ENERGY BALANCE for 2010

Blekinge and Småland

A common energy balance for the four counties of

Blekinge, Jönköping, Kalmar and Kronoberg


SMÅLAND
BLEKINGE
South Sweden

REGIONFÖRBUNDET
I KALMAR LÄN

REGIONFÖRBUNDET
SÖDRA SMÅLAND

REGIONFÖRBUNDET
JÖNKÖPINGS LÄN

REGION
BLEKINGE

Länsstyrelsen
Kalmar län

LÄNSSTYRELSEN
I KRONOBERGS LÄN

Länsstyrelsen
i Jönköpings län

LÄNSSTYRELSEN
BLEKINGE LÄN

Energy balance for 2010, Blekinge and Småland

A common energy balance for the four counties of Blekinge, Jönköping, Kalmar and Kronoberg

Document information:

Title:	Energy balance for 2010, the south-east region
Compiled by:	Annamaria Sandgren (Grontmij AB)
Issuer	The county administrative boards and regional councils in Småland and Blekinge
Completed:	February 2013

Contents

Contents 3
Introduction 4
Objective 4
Scope 4
Structure 4
Energy and climate objectives: Europe and Sweden 5
Sankey diagram for the south-east region for the year 2010 6
End consumption of energy 7
Industry 9
Households 10
Transportation 10
Energy production and energy supply 12
Electricity production and electricity supply 12
District heating production 13
Estimate of the share of renewable and non-renewable energy 14
Greenhouse gas emissions 15
Greenhouse gas emissions in the region 15
Emissions per person 17
Method description - data sources and uncertainties 19

Introduction

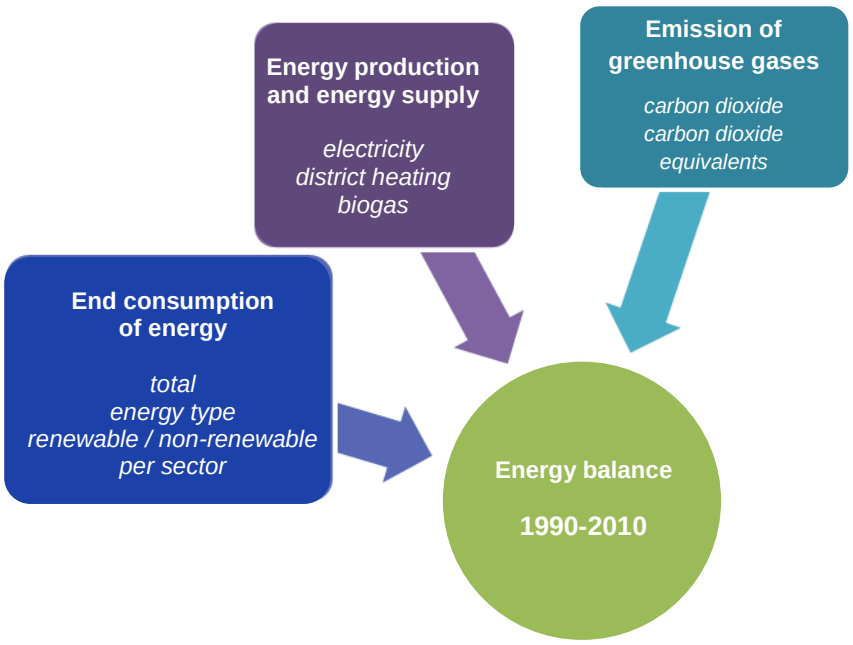
Objective

The energy balance is a chart of the energy flows in the region. Questions that are answered include: Which and how much energy is used in the region? Where is it used? How much electricity and district heating are produced regionally? How much electricity is supplied from elsewhere? How much petrol and diesel are used? How substantial will the carbon dioxide emissions be?

The overview that is obtained constitutes a basis for following up set targets and prioritising measures concerning things such as regional energy production, energy rationalisation, the transportation system's energy consumption and a reduction in the use of fossil fuels.

Scope

The energy balance shows the way in which the energy flows were broadly characterised in 2010 and the development that has taken place since 1990. The balance covers the energy that is produced, supplied and used within the geographical borders of the counties. The exceptions are aviation and marine traffic and the nuclear power plant in Oskarshamn.



Structure

The introduction contains the objective and scope and a compilation of applicable energy and climate objectives plus a Sankey diagram of the region's energy flows. Next follows a review of the end consumption of electricity, district heating and the various types of fuel, in total and by sector. The production of district heating and biogas are reviewed along with the regional production of electricity and the supply of electricity. The share of renewable and non-renewable energy has been estimated for the total energy consumption. This is followed by an account of the greenhouse gas emissions that are linked to the energy sector. Finally, we have a method description whose objective is to facilitate future monitoring.

Energy and climate objectives: Europe and Sweden

Table 1: Base year is 1990 unless otherwise indicated

	EU targets for 2020	Sweden's energy and climate objectives
EMISSIONS	Reduction in greenhouse gas emissions by at least 20 per cent by the year 2020 (EU 27). The emissions must fall by 30 per cent if there is a broader, international agreement.	Sweden's emissions must fall by 40 per cent by the year 2020. The target refers to the non-trading sector. Two thirds of these reductions must take place in Sweden and one third in the form of investments in other EU countries or flexible mechanisms such as the CDM (Clean Development Mechanism). The vision is that by 2050, Sweden must have no net greenhouse gas emissions.
RENEWABLE ENERGY	The share of renewable energy must correspond to 20 per cent of all energy consumption in the EU by the year 2020.	At least 50 per cent of renewable energy by 2020. Fossil fuels in heating are to be phased out by the year 2020.
ENERGY RATIONALISATION	Greater energy efficiency within the Union - the use of energy must be streamlined by 20 per cent by 2020.	A 20 per cent reduction in energy intensity between 2008 and 2020.
TRANSPORTATION	Biofuels must constitute at least 10 per cent of the total fuel usage within the transportation sector no later than 2020.	At least 10 per cent renewable energy in the transportation sector by 2020. By 2030, Sweden must have a fleet of vehicles that is independent of fossil energy

Sankey diagram for the south-east region for the year 2010

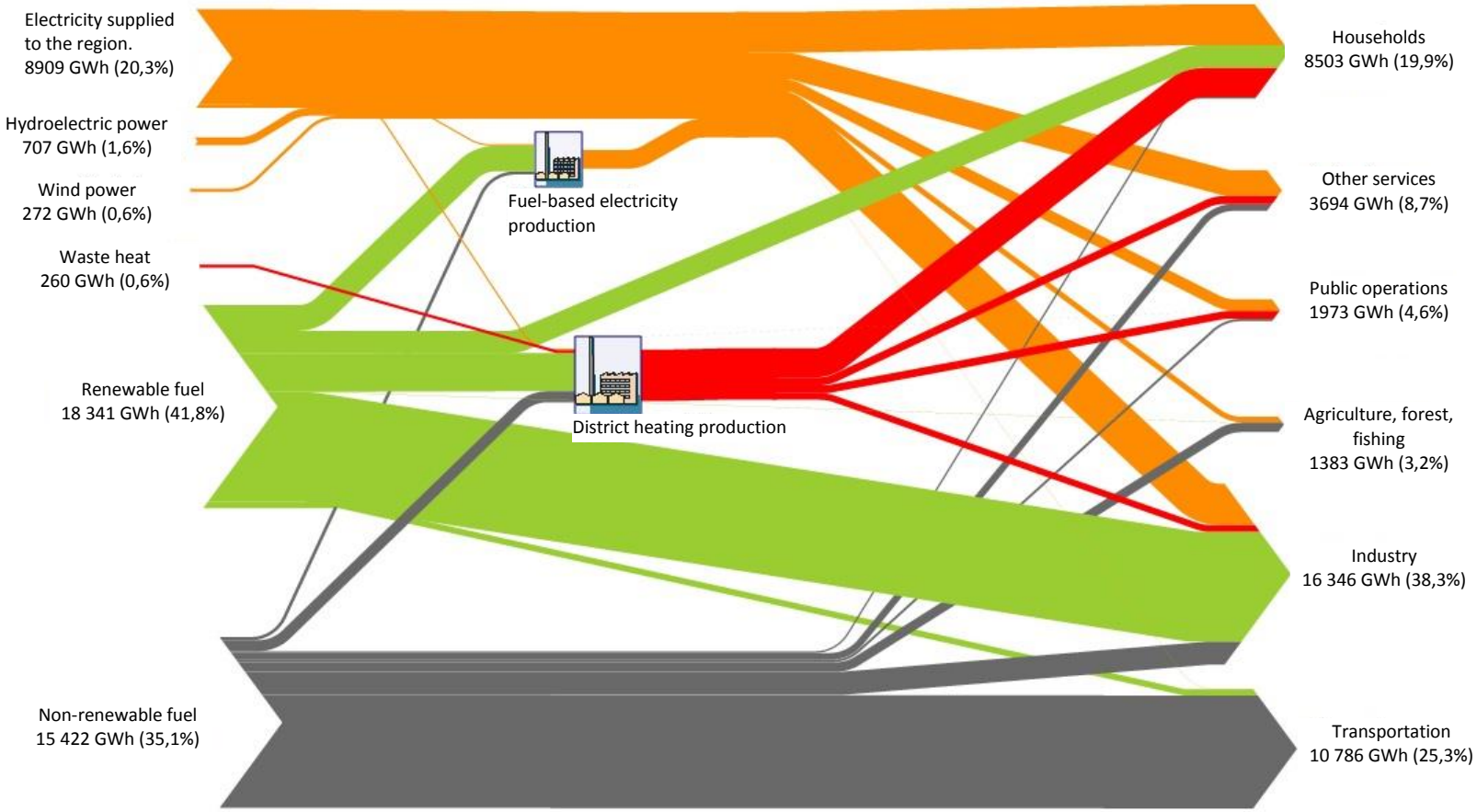
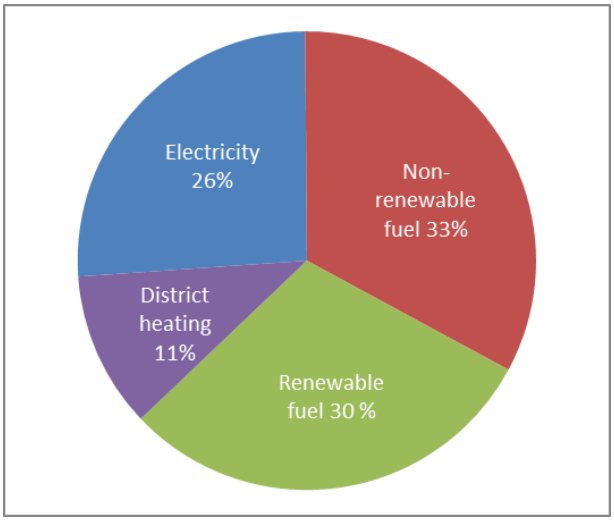


