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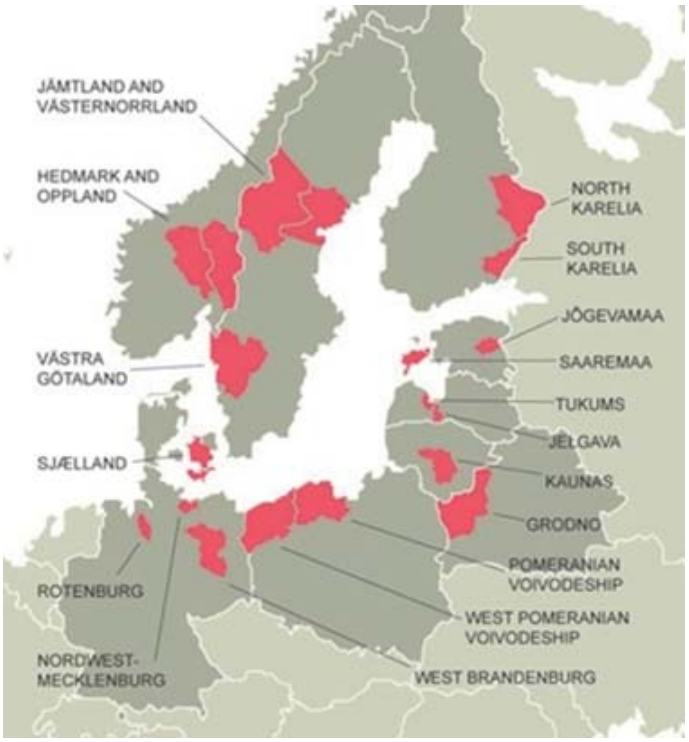
WP4 Sub-Regions

Key-findings and lessons learned

Editor: Gunnhild Søgaard, Norwegian Forest and Landscape Institute



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Content

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Introduction

Gunnhild Søgaard, WP4 leader, Norwegian Forest and Landscape Institute

For the rural regions biomass and bioenergy could be central affairs for the regional development. Effective use of biomass shows new agricultural perspectives and creates regional employment. The main aim of Work Package 4 (WP4) was to establish one or more sub-regions in each of the countries bordering the Baltic Sea, and develop these as "testing grounds" for policy as well as technical and market issues on sub-regional scale. In total 17 sub-regions were identified. Besides concrete work on local and sub-regional level to develop these "testing grounds", exchange of knowledge and experiences between the sub-regions has been an important aim of the Work Package. WP4 has been led by the Norwegian Forest and Landscape Institute, and in total 26 partners has contributed in the Work Package (table 1). This report provides short summaries of main objectives in each Task, plus key-findings and lessons learned. For some of the Tasks selected good examples is also presented. The report also provides the answers provided by the sub-regional partners regarding which are the most important key-findings and lessons learned of WP4 sub-regions, and how they will use the findings and results of WP4 sub-regions beyond the project lifetime.

Table 1. The following 26 partners contributed to Work Package 4. In some cases two or more partners cooperated on one sub-region.

PP	Partner	Country	Sub-Region
01	Swedish Energy Agency	SE	-
02	Regional Association of Jämtland (former JiLU, Insitute of Forestry, Jämtland County Council)	SE	Jämtland & Västernorrland
03	Nordic Energy Research	-	-
04	Chamber of Agriculture Lower Saxony	DE	Rotenburg
06	Landkreis Nordwestmecklenburg	DE	Nordwestmecklenburg
07	Potsdam Chamber of Commerce and Industry	DE	West Brandenburg
08	University of Rostock	DE	Nordwestmecklenburg
09	Research Institute of Food and Resource Economics	DK	Region Zealand
10	Motiva	SF	-
11	University of Eastern Finland	SF	North Karelia
12	Forest Development Centre Tapio	SF	South Karelia
13	Foundation Private Forest Centre	EE	Saaremaa and Jõgevamaa
16	Latvian State Forestry Research Institute "Silava"	LV	Tukums and Jelgava
17	Vides projekti (State project management company)	LV	Tukums and Jelgava
18	Latvia University of Agriculture	LV	Tukums and Jelgava
20	Lithuanian Energy Institute (LEI)	LT	Kaunas
21	Lithuanian Institute of Agriculture	LT	Kaunas
22	Institute of Fluid Flow Machinery (IMP PAN) and Baltic Eco Energy Cluster (BKEE)	PL	Pomorskie Voivodeship
23	Technical University of Kozalin	PL	West Pomeranian Region
26	Volkovisk Forestry Enterprise	BR	Grodno
27	Grodno PLHO	BR	Grodno
28	Norwegian Forest and Landscape Institute	NO	Region Inland
30	The Energy Farm	NO	Region Inland
32	Naturbrukskansliet, Region of Västra Götaland	SE	Västra Götaland
35	Region Zealand	DK	Region Zealand
36	Roskilde University (Roskilde Universitet, RUC)	DK	Region Zealand

