

COMPENDIUM

**Study Tour to Denmark and Sweden, May 2013
In the framework of
"Engaging Citizens in Sustainable Energy to improve environment and local Economy"
ECSE Project in 2012-14.**

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<http://www.inforse.org/europe/ECSE.htm>

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The municipality is situated 30 km south of Copenhagen. Inhabitants: 21,000 people. Area: 40 km².

The population consisting mainly of families with children and middle aged people.

In the municipality there are several schools and kindergartens, a sport center, which is a leisure time centre offering many activities, swimming pool, library, old people's home, local newspaper etc. There are about 50 sport clubs, 4 nature associations, 6 scouts association, several music, dancing, hobby and art associations.

The biggest towns or villages are: Solrød Strand (15,159), Havrup (3992), Jersie (530), Solrød (476), Lille Skensved (60).

The *Municipality Council* has 19 members, whom are elected for 4 years. The Council is working through 3 Committees. (1) Economic-, Technical- and Environmental; Social-, Health (2) and Family-Educational (3).

Solrød's web site include an *interaktive map*, where you can add different elements of the municipality e.g. lokal plans, roads, buildings, educational institutes, water and heating supply, sewage, waste collection, snow-moving plan, nature area etc.

Energy and Climate Agreements:

The municipality is one of the Danish municipalities working for a better environment, to reduce their CO₂ emissions and reduce the energy consumption.

The municipality has signed:

- "Curve Breaker" Agreement with the El-Spare Trust. Thus, they undertake a reduction of electricity consumption in municipal buildings, institutions, etc. by 7 % in the period 2006-2010.
- "Climate Municipality" and has an agreement with the Danish Society for Nature Conservation of reducing CO₂ emissions by 2% per year.
- "Covenant of Mayors", which is a joint European action on climate change at the local level. This agreement commits the municipality to implement a CO₂ reduction of at least 20% of its competence by 2020.

Climate Plan

In order to create a Master Plan for Solrød Municipality's climate work, the municipality has prepared a Climate Plan. The plan aims to bring together local efforts so that coordinated across the organization. Climate Plan was adopted by the Solrød Council in 2009.

The Climate Plan is covering the period 2010-2025, i.e. it runs over a 15-year period. It contains a short-term plan until 2014, when formulated as specific targets for different sectors of the municipality and a long term plan up to 2025, aiming at the municipality has reduced greenhouse gas emissions by approx. 50%.

The actions that appear in Climate Plan are not all new initiatives since some activities and plans were prepared before, and these are incorporated in the Climate Plan. For example, Solrød municipality had both an Energy Policy and Action Plan for municipal buildings (annual, ongoing review of the Action Plan.) The municipality had a Heat Plan 2008-2012 (revised after four years), drafted and approved in 2008 and is also in the process of preparing a Climate Adaptation Plan.

It is estimated that total greenhouse gas emissions in Solrød Municipality is 143,800 tonnes per year from which 93% comes from the use of fossil fuels - coal, oil and natural gas. The largest contribution to greenhouse gas emissions come from the three energy sectors - electricity, heating and transport, and they therefore have the highest priority in the Climate Plan.

The following are some interesting initiatives that are included in the Climate Plan:

Energy Group: The Climate Plan shows that Solrød municipality has to have attention to both energy savings in existing buildings and in new construction.

Already in 1999, the city focused on energy consumption, and at the beginning of 2000, there was an "energy pool" in which the various institutions, schools and other municipal property had the opportunity to seek funding for energy efficiency measures. As a result the municipality has achieved a saving of 487,190 kWh of heat consumption and 436,541 kWh of electricity consumption in 2000-2008 and reduced the CO₂ emissions by about 300 tons.

Energy Management: From 2002, all municipal institutions has to have a Municipal Energy Management, which easily gives the municipality an overview of the energy consumption. At the same time the system gives them the ability to cope with the high-consumption equipment or abnormalities if suddenly there is an excessive demand or major changes in consumption. Based on the experience there is a plan to establish a testing of using a similar system in the residential areas targeting at single-family and multi-storey residential areas. Besides, the municipality is experimenting with LED lighting in public buildings. At new buildings construction Solrød municipality should focus on insulation and high quality of the building constructions.