Figure 1. Sankey diagram for 2010 showing the energy flows in the counties in Småland and Blekinge. The total gross supply was 44 TWh and the end usage 43 TWh. "Fuel-based electricity production" in the Figure refers only to electricity production; the heat that is produced in the CHP plant can be found under "District heating production". The losses are not included (orange = electricity, green = renewable fuels, grey = non-renewable fuels, red = district heating)

End consumption of energy

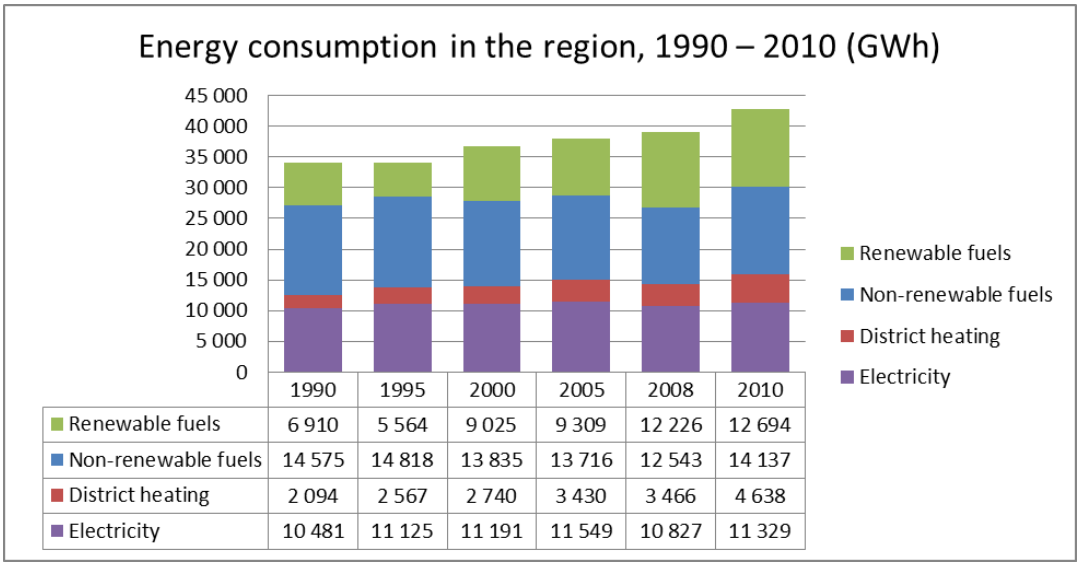
In the counties in Småland and Blekinge, a total of 43 TWh energy was used in 2010 in various forms. The distribution per energy type is shown by Figure 2 below. District heating originates largely from renewable sources as well as the counties' regional electricity production, which will be dealt with further on in the chapter in *Estimate of the share of renewable and non-renewable energy*.



Energy consumption in 2010

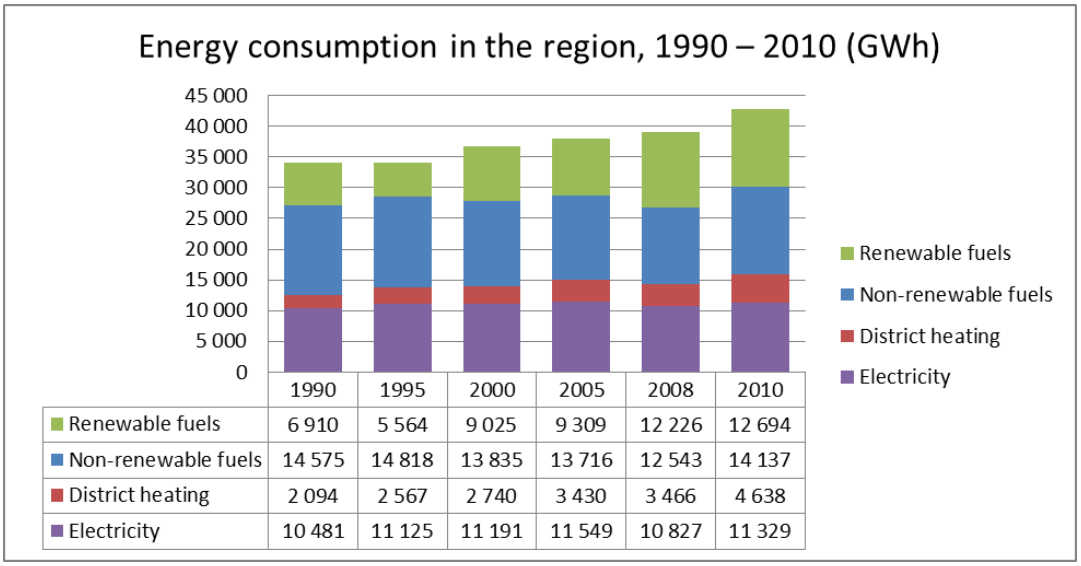
Figure 2. End consumption of energy in the counties in Blekinge and Småland in 2010 (TWh). Data source: SCB (Statistics Sweden) with supplements according to the method description

Renewable fuels include ethanol, bio oils, timber fuel, chips or biogas and non-renewable fuels may be things such as petrol, diesel or firing oil or coal. The waste is distributed between renewable and non-renewable, depending on its origin. The trend for the total annual energy consumption is increasing in the region (see



	1990	1995	2000	2005	2008	2010
Renewable fuels	6 910	5 564	9 025	9 309	12 226	12 694
Non-renewable fuels	14 575	14 818	13 835	13 716	12 543	14 137
District heating	2 094	2 567	2 740	3 430	3 466	4 638
Electricity	10 481	11 125	11 191	11 549	10 827	11 329

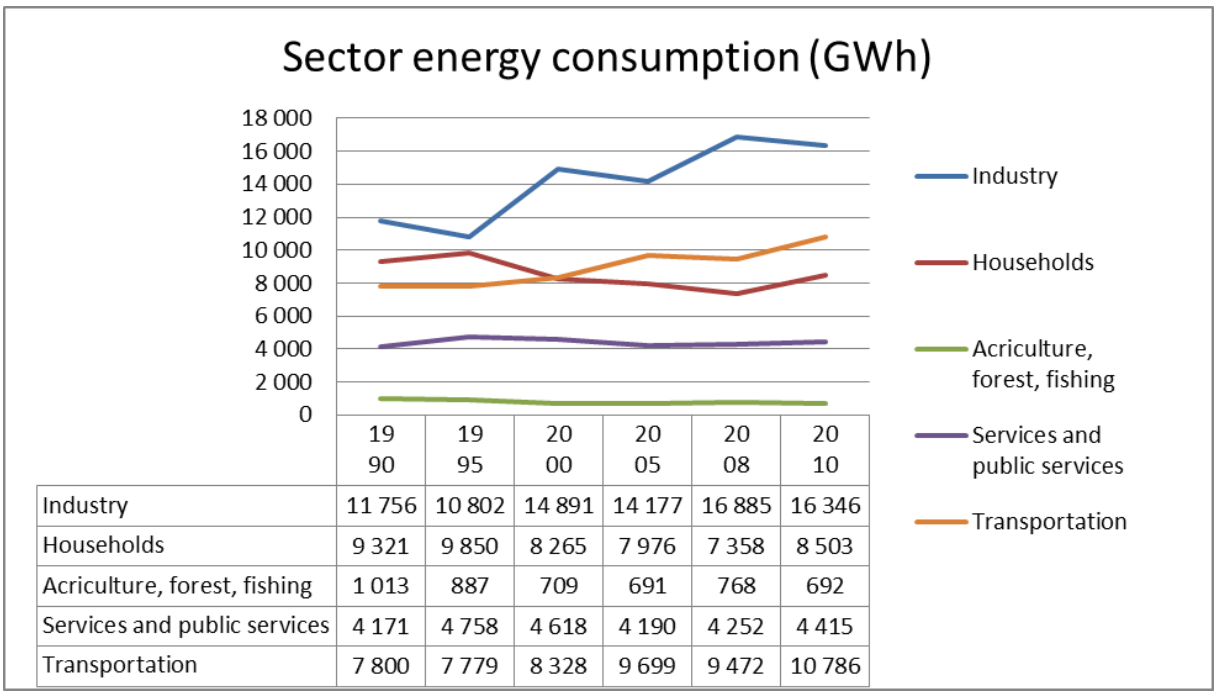
Figure 3). Over the past decade, energy consumption has increased by 16 per cent. Electricity and non-renewable fuel have increased by a few per cent (1 and 2 per cent respectively), and district heating and renewable fuel have increased by just over 69 and 41 per cent. 2010 was a relatively cold year, which meant that energy consumption was somewhat higher than normal.