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Bioenergy at the sub-regional level

Why focus on the sub-regional level? Bioenergy plays and will be playing, an important role for rural development. One of the main focuses of the Bioenergy Promotion project was therefore the development of sub-regions into demonstration regions – "testing grounds" – for sustainable development in the field of bioenergy. In total 17 sub-regions in 10 different countries took part in this work (Figure 1). These sub-regions were placed along several gradients, from already experienced to starter regions in terms of bioenergy, from regions with abundance of biomass resources and low population densities to regions with high population densities and net imports of biomass resources. Over three years we followed these sub-regions in their work, supported further work and development, and created networks for experience exchange across borders.

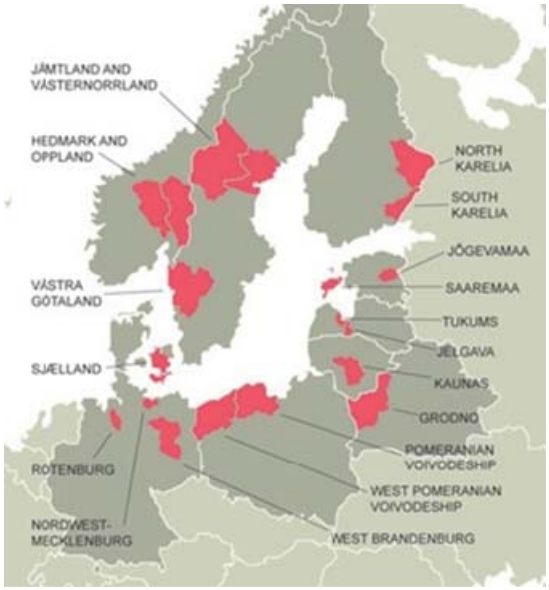

Figure 1. The countries and the sub-regions (in red) taking part in the project.

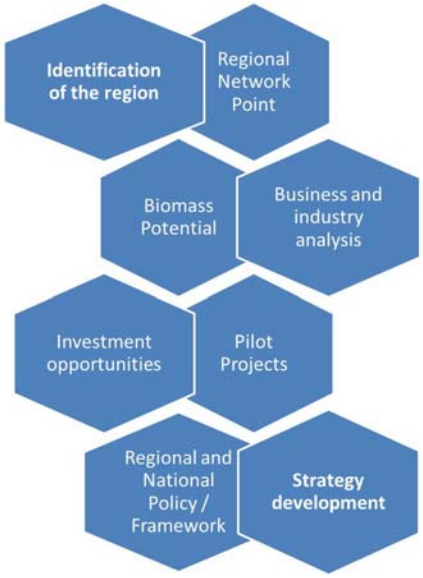

Figure 2. The steps in building a "bioenergy region", from identification of the region to development of a strategy for further development..

The establishment of the sub-regions as bioenergy regions was performed in several steps, from the identification of the region to start with, through analysis of existing business and industry, biomass potentials, investment potentials and policy framework, ending up with a strategy for further development. This work was complemented by the establishment of networks among stakeholders within the regions and dissemination of information through regional network points (Figure 2). This structure of development, and the experiences made along the process, can be utilized for the development of new bioenergy regions in each of the participating countries.

Many lessons were learned during the project work. Some of them could be generalized to all regions, regardless of "development stage", resource availability or population density. Among those is the need of a "bottom-up" approach. To include and involve the inhabitants in the planning processes is of vital interest. This increases the social acceptance of new bioenergy facilities, but may also increase the willingness to develop and invest in own projects.