Renewable Energy: Solrød Municipality plans to promote the use of renewable energy sources. The municipality wants to increase the use of district heating, but also wants to promote solar energy and biogas. The plans include setting up solar collectors in all sports halls. The municipality also built a low-energy kindergarten with solar cells on the roof. The municipality is exploring the possibility of establishing a locally produced biogas plant for use in heat supply. There is an investigation including clarifying the local raw material quantities for biogas production and assess the plant's construction, location, supply areas, potential stakeholders, economics, etc. See more on the planed biogas plant. (www.solrodbiogas.dk)

Gammel Havdrup, Solrød municipality, Straw Fired Local-District Heating Plant

Gammel Havdrup, Solrød municipality. It is a result of the municipality's plan in 2008 that stated that the area should be changed from oil, and electricity to renewable energy i.e. straw, sun, and woodchip. The area is far from the present and futures district heating system. The local district heating provides hot water to 58 houses, and owned by the users. The pipes are 4km long. The installation got a loan guaranty from the municipality, which means that the interest rate is lower than it is at banks. There was no down payment. The investment is paid back by 12 years from the payment for the heating. The price is 90% of the oil heating. After 12 years, when the loan is paid back, the price will be much lower. The project decreases the CO₂ emission by 300 tons/year.



KØGE KOMMUNE

Municipality of Køge

The municipality is located 40 km² south of Copenhagen and has about 57.000 inhabitants.

The Municipal Council of Køge has 27 members.

Køge municipality chose to become a "climate municipality" and has committed itself to an annual reduction of greenhouse gas emissions by 2% until 2014. They have signed a ground-breaking agreement of 7% reduction in electricity consumption in municipal buildings in the period 2009-11. It published a Green Accounting the 4th time in 2011.

The municipality joined the Covenant of Mayors in 2011, and the Climate Plan is in a hearing process in 2013. For many years, Køge municipality has supported local Agenda 21 activities, and has built a fruitful local network and local competence. e.g the establishment of The Green House in 1997 helped to build an independent green, technical advice unit in close dialogue with business and citizens.

See the Climate municipalities in Denmark. <http://www.dn.dk/klimakommune>

Køge municipality: <http://www.koege.dk/>





The Green House, town of Køge, Denmark

The Green House is a large center of excellence in environmental, energy, housing and health on Zealand. The house provides basic and specialized guidance to citizens, associations, companies, municipalities and municipal institutions. The Green House was established by the Municipality of Køge in 1997 and has since 2007 been part of the “Energy Service” that provides free, impartial advice on energy conservation and renewable energy.

Vision: The Green House wants to provide all citizens, small businesses and institutions with knowledge and options, so they can see environmental action in everyday life as common sense. We focus on the user's situations and achieve results through dialogue, processes, network and our broad technical competences. In the Green House, we develop solutions that are sustainable and renewable, both in terms of utilization of energy and resources and in terms of the citizens' actions. -We achieve this by involving users of the projects from the very start, a method we believe gives ownership and commitment.

Organization: The Green House is an independent non-profit institution with its own board of 9 members, who represents different associations in Køge. Two members are appointed by Køge City Council for a 4-year period. There are 15 employees in the Green House. Our staff is well diversified, covering a number of specialized themes. This creates a good foundation for interdisciplinary work.

Project Cooperation: An essential basis for the Green House's work is that it has many partners. Projects will always be carried out in partnerships with many stakeholders and with relevant professional partners. The projects provide the economic basis and a technical cooperation that can result in good service for the citizens.

Projects

The Green House initiates projects and campaigns to develop sustainable living, and we help others when we have a common agenda. Examples of projects:

- Ask about Energy: Individual counseling on renewable energy including energy audit of the buildings.
- Green Certificates: Environmental certification of shops, businesses and other work places
- Green Mobility: Personal transport guidance, Car-Free School - a project on healthy, safe and sustainable transport. Renting el-bicycle and bicycle trailers to citizens. There is a Car -Share Association since 2001.
- Rainwater - from problem to resource: Rainwater harvesting, the campaign "Take control of rainwater"
- Sustainable Urban Development: Houses of the Future - how to promote future low-energy houses? Professional counselling on sustainable urban areas in Køge. This has included advice for construction of a residential area built with environmental houses, many following the first standards for Nordic Swan labeled houses.
- Nature and Health: Walking to calm down stressed people, hogweed control, and Nature conservation and restoration

Green House: <http://www.dghinfo.dk/>

VE (previously called OVE) The Danish Organisation for Renewable Energy (In Danish: VevarendeEnergi, In English: SustainableEnergy)

VE is a non-governmental, non-profit association of 2.500 Danish individual and institutional members. OVE was founded in 1975.

