



Results and Findings

in the Wood Energy and Cleantech Project



Wood Energy - a Current Topic

Wood energy has been a traditional energy source in our regions. Even in modern times, one of the greatest use of the harvested forest was wood fuel for energy purposes. From the 1950s up to 1990, the energy sources for heating consisted mainly of oil-based fuels like natural gas, coal, and electricity.

The interest in wood energy is constantly increasing, since:

- the price of fossil fuels has been continuously rising
- people have become more aware of pollution and global warming
- regions that have compiled development strategies have set certain rules and qualifications for investments
- wood-fueled boilers and combined heat and power production units (CHP) has become more efficient

The seriousness of the situation is also reflected in the Climate Change Package of the European Union:

- 20 % increase in energy efficiency (compared to projections) by 2020
- 20 % less green house gas emissions (compared to 1990) by 2020
- 20 % share of renewables in the final energy consumption by 2020
- 10 % share of biofuels in transport fuels usage by 2020

The legally binding targets for renewables in the final energy consumption (2020) are:

- for Estonia, 25 %
- for Latvia, 40 %
- for Sweden, 49 %

Project Focus

In order to help in fulfilling the targets, the Wood Energy and Cleantech project is working with a cross sector and transnational approach. Forestry, wood supply, energy production and energy distribution are investigated and analyzed from perspectives of policies, planning, market, competence, technology and energy systems.

Working Method

Information and Data Collection

- Policies
- Planning
- Market
- Competence
- Technology
- Energy systems

Analysis

- SWOT analysis
- Project planning

Practice

- Pilot projects
- Case studies
- Benchmarking
- Information activities

Knowledge Exchange

- Cross sector and transregional exchange

From the data collection, the analysis, case studies and the pilot projects, conclusions of the present situation were drawn and thereby recommendations for the future were made.

Awareness Raising

- Information and Communication

Information and communication of wood energy is a big field. Why does communication need to be improved?



End Users

The consumer of energy needs to have a warm house, hot water and cheap energy. If the consumers think more in a regional and local perspective using wood energy, it will be cheaper (for households and for industry as well). It is good for faster regional development and for improved environment conservation. It is sustainable and makes us more independent.

Municipalities

The municipality is the most important planning level when it comes to decisions about energy. The first step to make a good decision is to understand the situation and the importance of wood energy. Energy supply is the key part of territorial planning and should be integrated into it. The use of wood energy would improve local economy and social life.

Pellet and Woodchip Producers

The pellet and woodchip producers are interested in supplying a high quality fuel, at a competitive price, to the district heating companies. The local and regional market is a stable market based on long-term contracts. The market needs information of the benefits of wood energy, since woodchip producers compete with other energy suppliers (natural gas, oil, electricity).

District Heating Operators

The district heating operators have lots of requests from end consumers, municipality, wood suppliers, national rules and EU-regulations. They need to improve communication about the climate, environmental, economic and socio-economical (e.g. jobs) benefits. The district heating with wood energy is an efficient use of the wood fuel. Wood resources gives less ecological impact and more stable economy of the country.

Forest Owners

The forest owner wants to get a good price for the wood energy and the owner wants the end consumer to choose wood energy. In order to be a reliable wood energy supplier the forest owner has to ensure sustainable forests management and at the same time ensure maximal possible sustainable extraction of wood fuel from the forests.

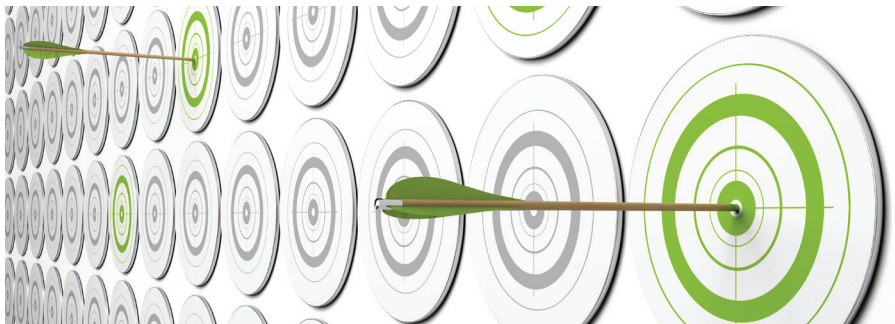
Information Activities

Some information activities have been tested as pilot projects with good results:

- Brochure for the public and school children - "Woody stories" - awareness raising to use more effective wood energy as the main energy source
- Ērgļu vocational school pilot project - "Wood energy for sustainable energy production in DH systems"
- Development of a competence center for the bioenergy value chain in Östergötland gathering authorities, universities and enterprises
- Informative awareness raising seminars for private forest owners

Policies and Strategies

District heating is a long-term commitment. Long-term strategies and plans are important for the confidence between producers and consumers. Stable long-term instruments and rules of the game are positive for the development of district heating. The combination of various laws, regulations, taxes, targeted support and information favors the development of biological fuels and helps to obtain the EU-targets of renewable energy and climate change.



The main decisions are in the hands of the municipalities. The regional level can only form visions and recommendations.

