was seen that the first and second option were not advisable at this stage. Primarily because the topic is completely new and will require a test pilot to find out the issues that farmers are facing regarding environmental protection. To include new completely different variables in the fertilizer survey did not appear appropriate very much for the same reasons. Even though the field interviewers would receive good training it would be too far away from what they normally ask.

Option three therefore appealed the most. The same staff that already collects the EPE data for the industry could also be used for the agricultural sector. It would also mean a good opportunity to evaluate the reactions of the respondents as well as their particular issues with this questionnaire and the information required.

2.7 Questionnaire for EPE in agriculture

When a list of examples of EFE in agriculture had been produced the next step was to discuss and outline the questionnaire itself. The Swedish EPE for industry which is the foundation to the new questionnaire has some restrictions. For example, it only separates four out the nine domain of the CEPA classification (air, waste, waster, other). The agriculture sector, which has other environmental concerns than the manufacturing industry, needs a slightly altered questionnaire. In Sweden, the agricultural sector is working quite a lot towards protecting biodiversity and ground water quality. A draft questionnaire to collect EPE data for the agriculture has been produced, see annex 2.

Basically the same approach as for the industry survey has been applied: The first page of the questionnaire asks about a short description of the enterprise production process and also about number of employees. The latter is used as a consistency check to see if all establishments are included in the answer. On page two and three the respondents have to fill in tables, with a minimum of written instructions, referring environmental protection investments. For help enterprises have examples and more detailed instructions. Each row in the tables is coded with a number and the respondent is asked to fill in written comments to each row. At the last page enterprises are asked to report eventual current expenditure for environmental protection. On this page respondents are also asked to estimate time needed filling in the questionnaire and to indicate if he/she wants a short summary of the result of the inquiry free of charge.

2.8 Brochure for EPE in agriculture

A short brochure that describes the practicalities for the assistance to the respondents was produced, see annex 3. The brochure for the respondents for the survey of EPE in industry was used as a starting point. It was altered to suit the agriculture sector e.g. include EPE examples that relate to the situation of agriculture.

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3. Develop the renewable energy and heat recovery variables in the EPE survey for the industry

3.1 Summary of the activity

In this part of the project, we outline a definition and description, as well as examples of expenditure in energy economising that could be used to ask the Swedish industry[2]. During some years Statistic Sweden has included questions in the survey on environmental protection expenditure related to energy and heat economising. The results have, however, been of uncertain quality why a more careful examination of the area has been called for. The aim is that the result of this project is going to feed into the existing EPE-survey where changes will be made to increase the quality of the variables on energy economising.

The area has unfortunately not been given attention in the environmental accounts internationally. The suggestions and proposals provided in this chapter discusses the existing frameworks of which there might be issues related to comparisons and international harmonisation.

3.2 Background

According to the International Energy Agency (IEA) efficient management of energy use is a cost-effective tool to attain a sustainable future. Reduced energy consumption cut fuel costs, improves competitiveness and is beneficial to the environment. Therefore, energy efficiency is one focus area to the IEA (IEA 2005) An important factor about the matter of efficient use of energy is the industrial use of energy and how the industry manages questions regarding energy efficiency. In the IEA handbook on energy efficiency, evaluation is pointed out as a crucial issue to good governance (IEA 2010).

Statistic Sweden (SCB) has been conducting surveys on environmental protection expenditure (EPE) in the Swedish industry since the 1980s. In the eighties and the nineties the surveys was carried out intermittently but since the reference year 2001 the survey has been performed on an annual basis.

[2] In the notion of 'Swedish industry' we include the mining and quarrying industry (NACE 05-09), the manufacturing industry (NACE 10-33) and the energy and water industry (NACE 35-36).

Since 2001, SCB has also included voluntary questions on renewable energy and heat recovery. The instructions on the variables have been rather vague and the response rate to the questions has been low. By this reason it has been difficult to interpret and analyse the results from the survey regarding these variables. However, these kinds of expenditure are not included in the definition of EPE unless the primary purpose is environmental protection but several users have been asking of better information on the matter over the years. In addition, the Scientific Council of SCB has recommended a more thorough analysis of the area to be able to improve on the quality of the variables. In this part of the project we have been out to develop the instructions as well as to clarify the questions, e g with more and better examples, and this in order to be able to answer to the needs of the users.

3.3 Objective

The objective of this chapter is to explore and develop the already existing variables on energy economising in the survey on environmental protection expenditure in industry.

The study has looked at existing statistical frameworks within Eurostat but also what is ongoing at the International Energy Agency. The study has also been in contact with the Swedish Energy Agency for further input and expertise.

3.4 EPE-survey and energy economising in Sweden

In the existing survey in Sweden on environmental protection expenditures in industry, as well as in the handbook (SCB 2001) accompanying the questionnaire, the definitions and descriptions regarding investments and current expenditure in the area of economising with energy and heat are only rudimentary. When the Swedish survey on EPE, the one used since 2001, was developed, a consultative group consisting of possible respondents and users were formed. The group were of the opinion that the definition of environmental protection were too narrow to capture the ‘environmental work’ done within the Swedish industry. They argued that a large part of what the industry perceives as environmental management and *protection* is connected to energy issues. Therefore, not to include these questions in the survey would possibly make the survey obsolete from a user or an industry perspective. The compromise solution was to include a simple set of variables where the respondents could report their expenditure on energy and heat economising. Unfortunately, the area was not well explored and the information provided in the questionnaire as well as the clarity of the questions was not of good quality. Hence, the responses gotten so far have been of questionable quality and too few to admit any meaningful analysis. In the last years SCB have stopped publishing the results from these variables due to the lack of quality in the data and the difficulty in interpreting the results. Nevertheless, measurement on expenditure on energy and heat economising are still standing as much sought-after variables by users.

To develop a more firm description and definition of the area as well as to clarify the questions in the questionnaire, SCB took some measures including contacting the

Swedish Energy Agency (hereafter referred to as EA) to partake in this part of the project. The EA is the national counterpart to IEA and they have for a long time been involved in different kinds of efforts to increase energy efficiency, both for households and industry. One project from EA that drew SCB's attention was their *Programme for energy efficiency in energy intensive industry* (PFE). The objective of PFE is to increase the energy efficiency in Swedish manufacturing enterprises which have a large consumption of energy. To participate in the programme, the enterprises have to work in a structured manner with issues regarding to energy and take measures to reduce their energy consumption. The incentive for the enterprise is being entitled energy tax cuts and lower costs due to decreased energy consumption. The PFE-programme has been ongoing since 2004 and the first period was finished in 2009. The 87 participating enterprises had by then achieved a total decrease of 1.4 TWh in energy consumption (equals the energy consumption of around 80 000 Swedish households), completed more than 1000 measures and together spent over 600 million SEK (equals roughly € 60 million) in energy related investments (Swedish Energy Agency, 2009).

SCB wanted to draw on the experiences from EA regarding the PFE-project. The EA's experiences was thought to be of good help in regards of developing a description and to produce good examples on what kinds of equipment as well as measures for the respondents to include in their answers to the questions regarding energy and heat economising.

3.5 An international outlook

Other sources such as Eurostat and the OECD have also been examined. Eurostat has long been working with the framework of SERIEE (published in 1994 which covers environmental economic statistics but only briefly mention resource management expenditures). In recent years there has been work ongoing trying to further develop resource management expenditure statistics. However, the focus has been on the larger framework and classification issues and not on hands-on data compilations. (E.g. Istat 2009 and the work of the Eurostat Task Force on Resource Management Expenditure Accounts 2010)

Regardless, looking at the definition applied to the statistics on environmental protection expenditures some elements could perhaps also be extracted to apply to new statistics on resource management of which energy economising measures would be a part of.

> Environmental protection is an action or activity where the **main purpose** is to collect, treat, reduce, prevent, or eliminate pollutants and pollution or any other degradation of the environment resulting from the operating activity of the company.

If something similar were to be constructed for resource management it would perhaps look like the following:

> Resource managment is an action or activity where the **main purpose** is to collect, treat, reduce, prevent, or eliminate the use of natural resources resulting from the operating activity of the company

Boundary issues would arise in relation to for example recycling of wood and steel products but also for energy economising. There might also be an issue of renewable vs. non-renewable natural resources. Would it be reasonable to include both types of resources in the statistics or would one only focus on the critical resources (fossil oil, gas, minerals etc). In the Scandinavian countries water is available and used in several important industries such as the electricity-, steel-, and pulp and paper industries to a very low cost. Regardless the government in for example Sweden is setting out strategies to reduce the consumption of energy without restrictions to what type of energy source should be reduced. By only including non-renewable resources the Swedish strategies and policies with relations to natural resources would not be sufficiently covered.

The OECD, the UNEP and the EEA on the other hand explored energy subsidies to a large extent (e.g. OECD 2010, UNEP 2004 and the EEA 2004) . However, this project focus on hands-on expenditure by the industry itself and not government related payments. Therefore that work was also not given further attention in this project.

3.6 Outlining a definition and description of energy economising expenditure

It was mentioned in the beginning of this part of the report that IEA pointed out evaluation as a critical part of good energy efficiency governance. One purpose in outlining a proposal for energy economising expenditure is to contribute to a better understanding of the area and in this way construct a basis for a sound evaluation of measures regarding energy efficiency.

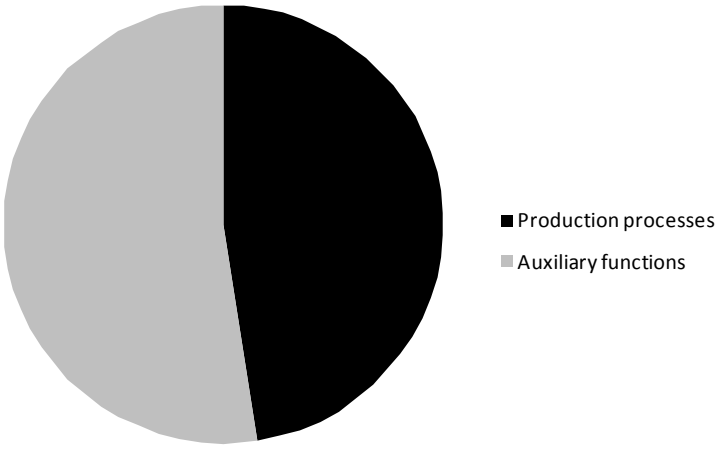
In the current survey on EPE in Sweden the guidelines in the accompanying handbook is as follows:

> *"Swedish enterprises invest relatively large amounts in new technology to minimise energy consumption, which mainly is not classified as environment protection. Instead it is classified as economising with natural resources according to Eurostat definitions. Investments with a purpose for energy-saving or heat-recovery shall normally be accounted as economising with natural resources. Whereas investments in energy-saving or heat-recovery, that have a clear purpose and a direct effect to minimise the occurrence of CO_2 or other greenhouse gases (in the production process from the enterprise), shall be accounted as environmental protection expenditure. It might be difficult for enterprises to know how to deal with these investments, and therefore Statistics Sweden has chosen to include a section about 'Economising of natural resources' in the questionnaire. (SCB 2001)*

In the actual survey a few examples of energy and heat economising items and techniques are listed in addition to the rather brief description above. The list includes, for example, compressors for lower energy consumption, heat exchangers and air recycling but is in no way an exhaustive record of what might constitute energy economising expenditure in the Swedish industry.

To be able to construct a better description of the area and an enhanced listing of possible items and techniques SCB looked into the material from EA's PFE-project. The results from the PFE-project show that a division is seen between where measures can be taken to decrease energy consumption. On the one hand there are measures in the *production processes* and on the other, there can be measures taken in the *auxiliary functions* which lead to a decrease in energy consumption, see figure 5. The production process part is focused on the actual processes that lead to the manufacturing of goods, for example, the process of smelting iron ore to be able to produce metal goods. On the other hand, the auxiliary functions[3] are all other functions of the enterprise necessary to be capable of running a production plant. This involves all functions from office equipment to ventilation systems and lighting equipment.

Figure 5: Division of function, year 2004-2009. Share of total MWh energy saved.

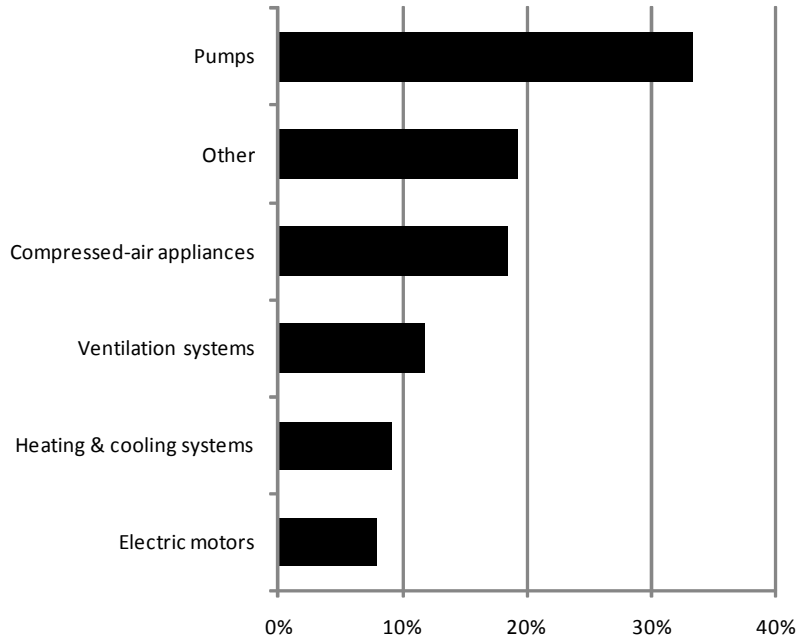


Source: Swedish Energy Agency, 2009, adapted by SCB.

