

The Energy Transition Chronicles

VÄXJÖ (SWEDEN), A “BIO-ECONOMY” FOR ALL



This document is an extract from the publication entitled **“The Energy Transition Chronicles”** prepared by Energy Cities with the support of the Franche-Comté Regional Council and of ADEME (French Environment and Energy Management Agency). You can get the full-text version (with the stories of Schönaue, Växjö, Burgenland, Brussels-Capital and Heidelberg) via Energy Cities’ website www.energy-cities.eu - Resources > Publications.

The Energy Transition Chronicles

Energy Cities provides local authorities with support for implementing their own energy transition process. The *Proposals for the energy transition of cities and towns* (www.energy-cities.eu/30proposals) are illustrated with around a hundred of inspirational examples from all over Europe. In this document composed of five case reports, Energy Cities goes further and tells the tale of energy transition success stories. Because it is important to show that energy transition is “possible”. Why, how, with whom, for what results? We interviewed local players and decision-makers to find out more. Here are their stories...



Floriane Cappelletti, Jean-Pierre Vallar, Julia Wyssling

Publication: January 2016





The City

Växjö
Sweden
85,000 inhabitants

© photo Mats Samuelsson

Local key players



Bo Frank, Mayor (left)



Henrik Johansson, coordinator of the city's environmental department

Key figures

2.7 is the number of tonnes of CO₂ per capita emitted in 2012 (EU average: 7.01 tonnes)

88% is the proportion of renewable energy in the local energy station supply mix

73% is the economic growth rate increase between 1993 and 2010

2,000 is the number of local jobs created in the private sector between 2011 and 2014

Milestones

1960 The city council is alerted to the condition of the lakes (eutrophication) and launches a conservation programme

1970 The oil crises prompt the municipal energy company to seek another source of energy: biomass

1995 Växjö cooperates with the NGO *Swedish Society for Nature Conservation* to mobilise local stakeholders

1996 The city council adopts the “fossil fuel free” objective

1997 Creation of the Investment fund for environmental protection by the Swedish government

2006 The city launches its Environmental Programme, which replaces the Local Agenda 21

2010 Revision of the Environmental Programme – the city sets 2030 as the deadline for becoming “fossil fuel free” – the focus is set on transport

2012 The city reduces its CO₂ emissions by 41% compared to 1993

CONTENTS

Key points to remember	5
Part 1 – The Växjö’s energy transition chronicles	6
1. The Greenest City in Europe	6
2. Towards a fossil fuel free city	6
2.1 The trigger – Action against eutrophication of the lakes	6
2.2 The first steps – Towards a biomass-based energy supply	6
2.3 The foundation stone – From an exchange of ideas to a political consensus	7
2.4 From reflection to action – The strategy for a fossil fuel free city	7
3. Results and impacts of the fossil fuel free process	10
3.1 Turning a weakness into a strength.....	11
3.2 The “bio-economy”, a competitive edge.....	13
3.3 The transition towards a high quality of life.....	14
Part 2 – Analytical inputs	15
1 Governance model	15
1.1 The Swedish model.....	15
1.2 The Växjö model	15
2 Action drivers.....	17
2.1 Local authority powers	17
2.2 Cooperation with all the sectors	17
2.3 Political consensus and continuity	17
2.4 Financing.....	18
2.5 Planning, evaluation and adaptation.....	18
2.6 A cyclic approach to sustainable development	18
Part 3 – Resources	19

KEY POINTS TO REMEMBER

The municipality of Växjö, in Sweden, set itself a challenge very early on: to become a fossil fuel free city. This objective was the result of a long-term process: it began when a few measures, which through their success left a deep impression on the elected representatives, thrust the city down an energy and then environmental transition path. The process works through close cooperation between the political, economic, institutional and community stakeholders.

External events, such as the eutrophication of the lakes in the 1960s and the oil crises in the 1970s, aroused the interest of the elected representatives and set the whole process in motion. For local stakeholders, restoring water quality was essential to improve the quality of life in the city and once again make the lakes an attractive place for people. The municipal energy company suggested biomass -a local, abundant source of energy stimulating forestry- as an alternative to oil to avoid exposure to the fluctuations of the oil market. The elected representatives noticed that environmental and energy measures had beneficial impacts on local development. To encourage this trend and assess its potential, the city decided to work with the biggest environmental NGO in Sweden. The NGO implemented measures that created a positive spirit of dialogue between elected representatives and municipal staff, resulting in fruitful discussions between all the economic, political, socio-cultural and community players. In 1996, these discussions led the city council to take the unanimous decision to make Växjö a fossil fuel free city.

This political decision was followed by two periods. In the 1996-2006 period, the city council had no clear plan of action on how to attain its objective. In the same period, the Swedish government launched a local investment fund which proved of pivotal importance to Växjö, as the municipality had to bring together all the local stakeholders to prepare projects and define responsibilities before submitting its application for funding. This work was the starting point of the Local Agenda 21. But in 2006, the municipality realised that attaining its objective would require a coherent, long-term action plan. The second period started in 2007, when the city council set up the local climate commission composed of major public and private stakeholders to work on this action plan. The commission identified priority actions and the players responsible for them. The city council then set up an annual monitoring plan to assess progress and take corrective measures if necessary. In 2010, Växjö officially announced its aim to become “fossil fuel free” by 2030.

By 2012, the city had reduced its CO₂ emissions by 41% compared to 1993. Biomass covers 88% of the district heating supply and the share of oil in the energy mix has dropped from 100 to 6% in 25 years. 58% of the energy supply in Växjö is from renewable sources, i.e. 10 points above national average. Between 1993 and 2010, the economic growth rate rose 73%. The city is an acknowledged pioneer of ecological transition and its “green” profile has attracted between 150 and 200 delegations from all over the world.