	1990	1995	2000	2005	2008	2010
Renewable fuels	6 910	5 564	9 025	9 309	12 226	12 694
Non-renewable fuels	14 575	14 818	13 835	13 716	12 543	14 137
District heating	2 094	2 567	2 740	3 430	3 466	4 638
Electricity	10 481	11 125	11 191	11 549	10 827	11 329

Figure 3. Overview of the development of energy consumption in the counties in Småland and Blekinge in 1990 - 2010 (TWh). Data source: SCB with supplements according to the method description

When we look at how much energy each sector uses in the region, we see that industry represents the greatest usage and that the trend is strongly increasing. The household and transportation sectors are of the same magnitude. Since 1990, the trend for households has been a reduction in the usage over the first ten years, increasing slightly by 2010. 2010 was a cold year, however, which can be seen through the energy consumption of households. The energy consumption of transportation has increased throughout the period.



	1990	1995	2000	2005	2008	2010
Industry	11 756	10 802	14 891	14 177	16 885	16 346
Households	9 321	9 850	8 265	7 976	7 358	8 503
Acriculture, forest, fishing	1 013	887	709	691	768	692
Services and public services	4 171	4 758	4 618	4 190	4 252	4 415
Transportation	7 800	7 779	8 328	9 699	9 472	10 786

Figure 4. Sectoral energy consumption in the counties in Blekinge and Småland, 1990 - 2010. Data source: SCB with supplements according to the method description

If we link energy consumption to the gross regional product (GRP), we see that the relative energy consumption in the region fell during the 1990s and the start of the noughties (see Figure 5). The relative carbon dioxide emissions are also falling.

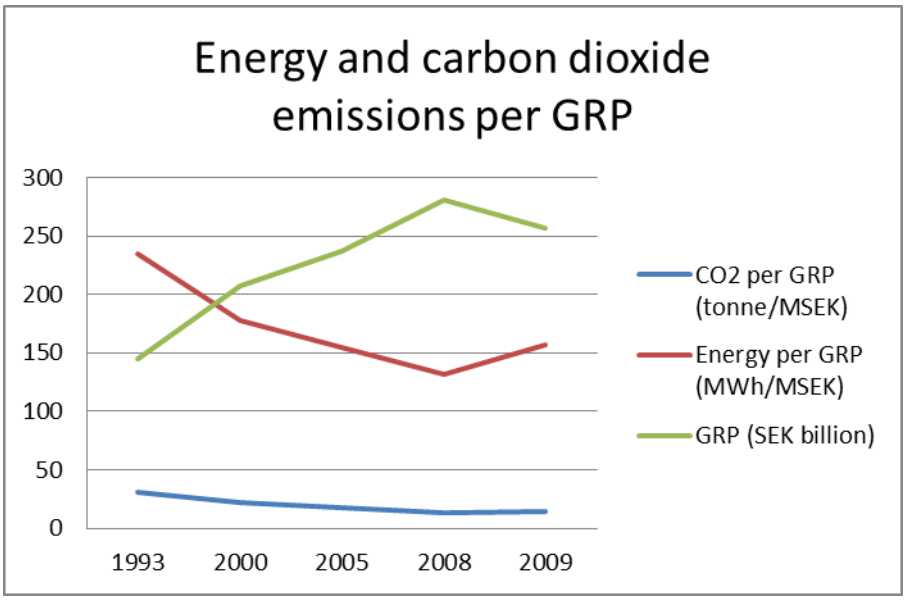
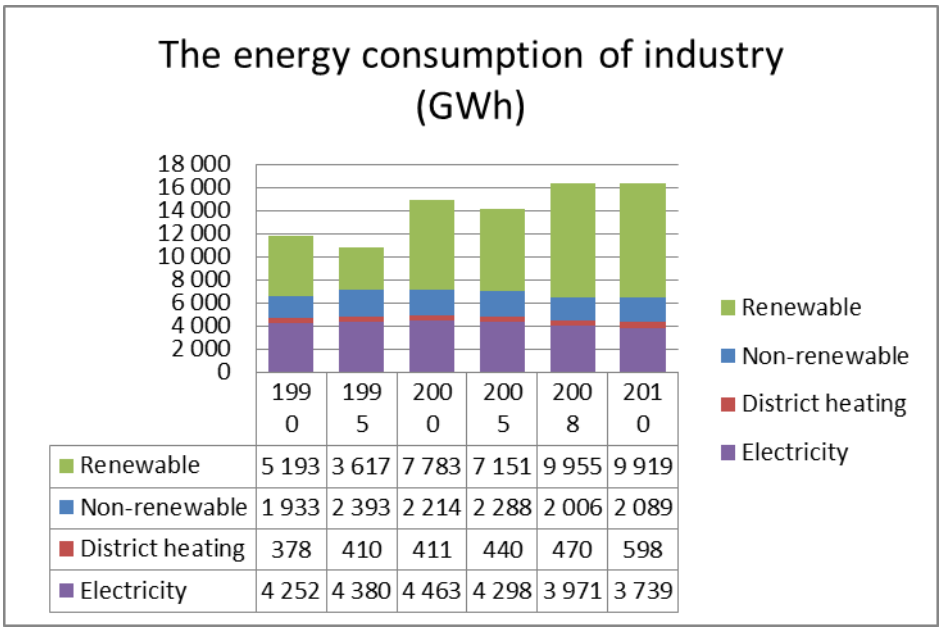


Figure 5. Development in the gross regional product in relation to energy consumption and carbon dioxide emissions in the counties in Blekinge and Småland

Industry

Industry in the region uses a large share of the energy. The trend in industry's usage has a great influence on the trend for the whole region. In 2010, energy consumption had increased by 10 per cent compared with the year 2000 and, compared with 1990, the increase is close to 40 per cent. The use of renewable fuel is what represents the increase. The trend for the other energy types is relatively stable (see Figure 6).

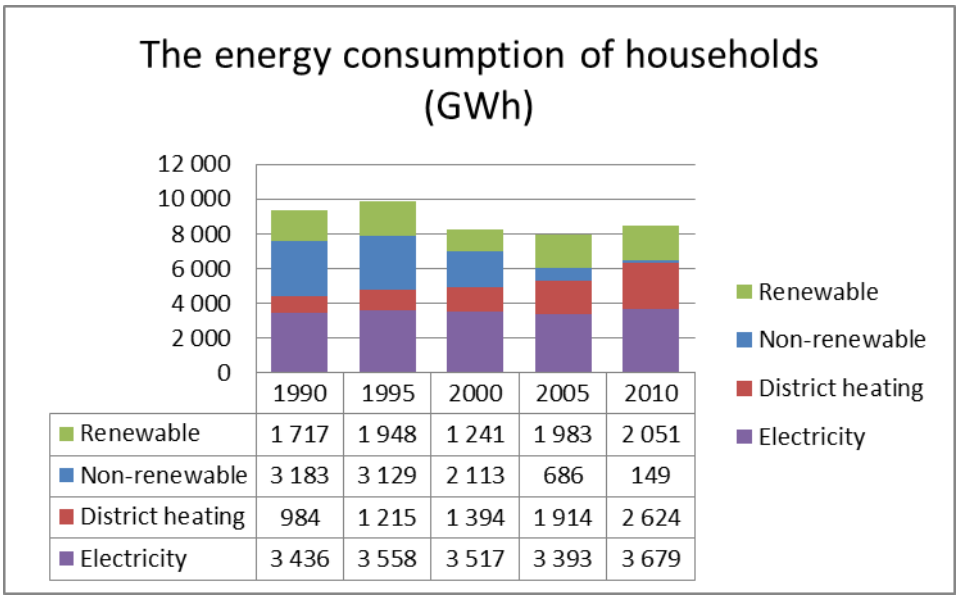


	1990	1995	2000	2005	2008	2010
Renewable	5 193	3 617	7 783	7 151	9 955	9 919
Non-renewable	1 933	2 393	2 214	2 288	2 006	2 089
District heating	378	410	411	440	470	598
Electricity	4 252	4 380	4 463	4 298	3 971	3 739

Figure 6. Energy consumption within the industry in the counties in Blekinge and Småland

Households

There is a clear trend as regards the use of oil having principally ceased and been replaced by district heating and renewable fuel. Energy consumption in households also appears to have increased during the noughties. The year 2010 was particularly cold, which is also reflected in the energy consumption. The break in the trend regarding electricity consumption between 2005 and 2010 may also be due to the fact that previous data was based on the 2003 survey of single family households, plus the fact that the statistics were estimated on the basis thereof until the year 2005. Data for 2010 is based on a survey of single family households in which, for example, the distribution between different types of heating has changed[1]. The share of heating from heat pumps has increased, for example.



