



Tips Learned

2st Interregional Event

ENERSELVES

Policy instruments for energy selfconsumption in buildings



Country: **Sweden**

Region: **County of Blekinge**

Host partner: **Energy Agency of Southeast Sweden [Energikontor Sydost AB]**

Dates: **10th – 11th May 2017**



Objectives of the event

The overall objective is to increase the capacity of project targets groups with interregional learning. Focus on the 2nd Interregional Event was to have an exchange of experiences and to increase the capacity of project targets groups about solar energy in buildings. Several study visits were made to show good examples.

As a dissemination event we arranged a solar energy seminar. Our objective with the solar energy seminar was to increase the knowledge about the potential and technology with solar energy among at least 80 participants including regional and interregional stakeholders.

Day 1, 10 th of May 2017

Summary of agenda including speakers

09.00 – 10.00	Project meeting Enerselves Partners' Handbook Brief summary on next tasks and activities
10.00 – 10.30	Coffee break
10.30 – 12.00	Steering Committee Enerselves Outsourcing process of Communication companies per partner. Enlarge information about Interregional Events and its organization for future events Next Interregional Event in Brussels (Scheduling 20-22 nd of June) Next interregional Event in Poland (Scheduling 12-13 th of September)
12.30 – 13.30	Lunch at Soft Centre
13.30 – 14.00	Monitoring self-supply and demand online, Fredrik Wahlberg, Olofströmshus
14.00 – 14.30	Cradle to Cradle, an energy in buildings perspective, Lisa Aelman, Cefur
14.30 – 14.40	Introduction to study visits, Ulf Hansson Energy Agency for Southeast Sweden
14.40 – 15.00	Coffee break
15.10 – 17.30	Bus from hotel Ronneby brunn, at 15.10 to the town Hällaryd 1st study visit: Small scale bioenergy heating, Paul Bergholtz 2nd study visit: Battery for storage of selfproduction Paul Gummesson, Solar Supply

Project meeting



Sarah Nilsson informed about the experience from previous Interreg 4C projects EnercitEE and BIOENAREA. In the report “Improving energy efficiency – contributions from five European regions” you can find several good examples to learn from. One local example from the project is the retirement home Olsgården.

BIOENAREA project aims at exchanging and transferring experiences among partners in order to increase their capacities to favour and optimize the use of bioenergy. At one of the study visits we will look at a near-heating plant using bioenergy produced in the region.

Lectures

Monitoring self-supply and demand online, Fredrik Wahlberg, supplier to Olofströmshus

Olofströmshus is a municipal housing company, with Olofström municipality as sole owner.

They showed us their new digital system for monitoring energy use and self-production of energy production in their buildings. It has proven a very good tool for the maintenance staff when optimizing operation of the buildings.

Fredrik Wahlberg made a presentation about systems for monitoring energy consumption to ensure that municipal buildings become energy efficient in the long term.

How can you keep a low energy level after investing and implementing measures to reduce energy consumption? You need a control system and continuous maintenance with inspections. To gain control, you can use a control system, but you must also influence the behavior of users. It begins by increasing understanding of how different behaviors or adjustments affect energy consumption. For example, temperature adjustments.

Olofströmshus uses three systems:

- SCADA in this system you can see status, temperature, control ventilation and pumps
- FMS Facility Management System maintenance, authority, documentation
- Energy report

SCADA System Supervisory Control and Data Acquisition

Measurement of Olofströmshus buildings and a control system for changing settings at a distance. This facilitates the control of 200 buildings. You can get an overview for all properties. You can also get alarms from individual buildings if something happens. Temperature control is done automatically, both indoor and outdoor temperature, ventilation on and how much energy you are consuming.

Previously, Olofströmshus had different systems that did not communicate with each other. Now everything goes through a common system. Tenants can also enter the website and see conditions in the building. Olofströmshus has many different types of buildings ranging from schools, ice halls, elderly homes to multi-family houses. Previously they had problems to be to track up investments made. They wanted to make sure that they really saved what they planned with a measure. Now they get a good follow-up of whether an action gives the effect they planned or not. 5 sensors for driving / following up a building.



FMS Facility Management System maintenance, authority, documentation

FMS gives you bug reports, planned maintenance activities and what has been implemented. Being able to report how you have driven and maintained your building can help you get a better price when selling.

Lighting, fire protection, heating system, ventilation system are included in the system. On-site engineers can retrieve all information about the different systems using an Ipad. It's like a logbook for each building.

In the Energy report you can find all data on energy consumption.