There are big national differences in the forming of steering tools, which affects the possibilities to act on a regional and local level. There are big regional differences in the way of looking at planning and planning procedures, and the role of reliable statistics is important as a base for long-term decisions in the municipalities.

Communication between all players in the value chain is very important and has to be improved.

Future Activities

- Develop consistent support system in the European union.
- Develop a standard for statistics on district heating (boiler size, fuel consumption, type of fuel, efficiency, properties of distribution network etc).
- Include small/medium scale facilities in the planning concept.
- Development of the educative material about the wood energy value chain, including all stages of the value chain.

Market Issues

In all partner regions, the forest growth is higher than the harvest, which shows that there is potential for increasing wood fuel volumes.

However, the local demand of district heating is not so high in the Vidzeme and Tartu regions, which results in a surplus situation and a possibility to export woodchips and pellets. The wood fuel is exported to the western part of Europe, where the local supply is low and the production cost is high. The local demand in the region of Östergötland can be produced in the region, which is an advantage due to short transport distances to the boilers.

There are changes in the market situation that have to be considered by keeping up to date with the world around us. Prices of natural gas is an important factor that affects wood energy use, especially when the USA have discovered big volumes of shell gas for domestic consumption resulting in a surplus of gas in Europe. Gas prices influences energy prices in general as well as prices of wood fuels.



Future Activities

- Establish a continuous function for business intelligence in the wood energy sector as a service for the wood fuel value chain, including district heating production and consumption.
- Informing decision makers on investment calculations, including environment as well as long and short term perspectives of energy investments.
- Inform about the importance of consistent economical steering instruments, in order to stimulate wood energy use in the whole region.

District Heating Technology

The conclusions in this field are based on the case studies, which focus on finding out the benefits for the region from the utilization of wood fuels.



Estonia

The case study of district heating in the town of **Elva**, in Estonia, describes one of the most successful small-town district heating system in Estonia. All of the main boiler houses of the town use woodchips to produce heat. Moreover, almost the entire district heating pipeline has been replaced. As a result, *a 4 800 tonne reduction in CO₂ emissions* was reached. Almost 60 % of the specific investments were received from different subsidisation mechanisms.

In addition to describing the current situation, the case study reports analyze the future of the region. It was calculated, that even in case of substantial reduction in heat demand, the management of the district heating system will be feasible. Should the town choose to build a CHP unit, a further 2 450 tonne reduction in CO₂ emissions would be reached due to electricity production from renewable sources.

Latvia

In Latvia, two case studies were compiled in order to analyze the current situation and possible future activities in the relevant regions.

For the **Beverina region**, it was discovered that since the measured energy consumption varies too much (consequently, the data is probably incorrect), *an energy strategy needs to be done* for the region to plan for the refurbishment of the boiler houses and

the district heating network. A total of three scenarios were created, which covered aspects from hiring an energy manager, to installation of new boiler houses and switching to a localized heating system.

In the case of **Aluksne** town, in Latvia, an evaluation of the two possible alternatives for the region was prepared. The two alternatives were: connecting four out of five district heating networks and continuing as a decentralised district heating system with five boiler houses. It was concluded that *the currently planned investment project (centralised district heating system) is not sustainable*. The best solution, in this case, would be a symbiosis of a centralised and decentralized district heating system.

Sweden

In the town of **Kisa**, in Sweden, the case was designed to describe the benefits of energy cooperation between the industries and the district heating network. By utilizing the energy system optimisation model MODEST, possibilities and benefits of using energy cooperation between the district heating network and the saw and paper mills, that are situated nearby, was analyzed. If the region would utilize the waste heat from the saw and paper mills, the region could *reduce global CO2 emissions by 28 000 tonnes per year* due to an increase in the biomass for heat production. The economic benefits for the industries and district heating system were calculated to be about 34 MSEK/year.

Future Activities

- Educate the local decision makers and specialists in the usage of modelling and optimization tools for analyzing different future perspectives of energy systems.
- Development of tools for comparing miscellaneous heating solutions. E.g individual heating versus district heating.
- Study the preferences of heating solutions of end consumers.
- Transition from oil and natural gas based boilers to biofuel-burning boilers by raising awareness and by implementing support systems.
- Researching the possibilities for using wastes from households and industry in small scale district or local heating. The main questions are: what is the minimum capacity and what are the environmental regulations for waste boilers?
- Elaborating small scale energy production, methodology, possibilities and experience.



Fuel Preparation

A stable consumption of forest fuels in the district heating systems stimulates the forest owners to invest in forest fuel as a separate assortment.

The variation of fuel quality is a problem for boiler operation and efficiency. An even woodchip quality is very important for the efficiency of the boilers, especially for small ones. Small efficient district heating plants show that it is possible to replace oil or gas as fuel.

Communication between all players in the value chain is very important.

Future Activities

- Develop a fuel quality standard for woodchips.
- Develop a consistent measuring system in order to facilitate comparison of different offers and stimulate the use and correct quality of woodchips.
- Cooperation between forest production and heat production in order to develop the quality of woodchips and to improve the efficiency of boilers.