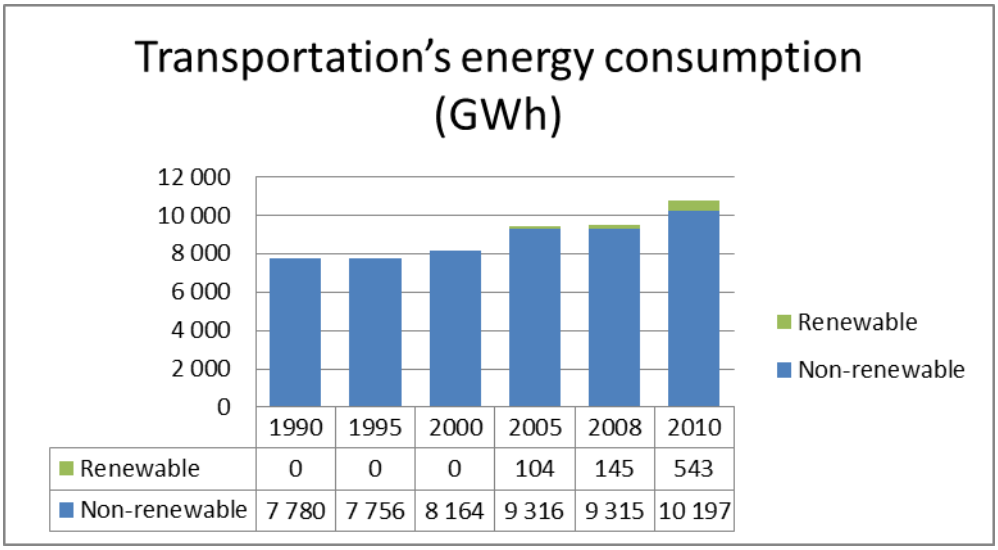
	1990	1995	2000	2005	2010
Renewable	1 717	1 948	1 241	1 983	2 051
Non-renewable	3 183	3 129	2 113	686	149
District heating	984	1 215	1 394	1 914	2 624
Electricity	3 436	3 558	3 517	3 393	3 679

Figure 7. Energy consumption of households in counties in Blekinge and Småland, 1990 - 2010

Transportation

Transportation represents the majority of the use of the non-renewable fuel in the region. The development for fuels sold is shown in Figures 8 and 9. In Kalmar, industry's consumption of solid renewable fuels has increased over the past ten years and the heavy traffic has therefore evidently also increased. Trade has also seen a steady increase throughout the noughties, which ought also to lead to an increase in transportation. Jönköping has become one of the important logistics centres in Sweden, which also increases the energy consumption by transportation. However, there are uncertainties linked to these statistics over the space of time and they do not correlate fully with the development in the emissions figures for transportation which are presented a little later on. The uncertainties in these statistics are examined more closely in the method description.

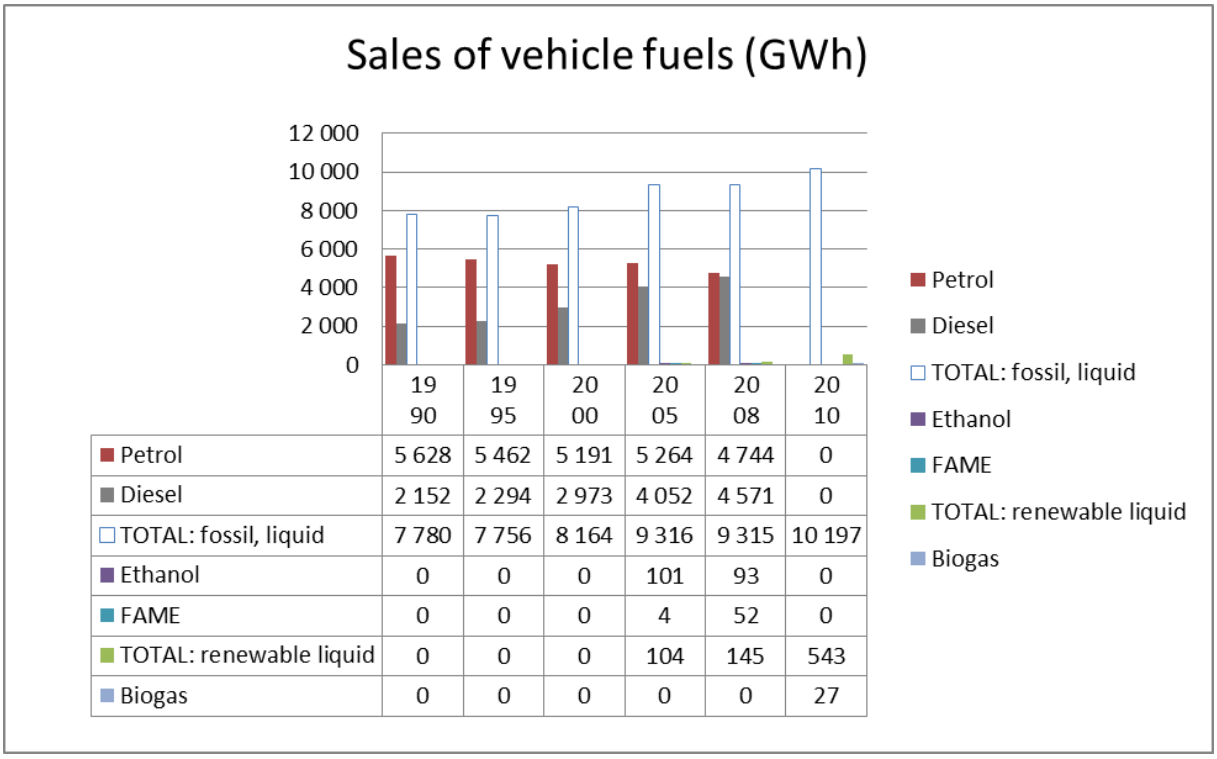
[1] SCB, 2011. KåRE Final report, part 2.



	1990	1995	2000	2005	2008	2010
Renewable	0	0	0	104	145	543
Non-renewable	7 780	7 756	8 164	9 316	9 315	10 197

Figure 8. Fuel sales in the counties in Småland and Blekinge, 1990 to 2010. Data source: SCB. Low-blend ethanol and FAME are distributed according to the national average for 2005 and 2008

If we look more closely at which types of fuel are included in the statistics, we see a fall in petrol sales and an increase in diesel sales. Low-blend ethanol and FAME are calculated on the basis of a national average for 2005 and 2008 respectively; the 2010 statistics include the low-level blend under the category of "liquid renewable". The increase in ethanol is partly because E85 has been included in the 2010 statistics for the first time.



	1990	1995	2000	2005	2008	2010
Petrol	5 628	5 462	5 191	5 264	4 744	0
Diesel	2 152	2 294	2 973	4 052	4 571	0
TOTAL: fossil, liquid	7 780	7 756	8 164	9 316	9 315	10 197
Ethanol	0	0	0	101	93	0
FAME	0	0	0	4	52	0
TOTAL: renewable liquid	0	0	0	104	145	543
Biogas	0	0	0	0	0	27

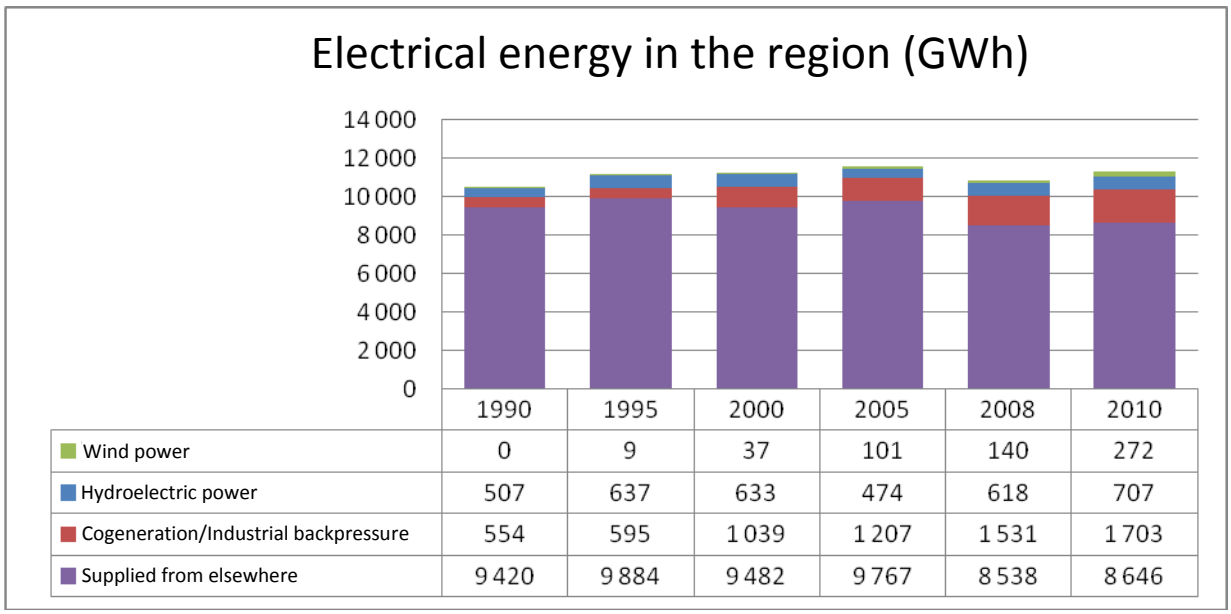
Figure 9. Sale of fuel distributed between fuel type for the counties in Småland and Blekinge, 1990 to 2010. Data source: SCB. Low-blend ethanol and FAME are distributed according to the national average for 2005 and 2008

Energy production and energy supply

This chapter gives an overview of the production of electricity and heat in the region.