Objectives: VE has a strong engagement:

- to influence the development of the energy policy to be more resource- and environment-conscious especially by facilitating the use of renewable energy.
- to get the people informed of their possibilities to make their own action by installing renewable energy systems in their own homes or institutions.

VE's Activities in Denmark:

Political Lobbying:

- Seeking to be represented in the energy related law and regulation formulating processes through hearings and committees. VE has been preparing Energy Visions with 100 % renewable energy by 2030, and tries to influence politicians to follow this path.
- Evaluating and producing policy and campaign papers on renewable energy issues.

Information Dissemination:

- Publishing a Danish bi-monthly magazine "Renewable Energy and Environment" in Danish for the members.
- Offering a homepage with keys to literature, demonstration plants, companies and other relevant sites on the internet (www.ve.dk)
- Participating in exhibitions, organising seminars, courses and teach-ins through the Local Energy and Environmental Adviser Offices www.energitjenesten.dk.
- Promoting information campaigns and services
- Involved in the Energy Forum of Schools aiming to implement more and better education on energy and environmental matters. (<http://www.sef.dk>).
- Organising meetings at which technicians and users share knowledge and experiences. The main topics discussed are windpower, solar energy, biogas, energy efficiency, and renewable energy in green cities, along with integration of renewable energy in to energy systems such as those for local cogeneration of heat and power.
- Providing expertise to promote environmentally benign uses of alternative energy sources and related technologies.

Co-operation in Denmark: VE has gone into co-operation with many other organisations interested in energy in Denmark. This includes environmental organisations, trade unions, the Council of Small and Medium Sized Companies, the Danish Folkecenter for Renewable Energy (<http://www.folkecentre.dk/>), and urban ecology groups. VE is member of the Danish NGO 92-group (www.92grp.dk)

VE's Activities in Europe:

International Networking: VE plays a significant role in international networking among NGOs.

VE is member of: **CAN-Europe**, Climate Action Network - Europe, a NGO Network with a Secretariat based in Brussels, Belgium. (<http://www.climatenetwork.org/>)

INFORSE, International Network for Sustainable Energy, a NGO network with its International Secretariat based in Denmark and with 7 Regional Co-ordinators in different continents. (<http://www.inforse.org/>)

Developing Countries: VE has had several projects in Africa and Asia supported by DANIDA.

INFORSE-Europe is one of the 7 regions of the International Network for Sustainable Energy (INFORSE), which is a worldwide NGO network formed at the Global Forum/UNCED (also called Earth Summit) in Rio in 1992. INFORSE has NGO observer status at the UN ECOSOC and UNFCCC.

INFORSE has more than 145 member organisations worldwide and works for implementation of sustainable energy solutions by exchange of information, awareness creation, formulation and implementation of strategies, and lobbying of international forums.

INFORSE-Europe has more than 80 members from 35 countries, which are detailed in our online [membership list](#). Since 2002, INFORSE-Europe has been operating as a separate economic entity.

INFORSE is a meeting place for NGOs working on grassroots level as well as on national, regional and international levels, all united on a common strategy for a long-term sustainable development with phasing out of nuclear and fossil energy use.

INFORSE lobbies to promote sustainable energy solutions - renewable energy and energy efficiency which utilise decentralised approaches. All activities seek to protect the environment, and to achieve development.

INFORSE-Europe has a 5-member Board elected at the General Meetings. The member organisations and the Regional Coordinator(s) organize regional meetings and initiatives including conferences, workshops, campaigns, research projects, and other cooperation projects among the members. The regional meetings are the foundation of the network's democratic structure, with discussions of regional action plans and initiatives. The Coordinators work on regional action plans, secure regional focal-points of INFORSE and coordinate the INFORSE regions. The Coordinators also incorporate the views and initiatives of each region in the planning of the network's global activities.

INFORSE-Europe Activities:

- **Sustainable Energy News** a newsletter published since 1992.
- **Contact List** - Online Database: 1000 contacts of NGOs, and, research, and educational institutes and decision makers. The database is updated annually since 1992. Searchable according to members, contacts, name of organisation and country.
- **DIERET**- Distance Internet Education on Renewable Energy Technology - is a 300+ page study material on a post graduate level. The course is not running any more but the material is available in English, Russian and Slovakian in the internet.
- **Seminars**: INFORSE-Europe has organised NGO seminars since 1992. The seminars are once or twice a year.
- **Energy & Climate in Schools**: Online resource database developed in 2004-06. Cooperation with SPARE. Educational material used in Russia, former CIS countries, Poland, and Romania.
- **Cooperation Projects**: Members are cooperating in projects making research and aid projects, mobile exhibition, publications, study visits, campaigns etc., Projects have included cooperation among NGOs and research institutes from Baltic countries, Belarus, Russia, Romania, Ukraine, Kazakhstan, Croatia, Poland, Hungary, France, Germany, UK, etc. INFORSE-Europe has participated in the Low Carbon Societies Network, Established by an EU FP7 Project.

