

Fossil Fuel Free Växjö



Climate changes

Climate change is one of our time's most urgent environmental problems. Man's emissions of greenhouse gases, particularly carbon dioxide from the burning of fossil fuels, are the primary cause. Växjö wants to be a fossil fuel free city and takes a global responsibility in terms of reducing the effects on climate.

In 2000 Växjö won the International environmental award for excellent atmospheric protection and in 2007 we were awarded the Sustainable Energy Europe Award by the European Commission. This goads us into doing even more in our struggle for being fossil fuel free. As the first city in Sweden, we now continue our work by forming a local climate commission. Together with the local companies and the university, the city will compile a toolbox to be used by citizens and companies going in for renewable energy.

Do you take responsibility? Or are you waiting for someone else to act? Do you know how much carbon dioxide your car emits per kilometre?

Bo Frank, Mayor of Växjö

In February 2007, Växjö won the Sustainable Energy Europe Award 2007 in the Sustainable Community Category for the considerable work to be a fossil fuel free city. The award was given by the European Commission campaign for sustainable energy in Europe.





The greenhouse effect influences you – how do you influence it?

Man's emissions of greenhouse gases intensify the natural greenhouse effect. That makes the temperature rise and the Earth's climate change. The researchers of the Intergovernmental Panel on Climate Change, IPCC, stated in their latest report of 2007 that "Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropoge-

nic greenhouse gas concentrations".

The different scenarios calculated by IPCC show a rise of the Earth's average temperature of 1.8 – 4.0° C before the turn of the next century. This expects to bring a more intense climate with more heat waves, storms and floods. The glaciers and the inland ices are melting, which together with the warming of the sea water make the sea level rise 0.2 – 0.6 metres. In some places, the existence of entire countries is threatened. The emissions of carbon dioxide will remain in the atmosphere and

contribute to a continuous global warming and rise of the sea level for more than thousand years.

Many of the negative effects of the climate change today affect already exposed areas, but even Sweden is affected. The average temperature in Sweden rises more than the world average and the rise in the winter is higher than in the summer. The increase of rain and snowfalls may lead to more floods and a rise of the sea level also affects our coasts. More frequent autumn and winter storms may lead to continuous consequences for the forestry.

What Växjö wants to **achieve**



The City of Växjö is a frontrunner when it comes to ambitious goals in climate work. Already in 1996, the politicians decided unanimously that Växjö shall become a fossil fuel free city – a decision that made a great stir all over the world.



In 2006, a new environmental programme for the city, consisting of three profile areas, was adopted. Fossil Fuel Free Växjö is one of these profile areas. Below, the goals for Fossil Fuel Free Växjö are described.

We have the vision of a fossil fuel free Växjö, where our energy consumption does not lead to any climate change.

Goals to strive towards

- The City of Växjö strives to use energy from renewable sources
- The City of Växjö strives to use energy efficiently
- The City of Växjö strives to go over to a fossil fuel free transport system

Goals to achieve

- To reduce fossil carbon dioxide emissions per inhabitant by at least 50% by the year 2010 and by at least 70% by the year 2025 compared to 1993.
- To reduce the consumption of electrical energy by at least 20% per inhabitant by the year 2015 compared to 1993.
- To increase cycle traffic in the City of Växjö by at least 20% by the year 2015 compared to 2004.
- To increase the use of public city transport by at least 20% and public regional transport by at least 12% compared to 2002.
- To stop the municipality's use of oil for heating, other than for complementary use by the year 2010.
- To reduce fossil carbon dioxide emissions from the municipality's transport and services by at least 30% by the year 2015 compared to 1999, and in the long-term cease to emit fossil carbon dioxide.





Strategy for a Fossil Fuel Free Växjö

Up to now, Växjö's success mainly depends on the fact that oil for heating has been replaced by biofuels. But to make the climate work a long-term success, it also takes energy efficiencies and major changes of the transport system. Växjö's strategy for a change to a fossil fuel free society comprises a combination of changed behaviour, energy efficiency and transition to renewable energies both in the heating and the transport sector.

