Energy Efficiency trends and policies in Sweden

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CONTENT OF THE REPORT

The report should describe energy efficiency trends and policies in your country, focusing on energy efficiency trends based on the ODYSSEE database (since 2000) and recent and innovative policies and measures from the MURE database. Please use when possible the different tools we develop to illustrate some examples.

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EXECUTIVE SUMMARY

This report presents an analysis of energy efficiency trends in Sweden on the basis of energy efficiency indicators extracted from the Odyssee database, as well as the measure database MURE. The indicators in this report are updated to 2013 and, in a few cases, until 2014.

The analysis focuses on changes and trends in the Swedish policy for energy efficiency in the period 1990–2013. There has been a general trend towards more market based systems, where general taxes and information campaigns have played a crucial role. In addition to this, regulations in especially transport and building sectors have constituted a key component.

The total energy consumption in Sweden was 48.6 Mtoe (565 TWh) in 2009. Total final energy consumption was 32.2 Mtoe (375 TWh) in 2013. No significant change in these indicators can be observed for the period 1990-2013.

1. ECONOMIC AND ENERGY EFFICIENCY CONTEXT

1.1. ECONOMIC CONTEXT

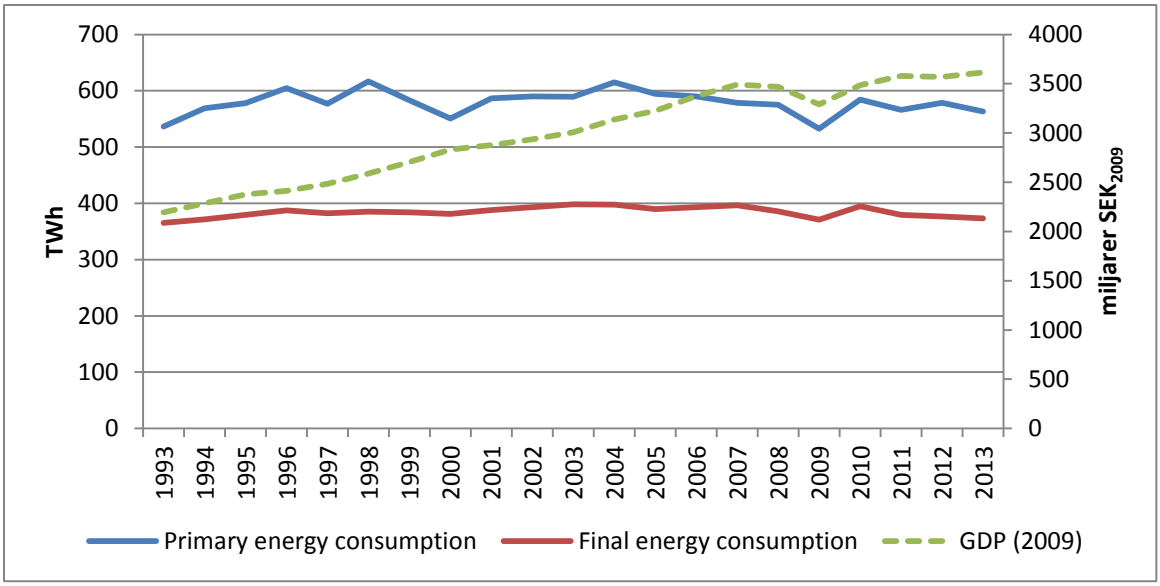
The all-European economic crisis in recent years has affected Sweden less than many other countries. Sweden's GDP has continued to grow despite a dip in 2009, albeit at a slower pace than before the crisis.

However, the current slow-down of global economy is felt through Sweden's heavy dependence on exports of in particular manufactured goods.

1.2. TOTAL ENERGY CONSUMPTION AND INTENSITIES

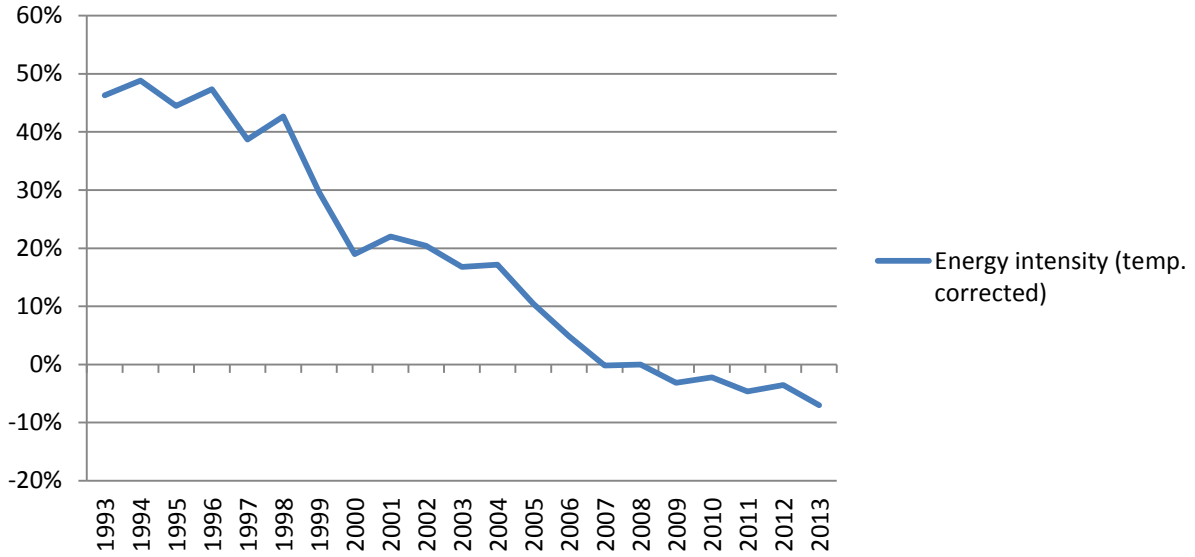
Sweden has a national, cross-sectoral target of reducing energy intensity by 20 % between 2008 and 2020. The Swedish target is, contrary to absolute targets, based on actual economic development and relates primary energy consumption to GDP. In 2013, primary energy consumption was per unit of GDP (in 2009 prices) 157 Wh/SEK, which can be compared to the intensity target for 2020, which is 131 Wh/SEK (in 2009 prices). According to forecasts made by the Swedish Energy Agency, the target will probably not be met. Due to the target formulation, low GDP development will make the target harder to reach.

FIGURE 1. PRIMARY ENERGY CONSUMPTION, FINAL ENERGY CONSUMPTION, AND GDP IN SWEDEN 1993-2013.



An unambiguous trend towards improved energy efficiency can be observed until 2007, but since then the trend has been less obvious with some fluctuations from year to year albeit the overall trend appears to continue. (Figure 2) This trend is caused by a number of factors, the most important of which is the economic downturn in 2008-2009, but at the same time the possibility that the trend of rapid improvement since the 1990s has been broken should not be excluded. This could be explained by the smaller number of companies outsourcing their production to other countries or that the share of ICT has stagnated.