In 2012-14, there are two cooperation projects in Belarus supported by Sida and EuropeAid. The project partners are Center for Environmental Solutions (CES) in Belarus and Skane Energy Agency in Sweden.

Vision 2050 - 100% Renewables INFORSE assists its members with preparing national visions and strategies for transition to sustainable energy systems, following the excel-sheet based model. Models developed for EU, and several European countries.

- **Lobby EU Policy**: INFORSE-Europe reviews EU energy and climate policies and comments on relevant parts based on inputs from the members. Among the EU policies are structural funds, renewable-energy and energy-efficiency directives, eco-design directive.

- **United Nation**: INFORSE-Europe has organised is organising exhibitions at the Conferences of Parties (COPs) of the UNFCCC and previously at UNCSD.

Biogas Plant. Town: Hashøj

Biogas and Fertiliser from Slurry and Organic Waste

The biogas is extracted from animal slurry (liquid manure) and organic waste. The animal slurry is from pig and cattle manure (urine and feces). The organic waste (bio-waste) is coming from restaurants, big kitchens of institutions, pig slaughterhouse, fish and food processing industries, and dairies.

The biogas production process temperature is mesophilic, at 37°C. In the absence of oxygen, the biodegradable waste decays to methane by anaerobic digestion.

Biogas to Energy (heating and electricity)

The biogas is converted to energy in form of heat for district heating and electricity.

Slurry and Bio Waste to Reused Fertiliser

The slurry is returned as processed fertiliser to the farmers' fields.

Before digestion, the biomass mixture passes through the pasteurization tanks for one hour, where effective pathogen reduction is ensured at 70°C.

The resulted fertiliser is a high-quality manure, which smells less, is sanitized (disinfected), homogenous and with a defined content of nutrients, which makes it easy to handle and to integrate in their individual fertiliser plans. In addition, this causes less leaching (loss of water-soluble nutrients from the soil, due to rain and irrigation), and thus cause less pollution of the groundwater.

Facts:

Hashoj Power & Heating and the Hashoj Biogas are two independent cooperatives, which were founded in 1993-94.

The Power and Heat Supply plant is owned by local citizens, and the Biogas plant is owned by local farmers.

The plants produce heat and electricity, delivered to the consumers at the lowest possible price, completely CO₂ neutral.

- Present used capacity: 220 m³/day slurry
- Gas production: about 25.000 m³ biogas/day
- Gas production rate: about 110 m³ biogas/ 1 m³ slurry (increased from 27 m³ - by installing extra reactor tank)
- Production: 1994: 8,000 Mwh/year, 2012: 45,000 MWh/year
- 2012: 60,000 tons of slurry and 20,000 tons of biowaste/year
- Biogas: 7,500,000 m³ biogas/year
- Consumers: Number of recipients of district heating: 483
- Farmers: 21 Local cattle and pig farms.
- Electricity sold to the grid: 17,500 Mwh/year biogas electricity and 2,000 Mwh/year natural gas electricity.

- Digester capacity: 7000 m³ (increased from 3000 m³)
- rocess temperature: 37°C, Pasteurisation: 1 hour at 70°C
- Gas storage capacity: 15.000 m³ (increased from 2200 m³)
- Utilization of biogas: cogeneration heat and power (CHP)/gas boiler)
- Transport vehicle of the slurry: 20-m³ vacuum tanker

Contact: www.hashoej-kv.dk



Investment in 1994:

Total cost: 2.9 million EUR

Government grant: 0.6 million EUR

Later new investment of reactor, storage and smell reduction. Major smell was when the tanks opened up at the arrival of the bio-waste and slurry.