Electricity production and electricity supply

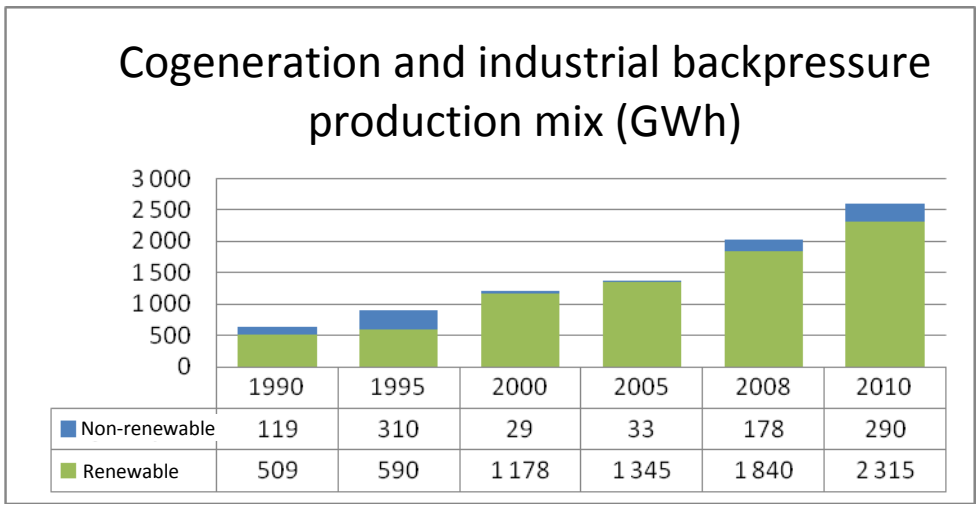
In 2010, 76 per cent of the electricity used was supplied to the region. In 1990, the corresponding figure was 90 per cent (see Figure 10). There have been several smaller hydroelectric power plants in the region for a long time. The increase in the regional electricity production is partly due to the erection of a number of CHP plants. Wind power has also increased strongly in recent years - 272 GWh were produced in 2010.



	1990	1995	2000	2005	2008	2010
Wind power	0	9	37	101	140	272
Hydroelectric power	507	637	633	474	618	707
Cogeneration/Industrial backpressure	554	595	1 039	1 207	1 531	1 703
Supplied from elsewhere	9 420	9 884	9 482	9 767	8 538	8 646

Figure 10. Electricity in the counties in Blekinge and Småland, some produced regionally and some supplied from elsewhere. Data sources: SCB (hydroelectric power), the Swedish District Heating Association (cogeneration), the Energy Authority (wind power), supplements according to the method description

The regional fuel-based production of electricity is largely renewable (see the Figure below).



	1990	1995	2000	2005	2008	2010
Non-renewable	119	310	29	33	178	290
Renewable	509	590	1 178	1 345	1 840	2 315

Figure 11. Production mix for the fuel-based production of electricity in the counties in Blekinge and Småland. Data sources: The Swedish District Heating Association and SCB

District heating production

The district heating supplies in the region have steadily increased over the past two decades, which is shown by the increase in the quantity of supplied energy in Figure 12. The Figure shows the quantity of fuel and electricity used to produce district heating in the region. The numbers are not normal year corrected, and 2010 was a cold year, which may explain the relatively large quantity of oil that was used as a peak load fuel at the time.

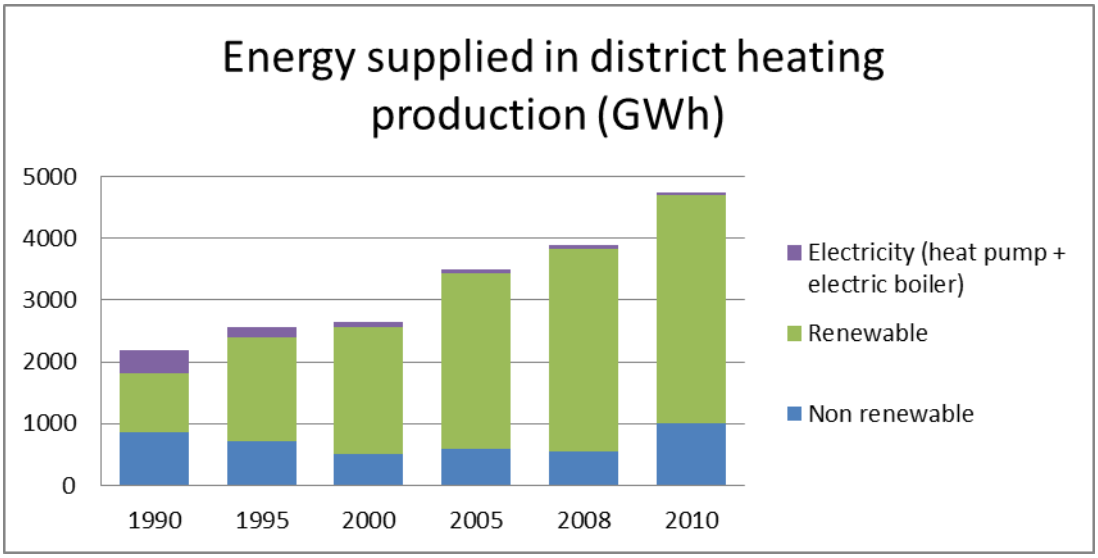


Figure 12. The development in district heating production in the counties in Blekinge and Småland. Data source: The Swedish District Heating Association (2005 and later) and SCB (2000 and earlier)

Estimate of the share of renewable and non-renewable energy

The share of renewable and non-renewable energy depends on things such as which types of fuel are used, the way in which district heating is produced in the region and the way in which electricity is produced from both a regional and a Nordic perspective. In 2010, the distribution was 57 per cent renewable and 43 per cent non-renewable (see Figure 13).

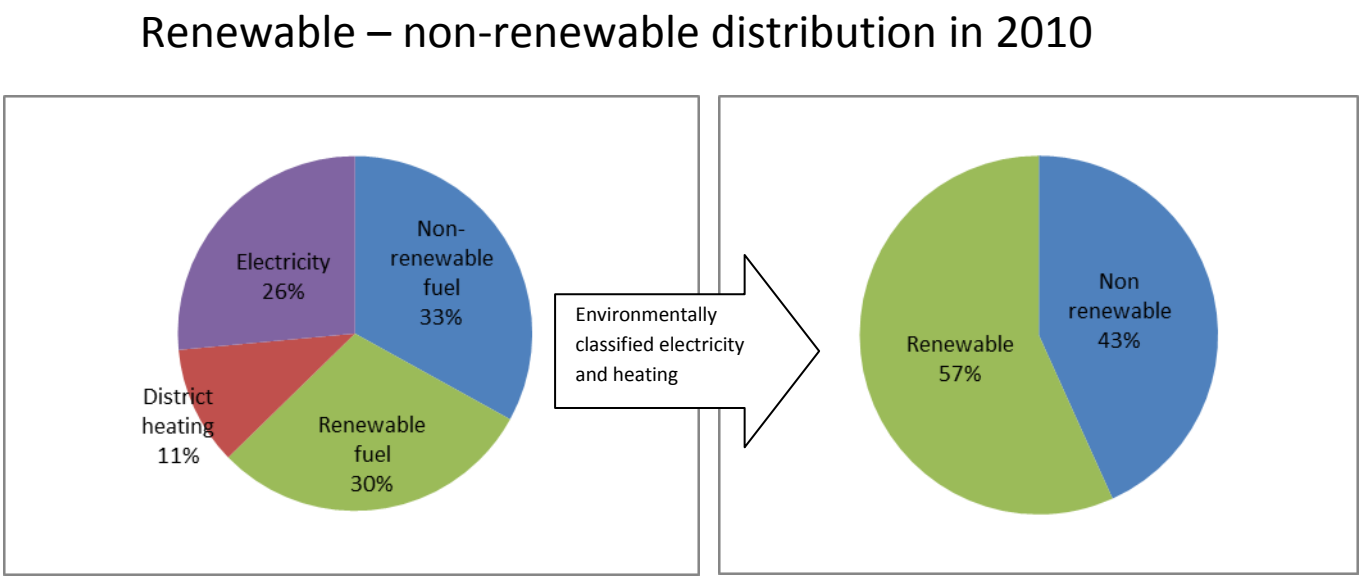


Figure 13. Energy consumption in 2010 in the counties in Blekinge and Småland. The pie chart on the left shows the distribution between different energy types, and the one on the right shows the total distribution between renewable and non-renewable when the district heating and electricity have been environmentally classified. Data source: SCB, The Swedish District Heating Association and *Svensk Energi*.

