



NORTH SEA  
SUSTAINABLE  
ENERGY  
PLANNING

Baseline Paper turned in June 2011  
Revised DATE

# Baseline North Sea – Sustainable Energy Planning

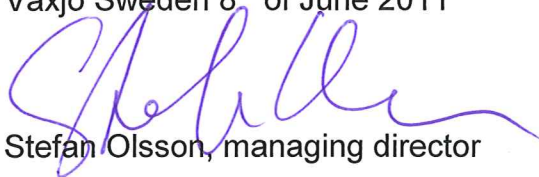
Period of publishing  
SPRING 2010–SUMMER 2011

Organization  
ENERGY AGENCY FOR SOUTHEAST SWEDEN

Author  
GÖRAN GUSTAVSSON

Confirmation of publishing permission

Växjö Sweden 8<sup>th</sup> of June 2011



Stefan Olsson, managing director

The Interreg IVB  
North Sea Region  
Programme



Investing in the future by working together  
for a sustainable and competitive region



European Community  
European Regional  
Development Fund

## **Table of contents**

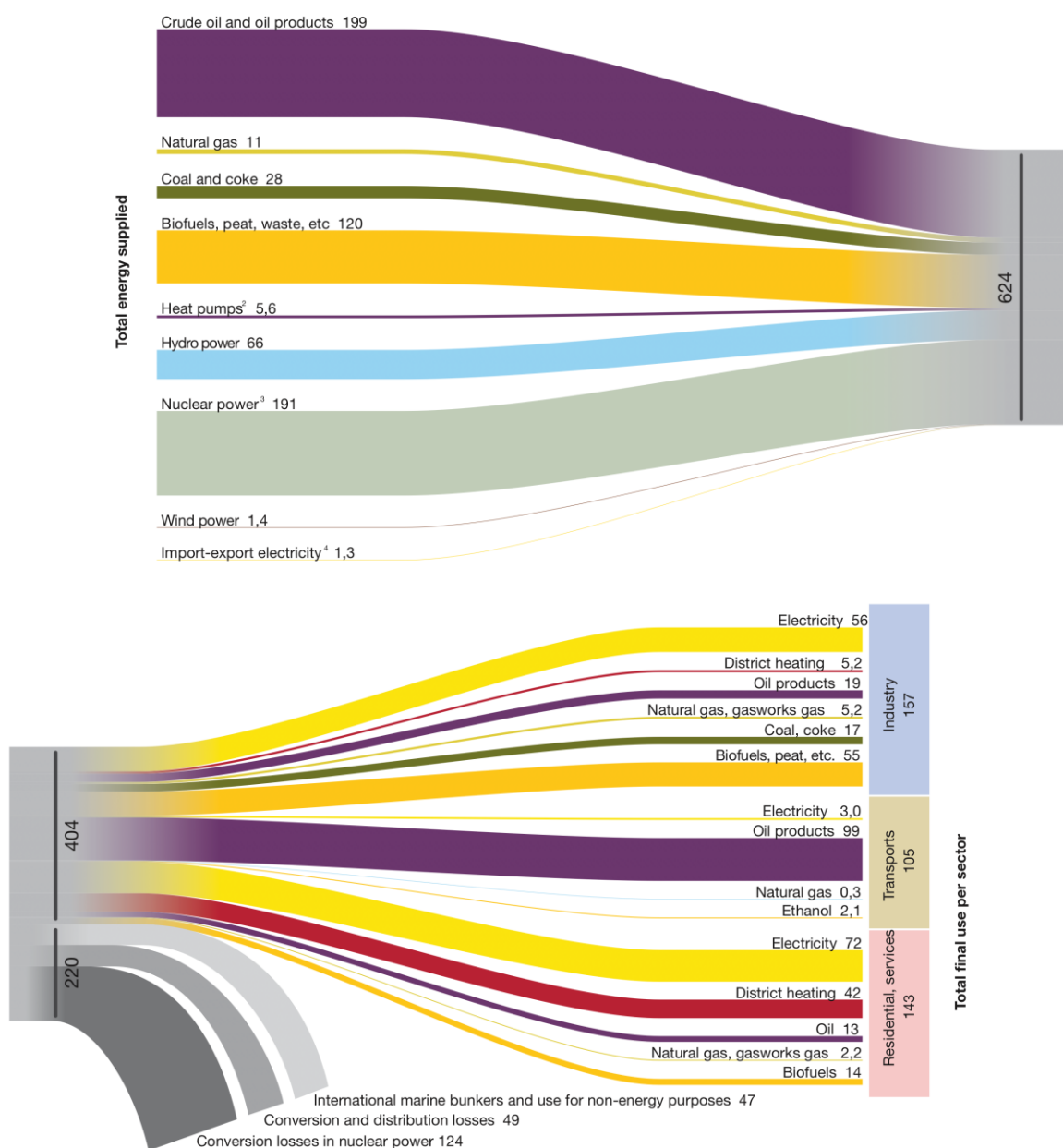
Analysis of energy context – Sweden .....	3
1 Energy infrastructure .....	3
2 Organisations and markets .....	6
3 Built environment .....	9
4 Government .....	9
5 Governance instruments .....	9
6 Economic, financial and fiscal conditions .....	13
7 Energy issues and debates .....	15
8 SNEI:s. The County of Kronoberg .....	16
9 Appendix 1. Categories of governance instruments .....	20

## Analysis of energy context – Kronoberg

### 1 Energy infrastructure

What are the sources, generation technologies and delivered forms of energy in the country/region? What are the approximate shares held by each in the supply mix and in the major market segments?

