

CSD 14 – National Reporting

Energy

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CSD 14 – National Reporting

Energy

1. Background

In the run-up to the World Summit on Sustainable Development in Johannesburg in 2002, the Swedish Government highlighted four important factors: water and sanitation, sustainable production and consumption, energy and natural resources. *A National Strategy for Sustainable Development* was also adopted in 2002. Later in the same year, a follow up to the World Summit on Sustainable Development in Johannesburg was held in Sweden with the presence of various stakeholders and interest organizations in the country. The strategy was revised in 2003, following upon agreements from Johannesburg and the EU strategies. The summary of the *Swedish Strategy for Sustainable Economic, Social and Environmental Development* is available at:

www.sweden.gov.se/content/1/c6/02/52/75/98358436.pdf.

On 23 May 2003 the Swedish Government passed a development related bill in direct response to the Johannesburg Plan of Implementation – *Shared responsibility – Sweden's policy for global development*. The bill proposes new goals for all aspects of Government operations with the aim of contributing to fair and sustainable global development. (A summary of the bill content is available at www.sweden.gov.se/content/1/c6/02/02/56/9a6ca06f.pdf)

The Johannesburg Plan of implementation urged States to make progress in the formulation and elaboration of national strategies for sustainable development (NSDS) and begin their implementation by 2005. This document presents the Swedish report on NSDS for CSD 14 in the thematic area *Energy*.

2. Decision making

2.1. Institutional base

The development of energy policies in Sweden has for many years been dealt with in the Ministry of Industry, Employment and Transport. Since 1st January 2005, however, energy issues rest with the newly created Ministry of Sustainable

Development. The work of the new Ministry builds on the idea of the green welfare state, i.e. use of new technology, construction and an active energy and environmental policy to drive forward the transformation and modernization of Sweden to benefit sustainable development, new jobs, growth welfare, a good health and protected environment

The Ministry of Sustainable Development is responsible for the overall coordination of the government's work on sustainable development. Specific areas of responsibility include environment, water, energy, climate change, construction and housing. (www.sweden.gov.se/sb/d/2066). However, work within the CSD framework is under the responsibility of the Ministry of Foreign Affairs.

The two main bodies responsible for the implementation of energy policy measures in Sweden are the Swedish Energy Agency and Svenska Kraftnät. However, the National Board of Housing, Building and Planning; the Swedish Consumer Agency; the Swedish National Electrical Safety Board; the Swedish Agency for Innovation Systems; the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning; the Swedish Research Council; and the county administrative boards also contribute to implement measures in the sphere of energy policy. In addition, the Swedish Energy Agency shares responsibility with the Swedish Environmental Protection Agency (<http://www.internat.naturvardsverket.se>) on climate related programmes, particularly emissions trading schemes.

The Swedish Energy Agency was established in January 1998 as the central government body responsible for authority functions related to energy supply and use. The Agency works for the development of sustainable and efficient energy systems in Sweden at competitive conditions and with low adverse impacts on health, environment and climate. The Agency's work shall be performed in cooperation with industries, energy companies, local governments, research organizations and international institutions. The *Energy Markets Inspectorate* is also a part of the Agency since January 2005. (www.stem.se)

Svenska Kraftnät is a state utility established on 1 January 1992. The company administers and runs the national electrical grid which in total consists of approximately 15,000 kilometres of 200 kV and 400 kV lines plus installations, and connections to neighbouring countries and IT systems. (www.svk.se)

2.2. Status of the Swedish energy system

Sweden's total energy supply amounted to 624 TWh in 2003, including a net import of some 13 TWh of electricity. Of this, total final energy use made up 406 TWh; conversion and distribution losses 178 TWh; and bunker oils and other

applications 40 TWh. Of the total energy supply, oil accounted for 34 percent, which were mostly used in the transport sector. Nuclear power accounted for another 32 percent, bioenergy for 17 percent and hydropower 8.5 percent. Other sources of energy used in the country include coal, heat pumps and wind power.

The Swedish energy system has changed dramatically since 1970. Total energy use increased by only 8 percent since 1970. Oil consumption decreased by 26 percent in the same period, while bioenergy utilization more than doubled. The final energy use in residential, service and industrial sectors has remained unchanged since 1970 due to increased energy efficiency. In the transport sector, however, there has been an increase of 64 percent in the same period. The preference for electricity in the final use is illustrated by an overall increase of 128 percent in electricity consumption since 1970. Approximately half of the electricity comes from nuclear power and 40 percent from hydropower. Other sources of electricity are CHPs and wind power. Today, 29 per cent of the total energy supply in Sweden comes from renewable sources.