Regarding electricity, some is produced regionally and some is supplied from elsewhere. "Nordisk elmix"[2] (the Nordic electricity mix) has been used to environmentally classify the electricity supplied. A mean value[3] has been used to make it easy to compensate for variations in the electricity mix which are due not to the system changes or actual trends, but temporary changes such as annual precipitation fluctuations or nuclear power maintenance stoppages. This clarifies the changes that have taken place within the region. District heating has not been normal year corrected, which means that the share of non-renewable for 2010 may be slightly greater than that for the normal year since a cold winter often leads to more oil being used as am peak load fuel.

Table 2. Annual development of the share of renewable and non-renewable energy in the counties in Småland and Blekinge

	2000	2005	2008	2010
Non-renewable	49 %	47 %	42 %	43 %
Renewable	51 %	53 %	58 %	57 %

[2] Guideline for the labelling of the origins of electricity (10/07/2012), *Svensk Energi*

[3] *Nordisk elmix* has been produced for 2005 onwards. A total mean value (61.4 % renewable) is therefore used in the 2000-2007table. For 2008-2010, a constant 4-year average has been used instead to take into account forthcoming system changes to the Nordic electricity system.

Greenhouse gas emissions

Greenhouse gases have always been found in the atmosphere but the concentration has increased and the greenhouse effect has been intensified due to human activity. Carbon dioxide, the dominant greenhouse gas, represents almost 80 per cent of the total emissions in the world and in Sweden. The use of fossil fuels, deforestation and the production of lime and cement are the primary reasons for the increase in the concentration of carbon dioxide in the atmosphere. The emissions linked to the region's energy consumption are largely only carbon dioxide emissions from the combustion of fossil fuels.

Energy is used within all sectors of society and there are many different ways of linking the emissions to the appropriate sector. In this energy balance, we have chosen to use the official statistics reported to the EU and the UN's Climate Convention[4]. This means that sectoral distribution and method choice follow that which has been determined by signing the Climate Convention. The advantage with this is that it is easier to follow up in the future and to do international comparisons. One disadvantage is that the emissions are not directly calculated from the energy figures stated in the previous sections. This may mean that the emissions figures do not correlate fully with the energy figures due to differences in method, suppositions or different sectoral divisions.

Something else worth pointing out is that the emissions in the statistics are based on the production perspective, which means that emissions caused by Swedish people outside Sweden's borders are not included. Such emissions include foreign aviation and maritime navigation[5] and emissions linked to the production of goods in other countries for importation into Sweden. On the other hand, emissions from the production of goods in Sweden for export to other countries are included. The emissions caused by imports and foreign travel do exceed the emissions created by exports, however. The Environmental Protection Agency has performed calculations from the consumption perspective which show that the greenhouse gas emissions, when all consumption (goods and foreign travel) is included, are 25-35 per cent higher compared with if you include only the emissions produced in Sweden[6,7].

Greenhouse gas emissions in the region

If we look at the carbon dioxide emissions in the region which are linked to the combustion of fossils, we see that the emissions for 2010 are twelve per cent lower than the emissions for 2000 (Figure 14). Carbon dioxide emissions from transportation are increasing while the emissions linked to electricity and heating are falling. The emissions levels for 2009 and 2010 were extreme in different ways. In 2009, the low emissions were a consequence of the economic crisis and in 2010, the emissions were high a consequence of a cold winter, limited nuclear power production and an economic recovery.

[4] SMED - RUS
[5] In Sweden, the emissions in 2010 from foreign maritime navigation were 6.8 million tonnes carbon dioxide equivalents and 2.1 million tonnes from foreign aviation (The Environmental Protection Agency).
[6] The impact of the consumption on the climate, The Environmental Protection Agency's report 5903
[7] The Swedish consumption's global environmental impact, The Environmental Protection Agency 2010

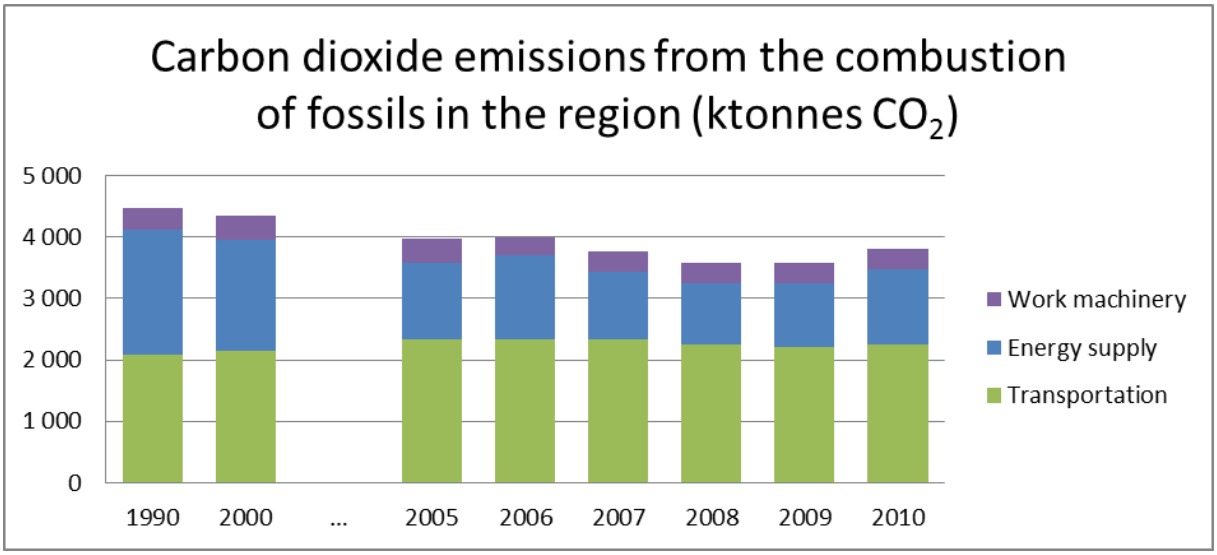


Figure 14. Sectoral carbon dioxide emissions linked to the energy and transportation sector in the counties in Blekinge and Småland, 1990 to 2010. Data comes from RUS

In order to put the energy and transportation sector's carbon dioxide emissions in their context, the development over the total emissions[8] for the region has also been calculated (see Figure 15), and these include emissions from agriculture in the form of methane and laughing gas and carbon dioxide emissions that are linked to industry processes. In all, the emissions have fallen by ten per cent over the past decade.

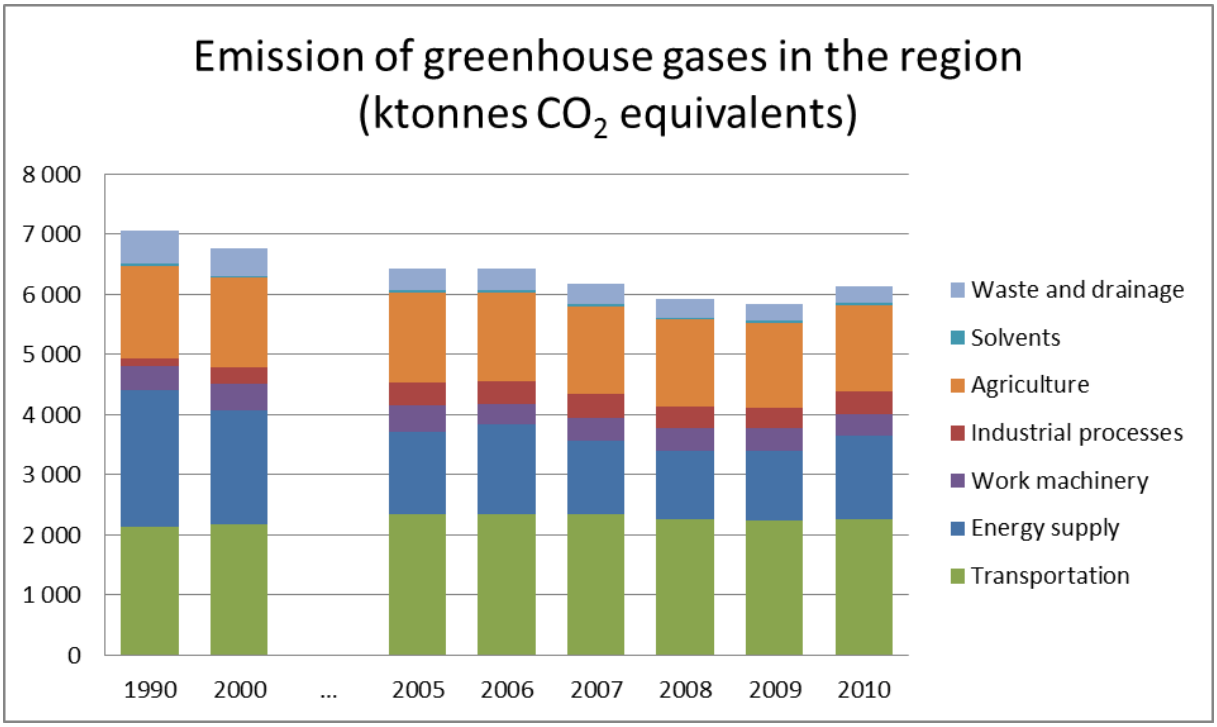


Figure 15. Sectoral greenhouse gas emissions in the counties in Blekinge and Småland. All greenhouse gases are counted as carbon dioxide equivalents. Data source: RUS

[8] Carbon dioxide, nitrous oxide (laughing gas), methane and fluorescent gases (HFC, PFC and SF6). The emissions are stated as carbon dioxide equivalents.