Cradle to Cradle, an energy in buildings perspective, Lisa Apelman, Cefur

Cefur is a center for research and development with close connections to regional business as well as society and university, using the concept Cradle to Cradle®. Cefur reports directly to the city council of Ronneby.

The vision of Cradle to cradle in the municipality of Ronneby is to

- Circuit without losses
- Use renewable energy
- No toxic substances in nature
- Increase biodiversity

Cradle to Cradle is more like a compass than fulfilling individual goals

The municipality of Ronneby presented a program for Urban Planning and building in Ronneby.

Having access to selfproduced energy is good. The fact that the politicians adopted a program with a focus on what we should achieve in Ronneby has given results. The program can be used as a roadmap for a step by step test of new technology. Eventually, it will result in buildings that produce more energy than they use.

Lisa gave several examples of new buildings in Ronneby with integrated energy production and high energy efficiency. One of them is Listerby School. The new school uses only ¼ of the energy used in the old school. Heat storage are used. They also looked at energy consumption in the production of the building, transport, construction barracks and more.

Tips learned – comment from participants

The lecture about “Monitoring self-supply and demand online” illustrated the great importance of monitoring for a good management of the energy and the easiness of monitoring. It is very important to monitor a building in order to obtain a long term energy efficiency. Monitoring self supply brought up lots of very important info about the state of the art considering energy management systems. It's easy to monitor with that kind of system. SCADA system is a suitable technology for several partners in the project and it could be used in our local context. It's good to involve companies in the lectures and study visits. In some cases they can provide services in other countries as well.



Cradle to Cradle was interesting, but not so many news. We had a Interreg-project called C2CNetwork. I've learnt that cradle to cradle extend beyond energy issues and also that it supports inclusiveness and ethical development.



Next to Soft Center, the electricity company "Enkla elbolaget" has a solar flower for electricity production.

In some places sunflowers are used for electricity production directly in connection with vehicle charging posts.

Study visit 1 – Villa with solar cells and battery for storage of selfproduction

We visited a private house with energy production for heating and electricity. The house was built in the year of 1965 and it has an area of 180 m². The villa is heated by a geothermal heat pump. On the huseroof there are solar cells for production of electricity. Previously about half of the electricity produced has been used in the household and the rest has been sold to the grid.

In order to be able to use the electricity from the solar cells more effectively, the homeowner has installed batteries for storing electricity from the solar cells. The capacity of the batteries are 8,4 kWh. The batteries have only been installed for a couple of months. It's too early to say something about the amount of electricity that will be used directly in the villa. The more electricity that can be used for selfconsumption, the more profitable the investment will be. The payoff time for solar cells in the southern part of Sweden is about 10 years.

Data and Key Performance Indicators

In the following table, some data and Key Performance Indicators (KPIs) of the installations visited are showed:



Building 1: Private house in Hällaryd, municipality of Karlshamn	
Website:	
Installation 1:	Solar Photovoltaics Installation for Self-consumption
Installed renewable power (kW):	Solar cells 7,5 kW west direction
Type of energy generated:	Electricity
Energy generated per year (kWh):	6000 kWh
Energy Self-consumed per year (kWh):	Selling 50% of this to the municipal energy company and consuming 50% itself. House Total Consumption: 14000kWh / year That is, the owner buys 11000kWh / year by municipal energy company.
Investment (€):	The solar system costs about 14 600 € (140 000 SEK) including installation. A 8 kWh battery system costs about 14 077 € (135 000 SEK) including installation.
Payback (year):	10 years for the photovoltaic installation With the current electricity price, the payoff time for the battery will be 100 years. If the national tax reduction is eliminated and the electricity price is doubled, the payofftime can come down to 15-20 years.
Save Annual Cost – average – (€):	The solar system about 14 60 € The battery system about 83 €.
Grant type (if any):	Investment support for photovoltaic installations 20 % of the investment. Investment support for energy storage maximum 60 % or maximum 5210 € (50 000 SEK)
Total quantity of grant (€):	PV installation 2920 € (28 000 SEK) Battery 5210 € (50 000 SEK)

Study visit 2 – Small scale district heating in Hällaryd

In the small town Hällaryd there is a small district heating system. The plant in Hällaryd is a production plant for biofuel-based heating. The plant is heated with wood pellets. The pellets are made of residues from furniture industries, carpentry business and sawmills in the region. It is important that the pellets have a good quality in order to avoid disturbances in operation. The district heating system provides heat to six nearby buildings, school buildings, home for elderly, the old Town hall and an apartment building. The pellet plant has replaced previous heating with oil. It is the municipality of Karlshamn, which owns the facility, but it is run by Karlshamn Energi AB. Karlshamn Energi AB works successfully with environmental issues. All the electricity that the company sells comes from renewable sources and the district heating is labelled Good Environmental Choice.