Present trends include continuous increase in the use of bioenergy, windpower and heatpumps but also natural gas. The consumption of coal is closely related to processes in iron and steel industries and has been stable for almost two decades. Liquid biofuels are being introduced in the transport sector (see also section 2.6). More information on Swedish energy systems can be found in the publication *Energy in Sweden 2004* (available online at [http://www.stem.se/web/biblshop_eng.nsf/FilAtkomst/ET19_04.pdf/\\$FILE/ET19_04.pdf?OpenElement](http://www.stem.se/web/biblshop_eng.nsf/FilAtkomst/ET19_04.pdf/$FILE/ET19_04.pdf?OpenElement)).

Today, Sweden has 11 nuclear power reactors accounting for almost half of the country's electricity generation. Following from a decision of a referendum in 1980, Sweden aims at phasing out nuclear power. A first reactor has already been decommissioned and a second one is scheduled to close down in 2005. However, the actual progress of decommission work will depend on the rate of introduction of alternative energy generation, improvements in the efficiency of energy use, energy research and technical development, as well as effects of EU directives and incentives.

2.3. Overall policy objectives

The overall purpose of Sweden's energy policy is to create conditions for efficient use and cost-efficient supply of energy, with minimum adverse effects on health, the environment and climate.

The 1997 energy policy agreement set out a strategy for continued restructuring of the country's energy system and included both a short-term and a long-term program. The short term program aimed at replacing the loss in electricity

production capacity resulting from the closure of the first nuclear reactor in Barsebäck, and this was successfully concluded in 2002. The long-term program focused on research, development, demonstration and climate related measures, and was concluded in 2004. In addition, this program included (i) an energy-related international climate investment program in line with the UN Framework Conventions on Climate Change (UNFCCC) at a total of 350 MSEK and (ii) a climate-related research program at a total of 70 MSEK for the period 1998-2004, which also included bilateral co-operation in the Baltic Sea Region.

Since 2002, a new energy policy program has been gradually introduced to facilitate restructuring and development of the energy system towards sustainability. The program consists of substantial long-term efforts on research, development and demonstration of new energy technology starting 2005, including stronger measures to assist commercialization of new energy technology. The Swedish program is increasingly coordinated with policy efforts in the EU, as well as with the global social and environmental agendas.

The present Swedish climate strategy dates from 2002 and relates to the period up to 2050 with the action plan program extending up to 2010 and checkpoints set for 2004 and 2008. According to the EU 15 internal burden-sharing agreement Sweden has a commitment not to exceed 1990 emissions by more than 4 percent. However, the national interim target set by the Swedish Parliament in 2002 aims at the more ambitious reduction target of 4 percent based on 1990 levels without the use of carbon sinks or the flexible mechanisms.

The first evaluation of the program was finalized with emphasis on the national interim target for the period 2008-2012. The 2004 evaluation forecasted emissions to fall by just over 1 percent between 1990 and 2010. Emissions need to decrease by a further 2 million tonnes of carbon dioxide equivalents if the national interim target is to be met. It has been observed that the Swedish climate strategy to date has had an impact on emissions in several sectors but the trend varies in each sub-sector. Policy instruments are particularly significant in the energy area and the carbon dioxide tax introduced in 1991 is believed to have contributed most to reduce emissions (*Swedish Climate Strategy – checkpoint 2004* available online at [http://www.stem.se/web/biblshop_eng.nsf/FilAtkomst/ET33_04.pdf/\\$FILE/ET33_04.pdf?OpenElement](http://www.stem.se/web/biblshop_eng.nsf/FilAtkomst/ET33_04.pdf/$FILE/ET33_04.pdf?OpenElement))

2.4. Present policy instruments and programmes

Sweden's energy policy is closely linked to environmental and climate policies. The main instruments used to promote renewable technologies are taxation, the green certificate scheme, subsidies for wind power, and forthcoming EU emission trading scheme. The present target is to increase the use of electricity from renewable sources by 10 TWh between 2002 and 2010. There is also a non-

binding planning objective for wind power of 10 TWh by 2015. The regional and local authorities are required to have plans to meet that target. In addition, the 2002 energy policy decision provides measures to improve the efficiency of energy including energy advisory services, technology procurement projects and market introduction of energy-efficient technologies.

Energy taxation in Sweden are of both fiscal and environmental character and includes carbon dioxide and sulphur taxes, as well as taxes to improve the efficiency of energy use, encourage the use of biofuels, create incentives for companies to reduce their environmental impact and create favourable conditions for indigenous production of electricity. The trend is for an increasing taxation to encourage sustainability, i.e. on energy use and emissions, which is to be offset by corresponding reduction in taxes on employment. A new Swedish taxation model is being developed at present, aiming at a coordinated and consistent taxation structure for business, whilst also complying with EU rules.

