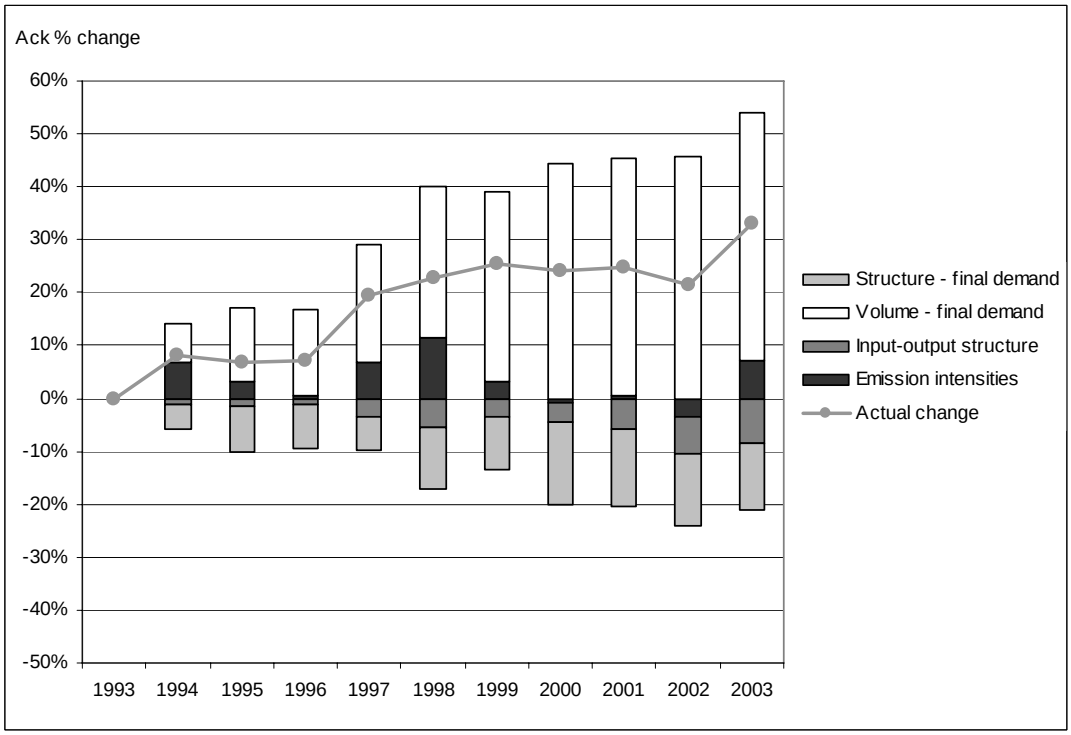
Statistiska centralbyrån
Statistics Sweden

eurostat

Sustainable development indicators based on environmental accounts

Change of domestic mobile emissions of carbon dioxide in the industry.



Mats Eberhardson, Viveka Palm and Martin Villner
Statistics Sweden 2007

Preface

This report has been prepared on commission from EUROSTAT, which supports and co-ordinates the development of environmental statistics in the EU Member States. The European Commission through DG Environment has contributed financially to the project. Martin Villner, Mats Eberhardson and Viveka Palm have carried out the work and are responsible for the report. The environmental accounts data are provided by Anders Wadeskog.

In 1993, Statistics Sweden, the National Institute of Economic Research and the Swedish Environmental Protection Agency were instructed by the Government to prepare a study covering the physical links between the economy, the environment and natural resources, the monetary reflection of these relations, and the state of the environment. The aim of the work on environmental accounts at Statistics Sweden is to develop and maintain a system of physical accounts that are linked to the production and consumption activities described in the national accounts. In practice this means a system of environmental and natural resource statistics linked to the industry, product and sector categories used in the national accounts, thus forming a satellite system of accounts around the national accounts.

According to the UN (SEEA, 2003), 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 classification of 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.

Statistics Sweden, February 2007

[1] NAMEA stands for National Accounting Matrix including Environmental Accounts. NAMEA is a way of presenting environmental accounts data.

Table of contents

Preface **2**

Summary **4**

1 Introduction **5**

1.1 Background 5
1.2 Aim 5
1.3 The SD strategy of Sweden 6
1.4 Concepts 6
1.5 Communication versus analysis 8
1.6 The report 9

2 National and sectoral development **10**

2.1 Economic growth and energy use 10
2.2 Economic growth and emissions of carbon dioxide 11
2.3 Economic growth, employment and living conditions 12
2.4 Development by industry 13

3 Decomposition of carbon dioxide emissions **17**

3.1 Present situation 17
3.2 Emissions of carbon dioxide - an overview 18
3.3 Emissions of carbon dioxide from stationary and mobile sources in industry 20
3.4 Emissions of domestic indirect carbon dioxide from exports and public and private consumption 21
3.5 Emissions of carbon dioxide by industry 23
3.6 Emissions of carbon dioxide in the transport sector 24
3.7 Carbon dioxide emissions from different product groups 26
3.8 Scenarios for emissions of carbon dioxide from private consumption 28

4 Responses **30**

4.1 Introduction 30
4.2 Long term political targets 30
4.3 The strategy and the Swedish public authority structure 31
4.4 Environmental legislation 31
4.5 Environmental Technology Institutions 31
4.6 Economic incentives- the example of Climate change 32
4.7 Costs of measures- the example of Health 33
4.8 Research needed 33

5 Concluding remarks **35**

6 References **36**

7 Annex **38**

Summary

The aim of this report is to investigate how sustainable development (SD) indicators can be underpinned by a statistical system that allows for analysis of inter-linkages between important areas. The main suggested linking in the statistical system is through actors in society, industries, governments, organisations and households. The other main linking device is the economic incentives for change.

Many countries have now designed indicator systems and strategies that show and put some boundaries on what issues nations have defined as important to sustainable development. Among these commonalities are notably the climate change issue, unemployment, pension systems, poverty, health and economic growth. This report focuses mostly on the environment- economy inter-linkages with the help of the system of environmental and economic accounts (SEEA).

The Swedish SD indicators and SD strategy are taken as a start. The indicators show that although the state of several issues appears good in an international perspective, there are trends that run counter to the goals. These are, for example, the climate change issue, where the decrease of emissions needed for the year 2050 is not evident. Also for the employment issue, the goals are not met. The relative poverty has also increased since the beginning of 1990s at the same time as the GDP per capita has increased.

As for other countries, the climate change issue is one major difficulty, where several new strategies and instruments will most probably need to be devised in order to reach the goals. This report shows how a decomposition analysis can cast light on what factors that comes into play in order to decouple carbon dioxide emissions from economic growth. Through different scenarios it is shown that an increase of the economic growth with 4 per cent is difficult to attain with decreases of emissions of carbon dioxide only by changes of the structure of the economy. More energy efficiency and more non-fossil fuels are likely to be needed to bring about a further increase. The trends of the shipping industry are particularly important for the results. These figures are not of a very good quality compared to other data and so the results will have to be regarded as a hot-spot, pointing to further investigations in that area.

The incentives for change are investigated through some of the money flows on a macroeconomic scale such as the state budget, environmental taxes and environmental costs. It is noted that for some of the areas where emission trends are most conspicuous, namely shipping, air traffic and goods transports, there are economic instruments lacking.

1 Introduction

1.1 Background

Since the notion of sustainable development (SD) was coined, many sets of indicators have been suggested to measure the degree of sustainability of the nation or a municipality (see for example Hass et al, 2002; Hass, 2006). Most of these have turned around the so-called three pillars (economy, environment and social issues) with deviations such as extra dimensions in the form of institutions. Lately the activity to set up national and regional (e.g. Nordic, European) strategies has also increased. For the EU countries this information has been gathered by the European Sustainable Development Network (www.sd-network.eu).The main issues are health, economy, social cohesion, and environmental issues. Since the government strategy is in focus, the issues will be followed from a national point of view (Government Communication 2005/06:126).

As the indicators are presented in the national strategy, the linkages between the areas are not closely described. In order to describe the linkages, we will have to depend partly on research and partly simply to link the statistics that can be linked together, by using known relations and accounting frameworks. The long time vision is that there would be a sustainable development account, where some main national indicators could be broken down in several sub-groups, indicating important relations. The issues in the report will be a first attempt.

Both the social and the environmental area have close connections to the economic areas, in terms of the cost of action and of inaction. However, these costs are only partly seen in the national budget. The costs for education, health care and for liming of acidified lakes can be found in the budget, for example. Other costs, such as those for water, waste treatment and for environmental taxes are largely paid by the private sector and do not show up in the national budget. How the social and environmental state affects economic development is in itself a field of research[2], which will not be dealt with in this report.

The effect of the economic activities on environment and social variables depends on the type of economic activity and how it is being pursued. The effects are also dependent on the size of the economic activity and how the surplus generated is being used.

1.2 Aim

The objective of this paper is to give some initial consideration to outline the need for a conceptual statistical framework that can underpin sustainable development indicators, and which will allow for analysing linkages between economic, environmental and social policies in order to meet long-term political targets.

In this report we will use the system of environmental and economic accounts (SEEA) to show how some of the issues in the SD strategies can be further analysed. In particular, the report will show how some of the issues that are of importance for several of the three pillars (economy, social and environment) in SD can be analysed.

[2] see e.g. Stern, 2006

1.3 The SD strategy of Sweden

In the latest Swedish strategy the following six main areas are represented by headline indicators:
- health
- sustainable consumption and production patterns
- economic development
- social cohesion
- environment and climate
- global development

The areas are very similar to the those in the EU strategy [3] and the framework for EUs indicators for sustainable development[4].

Under a total of 12 Swedish headline indicators are 75 other indicators, which shed light on the more specific issues that make up the over-all trend. (See Annex).

The Swedish strategy, as well as the European strategy, stresses the importance of social issues. It is clear that an accounting system such as the SEEA that aims to underpin the strategy will have to be complemented on the social side. Employment is one such issue with importance for both the social and the economic side of SD policies. Energy use and traffic are other issues with implications for all three areas.

1.4 Concepts

The concepts outlined here of an analytical sustainable development framework will have as a main focus activities as recorded on a yearly basis through the System of National Accounts (SNA), allowing for time series of indicators to be constructed.

Actors
The most important concept is that of actors, be they nations, governments, industries, civil society or groups of individuals.

The international classification of economic activities used as a basis for the SNA serves as a basis for accounts that also cover environmental and social issues. As different industries, the public sector, civil society and households are identifiable, the system allows for a full coverage of the national actors. It is also possible to use the system for sub-national, sectoral or international analyses, on the premise that the data quality is sufficient for such disaggregation.

Incentives
The second most important concept is what incentives cause the actors to behave as they do. Who can influence a particular problem or contribute to solve the issue? Here the costs of measures and costs for damages are of importance, as well as other incentives such as legal systems, taxes and subsidies. The SNA is an over-arching structure, but the satellite perspective makes it possible to look in more depth for those economic incentives which belong to the area or relate to a particular issue interest.

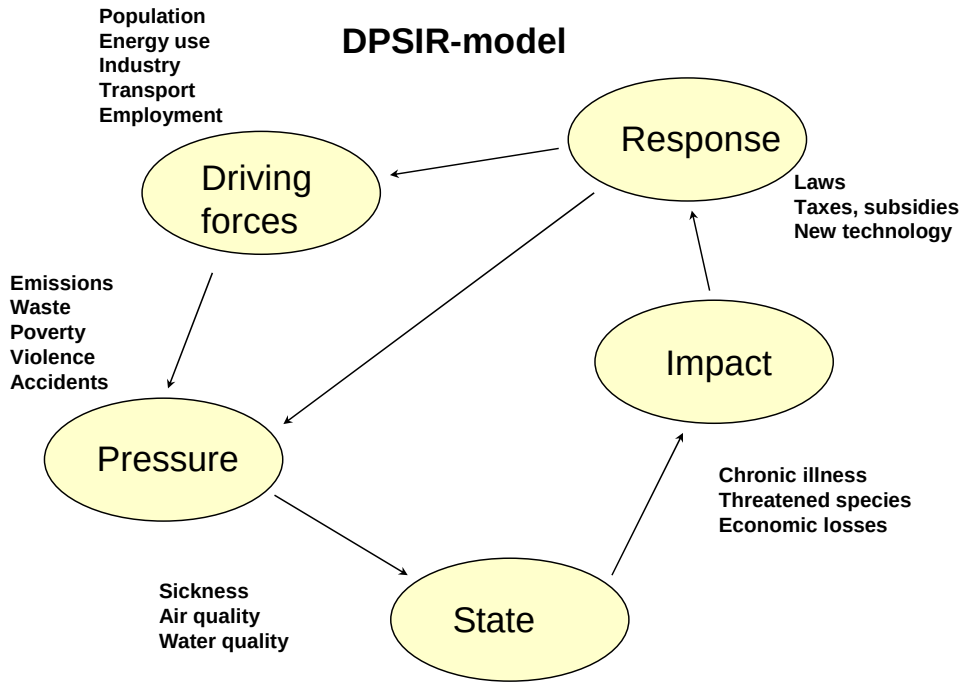
The statistical framework for sustainable development system would ideally describe the pressure, state and responses, emanating from the actors' through their activities, in relation to sustainable development policy targets. An example of this indicator model as it was formulated from an environmental perspective can be seen in figure 1.1.

[3] Renewed Sustainable Development Strategy: European Council, DOC 10117/06, 2006
[4] Measuring progress towards a more sustainable Europe - Sustainable development indicators for the European Union - Data 1990-2005, Eurostat, 2006.

It would thus be possible to use this approach for broad research on underlying causes and effects of varying incentives, by comparing between years, actors, nations or by going deeper into the underlying data.

From experiences with the SEEA, we can see that the data for driving forces, pressure and response have been those that are possible to relate to specific actors. The state and the impact variables are seen more as the result or outcome of a particular policy.

Figure 1.1. DPSIR-model. Environmental-economic indicator model.



Accounting

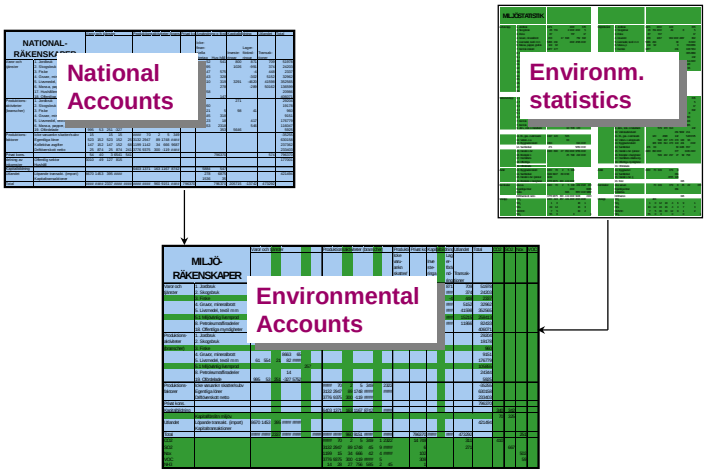
For the economy, the system of national accounts gives a detailed picture of the linkages between production and consumption activities, including investments. The system is designed so that the economic actors can be distinguished in the forms of an internationally harmonised classification system of both production activities and of consumption of goods and services. It can also describe the trade of goods and services between countries. The SNA provides a good statistical basis for many sustainable development issues, even though some of the definitions used may need to be scrutinised in the light of specific policies.

Since the 1990s, much work has been undertaken on creating a satellite system to the SNA. The System of Environmental and Economic Accounts (SEEA) links environmental issues in the form of use of natural resources, as well as the emissions of unwanted substances to air, water and as waste generation to the economic actors (SEEA, 2003). In particular, we are concerned with the chapters 3-6 in the SEEA-manual, on so-called hybrid flow accounts or NAMEAs, which link physical environmental information to the different actors in the economy. The system also includes a finer description of the standard SNA so that economic transactions with particular relevance to environment can be identified. (See fig 1.2). In the accounts the national uses of resources, environmental pressure, employment, economic results are all tied together through the economic actors, the government, and the households and non-governmental organisations.

A reason for treating sustainability as a question for policies today and keeping a close linkage to the ‘normal’ policy process is that the measures that are planned to lead society to sustainability will always be compared and balanced against the existing policy. There is a competition both for budget and for

space on the agenda. How can the energy system be changed to a more environmentally benign without damaging the local business, ensuring the supply for energy? How can policy assure that marginalised people can lead a better life, thus increasing the chances for their children to prosper?

Figure 1.2. The environmental accounts link economic and environmental statistics to economic actors: industries, authorities and households.



1.5 Communication versus analysis

The indicators are ideally meant to communicate with a broad range of people, not just those with an interest in a specific policy area. Thus it is important not to give too many details, nor to become too technical. In this respect a limited number of headline indicators have proven to be effective. That is not without recognition that there needs to be a more elaborated indicator system beneath supporting the headline indicators. Such statistics may be used at the sector levels for example to flag when some underlying trends are going counter to what would appear to be happening, as reported in aggregate through a headline indicator. Underlying indicators can also provide a basis for headline indicators if the issue is re-evaluated and becomes a top-level priority.