PART 1 – THE VÄXJÖ’S ENERGY TRANSITION CHRONICLES

1. THE GREENEST CITY IN EUROPE



Located in Southern Sweden, in a densely wooded region, the municipality of Växjö is peppered with lakes, including in the city centre. The Kronoberg county town is home to 85,000 inhabitants, including 36,000 students at the Linnaeus University, and to 8,000 businesses which benefit from a dynamic and diversified business environment. The main sectors of activity are the service industry, commerce and education. Over 600 companies operate in the field of IT and communications. Växjö is a pleasant, culturally buoyant city which takes pride in its many lakes and green spaces, including in the city centre. Växjö is acknowledged as one the greenest cities in Europe, a reputation that owes a lot to the active involvement of its inhabitants, businesses, NGOs and university.

2. TOWARDS A FOSSIL FUEL FREE CITY

2.1 THE TRIGGER – ACTION AGAINST EUTROPHICATION OF THE LAKES

It all started at the end of the 1960s, when the local community realised that eutrophication and pollution were suffocating the lakes. A eutrophication response plan was developed to solve the crisis and the lakes were restored to a healthy condition. Lakes are part of municipal urban planning as they are considered to be a prime development asset for the city. Inhabitants now come in numbers to the lakes to take a stroll, fish or swim.



The success of this conservation programme, the involvement of the players and the renewed attractiveness of the lakes left a deep impression on the elected representatives who realised that environmental protection could be a major growth driver for the city.

2.2 THE FIRST STEPS – TOWARDS A BIOMASS-BASED ENERGY SUPPLY

The 1980s saw the first steps towards a sustainable energy supply based on biomass. It all started in the 1970s with the oil crises and the resulting increases in fossil energy prices. The municipal energy company, *Växjö Energi Ltd* (VEAB), used oil to supply the district heating network. Anxious to secure its energy supply and offer stable prices to its customers, VEAB decided to reduce its dependence on and vulnerability to oil market fluctuations. Since the city was surrounded by lakes and forests, biomass seemed the obvious choice. The forestry industry could supply VEAB with huge quantities of wood shavings and sawdust it had no use for. Växjö thus became the first Swedish city to use biomass to supply a district heating network. This helped increase the popularity of district heating and the network was gradually extended.

With the support of the municipality, VEAB reached its prime objective, i.e. to reduce its dependence on oil. Using biomass also had a number of additional benefits for the local economy, such as the creation of jobs in the forestry industry and at VEAB, which in turn generated additional tax revenues for the municipality and helped reduce its carbon footprint.

2.3 THE FOUNDATION STONE – FROM AN EXCHANGE OF IDEAS TO A POLITICAL CONSENSUS

Heartened by the success of the lake decontamination programme, the city's elected representatives realised that Växjö had gained a solid reputation for heat and electricity production from biomass with key players such as VEAB, the University of Växjö, already well-known for its research in this field, and newly-established companies in the bioenergy and forestry sector. The municipality decided to launch other projects to encourage emulation, mobilise local stakeholders, accumulate know-how and generate positive impacts on the economy and the environment. Anxious to substantiate its future environmental measures, the municipality approached the biggest environmental NGO in Sweden, the *Swedish Society for Nature Conservation* (SSNC), in 1995. A number of seminars and training sessions were organised as part of this cooperation, which was originally due to last three years, and created a fruitful spirit of dialogue between the SSNC, the elected representatives and the municipal staff. Roundtable discussions were also organised with local NGOs, businesses and citizens to have them take ownership of the debate and start sharing ideas.

Public consultations, discussions and active participation of a number of organisations served as a basis for developing the local Agenda 21¹. Växjö had all the cards in hand and a strong local potential to take action against a global issue: CO₂-induced climate change.

In 1996, following a seminar on the climate in which businesses were invited to express their vision of a fossil fuel free future, the elected representatives unanimously voted for Växjö to become a “*Fossil Fuel Free*” city. The medium-term target was to reduce CO₂ emissions per capita by 50% by 2010 compared to 1993.

2.4 FROM REFLECTION TO ACTION – THE STRATEGY FOR A FOSSIL FUEL FREE CITY

When this decision was taken, the municipality did not know how it would attain its objective nor what measures it should take to become a fossil fuel free city. For Växjö, the solution was found through a coincidence: when the municipality needed to prepare its action plan, the Swedish government announced the creation of a 600-million euro investment fund for environmental protection in 1997. Municipalities were given the possibility to apply for funding through a Local Investment Plan (LIP) which could include a wide range of projects led by the local authority, businesses or NGOs. In Växjö, the LIP proved a useful tool to mobilise local players around theme-specific debates. The municipality and local stakeholders defined what projects would be included in the LIP and what measures would be taken as part of the Local Agenda 21. A number of projects were then implemented in Växjö, with financial support from the Swedish government and the European Commission.

¹ Local Agenda 21: adopted in 1992 at the Rio Earth Summit, it identifies local authorities as key players in promoting sustainable development. The Local Agenda 21 is about integrating all sustainable development dimensions into local projects: balancing the short term with the long term, reconciling economic, social and environmental demands, integrating local and global issues (energy efficiency, greenhouse effect) and environmentally and socially responsible development.

Between 1996 and 2006, the LIP provided a framework bringing together project holders from different sectors with the municipality acting as the main coordinator. Of its ten departments, the Executive Committee and the Technical Department were the most involved in environmental issues. Their knowledge of the territory made it possible to take a direct approach and have personal contacts with individuals and organisations. They were able, for example, to easily identify fuel oil users and have direct discussions with them to define what support the municipality could best provide. On specific themes, they identified which organisations were willing to participate and in a position to provide leverage depending on their corporate objects. The educational sector was more specifically entrusted with working on citizens' behaviour. The Executive Committee was the main coordinator. Each year, as part of its re-application for funding to the Swedish government and the European Commission, the Executive Committee published a call for projects, thus gathering players that would not otherwise meet and encouraging them to come up with innovative projects. Both departments worked in close collaboration with municipal companies, such as the municipal housing company or the municipal energy company, in order to plan and finance actions.

Within the municipality, the fossil fuel free objective is shared by all and each municipal department or company takes action at its own level by adopting environmentally-friendly behaviour or carrying out more specific projects. Växjö believes cross-sectoral measures are necessary and combines measures aimed at changing behaviour, improving energy efficiency and promoting the use of renewable energy in transport or for producing heat and electricity.