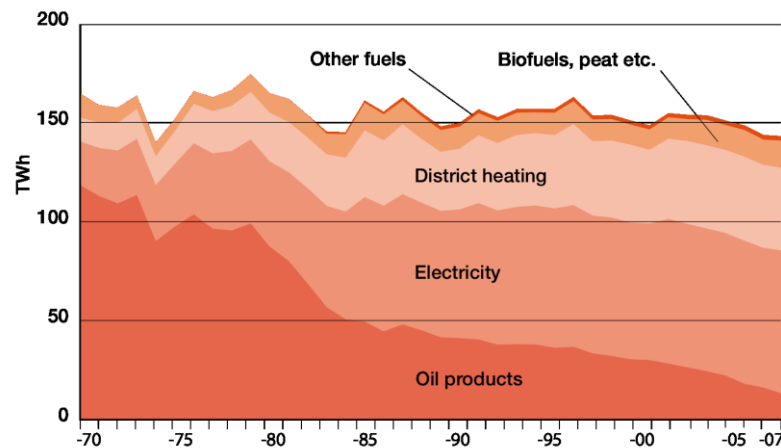
**Figure 7: Energy supply and use in Sweden, 2007, TWh**





Source: *Energy in Sweden 2008, ET2008:16, The Swedish Energy Agency*, <http://www.energimyndigheten.se/en/>.

Specifically, what are the generation mix for electricity and the mix of energy forms and technologies used in heating – both supply and use?

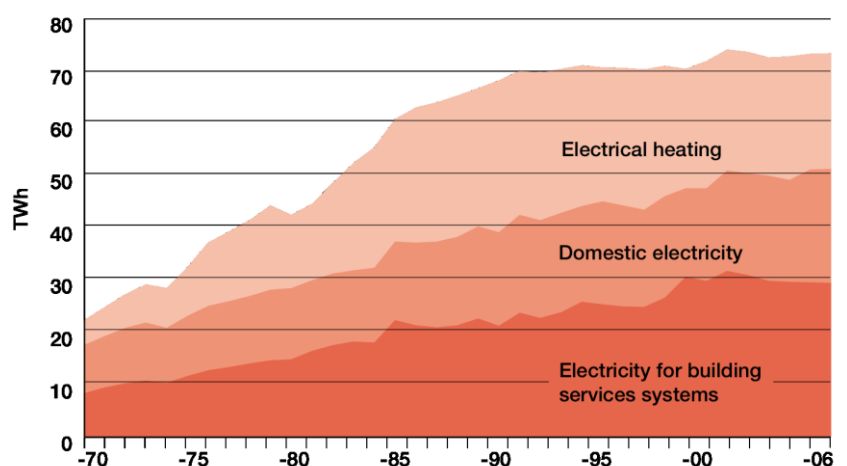


**Figure 14:**  
Final energy use in the residential and service sector, 1970–2007

SOURCE: STATISTICS SWEDEN AND THE SWEDISH ENERGY AGENCY

**Figure 13:**  
Electricity use in the residential and service sector, 1970–2006, statistically corrected for weather conditions

SOURCE: STATISTICS SWEDEN AND THE SWEDISH ENERGY AGENCY

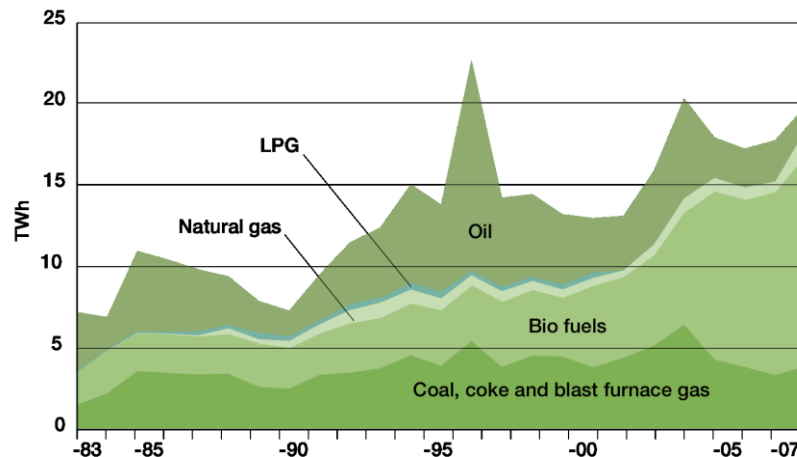
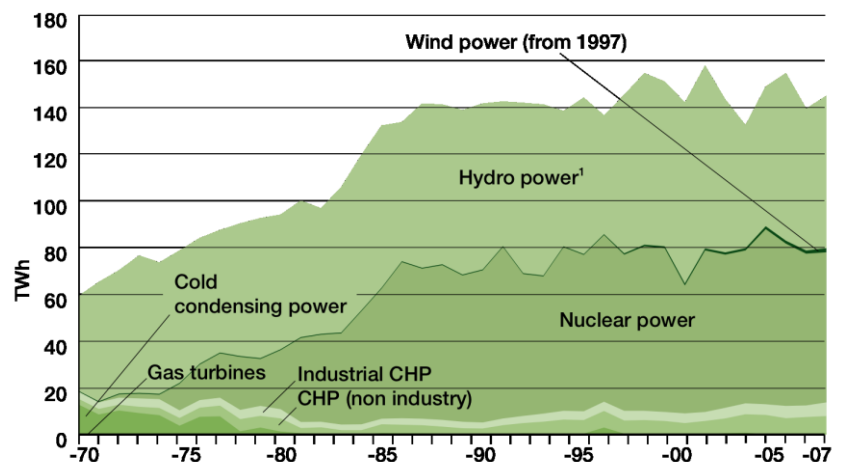


Specifically, how much electricity and heat is provided from renewable sources?