Data and Key Performance Indicators

In the following table, some data and Key Performance Indicators (KPIs) of the installations visited are showed:

Building 1:	Schoolbuilding in Hällaryd, municipality of Karlshamn
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Website:	
Installation 1:	
Renewable power (kW):	1300 kW
Type of energy generated:	Small-scale district heating
Energy generated per year (kWh):	1296 MWh (in 2016)
Energy Self-consumed per year (kWh):	1296 MWh (in 2016), 270 tonnes of pellets
Emissions Saved (kgCO ₂ /year):	fossil CO ₂ minskade med ca 500 ton/år
Investment (€):	656 700 € (6,3 M SEK) Including central heating, piping and customer centers,
Payback (year):	About 20 years. It's because there was nothing to build on, it was a brand new network.
Save Annual Cost – average – (€):	30% of annual energy consumption
Grant type (if any):	30% national grant " Energy efficiency in public facilities"
Total quantity of grant (€):	469 000 € (4,5 M SEK)

Some photos of study visit 1



Paul Gummesson from Solar supply are talking about the solar energy installation with the lead partners and stakeholders from Spain. Private house with solar cells on the roof and battery for storage of solar energy in the garage.



Figure 2. Images of study visit 1, a private house with solar cells and batteries for energy storage.



Figure 3. Images of study visit small scale district heating with biofuel.



Tips learned – comment from participants

The investment cost is high if you are going to invest in solar panels for production of electricity, but the payoff time is 10 years in Sweden. In Spain the pay-off time is 8 years. One reason why it does not differ more in pay-off time, although there are more hours of sunshine in Spain, is that the solar cells work better in a colder climate. In Sweden, private individuals can sell energy to the grid. The person or company that sells electricity to the grid can get an electricity certificate that gives an economic bonus. It is also possible to receive contributions partly for investment in solar cells and partly to invest in batteries for storage of electricity. Generally, interest in energy storage increases. Technical solutions with production and storage of soles should be implemented to a large extent in all countries. It is important that we contribute to such a development within the Enerselves project.

Support systems for investments in solar cells and how the produced electricity is taxed or not differentiated between the countries. These are important instruments that governments and regions can use to influence developments.

With regard to the district heating plant, an important lesson is that it is important to have good quality of the bioenergy raw material. If the quality of the pellets is poor, it causes malfunctions. It's worth paying more for better quality.

The Swedish municipalities have a high involvement in energy savings and innovative approaches.

It was great with study visits with explanations for non-technicians. It is important that all actors can understand and learn from the information from study visits. The places we visited should be presented as good examples at the Enerselves website.

A proposal for upcoming interregional events is that we will plan in time to increase active involvement from all partners and stakeholders. Then we get a bigger exchange compared to what we had during the first two matches.

We need to develop indicators on how each technology can be applied in each country.



Day 2

Public seminar about solar energy

It was a conference with 107 participants. In addition, participated two classes of high school students during part of the seminar. The seminar was held at the Softcenter in the municipality of Ronneby.

The number of installed solar cell systems in the county of Blekinge increased by 74% in 2016. The Swedish Energy Agency believe that by 2040 the potential for solar cells account for 10% of Sweden's electricity. It's important to increase the awareness of the potential in solar energy among different stakeholders. The seminar gave us an opportunity to learn more about Photovoltaics, such as technology, potential, architecture and solar cells, economy and a study visit.

Agenda for the seminar on the 11 th of May

08:30 Registration

09:00 Introduction, Katrine Svensson Energy Agency for Southeast Sweden

- Welcome, introduction to the projects Sun in the south, Enerselves, Sun in physical planning Stefan Olsson, Katrine Svensson and Annika Lindh from Energy Agency for Southeast Sweden
- Potential, sun map and regional targets, Samuel Karlström County Council of Blekinge
- Statistics photovoltaics in Blekinge, Pierre Ståhl Energy Agency for Southeast Sweden

09:30 Technology & Trends, Johan Lindahl Swedish Solar Energy

- Basics of the technology (including solar heat panels)
- Connecting to the grid, roof valleys, etc.
- Developments in Sweden and global
- Systems Perspective
- Basics of terms and conditions (taxes, "green certificates", VAT, investment cost)