The first projects highlighted how hard it was to convince the population to change their habits when this involves a financial effort or changing their lifestyle. The municipality therefore set itself the ambition to make life without fossil fuels easy, for example by providing cheaper, more convenient district heating, more efficient public transport services or more pleasant cycling lanes and pedestrian areas. The idea was not to penalise those who did not contribute to reaching the objective, but rather to encourage those willing to participate. An annual report published by the Executive Committee provided information on the progress and results of the various measures, as well as the reduction in CO₂ emissions.

In 2006, however, the municipality realised that projects were being devised erratically, depending on the context, with no real coherence. The objective to reduce CO₂ emissions per capita by 50% by 2010 compared to 1996 was compromised for lack of strategic guidelines and priorities. The municipality therefore decided to revise its objectives and to set up an Environmental programme to replace the Local Agenda 21 initiative. The target year was then extended to 2025, with a 70% reduction in CO₂ emissions per capita compared to the 1993 baseline. The municipality was well aware that it would not be able to reach this objective alone and neither could it make it mandatory. It therefore decided to call for additional efforts and to gather various experts on a voluntary basis to design a joint action plan. Växjö used the Swedish government and its Climate Commission as a source of inspiration to create its own local partnership commission. Växjö invited all stakeholders, including the municipal administration, the university, the municipal energy company VEAB, the NGO SSNC and transport companies.

Throughout 2007, the local climate commission met on a monthly basis on specific themes such as small-scale power generation, car fuels or cycling. These discussions made it possible to define a baseline and then identify the measures to be taken and the organisations that would be responsible for implementing them. One of the main observations was that citizens were responsible for most CO₂ emissions and should therefore be targeted as a priority. This is why the municipality decided to focus on two areas: urban planning and sustainable transport. By the end of 2007, the commission published a report setting out the

priorities up to 2010. To improve action management efficiency, the executive committee set up an ecoBUDGET², or environmental budget model, to monitor annual progress. The Commission was to present its results to the city council once a year.

The municipality also became the coordinator of the European project SESAC³ (2006-2011) which aimed to accelerate innovation in renewable energy, energy efficiency, CHP and green buildings. Växjö launched demonstration projects for the construction of highly energy efficient housing, biogas production and absorption chilling.

In 2010, the Environmental Programme⁴ was revised and 2030 was identified as the year when Växjö was to become fossil fuel free. The municipality refocused its efforts away from the city's energy supply to the launch of a plan for the transport sector. This sector has a major environmental impact as transport is responsible for 78% of CO₂ emissions despite the efforts of the municipality to develop cycle lanes and pedestrian areas and to improve public transport. The municipality decided to tackle this issue in close collaboration with local stakeholders, taking charge of the measures it can implement itself and leaving local players do the same on a voluntary basis. This approach bore fruit and many companies switched to biogas and applied energy efficient measures. For example, a taxi company decided to use a geolocation system to improve its performance.

² ecoBUDGET: www.ecobudget.org/?id=7030

³ "Sustainable Energy Systems in Advanced Cities" is a European project integrated into the "Concerto" sub-programme dedicated to energy efficient districts. Växjö is the coordinator of the consortium composed of Grenoble and Delft. Energy Cities is a project partner. www.concerto-sesac.eu

⁴ Environmental programme: www.vaxjo.se/upload/www.vaxjo.se/Kommunledningsf%C3%B6rvaltningen/Planeringskontoret/Milj%C3%B6dokument%20och%20broschyrer/10%20Environmental%20programme.pdf

3. RESULTS AND IMPACTS OF THE FOSSIL FUEL FREE PROCESS

Over the years, Växjö has evolved from implementing an energy transition to an ecological transition by integrating all aspects of sustainable development and not just its environmental dimension. Eleven areas of action are identified: climate, growth, equal pay between genders, educational level, health, fighting isolation, fighting poverty, employment, waste, water quality and artistic/cultural creativity. The ecological transition initiated some twenty years ago has transformed the city. The results and impacts of the measures have been evaluated (in terms of CO₂ emissions, energy mix composition, renewable energy, “bio-economy”).