**Figure 23:**  
Electricity production  
in Sweden, by types  
of production plant,  
1970–2007

SOURCE: STATISTICS SWEDEN  
AND THE SWEDISH ENERGY  
AGENCY

1 INCLUDES WIND POWER  
UNTIL 1996.



**Figure 24:**  
Fuel input for electri-  
city production (ex-  
cluding nuclear fuel),  
1983–2007

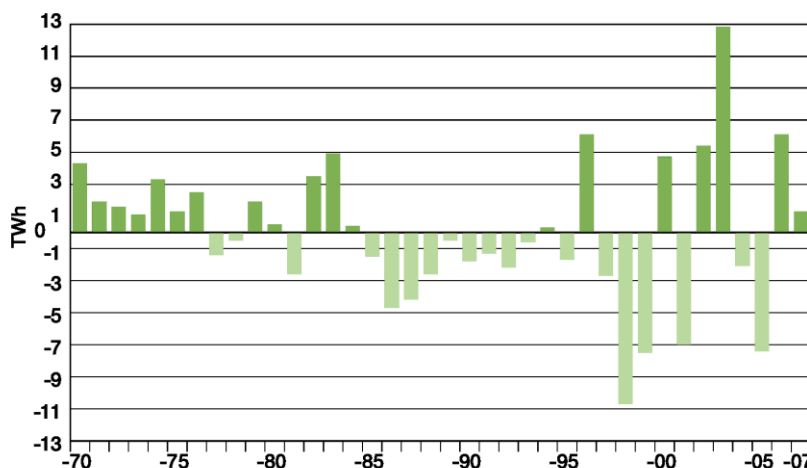
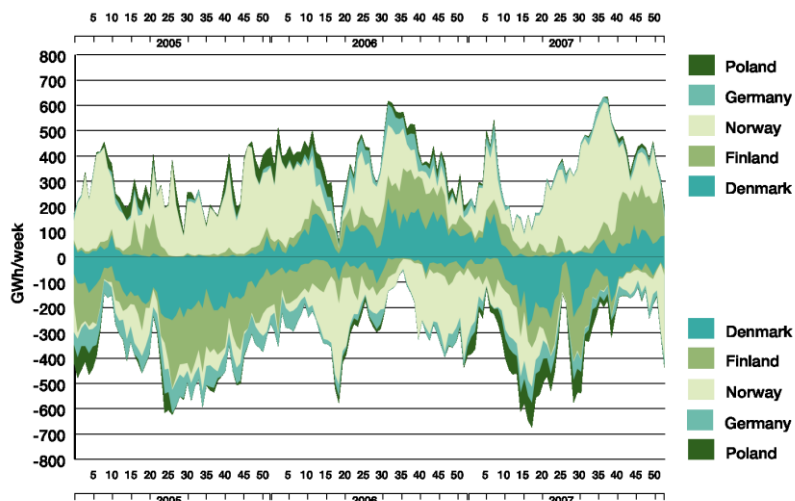
SOURCE: STATISTICS SWEDEN  
AND THE SWEDISH ENERGY  
AGENCY

To the extent it is possible to make the distinction, how much energy of each form is generated and supplied locally, and how much supplied via national or regional networks? How much does energy provision rely on imports to the country? What geographical imbalances and transmission requirements exist?

*This is a big and complicated question to answer easily. Sweden as a close cooperation with mainly Norway and Finland when it comes to trading electricity, mainly by evening out peaks in power demand, which makes a lot of imports and exports even though we in reality do not need the imports for our total energy supply. What we do need is help with power demands, not the energy demand.*

**Figure 27:**  
Swedish electricity  
import (+) and export (-),  
January 2005–  
December 2007

SOURCE: STATISTICS SWEDEN AND  
THE SWEDISH ENERGY AGENCY



**Figure 28:**  
Sweden's net import  
(+) and net export (-) of  
electricity, 1970–2007

SOURCE: STATISTICS SWEDEN  
AND THE SWEDISH ENERGY  
AGENCY

Are there any unusual energy-using sectors (specific industries, agriculture) in the country or region? What are their energy needs and how are they supplied?

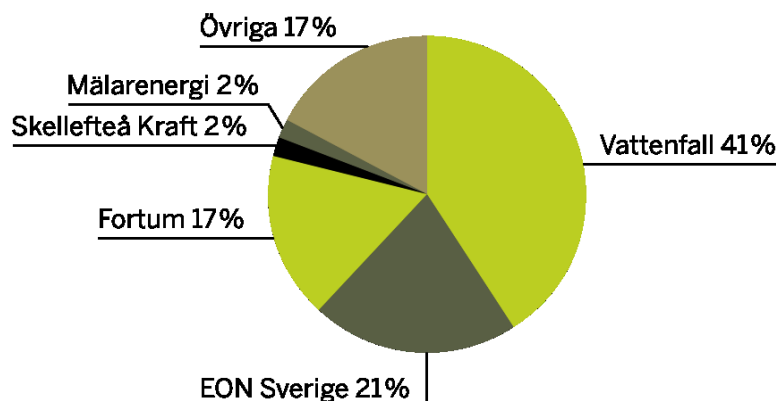
*Look at the end of the document where you will find regional specific information.*

## 2 Organisations and markets

Which organisations, and what type of organisation, own and run the energy infrastructure in the country/region? What organisations are responsible for the functions in each energy chain? (Collection, generation, transmission, distribution, retailing.)