As also can be seen in figure 5, the single largest decrease, according to EA, is in the production processes but on a total level the auxiliary functions accounts for roughly half the decrease in the PFE-project. As can be seen in figure 6, within the auxiliary functions, pumps and compressed-air appliances are the most important areas for energy consumption decreases.

Figure 6: Division of function within auxiliary functions, year 2004-2009. Share of total MWh energy saved.

[3] The term 'auxiliary functions' should not be mixed up with the statistical term 'auxiliary activity' which has another meaning.



Source: Swedish Energy Agency, 2009, adapted by SCB.

3.7 A proposal of energy economising expenditure

According to EA, most measures to reduce energy consumption are questions of optimisation of equipment or different kind of adjustments to the needs of production, such as timers and detection systems. Some of these measures are small in terms of financial means but can bring about a substantial decrease in energy consumption. This means that in regard to the SCB survey there would be interesting to ask the respondents not only of their expenditure on a certain energy economising item or technique but rather of their estimated decrease in energy use. Another suggestion could be to include an estimation of how much is foreseen in reducing the enterprise's energy costs. Such a question would be two- or three-folded; firstly, the record of the actual investment, then an estimation of the reduced consumption and lastly an estimation on financial savings due to the decrease in energy consumption. This way, a seemingly insignificant investment can be shown to be very significant when it comes to reducing energy consumption and/or future expenditure. A problem might arise in the case of estimation. Since SCB asks the respondent of the expenditure from the previous year, there could be indications on decreased energy consumption or costs from the carried out expenditure. The assumption is though that when it comes to energy economising measures one year might be too short to actually tell the difference. The plan would rather be to ask the respondents to estimate from a five-year perspective.

Regarding the outlining of a description and definition of expenditure on energy economising the project looked at it in a wide context. Even if a broader definition as

the one discussed above were to be followed this project still needs a specific definition related to energy economising. A new definition is proposed to be as follows:

> *"The definition of energy economising is parted from the definition of environmental protection. The primary goal and purpose of environmental protection is to protect the environment. Energy economising is defined to include measures and activities to reduce energy consumption caused by activities of the enterprise. The main goal and purpose* is not necessarily *to protect the environment, although the activity might have beneficial consequences even for the environment. Rather, the effect of the expenditure, namely the foreseen reduction of energy consumption, is the focus of inquiry.*
>
> *The costs rising from the measure or activity described above are called energy economising expenditure and must be associated to a measure or activity by the enterprise."*

Considering the division of measures into a *production process* part and *auxiliary function* part as discussed above, SCB propose a similar division when it comes to examples and description of energy economising expenditure.

Regarding the production process part, it is close to impossible to include an exhaustive list of all conceivable adjustments to production processes to reduce energy consumption – in particular, when these adjustments often concerns specific optimisations of production processes. The respondents, i.e. the Swedish industry, are a multifaceted group with a diverse set of production processes and SCB will settle with describing the objective of the inquiry. That is, all measures and activity performed by the enterprise aiming at reducing energy consumption, regarding the production processes, should be accounted for. The EA have been keeping records, and a list, of all measures and activities carried out during the PFE-project so far. SCB will enclose examples on production processes' adjustments from this list to the SCB-survey. This list of adjustments includes investments done in the most energy consuming industries in Sweden, such as the pulp and paper industry and the mining and quarrying industry. This way, the respondents should be able to determine which kind of adjustments their specific production processes could benefit from as well as which adjustments to record in the survey.

Examples in the second part, the auxiliary functions, would include those EA take into account in their report from the PFE-project. These include:

- *Lighting appliances*
- *Electrically-driven machinery*
- *Compressed-air appliances*
- *Compressors*
- *Cooling and heating systems*
- *Heat recovery systems*
- *Ventilation systems*
- *Pumps*

- *Motors*
- *Computers and other office equipment*

The measures taken, or activities performed, in this part could be replacement of old equipment to new less energy consuming equipment, such as motors or light bulbs, but even installation of switches and detectors to avoid unnecessary energy consumption and thereby enabling a 'smarter' pattern of energy consumption within the enterprise. Even in this part, EA has a list with actual examples from the industry on energy economising items and techniques. This will also feed into the improved survey. In addition, when enterprises seek to decrease their energy consumption, the first step is often to perform some kind of 'energy mapping' to establish the focus areas where consumption decreases can be made. Costs arising from such mappings should also be accounted as an energy economising expenditure.

Another important area for energy economising expenditure is *transports*. The PFE-project did not look into this area since the focus for the project was mostly on electricity saving measures. The transports would although be classified into the auxiliary functions group since it is not part of the production process. In this area a lot of measures could be thought of, including exchanging of fuels, change of mode of transportation and optimisations of routes to minimise the distance of transport.

3.8 Concluding remarks

In SCB's view, the energy economising expenditure differs from EPE in at least one important aspect. Whereas the EPE is decided due to its main motive with little or no possibility to follow up the effect of the expenditure, the energy economising expenditure should be determined from its effect as this is important to follow rather than the economic savings made possible from the action. To be accounted as an EPE, the purpose of the expenditure has to be an environmental one. Due to experience, this is most often difficult for the respondent to settle on. Not infrequently, the EPE is of a multipurpose nature which leads to complicated discussions with the respondents what to account for and what not. In the case of energy economising, SCB will propose the respondents to include all expenditure arising from all directed measures and activities that leads to a decrease in the enterprise's energy consumption. This proposal is due to the assumption that quite a few of the energy economising expenditure might be driven by economic motives rather than a purpose to reduce the energy consumption per se. Whether the purpose is financially motivated or otherwise does not matter because the effect is indeed lower energy consumption. In this inquiry, the focus is the actual expenditure and their effects, in both physical and monetary units. Another reason to allow for effect is due to the fact that the Swedish PFE-project showed that the expenditure to economise energy use can be quite low with high saving effects in TWh. However, it is important that there are clear guidelines on how far the respondent is allowed to go to account for energy expenditures. The reason for choosing motive in the EPE statistics was that there are a number of measures that can be allocated to reducing environmental pressure but it was decided that the statistics would only show the direct environmental concern of the subject and not their everyday business.

The path forward is therefore a mix of purpose and effect. Clearly, on a theoretical level the notion of purpose might always be the first choice and the departure from this will lead to a problem that should be addressed. The most obvious example of the problem is that some parts of the energy economising expenditure will also be recorded as an EPE, such as the enterprise connecting to a district heating system in exchange for other heating systems. In the EPE context this expenditure will be recorded according to the purpose criterion, but it will also be recorded as an energy economising expenditure due to its effect. This will lead to a possible double counting. The solution to this, in the opinion of SCB, is to not view a sum of EPE and energy economising expenditure as a grand total. Rather, it is not possible to sum up these two variables but they should be viewed as two separate variables. The reason is being that they do not try to measure the same thing but both are of interest to the users. As was said in the beginning of this part of the report, several users have asked for this kind of statistics and the purpose for using the variables are somewhat different from the use of the EPE statistics. To SCB's knowledge, there have not been any discussions within the statistical community of Eurostat on the more practical level of the purpose criterion in the case of energy economising expenditure. Hopefully, this report will start such a discussion.

SCB will take the experience from this project and let it feed into a revised questionnaire regarding EPE and energy economising expenditure. Unfortunately, the timing of this project did not allow for an inclusion in the EPE-questionnaire for 2009. Hence, there are no empirical testing done so far of the new definition and description. The aim is although to include this in the future questionnaires.

Statistiska centralbyrån
Statistics Sweden

4. The Environmental Barometer in Swedish industry

4.1 Summary of the activity

During 2010 Statistics Sweden performed a questionnaire based survey asking around 800 enterprises in a qualitative form how they considered themselves working with environmental management and reducing their environmental pressure.

The response rate only came to 31% when looking at the number of enterprises and 36% when looking at the number of employees. However, creating broad stratum groups out of the NACE 2007 categories we are able to draw some conclusions of the survey.

It is clear that most enterprises in Sweden are on a global, growing market. It is very common (60%) with a person that is in charge of questions regarding the environment. Some even have a whole section working on these questions (20%). However, in general the number of persons working with these questions today is the same as 5 years ago.

The Swedish enterprises do not consider their activities to have a very large negative effect on the environment. If they do report any negative effects they are related to energy use and use of non renewable material, where most enterprises say they have a large negative effect on the environment (27 percent on energy use, 17 percent on use of non renewable materials). However, the measures implemented have been focused on protection of landscape (63 percent) and the reduction of odor (60 percent). Close are also measures to reduce the use on non renewable materials (59 percent) and water use (59 percent).

Most measures related to landscape are the creation of green surface areas to encourage biodiversity (62 percent). The Swedish enterprises are also to a large extent replacing the use of non renewable materials both in the production phase but also in the product itself. Looking at the measures being implemented to reduce the use of energy the enterprises are changing their transportation logistics rather than changing the production process.

There are mainly economical aspects that are seen as obstacles to the environmental work. It is simply too expensive and the market is not big enough for investments. Another problem seems to be that there are hardly any short terms profits to earn, though there might be a positive effect on the long term profit.

On the more personal plane, the respondents agree that environmental questions are important and agree to statements like “humans should live in peace with nature”. Legislation is seen as the most efficient method to solve environmental problems, while the mechanisms of the free market are not seen as a solution.

4.2 Background

In 2007 DG Environment released a publication *Sectoral costs of environmental policy* (VITO). In this study the drivers of environmental expenditure were investigated. Were for example the costs of EU environmental policy significant for firms? Did the costs affect their international competitiveness? Was the sum of individual environmental policies more or less than the its constituent parts meaning that it is the cumulative burden that needs to be assessed? The study performed a qualitative survey investigating the drivers. Swedish enterprises were responding reasonably well to this survey.

The intention was therefore that this project should perform a similar study focusing on the Swedish industry with the same type of questions. VITO sent us the questionnaire that they had used so that this project could see the exact questions and start developing a Swedish version. However, going through the questions it did not turn out to be that easy. This project intended to use the results of this qualitative questionnaire to extend the knowledge base on why Swedish industry invested in environmental protection the way they did. The questions developed by VITO had a clear EU relevance focusing only on EU regulations, directives and strategies. As EU regulations are incorporated into Swedish legislation would not have been that easy for a Swedish enterprise to pinpoint the exact EU relevant legislation in their decision making process. In Sweden environmental legislations include several topics and it would have been quite complicated to sort out what piece of legislation should have been covered without creating a 50-page questionnaire.

The EU approach was therefore abandoned and the project instead searched for anything similar but Swedish based. Contacts with the Confederation of Swedish Enterprise were taken to see if they had done something similar before or knew of someone who had. In 2003 the Swedish Business Development Agency (NUTEK, it does not exist anymore but has been divided into two different agencies) conducted an extensive survey among small and medium enterprises mapping their work in environmental management and the importance of marketing and environment.

Another search over the web revealed that there had been an environmental barometer conducted in Sweden during the early 1990’ies. The last survey had been for 2001. Chalmers University of Technology published on the other hand an environmental barometer for the construction and property sector for 2006 (Gluch et al 2007). This survey was based on the previous environmental barometer conducted in the 1990’ies. The authors of this report were approached and they generously sent the entire questionnaire to Statistics Sweden.

The questionnaire was very extensive and covered the topic that felt relevant for our purposes. In general, being able to use an already tested and implemented questionnaire is very good. Other respondents have already been able to polish away

inconsistencies and the organisation performing the survey has had a chance to improve guidelines and question design. This is why Statistics Sweden continued the project following the work of Chalmers.

4.3 Objectives

The objectives of this task were twofold: to perform a qualitative questionnaire investigating the reasons behind EP investments in Swedish mining, quarrying and m. The intention was to improve the analytical value of the survey on EPE in industry. The second objective was to link the results of this exercise to the information already collected through the environmental protection expenditure statistics.

This task is divided into two analytical approaches:

1. The results of the questionnaire is analysed and presented at a macro level (NACE-categories) (chapter 4).
2. The results of the questionnaire are combined and compared to the results of the survey on EPE on a micro level. The results are described by NACE-categories (chapter 5).

4.4 Survey procedure

Testing the questionnaire
The questionnaire used by Chalmers is following a Lickert scale of questions and responses to a large extent. The respondent is posed a question and has generally five alternatives to answer, ranging from “do not agree at all” to “I agree fully”. After receiving the questionnaire from Chalmers the method unit for Cognitive Methods was contacted at Statistics Sweden. This unit specializes in testing questions, the design of the questionnaire itself and ensures that the right information is collected as intended among other things.

The results of their work were implemented in the questionnaire. Some questions had to change the wording somewhat, some alternatives for responding changed layout. For example, if the answers were originally in text it was recommended to use a falling scale of numbers instead.

The questionnaire has not been translated into English but is available in Swedish upon request.