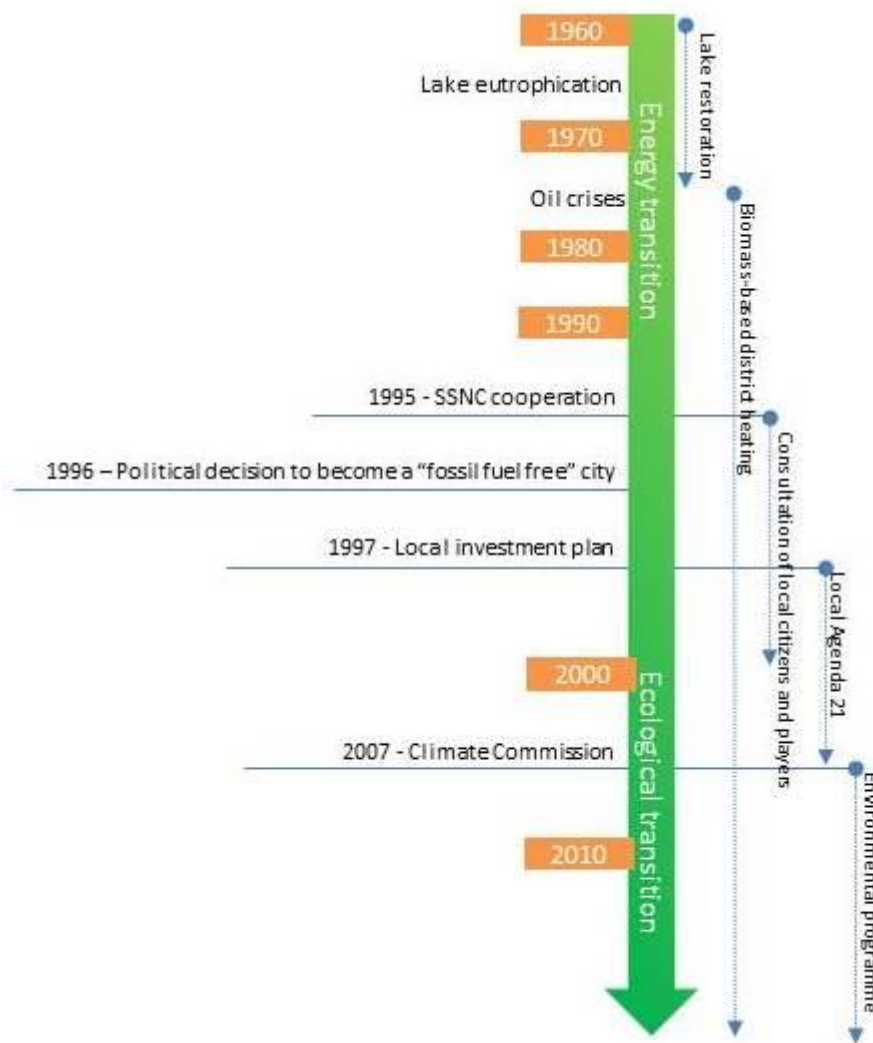


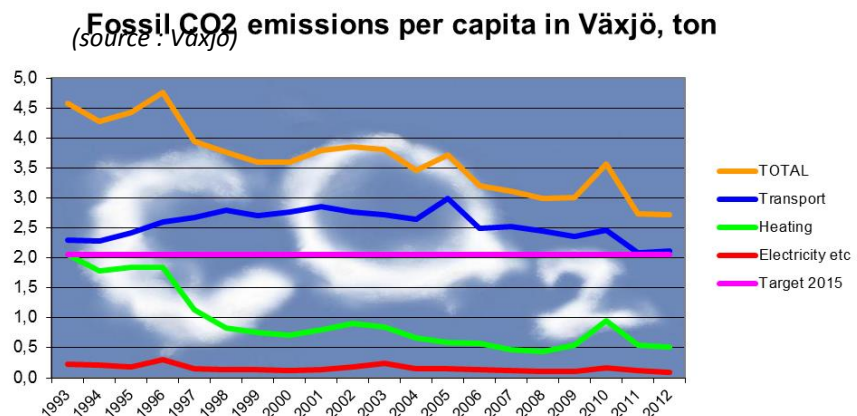
Diagram: Towards a Fossil Fuel Free City

3.1 TURNING A WEAKNESS INTO A STRENGTH

CO₂ EMISSIONS

Växjö's medium term objective was to reduce CO₂ emissions by 55% by 2015. In 2012, the city had already reduced its CO₂ emissions by 41% compared to 1993. In the same year, CO₂ emissions from electricity production, heating and transport amounted to 2.7 tonnes per inhabitant. In 1993, they amounted to 4.6 tonnes per capita, an already low level as a result of the commissioning of the first biomass boiler in the 1980s. By way of comparison, the national average in 2011 was 5.1 tonnes and the EU average (27 members) 7.01 tonnes of CO₂ per capita⁵.

Transport is responsible for 78% of CO₂ emissions (of which 39% are produced by cars, 18% by HGVs and 10% by machinery), with industry, commerce and the public sector generating 13% of CO₂ emissions all together and housing accounting for 9%.



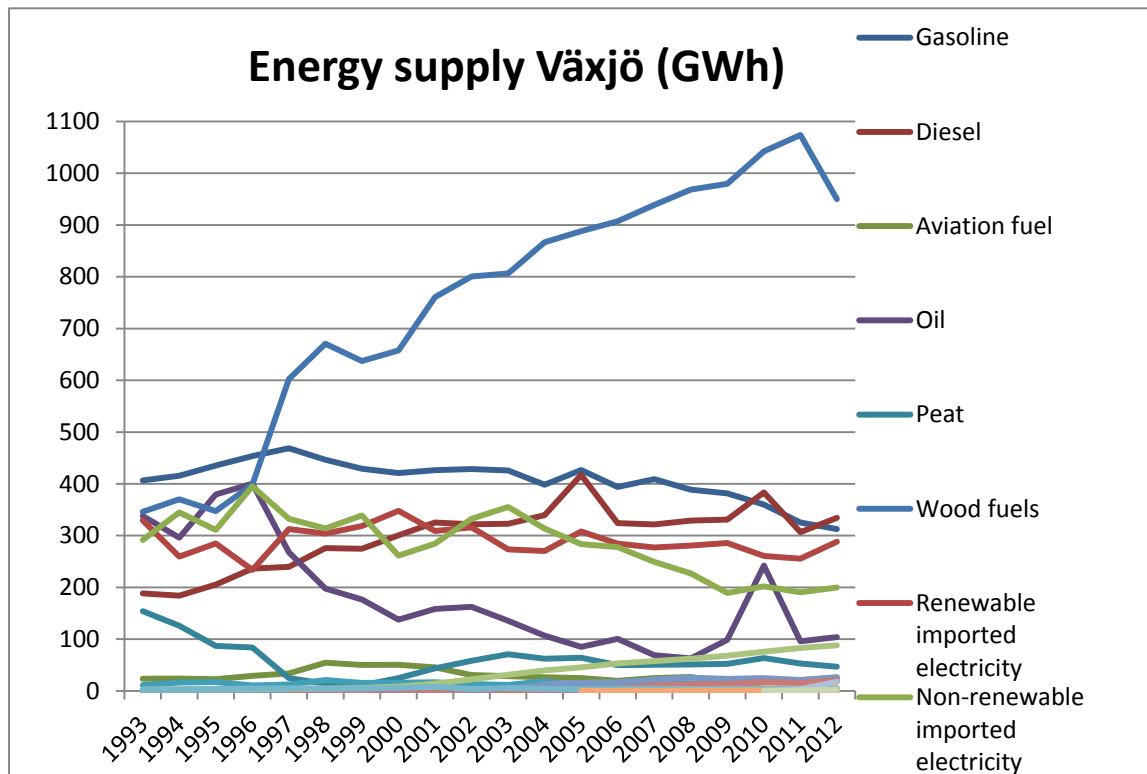
Transport is the sector that registered the slowest progress: in 2012 CO₂ emissions from transport were down only 8% compared to 1993, whereas they had dropped by 75% for heating and by 60% for electricity. As illustrated in the above graph, a peak of CO₂ emissions was observed in 2009 and 2010, due to particularly cold winters during which the district heating system could not fully meet the demand for heating. The use of fossil fuels (here oil) explained this peak in CO₂ emissions.