Changed behaviour

To make people change their behaviour is very difficult if it means financial sacrifice and change of lifestyle. A transition to biofuels and energy efficiency is often profitable and when it comes to district

heating even convenient, whereas it takes much more to make someone use the bicycle instead of the car. We have to make it easier to live a life without fossil fuels, for example with cheap and convenient district heating, attractive public transport and good walking and cycling paths



Energy efficiency

The best energy is the one that is never used, which makes energy efficiency an important subject. Several studies and actions show that a 20% reduction of energy consumption is possible. The potential of cost-efficient actions is big for companies and public administration as well as for private persons. Within the EU-project SESAC, the public housing sector and private companies build energy efficient houses..

Heating

In a fossil fuel free Växjö, the heating is mainly based on forest products. There is also a potential of increased use of solar heating. For heating, oil and electricity is replaced by district heating based on biofuels when possible. Otherwise, small-scale heating with pellets or wood is the best alternative. In cases where the previous heating has been based on electricity, heat pumps may be an alternative.



Photo: P-A Sandberg

Transport

The emissions from the transport sector are more difficult to deal with. The municipality does not control the transport as they do the heating, but can nevertheless make it easier for those who prefer a more environmentally friendly way of transporting themselves. We have to make both traffic more efficient and replace fossil fuels with renewable ones. The City of Växjö works with different kinds of renewable fuels, such as ethanol, DME and biogas.

Actions within energy efficiency



1994 The work to make the street lighting more energy efficient starts

1998–2000 A comprehensive programme for a more efficient energy consumption in health care is implemented by the county council.

2003 The municipality issues a quality programme meant for building contractors buying municipal land. The programme includes among other things a demand for low energy consumption.

2005 To reduce the use of electricity, individual measurements of electricity are initiated in students' lodgings.

2005–2009 The public housing sector and private companies build energy efficient wooden buildings.

2007 Behaviour influence by transmission of measurements is initiated in a number of newly built apart-

ments. On a display, those living in the apartment can read their consumption of energy and get suggestions how to reduce it.

2007–2009 The municipal company Vidingehem optimizes the energy use in apartments by making use of sunlight.

2007–2010 The municipal company Hyresbostäder builds so called passive houses – houses without traditional heating systems.





Photo: Stefan Olsson

Actions within heating

1980 The municipal energy company, Växjö Energy Ltd, starts using biofuel for district heating, which twenty years later represents more than 90% of the supply of energy.

1997 Växjö Energy Ltd builds a new 100MW power and heating plant for the production of electricity and district heating based on wood chips.

1997–1999 Biofuel based small-scale district heating plants are built in four minor villages.

1998 Solar panels are installed on the roof of the public swimming baths to heat the water for the showers.

1998–2005 Municipal subsidies are given to private persons for installation of solar panels or for conversion from oil heating to biomass heating.



2001 Växjö Energy Ltd begins a conversion of heating systems in single-family houses, from electric heating to district heating.

2009 The industry Reppe AB goes in for heating out of grain waste and replaces a large amount of oil.

2011 Foundation of a regional district heating cluster by connecting the district heating networks of Växjö and neighbouring Alvesta.

■ *Actions within **transports***



1997 The municipal efforts to produce bio-DME as an alternative to diesel begin. The goal is a large-scale bio-DME production plant. DME is a very energy efficient vehicle fuel.

1999 The first filling station in Växjö for ethanol is built.

2002 The continued establishment of cycle paths is combined with spreading of information to get more people to use their bikes.

2002 Free parking for environmentally adapted cars.

2002 – 2005 Municipal subsidies are given for the purchase of environmentally adapted cars.

2004 Växjö Taxi use positioning system for more efficient transportation. Total driving distance is reduced by 20%.

2007 The first filling station in Växjö for biogas is built. The biogas is produced at the municipal sewage treatment plant.