*The electricity production is mainly controlled by 5 companies.*

Figur 5. **Sveriges största elproducenter 2008**



*The local electrical distribution network is either locally owned by small local companies, often owned by the municipality or big companies that also produce the electricity. It is forbidden for an electricity producer to also own the electricity network, so they have split the production and the network in two sister companies instead, but the owner is still the same.*

*The national electricity distribution network is owned by Svenska Kraftnät, a state owned company that runs the high voltage network for transporting hydro power from the northern part of Sweden to the southern part, and for transporting electricity from the three nuclear power plants to the different parts of Sweden.*

*The oil and petrol market is controlled by mainly Statoil, Shell, Preem and OKQ8.*

*The biofuel market is mainly distributed amongst several both small and big companies all over the country.*

*The central heating systems are normally owned locally, often by the same companies that own the local electricity networks.*

*We have a small use of natural gas in Sweden since the gas network is localized in the south west (see map). Most of the gas comes from Denmark.*





What community-led energy initiatives have taken place? What sort of local groups or agencies have been involved, and what involvement or support has come from national agencies, energy companies, or intermediaries?

*Each municipality in Sweden has an energy advisor that gives advice to private homes as well as to organizations and companies. The work regionally in most regions of Sweden is coordinated by the regional energy agency office. Both the energy advisors in the municipality and the regional energy agency office is partly financed by the state and partly by the regions and the municipalities.*

*A big work and national coordination is done by the state authority The Swedish Energy Agency, that arrange seminars, funds scientific work, educate the energy advisors and publish a lot of statistical information as well as brochures about energy efficiency, both concerning companies as well as for homes.*

*Besides this there exist consultancy companies that help companies as well as private people with energy advice.*

What are the key factors affecting consumer confidence in new energy technologies and services?

*Ease of use, price stability (low price), and secure operation.*



### **3 Built environment**

What is the typical pattern of housing types and ownership?

*When it comes to rented flats, a big portion of the flats are owned by companies owned by the municipalities.*

*Other kinds of flats are cooperatives where the cooperative owns the building and the inhabitants pay a rent for their flat to the cooperative.*

*From 2009 it is also possible to own your apartment, something that was not possible before in Sweden. This is the same as most apartments are arranged in for instance Spain, Italy and France.*

*A lot of people also live in private villas, both in the cities as well as on the country side.*

How is the construction of housing and public/commercial building organised?

*The construction of new buildings is done by both big international companies as well by small local entrepreneurs.*

Who provides advice on energy issues in buildings, and how effective is that?

*The effectiveness is difficult to estimate.*

### **4 Government**

What quasi-government agencies are involved in the country or region in energy provision? (Regulators, general and specific energy agencies, etc.)

To what extent is the implementation of energy initiatives left to charities, community groups and other non-government organisations (NGOs)?

*None, except for wind power cooperatives, where people go together to finance and run a wind power plant.*

### **5 Governance instruments**

What national and regional policies directly or indirectly influence energy provision and environmental aspects of energy use? In particular, how have European directives been translated into national and regional policies and legislation, and what interventions are intended to comply or achieve harmonisation with European initiatives?

### **Nord Pool**

*In 1996 Norway and Sweden starts Nord Pool, a spot market for selling and buying electricity. Today Nord Pool consists of all the Nordic countries Norway, Denmark, Finland, Åland and Sweden. All electricity producers sell their electricity through Nord Pool and all buyers are because of this forced to buy the electricity through Nord Pool.*

*The method results in a pricing that does not reflect the production cost of the electricity, but rather reflects between demand and offer, but where the buyers are forced to buy, since electricity cannot be stored, but the sellers can regulate the amount of electricity that they produce (they do not have to produce electricity) thus creating a seller's market.*

Sources:

Nord Pool: <http://www.nordpool.com/>

The Swedish Energy Agency: <http://www.energimyndigheten.se/en/>

### **Energy taxes**

*Energy tax is a common word for excise taxes on fuels and electricity. The energy taxes can roughly be divided in fiscal and environment taxes. Amongst the environment taxes we have carbon dioxide and sulphur taxes, whereas the common energy tax is a fiscal tax in first place. There is no clear distinction between taxes with environmental impact and fiscal taxes, since both have a fiscal and environmental function. The common energy taxes have existed for several decades and are charged on most fuels and are primarily bases on the energy content. The tax on carbon dioxide that was established in 1991 is charged per kg of emitted carbon dioxide on all fuels, except bio fuels and peat.*

*A tax on sulphur was introduced 1991 and is charged from coal, peat and oil. Oil with sulphur content less than 0.05 % (weight) is not charged any sulphur tax. In 1992 a tax on NOx-emissions was introduced and is charged from boilers, gas turbines and stationary heat plants of 25 GWh/year or more. The NOx tax is neutral when it comes to the state's finances, since it is paid back in proportion to each energy plants energy production, which means that the energy plants with the highest emissions becomes net payers.*

*The production of electricity in Sweden is free from the taxes on energy and carbon dioxide, but in some cases the taxes for nitrogen and sulphur apply. Taxes are however paid for actual energy use.*