ENERGY SUPPLY

In 2012, Växjö's total energy supply amounted to 2 448 GWh, with heating accounting for 45%, transport 30% and electricity 25%. Renewable energy represented 58% of the energy mix, but only 8% in the transport sector, against 85% for heating and 70% for electricity. Växjö is Sweden's renewable champion and is 10 points above the national average of 48%.

⁵ Source: IEA, CO₂ emissions from fuel combustion highlights, edition 2013

The table below represents the trend in energy supply, with plummeting oil and rocketing biomass.



THE PLACE OF DISTRICT HEATING

Since the beginning of the 1970s, VEAB has been steadily pushing for district heating to replace electrical or fuel oil heating systems. District heating was integrated into the heating network in the centre of Växjö and subsequently into the networks of the housing areas heated by their own boilers. It was then extended to industrial areas and to the rest of the territory.

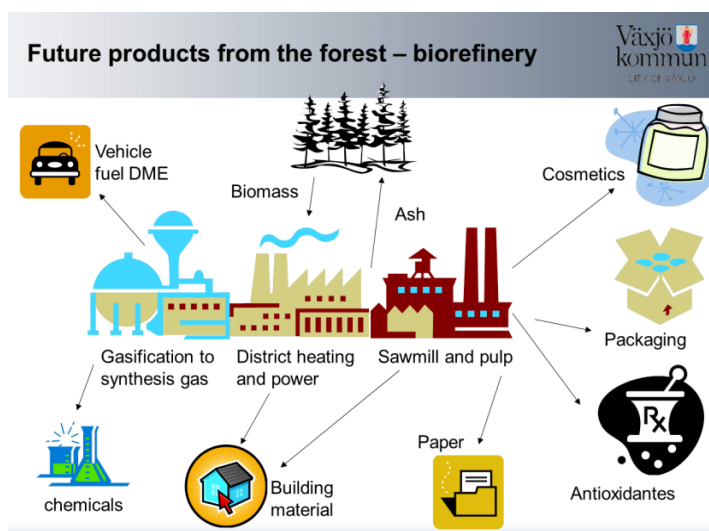
In the last 25 years, the share of oil in the energy mix has dropped from 100% to less than 6%. In 2012, biomass accounted for 88% of the supply, oil 6% and peat 5%. To increase production capacity and meet increasing demand, the station has been gradually extended. It now serves 7,230 customers (i.e. 6,177 houses) and has 365 km of pipework. The station produces 982 GWh of energy, including 781 GWh of heat, 190 GWh of electricity and 10 GWh of district cooling. The electricity produced covers between 25 and 30% of Växjö's annual consumption, the rest being imported. To smooth out variations in energy demand and to avoid using oil, a heat storage tank has been installed. VEAB is the main energy supplier in Kronoberg County and has installed biomass boilers in some neighbouring municipalities. District heating has become extremely popular, especially since the 1990s due to increasing oil prices and the introduction of the Swedish tax⁶ on CO₂ in 1991. The municipality of Växjö first encouraged connexions to the district heating network, and then made it compulsory for new buildings – the bylaw imposing this connexion has been suspended and is currently being examined by the Swedish government to determine whether this amounts to unfair competition.

⁶ <http://www.ceps.eu/files/MinistrySweden.pdf>

3.2 THE “BIO-ECONOMY”, A COMPETITIVE EDGE

The progress towards a fossil fuel free city resulted in a 73% economic growth rate between 1993 and 2010. The city boasts a dynamic industry, an airport that meets environmental protection standards as well as large companies such as Volvo, a carbon neutral company which produces articulated dumpers on a 45,000 m² site entirely supplied with renewable energy. Volvo is a good example of how everything is interconnected: waste heat produced by the plant is used in greenhouses for growing tomatoes. The city tries to identify all local potential, exploiting synergies between sectors and infrastructure in its territory. Växjö is permanently reinventing itself with a view to constant optimisation⁷.

To date, although no study has been conducted to measure the economic impact of Växjö’s energy transition, the direct impacts of the shift to a low-carbon economy are visible at all levels. Forestry has experienced rapid economic expansion, with forestry waste being sold to the CHP unit and for producing biofuels. The value created by harnessing biomass (as illustrated below) also generates activity. In addition to developing the biomass sector, the energy transition process in Växjö contributes to developing other activities, such as consultancy and advice, or operation and maintenance of renewable energy and energy efficiency facilities.



ECONOMIC GROWTH AND CO₂ EMISSIONS (SOURCE : VÄXJÖ)

communication sector and 700 jobs are expected to be created in the next few years. This economic activity has a direct impact on the municipality’s revenues since the main form of direct tax paid in Sweden is local income tax. It is one of the reasons which motivate municipalities to support a buoyant economy.

For Växjö, becoming the greenest city in Europe is not only an environmental challenge, it is also an economic one: it is a competitive edge that contributes to increasing its attractiveness to investors,

⁷ The list of projects under the Växjö Environmental programme is available from: <http://www.vaxjo.se/Other-languages/Other-languages/Engelska--English1/Sustainable-development/Projects/>

entrepreneurs and talents. A business support and networking strategy has been launched to support local economic expansion. The city today is recognised as a pioneer of the ecological transition towards becoming a fossil fuel free city. Its green profile has already attracted 150 and 200 delegations from all over the world.