2007–2011 A siding running to the combined power and heating plant is built to make transportation of wooden chips by rail possible.

2009 Small scale DME fleet test.

■ **Other actions**

1983 Växjö Energy Ltd starts producing electricity based on biofuels.

1997 Municipal counselling on energy is introduced, free of charge.

2002 – 2004 A municipal Mobility Office is working in purpose to get a change of attitude and behaviour among the inhabitants when it comes to travelling. Campaigns are held to show the financial and health advantages of using the bike.

2003 Centre for gasification of biomass is established at Växjö University. This is an important step in the DME work.



2006 – 2009 District cooling (absorption) is installed at Växjö Energy Ltd, Växjö University and General Hospital.

2007 Production of an electronic climate map to give information about climate measures taken in Växjö.

2007 The City of Växjö starts a local climate commission.

Resources for **climate protection**

In addition to political unanimity and good co-operation between persons and companies involved, the supply of resources is important to explain Växjö being successful in climate protection. Växjö has on several occasions received subsidies from the Government and the European Commission to run projects intended to reduce the effects on climate or to render the use of energy more effective.



The SESAC project started in 2005. It is part of the Concerto initiative under the 6th Framework Programme and co-funded by the European Commission. The project is about building sustainable energy systems in a number of European cities, which will serve as a model to others.

In the southern parts of Växjö,

energy efficient wooden houses are built by municipal and private companies. Wooden houses are not only energy-saving when produced but also give the tenants a possibility to save energy and money during the life of the house. Also individual measurement for energy and water is installed in these houses. The tenants can read their energy consumption on a display as well as getting >



Illustration: Mikaela Enger

- > information and guidance on how to make energy savings.

To reduce the use of energy for different sectors' need of cooling, Växjö Energy Ltd is developing a production of absorption cooling based on district heating. As an additional advantage, Växjö Energy Ltd is able to produce more biofuel based electricity during summertime.

The last part of the SESAC project is about increasing the biogas production at the sewage treatment plant to be able to produce vehicle fuel.

In Sweden, there is an opportunity for cities to get subsidies from the Swedish Environmental Protection Agency to be used for actions to be taken within a local climate investment programme (KLIMP). Such programmes describe how the city works with climate issues, goals to be reached and actions to be taken by all parties concerned. Växjö was given subsidies for such a programme in 2004.

Thanks to these subsidies, Växjö is able to enlarge the cycle path network and take measures to make public transport more attractive. Several of the municipal building



companies strive to make the use of energy more efficient and individual electricity measurements possible.

The municipality gives subsidies to private persons replacing their old wood stoves with new ones.

Växjö Energy Ltd has the possibility of continuous replacement of electricity based heating systems by district heating all over Växjö and in some of the surrounding villages. Also the absorption cooling project has been co-funded through KLIMP.

For further information about measures both taken and planned, please see the climate map on the web, www.vaxjo.se/english.



Photo: Robert Blombäck

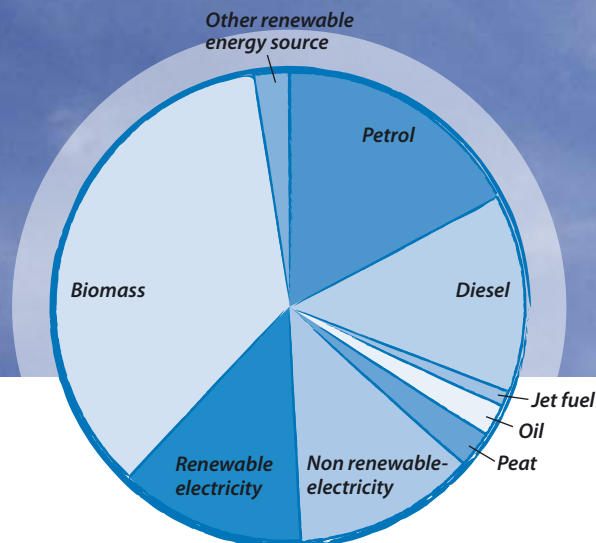
Over 50% **renewable energy**

In a fossil fuel free society, the energy consumption has to be based on renewable energy sources. Växjö has got on very well within this area. In 2005, 51% of the energy consumption was based on renewable energy sources.