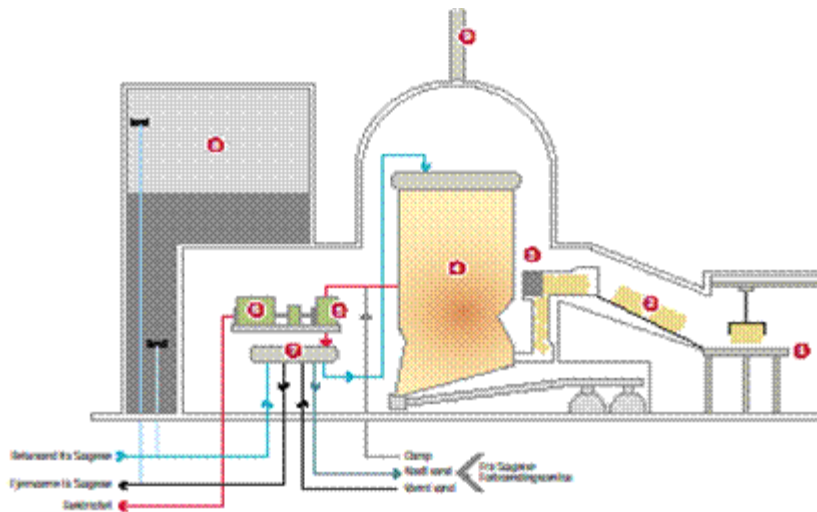
Straw Cogeneration Heat & Power (CHP). Town: Slagelse (Built in 1990)

The *straw storage* (1) can have 1150 straw bales, which is about 3 days supply. (1 straw bale is 530 kg, 1150 straw bale is 610 tons). From the straw storage the straw bales are transported on the *transport belt* (2) to the *straw shredder* (3), where the bales will be cut into smaller pieces, before it is going into the *boiler* (4). In the boiler the straw is burned. (15 straw bales are burned in one hour).

The boiler (4) consists of a lot of pipes, which has water and steam in it. The many pipes are making the walls in the boiler room. The water will be transformed to high pressure steam. The steam goes to the *turbine* (5), which is connected to the *generator* (6), which produces electricity. From the turbine a part of the steam goes to the *heating exchanger* (7). Here the steam heats up the district heating water, and the steam condensates to water. The district heating water is going to the houses.

The *warm water storage* (8) can keep 3500 m³ water, which is about 5 hours heat supply.

Before the smoke goes to the *chimney* (9), the smoke is cleaned.



The CHP total heat covers 85% of the area's heating needs. 4 gas-fired boilers covers the remaining part of the heat demand and serves as a reserve for the power plant.

The plant supplies 10,000 homes with electricity and 6000 homes with heat.

The plant in Slagelse CHP plant is a fully automated plant. It is controlled from a control room.

The plant utilizes 90% of the input fuel's energy: 36% for electricity production, 54% for heat production. The emission of CO₂, SO₂ and NO_x is significantly reduced by producing both heat and electricity. In addition, burning of straw has more environmental benefits. The amount of SO₂ and NO_x, which are separated during combustion is less than using fossil fuels like coal and oil. In addition, emissions of CO₂ by straw burning is neutral, as the straw emits exactly the same amount of CO₂ during combustion, as it takes from the air during the growth period.

The Fuel: The straw is provided by the farmers who afterwards receive the slag and ash, which are spread in addition to fertilizer on fields, from where straw originally came from. The annual consumption of straw is approx. 30,000 tons.

Technical details: (Contact: www.sk-forsyning.dk)

Electrical output: 12 MW. Heat output: 28 MJ/s of heat. Electricity production: 36 million. Kwh/year

The plant's area is 14000 m². The biggest building is the straw storage, which is 2100 m².

Straw Boiler: Steam 40,3 t/hour, Steam pressure: 67 bar, Steam temperature: 450° C, Straw use ca. 7,5 t/h.

Turbine: rotation speed 8.016 rotation/min, Steam: 57,6 t/h, Steam pressure 65 bar, Steam temperature: 430-450° C

Generator: rotation speed 1.500 rotation./min, Voltage: 10,5 kV, Rated power: 14,2 MVA,

District Heating: Water flow temperature to houses: 90° C, Return flow temperature: 55° C

District Heating with Solar and Wood.

Town: Svebølle – Viskinge

The solar collectors and the woodchip boilers provide the majority of the heat to the 588 customers.

Solar Collectors (2011)

The solar collector area is 7000 m².

561 pieces (37 rows x 17 collector panel)

11 panels in each row is HT-SA type with an isolating folie, which is good for higher temperature.

6 panel in each row is a HT-A type without isolating folie, which is good for lower temperature.

The collector panels are placed with 35 degree angle. The rows are 4.5 m from each other.

Built in 2011 by ARCON company.

Investment cost: 1,3 million EUR,

Expected life time: 25 years.