A part of this is the important lesson that the level of knowledge may be low even in regions where bioenergy business and industry are well developed. In all regions it may therefore seem that work towards an increased level of knowledge in the population on benefits and challenges connected to increased production and use of bioenergy is an important element for further bioenergy development. Rising of awareness is necessary on all levels, from school children to stakeholders and politicians.

An aspect to keep in mind at all times when working at the sub-regional level is that the regions are not independent. They may be dependent on import or export of biomass or bioenergy, and they will at all times be subject to national regulations. Particularly in terms of resources the state of the region as net exporter or importer is important, and the logistics and a comprehensive life cycle analysis of the conversion of biomass to energy products might be crucial for the possibilities of economically and ecologically sustainable businesses on bioenergy. As a part of the question of regional potentials of biomass resources is the need of bioenergy in the region. An important aspect of new investments is the adjustment to the actual need. “Less-is-more” might be a valuable guidance, and investments should at all times be adjusted to the available resources and market potentials.

Through the project several pilot projects were identified. These were innovative projects, with potentials for development of sustainable production and use of bioenergy. These pilot projects might serve as inspiration for developments in the other sub-regions, and from the exchange of experience on working with these pilot projects lessons learned on innovative developments could be utilized also in new projects developed later.

One important lesson learned is the valuable role networks can play. Building networks across borders, and also across sub-sectors within bioenergy, plays a crucial role for experience exchange, development of new ideas and in a long term perspective to increase communication, transparency and trade on bioenergy within the Baltic Sea Region. The Bioenergy Promotion project has contributed to the creation of networks both across borders and sub-sectors of bioenergy and also among stakeholders within the sub-regions.

These networks, and also some of the numerous pilot projects identified in the frame of the project, will be sustained and utilized also after the end of the project. So will the knowledge gained through the project work. Some of the regions will take part in an Extension Stage of Bioenergy Promotion, while others will continue cooperation through informal channels and new projects. The project will also continue to live through the strategies and plans developed in each region for an integrated and optimized use of biomass for bioenergy.

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The Tasks of Work Package 4

Work Package 4 has consisted of six Tasks. Below the Task leaders presents key-findings and lessons learned from these tasks.

Task 4.1 Identification of regions and Task 4.3 Regional Network Points

Ole Helmer Bjørlien, the Energy Farm/Arena Bioenergy Inland

Short description of Task 4.1 Identification of regions

Identification of regions, sources and models to be demonstrated, as well as coordination of the different needs of the rural areas.

Short description of Task 4.3 Regional Network Points

Development of a regional network point in each sub-region. These network points aim to:

- disseminate information to politicians as well as businesses, farmers´ unions, newspapers, education facilities, schools, etc.
- provide a communication / information platform where the public can easily access information on biomass, bio energy etc.
- support and coordinate demonstration projects, best practice transfers and best practice know-how

Key findings

In the project we have identified 17 bioenergy regions and know the status and the regional activities there[1]. These regions are closely related to 13 regional network points (in addition to this they also have a regional office in Belarus). The regions represented in the project are quite different, but according to bioenergy they are quite similar.

- Most of the regions have a lot of forest and some agricultural land.
- Most of the regions are young, 1 – 3 years, but there are also some that are more than 10 years old.
- The main bioenergy businesses are wood chip production, bio heat entrepreneurship, some with CHP, biogas plants, pellet production and some with biodiesel production.
- The BE production varies a lot from just a little to 6.5 TWh.
- There is a lot of expertise areas represented, as Wood pellet, black liquor, wood chips, machines and technology, CHP- technique, production and logistics on raw materials, research centres and education institutions,.
- There are established businesses in some expert areas as mentioned above and others.
- Most of the the regions have a big potential in Bioenergy.
- Many of the regions have “success histories” to tell.
- There are big differences in traditions, political attitude, laws and rules and how they are practiced, between the regions.

[1] Bjørlien, O.H. (ed.) 2010. Task 4.1 – (sub)Regions ” Identification of regions, sources and models to be demonstrated, as well as coordination of the different needs of the rural areas” 53 p + annex.