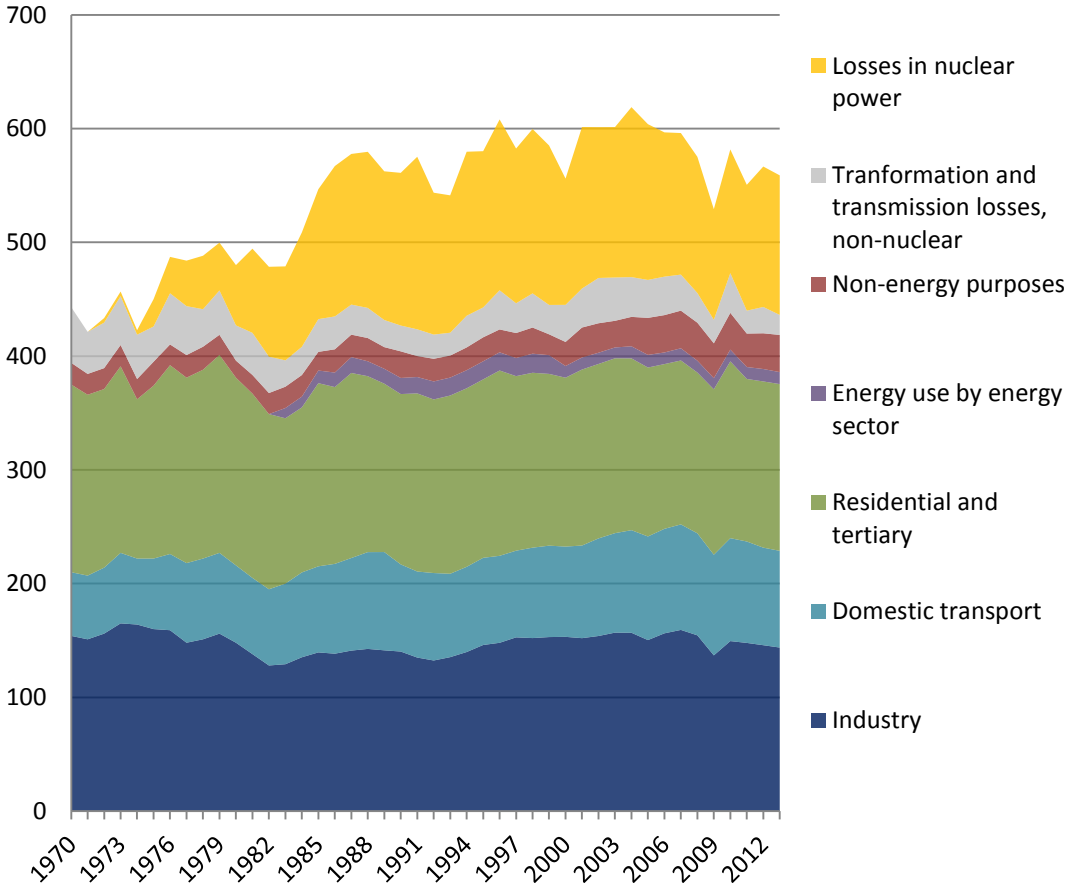
FIGURE 2. ENERGY INTENSITY IN SWEDEN 1993-2013, WITH 2008 AS BASE YEAR.



Fluctuations in primary energy consumption in Sweden are to a significant part a consequence of the

relatively high share of nuclear power. When for instance a nuclear power plant is temporarily shut down for service, this will be reflected as a reduction of primary energy consumption.

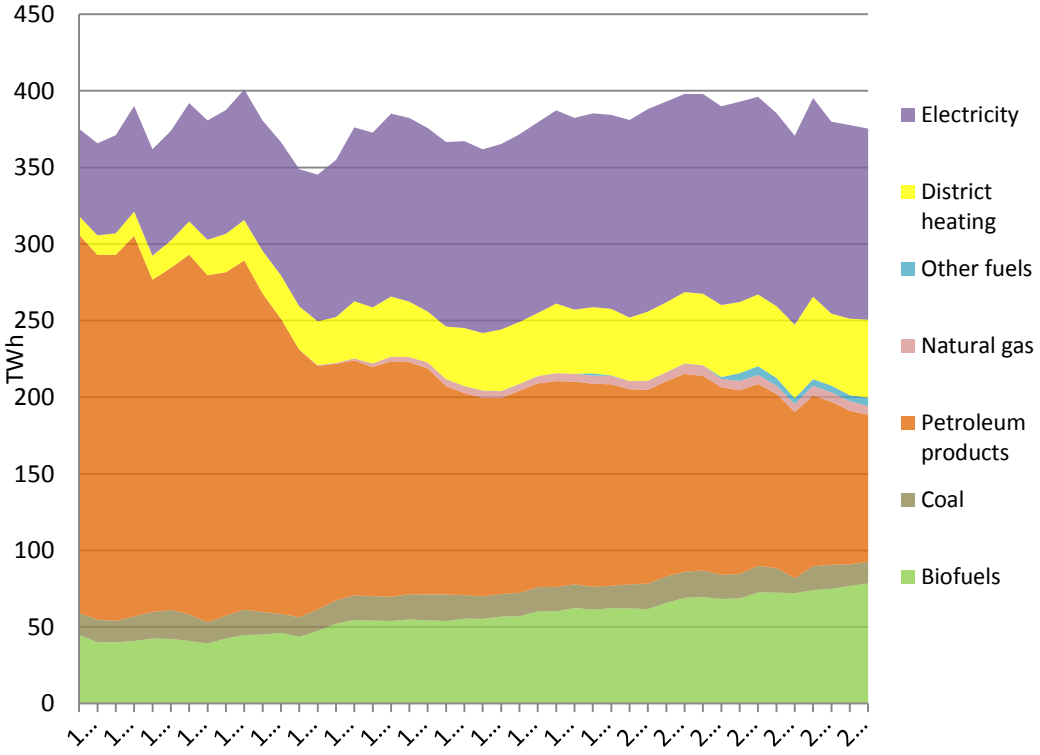
FIGURE 3. PRIMARY ENERGY CONSUMPTION IN SWEDEN 1970-2013, TWH



Contrary to primary energy, final energy consumption has remained rather stable with the exception of a dip in 2009. The shift away from petroleum to mainly biofuels continues.