10:10 Coffeebreak

10:30 Solar energy in buildings / architecture, Jouri Kanter LU / LTH

- General planning
- Buildings
- Building Integration
- Building permits
- Certification of buildings, Leed BREEAM, Green Buildings

11:30 Economy, Johan Lindahl Swedish Solar Energy

- Economic calculations (micro, small, commercial production).
- Added value to the building - operating and energy costs, certification
- Market - continued falling costs and improved efficiency of PV

12:20 Lunch

13:00 Presentation of the photovoltaic plant Olsgården, Kristian Olsér Ronnebyhus

13:30 - 15:00 Study visit to Olsgården (bus trip)

Johan Lindahl gave us a broad review of technology, market, regulations, taxes and the economy of solar cells. Johan Lindahl is the spokesperson for the Solar Energy Association of Sweden, which with about 165 professional members represent both the Swedish solar energy industry, and the research institutions operating in the solar energy field.



In his presentation, Johan showed the annual solar cell capacity installed in the world and in different European countries. Historically, there has been a rapid expansion of solar cell expansion in Denmark, Belgium and Spain. In all three cases, the development was hampered by reduced subsidies or the introduction of fees.

The efficiency of solar cells has increased gradually, while production costs have fallen to cheaper. Johan showed the price trend in Sweden for solar energy, what support is available and how taxes look on renewable electricity. Electricity certificates are a financial support for renewable electricity producers. For each produced megawatt hour (MWh) renewable electricity, the producer receives an electricity certificate. Electricity certificates are sold in an open market, thus providing additional revenue to renewable electricity generation, in addition to the usual electricity sales.

How fast the expansion of solar cells will take place in Sweden is governed by rules and instruments, economics and power grids and the development of technology. 80% of the Swedish population thinks we should invest more in solar energy than we do today. Many Swedes are positive about producing their own electricity. They want to produce their own electricity to save money, spend less on the environment, be more self-sufficient, have a fun project or impress the neighbors.

Jouri Kanters talked about solar energy in buildings / architecture

How can we integrate solar cells and solar panels in the best possible way in buildings? What opportunities exist to improve the whole planning process to promote the use of solar energy?

Dr Jouri Kanter is an architect and assistant professor in the Department of Energy and Building Design at the Faculty of Engineering. His research focuses on just solar energy in architecture and urban planning.

Jouri showed how different solar collectors and solar cells can look and how they can be integrated into buildings. Solar cells are also available in different colors, making them easier to adapt to the building.

In the case of ceiling angles, 30 or 50 degree angles do not play such a big role. Solar radiation is good no matter what. When it comes to direction, south is the best, but even an angle slightly east or west gives sunlight.

He also talked about what opportunities municipalities have to create the conditions for solar energy in urban planning. Municipalities can simplify the building permit process to facilitate those who want to install solar cells.

There are different ways to integrate solar cells into buildings. It adds value to the fact that you get an energy production in place, the building itself is a load-bearing construction (you do not need to amplify the building if solar cells are integrated in the roof or walls), they replace conventional building materials and show that you as property owners care about the environment.

Study visit 3 – The Solar Park at Olsgården

We did a study visit to the retirement home Olsgården, situated north of Ronneby. Olsgården is owned and managed by the municipal company AB Ronnebyhus. The retirement home consists of several different buildings. On the rooftops there is a solar cell park that belongs to the top 10 in Sweden in terms of peak power. The solar cell park was built in 2014. During 2015-2016 the solar park has produced approximately 200 MWh of electricity per year. The solar cells cover a surface of 1316 m².



Data and Key Performance Indicators

In the following table, some data and Key Performance Indicators (KPIs) of the installations visited are showed:

Building 1: Retirement home Olsgården, municipality of Ronneby	
Website:	
Installation 1:	Solar Photovoltaics Installation for Self-consumption
Renewable power (kW):	200,175 kW
Type of energy generated:	Electricity
Energy generated per year (kWh):	200 000 kWh
Energy Self-consumed per year (kWh):	200 000 kWh (total consumption 520 000 kWh)
Emissions Saved (kgCO ₂ /year):	250 tonnes
Investment (€):	approximately 364 800 € (3,5 million SEK)
Payback (year):	8 years
Save Annual Cost – average – (€):	23 500 € (225 000 SEK)
Grant type (if any):	Regional
Total quantity of grant (€):	127 800 € (35 % of the investment)

Some photos of study visit 1



Solar cell park at Olsgården, houses for elderly close to Ronneby.



Figure 4. Images of study visit 3.

The interregional meeting ended immediately after the study visit.