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Short description of the regions

North Karelia and South Karelia, Finland is an important forest district with focus on bioenergy for many years. The network has existed for many years and there are an excellent corporation between research entities, forestry units, public authorities and private sector. These regions are pioneers both nationally and internationally.
Rotenburg region in Germany is an administrative region with forestry resources, however, dominated by agriculture. A bioenergy stakeholder group has been established with focus on local and environmentally friendly bioenergy both from woody resources and biogas, on identification of heat consumers and assessment of energy resources.
West Brandenburg in Germany is a large region with more than 1 mill inhabitants. Half of the area is farmland and one third is forest, and the potential for bioenergy is high. The region is in front in biogas, biodiesel and CHP and the aims for bioenergy are high.
Nordwestmecklenburg in Germany is a small region mostly with agricultural land. The region is active in biogas and local renewable energies. The utilization of biodegradable waste and residues for bioenergy is growing.
Pomorske voivodeship in Poland covers a big area. Forestry covers 36% of the area and there are big agricultural areas. Renewable energy, primary bioenergy, covers about 6% of the heat demand.
West Pomeranian Region in Poland is a green region dominated by agriculture and tourism. A decree from 2005 in Poland quantified the size of growth from renewables from 2.65% in 2003 to 9% in 2010.
Tukums area in Latvia has 40% forest and 42% agricultural land while Jelgava has 29% forestry and 56% agricultural area. For both regions bioenergy based on wood is growing.
Kaunas region in Lithuania has 29% forest land. They want to put priority on information to authorities, politicians, business, farmers, education facilities and others.
Saarema and Jögevamaa counties are the two regions representing Estonia. Saarema wants to be independent from mainland energy and bioenergy is important to solve that challenge. Modern bioenergy is new in Estonia.
Jämtland & Västernorrland and Västra Götalandsregion in Sweden are both regions that has been working for a long time with bioenergy and they have a well-developed system both in logistics and in production and distribution of bioenergy. They are also active in R&D activities.
Region Zealand in Denmark is active in bioenergy but mostly based on waste and agriculture products. 54% of Danish homes are heated by CHP-plants.
Grodno region in Belarus has 38% forest land. 0.76 hectares of forest accounts for one inhabitant in the region. The main resource for bioenergy production from forests of the Grodno region is biomass. In recent years, in the region have seen significant growth in the market of production and consumption of new types of biofuels derived from forest resources, primarily wood chips.
The Inland Region in Norway was established as a bioenergy region through the Arena Bioenergy Project in 2007. This is a big geographic area with forest products as the main source for bioenergy. It is good activity in building bioenergy plants and there are developed networks in education, R&D activity, small scale bioenergy and among waste companies. The network goes from ”Root to Soot”.

Regional network points

The information gathered from eleven Regional Network Points that has been established in the regions show that they are acting fully in accordance with the aim of Task 4.3[2]. The regions with regional network points are Region Zealand in Denmark; Private Forest Centre in Estonia; North and South Karelia (Finland); Rotenburg (Wümme) County in Germany; Westbrandenburg in Germany; Jelgava in Latvia, Kaunas County in Lithuania; Hedmark and Oppland in Norway; Pomorskie Voivodeship in Poland; Västra Götaland in Sweden; Jämtland and Västernorrland in Sweden.

The Regional Network Points are different from region to region in relation to how they are organized, their goal and expectation, their target groups and the strategy used to disseminate information. The establishment of Regional Network Points has been possible through the combination of different approach to get financial support. As an example some of the Regional Network Points are project based, other use private and institutional funds, and in some cases the combination of both. Some are for example linked to private institutions and some is linked to Universities.

Regional Network Points are using different mechanisms to disseminate information. All responders have established an internet website and are using this to disseminate information. The content and design of the websites varies between RNPs. Further, they are also using email list and local newspapers in their dissemination strategy. However, none of the responders has reported the use of “new” social media as facebook or twitter as part of their dissemination strategy. Tomorrow’s leader and decisions maker can easily be addressed through this social channels and therefore it may be worth to consider the inclusion of this social channel as part of the dissemination tools used by the Regional Network Points.

Furthermore, seminars, conferences, demonstration days, and consultancies are also examples of other activities used by all RNPs to disseminate information about bioenergy. The dissemination of information to politicians, scientist, communities, forest owners and farmers’ organization, business companies and educational institutions is taking place. About the type of information that RNP are disturbing, main focus is given to increase utilization of agricultural and forest biomass for energy purpose, as well as increase in utilization of agricultural and forest waste for energy purpose. Information on policies that influence the development of bioenergy sector is also spread.