*The nuclear power tax was calculated on the basis of electricity production earlier but since July 1st 2000 it is based on the highest permitted thermal effect inside the reactors.*

### **Green Certificates for Promoting Renewable Electricity**

*On May 1, 2003, a new support system for renewable electricity production, based on trading in electricity certificates for renewable electricity, was introduced to bring a greater proportion of electricity from renewable sources into the country's energy system. All electricity users, with the exception of manufacturing processes in energy-intensive industries, are required to buy certificates corresponding to a certain percentage of their electricity use. ([www.regeringen.se/en](http://www.regeringen.se/en))*

*The system of Green Certificates is a market based support system for the expansion of electricity production from renewable energy sources and peat in Sweden. The goal is to increase electricity production from these resources by 17 TWh from 2002 to 2016.*

*A Green Certificate is awarded to those who produce and measure one MWh of electricity from renewable energy sources or peat in an approved facility. Electricity from the following sources entitles a Green Certificate; wind power, solar power, wave power, geothermal energy, some bio fuels and certain hydro power. In 2007 electricity users were obligated to buy Green Certificates in correspondence to 15,1 % of the electricity use. The system only applies to energy that is produced in Sweden. ([www.energimyndigheten.se/en](http://www.energimyndigheten.se/en))*

*The manufacturing industry does not pay any tax on fossil fuels and only 21% of the tax on carbon dioxide. For the energy intensive industry there are special rules that permit reduction of the tax on carbon dioxide.*

### **Certificates of Emission**

*Emissions trading is an administrative approach used to control pollution by providing economic incentives for achieving reductions in the emissions of pollutants. It is a political instrument enforced by the EU as a part of the ECCP. The system entails around 40% of the greenhouse gas emissions in the EU. In Sweden around 35% of greenhouse gas emissions are included in the trade scheme. ([www.energimyndigheten.se/en](http://www.energimyndigheten.se/en))*



### **The Programme for Improving Energy Efficiency in Energy Intensive Industries (PFE)**

*On 1 January 2005, the Programme for Improving Energy Efficiency*

*Act came into force. The programme is intended to increase energy efficiency and create opportunities for tax exemption. On 1 July 2004, the tax on industrial process-related electricity was raised from SEK 0 to SEK 0.005 per kWh. The Directive gives energy-intensive companies in manufacturing industry, which are subject to the tax, the opportunity of being granted tax exemption on their electricity consumption if they take action to improve their energy efficiency. The government has, therefore, adopted a programme of improving energy efficiency in energy-intensive companies (PFE), with the carrot of reduced taxation. Participation in the programme is voluntary, and is open to energy-intensive manufacturing companies which meet certain criteria. ([www.energimyndigheten.se/en](http://www.energimyndigheten.se/en))*

### **Energy Declarations**

*The law of Energy Declarations for buildings came into effect 2008/09 and is based on an EG directive. Owners of small houses, apartment blocks and offices/warehouses are obligated to declare the energy use of the building and certain parameters of the indoor environment in an Energy Declaration. ([www.energimyndigheten.se/en](http://www.energimyndigheten.se/en))*

### **Municipal Energy and Climate Advisors**

*The municipal Energy and Climate Advisors are funded through the Swedish Energy Agency and are available in all Swedish municipalities to provide the public, SMEs and organisations with unbiased and locally adapted service. There is also regional Energy Agencies to educate and coordinate information activities in support to the municipal advisors. ([www.energimyndigheten.se/en](http://www.energimyndigheten.se/en))*

What are the principle concerns of these policies? What relevant areas of energy provision, environment protection, etc. do these address? (emission reduction, energy efficiency, building energy performance, micro- and decentralised generation, renewables, R&D, competition, security, energy poverty, green employment and industry generation, publicity and advice, etc.) Are there objectives and concerns which are unique or peculiar to the country or region?

### **Tax on sulphur and NOx**

*With the carbon dioxide tax the goal is to reduce the use of fossil fuels and to use energy more efficiently. Concerning the sulphur and NOx taxes the ambition is to reduce the emissions since they reduce the growth of the forests, acidify the nature with serious impact on the environment and is bad for the health (NOx).*

### **Green Certificates for Promoting Renewable Electricity**

*The aim to increase the amount of renewable energy produced in*

Sweden.

### ***Municipal Energy and Climate Advisors***

*The ambition is to reduce the overall consumption of energy in all sectors of society as well as reduce the usage of electricity.*

Do these national and regional energy strategies address particular technologies, or do they remain neutral towards different means of achieving the goals? What technologies are considered suitable for sustainability goals, and eligible for support? On what grounds or criteria are others excluded? Are the merits and roles of particular technologies still disputed?

*The overall ambition is that regulations should be as neutral as possible considering which techniques to use. The regulations are more aimed at a goal rather than a method.*

*There are several discussions about what techniques to use in certain areas, such as transportation, electricity production, heating etc.*

To what extent and by what means have governments and other agencies attempted to influence energy users' behaviour? How effective are these attempts considered to have been?

*With the Municipal Energy and Climate Advisors, partly financed by the state through the Swedish Energy Agency, the government want to give advice to both single households as well as the industry concerning energy efficiency and what energy sources to use. To make sure that the quality is equal, the Swedish Energy Agency have educations of the advisors concerning basic energy knowledge, energy issues in single households, energy consumption in industry and transportation. To improve the cooperation between the advisors in the different municipalities the Swedish Energy Agency together with the regional authorities finance regional energy advisor coordinators that coordinate common activities within the region. .*

*With the PFE program they Swedish Energy Agency try to increase the knowledge about energy use within the industry.*

*The Swedish Energy Agency is a promoting authority which means that they do not exercise control, but instead spread information, publish documents, finance research etc. concerning energy efficiency issues.*



## **6 Economic, financial and fiscal conditions**

What is the current and likely health of the national or regional economy as it



affects energy provision, building, business investment?