In order to make progress on the issue as well as to set realistic targets, it is of value to be able to use a headline indicator that can be connected to deeper analysis. In this respect the GDP measure, whilst being highly aggregated, through its connection to the SNA has been an effective indicator on national production and wealth. For environmental issues, the SEEA has proven to have many of the same benefits in terms of being able to disaggregate. Thus, it is possible by disaggregation to use the same indicator for the nation, the region, for a particular industry, for the households etc.

1.6 The report

Chapter 1 introduces the strategy for sustainable development, the aim of the project and the need for more integrated analyses coupled to the SD indicators. The idea of satellite accounts that build on internationally harmonised classifications and how the environmental accounts are constructed is also touched upon.

In Chapter 2, on the development over time, the trends and targets for the main indicators are presented for Sweden for 1993 to 2003. Energy use, emissions of carbon dioxide, employment, health, poverty and working environment is presented. Firstly on a national scale and then for some important industries. The industry indicators are based on the classification in the SNA and the SEEA. The economic activity is increasing, as is consumption. The transports, especially of goods, are increasing. So are the trends for particular sicknesses and for violence, even though the overall health indicator of life-length is increasing. Employment has not reached the political target. On the environmental side, the long-term goal for emissions of carbon dioxide is a huge challenge to meet, which will need both fuel changes and efficiency changes. Some stabilisation of emissions can be seen and some explaining factors will be investigated in the next chapter.

In Chapter 3 a decomposition analysis of the carbon dioxide emissions is made for the years 1993 - 2003. A decomposition analysis provides a description of the factors that the development can be decomposed into. It provides an integration of information from the environmental and economic areas. The emissions of carbon dioxide are decomposed into changes in fuels mix, consumption level changes, consumptions structure changes and weather changes. The effects of trade on the emissions are also presented. A scenario analysis is also performed, to present how different factors may affect the emissions, given a 4 % increase of economic growth.

Chapter 4 presents some of the responses that have been proposed or used as incentives or disincentives for the management of the problems encountered in the strategy. There will be a focus on environmental initiatives such as various incentives for more sustainable production and consumption patterns. Some interesting analyses on health economics will also be presented.

2 National and sectoral development

One of the main purposes with environmental accounts is to link the environmental field with the economic field to see how they interact with each other. This is achieved, among other things, by accounting on emissions by industry. Decoupling means that the connection between economic growth and environmental impact is broken[5]. By indexing the variables, comparison of these changes are shown despite different measurement units. Sometimes a distinction is made between relative and absolute decoupling. Relative decoupling means that the economic growth increases faster than the environmental impact while absolute decoupling means that the environmental impact must decrease.

By including social aspects, for example health and working environment, together with environment and economic aspects in the analyses a more complete picture of the development is achieved. Similar as for the environment it is possible to see how social aspects vary compared to economic growth. The objective is that the economic growth should increase and the living conditions should improve.

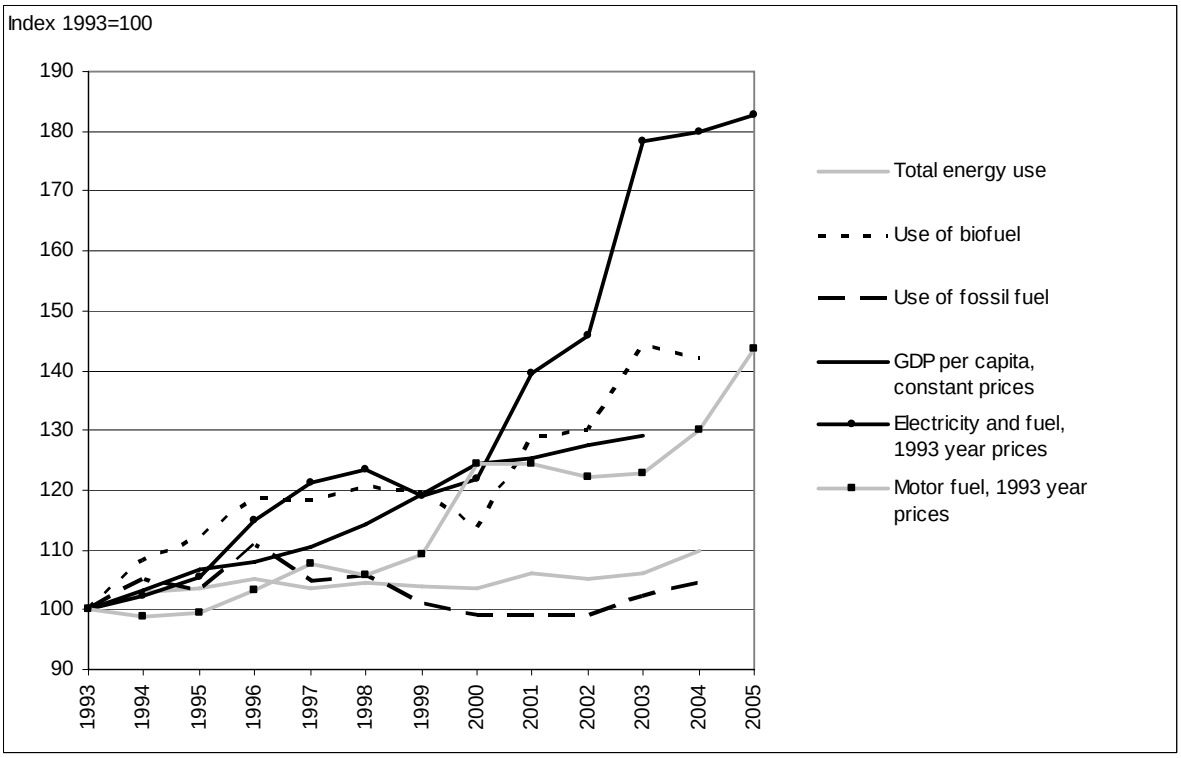
Sweden's strategy for sustainable development has four strategic challenges; one of these is sustainable growth. One of the goals for a sustainable growth is to break the connection between economic growth and environmental degradation and at the same time promote the welfare. In connection with the strategy, 87 indicators were chosen to evaluate the results (see annex). The indicators can be found on the SCB web (www.scb.se/mi1303), but only with Swedish text. Two of these indicators are index indicators; Energy efficiency (Wh/GDP) and Goods transports compared to GDP. Changes of the energy and emissions variables can be due to different factors, for example changes of emissions intensities, production/consumption patterns and the relationship between services and goods in the economy, as will be analysed in chapter 3.

2.1 Economic growth and energy use

Diagram 2.1 compares GDP per capita with the total energy use for Sweden. The energy use has increased by 10 per cent between 1993 and 2003 while the GDP per capita has increased by 30 per cent. In the beginning of the 1990s it was an economic recession in Sweden which resulted in a decline of GDP per capita between 1990 to 1993. After 1993 the economic growth has increased continuously. At the same time the use of bio fuels has increased rapidly the use of fossil fuels is roughly at the same level as in the beginning of the time period. This means that relative decoupling has occurred regarding fossil fuels and the total energy use. The prices on the electricity, fuel and motor fuel have increased by 85 respectively 45 per cent during the last 12 years. The increase in energy prices has probably contributed to that the Swedish energy use has been fairly constant since 1994. As can be seen in 2.1 the relation between economic growth and energy use is complex. This will be further investigated in chapter 3.

[5] M. Jänicke, H. Mönch, T. Ranneberg, and U. E. Simonis, ”Structural change and environmental impact. Empirical evidence on thirtyone countries in East and West,” Environmental monitoring and assessment 12 (1989), no.2: 99-114.

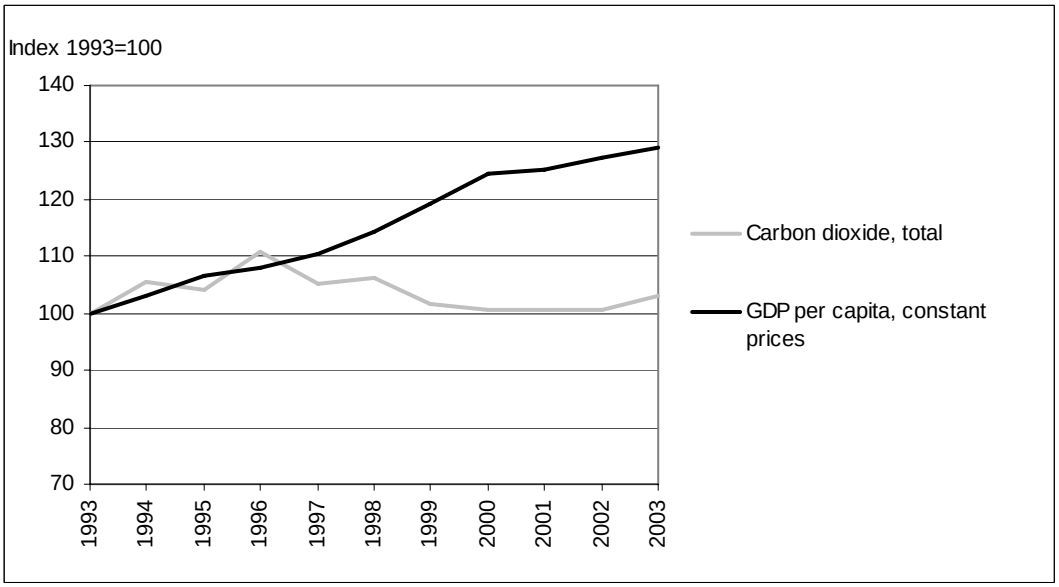
Diagram 2.1. Change of GDP per capita, domestic Swedish energy use and energy prices.



2.2 Economic growth and emissions of carbon dioxide

Energy use is closely related to emissions. The composition of the energy system has a large impact on the emissions. Diagram 2.2 compares the development of GDP per capita and carbon dioxide emissions. The emissions of carbon dioxide have been fairly constant at 55 millions[6] tonnes carbon dioxide per year due to decreased oil use in the housing and service sector and increased use of district heating. This decline in carbon dioxide emissions has been counter balanced by increased emissions from the road traffic, iron- and steel production and refineries.[7] During the same period GDP per capita has increased by 30 per cent.

Diagram 2.2 Change of GDP per capita and domestic Swedish emissions of carbon dioxide.



[6] Sustainable development indicators for Sweden - a first set 2001, Statistics Sweden
[7] www.miljomal.nu

2.3 Economic growth, employment and living conditions

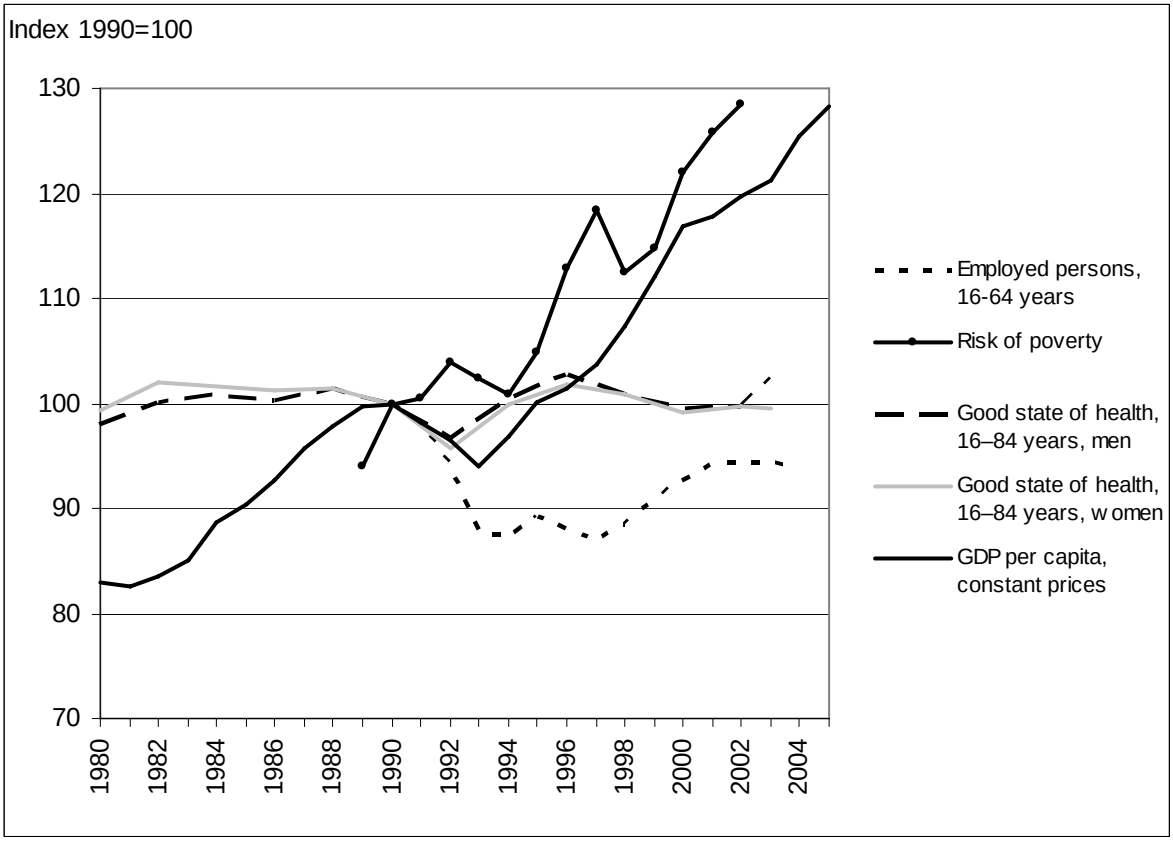
GDP is used for measuring economic development. But GDP is not a good indicator for measuring social development and environmental impact. For example a high or increasing GDP does not necessarily result in a declining poverty or an improvement of the environment (see diagram 2.3 and 2.2).

In this part different aspects of living conditions and employment are indexed in the diagrams 2.3 and 2.4. Diagram 2.3 compares economic growth with poverty in the population, employed persons and the state of health. The share of persons that has a low income has increased since 1989 by 33 per cent which is more than the GDP increase. A person with an income below 60 per cent of the disposable median income is assumed to have difficulties in maintaining a normal consumption level and be well integrated in the society. Despite an increase of the employment during 1997 to 2001 the share of persons in risk of poverty increased during this period.

The employment is important both for the economy and the individual. Work is often cited as a basic need alongside food, housing, etc[8]. Unemployment is therefore an important factor for social exclusion. A growing economy often needs more labour. A shortage of labour can undermine competitiveness by making it difficult for companies to meet orders. In the beginning of the 1990s the number of employed persons and GDP per capita decreased because of the economic crisis. The GDP has since then increased continuously while the employment began to recover in the end of the 1990s.

At the same time as the economic growth has increased by 46 per cent during the last 23 years, the share of persons who experience good state of health has been unchanged.

Diagram 2.3 Change of GDP per capita, employed persons, persons with a disposable income 60 per cent below the median income (risk of poverty) and persons who experience good state of health.

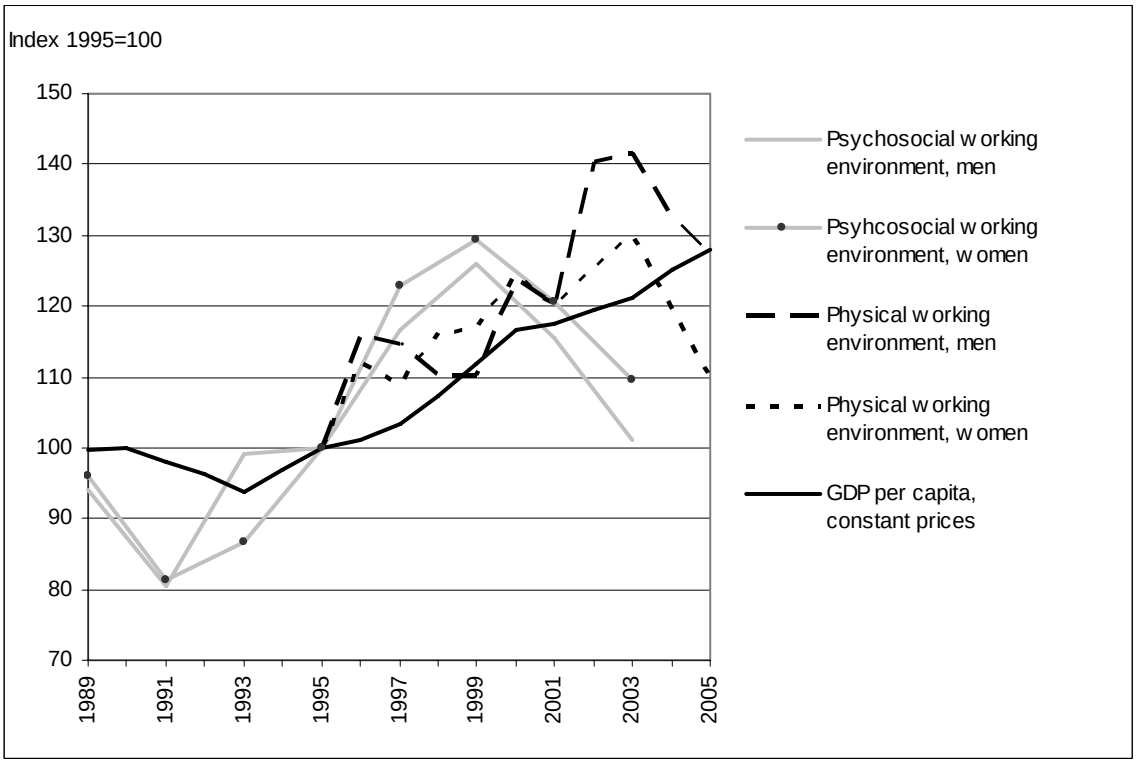


[8] Sustainable development indicators for Sweden - a first set 2001, Statistics Sweden.