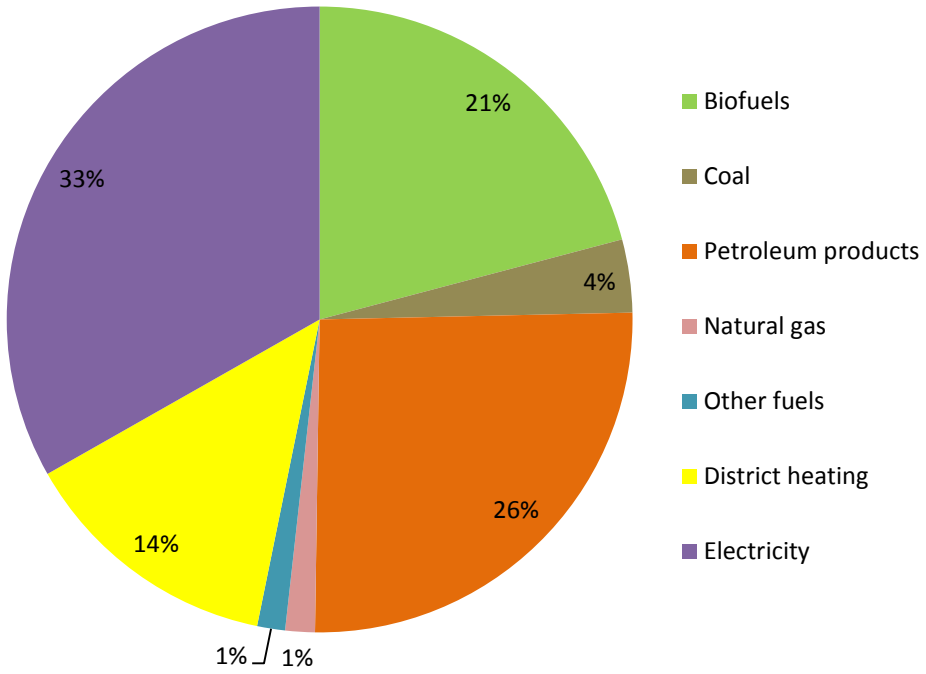
FIGURE 4. TOTAL FINAL ENERGY CONSUMPTION IN SWEDEN 1970-2013, TWH

Figure 4. Total final energy consumption 1970 - 2013, TWh



As shown in figure 5, biofuels constitute more than a fifth of Sweden´s energy consumption. This follows to a high degree from the role of forestry industry in Sweden, which in addition to its primary products (wood, pulp and paper) also, mainly as a side-effect, allows for the use of biofuels.

FIGURE 5. FINAL ENERGY CONSUMPTION BY ENERGY CARRIER 2013, IN PER CENT OF 375TWH.



1.3. ENERGY EFFICIENCY POLICY BACKGROUND

The current Swedish government, in office since October 2014, launched a broad-based parliamentary commission in March 2015, the task of which is to propose a new long-term energy policy with focus on energy supply. The Commission is chaired by the minister of energy, currently Mr. Ibrahim Baylan, and it will present its proposals before the end of 2016. The purpose is to develop foundations for future energy policies acceptable to all political parties which would limit the scope of sudden changes in the long-term energy policy making.

In 2014 several policy instruments for energy efficiency were terminated in accordance with original plans. In a number of cases there have not yet been any immediate replacements of those instruments, although several options are currently being discussed.

The principal policy instrument for energy efficiency, among other objectives, is taxation on energy and CO_2 emissions. The general level for the CO_2 tax is 1.08 SEK/kg (2014). Taxes are levied on electricity, fuels and emissions of carbon dioxide. The tax level varies according to whether fuel is used for heating or as motor fuel. There are also variations depending on whether energy is used by households, industry or in the energy conversion sector. Taxes on electricity vary according to geographical location. Tax on carbon in domestic refuse was abolished in 2010.

In the beginning of 2015 the following amendments were made to tax rates;

- The energy tax reduction on low-blended FAME in fossil diesel for transport use was reduced from 84 percent to 8 percent (The reduction applies only to the share of biofuel).
- The corresponding energy tax reduction for high blend FAME for transport use was reduced from 100 percent to 44 percent. (The reduction applies only the part which is biofuel)
- The exempt of CO_2-tax on all biofuels in transportation fully remains.
- The exemption of both energy and CO_2-tax for biofuels used in heating remains at 100 percent.
- The reduction on CO_2-tax for fuel used in a number of sectors was reduced from 70 percent to 40 percent. These sectors include, among others, industrial processes, agriculture, forestry and heat production in CHPs. However industrial processes and CHPs participating in EU-ETS are still subject to a 100 percent reduction of the CO_2-tax.
- The so called 0.8 %-rule has been abolished in 2015. According to this rule, a number of energy intensive companies whose costs for energy exceed 1.2 per cent of turnover, pay only 24 % of the CO_2 tax which would otherwise have been levied on them for energy exceeding the 1.2 % threshold.
- The energy tax on electricity was increased to SEK 0.294/kWh from SEK 0.293/kWh (with the exception for some municipalities in Northern Sweden where different tax rates apply).

The Swedish tax Board is responsible for the implementation of the taxes.

Table 1. Selected energy and carbon dioxide taxes as of 1 January 2015

Fuel	**Energy tax**	**CO_2 tax**
Fuel oil, diesel heating oil, SEK/m^3	850	3218
Coal, SEK/tonne	646	2800
Natural gas as vehicle fuel, SEK/1 000 m^3	0	2049
Natural gas for other purposes, SEK/1 000 m^3	939	2313
Petrol, environmental class 1, SEK/litre	3.25	2.60
Electricity, general level, SEK/kWh	0.294	0

Electricity, general level, Northern Sweden, SEK/kWh	0.194	0
Electricity, industrial processes, SEK/kWh	0.005	0

Another fundamental component of overall energy efficiency policy is the network of municipal energy and climate counsellors. The purpose is to spread objective information about energy supply, energy distribution and energy use in order to lower the use of energy. The counselling is directed at the general public, enterprises and to local organisations. In addition, there are established regional energy offices, which coordinate and support the energy counsellors.

1.3.1. ENERGY EFFICIENCY TARGETS

Sweden has no other energy efficiency target than the above mentioned cross-sectoral target of reducing energy intensity by 20 % between 2008 and 2020 and the overall targets in the EU to reduce overall energy consumption by 20 % and energy use in transports by 10 % by 2020.

2. ENERGY EFFICIENCY IN BUILDINGS

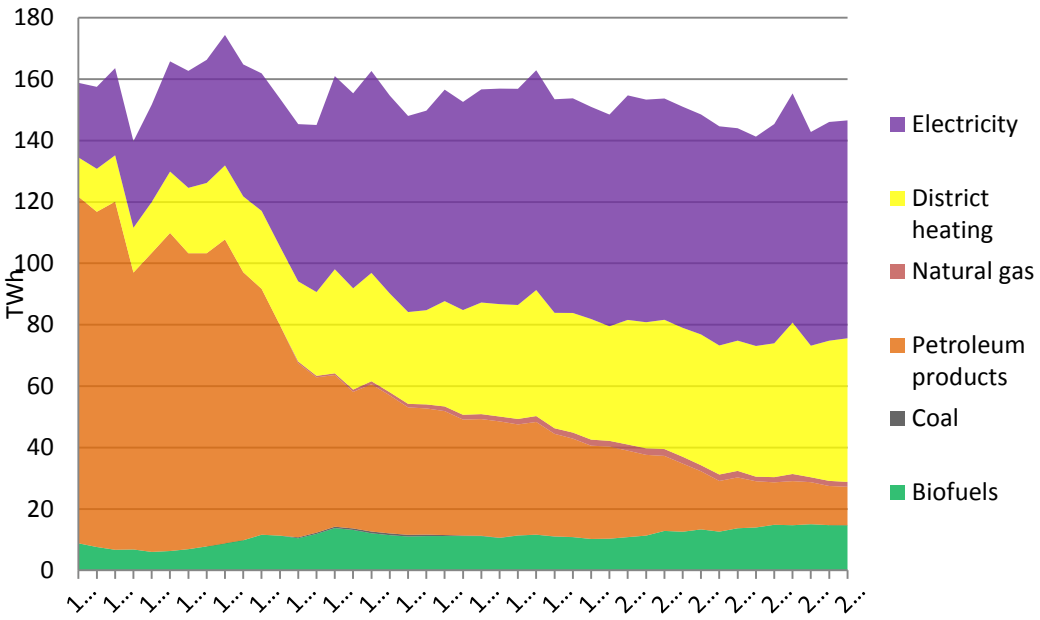
Final energy use in the residential and tertiary sector amounted to 147 TWh in 2013, see figure xx. This accounts for 39 % of Sweden's total final energy use. The sector consists of residential premises (including holiday homes) and commercial premises (excluding industrial premises), agriculture, forestry, horticulture, fisheries[1], construction sector, street lighting, sewage[2], and other service activities, the construction sector, street lighting, sewage treatment plants, electricity and waterworks. Of the total energy use in the sector, most (about 90 %) is used in residential buildings and commercial premises.