Emissions per person

If we omit the carbon dioxide emissions that come from the energy and transportation sector per person in the region, the figure ends up at 4.2 tonnes per person for 2010 (see Figure 16).

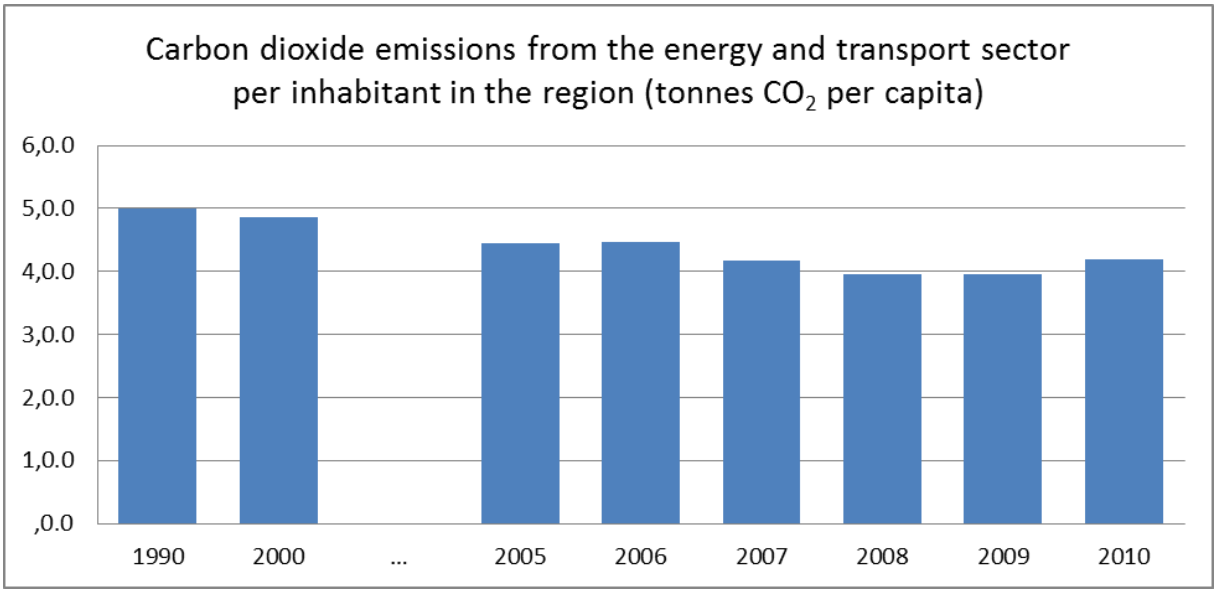
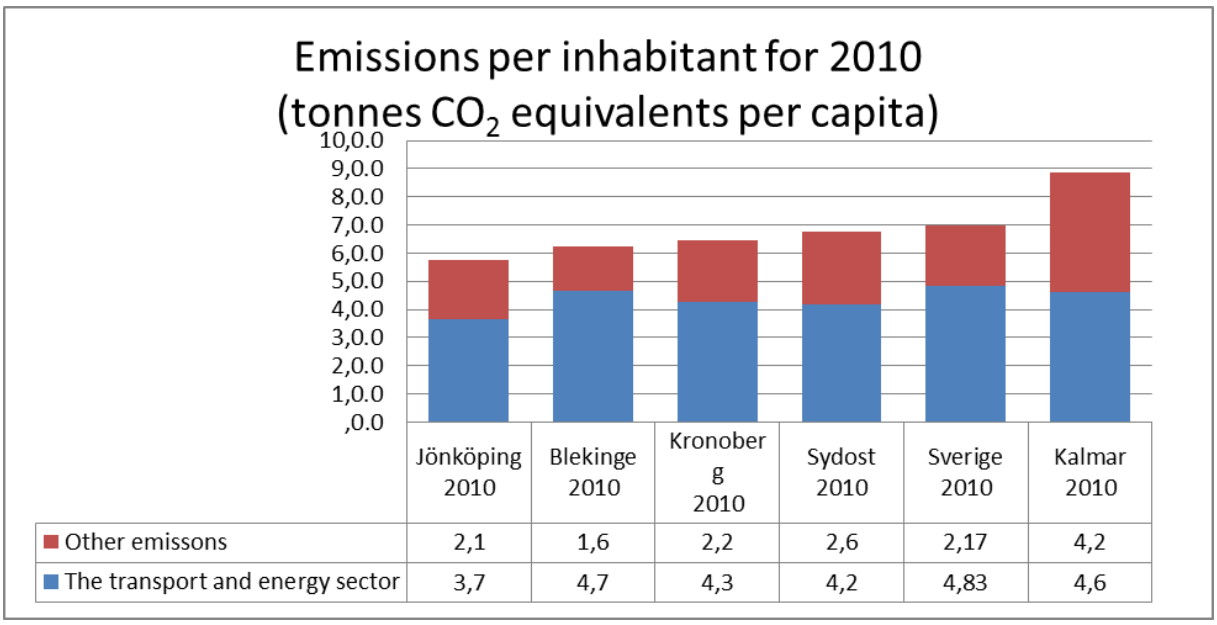


Figure 16. Carbon dioxide emissions linked to the combustion of fossils within the energy and transportation sector per inhabitant in the counties in Blekinge and Småland in 2010. Data source: emissions data come from RUS and the population statistics from SCB.

Figure 17 compares Sweden and the various counties. The production of cement in Degerhamn is the reason why Kalmar's emissions are so much higher than in other counties. Blekinge's emissions within the energy and transportation sector are higher than in the other counties because of the oil-fired Karlshamn plant which is a part of the national power reserve.



	Jönköping 2010	Blekinge 2010	Kronoberg 2010	Sydost 2010	Sverige 2010	Kalmar 2010
Other emissons	2,1	1,6	2,2	2,6	2,17	4,2
The transport and energy sector	3,7	4,7	4,3	4,2	4,83	4,6

Figure 17. Greenhouse gas emissions per inhabitant in Sweden and the counties in Blekinge and Småland in 2010. Data source: emissions data come from RUS and the population statistics from SCB.

A comparison has been made to show the international level of emissions. The emissions figures in Figure 18 concern different years but still show the big picture. All counties are above the global average while below the EU and the USA levels. The column on the far left shows the per capita level that the global emissions must reach in order to achieve the target of a temperature increase of only two degrees[9].

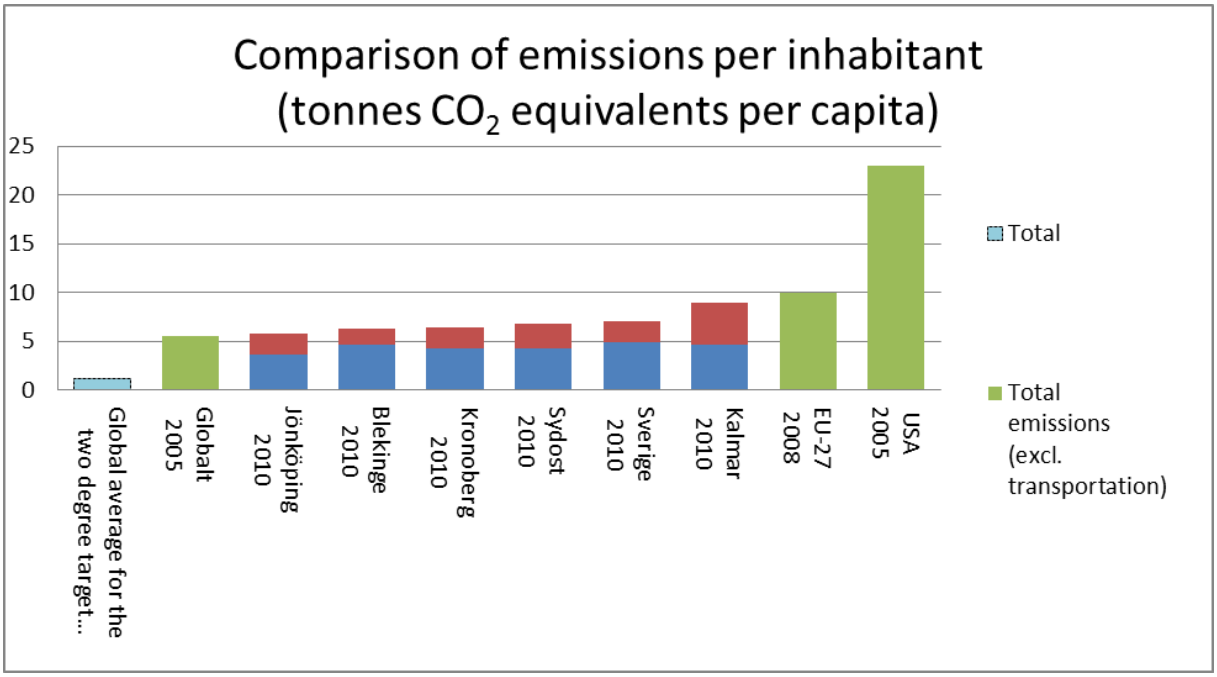


Figure 18. An international comparison of greenhouse gas emissions per inhabitant; globally, in Sweden, in Jönköping, the EU-27 and the USA. Foreign transportation is not included and the production perspective has been applied. Data source: The Environmental Protection Agency, RUS and SCB.