Web-based questionnaire
The questionnaire was only to be available on the internet. The reason for this is that Statistics Sweden has a policy to simplify for respondents and it has been decided that most enterprises use the internet today, preferring this to paper versions. It took some time to develop the web-site including organizing the passwords and usernames.

Data storage

It was important for the project that the results would be stored for future work and developments and a SQL database was developed. This facilitated the programming later on to arrive at some results. It also facilitated the connection with EPE statistics which is also stored in a similar database.

The population frame on which the survey was drawn
The population frame is the Swedish Mining, Quarrying and Manufacturing industry. As the project wished to link the results of this survey to the survey on EPE statistics it was decided to take the exact same sample as was used for the 2010 survey for environmental protection expenditure. The same statistical theory would still hold, the sample was drawn based on a stratified random sample and they are assumed to be independent of each other.

The respondents are allocated to industries according to NACE 2007. The initial intention was to present data on two-digit NACE-level but due to the low response rate some industries had to be aggregated into larger groups (31 percent when looking at number of responding enterprises, 36 percent when looking at number of employees).

The aggregated groups ensure that the results are reliable enough for interpretation. In this case it means that we want at least 20 respondents in every group (some exceptions are made). There is no standard on Statistics Sweden about the least number of respondents needed for a question to be "good enough". Instead a variance analysis has been performed. The standard errors proved to range from about 1 percent up to 20 percent depending on question.

There are a total of 10 groups, but only 8 are accounted for. Groups NACE 07-09 and 19 contain too few, if any, answers.

NACE 2007	Explanation
07-09	Extraction of minerals
10-15	Food, beverage, textile etc
16-18	Wood, pulp, graphic production
19	Petroleum, mineral coal
20-23	Chemicals (medical etc), plastics
24-25	Steel and metal production
26-27	Computers, electronics
28	Other engineering industry
29-33	Transport, furniture, other production, reparation
35-36	Production of electricity & heat, supply of water

4.5 Results

The questionnaire was divided into four sections:

- The business
- Environmental management
- Effects on the environment and what measures to take

- Reflections

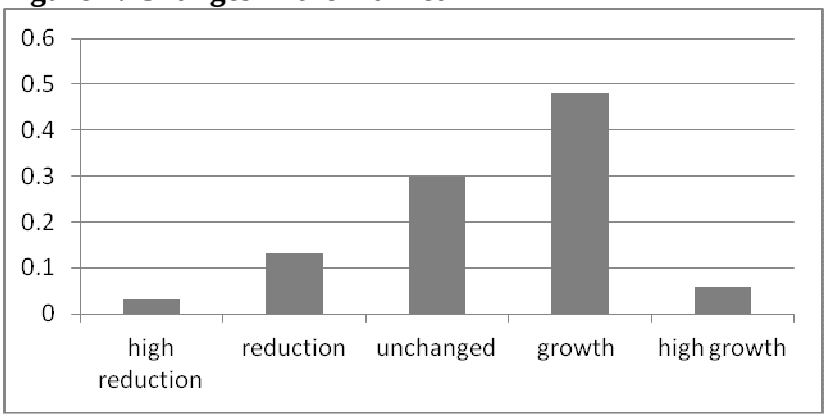
The following chapters follow the same distribution.

Section 1: The business

The market and changes in market (Q1-Q2)

More than half of the enterprises in the industry branches say they have a global market for their main products/services, while a fourth say it's European and half of that say it's national. Only a few percent say their market is regional or local.

Figure 7: Changes in the market



More than half of all enterprises believe that their market has grown during the last five years (see figure 7). In the computer and electronic industry (NACE 26-27) more than 80% think their market has grown or grown greatly, while 27% in the transport, furniture, reparation and other production industries (NACE 29-33) believe their market is smaller today and another 32% believe it is unchanged.

Section 2: Environmental management

Employees related to environmental management (Q3-Q6)

A total of 60% of all enterprises have a person that work with environmental questions frequently, while 20% have no one on such a position. 20% have a whole section working with these questions. In wood, pulp, graphic production (NACE 16-18) and steel and metal production (NACE 24-25) 30% of enterprises lack a person in that position, which is the highest frequency.

The number of persons working with environmental questions at the enterprises is mainly the same today as four years ago. The biggest increase seem to be in the food, beverage and textile industry (NACE 10-15) where one fourth of enterprises have more persons working with these questions today than four years ago. In the board rooms, 2/3 of the enterprises don't have a person that's responsible for environmental questions.

Roles and responsibilities (Q7)

This question is about responsibility and the possibility to influence decisions that might affect the environment.

Almost 60% feel they have at least pretty good knowledge in how to influence strategic decisions to meet environmental interest but just below 50% have the authorization to actually do so. But on the other hand, almost 70% feel they have at least a fair good mandate to stop activities that may be of danger to the environment.

Section 3: Effects on the environment and what measures to take

Own assessment of the enterprise negative effect on the environment and work undertaken to reduce the negative effect (Q8-Q12)

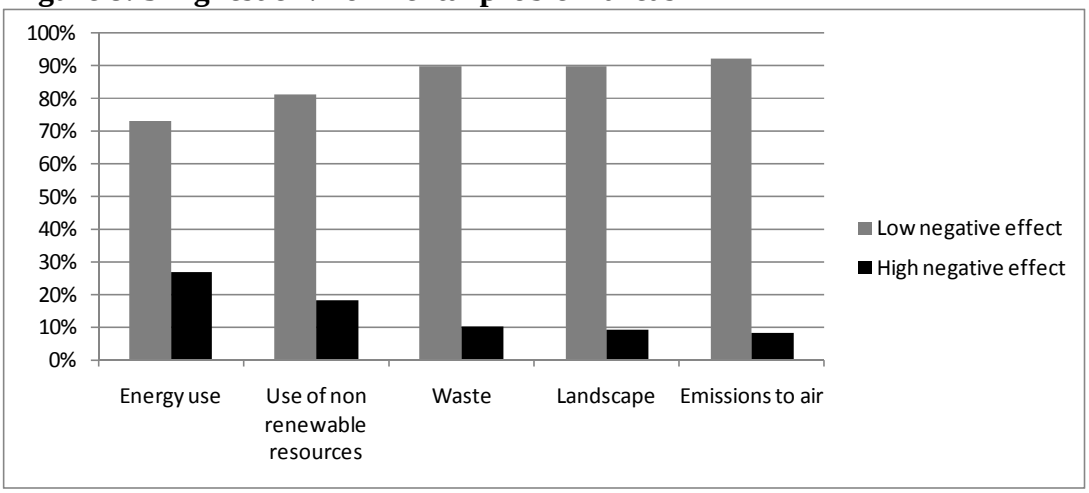
Questions 8 to 12 are connected because they discuss the enterprises impact on the environment, if there has been any change in the impact the last five years and if any large, more or less successful, improvements have been made during that time.

Every question is divided into different areas, such as energy, water, waste etc. This makes it easy to compare results from question 8 to 12.

The project was interested to find out if the enterprises saw environmental problems with their activities but allocated their funds not to the problem areas but to other environmental domains.

Overall, the Swedish enterprises finds that in general the negative effect of the activities preformed is very low or low (see figure 8) regardless of environmental area. There seem however to be more enterprises finding that the energy use is a cause for concern, 27 percent thinks that the environmental effect is high or very high. It seems that the awareness of the energy use' negative impact on the environment is pretty high. No one believes that their enterprise' use of energy is irrelevant to the environment.

Figure 8: 5 highest environmental problem areas



Only 7% believes their enterprise have a big or very big negative impact on the environment when considering water use.

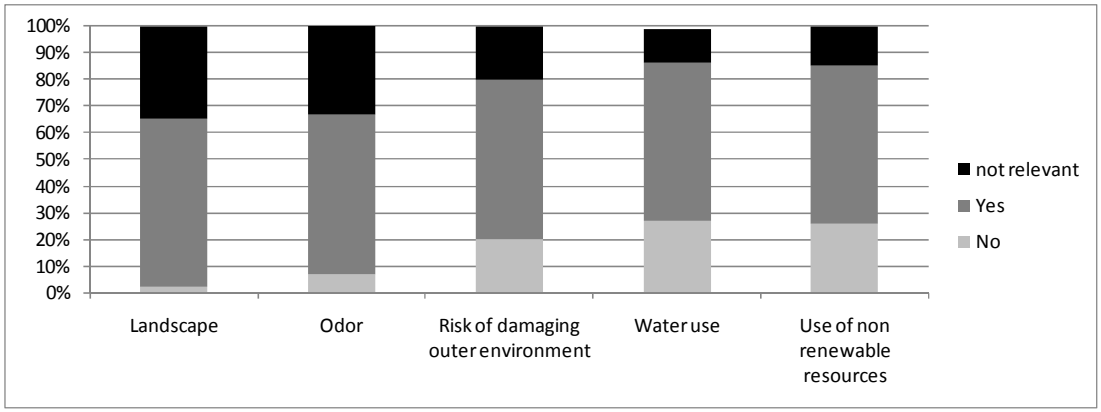
One industry group stands out looking at the industry breakdown. In NACE 35-36, energy and water production, 69% believes their energy use has a big, or very big, negative effect on the environment.

Only six percent say their negative effects of water use has increased the last five years, 66% say it's unchanged and 28% say their effect has decreased. 16% say the impact on the environment from their energy use has increased, 51% say it has decreased and 33% say it is unchanged.

A question followed if there have been any large interventions to decrease/stop the negative effect on the environment (see figure 9). The most common large intervention is to restore landscape and reducing the risk of outer environmental damage, closely followed by reducing the water use and reducing the use on non-renewable materials.

An interesting feature is that despite the acknowledgement that the effect of energy use is large only 35 percent said that they had conducted extensive measures to decrease their energy use.

Figure 9: 5 top actions taken to decrease or prevent negative environmental effect



There are a notably many interventions that seem not have any relevance to effect. Throughout all measures about half of the respondents claim that the degree of intended effect has had nothing to do with the measures conducted. Among those that think that the measures taken should have had effect only measures directed at waste management (23 percent) and energy use (21 percent) appears to have large impacts. One reason can be that it easier to measure the effect in tones of waste reduced or TWh saved.

Questions 10 and 11 dealt with major measures implemented in the past five years. Question 12 asked the respondents for any measures implemented at all in the past five years to reduce the environmental impact of the activity of the enterprise.

Figure 10: Five most common efficiency measure taken

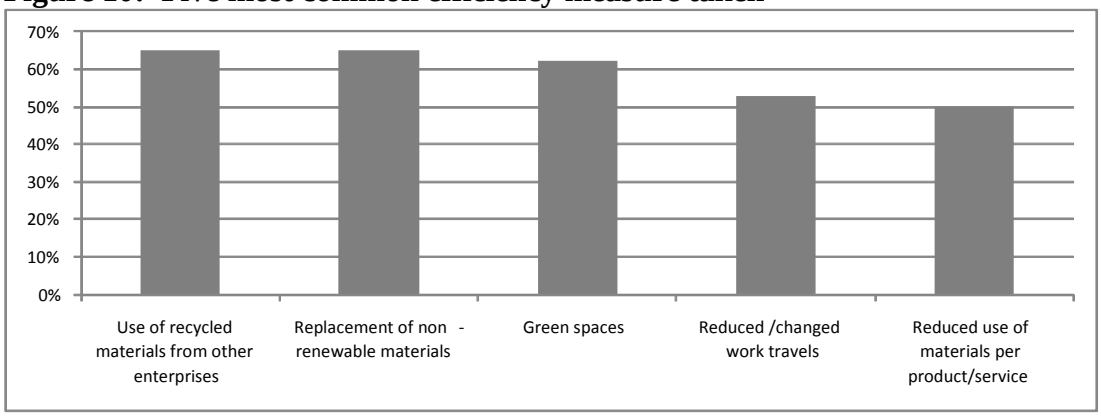


Figure 10 show the five most common efficiency measures to reduce negative effect on the environment. The results show that 65 percent of all enterprises have, for example, taken measures to use recycled materials from other enterprises, closely followed by replacing non-renewable materials consistently with questions replied to above.

Following the trail of energy efficiency, in the Energy and Water supply industry almost 50 percent find the related question to be irrelevant. Industries such as paper industry and electronic equipment on the other hand reply that reducing energy use in particular the transportation is something that they have done during the 2005-2010 (56 percent and 54 percent respectively).

Additional information about actions taken to reduce or prevent negative environmental effects with a focus on environmental management (Q13 – Q16)

Questions 13 through to 15 are similar to some questions above and they focus on whether the enterprise has taken actions to reduce negative impact on the environment. The latter has a focus on the management.

As for the management of the enterprises, around two thirds of all enterprises do not take environmental performance into consideration when choosing a supplier or demands environmental standards on existing suppliers. However, only a few percent thinks these two questions are irrelevant (about 2 percent of the respondents).

More than 80 percent do not have an environmental policy and routines to define and evaluate relevant legislative demands. The majority of the taken measure are to make a market survey on “green” products.

The follow-up question is about in what areas these measures have been taken and two areas stand out. 92 percent has taken measures in the production to reduce or erase the negative effect on the environment and 89 percent now recycle their waste to achieve the same effect.

In two other areas of big interest, transport/logistics and purchasing of services/material, 59 and 50 percent of enterprises respectively have taken measures.

Importance of other actors (Q18 & Q19)

There are plenty of different operators that influence the enterprise to achieve positive development regarding the environment.