Maximal effect: 4.8 MW,

Calculated annual energy: 3.158 MWh.

The solar heat provides heating 20% of the annual heat supply.

During the summer it provides all of the heat demand.

A 1,300 m³ heat storage can store 3 days heat for cloudy days.

If necessary the gas heating plant is switched on.



Landfill Gas

The plant was originally built in 1996.

Originally, a gas engine running on landfill gas produced electricity.

Later the gas was not enough to produce electricity and the engine was changed to a gas boiler.

The present gas boiler is from 2011.

2.5-MW Wood Chip Boiler (2011)

Wood chip water content can be between 35-55%, with optimal effectivity with 45 %.

If the water content is high (e.g 55%), a smoke-gas condensator (1.9MW) is used, which removes heat from the smoke and brings that to the water that comes back from the users.



1.6-MW Woodchip Boiler (1992)

Wood chip water content can be between 35-60%, with optimal effectivity with 45 %.

It works similar as the new woodchip boiler.

Bio boiler (raps oil)

The boiler starts up automatically when the primary facility can no longer handle the load and is used in this context only as emergency installations.

Contacts: <http://www.svf.dk/>

The Region of Skåne, Sweden

Skåne has an area of about 10,000 km², consists of 33 municipalities and has a total population of 1,25 million inhabitants. The municipalities range from 7,000 to 300,000 inhabitants, the biggest ones being Malmö, Helsingborg and Lund. The area is connected with a bridge to the Danish island of Sealand, where Copenhagen is.



Skåne Energy Agency (SEA)

is one of the 14 regional energy agencies in Sweden. SEA is a unit within the *Association of Local Authorities in Skane* (KFSK) with the purpose to work for efficient use of energy and the increased use of renewable energy in the region of Skane (Scania). KFSK is a non-profit organization, where the members are the municipalities. The steering group consists of five local politicians from the region and 3-4 expert s.

Profile and Areas of Expertise

SEA is Sweden's second largest energy agency with more than 20 employees. The office is located in the city of Malmö. The work areas are divided into three main areas such as renewable energy, energy efficiency and planning & strategies. *In the area of renewable energy* the agency works with biogas, biomass, solar energy, wind and hydrogen and fuel cells. *In the area of energy efficiency* the work cover energy in existing buildings and SMEs, new buildings, behavior related issues and transport. The work in both these fields is done through networks, projects and through energy advisory services.

SEA supports the municipalities in Skåne with the development of their energy plans and the county administrative board with the regional energy plan. SEA also addresses issues of public tendering and city planning.

SEA operates in close cooperation with municipalities, utility companies, property developers, farming associations, consultancy companies and universities in our different projects and networks.

SEA target groups include municipalities, private companies, associations and private households. SEA have more than 10,000 participants in our activities each year.

The work of SEA is directed towards all inhabitants and organisations in the region, from the heaviest industrial companies to private citizens. SEA is independent and often takes the role of being initiator and instigator – always with the goal of decreasing the environmental stress. The agency is working through several networks.

The SEA Networks:

“**The Energy Advisers**” of Skåne, to which 20 municipal energy advisers in the region are connected. The advisors in the network represent all 33 municipalities of Skåne. The municipal advisory service is directed towards the general public, smaller businesses and organisations, and provides consumer information in the energy, environmental and indoor climate fields.

An important part in all of the regional energy agencies' work is to distribute information. Creating contacts is a natural part of the work and through this work the energy agencies play a coordinating role in their respective region. The energy agencies hereby form a powerful link between companies, organisations and authorities.

“**Network for Energy Efficiency**” is a strategic network working closely with the County

Administrative Board of Skåne. It has four annual networking meetings with different themes such as transportation, real estate and procurement of energy efficient products is held within the network. The network meetings are an opportunity for local governments to share experiences and learn from each other.

Background of the energy efficiency state support: The 27 municipalities in Skåne have received state support for strategic energy efficiency work for the period 2010-2014. In the first year the municipalities received support to develop their strategy for improving energy efficiency of its own operations - mainly in their own buildings and transports. The strategy must include: (1) A situation analysis of the municipality's energy usage; (2) Targets for energy efficiency are 2014 and 2020; (3) An action plan to achieve goals. The municipalities have completed their strategies in 2011 and now they are working on measures in the plan. Data on municipal energy use must be reported annually to the Swedish Energy Agency for monitoring progress towards the goals of energy efficiency.