Forestry and Wood Energy

The forest in the region is used for timber, paper, nature conservation, recreation and energy. There is more than enough to heat our buildings and it is possible to be totally free from fossil fuels for heating purposes.

Sustainable use of forest for energy means to consider all aspects of the forest from silvicultural methods, harvesting methods, fuel quality to natural conservation, water protection and cultural heritage and planning procedures. This requires deeper knowledge of the forest and its management.

To a great extent, the regional differences are depending on owner structure and the size of forest estates. The circulation of nutrients must be improved.

Communication between all players in the value chain is very important and has to be improved.

Future Activities

- The forest management has to be adapted to the site and the climate. Correct selection of species for the site has to be made. Making mistakes in the planning process will be expensive.
- Concrete activities have to be implemented in order to regulate the population of wildlife acceptable for wood production.
- Research and educate on:
 - harvesting methods adapted to prevent damages to soil and water
 - energy harvesting from former grazing land and deciduous areas in order to improve biodiversity
- In order to fulfill objectives of high forestry production and environmental protection, development of planning tools and methods including wood energy is needed.
- Development of new methods on how to produce more wood energy in small private forest areas.
- Close the circulation of nutrients by recycling ash from the boiler houses and thus compensate for the harvest of green material and young trees.

Project Publications

Policies and Planning

- SWOT-analysis: Analysis of the Östergötland Region (2011)
- SWOT-analysis of the South-Estonia Region (2011)
- SWOT-analysis of the Vidzeme Planning Region (2011)
- Report on Partners SWOT-analysis, Comparison Between Regions with a Broader EU-perspective (2012)
- Investigation of Governance of Planning Procedures, Östergötland, (2011)
- Amata Municipality Pilot Project "Green action plan" (municipal level) (2012)
- Energy Planning Guidelines of the Vidzeme Planning Region (2012)
- Wood Energy - A Hot Topic (2012)

Competence

- Competence in the Forestry Value Chain of Wood Energy (2012)
- Competence of District Heating Operators (2012)

Market

- Guidelines for Business Intelligence of Wood Fuel in District Heating in the Partner Regions (2011)
- Market Analysis of Wood Resources for District Heating in the Partner Regions (2011)

Technology and Production

- Comparison of Wood Fueled District Heating in the Partner Regions (2011)
- Case Study of Elva Heat Sector - Environmental and Economic Aspects (2012)
- Technology Study Tartu, Estonia (2011)
- A Transition from Fossil Fuels to Biofuels - A Case Study of Elva District Heating Network (2012)
- The Benefits of Energy Co-operation between Industries and Utility in the Municipality of Kisa. (2012)
- Technology Study Vidzeme, Latvia (2011)
- Technology Study Östergötland, Sweden (2011)
- Methodology and Algorithm Development for Energy Biomass Amount Assessment in Forest Stand (2012)

Project Activities

- Kick off conference Valmiera, LV 2010 10 08
- Forestry evenings, SE 2011 03
- Study tour in Sweden, 2011 04 10
- Market analysis workshop, SE 2011 05 10
- Business Intelligence workshop, SE 2011 08 24
- Interim conference Kisa, SE 2011 08 25
- SWOT-analysis workshop, LV 2011 09 13
- Competence development workshop, LV 2011 06 08
- Project development workshop, LV 2011 06 09
- Study tour in Latvia, 2011 09 29
- Research meeting benchmarking, SE 2011 12 07
- Large scale district heating transnational meeting, SE 2012 01 24
- Planning tools and strategies workshop, LV 2012 03 26
- Communication strategies workshop, LV 2012 03 27
- Study tour in Estonia, EE 2012 04
- Round table discussions - benchmarking, EE 2012 04 25
- System analysis and environmental aspects workshop, EE 2012 04 26
- Ash recycling - benchmarking, SE 2012 05 15
- Policies and planning local seminar, LV 2012 06 07
- Small scale district heating transnational meeting, SE 2012 06 13
- Forestry days female forest owners, SE 2012 08 31
- Regional planning final workshop, EE 2012 09 12
- Technical support and case studies workshop, EE 2012 09 13
- Wood energy conference, EE 2012 09 15
- Competence profiles forestry operations - local seminar, SE 2012 09 27
- Follow up study tours in field, SE 2012 09 28
- Participating in Climate and Bioenergy Fair in Linköping, SE 2012 10 05
- Wood Energy and Cleantech final conference, EE 2012 10 30

More activities can be found on the project website: **woodenergyproject.eu**



County Administrative Board of Östergötland, Sweden

johan.palm@lansstyrelsen.se

Swedish Forest Agency

marja.gustafsson@skogsstyrelsen.se

Estonian University of Life Sciences

alo.allik@emu.ee

Foundation Private Forest Center, Estonia

indrek.jakobson@eramets.ee

Vidzeme Planning Region, Latvia

gatis.teteris@vidzeme.lv

Forest Advisory Service Center, Latvia

raimonds.bermanis@mkpc.lkkc.lv

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www.woodenergyproject.eu



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