More than 60 % of the energy in the sector is used for space heating and domestic hot water production. As the energy use for space heating is affected by temperature conditions, there can be variations in energy demand from one year to another.

[1] More detailed information on energy use in these sectors can be found in the publications 'Energy Use in Agriculture 2007' (Statistics Sweden), 'Energy Use in the Fisheries Sector 2005' (ER 2006:35) and 'Energy Use in Forestry 2005' (ER 2007:15). Information on energy use in the horticultural sector can be found in 'Horticultural Production 2005', which can be downloaded from www.jordbruksverket.se.

[2] More detailed information on energy use in these sectors can be found in the publications 'Energy Use in Agriculture 2007' (Statistics Sweden), 'Energy Use in the Fisheries Sector 2005' (ER 2006:35) and 'Energy Use in Forestry 2005' (ER 2007:15). Information on energy use in the horticultural sector can be found in 'Horticultural Production 2005', which can be downloaded from www.jordbruksverket.se.

FIGURE 6. FINAL ENERGY CONSUMPTION IN THE RESIDENTIAL AND TERTIARY SECTOR 1971-2013, TWH



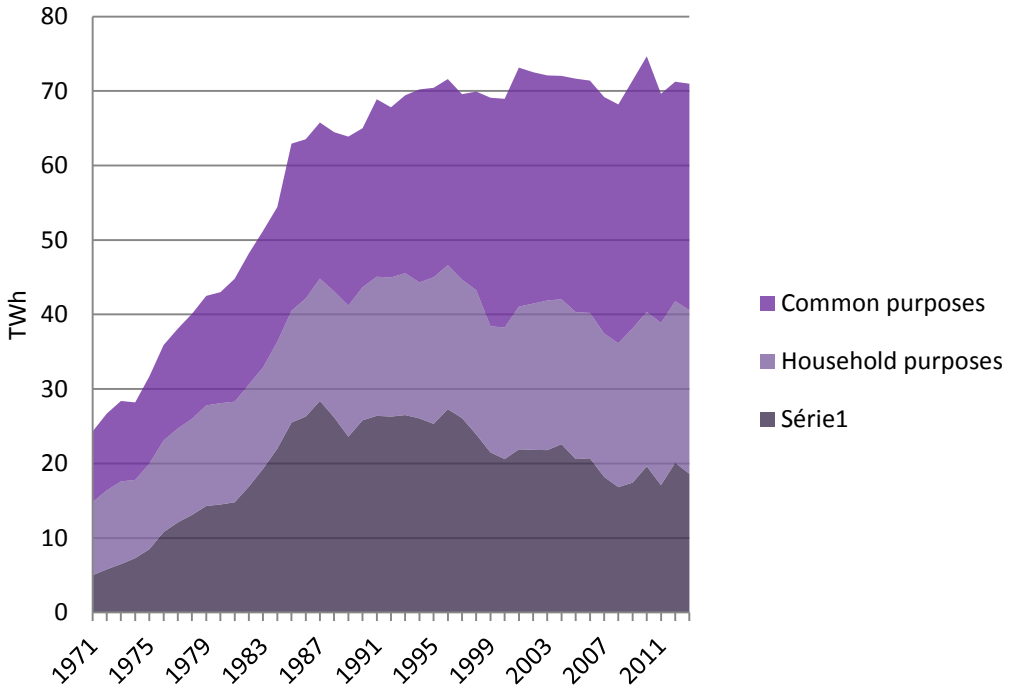
Source: Statistics Sweden, EN 20 SM, calculations by the Swedish Energy Agency.

The relative proportions of the different energy carriers have changed over time, which can be seen in **Erreur ! Source du renvoi introuvable.**. Oil crises, rising energy prices, changes in energy taxation and investment policies have all affected the shift from oil to other energy carriers. Oil consumption in this sector has been reduced by 70 % between 1990 and 2013 and is currently 13 TWh. An important reason for the decrease of oil use has been the rise in oil prices as a consequence of i.a. higher taxes on oil, leading to a change to electricity, district heating and the increased use of bio fuels. Especially in one- and two-dwelling buildings, bio fuels are used for heating. The most common bio fuel is wood, although pellets and wood chips are also used.

Figure 7 shows how the total use of electricity in the sector has changed during 1990–2013. Much of the electricity used in the sector is for building services systems and for work activities in non-residential buildings / commercial premises[3]. The amount of electricity used for these purposes has increased substantially, from 21.3 TWh in 1990 to 30 TWh in 2013.

FIGURE 7: USE OF ELECTRICITY IN THE RESIDENTIAL AND TERTIARY SECTOR 1990–2013

[3] Electricity for building services systems is that which powers fixed equipment in the building, such as lifts, escalators etc., and for climate control and for lighting in common areas (entrance lobbies, stairwells etc.) Electricity for activities in the building is that used for such purposes as computers, office equipment and lighting in occupants' areas.



Note. Temperature correction according to the method used by the Swedish Energy Agency

Source: Statistics Sweden, EN 16 SM, EN 20 SM, calculations by the Swedish Energy Agency

The use of electricity for domestic purposes[4] increased from 18 TWh in 1990 to 22 TWh in 2013. This is explained by an increase in the number of households and a growing number of electrical and electronic equipment owned by the households.

Over the period 2005–2008, the Swedish Energy Agency carried out a study to provide updated data on the breakdown of uses of domestic electricity. The results indicate a wide spread in measured electricity use between households, varying from 2 000 kWh/year to 7 000 kWh/year for a detached house, and from 1 000 kWh/year to 5 000 kWh/year for an apartment. Over the whole year, lighting is the largest user of domestic electricity, followed by electricity use for refrigerators and freezers in second position, and entertainment electronics (TV, computers etc.) in third position.