The *electricity certificate system* was introduced on 1st May 2003 with the aim to increase the proportion of electricity from renewable sources by adding 10 TWh into the country's system between 2002 and 2010. All electricity users, with the exception of manufacturing processes in energy-intensive industries, must buy a certain percentage of their electricity from renewable sources. The system is intended to reduce the production costs of such electricity while creating competition between the various renewables, e.g. biomass, hydropower and wind power. During a transition period, the system is complemented with targeted support for wind power production in the form of environmental subsidy. An evaluation of the electricity certificate system conducted in 2004 by the Swedish Energy Agency suggested that the electricity certificate system should be made permanent in the efforts towards sustainability, long-term targets should be set to allow more time for new investments, quota obligations should be transferred from consumers to suppliers and the certificate price should be included in the total electricity price to strengthen consumer's rights. The Swedish government has stated its intention to propose changes in the system, including a new target, before the end of 2005. (Summary of the evaluation available online at [http://www.stem.se/WEB/STEMFe01.nsf/V_Media00/51725A85F5B5A257C1256FC60053AD89/\\$file/Summary%20-%20stage%202.pdf](http://www.stem.se/WEB/STEMFe01.nsf/V_Media00/51725A85F5B5A257C1256FC60053AD89/$file/Summary%20-%20stage%202.pdf)).

The present *energy efficiency improvement program* started on 1st January 2005 is designed to improve the efficiency of energy intensive industries. Companies participating in the programme can receive a full rebate of the energy tax on electricity (0.05 SEK/kWh) if they introduce an energy management system and perform energy audits to determine their potential for improving energy efficiency. Over a five-year cycle, the companies must apply all the energy efficiency improvement measures that have been identified, and which have a payback time of less than three years.

Energy research, development and demonstration activities are aimed at developing cost-efficient energy systems based on renewable energy sources, and developing system solutions for more efficient use of energy. In addition, the Parliament has approved a number of measures intended to encourage increased energy efficiency in the residential and service sectors. These measures include substantial investment in *technology procurement* projects to improve efficiency of energy use and reduce the use of electricity. By end of 2004, a proposal was made to introduce the EU *Energy Performance of Buildings Directive* in Sweden, which aims at improved energy efficiency in residential and service buildings by 1 percent per year, and 1.5 percent improvement in public sector buildings.

The *national climate investment programme (Klimp)* provides grants for local authorities and other parties to make long-term investments in measures intended to reduce the emissions of greenhouse gases, assist restructuring of the energy system or demonstrate new technologies that can contribute towards these objectives. A total of SEK 1 040 million has been awarded to climate investment programmes 2002-2006. So far, SEK 810 million has been distributed to 47 programmes with a total of almost 400 different measures. More than 50 percent has been directed to energy related projects, such as the extension of the district heating net and conversion to bio fuels. Ten percent has been directed to waste related projects, mainly to the production of biogas. The grants given are estimated to lower the emissions of climate gas by approximately 365 000 tons of carbon dioxide equivalents per year and lower the use of energy by 570 000 Mwh. More information about the climate investment programmes can be found at the Swedish EPA website: www.naturvardsverket.se.

The *emissions trading system* follows upon EU directives defined in the autumn of 2003 and aims at enabling the EU and its member states to fulfil their commitments under the Kyoto Protocol in a cost-effective manner. The Kyoto Protocol entered into force on the 16th of February 2005. A first trading period shall run from 2005 to 2007 as an introductory phase to an international emission rights trading due to start in 2008. The Swedish allocation plan covers 38 percent of Swedish emissions in 2000 and the system entered operation on 1st January 2005. Since then, a new law concerning emissions rights has come into force and CO₂ emissions need to be licensed.

The Swedish Energy Agency is responsible for the national registry as regards emissions trading including projects within the framework of flexible mechanisms of the Kyoto Protocol, that is, the Clean Development Mechanism (CDM) and Joint Implementation (JI). Furthermore, the Agency in its role as national expert authority is appointed Designated National Authority (DNA) for CDM-projects and National Focal Point (FP) for JI-projects with the responsibility to approve and monitor such projects as well as to provide information and guidance to Swedish companies on CDM and JI.