Use of the project

It has been very interesting and useful to participate in the project. Among positive effects we can summarize:

- Experiences in how to build up clusters/networks in different countries, and how different kinds of network points functions.
- Experiences in arranging international meetings.
- Learning about establishing a large scale international project including EU financing and national financing.
- Learning how to present own projects.
- Getting useful international contacts both on administrative and public level, among R&D and educational institutions and private companies.

[2] Tyrihjell, M. C. (ed.) 2010. Regional Network Points (RNP) partners activities under Task 4.3. Summary of questionnaire response. 8 p.

- A big potential in developing international bilateral projects between partners with common interest.
- An inspiration among some of the partners in our cluster and a door opener between companies/institutions that can benefit from exchanging knowledge.

What we have learned

- Acceptable economy is very important for our engagement in the project. In Norway we have not got full financing and therefor the Energy Farm and Arena Bioenergy Inland has not been able to work enough with our tasks, and take out the potential in the project. We have learned that we need to have a well-funded budget and guarantied finances.
- As Norway is behind other countries in developing bioenergy it is very useful to establish good relations to actors in front. Transforming knowledge from the actors in front is important, but then it is a challenge that the actors in front also needs to earn something from the project.
- We have used too much resources in reporting and describe status in relation to developing new projects based on the participants in the network Bioenergy Promotion.
- Contact between participants in the project between the Workshops would have been useful. For that we should have some inspiration, as for example common R&D-projects
- A project period of 3 years is to short.
- It is a challenge to compete with fossil energy. We have to be efficient and it is often necessary to use feed in, state rules or support to help bioenergy.

Task 4.2 Biomass Potentials

Alexander Rosenberg, Chamber of Agriculture Lower Saxony

Short descriptions of objectives and main deliveries

The objectives of Task 4.2 are described as follows in the application:
"Assessment of potential for biomass utilisation in regions: The potential for increased utilisation of biomass resources in the sub-regions will be assessed taking sustainability criteria into account. The preparation of a common methodology for data-mapping and assessment of the regional potentials will ensure that main resources from forest, agriculture and biological waste and by-products from agriculture and the food-industry will be included. Relevant results from other European projects could be used (e.g. REFUEL- they have done a European analysis on biomass availability."

Task leader of Task 4.2 developed a 3-part questionnaire, to be answered (three deadlines in 2010) for each bioenergy resource type relevant for the respective region separately:

- Description of the resource
- Quantification and options for increasing the resource
- Sustainability aspects

Sustainability aspects were developed by WP3. As this output was delayed, a few PP made only a rough assessment as developed by TL 4.2, regarding ecological, economic and social aspects.

The resources were classified:

- according to their land-use origin (agriculture, forestry, other land-utilisation, non-used land), supplemented with resources without having the primary source in the region.
- the level of processing (primary production, complementary resources from further production, waste)

Peat as an energy resource was excluded from the investigation. For quantification purposes, conversion parameters as used by the regions for the specific resource volumes were compared and the energy values were expressed in MWh. The final results were published in a report June 2010[3].

Two (3) good examples

Bioenergy from agricultural land-use, crops or by-products not competing with food or fodder production
There is a considerable potential for bioenergy crops on agricultural areas not suitable for food production, due to unfavourable topography (Norway), climate conditions (northern Sweden), soil quality e.g. after peat extraction (Finland), the farming structure (Poland, Lithuania, Latvia) or local soil contamination (Poland). On steep slopes in Oppland&Hedmark, biomass production could be increased from roughly 3.000 tons to 20.000 tons. In the Polish Pomorskie region, 65.000 ha of idle farmland could be planted with fast growing short rotation trees, generating an output of $5x10^6$MWh, and Kaunas in Lithuania estimates a corresponding increase from now only 10 ha of SRC to 1000 ha with an energy output of 5.3 GWh, and in this region the area for rapeseed could be enlarged from 29.000 ha to 55.000 ha, from which 50% could be processed to biodiesel corresponding with 210 GWh. Many partner organisations regard the legal framework of the EU Common Agricultural Policy as crucial for the attractiveness of biomass production and/or utilisation at different levels of the agricultural production chain.