The use of electricity for heating in the sector increased gradually from 5 TWh in 1970 to 29 TWh in 1990 (statistically corrected values), reaching a peak at the beginning of the 1990s. In 2013, electric heating amounted to 19 TWh. The reason for this decline is mainly the increased use of district heating and bio fuels, but also the fact that heat pumps have become more widespread in this period. In 2013, every second one- and two-dwelling premises has installed a heat pump in their home.

[4] Domestic electricity is that which is used for lighting, white goods, domestic appliances and other electrical equipment in a home.

Electricity used for floor heating and fan heaters also contributes to the heating of a building, but is partly accounted for in the statistics as domestic electricity.

A total of 80 TWh were used for space heating and domestic hot water production in 2013, which is 55 % of total energy consumption in this sector.

Total use of energy for space heating and hot water in in one- and two-dwelling buildings amounted to almost 33 TWh 2013. Of this, electricity was 15 TWh, solid biofules 11 TWh, district heating 6 TWh, while oil, continuing its decline, was 0.9 TWh. Heat pumps were used in 52 % of the one- and two-dwelling buildings in 2013.

District heating is the most common form of heating in multi-dwelling buildings, with about 90 % of the space being heated by it in 2013. Total use of energy for space heating and hot water in multi-dwelling buildings was 20 TWh in 2013. Of this 18.4 TWh were district heating, 1 TWh electric heating, and 0.16 TWh oil, 0.2 TWh gas and 0.2 TWh solid biofuels.

District heating is also the main source of heat in non-residential premises (offices, commercial premises and public buildings) as well, with 71 % of the area being heated by it in 2010. Total use amounted to 21 TWh of which 16.9 TWh was district heating, 2.8 TWh electrical heating, 0.5 TWh oil, 0.2 TWh gas and 0.7 TWh solid biofuels.

2.1. ENERGY EFFICIENCY POLICIES

In addition to the requirements following directly from EPBD and EED, the Swedish buildings and tertiary sector are directly targeted by the group of policy instruments called technology procurement groups. By supporting actors within a specific segment to cooperate on procurement (and exchange of experiences, too), a downwards pressure on prices for new technology is created and maintained. Currently there are four such groups, namely BeBo for (large-scale) landlords, BELOK for landlords renting commercial space, HYLOK for the public sector, and finally BeLivs for the food processing and distributing sector. An estimated 20 % of commercial space and 70 % of apartments are included in these groups.

There is no quantified energy efficiency target for this sector beside direct requirements on building norms set by the Swedish National Board of Housing (Boverket). The purpose of the building regulations is that the buildings should fulfil essential technical requirements. The purpose is also to support overall environmental targets, such as “Good built environment”. When it comes to energy use, the regulation states that the building is to be constructed in a way limiting energy use by means of low heat losses, low need for cooling, an efficient heat and cool use and an efficient electricity use.

The first building regulations came in 1993 (BFS 1993:57). The second version came 2010, BBR 18, (BFS 2011:6), and the most recent revision is BBR 21 (BFS 2014:3). The new building regulations have higher demands on buildings energy efficiency. The requirements on energy efficiency in buildings were reduced by an average of 20 percent compared to the first one.

A couple of policy instruments were completed in 2014 in accordance with original plans. These

instruments are the support for municipalities and country boards for energy efficiency and the pilot project sustainable municipality.

3. ENERGY EFFIENCY IN TRANSPORT

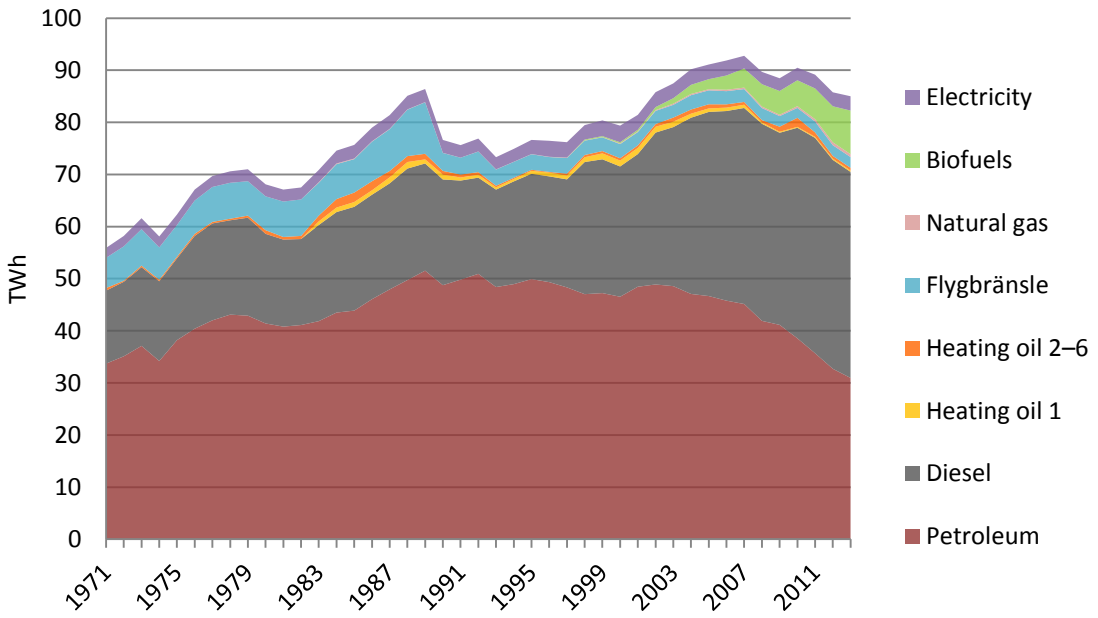
3.1. ENERGY EFFICIENCY TRENDS

The transport sector accounts for approximately one quarter of Sweden's final energy consumption, and is dominated by fossil fuels. With the increasing requirements to reduce emissions of greenhouse gases, the conversion to alternative fuels is expected to play an increasingly important role for the next years to come.

Figure 8 shows how total final energy consumption in the transport sector has changed during 1970–2011. Sweden's energy use in the transport sector has been continually increasing; a trend that seems to have changed after 2007 when the transport sector reached its highest level ever (126.3 TWh). The energy use in transport has since then slowly decreased to 113 TWh in 2013, including 28 TWh used in international transport (shipping and aviation). Road transport accounted for 93 % of total domestic energy use in this sector.

Transport is the end use sector that has the greatest difficulty in switching to different energy carriers, and alternative solutions for transport are therefore a major policy challenge.

FIGURE 8. FINAL ENERGY CONSUMPTION IN TRANSPORT, DOMESTIC 1970-2013, TWH



Total energy use for domestic transport in 2013 amounted to about 85 TWh. Energy use in the transport sector consists mainly of petroleum products, primarily petrol and diesel fuel. In 2013, the use of these two fuels exceeded 82 % of the country's energy demand for domestic transport, with electricity accounting for a further 3 % and aviation fuel for 2 %. The remaining energy demand for transport was met by medium distillate and heavy fuel oils, biogas, natural gas, biodiesel and ethanol. The use of petrol has declined with more than a third between 2002 and 2013, which partly can be explained by a constantly falling proportion of petrol engines in passenger cars and light commercial vehicles. Meanwhile, the use of diesel fuel has increased by 38 % over the same period, which is largely due to a steadily increasing proportion of diesel-powered vehicles among new vehicle sales. The proportion of new vehicles that were diesel-powered during 2013 was approximately 60 %.