The Agency is also engaged in implementation of CDM and JI projects within the framework of the *Swedish International Climate Investment Programme* (SICLIP) following the Energy Policy Decision from 1997. Between 1993 and 2001, the focus of the programme was on AIJ (Activities Implemented Jointly) pilot phase projects in the Baltic Sea Region and Eastern Europe. Some 70 projects were implemented mainly aimed at increased use of renewable energy and efficiency in the district heating sector. Since 2002, the programme has focused on the implementation of CDM and JI projects. In addition, the Swedish Energy Agency responds for the Swedish contribution and participation in the regional climate fund, the Testing Ground Facility (TGF) in the Baltic Sea Region. Within the climate research programme, bilateral R&D projects are implemented with institutions in Poland and Russia concerning bioenergy and energy efficiency

2.5. Energy markets

The deregulation of energy markets offers an opportunity for increased cost efficiency in energy production, distribution and use. While electricity generation from renewable sources tends to have higher production costs and depends on incentives to be more widely established, the use of renewables in heating and cooling has been a competitive alternative in Sweden not least due to CO₂ taxation. The expansion of heating and cooling markets implies lower demand for electricity thus increasing the total system efficiency.

The electricity and district heating markets in Sweden were deregulated in 1996. The Swedish electricity market is part of a common Nordic market that includes all Nordic countries with the exception of Iceland, and is increasingly integrated with markets south of the Baltic. Electricity trading is done through the Nordic electricity exchange, Nord Pool. On the competitive market comprising more than 200 active electricity companies, free pricing is employed and the price of electricity is determined on the basis of supply and demand.

Since deregulation, significant concentration in the ownership of generation capacity has been observed and, today, the three largest energy companies in Sweden account for almost 90 percent of Swedish electricity generation. That development is closely monitored in order to guarantee consumers' rights.

Distribution networks are still operated by monopolies. The Electricity Act dates from 1997 and regulates the access to the power grid. The *Energy Markets Inspectorate* at the Swedish Energy Agency exercises surveillance of the tariffs charged by grid owners, and ensures that they comply with regulations concerning metering, and deliver a good service. The Agency has developed a Performance Assessment Model which is a tool for assessing the reasonableness of the transmission tariffs levied by the local network companies. In May 2003, the Stockholm Administrative Court of Appeal issued its first verdict concerning the

reasonableness of the network charges judging in favour of important fundamental principles put forward by the Agency, and resulting in refunds of approximately SEK 20 million to consumers. Some companies have appealed to that decision.

District heating is widely used in Sweden and accounts for half of all space heating in multi-family houses and in commercial and industrial premises. There are more than 200 local district heating companies in Sweden, most of which are wholly or partially owned by municipalities. Since it is expensive for the customer to change to a different heating alternative, the district heating market is usually said to be a local monopoly. In 2002, the Government appointed a commission entrusted with the task of evaluating competition in district heating. The commission proposed that district heating operations should be reported separately from electricity trading to avoid cross-subsidies within companies.

While district heating has been used in Sweden since the 1950s, district cooling appeared first in the early 1990s. Nevertheless, the market has expanded rapidly and, today, some 640 GWh of district cooling are being supplied by 30 commercial district cooling companies. District cooling finds a market almost exclusively in the commercial sector for air conditioning of shops and offices, and in industry for process cooling and cooling of large computer centres.

Natural gas was introduced in Sweden in 1985 and still plays only a marginal role in Swedish energy supply. Sweden does not have its own natural gas production and all gas is being imported from Denmark. The natural gas market is being deregulated in stages, and will be completely open to competition by 1 July 2007 at the latest. Since 2003, corporate consumers with an annual consumption in excess of 15 million cubic metres have been free to choose their natural gas suppliers and starting 1st January 2005 the same right has been extended to other corporate customers. The Swedish gas network is expanding, lately with the construction of a gas pipeline from Gothenburg to Stenungsund on the west coast of Sweden. Also a new transmission line known as the Baltic Gas Interconnector is being developed between Germany and Sweden via Denmark.

2.6. Energy in transport

A strategy for the introduction of bio based motor fuels has been developed by the Swedish Energy Agency in collaboration with VINNOVA (the Swedish Agency for Innovation Systems), the Swedish Road Administration and the Environment Protection Agency. It recommends that bio-based motor fuels should be introduced by means of a low mixture of between 5 to 25% in existing motor fuels. (Available at: http://www.vv.se/filer/publikationer/2002_144.pdf)

The energy tax on ethanol in E85 fuel (85% ethanol and 15% petrol) was removed on 1st January 2003, thus reducing the price by some 5% (2004) compared with

petrol (also accounting for the difference in energy efficiency of the E85). As a result of further reductions of taxes on large amounts of ethanol during 2003, most 95-octane petrol throughout Sweden now contains a 5% ethanol mix.