Another important aspect of living conditions is the working environment. One indicator for psychosocial working environment and one for physical working environment are compared to GDP per capita in diagram 2.4. The psychosocial indicator measures the share of employed persons that for instance has answered positive on the questions if the work is stressful and if there is little support from workmates and managers. The physical indicator measures the share of employed persons who have problems due to physical load, e.g. the person performs heavy lifts.

The share of persons who had problems with their physical working environment increased from 1995 to 2003 and then decreased slightly the years after. The psychosocial working environment deteriorated during the 1990s and then improved slightly. At the same time as GDP per capita has increased during this period the working environment has deteriorated.

Diagram 2.4 Change of GDP per capita and persons who have problems with their physical and psychosocial working environment.



2.4 Development by industry

One way to get more detailed information about the national data is to show the data by industry. Diagram 2.5, 2.6 and 2.7 show emissions of carbon dioxide, value added and employment broken down by seven industry groupings and households. Regarding emissions of carbon dioxide the largest emitters are the manufacturing, mining industry, households, transport companies and the energy industry. The manufacturing, mining industry and transport companies have increased their emissions since 1993. The emissions from the energy sector are almost at the same level as 1993 and emissions from the households have gone down. The emissions from the households in this diagram come from car driving and heating of houses. At the same time as the emissions of carbon dioxide have increased in the manufacturing, mining industry and the transport companies, their value added has increased. The number of employed persons has been fairly constant in many industries. However, in the wholesale, retail industry an increase has occurred. In the agriculture, forestry and fishery the number of employed persons has decreased.

Diagram 2.5 Domestic emissions of carbon dioxide by industry, excl. public sector.

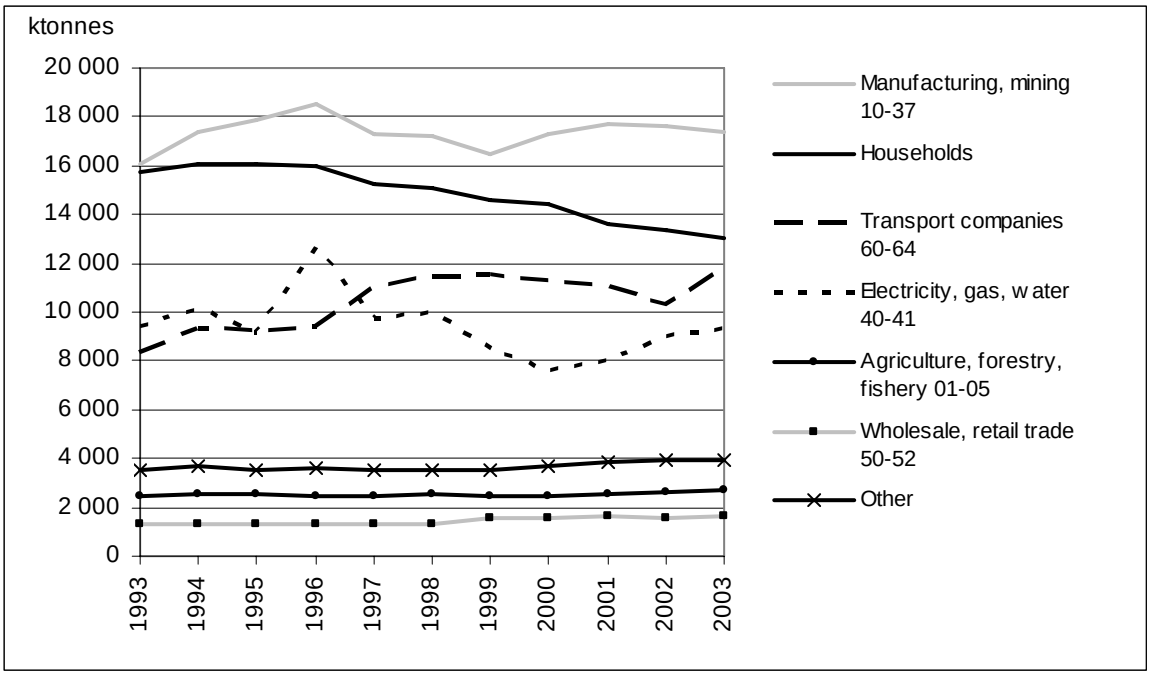


Diagram 2.6 Value added by industry, 2000 year prices, excl. public sector.

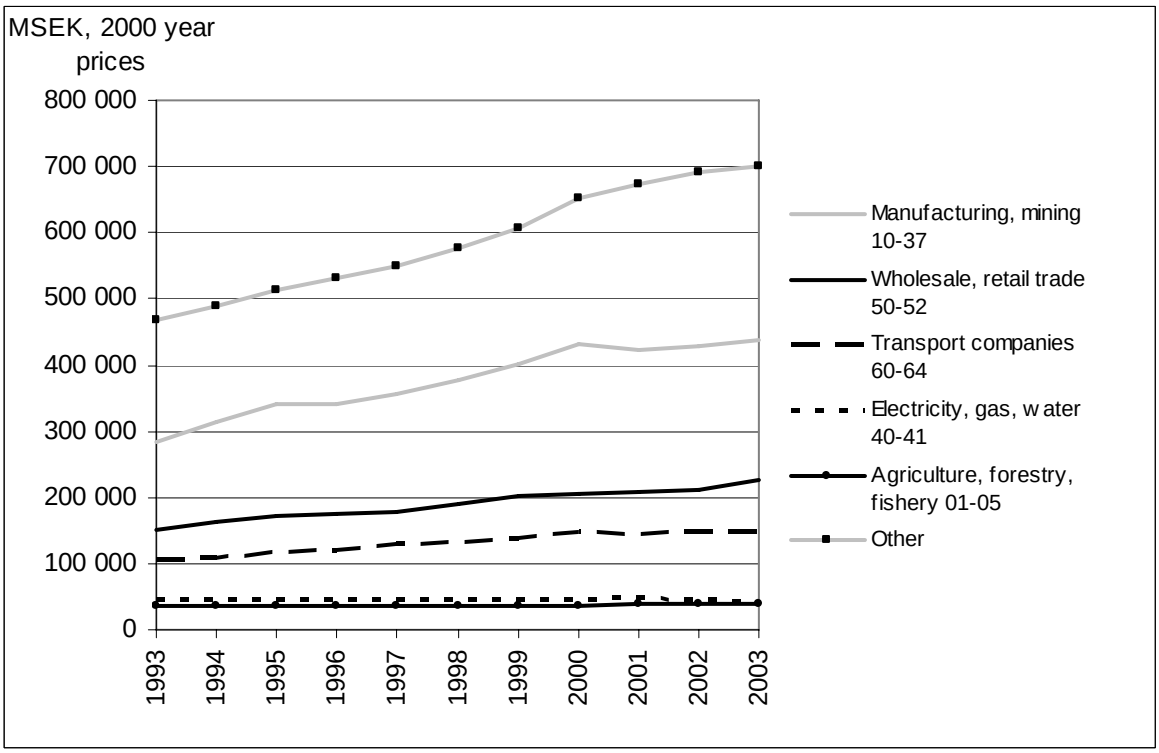
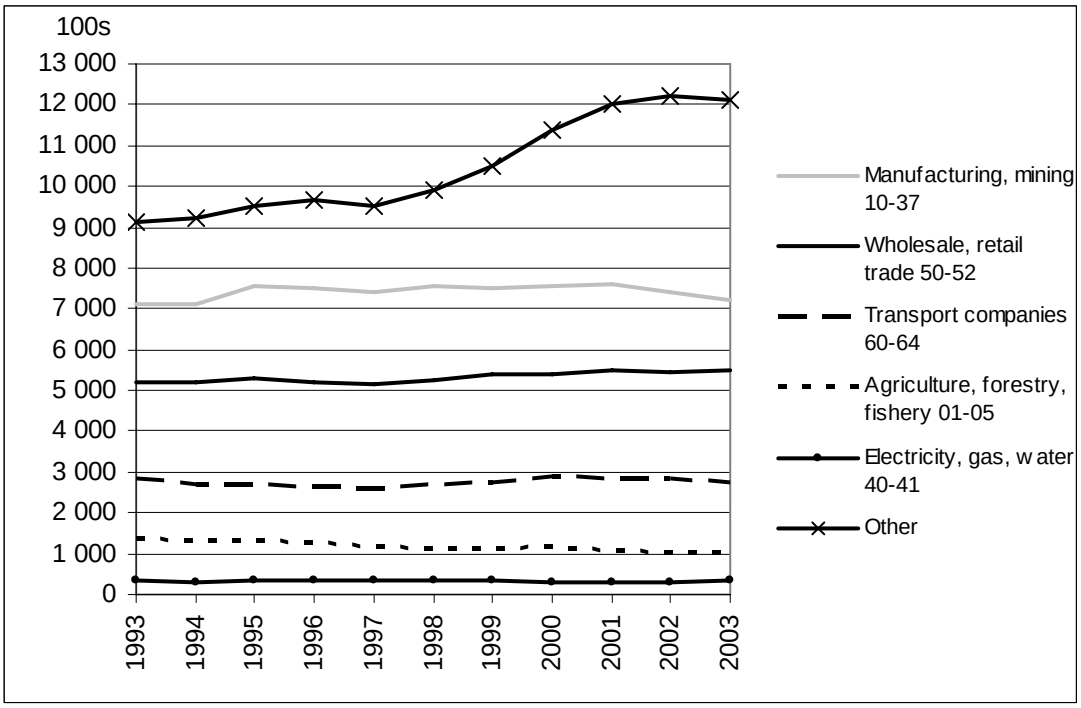
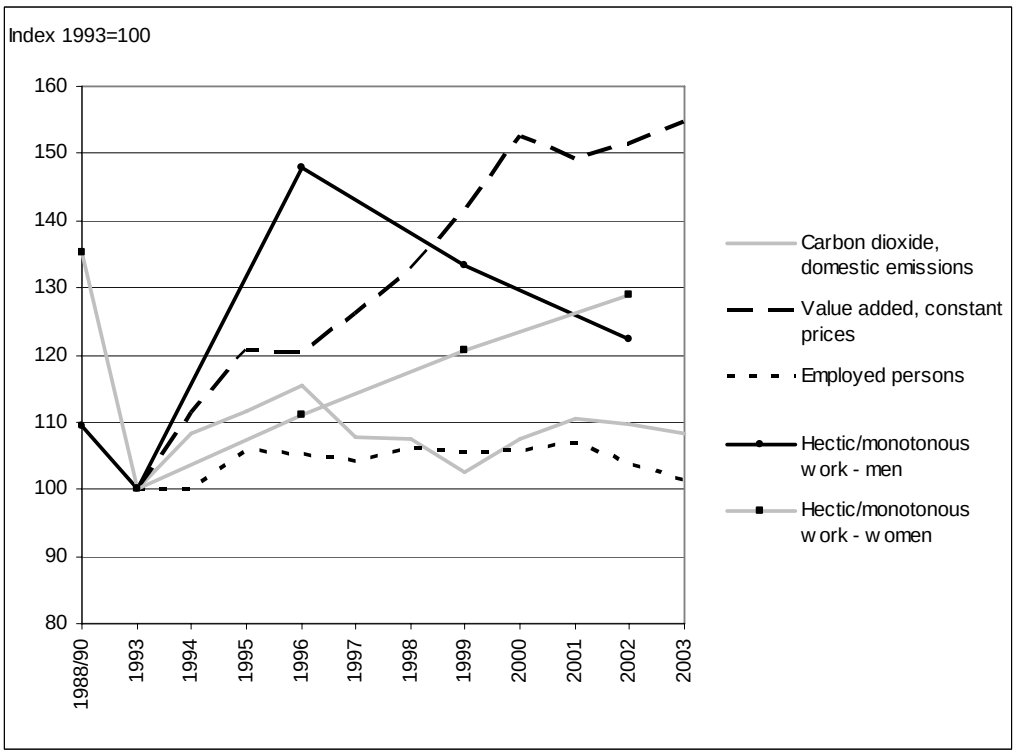


Diagram 2.7 Employed persons by industry, excl. public sector.



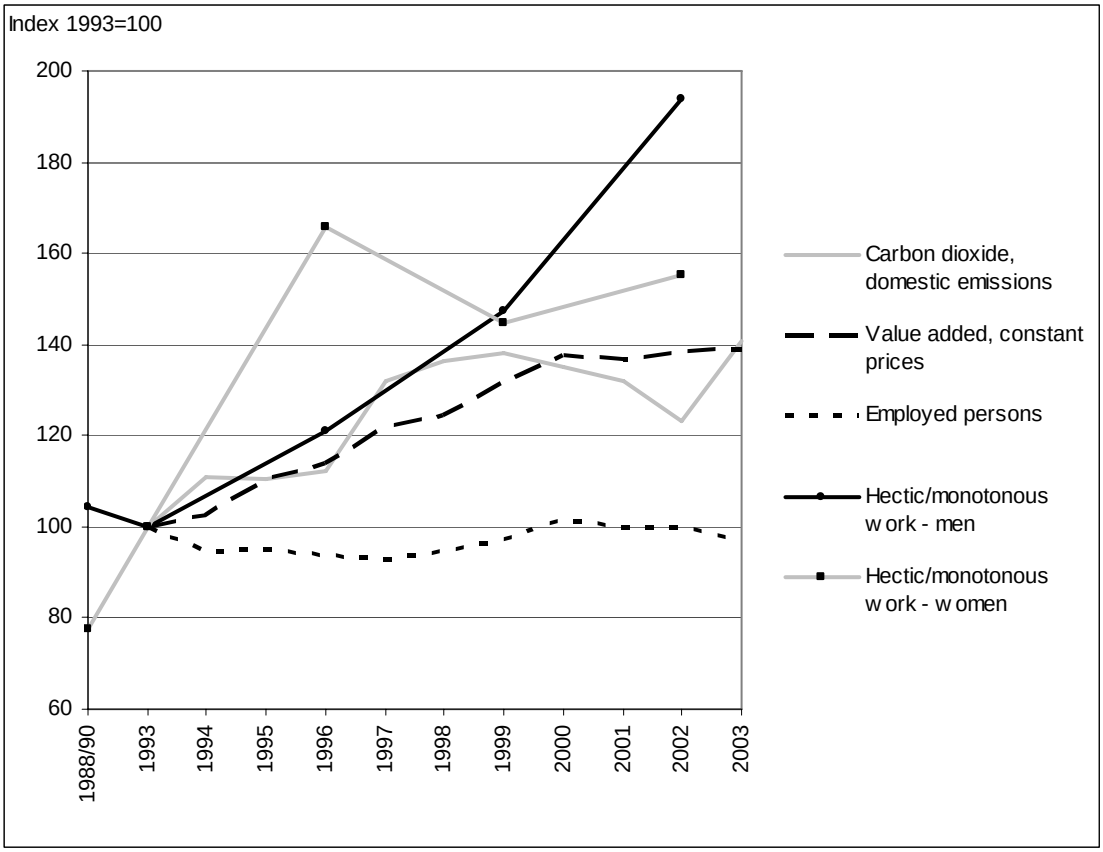
The manufacturing and mining industry is shown in diagram 2.8. The value added has increased steadily since 1993 while emissions of carbon dioxide have increased. At the same time it has been an increase of number of persons who experience that their work is hectic and monotonous. Among men the trend is downward since 1996, but among women the increase has been constant since 1993. The number of employed persons has been fairly constant during this period. The time series start at 1988/90 which is before the economic crisis in Sweden. The crisis in the beginning of the 1990s had a profound impact on different social aspects in Sweden.

Diagram 2.8 The manufacturing and mining industry (NACE 10-37).



The working environment has been more hectic and monotonous in the transport industry (see diagram 2.9). It has been a constant increase of hectic and monotonous work among men since the early 1990s while among women the increase has levelled out since the mid-1990s. The emissions of carbon dioxide have increased at a similar rate as the value added, therefore no decoupling has occurred.