Figure 11: Important or very important operators

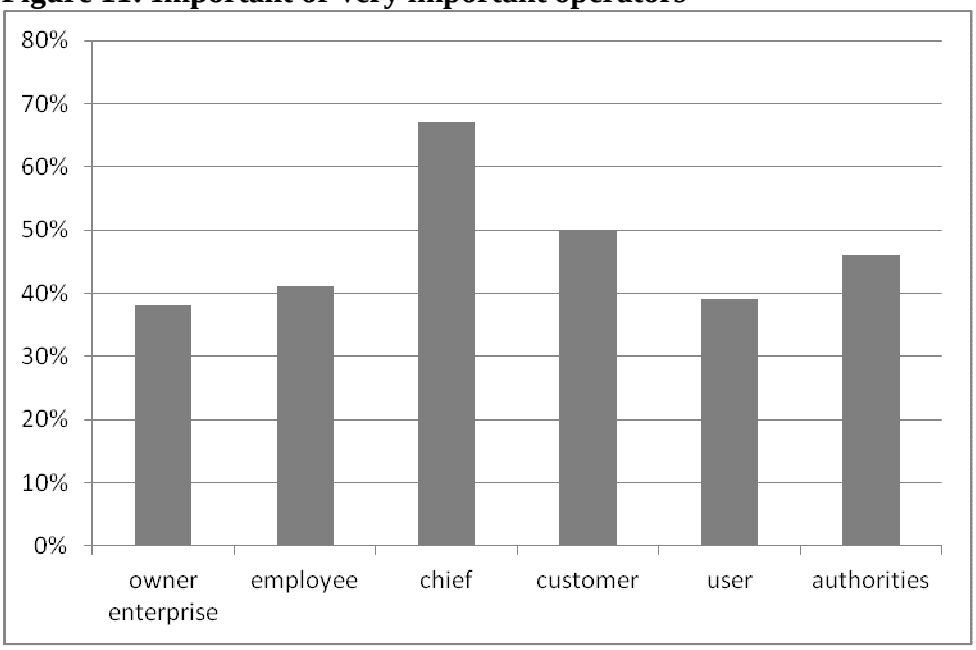


Figure 11 show the major operators that is said to influence decisions of environmental interests. The biggest influence has the enterprises own chiefs. In two thirds of the enterprises they have an important or very important role when environmental decisions are made. Only about ten percent say they are less then medium important (1 or 2 on a scale of 5).

Another important actor is the environmental authorities. Yet again, only ten percent say their importance is less than medium. The customers/clients and users are also important, as 50 and 40 percent respectively, value them as important or very important actors.

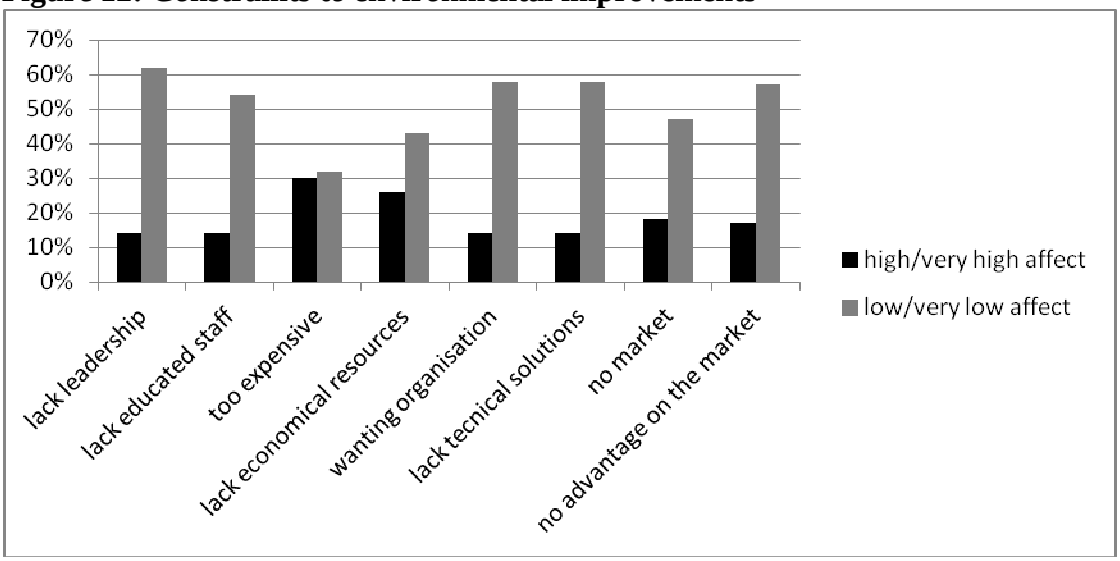
In what way does the enterprise involve other, external, actors? The most involved external actor is the local authorities and it's mainly via deliberation and consulting. The commune is also often involved in deliberation and consulting. Users, customers and clients are often sent information (about 35%) to involve them in environmental work. 70% say that a consultant is involved and it is, of course, mainly for consulting.

Among actors that are not involved at all in around 50% or more of the enterprises environmental work, are the state, environmental groups, labor unions and research institutes.

Constraints of environmental improvements (Q20)

To what extent have different obstacles inhibited the environmental work in the enterprise?

Figure 12: Constraints to environmental improvements



Constraints connected to economy have the most answers on high or very high affect. This means that different economical obstacles/factors inhibit the environmental work. Such constraints can for example be that costs are too high, the enterprise is perhaps lacking the relevant economical resources, there is no market for environmental products/services which in turn will not provide an advantage on the market.

Lack of co-operation from suppliers, the own industry or client is hardly seen as a constraint at all, as around 80% say it's got no or low affect on the environmental work. Internal factors, such as lack of leadership, lack of educated personnel and a wanting organization, are seen as moderate problems. Around 40% say that they have medium affect or higher.

Section 4: Reflections

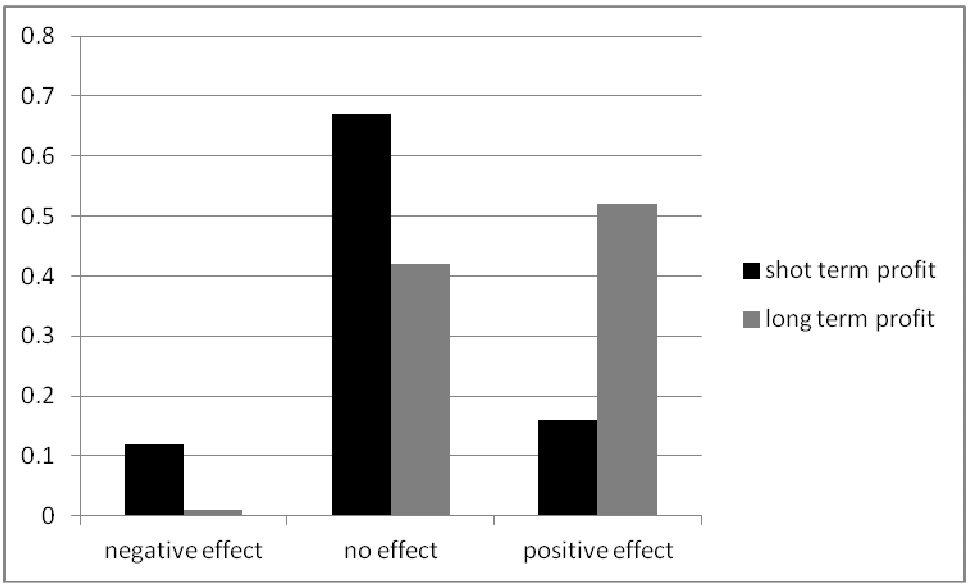
In this section, subjective reflections are presented about the enterprises environmental work and the respondents own thoughts about the environment in general.

Business improvements due to environmental activities (Q21)

The question posed was: what effect have the measures implemented by the enterprise had on following factors: (the respondents were then provided with a list of examples ranging from competitive advantage to sales to productivity).

The answers were difficult to interpret and providing a scale of important factors could not be done. This is due to almost all measures had had some positive effect on all factors and none had seen a negative effect in any of the factors. The most

positive effect of the environmental work is on the image of the enterprise and on the satisfaction of the personnel.



However, looking at profit specifically, two thirds said that the measures makes no difference in the short run but about 50% say they think there will be a positive effect in the long run. Only twelve percent thought it will give a negative effect in the short run.

Personal opinions regarding environmental issues in general (Q23 & Q24)

The questionnaire ends with two questions about personal thoughts about the environment and sustainable development. The dominant thought is that humans should live in peace with nature, and only 20% believes strongly or completely that humans have the right to use nature for its own needs.

Most believe legislation is a good method to solve environmental problems. More than 50% agrees strongly or completely to that it is a good method. About 50% does only agree to some extent or does not agree at all to let the mechanisms of a free market solve environmental problems. That technical development is the solution to environmental problems is a more common thought, but not as strong as legislation. Most people believe it is a solution but not that strongly (might be interpreted as; technical development is a part of solution but not the best/most powerful part).

If the enterprise has a good environmental reputation it will rather affect the possibility to keep competent staff than, for example, affect the willingness of the clients to pay more for the products.

Sustainable development is a known concept to most enterprises and it is a part of the business strategy in many cases. Two thirds don’t agree to at all or only to some extent that it’s not their task to further sustainable development.

5. Analysis of combined results from Environmental Barometer and EPE-survey

In this chapter, we present an analysis of combined micro-material from the Environmental barometer-survey and the survey on environmental protection expenditure in the Swedish manufacturing industries during 2009. The "sample" used here is the enterprises who had answered both surveys. A discussion of the results will follow in the two subsequent chapters where the material is divided into two groups. The first subchapter focus on a group of enterprises with 500 or more employees and the second subchapter centre in on three specific industries: manufacturing of food, paper and basic metals. The idea behind this practice is to include some of the largest enterprises in Sweden as well as the industries with the highest levels of environmental protection expenditure (EPE). Another division of the material is also made, that is a split between the levels of EPE within the different groups; one group of enterprises with less than 10 million SEK (equals roughly 1 million EUR) and a second group with more than 10 million SEK. Generally, the level of EPE follows the size of the enterprise, so as a simplification one could say that the group with less than 10 million SEK in EPE is the smaller enterprises and the other group consists of the larger enterprises.

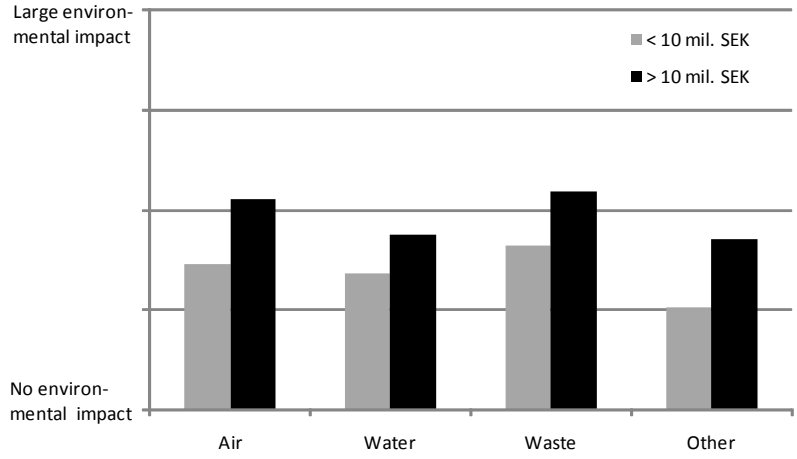
To be able to produce any credible results we used only the variables from the Environmental Barometer that has clear connections to the EPE-survey. This means that all variables extending the definition of environmental protection, such as the use of energy, are left out. The variables used are those connected to the CEPA-classification and in the figures these are shown as *Air*, *Water*, *Waste* and *Other* (which includes questions on soil and groundwater, noise and biodiversity and landscape).

5.1 Enterprises with 500 or more employees

Below, the results of the analysis of the group of enterprises with 500 or more employees are shown. The presentation follows the order of questions in the questionnaire.

In figure 12, the responding enterprises' appreciation of the environmental impact from their production is shown. The first thing to notice is that neither of the two groups mean that their production have a large impact on the environment. Rather, the activities are seen as having a moderate impact. As also can be seen, the group with a higher level of EPE also deem their production to have a larger negative impact on the environment. The pattern, though, is similar between the two groups, e.g. both groups indicate that the largest environmental impact comes from waste.

Figure 12: Appreciated environmental impact, by environmental domain and size of EPE, (Enterprises with 500 or more employees and environmental protection expenditure 2009)



In figure 13 the results from the question on how the environmental impact has changed during the past five years are presented. Both groups have the understanding that their environmental impact due to production have decreased during the period. In all cases, except from the environmental domain *Waste*, the group with more than 10 million SEK of EPE mean that their impact has decreased more than the group with a lesser level of EPE. One interesting connection between these two first figures is that among the group with highest levels of EPE view waste as their largest area of environmental impact, but this is also the area were the deemed impact has the lowest level of decrease.