Biogas Syd is a regional association for biogas stakeholders. Based on a common background, Biogas Syd elaborates the issue of biogas in all its parts, from the production to the final use. The group works with biogas issues in the field of business development, environment, technology, economics, agriculture and information but also links to research.



H2-Skåne Network H2-Skåne is leading the development of hydrogen as an energy carrier towards the transition to a more sustainable energy system. The hydrogen can be produced from renewables sources such as solar, wind and water. In the process the hydrogen's chemical energy is transformed into electricity and heat. Hydrogen can power electro motors and it can replace combustion engines in vehicles, it can also be used for the energy supply of buildings. H2-Skåne is also member of "Hydrogen Sweden", which is member of the SHHP (Scandinavian Hydrogen Highway Partnership) - working for a common H2 infrastructure in Scandinavia.



"Solar Region Skåne" network is a non-profit organization with members from solar interested municipalities, businesses, schools and individuals in the region. It organizes seminars, study tours, training courses, membership meetings and other activities to spread awareness and increase the use of solar energy in Skåne i.e., solar collectors producing hot water, solar cells producing electricity, and passive solar architecture.

"Small Scale District Heating" network. The local heating is an economically and environmentally friendly way to produce heat that is suitable for smaller towns and communities. The energy often comes from wood chips, straw or biogas. The network works together with the Agricultural Society, LRF Skåne County Administrative Board of Skåne and the Swedish Forest Agency.

"Skåne Wind Academy" network is working to increase the exchange of knowledge and experience between different players in the wind power sector in Skåne. The association aims at balancing different aspects like technical, economic, environmental aspects. Our members come mainly from industry, government, academia, and associations.

SEA also organizes a so called **"Skåne Energy-Parliament"** which is a dynamic meeting place for energy issues, organised on a yearly basis. It is a combined conference and exhibition, where meetings are in focus. At the annual event the regional actors take advantage of the latest knowledge and experience. Both big and small issues in the fields of renewable energy, energy efficiency, transportation, real estate, labor, economics and planning are discussed.

Skåne Energy Agency (SEA) (Energikontoret Skåne) (www.ek-skane.se)



Eslöv Municipality, Skane county, Sweden

Polulation: 31,448, Land Area:426 km², Water area: 4.86 km²
Biggest city is Eslöv (16,551), 4 urban areas has 1000-1500 people, and 7 have 200-900 people.

There are 11 castles. There are 5 standing stones and 2 runestones dating from about the year 1000. There is Sweden's only sugar refinery. There are two nature reserves. 58 wind turbines (290 wind turbines are in Skane county)

The main action areas of the climate plan are: Energy efficiency in municipal buildings, and in residential buildings; Biogas; Environment; Sustainable Procurement; Development of district heating; Promoting bicycling; Sustainable Infrastructure;

Information the environment; Economy.

<http://www.eslov.se/>

Low Energy Houses in Quarter Valpen

The new buildings, which under construction in the Quarter Valpen are low energy buildings, and the ambition of the work will be to reach the standard for passive houses.

The buildings are built with using healthy materials and sustainable solutions. Consciousness of materials and technology choice ensures aims a simple and effective management with low management costs.



The buildings walls, ceilings will be very well insulated to minimize heat loss. The construction is air-tight. The heat generated by the residents, household appliances and lamps are utilized in the home. The houses are equipped with a ventilation unit for exhaust and supply air and heat exchangers. There will be no ordinary radiators. If it will be very cold and the self-heating is not enough extra heat will be added by air supply, Solar PV cells are placed on the roof, which produce electricity that drive ventilation fans. The windows have low U-values, which is a measure of the heat loss of a building element. To reduce power consumption further LED lighting are installed in stairwells and public areas. These are controlled by motion and twilight switches and the outdoor LED lighting is controlled of Lux sensors. Even in appearance, the area is to breathe good environmental choice. For example the bike garages and other low buildings will have sedum plant roofs. Sedum plants are commonly known as stonecrops. The plants have water-storing leaves, which decreases the amount of water fall to the streets and drains in caese of heavy rainfalls.

Main Data

Construction cost per square meters: 25000 SEK

Average rent: 140 SEK/Square meter

Number of apartments: 101

Construction time: 2012-2013

Energy consumption: 62 kWh/Square meter and year

About EBO: The buildings are owned by EBO (Eslöv Bostads ab), which is a housing property company formed in 1964 through a partnership between the city of Eslöv and Swedish Riksbyggen. EBO owns, manages and develops Eslöv's largest property with 2,300 apartments with 180,000 m² of rentable floor space and 300 flats for the elderly. Every 15th household in the municipality lives in an EBO owned flat, which has about 60% of the local rental market. The company has 33 employees and manages 30,000 m² of office space for businesses.