3.3 THE TRANSITION TOWARDS A HIGH QUALITY OF LIFE

Växjö has a growing population with a young profile, and gains over 1,000 new inhabitants each year. Half of these newcomers are people of Swedish origin and half are people from the four corners of the world, mainly refugees. By 2030, 30,000 new inhabitants are expected to join the local population. Anticipating on population growth forecasts, the municipality is considering a vast sustainable housing programme.

The social impacts of energy transition are visible in the progress made in terms of quality of life, whether in the housing sector, local infrastructure or access to green spaces. The ecological transition has made it possible to build eco-buildings that use 35 to 40% less energy than buildings meeting national standards, to improve public transport, cycling facilities and pedestrian areas as well as accessibility to green areas and lakes, now at a walking distance for most citizens. According to the Swedish Statistics Institute, 46% of households in Växjö do not have a car.

Social cohesion has been reinforced, there is more interaction between politicians and the local population *via* the many discussions organised in the neighbourhoods. Networking is also essential with a strong fabric of private, public and community players. The prime objective is to engage citizens on the issue of sustainability and energy transition. However, Bo Frank notices a weaker commitment than at the beginning of the transition process. According to him, this is due to the fact that ecology is now on the agenda of all Swedish political parties, thus conveying the impression that the political sphere has fully taken charge of the issue.

PART 2 – ANALYTICAL INPUTS

1 GOVERNANCE MODEL

The governance model applicable to Växjö's energy transition gradually came into being, adapting to the needs and constraints of each period. The city owes its motto of "Växjö, the Greenest City of Europe" to the strong involvement of all local players and to a coherent, long-term strategy.

1.1 THE SWEDISH MODEL

Understanding the governance model of Växjö requires first understanding the Swedish model. As Pierre Forthomme explained at a seminar organised by the *Association des Amis de l'École de Paris du management* in 2007, Swedish society is a horizontal society, sociologically under protestant influence. Sweden does not operate on a vertical, hierarchical model. The principal of empowerment and the notion of horizontality are strong values. The now widespread use of the second-person pronoun "du" also tends to erase the hierarchical distance imposed by the more formal, third-person form of address, now reserved to the royal family for ceremonial reasons. The notion of community is highly developed, as is concern for others and for the common good. A strong feeling of individual responsibility to the group and dedication to work contribute to creating strong communities. Land is viewed as a common good and each individual is entitled to use the natural environment freely, regardless of public or private ownership rights, provided the use is reasonable and restrained. The "magic triangle" – economic performance, social cohesion and respect of the environment – has established a connection between these traditional values and policy-making. In other terms, for Swedes, economic performance objectives are directly related to social progress and sustainable development.

Sweden is a constitutional monarchy with a parliamentary system. The 1901 Local Authority Act significantly reduced the State's powers. The 1975 Constitution guaranteed autonomy to two local authority levels, the counties and the municipalities. Municipalities have a wide range of responsibilities, including primary and secondary education, social welfare, urban planning, water distribution and sanitation, environmental protection, waste collection, parks and open areas. The municipality can levy taxes to exercise its responsibilities.

1.2 THE VÄXJÖ MODEL

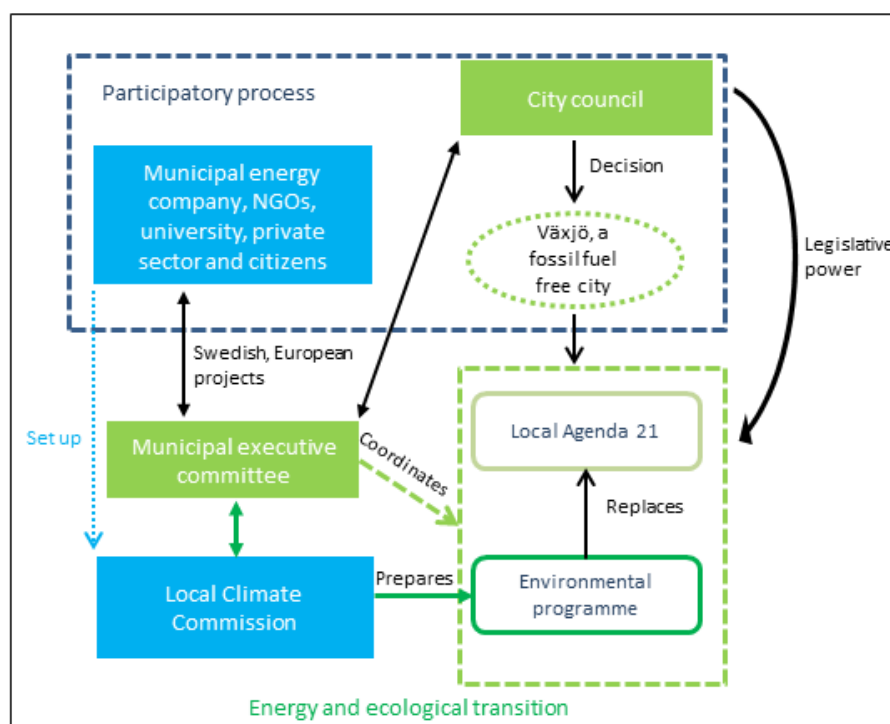
In the 1990s, the energy company VEAB played a decisive role by starting the energy and then ecological transition process. Made vulnerable by the oil crisis, VEAB went in search of more secure supply solutions at more stable prices. Later in 1995, the municipality of Växjö took advantage of the success of its lake conservation programme and the production of heat and electricity from biomass to sign a contract with the largest environmental NGO in Sweden, SSNC, to evaluate the potential of environmental measures. SSNC acted as a catalyst in the dialogue between elected representatives and municipal staff and organised fruitful exchanges between economic, political, socio-cultural and community players. This strong involvement of local players led to the unanimous decision to make Växjö a fossil fuel free city in 1996. The Swedish government then contributed to the process with its investment fund for environmental protection. The calls for projects issued by the Government contributed positively to bringing businesses, NGOs and the municipality together as project holders. This was the first step

towards the preparation of a Local Agenda 21. Overall, the 1996-2006 period was marked by a host of measures led by different players as part of the “Fossil Fuel Free Växjö” programme defined in 1999. Within the municipality, the two key departments were the technical department and the municipal executive committee. In 2006, following a CO₂ emission evaluation survey, the municipality realised that a coherent action plan was needed to achieve the objectives set for 2010. A local climate commission was set up in 2007 for a period of one year to accelerate transition. Its aim was to unite and have the following key players work together:

- Elected representatives,
- Members of the municipal executive committee, as coordinators of the initiative,
- Academics – for their research skills,
- The municipal energy company - for its infrastructure and the efforts made
- The environmental agency SSNC – for its expertise in energy efficiency, transport and renewable energy, and
- Representatives from the private transport sector – notably a taxi company and a road haulage contractor.