Diagram 2.9 The transport industry (NACE 60-64).



3 Decomposition of carbon dioxide emissions

The purpose of this chapter is to examine the reasons of the relative decoupling between emissions of carbon dioxide and GDP. We will look at the time series 1993-2003 for carbon dioxide and perform different kinds of decomposition analysis (For methodology see Wadeskog and Palm, 2003). The chapter is divided into two different parts; one where we analyse the causes to the present situation in terms of emissions of carbon dioxide and a second part in which we build different future scenarios and their relation to the political objectives of reducing carbon dioxide emissions and decrease the use of fossil fuels.

3.1 Present situation

Between 1993-2003 we can see a relative decoupling between emissions of carbon dioxide and GDP, i.e. the increase in GDP is more rapid than the increase in carbon dioxide, which was discussed in the previous chapter (see diagram 2.2). To build a sustainable development, i.e. increasing growth in GDP and at the same time decreasing emissions, we need to understand the underlying causes to this decoupling. One way to analyse this is to use decomposition analysis and to look at the parts affecting carbon dioxide emissions. In this case we examine the volume and structure of final demand, the structure of the input-output matrix, i.e. how the industries trade with each other, and the emission intensities.

Decompositions components

- Structure of the final demand

Describes changes of the emissions due to changes in the economy, e.g. changes in the distribution between goods and services

- Volume of value added

Describes changes of the emissions due to changes in the volume of value added.

- Input-output structure

Describes changes of the emissions due to changes in the input output structure, i.e. how the industries trade with each other.

- Emissions intensities

Describes changes of the emissions due to changes in emissions intensities. Emission intensity means how much emission that is emitted per Swedish krona.

Domestic emissions in the industry
Emissions that arise from production and consumption of goods and services in the industry.

Domestic emissions from private consumption

- Indirect emissions

Emissions that arise from the production of the goods and services that the households consume. These emissions are a part of the domestic emissions in the industry that are reallocated on the products that households consume yearly.

- Direct emissions

Yearly emissions that arise from the households' use of direct energy, i.e. car driving and heating of houses.

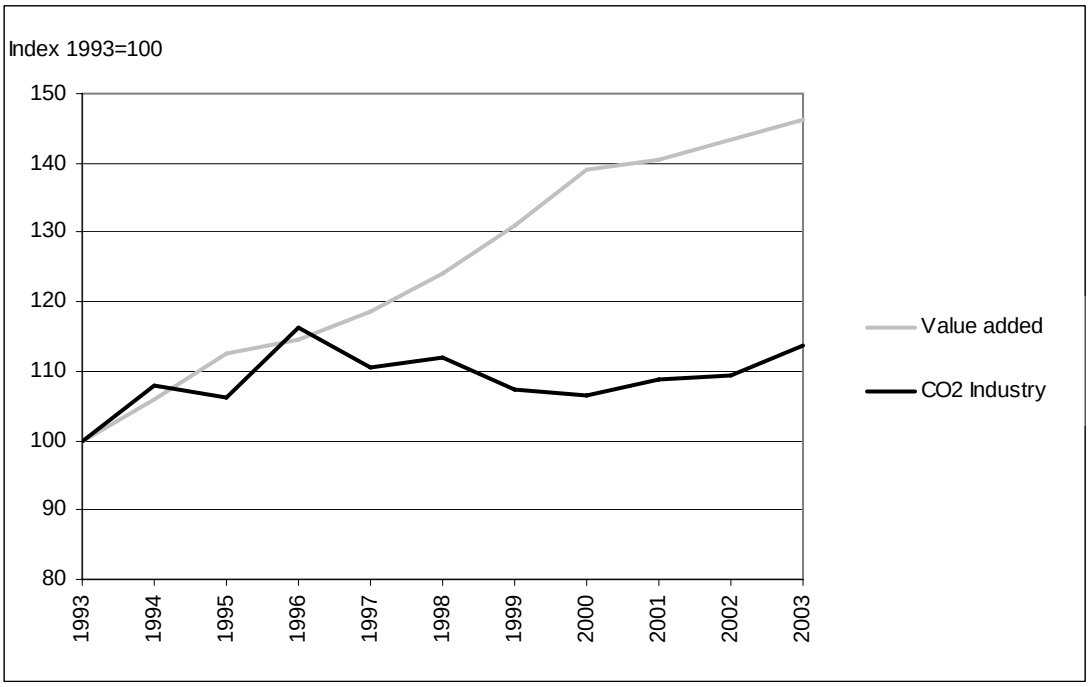
Imported emissions
Emissions caused by production of goods and services in foreign countries and imported to Sweden.

Sweden's domestic emissions are equal to the domestic emissions in the industry + the direct domestic emissions from the households + the domestic emissions from the public sector + Non gov. households organisations.

3.2 Emissions of carbon dioxide - an overview

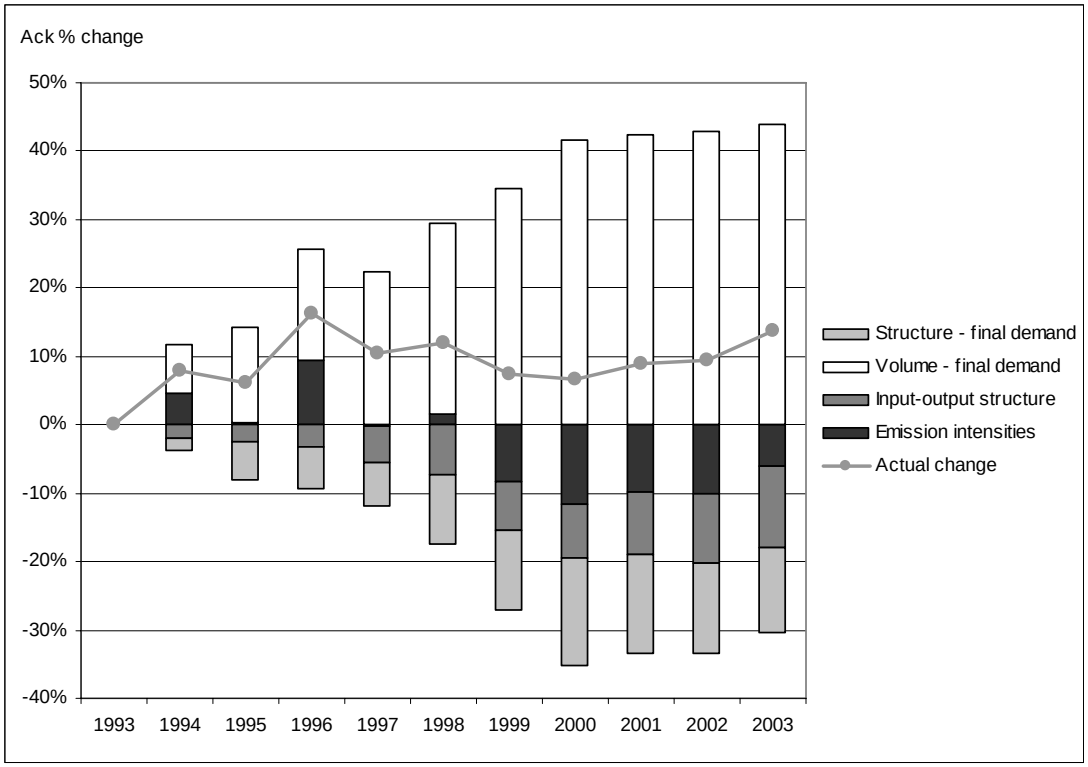
Diagram 3.1 gives an overview of the domestic emissions of carbon dioxide in the industry compared with the industry's value added. The emissions have increased by approximately 14 per cent between 1993 and 2003 while the value added has increased by nearly 50 per cent, i.e. a relative decoupling has occurred.

Diagram 3.1 Change of value added and domestic emissions of carbon dioxide in the industry. (These emissions are not the same as the emissions in diagram 2.2 which also includes e.g. direct emissions from the households)



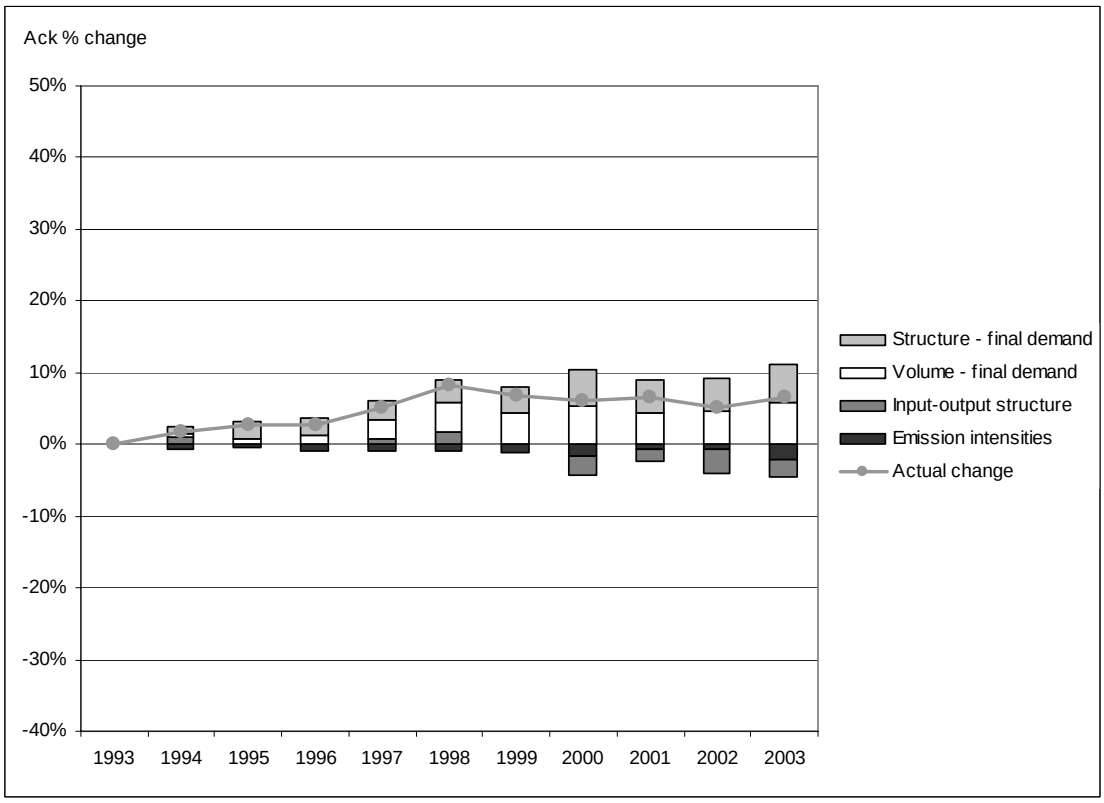
The next diagram (diagram 3.2) shows what has caused the actual changes of the emissions of carbon dioxide. The different components that have affected the emissions are the structure of the economy (e.g. the distribution between goods and services), the volume of value added, the input-output structure and emissions intensities. The graph in the diagram shows the actual change of emissions, i.e. it is the same graph as in diagram 3.1. The volume change is an increasing factor while the structure of the economy, input-output structure and emissions intensities have been a decreasing factor during most of the years. For example, if the volume had been at the same level in 2003 as 1993, then the emissions of carbon dioxide would have decreased by 30 per cent. One explanation of why the structure of the final demand has been a decreasing factor is probably a shift in demand from goods to more services.

Diagram 3.2 Change of domestic emissions of carbon dioxide in the industry.



The total emissions of carbon dioxide from the industry can be divided in domestic and imported emissions. The change of emissions caused by production of goods and services in foreign countries and imported to Sweden is shown in diagram 3.3. The import has increased the emissions from industry by roughly 7 per cent, because of an increase in the volume of final demand and changes in the structure of intermediate and final demand.

Diagram 3.3 Change of imported emissions of carbon dioxide in the industry.



3.3 Emissions of carbon dioxide from stationary and mobile sources in industry

The domestic emissions of carbon dioxide in the industry can be divided into stationary and mobile emissions which have been done in diagram 3.4. and 3.5. The emissions from the stationary sources are at the same level in 2003 as in 1993. The increases due to the volume increase of final demand have been counterbalanced by changes in the structure of the economy, structure of the input output and decreasing emission intensities.
For the mobile emissions however, emissions have increased by approximately 35 per cent. The large increase of the volume has not been counterbalanced in equal amount by the other three factors. In fact, the emissions intensities for mobile sources have increased by approximately 8 per cent.

Diagram 3.4 Change of domestic stationary emissions of carbon dioxide in the industry.

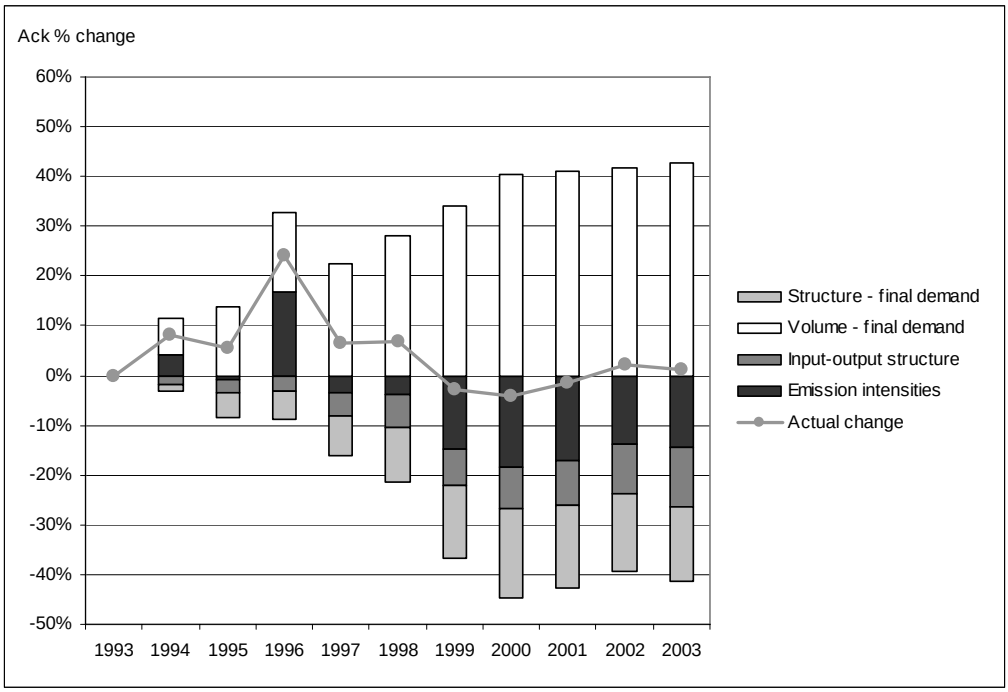
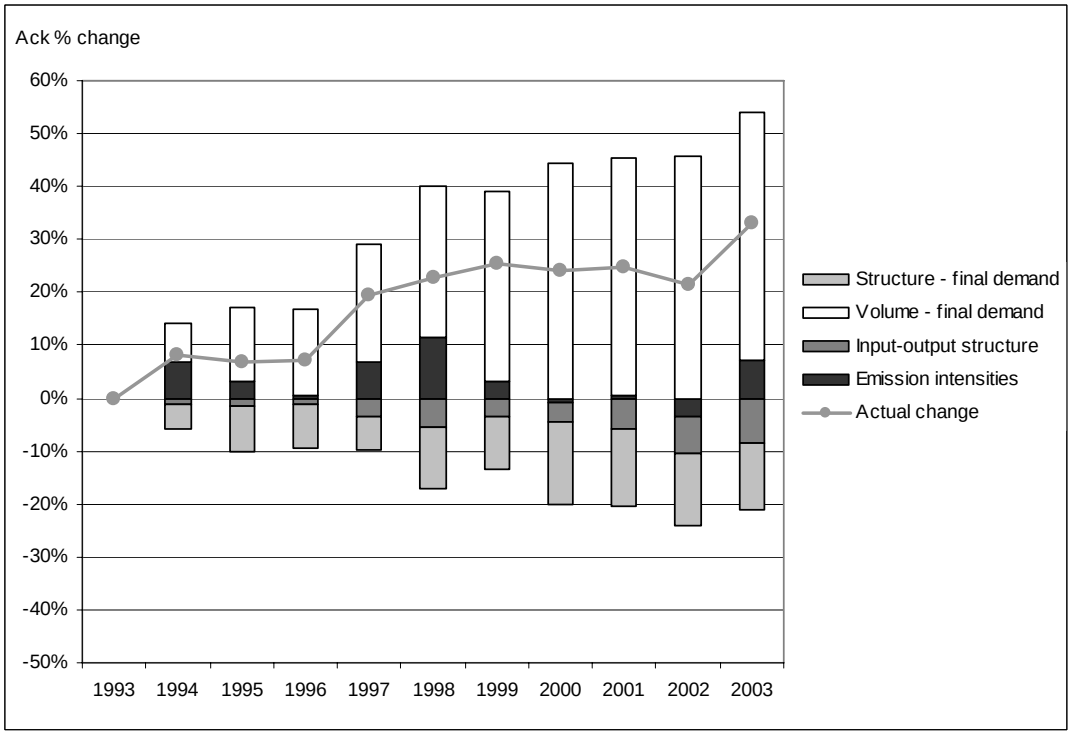


Diagram 3.5 Change of domestic mobile emissions of carbon dioxide in the industry.