*Without having any references, besides the general impression after listening to and reading the daily news. Sweden has managed the economic crisis rather well and the impression is that the economic crisis mostly has affected the car industry and the financial sector. The Swedish economy was very strong before the crisis and has managed the crisis well and the limits within the EU are kept with margin (low budget deficit, low debt and low inflation). Currently the unemployment is almost 10% (up from approximately 5% 2006). The financial sector has already recovered and things are not well, but looking better when it comes to the car industry.*

*Because of the rather strong finances the income taxes and taxes for family companies have been lowered for three years in a row.*

What aspects of the taxation system affect energy provision, intentionally or inadvertently?

*There are tax reductions for private home owners that do renovations to their houses. The maximum tax reduction is € 5 000 per person and year. The tax reduction started in 2009 and will continue at least 2011. Because of this tax reduction the black sector within the building sector has decreased and the unemployment within this sector as not risen so much.*

What specific financial support schemes are used in energy provision, and what do they cover? (grants and subsidies, loans, tax concessions, free or means-tested supply or installation, etc.) Who is eligible for them, and what else limits their availability?

*Beside this there are subsidies for installing solar panels (thermal) for both private households as well as the industry and the same goes for installation of photovoltaic systems where the subsidy is between 55 and 60% of the investment cost.*

*In order to reduce the use of electricity for heating (which stands for almost 40 % of the private homes heated today) there is a subsidy for installing water based heating systems in those houses.*

*Some banks also offer special energy loans for private home owners.*

What incentives are provided explicitly for micro- or decentralised electricity and heat generation? (capacity allowances, tradeable renewables, energy efficiency or carbon credits, guaranteed or explicit feed-in tariffs, etc.). How are these funded? (levies on fossil-fuel generation or purchase, general taxes, sale or auctioning of credits) How well do they work, and what problems have been raised? Do they focus on particular kinds of group to deliver decentralised generation (e.g. local government) or are they flexible? What obstacles are there to greater connection of distributed generation? (technical connection requirements; capacity or reliability limits; low,

uncertain or non-transparent tariffs; poor publicity; confusing or burdensome application procedures; etc.)

*The Electricity Certificates are a way to economically stimulate the production of renewable electricity. All sellers of electricity are forced to by a certain percentage of renewable electricity. The amount is increased each year. The extra cost for this is paid by the end uses and can be around 10-15% of the cost of electricity. The money is then transferred to the producers of renewable energy, where they get a certain amount of money extra per kWh. The positive thing with this system is that it stimulates the producers to connect also small systems to the national net.*

*In 2009 a subsidy for small scale biogas was also introduced.*

## **7 Energy issues and debates**

What level of awareness exists among energy users and the general public on energy and environment issues?

*The level of awareness in Sweden generally lies on two different levels. One is purely emotional/ideological and the other one is more based on facts. Judging from various articles and blogs there seems to be discrepancy between what the general public feels about an issue, (what feels safe vs. dangerous and so on) and what they actually know about the options within the issue.*

*There seems to be a divide between those who think nuclear plants are dangerous and should be shut down in favour of other energy sources, and those who claim that nuclear power is the only truly viable option today to carry the energy demand in Sweden and that other energy sources only have the possibility to be a complement.*

*Wind, water and solar power: There seems to be agreement regarding the potential of wind, water and solar power but discussion on whether renewable energy sources like wind, water and solar power can really ever be as competitive as nuclear power and fossil fuels. Solar power is too expensive in its current form and water can't be used to the extent necessary if not complemented by all other resources. Wind mills are seen as positive but there are issues that remain; destroying the landscape, disturbing migrating birds at sea and so on, even though fairly extensive studies have been carried out that suggest that neither of the issues need be a problem if only handled correctly. Many citizens have also been outspoken and critical to having wind mills in the vicinity of their homes, but research has also said like with railways and power plants of all kinds, people get used to things once they're there.*



*Regarding bio fuels there is some consensus as to its potential but a disagreement around the amounts Sweden can actually produce and if it is a viable option in comparison. This leads us back to the original divide between those who believe in renewable energy, in taxing CO2 emissions, and in teaching the public how to use less energy by making it more expensive in some cases, and those who think expanding nuclear power plants and aiming at fusion plants to answer the energy demand and get rid of the oil dependency as the viable option.*

*The debate on energy is fuelled by politicians on various levels, civil servants, bloggers, PH.D's, doctoral students, journalists and caring citizens, certain think-tanks, corporations, networks and a range of interest groups as well as public authorities.*

What issues or concerns are prominent or controversial in the country, region or localities? Who is involved in those debates? Are particular interests or groups driving these debates? How extensive is media coverage of them?