The use of fuel in domestic aviation has decreased significantly for several years. The decrease over the last decade is due to the transition from aviation to railway and also partly due to the effects of the economic crisis of 2009, which lead to a reduction of domestic flights.

The use of biofuels, such as ethanol, biogas and biodiesel continues to grow. Between 2012 and 2013, the use of biofuels increased by 21 %, which is the biggest growth in absolute terms on record. In particular the use of biodiesel increased, while biogas consumption remained more or less constant and a decline was registered for ethanol, both in low-blend due to lower use of petrol and in high-blend fuels. In terms of volume, biodiesel accounted for 64 % of total biofuel consumption in 2013.

In 2013 biofuels made up for 12 % of domestic transports and 10 % of road transport, which is an increase from 7 respectively 6 % in 2010.

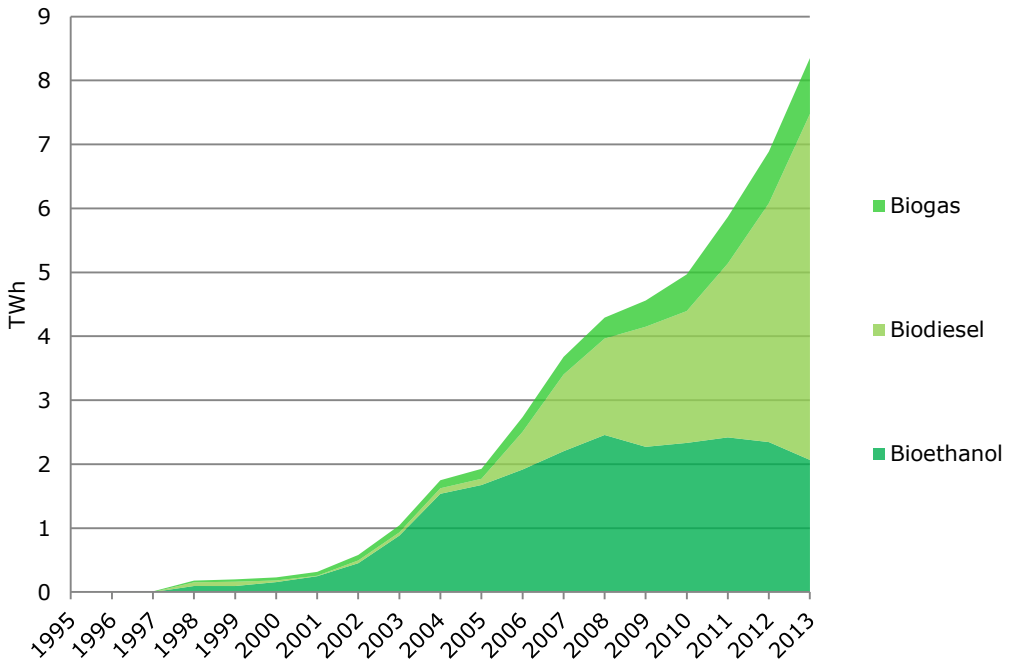
In order to make biofuels competitive, the consumer price is in some cases based on the price of the corresponding fossil fuel, and thus not on actual production costs. However, this does not automatically imply that biofuels would be chosen, which is illustrated by the fact that although ethanol (E85, which is consisting of 85 % ethanol and 15 % petrol) has been cheaper than petrol to the consumer, the demand for it has declined since 2011.

Also the number of new cars running on ethanol has declined in the last four years. This can partially be explained by changes in the tax structure for environmentally-friendly vehicles, which have made ethanol-based vehicles less popular. The decline in ethanol hybrid new-car sales has been dramatic; down from 59,000 in 2008 to 2,600 in 2014. This development can be explained by reports of engine problems and an anxiety that ethanol may not be as environmentally-friendly as previously supposed. The amount of ethanol used in existing petroleum-ethanol hybrid vehicles has decreased, too. This may in part be explained by the fact that a significant share of the ethanol-run vehicles now stem from the second-hand market, where the purchasing price of the vehicle is more important than fuel options.

The biodiesel HVO was introduced to the Swedish market in 2011. The demand has increased and already in 2013 it was the most used biofuel in Sweden. Low-blend HVO had a market share of 36 % among renewable motorfuels in 2013. Recently pure HVO has been introduced for heavy vehicle purposes, but so far there is no standard for it and thus permission from the vehicle producer is

required. In contrast to FAME, HVO is chemically identical to fossil diesel, and can therefore be mixed with fossil diesel to a higher degree and used in ordinary diesel engines without adjustments.

FIGURE 9. BIOFUELS IN TRANSPORT, DOMESTIC, 1995-2013, TWH



Source: Statistics Sweden and the Swedish Gas Association

Since the introduction of the Pumps Act in 2006 the effect has been that stations with renewable fuels as an option has increased from 10 % (2005) up to 62 % (2010). The choice among the stations has almost exclusively been to install E85-pumps. The Pumps Act requires that all petrol stations that sell more than 1000 m³ of petrol or diesel fuel each year must supply at least one renewable fuel, and its purpose is to increase the availability of renewable fuels and thereby reduce CO_2 emissions.

3.2. ENERGY EFFICIENCY POLICIES

Sweden has a sectoral target in transport to reach a fossil-free vehicle fleet by 2030. The exact definition of how this should be interpreted is for the time being not decided.

To a large degree, Swedish energy efficiency policy in the transport sector is based on vehicle taxation, e.g. lower tax rates for environmentally-friendly vehicles. In January 2013, the definition of environmentally friendly vehicles was changed. An environmentally-friendly vehicle is allowed to emit CO_2 up to a certain ceiling in accordance with its weight. A petrol-driven vehicle of average European service weight, 1 372 kg, is allowed to emit a maximum of 95g CO_2 per km. Ethanol and gas-driven vehicles are allowed to emit up to 150 g because of the renewable origin of the fuels. This

definition includes also light-duty vehicles and minibuses, in addition to cars.

Taxations rules which favour environmentally-friendly vehicles focus on company cars and the premium on so-called super-environmentally-friendly vehicles, i.e. cars with a maximum emission of 50 grams CO_2 per kilometer. The premium of a maximum of 40 000 SEK can be applied for by the purchaser. The Swedish government has directed money to this to continue during 2015 and 2016.

Currently, the government is analysing the possibilities to introduce a bonus-malus system for cars. In such a system, purchasers of cars with relatively low emissions receive some sort of bonus, while those who choose a vehicle with higher emissions face higher taxes. A proposal on such a system is expected during 2016 and to be implemented in 2017.