3.4 Emissions of domestic indirect carbon dioxide from exports and public and private consumption

Another way to show the change of the domestic emissions of carbon dioxide in the industry, is to allocate their emissions on the final demand components; exports, the public and the private consumption excluding investments. This is sometimes labelled indirect emissions. The indirect emissions from exports have increased by nearly 40 per cent, which arises from the large increase of the volume. The increased emissions in exports are partly counterbalanced by a decrease of the emissions in the public consumption by roughly 15 per cent and a decrease in the private consumption by 5 per cent (see diagram 3.7 and 3.8). The indirect emissions from the public and private consumption have decreased partly because of a changeover to distant heating respectively bio fuels.

Diagram 3.6 Change of domestic emissions of carbon dioxide from exports.

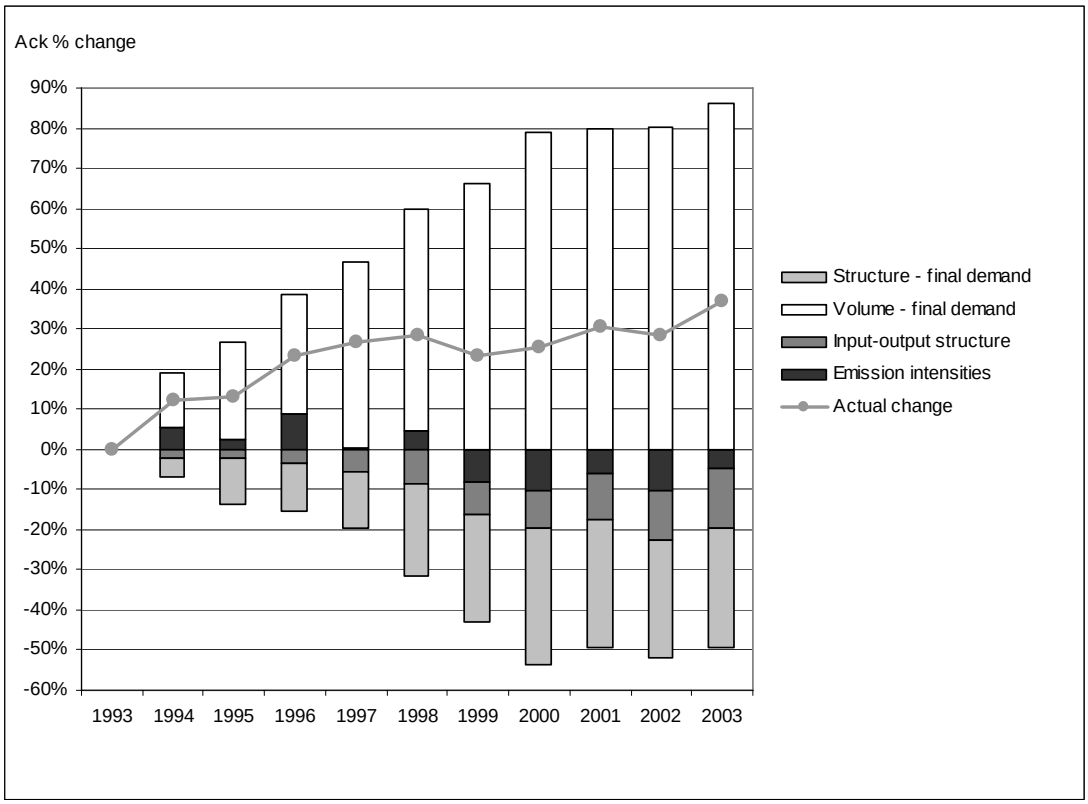


Diagram 3.7 Change of domestic indirect emissions of carbon dioxide from public consumption.

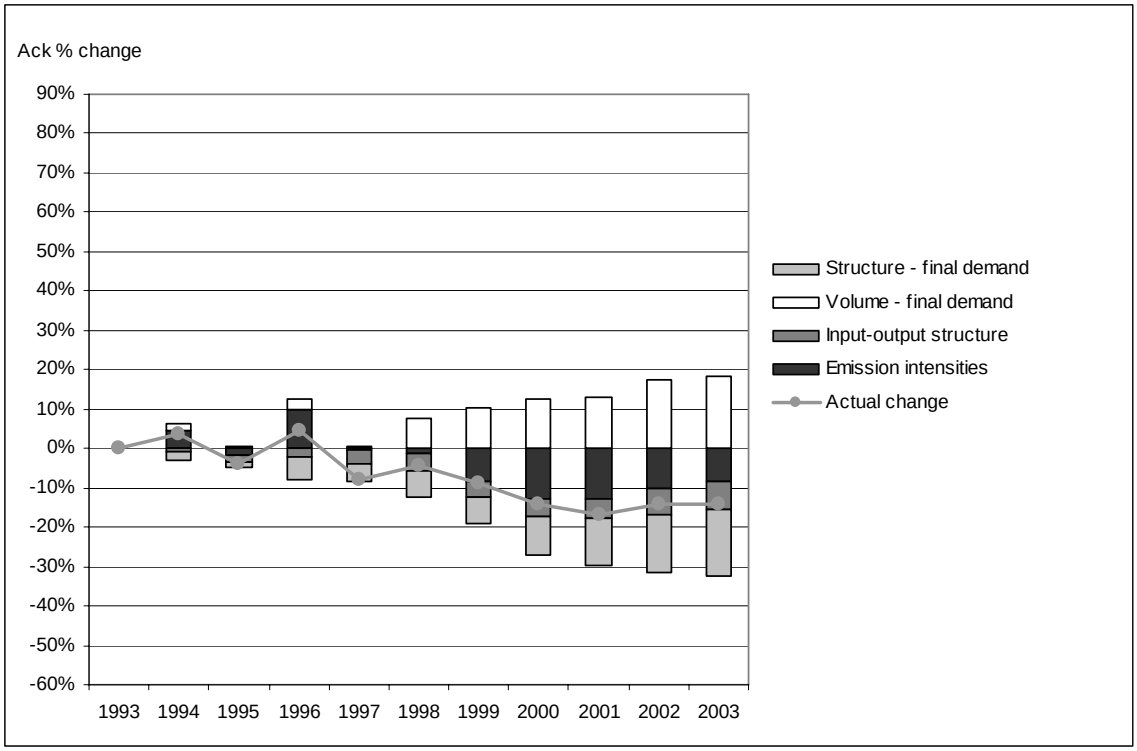
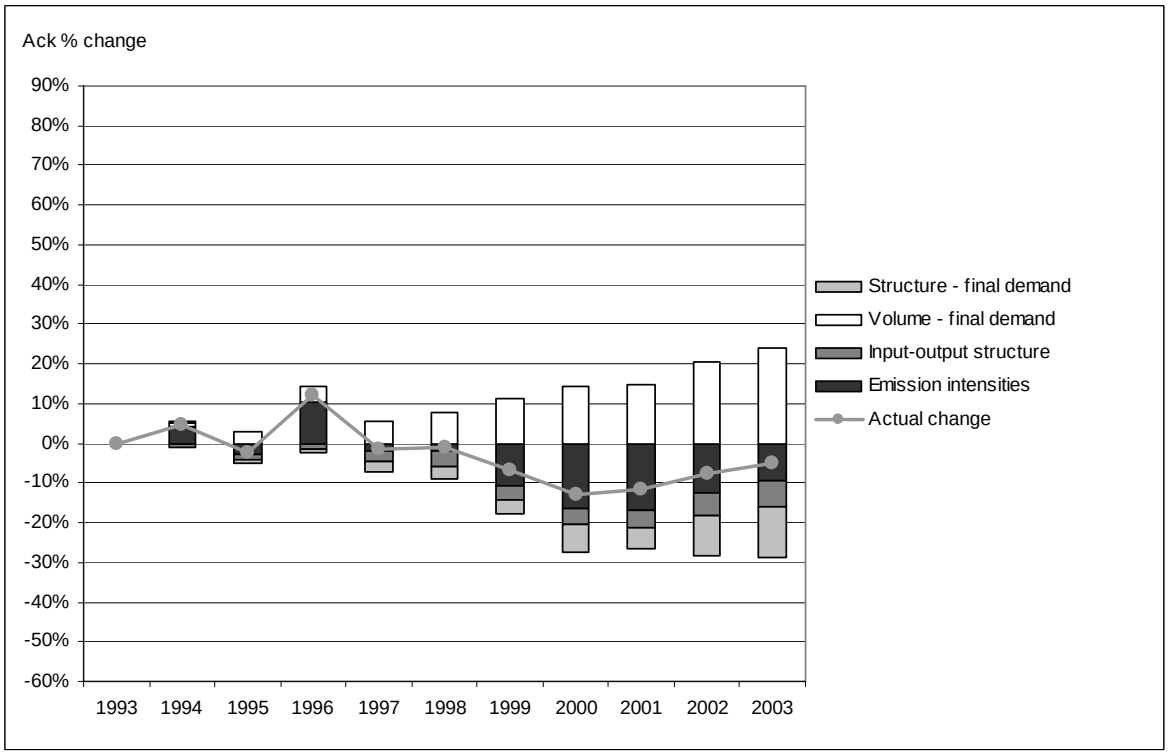


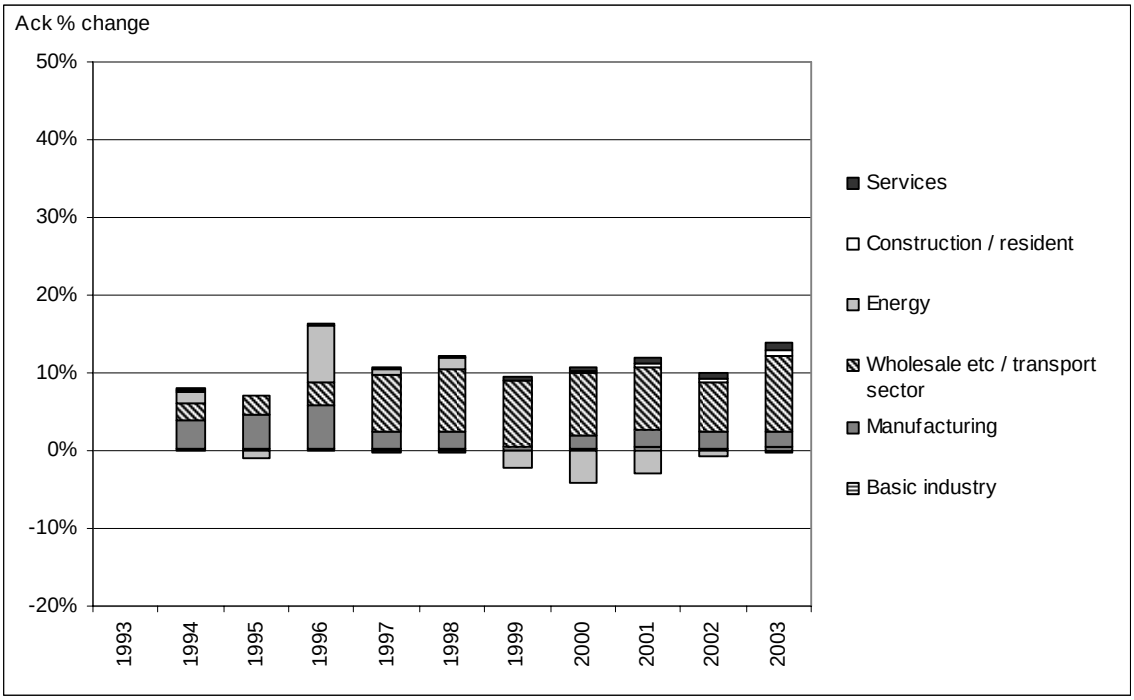
Diagram 3.8 Change of domestic indirect emissions of carbon dioxide from private consumption (households). The direct emissions from households are not included as they cannot be allocated on these factors.



3.5 Emissions of carbon dioxide by industry

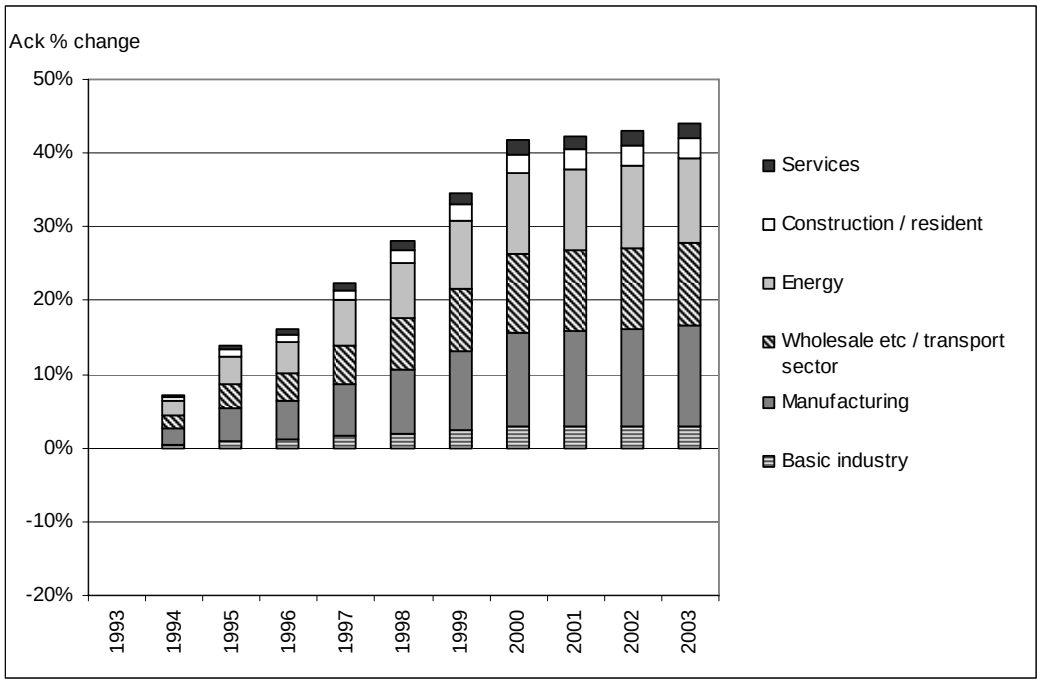
To further understand which part of the industry that is responsible for the increase of the domestic emissions of carbon dioxide, it is possible to disaggregate the emissions by industry (shown in diagram 3.9). The diagram shows that the wholesale/transport sector stands for the largest part of the increase, roughly 10 per cent. The large increase of the emissions of carbon dioxide by the transport sector is uncertain because the increase is due to an increase of the emissions from the water transport (shipping industry). The emissions from this industry consists for instance of bunkering of fuel which is difficult to estimate.

Diagram 3.9 Actual changes of domestic emissions of carbon dioxide in the industry.



Similarly as for the previous diagrams it is possible to break down the emissions in four emissions components, i.e. the volume in final demand, structure of the economy, structure of the input-output and emission intensities. Diagram 3.10 shows the change of indirect emissions of carbon dioxide that arise from the volume in final demand disaggregated by industry. The industries that contribute most to the increase of the emissions that arise from the volume in final demand are the manufacturing industry and the energy industry and the wholesale/retail/transport sector.

Diagram 3.10 Change of domestic emissions of carbon dioxide regarding the volume in final demand by industry.