*The major debates in Sweden concern whether or not nuclear power is an energy source that we must have or not and whether it is economical or not compared with other energy sources. Approximately 50% of the population is for and 50% against nuclear power. The figure varies up and down depending on the year.*

*Another debate is whether renewable energy, mainly wind power, has the potential to really do a difference. Also there is a lot of discussion about the impact that wind power has on the environment, mainly that the landscape looks different. People do not want windmills so that they can see them.*

*Concerning all of the debates above both politicians and private persons and the industry are involved and it is not possible to say that any specific group is in favour of one thing or another.*

## **8 SNEI:s. The County of Kronoberg**

1. *Regional strategy Kronoberg for 2005 which will be revised in 2009/10 in cooperation with work in SEP.*
2. *"Action strategy for more efficient use of energy for buildings and transport in the County of Kronoberg 2005".*

*The strategy main positions are*

- *Decrease of discharge from transport sector*
- *Continue energy efficiency work*
- *Increase part of renewable energy*
- *Develop a climate and environmental friendly business sector*

*To develop the main strategy we need to more work with supporting strategies linked to*

- *Climate addressed planning and steering documents*
- *Better Climate information*

*The energy action strategy from 2005 needs to be developed with more actions linked to wind energy, biogas from waste and farming, better distribution of biofuels for vehicles, passive house and more. Even more about this to develop regional industry and business linked to energy and climate issues i.e. biomass. Also to support networking within the energy and climate sector. All these things will be handled within the SEP project.*

### **Conditions for Kronoberg**

*The long term goal is that the use of fossil fuels has come to an end 2050. The goals for the year 2010 is 3500 kg carbon dioxide/inhabitant, half of the energy consumption will be renewable (fulfilled), bio fuels give 2 TWh/year (fulfilled), the electricity consumption is 10 % less than 1995, renewable fuels for transports is at least 6 % (fulfilled) and the emissions from transports are less than 1990.*

*We will use more biomass to reach the goals in, for example, more district heating plants and local production of vehicle fuel. We will produce more biogas from manure and sewer and we will get more wind power plants. The key milestone for the use of biogas is to make it possible for the public to achieve gas for their vehicles. The ongoing activities can be incorporated into the energy strategy by the help of the activities in the networks. The key stakeholders shall be involved in the energy strategy by the help of climate agreements and their contribution in different relevant networks.*

*The use of energy is in Kronoberg in total 7 000 GWh/y with about 30 % as bio energy and RES in total about 46 %. Solar energy, wind power and biogas are contributing with a small part, but they are all growing, especially wind power. In our region there are only small scale hydropower plants. Peat is used partly in a few of the district heating plants. Every urban district in the county has a district heating plant for heating buildings and, in some cases, offering energy to industries for their manufacturing process. There exist no grids of gas or gas fuel stations.*

*Forest is the base for the climate – and energy strategy. Even though the use of bio energy is 30 % of the total energy use, there is still potential to use more biomass in, for example, more district heating plants and local production of vehicle fuel. There is potential for biogas from manure and sewer, especially from manure. There are applications for approximately 700 wind power plants. They could produce more than the use of electricity in the region today. Some of the applications are taken back, so the potential maybe are overrated. The industrial sector is wood, manufacture, glass and mainly SMEs. There is one paper/pulp mill in the region which is a large energy consumer. The housing stock is quite new, in general, but there are a lot of block of flats built during the 1960's in a national investment. These buildings need to be restored. The stakeholders that need to be considered for the planning and implementation of a successful energy strategy are for instance owners of residential properties, companies consuming much energy and energy companies.*

*Two interesting regional ideas for SEP are climate agreements and a regional climate-centre.*

*Climate agreements are voluntary letters of intent for companies and public authorities. A climate-centre is planned in Växjö. It is a business house for Cleantech companies owned by the municipality together with the industrial life with the purpose to sell internationally environment competence.*

### **Energy balance, County of Kronoberg**

The energy balance is a mapping of the energy flow in the County of Kronoberg. The energy situation in 2008 is compared with the situation in 1990, 1995, 2000 and 2005. The purpose is to view trends and changes in the energy area.

The total energy supply to the County of Kronoberg in 2008 was 6,650 GWh, of which renewable energy sources amounted to 54%. According to the County Administrative Board's regional environmental targets the share of renewable energy should be 50% in 2010.

In 2008 the supply from fossil fuels was 2,250 GWh, from renewable fuels 2,450 GWh and 1,940 GWh was electric energy. 58% of the electric energy was produced from renewable energy sources.