The local climate commission met on a monthly basis to set out the strategic directions and priorities and to define the type of actions to be undertaken as well as the players responsible for implementing them. The municipality's executive committee is also involved in monitoring activities and preparing an annual progress report for submission to the city council.

The municipality, the private sector and the university are working together towards achieving the zero fossil fuel objective. The measures implemented are financed through subsidies from the Swedish government, the European Union and the municipality. This close relationship between players is based on shared ideas, experiences and expertise. Växjö's involvement in networks of Swedish and international cities, such as Klimatkommunerna, Energy Cities, the Union of the Baltic Cities or ICLEI, is an example of this.



As for the private sector, Sweden aims to promote the competitiveness of its businesses through responsible commercial practices. The mobilisation of businesses can therefore be explained by their desire to present a flawless social and environmental profile, but also by the profit they expect to derive from them. As regards the university, it has developed an internationally recognised centre of excellence on biomass. As the main driver of this ecological transition, the municipality has been able to take advantage of a remarkable local predisposition to develop and implement collective strategies.

2 ACTION DRIVERS

The action drivers that enabled Växjö to go down an ecological transition path are commented below.

2.1 LOCAL AUTHORITY POWERS

Sweden is one of the world's most decentralised countries and local authorities are directly responsible for a wide range of areas, including environmental protection and energy supply. They can set standards and decide on financial incentives. They have used this comfortable leeway to encourage more environmentally-friendly mobility in city centres and to lay down building standards that are more stringent than European or national ones. Local authorities can also levy taxes to finance their responsibilities. Local income taxes are directly paid to municipalities and represent their main source of revenue (67% of total municipal budgets). Municipalities are therefore extremely keen to maintain a buoyant local economy and a low unemployment rate. In Växjö, the ecological transition has promoted local economic development, attracted new businesses and created jobs, a source of tax revenues for the municipality.

2.2 COOPERATION WITH ALL THE SECTORS

The intensive dialogue promoted through roundtable discussions, training sessions and working groups brings together political and economic representatives, academics, NGOs and local citizens. It has helped develop action plans and identify the organisations responsible for implementing them. In addition to this dense fabric of local players, exchanging ideas and experience with other cities through national and international networks has also contributed to attaining the objective.

2.3 POLITICAL CONSENSUS AND CONTINUITY

All the political parties officially committed themselves to the fossil fuel free city objective in 1996. The main strategic directions have always been taken unanimously. This political consensus is important to guarantee the continuity of environmental protection. Nothing has disturbed the implementation of the long-term strategy and vision, not even the change of the political majority following municipal elections.

2.4 FINANCING

Växjö has obtained funding from the Swedish government and the European Union for a number of measures. The city enjoys a high level of credibility due to its strong political commitment and wide support from its local players, which have also helped with funding. The city has also gained credibility for its capacity to present practical, quantifiable results.

2.5 PLANNING, EVALUATION AND ADAPTATION

Since 2007, the municipal executive committee has produced an annual report on the objectives set by the Environmental Programme that is validated by the municipal council. The report ensures transparency in the programme's progress and implementation, assesses the measures taken and recommends their adaptation if necessary. The city council has also adopted an environmental model budget based on the principle that ecology and economy are part of the same concept: resources management. This "green" budget aims at managing natural resources in the same way as financial resources. The budget is used by all municipal departments and companies and includes 16 environmental indicators used for managing and monitoring the Environmental Programme.

2.6 A CYCLIC APPROACH TO SUSTAINABLE DEVELOPMENT

In order to use its resources better, Växjö has developed a cyclic approach to sustainable development based on the concept of the circular economy, i.e. material recycling and flow optimisation. Many activities are interconnected. For example, natural and household waste is used to heat homes and fuel the city's buses which run on local biogas made from food and sewage waste. The development of biofuels is a good example of a circular economy, as it creates jobs and provides the agricultural sector with new outlets. Another example is the transformation of forestry waste by the CHP unit or the recovery of residual heat from the Volvo company to heat agricultural greenhouses.

PART 3 – RESOURCES

3 RESOURCE PERSONS

BO FRANK

Mayor
Västra Esplanaden, 18 Box 1222
351 12 Växjö, Sweden
Tel.: +46 470 413 90
E-mail: bo.frank@vaxjo.se

HENRIK JOHANSSON

Environmental coordinator - Executive Office
Växjö kommun, Box 1222
351 12 Växjö, Sweden
Tel.: +46 470 413 30
E-mail: henrik.johansson@vaxjo.se

4 DOCUMENTARY RESOURCES

Smaland airport, http://www.vxo-airport.se/corporate_info_environment_en.shtml

Azevedo, Isabelle, Delarue, Eric and Meeus, Leonardo, *Mobilizing cities towards a low-carbon future: Tambourines, carrots and sticks*, (Energy Policy, 2013)

Building Green, Växjö, Sweden: A Model of Sustainability (2013), <http://www2.buildinggreen.com/blogs/v-xj-sweden-model-sustainability>

ConsoGlobe, Växjö, *bientôt ville verte sans hydrocarbure !* (2014) <http://www.consoglobe.com/vaxjo-ville-sans-hydrocarbure-cg>