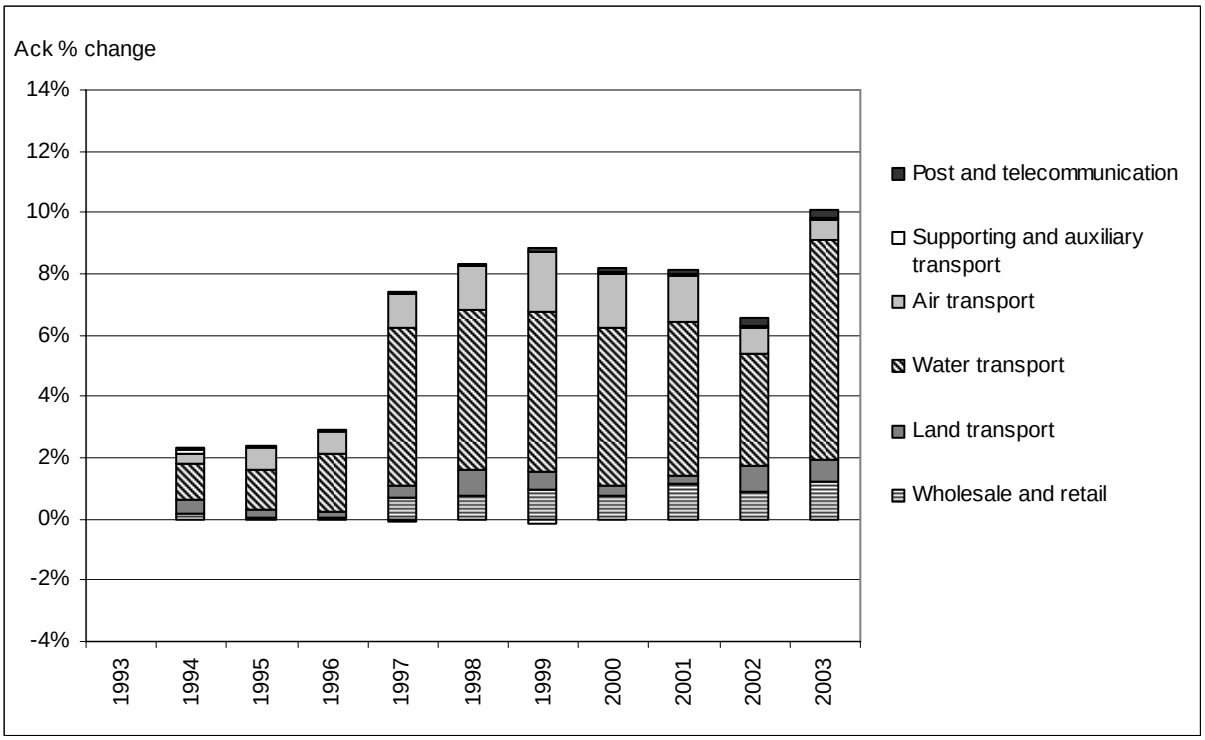


The other three emission components partly counterbalance the increase of emissions due to an increase of volume in final demand, roughly 10 per cent respectively (Not shown). Regarding the structure of the economy, it is the energy sector that stands for the largest part of the decrease of the emissions. Regarding the structure of the input output and the emission intensities the manufacturing industry stands for the main part of the decrease of the emissions.

3.6 Emissions of carbon dioxide in the transport sector

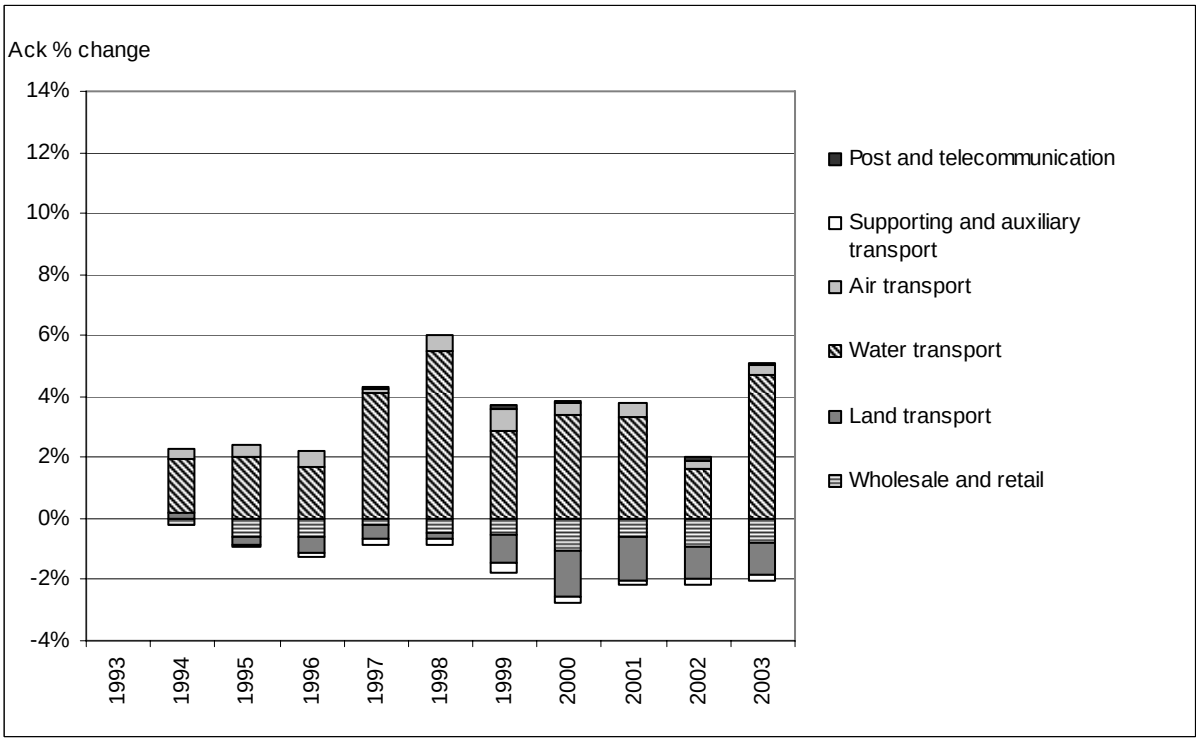
The transport sector is one of the main challenges to solve if the emissions of carbon dioxide are going to be reduced to levels that are necessary to mitigate the climate change. The diagram 3.11 shows the change of domestic emissions of carbon dioxide in different transport industries. Interesting to note is that all transport industries have increased their emissions since 1993. The transport industries have increased their emissions to different extents; the water transport industry has increased its emissions by roughly 7 per cent compared with 3 per cent for the rest of the transport sector.

Diagram 3.11 Actual changes of domestic emissions of carbon dioxide in the transport sector.



To see what has caused the increase in emissions for the transport sector the emissions are broken down in the four emissions components, i.e. the volume in final demand, structure of the economy, structure of the input output and emission intensities. That shows that the emissions from the volume in final demand have increased by roughly 12 per cent but also that the emission intensities have increased the emissions by roughly 3 per cent, i.e. the emissions intensities have increased. The emissions that arise from the other two factors have decreased by roughly 2 per cent respectively.

Diagram 3.12 Change of domestic emissions of carbon dioxide regarding emission intensities in the transport sector.



3.7 Carbon dioxide emissions from different product groups

The emissions from the private consumption, i.e. the households, can be distributed by different product groups (see diagram 3.13). This can be compared with the distribution of private consumption by value for the same product groups (see diagram 3.14). In this way it is possible to see the relationship between the consumption by value for a certain product group and its emissions of carbon dioxide.

As can be seen from the two diagrams there are differences between the consumption by value for a certain product group and its emissions of carbon dioxide. For example food/drinks, clothing/household appliances, housing/rent and services compose a considerable part of the private consumption by value but the emissions from these product groups appears relatively small. This is partly due to the product division, where fuels are seen as products in themselves. The emissions from heating of private houses with fuels are therefore recorded as direct emissions from households. The private consumption by value of household energy and direct energy are much smaller compared with their emissions of carbon dioxide, e.g. the emissions from the use of direct energy stands for almost half of the total emissions from the households.

Diagram 3.13 Domestic direct and indirect emissions of carbon dioxide from private consumption by different product groups, 2003.

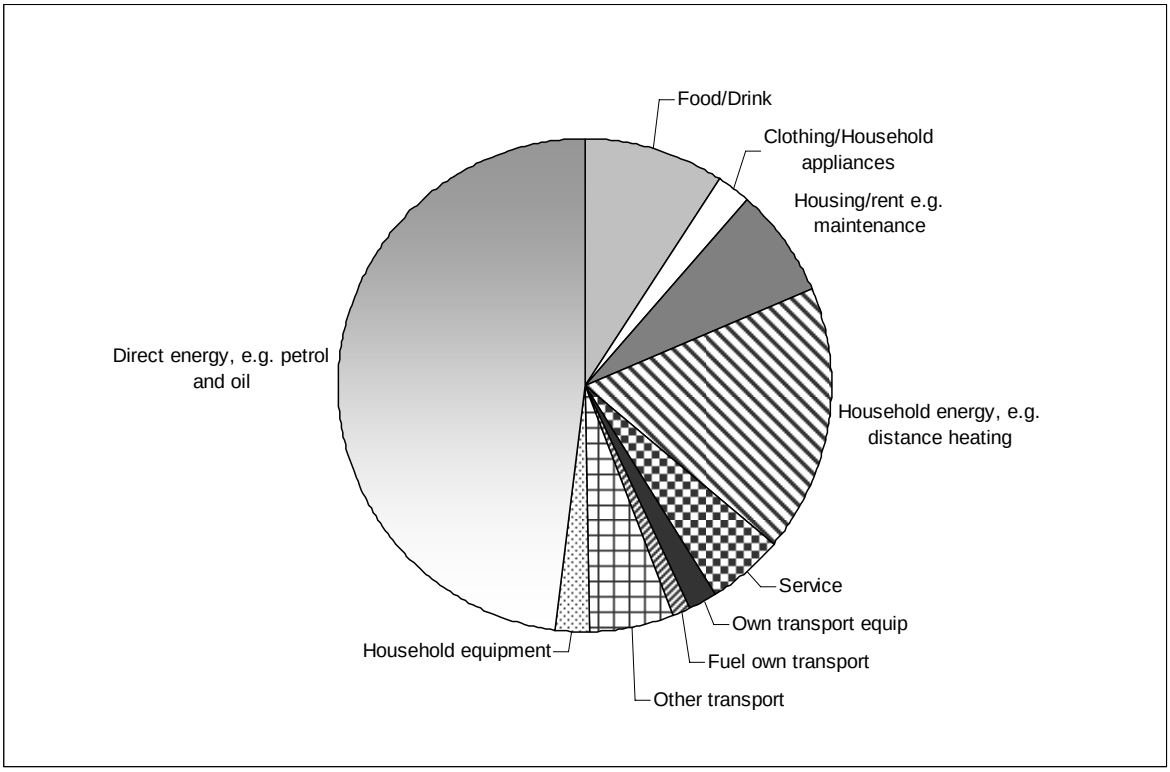
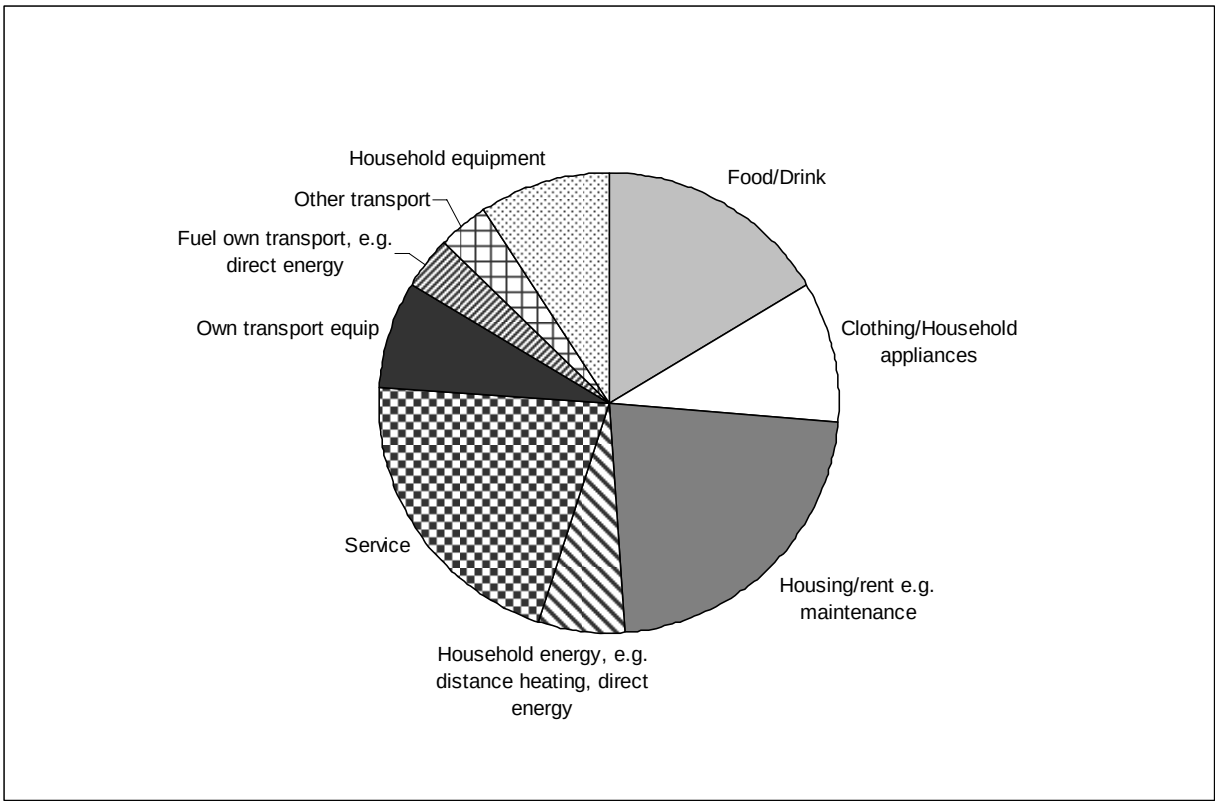
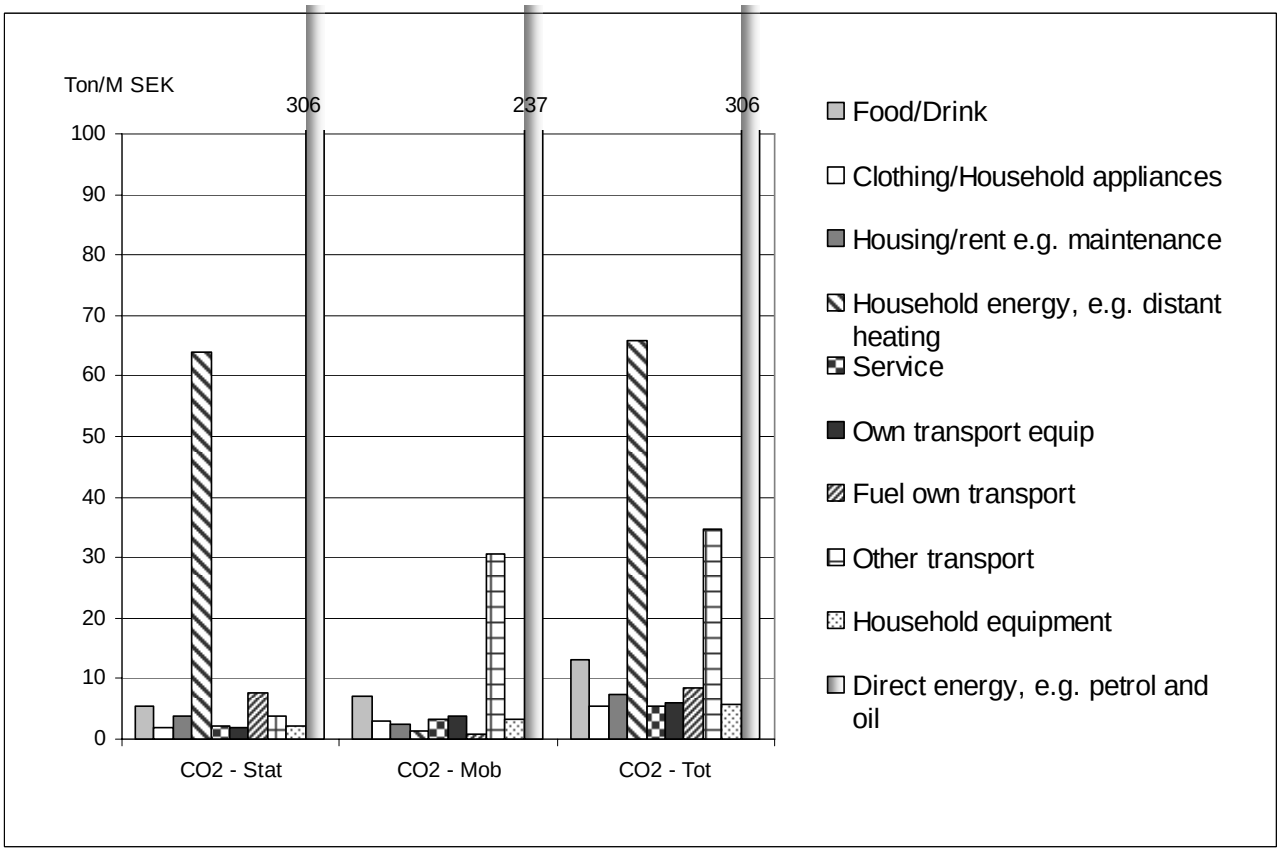


Diagram 3.14. Private consumption by value for different product groups, 2003.



Another way to show the relationship between private consumption by value and its emissions is to calculate emission intensities for different product groups (diagram 3.15). The diagram shows that the use of direct energy (e.g. car driving) emits large amounts of carbon dioxide per consumption by value.