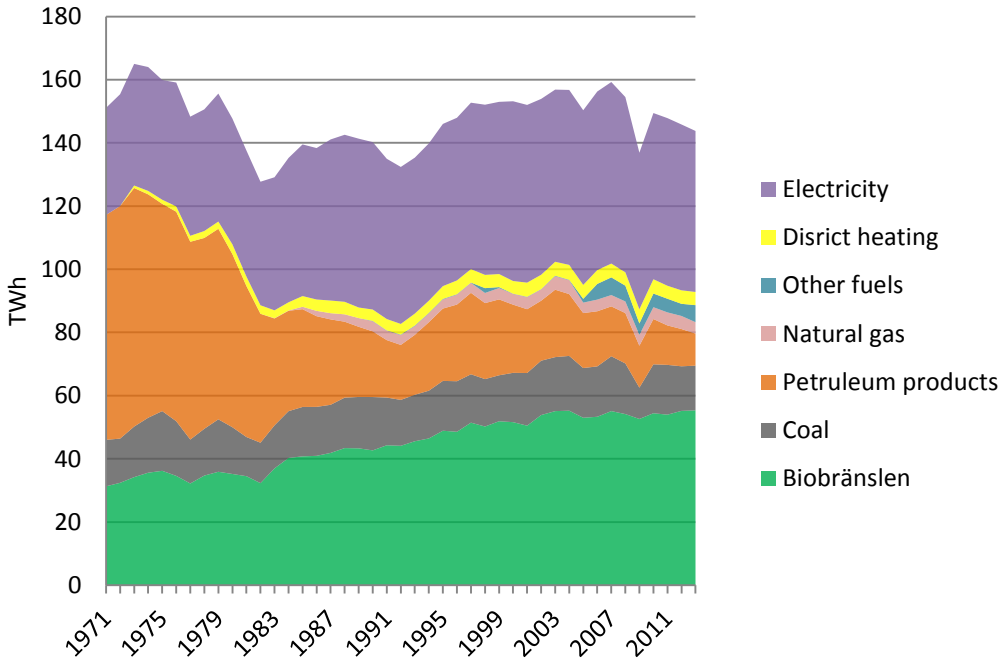
The transport sector is targeted by the energy and CO2 taxes. In section 1.3. recent changes in the energy and CO2 taxation related to transport are described in detail.

4. ENERGY EFFICIENCY IN INDUSTRY

4.1. ENERGY EFFICIENCY TRENDS

Energy use in industry in 2013 amounted to 144 TWh, which represents 38 % of Sweden's final energy use. This is a slight decline from 148 TWh in 2010. The main energy providers in industry are biofuels and electricity, at 38 % and 35 % respectively, complemented by 23 % of energy from fossil sources. District heating provides the remaining 3 % of energy use.

FIGURE 10. ENERGY CONSUMPTION IN INDUSTRY 1971-2013, TWH



Source: Swedish Energy Agency and Statistics Sweden (EN 20 SM, EN 31 SM)

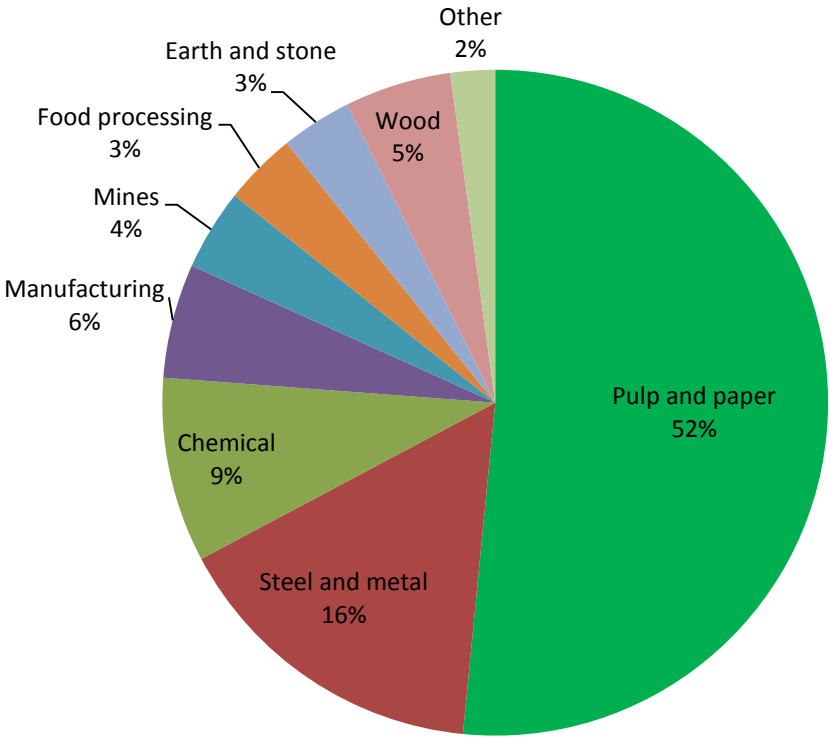
In Sweden, a small number of sectors account for the bulk of energy use in industry: see **Erreur ! Source du renvoi introuvable.**. The pulp and paper industry uses approximately 50 %, mainly electricity or black liquors[5]. The electricity is used mainly for grinders producing mechanical pulp, while the black liquors provide fuel for soda recovery boilers in sulphate mills. The iron and steel industry uses about 16 % of industry's energy, primarily in the form of coal, coke and electricity. Coal and coke are used as reducing agents in blast furnaces, while the electricity is used chiefly for arc furnaces for melting steel scrap. The chemical industry is responsible for 9 % of industrial energy use: here, electricity is used mainly for electrolysis processes. Together, these three energy intensive sectors account for almost three-quarters of total energy use in industry.

The engineering industry, although not regarded as energy intensive, nevertheless accounts for 6 % of total energy use in industry, as a result of its high proportion of Sweden's total industrial output. The remaining approximately 19 % of the energy used by industry meets the needs of other sectors. Although some of them can be regarded as energy intensive, their total energy use is relatively low. Some sectors are dominated by the use of fossil energy, such as the non-metallic minerals industry, while others, such as non-ferrous metals industries, are dominated by the use of electricity. This category also includes sectors mainly using a mix of fossil energy and electricity, such as the mining

[5] Black liquors are a by-product of pulp manufacture in sulphate pulp mills. They can be burnt to recycle chemicals and release energy.

industry, and those which are dominated by biofuels, such as the wood products industry, which also uses a considerable proportion of electrical energy[6].

FIGURE 11. ENERGY USE IN INDUSTRY, BY SECTOR, %, 2013



Source:

Swedish Energy Agency and Statistics Sweden (EN 20 SM, EN 31 SM)

Industry's energy use is governed in the short term by production volume. In the longer term, it is also affected by such factors as taxation, changes in energy prices, energy efficiency improvements, investment, technical development, structural changes in the sector and changes in the types of goods produced.

2013 saw a decrease of 6 % and 4 % for production volumes and energy use, respectively, in industry compared to 2010. The background to this development is that the quick rebound in Sweden after the recession in 2008 and 2009 has lost momentum because of the prolonged period of reduced demand. Energy use in 2013 remained approximately 10 % below the levels recorded before the crisis, while the production index of industry is almost 20 % below the level of 2007.