Dale, Ann, Växjö, Sweden: *The Greenest City in Europe* (CRC Research, 2011) <http://crcresearch.org/community-research-connections/climate-change-adaptation-and-mitigation/v%C3%A4xj%C3%B6-sweden-greenest-city-e>

ecoBUDGET webcentre, <http://www.ecobudget.org/>

Energy Cities, *Les villes sont prêtes à relever le défi de l'économie circulaire !* (2014), <http://www.energy-cities.eu/Les-villes-sont-pretes-a-relever>

Forthomme, Pierre, *Entreprise et Société en Suède : Un Regard Aux Sources Du Modèle*, (seminar organised by the Association des Amis de l'École de Paris du management, 2007)

Frank, Bo, *Circular Economy in Växjö, the Greenest City in Europe* (2014), [https://dl.dropboxusercontent.com/u/34920519/5 Bo%20Frank Vaxjo EcoCirculaire 24-06-14.pptx](https://dl.dropboxusercontent.com/u/34920519/5%20Frank%20Vaxjo%20EcoCirculaire%2024-06-14.pptx)

ICLEI Europe, *Sustainable Management*, <http://www.iclei-europe.org/topics/sustainability-management/>

Johansson, Henrik, *Fossil Fuel Free Växjö*, [http://www.energy-cities.eu/IMG/pdf/Fossil Fuel Free Vaxjo - the story.pdf](http://www.energy-cities.eu/IMG/pdf/Fossil_Fuel_Free_Vaxjo_-_the_story.pdf)

Kahn, Jamil, *What role for network governance in urban low carbon transitions?* (Journal of Cleaner Production, 2013)

Lacassagne, Sylvie, *Une ville moyenne en marche vers le Zéro carbone : Växjö* (Encyclopédie du Développement Durable), <http://encyclopedie-dd.org/encyclopedie/economie/4-3-territoires-et-amenagement/une-ville-moyenne-en-marche-vers.html>

Lindström, Pernilla and Lundström, Mats Johan, *Sustainability By Sweden Perspectives On Urban Governance*, (Boverket, 2008), [http://www.boverket.se/Global/Om Boverket/Dokument/internationellt arbete/Word Urban Forum 4 /Sustainability by Sweden WUF.pdf](http://www.boverket.se/Global/Om%20Boverket/Dokument/internationellt%20arbete/Word%20Urban%20Forum%204/Sustainability%20by%20Sweden%20WUF.pdf)

Meyrick, David and Robrecht, Holger, *ecoBUDGET - Introduction for mayors and municipal councillors* (UN-HABITA, UNEP, ICLEI) <http://issuu.com/unhabitat/docs/ecobudget/3>

SESAC, *Innovative sustainable construction - Together for the low-energy city with a high quality of life* (2011). [http://energy-cities.eu/IMG/pdf/sesac leaflet simple-pages.pdf](http://energy-cities.eu/IMG/pdf/sesac_leaflet_simple-pages.pdf)

Soares, Claire, *In Europe's greenest city, even its power plant smells more like a sauna* (The Independent, 2007), <http://postcarboncities.net/europes-greenest-city-even-its-power-plant-smells-more-sauna>

Swedish Institute, <http://sweden.se/society/energy-use-in-sweden/>

Tenje, Anna et Ahlrot, Julia, *Vaxjö determined to change*, (Energy Cities conference, April 2013), [http://riga2014.energy-cities.eu/IMG/pdf/12 vaxjo determined to change.pdf](http://riga2014.energy-cities.eu/IMG/pdf/12_vaxjo_determined_to_change.pdf)

Teubner, Wolfgang, *From Local Agenda 21 to Local Action - From the Aalborg Charta to the Aalborg Commitments, the way from sustainability planning towards an integrated and cyclical sustainability management & governance approach* (2008), [http://www.dnacascais.pt/Files/Billeder/Agenda21/Glocal/Apresentacoes/Da Agenda a accao Wolfgang Teu bner Glocal09.pdf](http://www.dnacascais.pt/Files/Billeder/Agenda21/Glocal/Apresentacoes/Da%20Agenda%20a%20acciao%20Wolfgang%20Teubner%20Glocal09.pdf)

UNEP, *The City of Växjö - a successful sustainable energy programme in Sweden*, <http://www.unep.org/GC/GCSS-IX/Documents/Swedish-1A.pdf>

VEAB – Växjö municipal power company, www.veab.se

City of Växjö, official website, <http://www.vaxjo.se/english>

City of Växjö, *Fossil Fuel Free Växjö*, (lists of ecological transition measures, 2007), [http://www.energy-cities.eu/IMG/pdf/CO2 engelska 2007.pdf](http://www.energy-cities.eu/IMG/pdf/CO2_engelska_2007.pdf)

City of Växjö, *Developing Sustainable Cities in Sweden* (2011), [http://www.vaxjo.se/upload/www.vaxjo.se/Kommunledningsf%C3%B6rvaltningen/Planeringskontoret/SusCit maildocument 111124.pdf](http://www.vaxjo.se/upload/www.vaxjo.se/Kommunledningsf%C3%B6rvaltningen/Planeringskontoret/SusCit%20maildocument%20111124.pdf)

City of Växjö, *Energy Plan* (December 2011), [http://www.vaxjo.se/upload/www.vaxjo.se/Kommunledningsf%C3%B6rvaltningen/Planeringskontoret/Milj%C3%B6dokument%20och%20broschyrer/Energiplan eng webb 2011.pdf](http://www.vaxjo.se/upload/www.vaxjo.se/Kommunledningsf%C3%B6rvaltningen/Planeringskontoret/Milj%C3%B6dokument%20och%20broschyrer/Energiplan_eng_webb_2011.pdf)

City of Växjö, *Environmental Programme* (2010), <http://www.vaxjo.se/upload/www.vaxjo.se/Kommunledningsf%C3%B6rvaltningen/Planeringskontoret/Milj%C3%B6dokument%20och%20broschyrer/10%20Environmental%20programme.pdf>

Photo credits: © City of Växjö, © Mats Samuelsson

Find the full-text publication “The Energy Transition Chronicles”
on Energy Cities’ website www.energy-cities.eu
Resources > Publications.