In May 2003, the EU Parliament and Council adopted a directive on the Use of Biofuels or Other Renewable Fuels for Transport. Following from that, the Swedish Government appointed the Renewable Vehicle Fuels Commission to suggest national strategies and objectives for the introduction of renewable motor fuels. In an interim report from early 2004, the Commission suggested that all filling stations selling more than 1000 m³/year of petrol and diesel must have at least one pump for alternative motor fuels. This means that 200-400 filling stations would have such pumps by 2008. Also a target of 3% bio based motor fuels for transport is suggested for 2005.

In addition, the Road Traffic Taxation Commission presented its final report in May 2004 proposing further rise in diesel taxes. In the longer term, it is suggested that petrol and diesel should pay the same amount of tax, and that vehicle taxes are based on CO₂ emissions per kilometre rather than on vehicle weight.

A number of Swedish towns are presently running programmes to acquire experience with public transport systems powered by renewable energy sources. For example, the city of Landskrona is running a trolley bus line powered by renewable electricity from wind and hydro power. Stockholm is one of the cities in the CUTE (Clean Urban Transport for Europe) EU project aimed to obtain experience in the operation of fuel-cell-powered buses.

Several small plants for the production of liquid biofuels have been built in the past years. The production of biogas and ethanol, the most common types of liquid biofuels in Sweden, amounts to the equivalent of 1.8 TWh annually. To fulfil the requirements of the new EU directives on liquid biofuels, Sweden would have to build another 10-12 large-scale plants for production of ethanol. The largest ethanol plant in Sweden today is producing 50 000 m³ of ethanol annually.

2.8. Export promotion and technology transfer

Market demand is playing a major role in the development of environmentally sound products and services. More efficient use of energy and materials is a clear trend. Swedish industry is to the fore in applying the international environmental management standards, EMAS and ISO 14000, as well as using life cycle assessments as a method for analysing and evaluating the environmental impact of their products and services. The majority of the large companies produces corporate environmental reports. Today, Sweden is marketing Environmental Product Declaration (EPD) as a suitable tool in evaluating environmental impact of products in a life cycle perspective.

During 2002, Swedish companies exported services and products with an estimated value of nearly SEK 15 billion. During 1999-2002, environmental technology companies showed a favourable business trend characterized by increased growth. While Sweden's overall exports during 2002 remained unchanged, the environmental technology companies showed growth of 8.4%. If this trend continues, Sweden's environmental technology companies should reach sales of SEK 20 billion by the year 2005.

The *Swedish Environmental Technology Network* is administered by the Swedish Trade Council and aims at joint actions to promote and support new business in the environmental technology area. Bioenergy is an area where Sweden is in the forefront and a bioenergy group within the network works to promote Swedish business and know-how. (<http://www.swedentech.com>)

An evaluation commissioned by the Government in 2004 emphasized the great growth potential of environmental technology business and suggested the creation of a new centre to promote such technologies and businesses. The environmental technology centre is expected to create a common platform for public organizations, companies and researchers, strengthening positive synergy throughout whole value chains, from research to market. The main objective is to stimulate business development around environmental technologies through more interaction among various actors, thus leading to improved competitiveness for Swedish environmental technologies and solutions both nationally and internationally.

Technology transfer is also being promoted through demonstration projects, for example, in the Baltic Region where forest management projects have given support to the development of biofuel markets resulting from forestry activities. Development assistance projects emphasize both the development of policy frameworks and of technical capacity through capacity building and introduction of new technologies.

The focus on energy efficient and environmentally sound products will also be further highlighted as a result of the EU-directive on ecodesign of energy using products. This directive has not yet entered into force, but when doing so, it will be an important instrument and contribute to a sustainable development, as producers get aware of that these aspects have to be taken into account in the design of products.

3. Capacity-building, Information, and Research & Technology

3.1. R&D, capacity-building activities, and centres of excellence

The Swedish government has conducted a Competence Centres Programme since 1995, administered by the Energy Agency and the Swedish Agency for Innovation Systems (VINNOVA). The concept of Competence Centres means long-term research cooperation between universities and industry, which gives dividend to both parties. The industry, universities and the government fund the centres jointly. Presently, there are 28 Competence Centres in Sweden. More information about the impact of the Swedish Competence Centres Programme 1995-2003 can be found at:

<http://publiceng.vinnova.se/Main.aspx?ID=caa79d81-43dc-41e9-b6d8-489a7b2124d4&ReturnID=a7ff7d75-672c-47be-8bf0-f148fc33a7c4>

Under the heading *Long-term development of the energy system*, the Swedish Energy Agency coordinates its economic support to basic research, applied research, and development cooperation within programmes or independent projects. There are three types of appropriation; Energy Research, Support to Energy Technology, and Introduction of New Energy Technology. These different frameworks for support can be combined. In 2004, a total of 801 M SEK was allocated to 780 separate projects.