With an international comparison, we must not forget that the numbers are from a production perspective, i.e. do not take into account foreign travel and the net importation of goods. Sweden's emissions from a consumption perspective are approximately 30 per cent higher while the global column remains at the same level. The counties in Blekinge and Småland, the EU-27 and the USA also have higher emissions if the consumption perspective is applied, although it is difficult to say how much higher.

[9] Assessments of necessary emissions reductions according to Stern (2006) and EEA (2005), and the assumption that the global population will amount to 9 billion by 2050 means that every inhabitant of the world can emit an average of 1.15 tonnes CO_2 equivalents per year.

Method description - data sources and uncertainties

In 2012, separate energy balances were produced for Blekinge, Jönköping, Kalmar and Kronoberg. Grontmij produced the balances for Jönköping, Kalmar and Kronoberg and the Energy Agency for South-east Sweden produced the balance for Blekinge. Grontmij then drew up this compiled energy balance for the south-east region. Largely the same statistical sources were used, but if you would like to know more details about Blekinge's figures, please refer to the method description in Blekinge's separate energy balance.

The energy balances are based largely on SCB's (Statistics Sweden's) regional energy balances but, for some energy types and sectors, the basis was supplemented with other sources. The sources that were used for the energy balances in Småland are reproduced in this chapter.

Unless otherwise indicated, the description referred to where SCB's statistics are concerned was obtained from some of the following reports. These reports can be downloaded from SCB.

- Durnell, U., 2011. *Slutrapport Kommunal och Regional Energistatistik;* [Final Report, Municipal and Regional Energy Statistics]
- Larsson, R., 2011. *Slutrapport Kommunal och Regional Energistatistik (del 2)* [Final Report, Municipal and Regional Energy Statistics] (Part 2)] or
- Rehn, H., 2010. *Kommunal och regional statistik 2010. Användarhandledning* [Municipal and Regional Statistics 2010. User Instructions]

Gross regional product

Statistics for the gross regional product can be downloaded as an Excel file from SCB's regional accounts. The GRP is stated in millions of Swedish *kronor* (MSEK).

The energy consumption of industry

In the compilation, SCB's statistics have been used for 1990-2004. There are confidentiality gaps for 2005 to 2010. The way in which these gaps have been supplemented depends on the assumptions made in the separate energy balances. Information has been obtained mainly from environmental reports and direct contacts and the assumptions made regarding maintained consumption (see each method description for more details per county).

The energy consumption of households

We have used only SCB's data for households. However, this data is encumbered with some method-related weaknesses. Figure 7 indicates a clear falling trend in energy consumption in the household sector, which is then interrupted by 2010. This is probably due not only to the fact that 2010 was a cold year, but also to the fact that SCB used a calculation model from the 2003 single-family house survey which was replaced by a new model based on a new single-family house survey when the statistics were redone. The big difference is that district heating and electricity consumption increased more than was assumed in the first model.

Transportation

As of 2009, SCB's municipal and regional energy balances have a new design, including the fact that different types of liquid fuel have been grouped together in one and the same fuel category. Figure 9

shows both the new and the old statistics. As regards energy consumption for transportation, SCB's data are based on the sale of fuel in the region, not on the number of vehicles that exist or the actual traffic flows (like the emissions statistics in the national emissions database - more on this under the heading "emissions"). SCB's statistics can therefore be misleading at local and regional level in that through-traffic tanking up can cause an apparently higher (or lower) share of transportation than that which actually occurs in the region. SCB has also implemented a campaign to obtain data concerning the industry's fuel consumption, which has led to a redistribution of the fuel consumption between the transportation and the industry sector. The transport statistics do not include maritime navigation or aviation, something which is also misleading since both of these contribute to emissions and energy consumption. Maritime navigation in the region is fairly marginal, but not aviation.

Low-level blending of renewable fuel in petrol and diesel

In Sweden, a small share of renewable fuel is blended with petrol and diesel, ethanol in petrol and fatty acid methyl esters (FAME) in diesel. The new statistics include this blending in the category of "renewable liquid" fuel. For the older statistics, we have recreated the low-level blend in petrol and diesel for 2005 and 2008 (the year 2000 and previous to that saw no low-level blend). This was done by calculating a national average for the low-level blend in petrol and diesel using "Monthly fuel, gas and storage statistics" (SCB) which indicate the total quantities of low-level blend fuel sold and volumes of low-level blend in Sweden. The shares used are summarised in Table 3.

Table 3. Calculation of low-blend ethanol and FAME in petrol and diesel for 2005 and 2008

	2005		2008	
	Share of low-level blend	Quantity	Share of low-level blend	Quantity
Ethanol in petrol	45 %	5 %	46 %	5 %
FAME in diesel	5 %	2 %	35 %	3.7 %*

*In 2008, there was a two and a five per cent blending in diesel. This is an average.

Hydroelectric power

SCB's data has been used for hydroelectric power production even though it contains only the biggest producers and thereby constitutes an underestimation of the actual production in the region. There are unfortunately no other official statistics from which to recreate small-scale hydroelectric power production.

Electricity from cogeneration and industrial backpressure

Fuel data and production figures for electricity from cogeneration plants are from The Swedish District Heating Association for 2005 onwards. The Swedish District Heating Association's data contains some uncertainties, as does SCB's data. The advantage of using The Swedish District Heating Association's data is that it is fully transparent and it is possible to see which fuel and production quantities are linked to which plant.

Wind power

Exactly as with hydroelectric power, SCB's statistics contain only the biggest plants. We have therefore chosen to use the wind power statistics in *Driftuppföljning av vindkraftverk* [Follow-up of

Wind Power Plant Operations] published by *Elforsk* at the request of the Energy Authority for 2008 and previously. These statistics may also be something of an underestimation of actual production since they are based on voluntary reports, but these figures are significantly higher than those from SCB. For Jönköping in 2010, we have used the Energy Authority's report called Wind Power Statistics 2011; ES 2012:02.

District heating production

All district heating production values are based on data from The Swedish District Heating Association for 2005 onwards. From 2007, The Swedish District Heating Association started to practise allocation in accordance with the Cogeneration Directive, i.e. fuel for heat in the cogeneration process has been allocated using the alternative production method.

Renewable and non-renewable in the region's energy consumption

Calculated on the basis of the distribution of the end consumption of fuel, district heating and electricity. The fuel mix for district heating and electricity from cogeneration has been calculated from The Swedish District Heating Association's statistics in accordance with the above.

Regarding electricity, some is produced regionally and some is supplied from elsewhere. The Nordic electricity mix[10] has been used to environmentally classify the electricity that has been supplied from elsewhere.

In order to compensate for the fact that the electricity mix that is imported changes with the passage of time, we have used a mean value for the share of renewable in the Nordic electricity mix. So that the figure is not completely dependent on wet and dry years, a total mean value has instead been used for 2000-2007 and a constant 4-year average has been used for 2008-2010 (Table 4). This method of calculating works provided that the electricity market is Nordic. In a few years' time, the European electricity market will be more integrated and the share of renewable in the electricity that is "imported" into the region will fall.

Table 4. Mean values for the share of renewable in the Nordic electricity mix that has been used

	2007-2007	2008	2010
Renewable	61.4 %	61.2 %	61.9 %
Non-renewable	39.6 %	39.8 %	39.1 %

Greenhouse gas emissions

With the new presentation of the municipal and regional energy balances at SCB, the distribution per type of fuel has disappeared, which means that it is no longer possible to calculate emissions using this data with any certainty (different fuels have different emission factors and they differ quite substantially between different types of fuel). We have therefore used data from the national emissions database, SMED, to show the region's emissions from the energy sector. Regarding energy consumption and fuel, SMED is based largely on SCB's energy statistics. However, there are some differences where the emission database contains supplementary methods. This means that the energy statistics and emissions statistics can be differentiated. Below follows a description of principal differences between SCB's statistics and SMED.

[10] Guideline for the labelling of the origins of electricity (10/07/2012), *Svensk Energi*.

Sector division in SMED

The division of sectors differs somewhat in SMED's emissions statistics from SCB's energy statistics. The biggest difference is that SMED has a sector called "energy supply" which contains all emissions linked to energy production and energy consumption. SMED, for example, contains no sector that delimits its illustration of emissions linked to the energy consumption of households. Nor is there a sector that delimits its illustration of emissions linked to energy consumption within industry - all emissions linked to energy production and energy consumption in SMED are in one and the same sector, that of "energy supply". There is on the other hand a separate sector in SMED which refers to the emissions that are linked to industrial processes, such as carbon dioxide that is emitted during the chemical process used to produce cement. At SCB, the sectors in which energy is used are illustrated as households, transportation, industry and public operations, for example.

Emissions from transportation

The other major difference between SMED and SCB is the way in which the transportation sector is dealt with. In SCB's statistics, the energy consumption of transportation is based on the sale of fuels, which means that the consumption ends up where the vehicles are tanked up, not necessarily where they drive. In SMED, models based on data for the actual traffic flows are obtained from satellite images which give a different accuracy of where the emissions actually take place.

Handling of changes to method at SMED

If comprehensive changes to methods are implemented, such as a change to the model for the calculation of emissions from transportation, SMED will change all data retrospectively in order as far as possible to prevent the statistics from showing breaks in the trend that are not real. This means that the statistics will always be "backwardly compatible". Even in cases where confidentiality ceases to apply, older data will be supplemented with the figures that are currently available. In SCB's statistics, there will in principle be no changes to older statistics, which will lead to greater risks of the statistics showing changes that are not real.