

The City of Växjö – a successful sustainable energy programme in Sweden

Name of the programme

Fossil Fuel Free Växjö

started 1996

Background and main objectives

Sweden works towards transforming its energy system into an ecological and economically sustainable system. This is done in collaboration with trade and industry, energy companies, municipalities and the research community. National policies and programmes are translated into local actions. There is a long tradition of community planning in Sweden, also in areas such as energy and environment. Many municipalities have been very active in defining and implementing ambitious goals, not least as part of the local Agenda 21.

In that context, Växjö has taken a leading role. Växjö is a municipality of 77,000 inhabitants located in the province of Småland, southern parts of Sweden. In 1996, the city council of Växjö unanimously decided that local emissions of greenhouse gases should be cut by half by 2010 compared with 1993 levels, and that the municipality shall become fossil fuel free. Furthermore, the aims set by the Climate Alliance, of which Växjö is a member, have been unanimously accepted. The Climate Alliance is an association of European cities and municipalities committed to make contributions for climate change mitigation and North-South equity issues. (<http://www.klimabuendnis.org/english/update/frameset.htm>)

Växjö started using biomass for district heating in 1980, and from combined heat and power production in 1983. A large part of the heating and electricity delivered in Växjö today comes from the municipal company VEAB, most of which is generated from forest residues. In the municipality as a whole, two thirds of the heating used comes from biomass.

In 1993, Sweden ratified the UN Climate Convention. In the same year, Växjö started monitoring the carbon dioxide emissions per capita, which back then reached 4.6 ton per year and were already lower than the national level. Various measures have been implemented to reduce these emissions as exemplified below.

Measures

Some of the measures used to accomplish the programme's objectives include:

- local demonstration of fossil fuel applications, such as small bio-based heating plants and CHPs
- subsidies for conversion of oil burners to pellets, and for 200 installations of solar energy applications with financial support from national policy programmes
- ethanol mix in gasoline and free parking for environment friendly cars
- 200 environment friendly cars by 2010 (150 in 2003).
- costless local energy advice (some 2000 consultations have been registered per year)
- dissemination of results nationally and internationally to contribute to improvements elsewhere and to collect ideas for new projects for Växjö.
- participation in international projects and networks, for example, EU and IEA

- organization of technical visits to promote local solutions and local business
- project *BioEnergy Småland – Expo Växjö* initiated in 2003 in cooperation with local industries, the Energy Agency for Southeast Sweden, the City of Växjö, Växjö University, and the Swedish Energy Agency, aiming at promoting new business based on environmental technologies and solutions.
- annual follow up of development and accomplishments

Institutional arrangements and support

The City of Växjö is the leading institution in this project. The municipality has a long tradition of environment related work dating from the 1970s. In 1995, the city municipality started cooperation with an environmental NGO, The Swedish Society for Nature Conservation, which further stimulated political and public awareness about sustainable development.

In addition, there is close collaboration with Växjö University, the Bioenergy Group in Växjö Ltd and the Energy Agency for Southeast Sweden, with main office in Växjö. The latter serves the municipality with expert advice in the energy field and works towards the industry and housing sector to promote energy efficiency in heating, electricity use and transport. The Bioenergy Group is an initiative of various local interest groups and industries including:

- biomass fuel suppliers
- boiler manufacturers
- energy companies
- energy information offices
- bio-energy consultants
- research centres

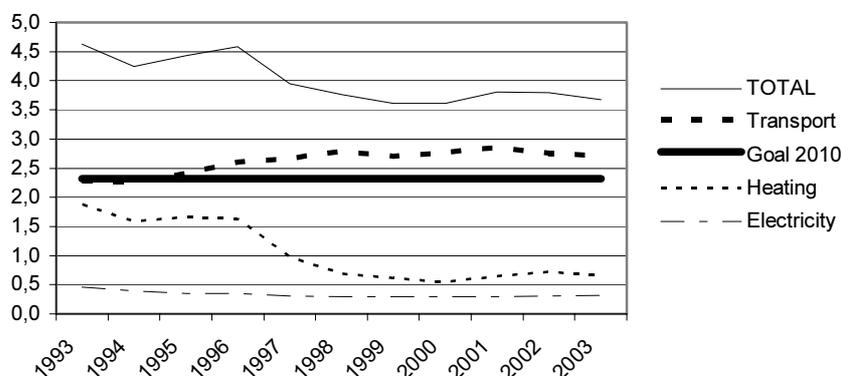
Further, the work in Växjö is supported by national agencies, namely the Swedish Energy Agency and the Swedish Business Development Agency. Växjö has received an investment grant of approximately 18 million Euro from the former Swedish Ministry of Environment which has generated 71 million Euro new investments in private and public organizations. In fact, as a benefit of being the first municipality to define and work for the realization of such ambitious environmental goals, local institutions have also been successful in attracting EU funds for various projects.