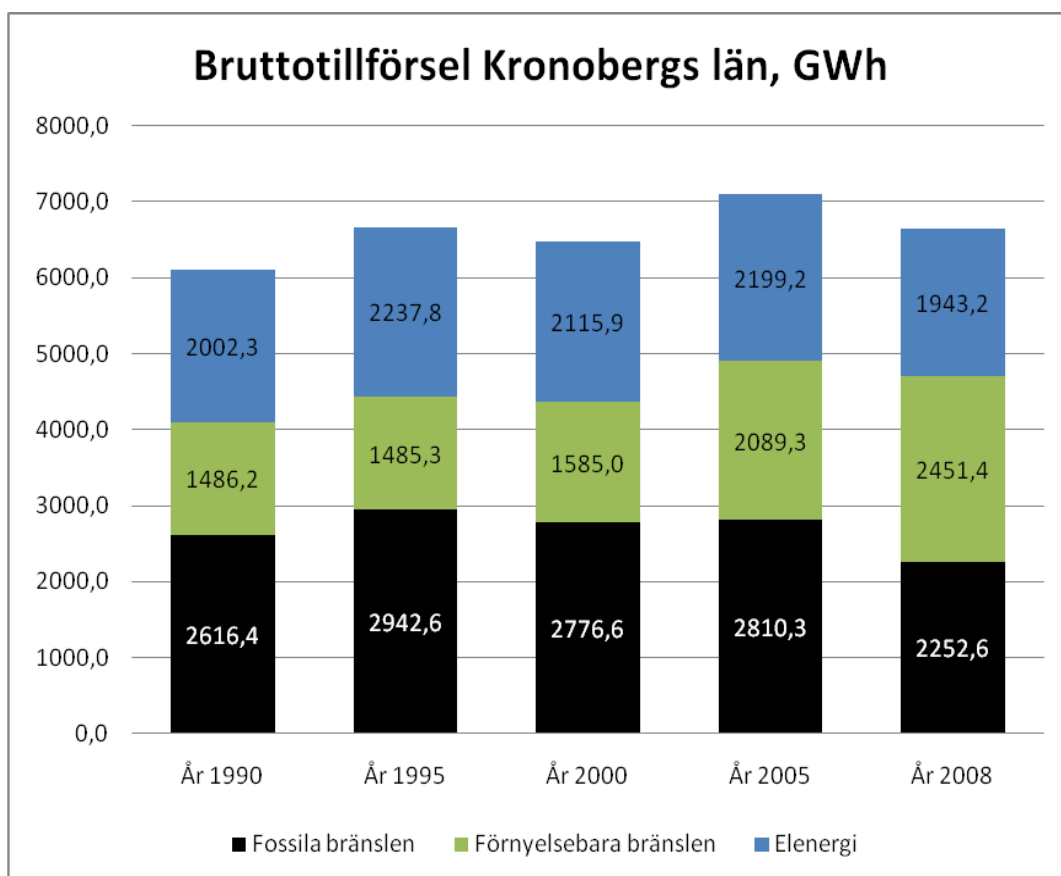
Gasoline supply has decreased in the County of Kronoberg since 1990. During the same period the supply of diesel has increased heavily. Since 2004 about 5% ethanol is mixed up in the gasoline. Fuel oil consumption has decreased a lot during these years, and the addition of energy from heat pumps has increased, as calculated with standard templates. In the County of Kronoberg there was no local wind power production during these years, but electricity was produced locally via hydro power. Wood fuel was by far the largest renewable energy source, and hydro power the second largest.

The final energy use is calculated to 6,580 GWh. Industry, transports and the household sector are the largest energy users in the County of Kronoberg.

The industry sector breaks the trend with a peak in 2008. In the transport sector the energy use increases, with a peak in 2005, which may be explained by the work caused by the hurricane Gudrun. For households there is a downward trend.

The total energy supply in the County of Kronoberg generated approximately 596,000 tonnes of carbon dioxide during the year, which corresponds to 3.3 tonnes per capita. The County of Kronoberg's target is 3.5 tonnes per capita in 2010. Carbon dioxide emissions have decreased since 1995, and distinctly from 2005 to 2008. The decrease has occurred despite the energy use being on a rather even level. The explanation to this is the increased share of renewable fuels.

The Energy Agency for Southeast Sweden has created an interactive map, with different types of energy production plants marked on the map. It is possible to search for different types of plants in every municipality and in different sizes. The map can be found on The Energy Agency for Sweden's webpage.



*Energy supply to the County of Kronoberg in 1990, 1995, 2000, 2005 and 2008, fossil fuels, renewable fuels and electric energy.*

## **9 Appendix 1. Categories of governance instruments**

There are a wide variety of instruments or measures that public agencies may have used, or may propose using, to influence energy provision, directly or indirectly. These include:

- restructuring of energy organisations and markets: privatisation, liberalisation, nationalisation, shareholding, competition
- energy-related provisions in general legislative framework, constitutions, charters, bills of rights
- construction and maintenance of infrastructure
- cooperative or indicative planning, forecasting, foresight exercises, setting priorities
- setting targets for uptake, market penetration, emissions reductions
- regulating markets, competition, pricing, trading
- pollution limits, penalties
- licences, permits or franchises with various conditions
- prescription or proscription of practices, moratoria
- structuring and regulation of markets in environmental values such as carbon or sulphur emission reductions
- promotions, guidelines, recommendations, best practice manuals, information provision, demonstrations, pilot projects and studies
- publicity, use of media, information, provision of statistics, exhortation, endorsement, structuring of or intervention in debates, symbolic actions, rituals, statements
- setting interest and discount rates
- financial incentives, subsidies, grants, loan schemes, provision of welfare services and support
- taxes or tax concessions, capital depreciation allowances
- use and purchasing of goods and services by public agencies
- business development support
- safety or environmental standards
- technical standards in systems, components and installation
- planning procedures, standards, controls in land use and the built environment
- regulations and standards in building energy use and conservation
- permits, e.g. for installation or access to resources
- research and development, demonstration, testing services
- control of building services technologies

- technical or policy advice
- training of professions and occupations (via industry and further/higher education)
- accreditation, certification, verification, auditing of equipment, occupations, retail schemes, green claims
- labelling of appliances and products
- *in situ* monitoring, auditing, evaluation of installations
- inclusion or exclusion of specific technologies or practices in directives and targets for renewables, embedded generation, etc.
- inclusion or exclusion of specific technologies in measures to acknowledge system benefits of local generation
- other interventions in energy markets, pricing regimes or regulations indirectly affecting specific technologies or practices
- incentives or constraints on domestic supply or manufacturing, or on access to technologies and materials from overseas
- funding or support of intermediate organisations: trade associations, expert networks, policy forums, etc.
- inquiries, commissions, legal action
- informal negotiation, arbitration, persuasion, threat
- miscellaneous directives or specific powers, quotas, discretionary permission.