Kvarteret Valpen. Illustration: EBO, 2011.

Heat and Electricity from Waste, Recycling Center Rönneholm

At Rönneholm's Recycling Center outside Eslöv, household and business waste is processed. The facility is owned by MERAB, which is a regional waste and recycling company that is owned by the three municipalities Eslöv, Hörby and Höör in Skåne.

At the recycling center heat and electricity is produced from methane gas. Methane gas is generated by the anaerobic decomposition at the landfill. Two Stirling engines have been installed and they are driven by methane gas from the landfill. The engines produce electricity and hot water.

The project to produce heat and electricity from methane gas is partly financed by the Swedish Energy Agency and production started in September 2013.

The electricity production will be connected to the electrical grid. However, production is expected to broadly cover the electricity needs of Rönneholm's recycling center. The heat will be used to heat the building at the recycling station where food waste is converted into a "soup", which can be used in biogas production.

Energy data

MERAB estimates that annually about 120,000 kWh of electricity and about 350,000 kWh of heat can be produced by methane gas.



photos: www.merab.se



The information in this leaflet is collected from www.eslov.se and www.merab.se

Solar Collectors at the Swimmingpool Karlsrobadet in Eslöv



The public swimmingpool is owned by the local municipality Eslöv. It was originally constructed in the late 1960s and since then an outdoor swimming pool and an "adventure" pool were added.

The water has historically been heated with district heating, but when the complex was expanded, it was decided to construct one of Sweden's largest solar collector heating facilities.

The water for the pools and hot showers are now heated with a combination of solar heating and CO₂-neutral district heating.

The facility won the Solar region Skåne 2012 "Solar award" with the nomination text *"A nice approach to the architectural thought out design, especially regarding the placement of solar collector in the building. The plant can help to increase interest solar energy and serve as an inspiration for others to invest in solar panels, by show the effective and appropriate use. The front-mounted system provides a modern look at the tastefully designed new building."*, and has got a lot of attention in the media and brought many study visits to the municipality.

Main data

Flat solar panels for water heating: 50

Number of vacuum pipes for water heating: 1536

Maximum output: 1, 4 MW

Payoff-time: 5-6 years

Date of construction: 2011-2013

Photo: Karlsrobadet, Eslöv. Photo: Solar Region Skåne

Waste Recycling, SYSAV

Sysav - South Scania Waste Company, receives, recycles and treats waste from households and businesses in southern Skaane. The company is owned by 14 municipalities in Skåne, with a joint population of over 665,000 and has approximately 6,000 companies as customers.

Sysav's concept applies an eco-cycle perspective, and is based on total solutions and high expertise to combine various treatment methods for dealing with each type of waste in the most sustainable way according to its properties. Waste is a resource and, as far as possible, should be reused. Sysav therefore recycles waste in the form of materials and energy, and only a small proportion is sent to landfill.

Sysav's main recycling facility is located in Malmö, for both material and energy recycling. For energy recycling purposes, a waste incineration (combustion) plant is used. The Sysav incineration plant in Malmö is the most energy efficient waste-to-energy plant in Sweden. With an advanced flue gas cleaning system Sysav manages to stay well below the emission rights.

Sysav's waste-to-energy plant has four boilers. The two oldest came into operation photo:www.sysav.se

in 1973. They are hot-water boilers which produce district heating. Both the boilers and the system for cleaning flue gases have been reconditioned and developed in line with heightened demands on waste combustion. The two newest boilers are steam boilers and generate both electricity and district heating. They came online in 2003 and 2008 respectively.

In total, Sysav is permitted to use 550,000 tonnes of waste a year as fuel. The plant produces approximately 1,400,000 MWh of district heating a year, which roughly equates to the district heating of 70,000 small houses. The steam boilers produced around 250,000 MWh of electricity a year in total, some of which is used in the plant itself.

Main data 2012

Waste treated	939 100 tons
Waste treated per day	2 572 tons/day
Waste sent to landfill	1,9 %
Waste recycled (energy,material)	98,1 %
Production of district heating	1,429,000 MWh
Delivery of district heating	1,388,000 MWh
Own use of district heating	41,000 MWh
Production of electricity	247,000 MWh
Delivery of electricity	136,000 MWh
Own use of electricity	111,000 MWh

The information in this leaflet is collected from www.sysav.se and Sysav's year report for 2012.