[6] Other sectors' include the mining industry, metal works industries, wood products industries, quarrying, the food industry and "other industries" (NACE 36-37, rev 1.1).

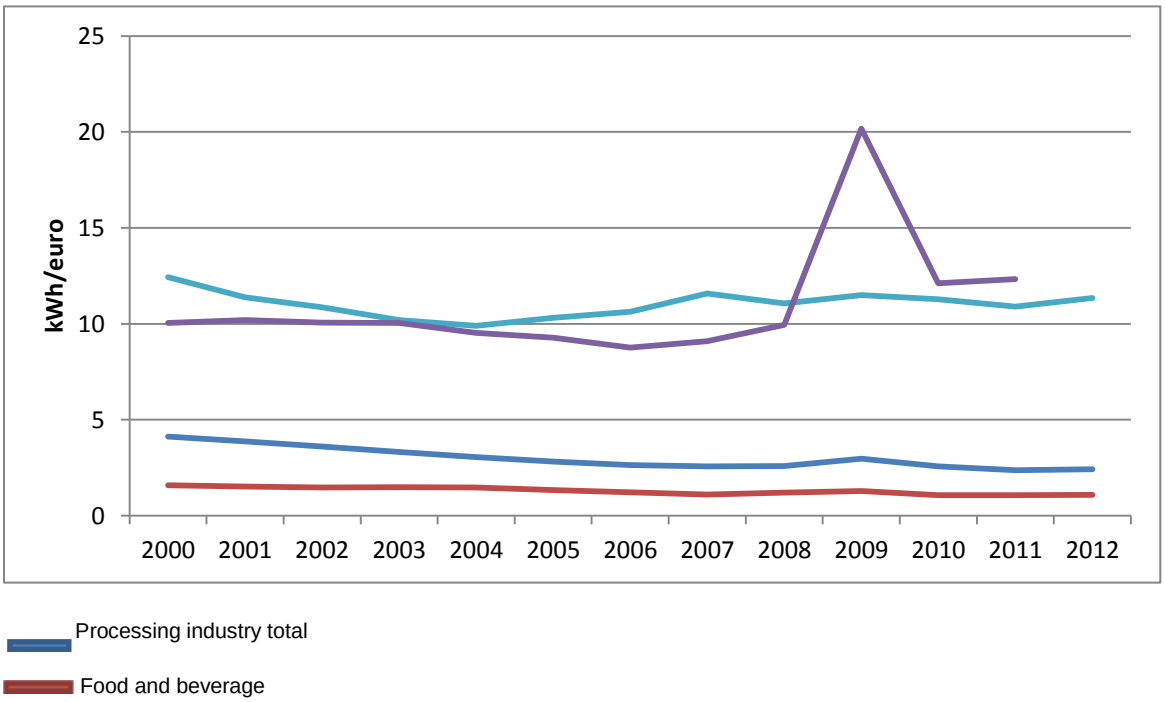
The recession affected certain sectors more than others. The iron and steel industry was the sector with the greatest reduction in energy use, which also resulted in a marked reduction in its use of coal and coke. In 2013 energy use by this sector remained 21 % below the figure for 2007.

Industry's energy use has remained fairly constant since 1970 despite increased industrial production. This is a result of energy efficiency improvements as well as a gradual transition from oil to electricity. The proportion of electricity use making up industry's total energy use increased from 21 % in 1970 to 35 % in 2013. This development began because of the oil crises of the 1970s, which led to both business and society in general embarking on intensive work to reduce oil use. In 1970, oil use represented 48% of the total energy use in industry, compared with 7 % in 2013. Industry primarily uses heavy heating oil.

The share of biofuels and peat in total energy use in industry has increased continuously from 21 % to 38 % in the period 1970 to 2013. In the pulp and paper industry and the wood products industry, biofuels are the dominant energy carrier.

In 2011-2012 energy intensity increased for processing industry, food industry and forest industry. Between 2000 and 2012 energy intensity decreased by 41 % in processing industry as a whole. In forest industry, energy intensity has declined particularly in the first years of the 21st century. In 2009, energy use related to value-added increased because of the economic downturn, with the largest increase taking place in iron-and steel industry, which was severely affected, because some support processes need to be running regardless of output, which has a negative impact on energy intensity.

FIGURE 12. ENERGY USE IN SWEDISH INDUSTRY IN RELATION TO VALUE-ADDED, SOME SELECTED SECTORS (2005 PRICES), KWH/EURO, 2000–2012.



Source: Eurostat, National Accounts och Detailed Energy Balance.

The transition from oil to, above all, electricity is reflected in the specific energy use figures for oil and electricity. Between 1970 and 1992, the specific energy use for oil fell by 81% while that of electricity rose by 23 %.

4.2. ENERGY EFFICIENCY POLICIES

The comprehensive program for energy efficiency in industry has been gradually wound down starting in 2012. Currently, the most important policy instrument targeting energy efficiency in the industry sector is taxation on energy and emissions of CO2, which is described in detail in section 1.3.

Currently there are four industry-related sector networks with the aim of improving energy efficiency funded primarily by the Swedish Energy Agency. The aim of the networks is to be a forum for the exchange of experience and information on energy efficiency. The financing from the Energy Agency covers only this part, not actual measures carried out in various industries.

1) The network for energy efficiency in various industrial processes, ENIG (founded in 2009), which consists of experts, industries (mainly SME), regional energy planning offices and municipal energy advisors. The objective of the project is to reduce the participating companies' energy use by an annual 5 per cent or a total of 30 per cent by 2015 through the development of techniques, methods, and practices in manufacturing.

2) Energy efficient sawmills, EESI (founded in 2010), which aims at demonstrating that specific energy use in sawmills can be reduced by 20 per cent by 2020. This includes mapping, modelling, and a plan for demonstration.

3) Project GeniAl for the aluminium industry in order to increase knowledge and to identify and implement measures for energy efficiency. Currently the project has entered its second phase, GeniAl II, in which the aim is to demonstrate how to reduce energy use in the aluminium sector by 25 per cent by 2020 (compared to 2005). In the first phase of the project, focusing on the flows of material and energy, it was demonstrated that theoretically more than half of the energy used by the aluminium sector could be saved. This would however require new technologies to be developed.

4) The Swedish Energy Agency finances research projects (JoSEn) in cooperation with the Swedish steel association, Jernkontoret, by 85 million SEK (EUR 10 million) for the period 2013-2017. The main purpose is to promote energy efficiency in steel producing companies.

5. ENERGY EFFICIENCY IN AGRICULTURE (ONLY IF RELEVANT)

5.1. ENERGY EFFICIENCY TRENDS

Present energy consumption and their main drivers: level and trends

5.2. ENERGY EFFICIENCY POLICIES

Present the energy efficiency strategy based on NEEAP 3. Please insist on recent and innovative measures, and add when possible quantitative and/or qualitative evaluation.

REFERENCES (IF ANY)