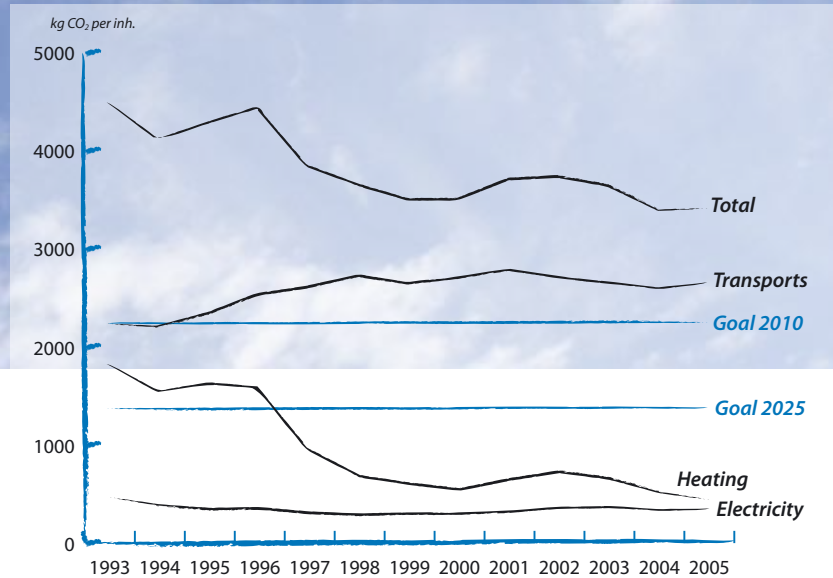
Most of the renewable energy consumption originates from the heating sector, where 88% of the consumption was based on renewable energy sources. In the transport sector, there is still a lot to be done, but thanks to ethanol being blended into the petrol, 2% of the energy in the transport sector was based on renewable sources. The remainder of renewable energy originates from non-locally produced energy, based on hydropower and wind power for example. During 2006 and for the future, trends indicate an increase of

renewable energy sources, both for heating and transports.

The diagram above shows the energy supply of 2005. Renewable electricity and non-renewable electricity refer to electricity being produced outside Växjö. Locally produced hydropower and wind power are to be found under other renewable energy sources, together with solar, biogas, geothermal, ethanol and rapeseed oil methyl ester (RME).



Low effect on the climate



Every year, the emissions of fossil carbon dioxide are calculated in relation to the goal.

Since 1993, the emissions of fossil carbon dioxide have been reduced by 24% per inhabitant. Within the heating sector, the emissions have been reduced by 76%. This is primarily due to a massive increase in the use of biomass for district heating and the extension of the district heating grid.

In the transport sector, however, emissions increased by 19% per inhabitant between 1993 and 2005, although transport emissions have

fallen over the last six years. Good effects have resulted from the municipality encouraging the purchase of environmentally adapted cars among other things. Increased blending of biofuels into petrol and diesel is a measure leading to further decrease of emissions from the transport sector.



Fossil Fuel Free Växjö is a programme including cooperation between the municipality, the municipal energy company VEAB, the municipal real-estate companies, local companies, Växjö University, Energy Agency for Southeast Sweden Ltd and others. By working together, the dream of a fossil fuel free Växjö can be fulfilled.

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Technical Visits

Individuals and groups from all over the world visit Växjö to learn about Fossil Fuel Free Växjö and how we manage sustainable development, bioenergy, forestry, elderly care and gender issues, just to mention a few subjects, and to enjoy what the city has to offer. We promise to do our very best to tailor a program according to your interests.



The city of Växjö has 78,000 inhabitants and is situated in the southern part of Sweden