Figure 13: Appreciated change of environmental impact during last five years, by environmental domain and size of EPE

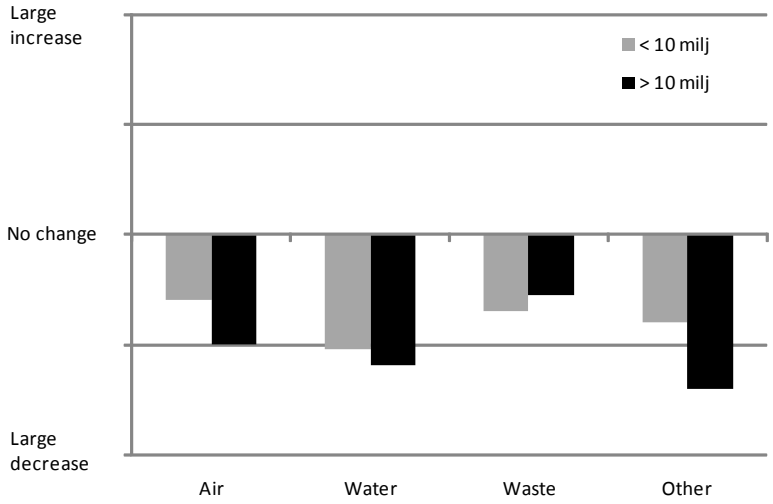
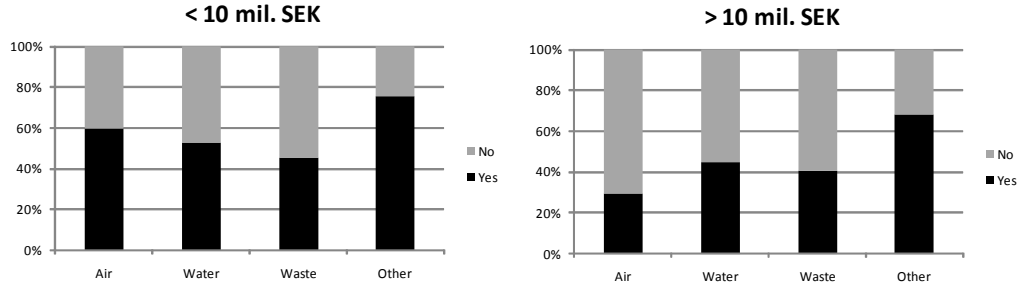


Figure 14 shows the outcome from the questionnaire regarding if the enterprises in the group have taken any measures in the last five years to prevent negative

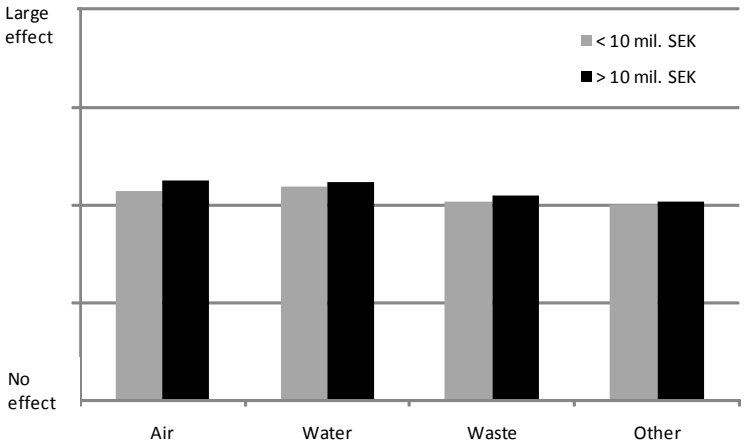
environmental impact. As a bit of a surprise, the group with a smaller level of EPE view their effort to prevent negative impact to a higher degree than the group with larger EPE. This is most notably in the environmental domain *Air* where 60 % the group with a smaller amount of EPE had taken measures to prevent negative impact. Even in the other domains there are more affirmative answers from the group of enterprises with less than 10 million SEK in EPE, although the differences are less significant.

Figure 14: Did the enterprises take measures to prevent negative environmental impact?, by environmental domain and size of EPE



In the last chart, see figure 15, of this part, the question to be responded was to what extent the measures taken had had any effect regarding the enterprises' environmental impact. As can be seen, both groups considered the effects of the effects as rather small. In addition there are just small differences between the two groups, bearing in mind that the group with a higher level of EPE had to a lesser degree taken measures to prevent negative impact as shown in figure 3.

Figure 15: The extent to which the measures taken have had effect, by environmental domain and size of EPE



5.2 Analysis of three different industries

In this part of the report we take a closer look at enterprises within three different industries, namely NACE 10, Manufacture of food products, NACE 17, Manufacture

of paper and NACE 24, Manufacture of basic metals. The enterprises here have two things in common; they belong to one of the three mentioned industries and they have recorded investments and/or current expenditure in the 2009 survey of environmental protection expenditure. All figures are displayed in three different versions where each of the industries has their "own" version of the figure (*A – Manufacture of food products, B – Manufacture of paper* and *C – Manufacture of basic metals*).

In the first set of charts, see figure15a-15c, the environmental impact is appreciated by the enterprises belonging to each of the mentioned industries. Just as in the case of the part above on large enterprises, the perception of the impact on the environment is that it is rather small. Also, the appreciated impact is practically on the same level regardless of industry.

When divided in the two groups – EPE less than, respectively more than 10 million SEK – the most apparent difference is seen in NACE 10, Manufacture of food products, while the difference between the groups in the other two industries is not that obvious.

Figure 15a. Appreciated environmental impact in NACE 10, by environmental domain and size of EPE

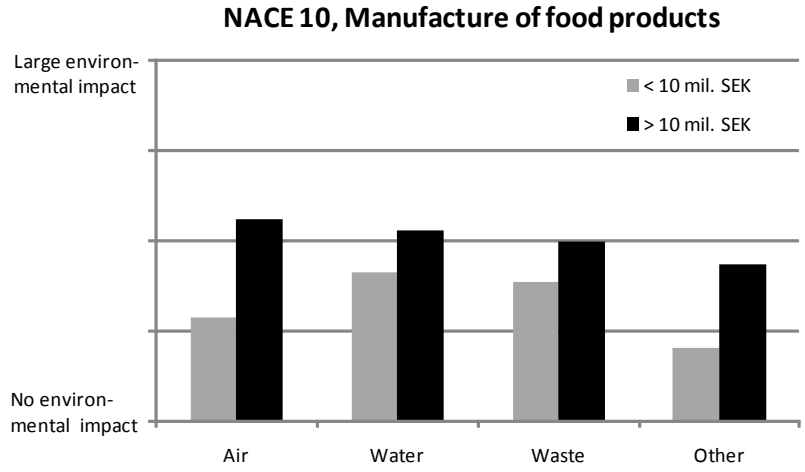


Figure 15b: Appreciated environmental impact in NACE 17, by environmental domain and size of EPE

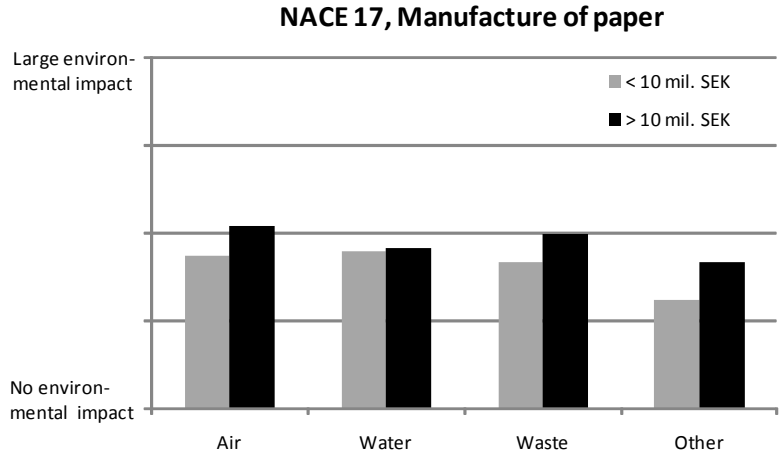
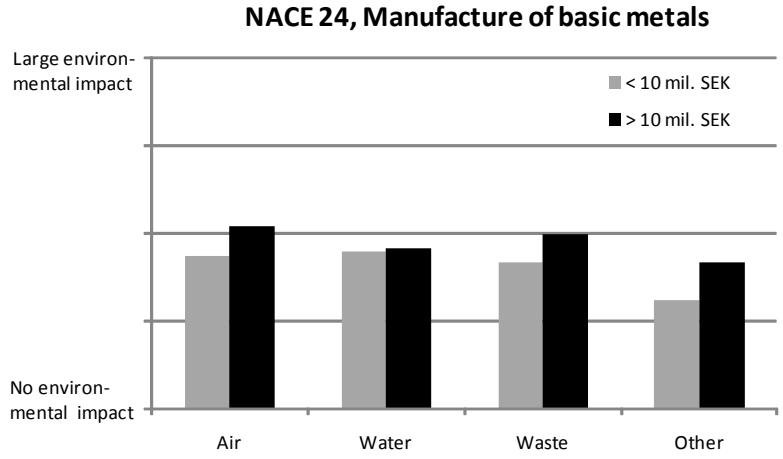


Figure 15c: Appreciated environmental impact in NACE 24, by environmental domain and size of EPE



When it comes to the question on whether the enterprises have taken measures to prevent negative environmental impact, as seen in figure 16a-c, there are both similarities and differences, both within, as well as between, the industries.

To start with the "intra-industry" comparison, one can assert that the pattern between the two EPE-groups is similar, even though the rate of affirmative/negative-distribution differs, most markedly within the paper industry. But within each industry, both EPE-groups mark the same environmental domain as where the most measures have been taken to prevent impact. This is also the case for the domain where least measures have been taken, e g in both groups of the basic metals industry the environmental area *Air* is where least amount of enterprises have taken measures.

In regards to comparing the industries it seems that the *Water* and *Other* is the areas where the paper and basic metals industries have taken the most measures, while in the food industry Air and Water appear to have been the areas of highest priority.

Figure 16a: Did the enterprises take measures to prevent negative environmental impact?, NACE 10, by environmental domain and size of EPE.

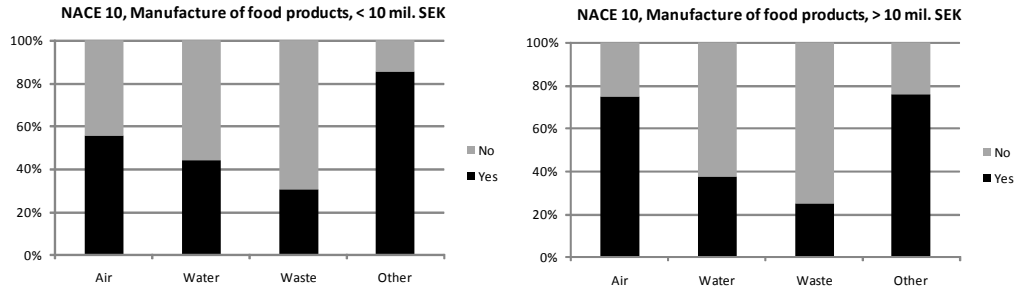


Figure 16b:. Did the enterprises take measures to prevent negative environmental impact?, NACE 17, by environmental domain and size of EPE.

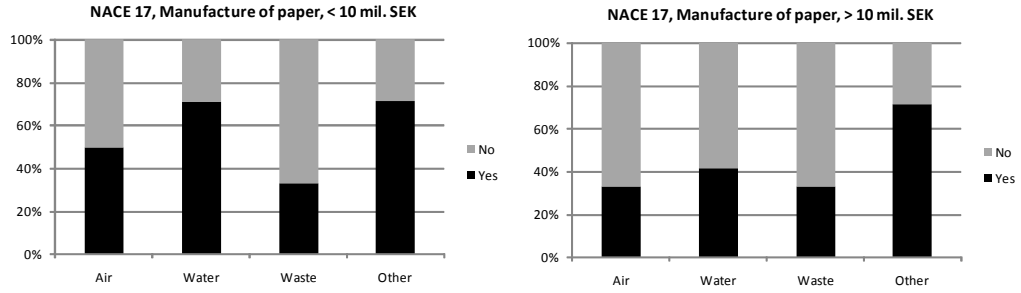
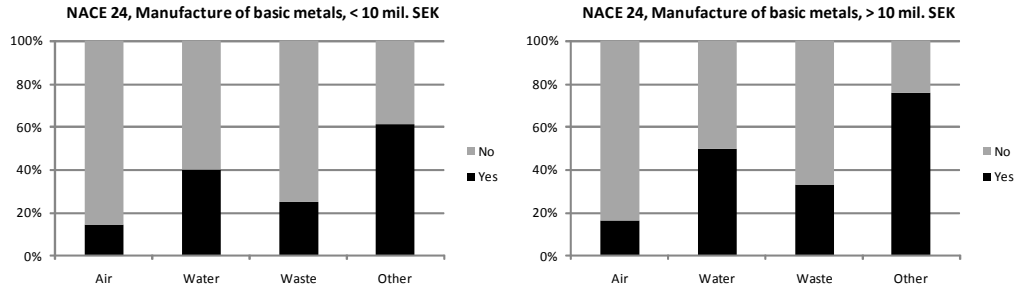


Figure 16c: Did the enterprises take measures to prevent negative environmental impact?, NACE 24, by environmental domain and size of EPE.



In figure 17a-c the extent to which the above mentioned measures taken have had effect is presented by the three industries. Here, clear differences are seen between industries and between the two EPE-groups within each industry (the exception being the basic metal industry where both EPE-groups seem to have similar appreciation of the effects of their taken measures).