The appropriation for *Energy Research* is used for financing research mainly within the university community. The conversion of the energy supply system, which the Swedish parliament has decided on, presupposes enhanced technical knowledge and technical development. Therefore, the Energy Agency focuses on research and development in programmes aiming at attaining a pool of knowledge. Usually, the economic support covers one hundred percent of the costs. However, some projects are co-financed with the industry.

The means available for support within the area *Energy Technology* are used for co-financing of independent technology development projects and programmes. When support is given to projects aiming at developing energy technology, it is primarily given to companies that are thought to be using the technology that will be developed. Support for basic and industrial research may not exceed fifty per cent of the total cost of a project.

Support within the area *Introduction of New Energy Technology* may be allocated in order to promote the development of technology based on renewable energy, and effective use of energy in industrial experimental- or full scale plants. This kind of support may be given to individual projects and to Swedish and international research and development cooperation. The support given may not exceed fifty per cent of the costs of a project. The bulk of the available economic means is allocated to larger projects coordinated by companies or industry

associations. This kind of support is thought to alleviate the technical and economic risk that a company has to take when introducing untested technology in full scale plants.

As a result of the government's guidelines, the Swedish Energy Agency is also increasingly focusing on business and export activities as a way to shorten the road between technology research and development and commercialization both nationally and internationally. This means, on the one hand, identification of technologies which are close to commercialization and, on the other hand, development of new applications and markets for Swedish technologies abroad.

3.2. Educational programmes

In past years, a number of university programmes focused on sustainable energy have been developed in Sweden, mainly at master's level. Some of these programmes are held in English, and receive students from all over the world. Some of the programmes can be followed from distance. Scholarships are available for students from developing countries, the Baltic countries, and Eastern European students. Examples of these programmes include:

Sustainable Energy Engineering at the Royal Institute of Technology, a Master of Science Degree Programme with two parallel majors: Sustainable Power Generation and Sustainable Energy Utilization in the Built Environment. (<http://www.energy.kth.se/index.asp?pnr=15&ID=222&lang=0>)

Environmental and Energy Systems Studies at Lund Institute of Technology, a programme focused on issues of energy and the environment in a national and global long-term perspective. (http://www.miljo.lth.se/engelska/eng_index.asp)

Chalmers Environmental Initiative at Chalmers University of Technology is an umbrella programme that also includes the Chalmers Environmental Network and comprises various areas focused on sustainable development including energy systems. (<http://www.miljo.chalmers.se/cei/profile/approach.htm#Network>)

At the regional level, Sweden is part of Agenda 21 for Education in the Baltic Sea Region, *Agenda 21E* (<http://www.baltic21.org>), which includes the Baltic University Programme (<http://www.balticuniv.uu.se/index.htm>) based at Uppsala University. A Baltic Sea Region Sustainable Development News service is being established to favour information exchange within the region.

3.3. Information networks and campaigns

The Swedish Energy Agency has a number of established channels of communication. Among these, the Agency's homepage (www.stem.se) is the most important. Each month, the website is visited by some 35 000 users. The Energy Agency produces several publications on a yearly basis regarding energy supply, the use of energy, the effects of energy production on the environment,

and developments on the energy market. These publications are available from the Agency's webpage. In addition, the Agency runs a webpage which provides easy accessible information for teachers and pupils (www.stem.se/energikunskap). Recently, an IEA portal has been launched in Swedish to facilitate the dissemination of collaboration results within IEA at various levels in the country (<http://www.iea-sverige.org>).

The preparations for trading with greenhouse gas emission allowance within the European Community include a broad scale information campaign towards relevant actors. The campaign included newsletters and a webpage which is run in cooperation with the Swedish Environment Protection Agency. During 2004 the webpage had about 17 000 visitors (www.utslappshandel.se).

Presently, there are 13 regional energy agencies in Sweden. These energy agencies have been created through cooperation between the administrative boards of the counties, associations of local governments, industry and municipalities. In its energy policy programme for 2003 – 2007, the government emphasises the importance of the regional energy agencies. The economic support given by the state is focused on three areas: Coordination of energy advice services; creation of regional competence within the field of energy, with particular emphasis on renewable energy and energy efficiency; and national, regional and local projects on energy advice related services, efficient use of energy, and renewable energy. It is also a priority to support initiatives and participation in EU-projects within these fields.