Diagram 3.15 Emissions intensities by product groups, 2003, domestic emissions. The direct energy intensities are not shown entirely, but their figures are shown.



3.8 Scenarios for emissions of carbon dioxide from private consumption

Sweden has a national goal to reduce the emissions of greenhouse gases by four per cent to 2008-2012. There is also a more ambitious goal to reduce the emissions of greenhouse gases to 4.5 tonnes carbon dioxide equivalents per year and person to 2050. That means that the emissions must be reduced from 70 millions tonnes today to 47 millions tonnes carbon dioxide equivalents to 2050. There are different solutions how this can be achieved. We will in this part look at different alternatives to reduce the emissions of carbon dioxide from private consumption. The alternatives we have chosen are improved emissions intensities, a 20 per cent increase of the households' consumption of services and a 20 per cent reduction of the households' use of direct fuels (e.g. petrol).

The change of emissions of carbon dioxide during one year for the emission scenarios are shown in diagram 3.16. The change of emissions due to an increase of four per cent of the private consumption by value would increase the emissions by 1 000 000 tonnes (scenario 1). The improved emissions intensities would reduce the emissions by roughly 170 000 tonnes of carbon dioxide (scenario 2). A substitution of the household's consumption of goods for consumption of services by 20 per cent would reduce emissions by roughly 500 000 tonnes (scenario 3). If the increase of the private consumption by value, the improved emission intensities and the increase of consumption of services are put together the emissions would increase by nearly 500 000 tonnes (scenario 4). If also a 20 per cent reduction of the households' use of direct fuels is added to scenario 4 the emissions of carbon dioxide would decrease by roughly 2.5 million tonnes. This reduction corresponds to a reduction of greenhouse gases by roughly 3.5 per cent which is close to the target of 4 per cent. However, the comparison is not altogether accurate, as the four percent target excludes the international transports such as air transport and shipping.

Emission scenarios

1. A four per cent increase of the private consumption by value.

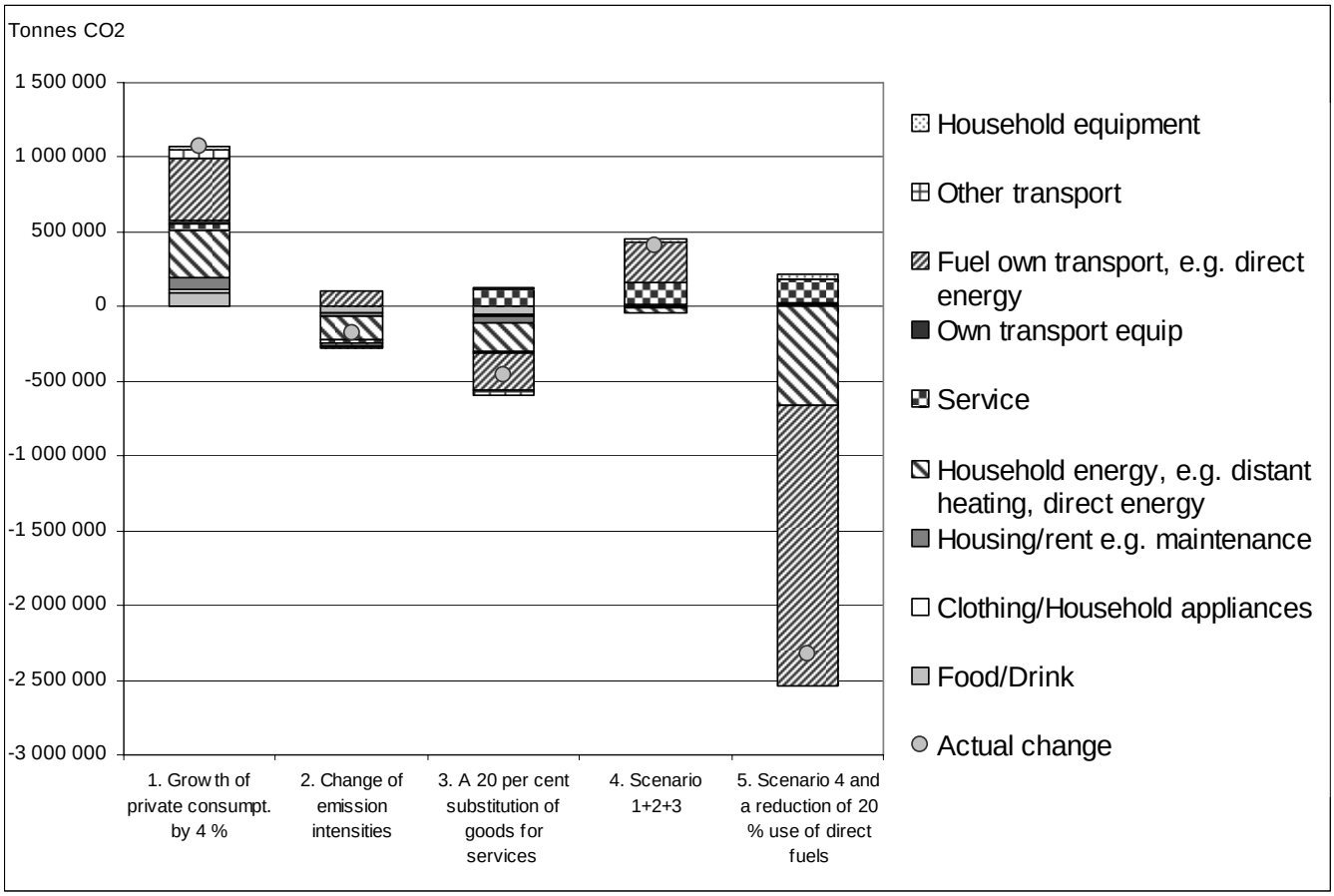
2. Improved emission intensities in the industry. The mean trend between 1993 and 2003.

3. A 20 per cent substitution of consumption of goods for consumption of services by the households.

4. Scenario 1, 2 and 3 together

5. Scenario 4 plus a 20 per cent reduction of the households' use of direct fuels, e.g. petrol and heating.

Diagram 3.16 Carbon dioxide emission scenarios for private consumption, domestic indirect and direct emissions.



4 Responses

4.1 Introduction

This chapter will discuss possible indicators that can be derived from the environmental accounts or other statistics and which concerns responses to the issues that are regarded in the sustainable development strategies. It is an attempt to outline how an underlying data-system can connect the head-line indicators to a more in-depth analyses of the responses at hand, and point to where the instruments are in place and where they are not. There will be a focus on economic instruments, but also other types of data which can be found in the full set of indicators. The full set of indicators concerns the initiatives for a more sustainable production and consumption pattern, such as e.g. environmental technology, green cars, ecological farming and investments in environmental protection.

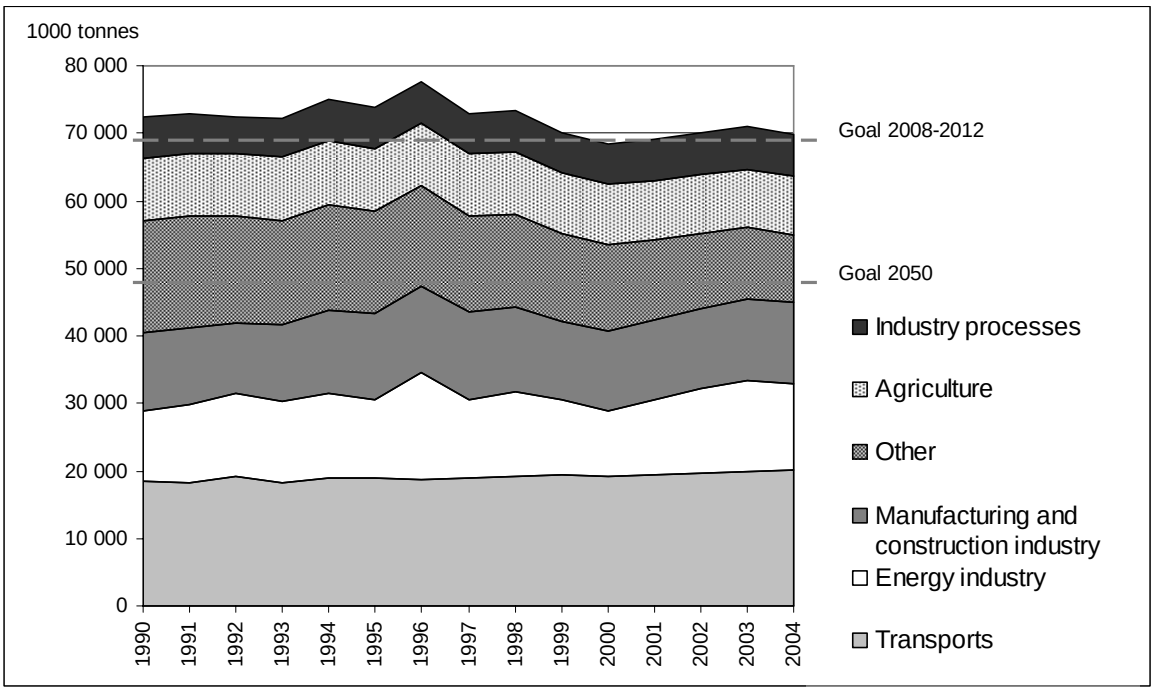
There are three different groups of instruments by which the state can administer the development: informative, administrative and economic instruments. The indicators are part of the informative instruments, by providing a follow up of the strategy. Through the forming of institutions and allocation of funds, the state also influences how much efforts will be devoted to various parts of the strategy.

While the state can set some of the national rules for how challenges are met, many other factors such as the development of the economy, the weather as well as the effects of general international development will also have a large impact on the resulting trends.

4.2 Long term political targets

Comparing political targets, international such as the Kyoto agreement target, or the Swedish Environmental objectives as well as targets on unemployment or traffic injuries, with the trends in the statistics shows how far from the goals we are (diagram 4.1). The environmental quality objectives focus on the state of the environment for the next generation, or about 25 years. The medium- term economic survey has a forward looking time frame. Also for the social sphere some long-term goals are set, e.g. for traffic injuries. In some cases, such as the pension systems and demographic changes, modelling is used to project possible future outcomes of the indicators.

Diagram 4.1. Indicator from the Swedish sustainable development strategy showing relations to targets. Greenhouse gases in Sweden, carbon dioxide equivalents.



4.3 The strategy and the Swedish public authority structure

The strategy lists different measures that are planned to reach the objectives. Many of the measures are concerned with planning. For example, one of the four themes is ‘building sustainable communities’ and here the planning process is central. Many of the listed measures are also public inquiries that are expected to result in more concrete plans. In order to understand how these planning measures are being implemented in Swedish society, we will briefly describe some of its components and institutions.

The Swedish system of authorities is divided in three levels for which there is separate political governance: the Parliament, the 21 County councils and the 290 Municipal councils. The work on how to reach sustainable development concerns all levels.

The Government governs the nation, implements the Parliamnent's decisions and initiates new laws and law amendments. It is assisted in its work by the Government Offices and around 300 government agencies. The Governments routine direction of government agencies is effected through annual appropriation directions, setting out the goals the agency is to achieve, how much money it has at its disposal and how the money is to be divided among the different activities.

The County councils are responsible for health planning and traffic planning. The County councils are more closely connected to the municipalities than the regional representatives of the state, the so-called County Administrative Boards.

The municipal council takes decisions in many areas: matters concerning schools, preschool, care of the elderly, roads, water and sewage, energy, etc. The municipalities also issue various types of licences, for example building licences and licences to serve wine, beer and spirits on premises. The activities are financed through municipal taxes, government grants and charges, and are primarily regulated by the Swedish Local Government Act. Other Acts important to the municipalities include the Social Services Act, the Planning and Building Act and the Schools Act.

4.4 Environmental legislation

Fifteen existing environmental laws were modernised to form the Environmental Code in 1999. Many activities fall within the scope of both the Environmental Code and other legislation. Examples include road and railway construction, mining and forestry.

The instruments under the Code include powers to set environmental quality standards governing the minimum acceptable quality of air, water, soil and the environment in general. Environmental sanction charges have been introduced as a more rapid way of dealing with infringements. These are levied directly by the authorities responsible for inspections and enforcement.

4.5 Environmental Technology Institutions

In 2005 the Government decided to set up the Swedish Environmental Technology Council (SWENTEC). The Council will have a role in coordinating overall public development programmes in the sector, covering everything from research and development to market introduction and export promotion. Moreover, the Council will support cooperation between regional networks consisting of industry, R&D organisations and regional authorities. The Government has allocated EUR 1.1 million to the Council for first year of its operations.

Vinnova - the Swedish Agency for Innovation Systems integrates research and development with technology, transport and working life. The aim is to promote sustainable growth by financing research and technical development and developing effective innovation systems.

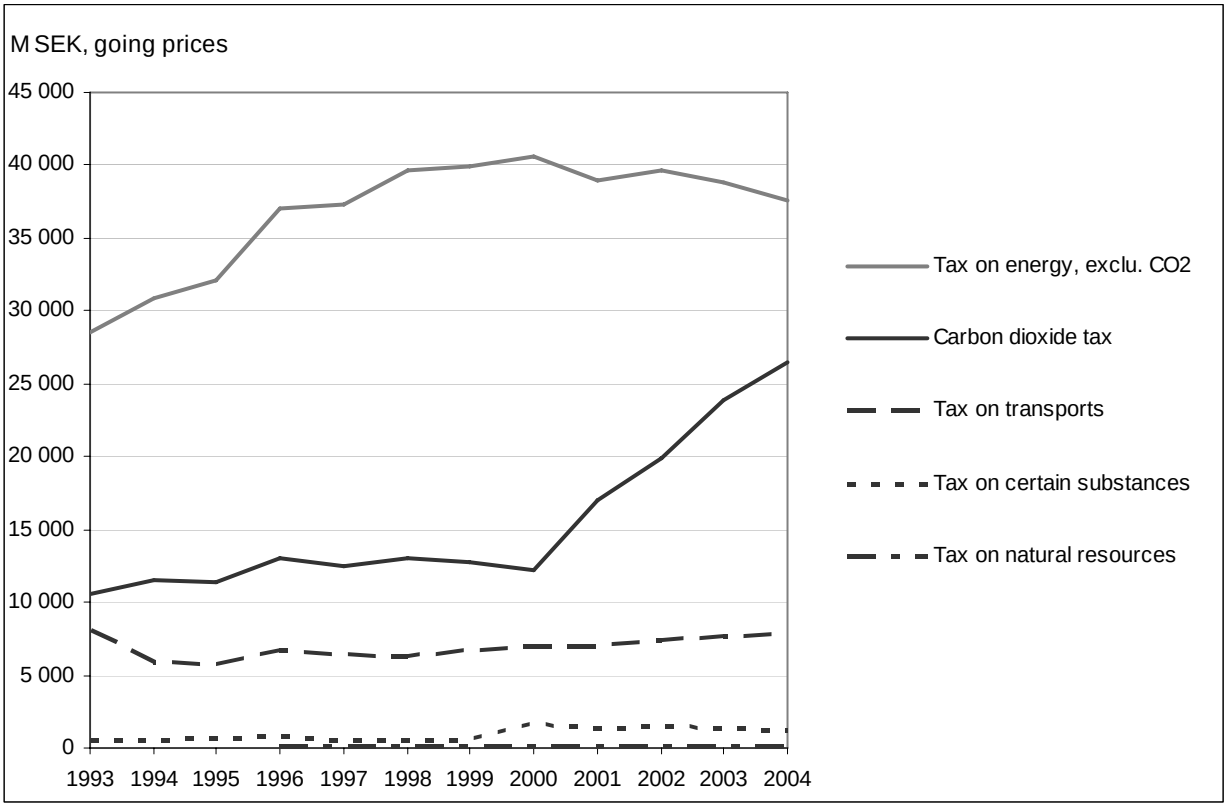
Nutek - the Swedish Business Development Agency is the national agency dealing with industrial policies and centres of excellence for entrepreneurship, business development and regional development. Nutek runs a programme for environment-driven business development. The emphasis is on supporting small and medium-sized enterprises to become more competitive by considering environmental issues in their product and business development. An earlier programme concentrated on introducing environmental management in small companies.

4.6 Economic incentives- the example of Climate change

Climate change is one of the most central issues in the SD strategy. This issue has implications for all threee dimensions of SD, and is long-term in its effects. It is closely linked to the consumption of fossil fuels, and to the anticipated rise of global consumption patterns to the level of those in the developed countries. It is still not clear how the international community will tackle this problem. The Kyoto targets have been a start of this process. The instruments in place are national energy taxes, carbon taxes and the emerging EU-system of emission rights.