The most explicit difference is seen within the food industry. In three out of the four environmental domains, the group with less EPE mean that their efforts to reduce environmental impact have had most effect. In case of the paper industry, it is completely the other way around. Here we find that the group with EPE more than

10 million SEK deem their measures to have been more effectual than the other group.

Figure 17a: The extent to which the measures taken have had effect, NACE 10, by environmental domain and size of EPE

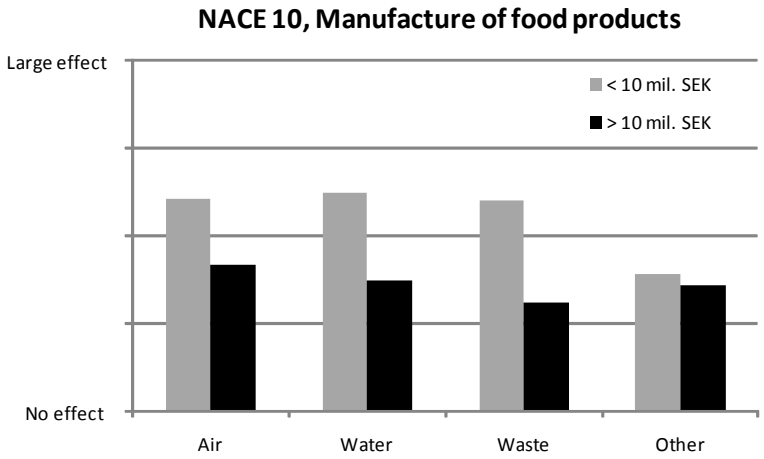


Figure 17b: The extent to which the measures taken have had effect, NACE 17, by environmental domain and size of EPE

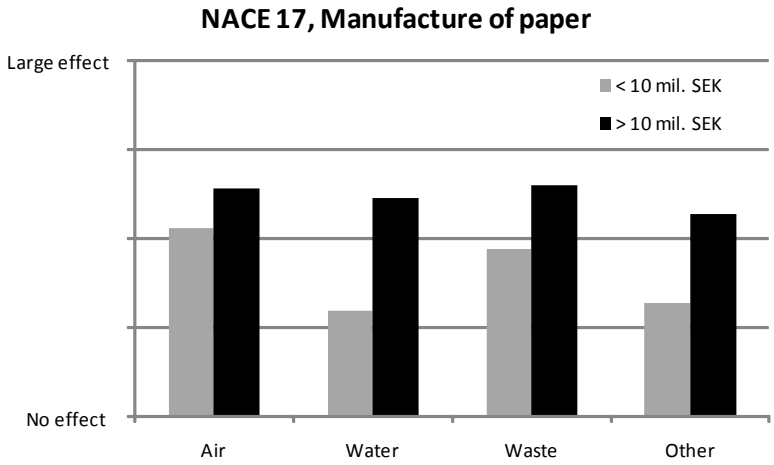
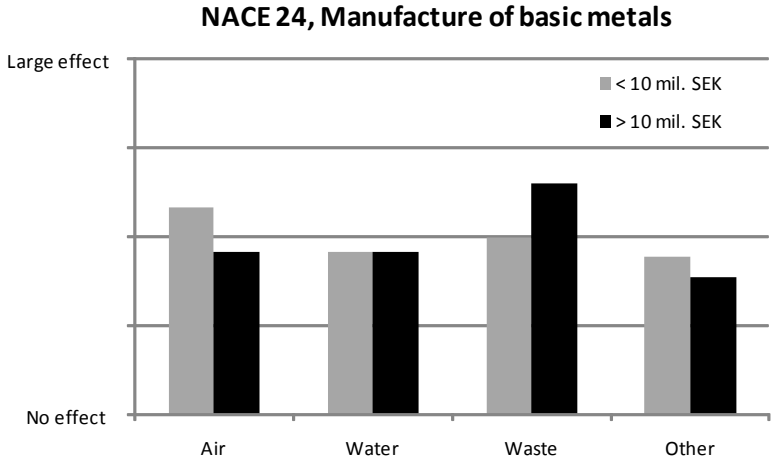


Figure 17c: The extent to which the measures taken have had effect, NACE 24, by environmental domain and size of EPE



Appendix 1 Examples of environmental protection expenditure in agriculture

1. Environmental protection investments

1.1 Type of investment - treatment

- Air
  - Sealing liquid fertiliser tanks.
  - Filters, scrubbers, cyclones, centrifuges etc.
  - Measures taken to reduce dust problems in relation to transport of storage.
  - Sealing of urine/or fertiliser wells.
- Water
  - Cisterns, pipes and hose ducts where petrol, diesel or oil has been handled, such as
  with secondary protection for amounts greater than 250 litres..
  - Management and treatment of sludge.
- Waste
  - Equipment for one's own storage and transport, such as special vehicles, containers, transhipment stations, sorting equipment.
  - Equipment for one's own collection and treatment, e.g. compactor and investments in one's own
  landfills.
- Land and water table
  - Plates against leakage.
  - Preventive measures against leakage at the storage site for urine and fertiliser.
  - Storage for plant protection products
- Landscape and biological diversity
  - Restoration of biotopes such as grazing grounds
- Other
  - Noise

1.2 Type of investment - preventive

- Air
  - Replacing CFC.
  - New furnace for the replacing of fossil fuels with biofuel, e.g. for heating a green house, workshop etc.
  - Added costs for new vehicles driven on biofuel instead of fossil fuels.
  -Adaptation of incinerators in transition to more environmentally-friendly fuels
- Water
  - Changing sprinkler systems in accordance with environmental requirements.
- Waste
  - Measures for reducing waste creation
- Land and water table

- Reduce the amount of urine created.

- Landscape and biological diversity
  - Rebuilding stalls and adaptation to ecological production.
  - Installation of wetlands.
- Other
  - Noise factor, e.g. added costs for purchasing of quietly-run machines.

2. Current expenditure for environmental protection

2.1 Internal expenditure

Expenditure for performing one's own work on operation, maintenance, supervision and inspection

- Air
  - Refrigeration, heating and climate control installations, such as leakage inspection, inspection reports
  - Refilling sealed liquid fertiliser and urine tanks.
- Water
  - Cisterns, pipes and hose ducts where petrol, diesel or oil has been handled:
    - Over-filling protection, readable fluid levels
    - Ventilation device, fixed connection for refilling, with extra rules in watershed areas
    - Secondary protection for amounts over250 L that are within the watershed areas
  - Balanced plant nutrients
  - Spreading times for farmyard manure
  - Catch crop
- Waste
  - Waste, e.g. sorting and one's own transport.
  - Hazardous waste, e.g. sorting, labelling, transport
  - Breaking down farmyard manure on uncultivated ground due to environmental requirements
  - Decommission cisterns, e.g. empty, clean, and report to the supervisory authority
  - Composting in accordance with the Swedish Board of Agriculture's general guidelines
  - Leachate from from silage stores must be collected
- Land and water table
  - Chemical products, e.g. lists, product safety information, stored with appropriate signage
  - Chemical pesticides, e.g. dosage keys
  - Farmyard manure (sealing or stable floating crust on liquid fertiliser or urine tank)
- Landscape and biological diversity
  - Consideration of natural hosts, e.g. avoid measures that can harm biotopes or elements of the landscape that have great value for flora and fauna (e.g. logging roads, reindeer, older trees in fields etc.).
  - Care requirements, e.g. assert arable land/grazing land/mown meadow or care may progress in accordance with "farm support".

- Protection of wild animals and plants, e.g. avoid measures that would intentionally disturb wild birds or protected plants.

- Other
  - Develop and implement measures related to Plant Protection
  - Develop and implement measures related to Plant Nutrients

Expenditure of performing one's own work for general environmental administration, education, information

- Certification, e.g. KRAV, Demeter, Sigill, etc.
- Environmental education programmes
- Environmental management system, e.g. ISO14001
- One's own working hours, e.g. municipal reporting for activities requiring reporting and permitting, diverse permits and licenses, environmental reports, keeping a work log, etc.

2.2 Purchased services and fees

Expenditure of purchasing services for operations, maintenance, supervision and inspection distributed to environmental areas

- Air
  - Refrigeration, heating and climate control installations, e.g. assessment and repair by certified personnel
- Water
  - Inspection of cisterns and pipes by an accredited inspector.
- Waste
  - Combustible and compostable wastes to the municipality
  - Collection of plastics organised by Svepretur (free of charge, collection for a fee)
  - Hazardous wastes to an approved recipient
  - Hazardous wastes, transport by approved transporters
- Land andwater
  - Chemical products (remote, isolated storage)
  - Farmyard manure (sealing or stable floating crust on liquid fertiliser or urine tank)
  - **-** Chemical pesticides, e.g. dosage keys
- Landscape and biological diversity
  Consideration of natural hosts, e.g. avoid measures that can harm biotopes or elements of the landscape that have great value for flora and fauna (e.g. logging roads, reindeer, older trees in fields etc.).
  - Protection of wild animals and plants, e.g. avoid measures that would intentionally disturb wild birds or protected plants.
  - Care requirements, e.g. assert arable land/grazing land/mown meadow or care may progress in accordance with "farm support".
- Other
  - Added costs for purchasing biofuel etc. instead of fossil fuels.
  - Develop and implement measures related to Plant Protection
  - Develop and implement measures related to Plant Nutrients

Expenditure of purchasing services for general environmental administration, education, information

- Certification, e.g. KRAV, Demeter, Sigill, etc.
- Environmental education programmes
- Environmental management system, e.g. ISO14001
- Environmental impact assessments
- Supervisory agency fees

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Appendix 2 - Questionnaire - Environmental protection expenditure in agriculture

The information submitted here is protected according to chapter 24 section 8 of the Public Access to information and secrecy Act (2009:400).

The questionnaire is under no legal reporting obligation.

Use the TAB key to move from box to box.

Environmental protection expenditure for agriculture 2010

Please return this form **no later than April 26 2011** using the enclosed business reply envelope or to the address below:

Statistics Sweden
DFO/IF
P.O. Box 24 300
104 51 STOCKHOLM

Name of enterprise	
Address	
Postal code City	

Enterprise ID no.	

■ Environmental protection expenditure 2010

This survey asks questions about spending by enterprises on measures to reduce various types of environmental impacts. Examples include measures to reduce emissions and discharges, dispose of and treat waste, reduce noise pollution, etc. The different sections of the survey are:

A Environmental protection investments
B Current expenditure for environmental protection

Depreciation/write-offs and payments of general environmental taxes are not included in this survey.

Subsidies from EU, government etc. should not be included in the expenditures.

Measures taken to meet technical, health or safety requirements or for purely economic reasons are not included in this survey, even though they can benefit the environment.

Responses from enterprises that have had no costs are very important for the quality of the results of this survey.

For more information please visit our website: www.mkost.scb.se

Person to contact at enterprise

Name of person to contact (PLEASE PRINT)	Position	Date
Address (if different from above)		Telephone (including area code)
Email		Fax

Activity of enterprise

State production processes, product or equivalent

Employees

Number of employees in 2010	

SCB RM/MN 181 E. 2010

Statistiska centralbyrån Statistics Sweden	Contact persons	Telephone	E-mail	Fax
Environmental Accounts and Natural Resources Unit	**...**	**+46 8-506 94...**	**... @scb.se**	**...**

Statistiska centralbyrån
Statistics Sweden

A Environmental protection investments in 2010

Has the enterprise made environmental protection investments 2009?
We ask here about new gross investments in machinery, buildings and land made wholly or partly to reduce impacts on the environment, including peripheral costs for planning,installation connection fees. Investments for the purpose of expanding, altering, adapting and improving already existing equipment should also be included.

☐ Yes
☐ No → ***Please complete section B***

Please state amounts in SEK thousands. *Example: SEK two million (2 000 000) is written 2000.*

A.1 *Larger* environmental protection investments *(Estimates are acceptable)*

List the largest investments, one investment per row. State total investment amount during the year where the main purpose is to reduce environmental impact, or give an estimate for the extra cost for more environmental friendly technology. Mark the type of investment and **one** main environmental area.

	SEK thousands	Type of investment: Prevention	Type of investment: Treatment	Main environmental area: Air	Water	Waste	Land and water table	Landscape and biological diversity	Other	Brief description of costs *(continue on page 6)*
101		☐	☐	☐	☐	☐	☐	☐	☐	
102		☐	☐	☐	☐	☐	☐	☐	☐	
103		☐	☐	☐	☐	☐	☐	☐	☐	
104		☐	☐	☐	☐	☐	☐	☐	☐	
105		☐	☐	☐	☐	☐	☐	☐	☐	
106		☐	☐	☐	☐	☐	☐	☐	☐	
107		☐	☐	☐	☐	☐	☐	☐	☐	
108		☐	☐	☐	☐	☐	☐	☐	☐	
109		☐	☐	☐	☐	☐	☐	☐	☐	
110		☐	☐	☐	☐	☐	☐	☐	☐	

A.2 *Minor* environmental protection *(Estimates are acceptable)*

Smaller investments can be added.

	Type of investment	Amount invested: SEK thousands	*Of which*: Air	Water	Waste	Land and water table	Landscape and biological diversity	Other
111	**Treatment**							
112	**Prevention** . . .							