Accomplishments

The total energy use in Växjö was reduced by 5.7 GWh, or three percent since 1993. However, the share of renewable energy has increased by 43.5 percent. The use of energy per capita has decreased by 7.2 percent and is now at 9,274 kWh per person and year. The objective is a reduction of 20 percent until 2010.

The fossil fuel based emissions have now been reduced from 4.6 ton per person in 1993 to 3.7 ton per person in 2003, or more than 20 percent. As a comparison, it can be mentioned that the total reduction of emissions per capita in Sweden as a whole was around 3.5 percent from 1990 to 2002, while CO₂ emissions were 5.4 ton per capita in 2002.

The final objective in Växjö is a reduction of 50 percent by 2010 compared with 1993. The following diagram illustrates the present status in relation to the final goals.¹



The diagram shows clearly the area where most progress has been achieved, that is in the heating sector. Emissions reductions in the transport sector have been more difficult to achieve but are now noticeable. Although the reduction between 2001 and 2002 was more due to less fuel being used in the local airport, the reductions of the following year were due to the low mix of ethanol in gasoline sold in the municipality. Nevertheless, emissions from transport are still 18 percent higher than in 1993. In heating, emissions are 65 percent lower than 1993 thanks to a constant shift toward biomass.

Lessons learnt and the road ahead

Political leadership was an important starting point for the progress achieved in Växjö. All political parties have unanimously supported the targets set. The local initiative pulls national and global incentives together with local potentials and experience. Växjö's climate and fossil fuel free agendas are directly linked to the objectives of the United Nations Framework Convention on Climate Change. At the same time, the initiative has been boosted by the local Agenda 21 development scheme and broad cooperation among stakeholders in the region.

In fact, broad institutional collaboration, including the efforts of researchers, industries and local policy makers around common goals have strengthened the regional competitive advantage, and provided multiple benefits. Not only emissions of greenhouse gases are being reduced locally, but the local efforts are serving as example to other municipalities in Sweden and abroad. Municipalities around Växjö have picked up the good examples and are also profiting from the regional development in the area. In fact, the success of the Växjö model has been recognized worldwide. Following on the achievements reached so far, some 40 foreign delegations visit Växjö every year.

The current initiatives build upon existing experiences in the municipality around environmental issues and have served to strengthen local networks. As a result, the local economy is receiving new inputs. The local efforts are helping open opportunities for export business, creation of new jobs, and overall improvement of the local economy and

¹ Grid from Nielsen and Nilsson, 'Socioeconomic effects of Fossil Fuel Free Växjö, Sweden – moving from 80% oil 1979 to 80% bioenergy supply for heating 2002', published within *IEA Bioenergy task 29 Socio-economic drivers* (forthcoming), City of Växjö.

environment. The *BioEnergy Småland – Expo Växjö* project started in 2003 builds a cluster based on Swedish know-how in bioenergy technology for export, and is a way of capitalizing on previous efforts and achievements. In addition, a strategy is being developed to promote energy efficiency in the building sector.

Useful links

The City of Växjö: <http://www.vaxjo.se/english/>

Technical visits to Växjö: http://www.vaxjo.se/english/technical_visits.html

Fossil Fuel Free Växjö: http://www.vaxjo.se/english/FFF_Vaxjo_04.pdf

BioEnergy Småland – Expo Växjö: <http://www.energikontor-so.com/BioEnergy/BioEnergyeng/bioenergyindexeng.htm>