For the environment-economic linkage the SEEA can provide a link between the emissions of climate change gases and economic activities. The system makes it possible to see the contributions from different industries from the production side, but also to link to the consumption pattern. The system also allows for analyses of economic incentives, such as environmental taxes (diagram 4.2) and subsidies. The analyses carried out in chapter 3 are based on environmental accounts data. For incentives data there are already some of the under-lying indicators that are taken from the environmental accounts. The indicators for environmental taxes are an example of these. They are linked to the industries, authorities and households that pay the taxes, and can be used for deeper analysis work.

Diagram 4.2. Environmental taxes. Underlying indicator.



In Sweden, green tax reforms have been put to place in 1990-1991 and 2000-2001. In the first reform taxes on sulphur and on carbon dioxide were introduced, while income taxes where lowever. In the second reform electricity and diesel oil were targeted for tax increases.

4.7 Costs of measures- the example of Health

Health can be used as an example of how headline and underlying indicators may be connected in future work. Some studies have been found that weigh together different health problems and link them to the costs of measures. The two headline indicators in the Health area are ‘life expectancy at birth combined with healthy life years at birth’ and ‘victim of violence or threat of violence’. Life expectancy is a stable and well-established over-all indicator that is the result of many different trends.

Beneath the headline indicator is today an array of indicators that give more detail as to why the life expectancy is evolving as it is. Self-perceived health, children’s well being, asthma in schoolchildren, psycho-social work environment, physical work environment, smoking, alcohol consumption, obesity, exercise habits and number of people killed or seriously injured in traffic accidents. Ideally, the connection between the overall indicator and the underlying indicators would be assessed. For example, to calculate how a realisation of the plan for decreasing number of accidents would affect the mean life expectancy (See for example Hjalte et al, 2003, Maraste et al, 2003).

Some research has been done with the help of a WHO database, following a similar idea, measuring causes of illness and relating it to ‘Disability free adjusted life-years’ (DALYs). This research shows the major causes for illness in Sweden and makes it possible to compare the costs for prevention activities with the benefits that can be foreseen (Moradi et al, 2006, Peterson et al, 1999). The content of the WHO database sets a limit for what can be included. The burden of disease in Sweden, as measured in DALYs, is dominated by three groups of diseases: cardiovascular diseases, mental disorders and malignant tumors which account for more than 60% of the total burden of disease in terms of DALYs.

Psychosomatic symptoms such as headache and stomachache, and mental symptoms such as depression and anxiety became more common among young people of school age during the 1990s. According to Statistics Sweden’s surveys of living conditions, the number of young people between the ages of 16-24 who reported having difficulties sleeping tripled during the 1990s. The incidence of anxiety increased during the period. The Statistics Sweden report "Young people in Swedish society - Generation gap 1980-2003" (English text p 111) describes the deterioration in health of above all the younger generation and especially regarding psychosomatic indicators. This deterioration can be seen as a reaction to strain and stress of employment, work environments, income-related problems, social relations, etc.

A health economic model has been presented in which the costs of various general interventions are weighed against their effects on child and adolescent mental health and their potential socioeconomic benefits (The National Board of Health and Welfare, 2004). The model is based on a prioritisation approach, which takes into account not only the costs incurred by the principal for a specific intervention but also how costs are affected in other societal sectors and in the long term.

The above mentioned report presents examples of costs for various general interventions. These costs are then compared both with the costs of different selective interventions for children and young people, and with examples of costs incurred by society for mental ill health in adults. The estimates presented should be seen as examples of an analytical method. As an example, by preventing one case of substance abuse during adult life, supportive education to improve parent skills can be provided for approx 3,400 or 6,900 sets of parents, depending on how the costs are discounted. This type of education has shown itself to be effective with regard to preventing aggressive mental problems in children and young people. It seems reasonable to suppose that by means of such a widespread educational intervention, at least one child could be prevented from becoming a substance abuser. This is what is required for the intervention to be socio-economically profitable in the long term.

4.8 Research needed

There are several ways of using statistics to obtain an understanding of what may happen over time. For example, data on investments in the economy (e.g. education, technology) will have a large impact on what happens in the future. Not only the size of the total investments of the economy will be of

importance in this case, but also what type of investments. Here, there is work that needs to be done, in order to be able to describe in more detail how the incentives to invest, and how the government budget are linked to the sustainable development strategies.

5 Concluding remarks

The report has investigated some possibilities to under-pin the existing sustainable development indicators in Sweden with accounting data. The inter-linkage between areas is made through the means of the actor perspective, which allows for coupling between environmental and economic issues through the environmental accounts. The actor perspective provides for disaggregation by industries and households, thereby showing more detailed information about trends.

The classification into industries also opens up for modelling approaches. As has been shown in chapter 3, by using input-output modelling, the carbon dioxide emissions trend can be decomposed into several factors. Most important are those of the volume of final demand, which generally increases the emissions. The types of fuels used are also of major importance and differences between years in the mix of fossil and non-fossil fuels can be seen.

The most important factor for the increases in emissions in this analyses however, turns out to be the increase of emissions in transports, most notably sea transport. This result has to be treated with caution, as the data and assumptions underlying the emissions from sea transports are not of a high quality. The Kyoto targets are not concerned with emissions from international transport, and so these emissions are not counted as part of the political emission targets. We therefore recommend that data collection and calculations methods for international sea transports and air transport are improved.

For the health area, other types of inter-linkages have been found, mainly through analyses on DALYs and on costs for interventions. The existing SD indicators are not linked, but the underlying indicators in the full set shed light on some important trends, and are in this respect a first attempt of analysis. This area would be of great interest to explore, as there are many countries that grapple with how to link the social and the economic areas. In part, explanations on the links e.g. between employment and economic growth and the interventions that are wished for will differ depending on value judgements. Still, there is probably a great value in statistical analyses that can shed light on how existing and new policies perform on a national basis.

An interesting area to investigate in future works is the distribution of emissions between different households types, incomes groups and types of dwellings. At the environmental accounts at Statistics Sweden some work has been performed in this area (Wadeskog and Larsson, 2003). For example, the report showed that the emissions of carbon dioxide increased with increased disposable income.

6 References

Council of the European Union, “Renewed Sustainable Development Strategy”, DOC 10117/06, 2006.

Eurostat, Wadeskog A and Larsson M, 2003. “Households in the Environmental Accounts”. Available at www.scb.se/mi1301

Eurostat, ”Measuring progress towards a more sustainable Europe - Sustainable development indicators for the European Union - Data 1990-2005”, 2006.

Hass, J., F. Brunvoll and H. Höie (2002): ”Overview of Sustainble Development Indicators used by National and International Agencies”. OECD Statistics Working Paper 2002/2

Hass J, 2006. “Challenges in establishing sustainable development indicators”. http://www.unece.org/stats/documents/2006/11/sust-dev/wp.8.e.pdf

Hjalte K, Norinder A, Persson U & Maraste P.
“Health-health analysis - An alternative method for economic appraisal of health policy and safety regulation: Some Swedish Estimates Accident Analysis and Prevention”, 2003; 35: 37-46

Jänicke,. Mönch, Ranneberg, and Simonis, ”Structural change and environmental impact. Empirical evidence on thirtyone countries in East and West,” Environmental monitoring and assessment 12 (1989), no.2: 99-114.

Maraste P, Persson U & Berntman M., “Long-term follow-up and consequences for severe road traffic injuries - Treatment costs and health impairment in Sweden in the 1960s and the 1990s”.
Health Policy 2003; 66: 147-158

Moradi, Allebeck, Jacobsson och Mathers. “Neuropsykiatriska sjukdomar och hjärt–kärlsjukdomar dominerar”. Läkartidningen Nr 3, 18 januari, volym 103 sidan 137.
http://www.lakartidningen.se/engine.php?articleId=2863 2006-01-17

National Board of Health and Welfare, 2004.”Tänk långsiktigt!”. (Think long-term, in Swedish with a summary in English) http://www.socialstyrelsen.se/Publicerat/2004/5143/Summary.htm Socialstyrelsen.

Peterson S, Backlund I, Diderichsen F: “Sjukdomsbördan i Sverige - en svensk DALY kalkyl”, Karolinska Institutet, Folkhälsoinstitutet, Epidemiologiskt Centrum, Stockholms Läns Landsting., 1999.

SEEA, 2003. “Integrated Environmental and Economic Accounting 2003”. United Nations, European Commission, International Monetary Fund, Organisation for Economic Cooperation and Development, World Bank. http://unstats.un.org/unsd/envAccounting/seea2003.pdf September 2005.

Statistics Sweden, “Structural decomposition of environmental accounts data – the Swedish case”, Anders Wadeskog and Viveka Palm, 2003.

Statistics Sweden, ”Sustainable Development Indicators based on environmental, economic and social statistics” (report 2003:3), in swedish.

Statistics Sweden, “Sustainable development indicators for Sweden - a first set 2001”, 2001.

Statistics Sweden, “Young people in Swedish society - Generation gap 1980-2003” (English text p 111). http://www.scb.se/statistik/_publikationer/LE0101_1980I03_BR_LE108SA0501.pdf

Stern , 2006. http://www.hm-treasury.gov.uk/independent_reviews/
stern_review_economics_climate_change/stern_review_report.cfm

Swedish National Institute of Public Health, “Health economic analysis of municipal interventions to improve mental health”. text on web page: http://www.fhi.se/templates/Page____6831.aspx

Swedish strategy 2006. Government Communication 2005/06:126. “Strategic Challenges – A Further Elaboration of the Swedish Strategy for Sustainable Development”.
http://www.regeringen.se/content/1/c6/07/01/83/1a9ae133.pdf

www.miljomal.nu

7 Annex

The full set of indicators in the Swedish strategy from 2006
(Indicator. More elaborate description)

1. Health

1.1 Life expectancy. Life expectancy and healthy life years at birth
1.2 Violence Victim of violence or threat of violence
1.3 Self-perceived health. Percentage of people who perceive their health to be good or bad.
1.4 Children's wellbeing. Percentage of schoolchildren who are generally faring very well right now
1.5 Asthma. Occurrence of asthma in schoolchildren
1.6 Psychosocial work environment. Percentage of employees with high strain and insufficient support
1.7 Physical work environment. Percentage of employees with complaints due to physical stress
1.8 Smoking. Percentage of the population that smokes daily
1.9 Alcohol consumption. Alcohol consumption per inhabitant aged 15 and older
1.10 Obesity. Percentage of people who are overweight or obese
1.11 Exercise habits. Exercise habits during leisure hours
1.12 Traffic accidents. Number of people killed or seriously injured in traffic accidents

2. Sustainable consumption and production patterns

2.1 Energy efficiency. Energy supply in relation to GNI, Wh/krona broken down by energy form
2.2 Investments. Investments in fixed and human capital, and R&D expenditures, in relation to GDP
2.3 Transport of goods/GDP. Total transport of goods (rail, road waterway) in relation to GDP
2.4 Energy supply. Supply per energy form
2.5 Energy prices. Prices for households; motor fuel, electricity and heating fuel
2.6 Fuel consumption for cars. Petrol and diesel consumption (litres per 10 km) for cars
2.7 Green cars Percentage of cars in environmental classes I, II and III
2.8 Public transport Percentage of population with access to public transport
2.9 Radioactive waste Quantity of spent nuclear fuel from Swedish power stations
2.10 Household waste Quantity of waste from households
2.11 Industrial waste Quantity of waste from the manufacturing sector
2.12 Environmental management systems. Number of businesses with EMAS and ISO 14001 and schools that have the Green Flag Eco-Schools Programme
2.13 Ecological agriculture. Area of ecologically cultivated soil, pastures and hayfields
2.14 Environmentally certified forests. Area of FSC and PEFC certified forests
2.15 Green public procurement. Percentage public procurement adapted to the environment
2.16 Investments in environmental protection
2.17 Employees of environmental companies. Percentage of employees
2.18 Environmental exports. Exports of environmental companies broken down by area

3. Economic development

3.1 Employment rate Percentage of gainfully employed people in the 20–64 age group
3.2 Public debt Public sector debt (net and gross) in relation to the GDP
3.3 Growth GNI per inhabitant and annual growth rate
3.4 Inflation Consumer price index, average for the year
3.5 Real wages Pre-tax real monthly wages
3.6 Unemployment Percentage of unemployed in the labour force
3.7 Hours worked per person. Number of hours worked per person of working age (20–64)
3.8 R&D R&D expenditures as a percentage of GDP
3.9 Research Number of people with graduate degrees for every 1 000 employees
3.10 Innovation Percentage of small, medium-sized and big businesses with innovation systems
3.11 Human capital Percentage of 20–74 age group with post-secondary education
3.12 Continuing education. Course participation on and off the job
3.13 Business climate Employees of small and medium-sized businesses, number of business starts

4. Social cohesion

4.1 Risk of poverty. % of population with disposable income below 60 per cent of the median income
4.2 Demographic dependency ratio Elderly, children and adolescents in relation to the 20–64 age group
4.3 Distribution of income Distribution of disposable income per consumption unit (s80/s20)
4.4 Children at risk of poverty. % of children in households with disposable income below 60% of the median income of the total number of children
4.5 Financial crisis. % of the population at financial risk, such as having to borrow money to pay the rent
4.6 People born abroad at financial risk. Percentage of people born abroad who are at financial risk
4.7 Regional demographic change. Demographic change in the counties
4.8 Long-term unemployment. Percentage of long-term unemployed in the labour force
4.9 Youth unemployment. Percentage of young people who are unemployed
4.10 People born abroad, employment. Employment rate and unemployment among people born abroad
4.11 People with disabilities, employment. Employment rate and unemployment among people with disabilities
4.12 Sickness absenteeism. Sickness absences, activity compensation
4.13 Fertility. Number of children a woman would give birth to during her lifetime if the current fertility rate held steady for all ages
4.14 Parental leave Use of parental leave or temporary parental leave
4.15 Equal opportunity, wages. Wage gap between men and women
4.16 Equal opportunity, managers. Percentage of women and men in managerial positions
4.17 Electoral participation. Percentage of qualified voters who vote in parliamentary elections
4.18 People born abroad, electoral participation. Electoral participation among people born abroad
4.19 Trust in the media Trust in the content of various media among the general population
4.20 School security Percentage of students who feel secure at school
4.21 Basic requirements of the educational system. % of students in year nine with a leaving certificate that does not qualify them for upper secondary school, and % of students who have not received a leaving certificate from upper secondary school within four years
4.22 Housing overcrowding. Percentage of the population with housing overcrowding norm 3, by size of household
4.23 Loneliness Percentage of the population who don't have a close friend
4.24 Consumption of culture. How often people read books, go to the cinema or attend the theatre
4.25 Computers and broadband. Percentage of the population with computers and broadband connections

5. Environment and climate

5.1 Greenhouse gases Greenhouse gas emissions per sector as compared to the targets
5.2 Hazardous substances. Concentrations of long-lived organic compounds in breast milk
5.3 Hazardous chemicals. Quantity of annual use of chemical products that are hazardous to the health
5.4 Temperature change. Average annual temperature in Sweden and around the world.
5.5 Carbon dioxide emissions from households. Total carbon dioxide emissions from households, direct, indirect and emissions in other countries
5.6 Nitrogen and phosphorous emissions. Net emissions of nitrogen and phosphorous from ground to sea
5.7 Ozone-depleting substances. Emissions of ozone-depleting substances
5.8 Air quality. Concentrations of nitrogen dioxide, sulphur dioxide and particles in groundlevel ozone
5.9 Traffic noise. Percentage of population bothered by traffic noise
5.10 Radon. Number of apartment buildings that have been tested for radon and show elevated levels
5.11 Biodiversity. Number of endangered and extinct species
5.12 Cod population. Cod population compared to the environmental target
5.13 Nature protection. Protected ground and water as a percentage of total area
5.14 Environmental taxes. Environmental taxes disaggregates by type
5.15 Proximity to nature. % of the population with access to a green area within 250 metres of their residence

6. Global development
6.1 Development assistance. Development assistance as a percentage of GNI
6.2 Carbon dioxide emissions in industrialised and developing countries. Carbon dioxide emissions per inhabitant in Sweden compared with developing countries and OECD member countries
6.3 Trade with poor countries. Sweden's exports and imports of goods to and from the 49 least developed countries (LDCs)
6.4 Poverty in developing countries. Percentage of the population who live on less than one dollar a day

Dissaggregations
All individual-related indicators are disaggregated by gender.
Certain individual-related indicators are reported separately by age.
For relevant headline indicators, there are regional breakdowns:
1.1 Life expectancy
4.2. Risk of poverty
4.1. Demographic dependency ratio
3.1 Employment
3.2 Growth (gross regional product per capita and total wages per capita)
2.1 Energy efficiency
5.1 Carbon dioxide emissions

Abbreviations
CO2 = Carbon Dioxide Emissions
EMAS = Eco-Management and Audit Scheme
FSC = Forest Stewardship Council
GDP = Gross Domestic Product
GNI = Gross National Income
ISO = International Organization for Standardization
LDCs =Least Developed Countries
PEFC= Swedish Programme for the Endorsement of Forest Certification Scheme
SME = Small and Medium Enterprises