Brief description of costs *(continue on page 6)*

Treatment: _____

Prevention: _____

Examples of environmental protection costs in agriculture

Environmental protection investments

Type of investment – treatment	Type of investment – preventive
Examples in different environmental domains	Examples in different environmental domains
Air	**Air**
– Sealing liquid fertiliser tanks – Filters, scrubbers, cyclones, centrifuges etc. – Measures taken to reduce dust problems in relation to transport of storage – Sealing of urine/or fertiliser wells.	– Replacing CFC. – New furnace for the replacing of fossil fuels with biofuel, e.g. for heating a green house, workshop etc. – Added costs for new vehicles driven on biofuel instead of fossil fuels. – Adaptation of incinerators in transition to more environmentally-friendly fuels.
Water	**Water**
– Cisterns, pipes and hose ducts where petrol, diesel or oil has been handled, such as with secondary protection for amounts greater than 250 litres – Management and treatment of sludge.	– Changing sprinkler systems in accordance with environmental requirements.
Waste	**Waste**
– Equipment for one's own storage and transport, such as special vehicles, containers, transhipment stations, sorting equipment – Equipment for one's own collection and treatment, e.g. compactor and investments in one's own landfills.	– Measures for reducing waste creation.
Land and water table	**Land and water table**
– Plates against leakage. – Preventive measures against leakage at the storage site for urine and fertiliser. – Storage for plant protection products.	– Reduce the amount of urine created.
Landscape and biological diversity	**Landscape and biological diversity**
– Restoration of biotopes such as grazing grounds	– Rebuilding stalls and adaptation to ecological production. – Installation of wetlands.
Other	**Other**
– Noise	– Noise factor, e.g. added costs for purchasing of quietly-run machines.

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B Current expenditure for environmental protection

Has the enterprise had current expenditures for environmental protection 2009?
List all other costs for environmental protection that are not investments here. These can be related to existing equipment but also i.e. payment for maintenance of purification plants, water and sewage fees, payment for transport and landfill site waste, supervisory fees, costs for environmental management and certification.

☐ Yes
☐ No → ***Please, send in the form***

Interest and capital costs (depreciation) payments of general environmental taxes and NO_x fees are not to be given.

Please state amounts in SEK thousands. *Example: SEK two million (2 000 000) is written 2000.*

B.1 Internal costs *(Estimates are acceptable)*

		SEK thousands	Brief description of costs *(continue on page 6)*
Operation, maintenance, supervision and control by environmental area: *Examples: Costs for personnel, material, energy used for operations and maintenance of existing environmental equipment and environmental monitoring.*	Air		
	Water		
	Waste		
	Land, water table		
	Landscape and biological diversity.		
	Other		
	Totalt		
General environmental administration, training, information *Examples: The company's own costs for general and overall information, investigations, staff training, environmental management, certification etc*			
Research and development *Examples: Total expenses for R&D, tests etc to reduce environmental impact from activities of enterprise*			
Other *Other current costs for environmental protection including estimated extra costs for purchase of material and fuel to reduce environmental impact.*			
of which **Staff costs** *Personnel costs including social security contributions and other salary expenses included in above cost for enterprise's own environment work.*			

B.2 Purchased services and fees *(Estimates are acceptable)*

		SEK thousands	Brief description of costs *(continue on page 6)*
Operations, maintenance, monitoring and control broken down by environmental area: *For example: List water and sewage fees under the environmental area "Water" and supervisory fees under "Other".*	Air		
	Water		
	Waste		
	Land, water table		
	Landscape and biological diversity.		
	Other		
	Totalt		
General environmental administration, training, information *For example: Environmental training, environmental certification, payment to environmental consultants or external environmental investigations.*			
Research and development *Costs that the company has paid for R&D carried out by others.*			
Other *Example: External costs for ground decontamination*			

Examples of environmental protection costs in agriculture

Current expenditure for environmental protection

Internal costs

Cost for performing one's own work on operation, maintenance, supervision and inspection.

Examples in different environmental domains

Air

– Refrigeration, heating and climate control installations, such as leakage inspection, inspection reports
– Refilling sealed liquid fertiliser and urine tanks.

Water

– Cisterns, pipes and hose ducts where petrol, diesel or oil has been handled:
  – Over-filling protection, readable fluid levels
  – Ventilation device, fixed connection for refilling, with extra rules in watershed areas
  – Secondary protection for amounts over 250 L that are within the watershed areas
– Balanced plant nutrients
– Spreading times for farmyard manure
– Catch crop.

Waste

– Waste, e.g. sorting and one's own transport.
– Hazardous waste, e.g. sorting, labelling, transport
– Breaking down farmyard manure on uncultivated ground due to environmental requirements
– Decommission cisterns, e.g. empty, clean, and report to the supervisory authority
– Composting in accordance with the Swedish Board of Agriculture's general guidelines
– Leachate from from silage stores must be collected.

Land and water table

– Chemical products, e.g. lists, product safety information, stored with appropriate signage
– Chemical pesticides, e.g. dosage keys
– Farmyard manure (sealing or stable floating crust on liquid fertiliser or urine tank).

Landscape and biological diversity

– Consideration of natural hosts, e.g. avoid measures that can harm biotopes or elements of the landscape that have great value for flora and fauna (e.g. logging roads, reindeer, older trees in fields etc.)
– Care requirements, e.g. assert arable land/grazing land/mown meadow or care may progress in accordance with "farm support"
– Protection of wild animals and plants, e.g. avoid measures that would intentionally disturb wild birds or protected plants.

Other

– Develop and implement measures related to Plant Protection
– Develop and implement measures related to Plant Nutrients

Cost of performing one's own work for general environmental administration, education, information

– Certification, e.g. KRAV, Demeter, Sigill, etc.
– Environmental education programmes
– Environmental management system, e.g. ISO14001
– One's own working hours, e.g. municipal reporting for activities requiring reporting and permitting, diverse permits and licenses, environmental reports, keeping a work log, etc.

Purchased services and fees

Cost of purchasing services for operations, maintenance, supervision and inspection distributed to environmental areas.

Examples in different environmental domains

Air

– Refrigeration, heating and climate control installations, e.g. assessment and repair by certified personnel.

Water

– Inspection of cisterns and pipes by an accredited inspector.

Waste

– Combustible and compostable wastes to the municipality
– Collection of plastics organised by Svepretur (free of charge, collection for a fee)
– Hazardous wastes to an approved recipient
– Hazardous wastes, transport by approved transporters.

Land and water table

– Chemical products (remote, isolated storage)
– Farmyard manure (sealing or stable floating crust on liquid fertiliser or urine tank)
– Chemical pesticides, e.g. dosage keys.

Landscape and biological diversity

– Consideration of natural hosts, e.g. avoid measures that can harm biotopes or elements of the landscape that have great value for flora and fauna (e.g. logging roads, reindeer, older trees in fields etc.).
– Protection of wild animals and plants, e.g. avoid measures that would intentionally disturb wild birds or protected plants.
– Care requirements, e.g. assert arable land/grazing land/mown meadow or care may progress in accordance with "farm support".

Other

– Added costs for purchasing biofuel etc. instead of fossil fuels.
– Develop and implement measures related to Plant Protection – Develop and implement measures related to Plant Nutrients

Cost of purchasing services for general environmental administration, education, information

– Certification, e.g. KRAV, Demeter, Sigill, etc.
– Environmental education programmes
– Environmental management system, e.g. ISO14001
– Environmental impact assessments
– Supervisory agency fees

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Description of costs. Give row number, name, purpose, basis for cost information.

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Appendix 3 Manual - Environmental protection expenditure in agriculture

Environmental protection

Environmental protection is defined to include all measures and activities aiming to prevent, reduce or eliminate environmental pollution caused by activities of enterprises. An example is added costs for new vehicles driven on biofuel instead of fossil fuels. The primary goal and purpose is to protect the environment. Also included are measures such as reports, monitoring, training and administration. Beyond this concept are measures which are directly aimed at products of the enterprise or natural resource management (including energy management), which, although positive for the environment are mainly fulfilling technical needs or requirements for the working environment, health and safety.

Investments

According to the ordinance, the definition of an investment is as follows: *"Investments in new and existing physical capital goods for environmental protection, either bought from a third party or works-made, with a life span of more than one year."* However, in case certain enterprises apply another definition, Swedish accounting regulations shall apply firstly. All the following shall be considered investments: new and re-investments, rebuilding investments and connection charges. An investment is regarded complete when the fi xed assets in question are transferred to the enterprise. In the case of major long-term investments, payments for each year shall be stated. Also included are all improvements, changes and renovations that lengthen the lifespan or improve the productive capacity of capital goods. Acquisition of smaller assets that are not marketed shall be included during the current reference period. On the other hand, goods acquired through enterprise fusions shall not be included.

Pollution treatment investment

Pollution treatment investments are investments for extra equipment which is installed to facilitate environmental controls for the enterprise. Characteristic of these installations are either that they operate independently of the production equipment, or are identifiable parts and accessories. This extra equipment treats pollution created during production, prevents spreading and measures pollution levels (monitoring).

To consider
It is important to take up costs for investments when the investment amount is reported (if investments are capitalized by the enterprise). Purchase price is the price stated on purchase invoice. Costs for planning, installation, transport, monitoring etc. shall also be included. Studies show these additional costs can be quite significant.

Pollution prevention investment

The purpose of pollution prevention investment is to minimise or prevent generation of pollutions, discharge and waste by changes in processing. Furthermore, pollution prevention investment can make it possible to use less polluting production inputs or new equipment and processes with better environmental efficiency. Pollution prevention investment refers only to the adoption and integration part, as opposed to a pollution treatment investment. Therefore, pollution prevention investment can either be a separate part or totally integrated in the production process. If the pollution prevention part is not identifiable, only an extra cost should be reported (environmental part), estimated by comparisons with an equivalent standard reference technology, except for environmental effect.

To consider
There may be investments that minimise the environmental effect without causing any extra costs for the enterprise. If an extra cost for environmental protection can not be estimated for one specific investment (or part of an investment), or if an environmental protection investment does not cause any extra cost, those investments should not be considered as environmental protection expenditure per definition.

Current expenditure for environmental protection

Current expenditure for environmental protection is often linked to earlier investments in environmental protection equipment. It can be expenditure for operation, maintenance and inspection and control of environmental protection equipment. Current expenditure for environmental protection may also occur when different activities start up that, although not directly connected to a certain production process, are aimed to prevent pollution (for example, general environmental administration, environmental management, certification and research).

Current expenditure for environmental protection includes following types of costs:
– Staff expenditures
– Manufacturing supplies (energy, materials, input goods, etc.)
– Purchase of environmental protection services
(payments for waste management, environment consultants)

Expenditures may also occur when activities are initiated that do not have any direct function to the production process but where the main purpose is to prevent pollution, for instance through environmental administration work, environmental guidance and certification as well as research. Current expenditure for environmental protection can include payments for environmental inspection and control, purchase of goods and services (by a third party) that have a positive environmental effect, as well as payments to county administrative board/municipality with the purpose to cover future costs for soil decontamination of polluted industrial areas.

Current expenditure for environmental protection includes only actual expenditures for environmental protection during the year. Following should therefore *not* be reported as environmental protection expenditure:
– General environmental taxes and similar.
– Depreciation (expenditure for wear-and-tear are normally estimated by specific methods).
– Interest payments.
– Fees and fines for not obeying valid environment protection legislation or compensation to a third party for environmental damages or similar related expenditures.
– Loss of income due to shutdowns caused by environmental legislation (because it does not involve actual expenditure).

To consider
Capital loss (estimated expenditures) is not considered to be environmental protection expenditure. Only actual expenditures during the year should be accounted.

Identification of environmental protection expenditure

There are two ways to facilitate the preparation and structuring of expenditures that are associated with EP. Firstly, ”normal” cost of capital for planning, equipment, material, maintenance, construction and installation must be treated. Expenditure for applications of permits, re-training of personal, yearly expenditures for staff, spare parts, maintenance, raw material and waste management are also included here. Secondly, the ”hidden” expenditures as control programme, sampling, inspections, environment report and other documentation work regarding operating, maintenance and control shall be treated.

Submit the enterprise’s information

The Swedish Parliament adopted a resolution in the spring of 2001 about a new statistics law (SFS 2001:99) to be added to the existing regulations for the official statistics. By the new law, enterprisers are held responsible to submit information about environmental protection expenditure.

There are two different modes to send in the information to Statistics Sweden:

1. The enterprise can log in at Statistics Sweden’s webbsite www.insamling.scb.se with username and password and fill in information directly in an Internet questionnaire. The information is transferred by a secure connection and no unauthorised will be able to see the information.
2. The enterprise can download a questionnaire in RTF-format (opens in Word) or PDF-format from Statistics Sweden’s webbsite www.h.scb.se/mkost and return by e-mail or mail to Statistics Sweden. Please notice that Statistics Sweden can not guarantee the security for information sent by e-mail.