The government also actively supports the municipal energy advice service, which exists in all 290 municipalities in Sweden. The role of the energy advisers is to give objective and independent advice and information regarding energy to the public and smaller companies. During the period 2003 – 2007, the Swedish government doubled its economic contribution to the municipal energy advisers compared to the previous five year period. The Energy Agency provides the advisers with a monthly newsletter, and also publishes various information materials in order to facilitate the advisors' work. In 2003, for the first time ever, all 290 municipalities in Sweden provided the service of energy advice.

Sustainable municipality is a five year programme which the Energy Agency initiated in 2003. The aim is to design local energy action programmes in order for them to contribute to a sustainable local growth, with particular consideration of ecological, economic and social aspects. Five municipalities participate, which all differ much in terms of geographic position, area, number of inhabitants, and composition of the business community. The activities within the project are not based on funding by the government. The role of the Energy Agency is rather to develop and increase knowledge, including knowledge concerning municipal cooperation. The programme is continuously evaluated by three teams of scientists from the Swedish university community. The results of this project are thought to benefit other municipalities.

Truly, it is a challenge to measure the effects of information campaigns. Measures to achieve more efficient use of energy is usually accounted for in figures, i.e. number of information leaflets published, number of seminars arranged, and so forth. The Energy Agency is presently working with developing indicators to use when evaluating the reached results in relation to the environmental goals.

Regarding the municipal energy advice service, no figures of quantitative energy effects are available. However, the Agency has concluded that the environment has been affected positively, as a result of that the energy advising structure and information campaigns gradually transfer knowledge to consumers regarding ways of heating, new technology, energy efficient equipment, etcetera.

From 1 January 2005, The Swedish Association of Local Authorities (SALA) and the Federation of Swedish County Councils (FCC) have formed a new headquarter with joint administrative units - *The Swedish Association of Local Authorities and Regions* (SALAR, <http://www.skl.se/artikel.asp?C=756&A=180>). In 2007 the two organisations (SALA and FCC) will merge and form a new, joint federation. Also the Swedish Council for Sustainable Development has been created with the task to promote sustainable development at the local and region levels. During 2005, the council will develop a proposal for long-term action. (<http://www.hallbarhetsradet.se/english>). Such developments indicate the strengthening of local action, building upon Swedish tradition of strong local level decision-making and participation.

Sweden takes an active part in the work to achieve sustainable Consumption and Production patterns in order to reduce the negative impact on environment and health that originate from the usage of energy and chemicals linked to products. Sweden takes part in the development of an integrated product policy within EU and in the international work on Sustainable Consumption and Production, SCP, within the framework of the Marrakech process and the follow up on the commitments from Johannesburg. Sweden has further developed a Nordic cooperation on SCP within the framework of the Nordic Council of Ministers and through this cooperation contributes to the CSD process (Commission on Sustainable Development). In order to further strengthen the Marrakech process, Sweden has assumed a Lead Country role for Sustainable Consumption and will provide a first report to the Marrakech +2 meeting in Costa Rica in September 2005.

4. International cooperation

4.1 Cooperation with neighbouring countries

Sweden actively participates in international cooperation for an improved and sustainable environment, in the Nordic region, in Europe and at the global level. The long-standing Nordic work for sustainable development is focused on reducing and eliminating the threat to the environment in the Nordic region, including the Baltic Sea area and the Barents Sea area.

The Nordic Council of Ministers (www.norden.org) is to a large extent the driving force in the regional co-operation. The energy cooperation focuses on three core areas; electricity market, climate and the regional co-operation (Baltic sea region and North-western part of Russia). As described before, the Nordic electricity co-operation is very successful and in many aspects a model for other electricity markets.

The Baltic Sea Region Energy Co-operation, BASREC, (<http://www.cbss.st/basrec/>) includes the five Nordic Countries, all the other countries in the Baltic Sea Region, and the EU Commission. Within the framework of the BASREC Working Group on Climate Change, a special fund has been established for implementation of JI projects in the region. At present, the fund has a capital of 15 MEUR, 10 MEUR being the contribution from the Nordic Countries and 5 MEUR från Germany. In September 2003, an agreement was reached by the responsible ministers in BASREC to establish the Testing Ground for JI in the Baltic Sea Region. The Testing Ground Agreement (TGA) awaits the signature of Russia which is expected to take place any time now that Russia has ratified the Kyoto Protocol.

Bilateral energy cooperation between Sweden and the countries in the Baltic Sea Region have been implemented both within the International Climate Investment Programme managed by the Swedish Energy Agency and within the framework of the support activities to the countries in this region managed by the Swedish International Development Authority (Sida) including capacity building.

Another co-operation concerns the so called Barents Region, i.e. the North-western part of the Russian Federation and the northern regions of Norway, Sweden and Finland. The co-operation is established both at regional and national level in a number of working groups, one of them on energy and one on cleaner production which also deals with the efficient use of energy.