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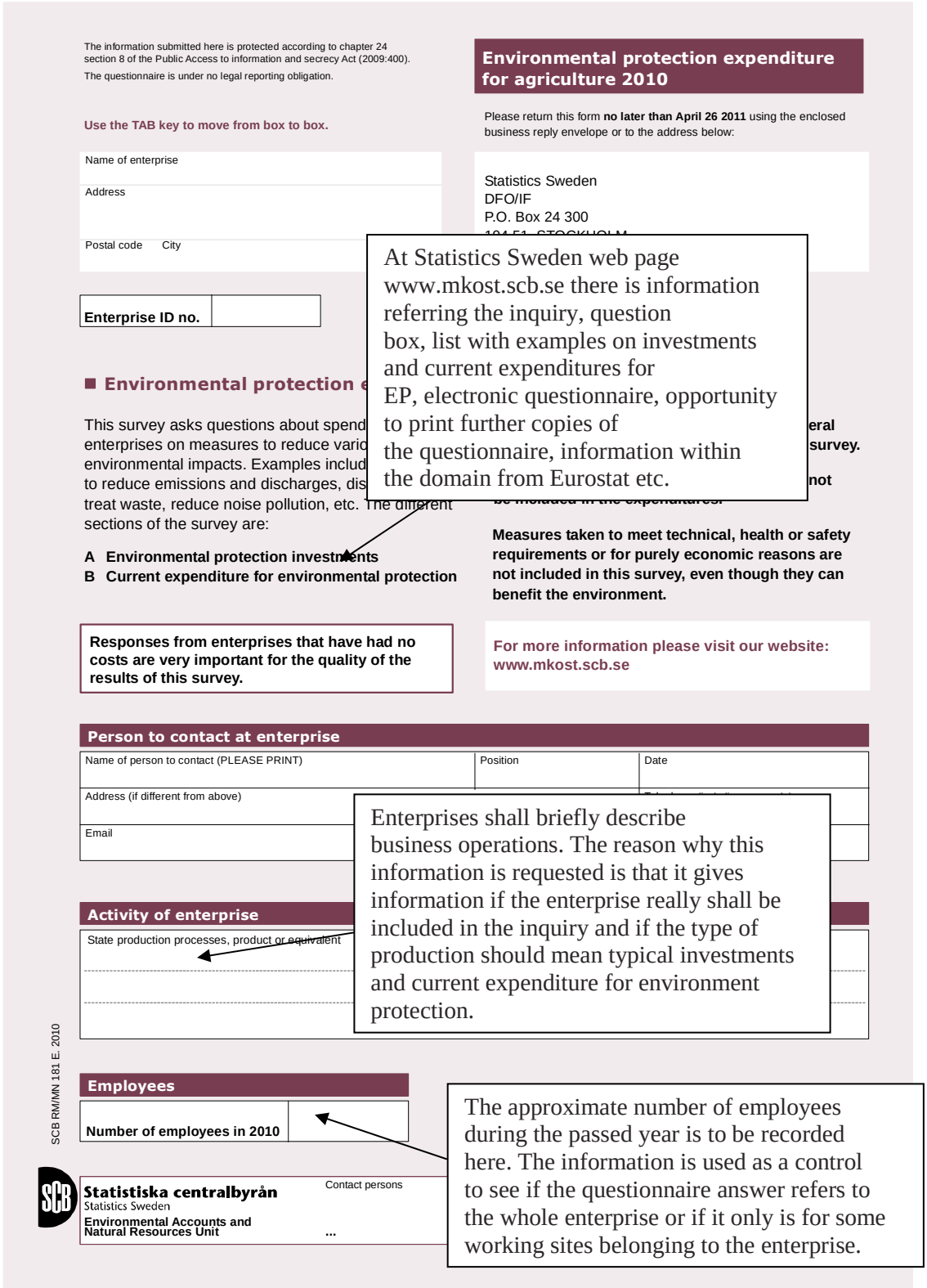
Filling in the questionnaire

First page

Describe briefly the type of agriculture and report number of employees. The information is used to check if several divisions in the enterprise are included in the answer.



The information submitted here is protected according to chapter 24 section 8 of the Public Access to information and secrecy Act (2009:400).
The questionnaire is under no legal reporting obligation.

Environmental protection expenditure for agriculture 2010

Use the TAB key to move from box to box.

Please return this form **no later than April 26 2011** using the enclosed business reply envelope or to the address below:

Name of enterprise
Address
Postal code City

Statistics Sweden
DFO/IF
P.O. Box 24 300

Enterprise ID no.

■ Environmental protection e

This survey asks questions about spend … eral enterprises on measures to reduce vario… survey. environmental impacts. Examples includ… to reduce emissions and discharges, dis… not treat waste, reduce noise pollution, etc. The different sections of the survey are:

A Environmental protection investments
B Current expenditure for environmental protection

Measures taken to meet technical, health or safety requirements or for purely economic reasons are not included in this survey, even though they can benefit the environment.

Responses from enterprises that have had no costs are very important for the quality of the results of this survey.

For more information please visit our website: www.mkost.scb.se

Person to contact at enterprise

Name of person to contact (PLEASE PRINT) | Position | Date
Address (if different from above)
Email

Activity of enterprise

State production processes, product or equivalent

Employees

Number of employees in 2010

SCB RM/MN 181 E. 2010

Statistiska centralbyrån
Statistics Sweden
Environmental Accounts and Natural Resources Unit

Contact persons
...

At Statistics Sweden web page www.mkost.scb.se there is information referring the inquiry, question box, list with examples on investments and current expenditures for EP, electronic questionnaire, opportunity to print further copies of the questionnaire, information within the domain from Eurostat etc.

Enterprises shall briefly describe business operations. The reason why this information is requested is that it gives information if the enterprise really shall be included in the inquiry and if the type of production should mean typical investments and current expenditure for environment protection.

The approximate number of employees during the passed year is to be recorded here. The information is used as a control to see if the questionnaire answer refers to the whole enterprise or if it only is for some working sites belonging to the enterprise.

Third page

Measures taken to meet technical, health or safety requirements or for purely economic reasons or to minimise use of resources (energy-saving) are not considered to be environmental protection. Difficulties have occurred among enterprises to estimate if an investment shall be considered as pollution treatment or pollution prevention. Investments in pollution treatment are capital goods working independently and are identifiable parts and additions to the production equipment. The equipment collect and treats pollution and pollutants caused by the enterprise. Investments in pollution prevention are designed to prevent or reduce the pollution created at the source thereby reducing the environmental impacts associated with the release of pollutants and/or polluting activities. Enterprises that disclose new or physical capital goods as current expenditures in accounting, when the amount is not come up to a certain value, do not need to change their routines. The inquiry only refers to the value for all gross investments for environmental protection made during the year.

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Statistics Sweden

A Environmental protection investments in 2010

Has the enterprise made environmental protection investments 2009?
We ask here about new gross investments in machinery, buildings and land made wholly or partly to reduce impacts on the environment, including peripheral costs for planning,installation connection fees. Investments for the purpose of expanding, altering, adapting and improving already existing equipment should also be included.

☐ Yes
☐ No → ***Please complete section B***

Please state amounts in SEK thousands. *Example: SEK two million (2 000 000) is written 2000.*

A.1 *Larger* environmental protection investments *(Estimates are acceptable)*

List the largest investments, one investment per row. State total investment amount during the year where the main purpose is to reduce environmental impact, or give an estimate for the extra cost for more environmental friendly technology. Mark the type of investment and **one** main environmental area.

	SEK thousands	**Type of investment** Preven-tion	Treat-ment	**Main** environmental area Air	Water	Waste	Land and water table	Landscape and biological diversity	Other	**Brief description of cos** *(continue on page 6)*
101		☐	☐	☐	☐	☐	☐	☐	☐	
102		☐	☐	☐	☐	☐	☐	☐	☐	
103		☐	☐	☐	☐	☐	☐	☐	☐	
104		☐	☐	☐	☐	☐	☐	☐	☐	
105		☐	☐	☐	☐	☐	☐	☐	☐	
106		☐	☐	☐	☐	☐	☐	☐	☐	
107		☐	☐	☐	☐	☐	☐	☐	☐	
108		☐	☐	☐	☐	☐	☐	☐	☐	
109		☐	☐	☐	☐	☐	☐	☐	☐	
110		☐	☐	☐	☐	☐	☐	☐	☐	

Here we ask about the largest investments where the main purpose is to minimise and treat emissions, pollution, waste etc. Enterprises have the opportunity to state ten larger investments. If the enterprise made less than ten investments, these shall be listed. The remaining minor investments can be added up together and be accounted in A2. All environmental protection investments shall be stated as either pollution treatment or pollution prevention investments. If the enterprise has difficulties to decide type of the investment, then briefly describe the purpose with the investment.

Environmental domain shall also be stated: *Air, Water, Waste, Land and water table, Landscape and biodiversity* or *Other*.
Only *one* main environmental domain shall be marked.
Again a brief description of the investment is very important!

A.2 *Minor* environmental protection *(Estimates are acceptable)*

Smaller investments can be added.

	Type of investment	**Amount invested** SEK thousands	***Of which*** Air	Water	Waste	Land and water table	Landscape and biological diversity
111	**Treatment**						
112	**Prevention** . . .						

Brief description of costs *(continue on page 6)*

Treatment: _____

Prevention: _____

If the enterprise has made more than ten environmental investments (maximum) accounted in table A1, the excess investments shall be added together and accounted in table A2. The value for each investment shall be *distributed* according to type of investment (Pollution treatment *or* pollution prevention) and also into *main environmental domain* (*Air, Water, Waste, Land and water table, Landscape and biodiversity* or *Other*).
Please note!
– Do not use table A2 as a summation of the larger investments already accounted in A1.
– The amounts for *Air, Water, Waste, Land and wate table, Landscape and biodiversity* or *Other* must be in accordance with the total investment amount!

Fourth page

Current expenditure for environmental protection includes expenditure and payments for operation and maintenance of environment protection equipment and plants, extra cost of purchasing less polluting and more expensive production inputs, costs for R&D, environmental education and training of own staff, general environmental information, payments to municipal water purification and waste-water treatment plants.

Depreciation or interest shall not be taken up in the questionnaire. Inspection fees paid to public authorities, REPA- fee etc. shall be included in current expenditure for environmental protection. Waste tax or other taxes shall not be accounted as environmental protection expenditures. Enterprises that perform waste water treatment or waste management for other enterprises shall only account their own expenditures for purification of waste water or waste management.

Example:
Two enterprises A and B. Enterprise A does not have own waste management. Enterprise B has own facilities for waste management. Enterprise A engages enterprise B to take care of their waste management and therefore accounts expenditure for a purchased (external) service for waste in the questionnaire. Enterprise B will receive an income from enterprise A that they have to take into consideration to before they fill in the questionnaire. Enterprise B must subtract the income from enterprise A from their total cost for waste management, and only report their net costs for their own waste management. For expenditures that are divided between several enterprises, ”incomes” from other enterprises must be subtracted from total expenditures.

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Statistics Sweden

B Current expenditure for environmental protection

Has the enterprise had current expenditures for environmental protection 2009?
List all other costs for environmental protection that are not investments here. These can be related to existing equipment but also i.e. payment for maintenance of purification plants, water and sewage fees, payment for transport and landfill site waste, supervisory fees, costs for environmental management and certification.

☐ Yes
☐ No → ***Please, send in the form***

Interest and environmen

Please state amounts in SEK thousands. *Example: SEK two million (2 (*

B.1 Internal costs *(Estimates are acceptable)*

		SEK thousands
Operation, maintenance, supervision and control by environmental area: *Examples: Costs for personnel, material, energy used for operations and maintenance of existing environmental equipment and environmental monitoring.*	Air	
	Water	
	Waste	
	Land, water table	
	Landscape and biological diversity	
	Other	
	Totalt	
General environmental administration, training, information *Examples: The company's own costs for general and overall information, investigations, staff training, environmental management, certification etc*		
Research and development *Examples: Total expenses for R&D, tests etc to reduce environmental impact from activities of enterprise*		
Other *Other current costs for environmental protection including estimated extra costs for purchase of material and fuel to reduce environmental impact.*		
of which **Staff costs** *Personnel costs including social security contributions and other salary expenses included in above cost for enterprise's own environment work.*		

B.2 Purchased services and fees *(Estimates are accep*

		SEK thousands
Operations, maintenance, monitoring and control broken down by environmental area: *For example: List water and sewage fees under the environmental area "Water" and supervisory fees under "Other".*	Air	
	Water	
	Waste	
	Land, water table	
	Landscape and biological diversity	
	Other	
	Totalt	
General environmental administration, training, information *For example: Environmental training, environmental certification, payment to environmental consultants or external environmental investigations.*		
Research and development *Costs that the company has paid for R&D carried out by others.*		
Other *Example: External costs for ground decontamination*		

As an effect of previous environmental protection investments, many enterprises often have in-house spending for environmental protection regarding operation and maintenance of these investments. In addition, other in-house spending might occur at enterprises for general administration, setting up and maintain environmental information systems, preparation for environmental licences, registration and certification, environmental education and information, external communications (e.g. with authorities), making environmental reports etc.

Some parts of these expenditures are staff cost for environmental protection purposes. The questionnaire inquires the size of staff costs for in-house spending on environmental protection, including all employers' charges and social contributions, etc.

To consider:
The amount accounted for *staff costs* can *never exceed internal costs,* since costs for staff is a *resulting expenditure* of *internal costs*.

Current expenditure for environment protection shall be listed as *internal costs* and *purchased services and fees*.

To consider:
Internal expenditure for operation and maintenance, inspection and control shall be divided into six environmental domains. The sum of the accounted values (Air, Water, Waste, Land and water table, Landscape and biological diversity, Other) shall be the same value as for operation and maintenance, inspection and control.

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