Major changes have occurred in the *electricity markets* in the Nordic countries and the EU over the last few years. These changes have resulted in a move away from national or regional monopolies to international markets, subject to competition, where electricity users can choose their electricity suppliers. Presently, all Nordic countries except Iceland are trading on the Nordic electricity exchange, Nord Pool. In 2003, about 31 per cent of the electrical energy used in the Nordic countries (except Iceland) was traded on Nord Pool's electricity spot

market. The benefits of a Nordic trading exchange are that Nordic power plants can be run in a more economic effective way, and that pricing becomes more effective as a result of reduced transaction costs and greater transparency. In addition, the exchange's spot price can also be used as a reference for bilateral trade. Border tariffs have been removed between Sweden, Norway, Denmark and Finland, which have helped to encourage trade. The Nordic electricity market is becoming increasingly integrated with the electricity markets on the south of the Baltic (particularly Germany and Poland), and there is already trade in electricity between Finland, Russia and the Baltic states.

Sweden uses a relatively small quantity of energy gases in comparison with many other European countries. However, the distribution network for *natural gas* is being extended. Natural gas was introduced to Sweden in 1985. Its use increased rapidly until 1992, after which growth continued at a more modest rate. The gas is currently supplied exclusively from fields in the Danish sector of the North Sea. A pipeline under the strait of Öresund brings the gas from Denmark to Sweden. As mentioned above, a transmission line is being developed between Germany and Sweden via Denmark.

4.2 Development Cooperation

Sweden, through the Swedish International Development Cooperation Agency, Sida (www.sida.se) cooperates with several developing countries to develop a sustainable energy sector.

In order for energy systems in developing countries and countries in transition to become sustainable; effective and sound institutions must be established. The often monopolistic characteristics and complexity of energy provision require regulations based on clearly understood and respected legislation and transparent and efficient day-to-day administration.

Sida therefore focus its support on institutional development, i.e. policy, rules, regulations, capacity and organizational development.

The Swedish policy for global development “Shared responsibility” points out that the whole of Swedish society shall participate in the development cooperation. Therefore, many Swedish authorities, for example the Swedish Environmental Protection Agency and the Swedish Energy Agency are more and more participating in the development cooperation as partners to similar authorities in developing countries. In this way, Sweden is able to integrate the Swedish experience into development cooperation, especially when it comes to institutional development.

Another bottleneck for development of sustainable energy systems is lack of funds for investments. Sida therefore assist with making financing available through grants, soft loans and guarantees as well as support to development of local capital markets.

Sweden is presently cooperating in the energy sector with: Tanzania, Uganda, Mozambique, Zambia, Vietnam, Sri Lanka, Palestine, Mongolia, China, Serbia, Kosovo, Moldova, Russia and Ukraine. Sweden also supports regional initiatives like SAPP (Southern Africa Power Pool, NBI (Nile Basin Initiative) and GMS (Greater Mekong Subregion). On global level we participate in initiatives such as ESMAP (Energy Sector Management Assistance Program), GVEP (Global Village Energy Partnership), EUEI (EU energy initiative), ENERGIA network (Network for women and energy)

Sweden also supports building of research capacity in many countries and some of the research focuses on energy. For example, the Asian Regional Research Programme in Energy, Environment and Climate (ARRPEEC) focuses on policy-oriented research aimed at mitigating emissions of greenhouse gases. The Renewable Energy Technologies in Asia (RETs in Asia) conducts research into technological solutions for various environmental problems, such as solving energy problems in rural households and developing solar dryers for drying agricultural products. The network AFREPREN is Africa's only network dealing with studies of energy and energy-policy related issues. Central to AFREPREN's approach is the bringing together of energy policy researchers and energy policy-makers in Eastern and Southern Africa.

5. Main links for more information

The Committee on Environment and Agriculture, Swedish Parliament: http://www.riksdagen.se/english/work/16_committees.asp#jou

Ministry of Sustainable Development: <http://www.sweden.gov.se/sb/d/2066>

Swedish Energy Agency: <http://www.stem.se/>

The Association of Regional Energy Agencies: http://www.fsek.se/engelska_filer/index_eng.htm

Swedish Climate Policy Research: <http://www.sweclipp.se/>

Swedish Climate Activities in Eastern Europe: http://www.stem.se/web/biblshop_eng.nsf/frameset.main?ReadForm&Doc=

Information campaign on trading with greenhouse gas emission allowance: <http://www.utslappshandel.se>

VINNOVA, a governmental agency created to promote sustainable growth:
www.vinnova.se

Nordic energy co-operation: <http://www.norden.org/energi/uk/index.asp>