Bioenergy from forestry, not competing with material wood production
There is a huge potential of woody biomass from logging residues (tops and branches) as well as from stumps. Whereas stump extraction is developed mainly in the Finnish Karelia-region, additional resources thus being limited, Jämtland in Sweden could double the residue potential and the Norwegian region even more, mainly through stump extraction. Considerable increase would also be possible in Rotenburg, Germany, (without stump extraction) and in the Latvian regions Tukums and Jelgava. For Rotenburg, the potential is estimated up to 3.000 t annually. However, interdependencies with changing markets for the main grades have to be considered.

Theoretically, all forest harvest is a bioenergy potential, but, giving preference to the solid processing chain, still under unfavourable market conditions e.g. for pulp and paper, even pulpwood grades might be a non-competing resource, specifically in forest-dominated regions like Jämtland in Sweden. However, as here the also the forest industry is well-developed, decreasing roundwood supply due to a decline of pulp or sawmill production would also reduce the bioenergy output from those industries, as that from sawdust and black liquor. The latter by-products, together with bark and slabs in sawmills, however, form a considerable additional potential in Grodno (Belarus), Pomorskie (Poland) and Tukums/Jelgava (Latvia).

[3] Rosenberg, A. 2010. Final report for Task 4.2. Regional Bioenergy Potential. 39 p + annex. Published online June 17, 2010

Bioenergy from other/non-productive land-use

Mainly Polish and German regions have a big potential of woody or mixed biomass from maintenance of hedges and herb strips along roads and streets. For Rotenburg in Germany, a potential of 3.500 t annually (app. 36 GWh) is estimated only from maintenance of municipal and county roads. Including private hedgerows, this potential could be nearly doubled. Similar resources are available in Nordwestmecklenburg, but responsible authorities must be aware of separating woody and herbal materials and assign them to different bioenergy production chains. Other sources are biogradable waste e.g. from private gardens, orchards etc, a potential which is estimated to app. 25.000 t in the Brandeburg (Germany) region.

Key findings and lessons learned

Regionality of mobile resources and energy carriers

Many resources on the first and further processing steps of bioenergy as main or secondary product or from waste are not clearly linked to a region, i.e. primary products can leave the region and be processed elsewhere or are imported into the region for further processing. The same for the final energy carrier – it can enter or leave a region. Bioenergy in a regional context therefore has to be clearly determined.

Exchangeability and interdependencies of resources

On various levels – from land-use and primary production to advanced processing, bioenergy sources can be exchanged with each other or non-energetic use, e.g. replacing SRC with rapeseed, maize for fodder with biogas use, direct burning of slabs from sawmills with pellet production etc. Moreover, often depending on market conditions, one BE resource may increase on account of another one, e.g. fuelwood replacing biodiesel from black liquor. This gives a lot of opportunities for landscape diversification, provide market procedures are supplemented with political steering measures, but overlapping of estimation and counting must be avoided when creating future scenarios.

Aspects of main and complementary resources

Main resources for bioenergy are forestry and agriculture, but resource considerations should keep in mind the potential of complementary resources, as side areas, by-products, waste etc on various levels of production.

Main conclusions

There is a huge potential of biomass available, though with big differences in origin and volume from region to region, without competing with traditional production like food or fodder production. Taking into account, that e.g. in Germany food beyond the “best-before”-date is disposed as waste at a market value of app. 20 billlion €, an enormous additional area would be available corresponding to the farmland which had been used for food production. Moreover, far beyond a population’s basic food supply needs, meat production consumes overproportionally much of the agricultural area, and a bigger, still sound, share of land used for bioenergy would be feasible without harming basic social needs. The “food-or-fuel”-aspect obviously is not relevant in Europe at present and in the coming decades, the more, as bioenergy cropped fields easily can be converted to traditional agriculture. As bioenergy still is less established in most regions and countries than is the food production, political incentives are still needed complementary to the market procedures, taking into account long-term goals and smoothing out the “hen-or-egg”-problem, that energy plant investors are waiting for energy carrier supply and suppliers for customers.

Task 4.4 Business and industry analysis

Gabriella Gärds, Regional Association of Jämtland (former JiLU, Insitute of Forestry, Jämtland County Council)

Short descriptions of objectives and main deliveries

The objectives of Task 4.4 are described as follows in the application:
"Analyzing the regional value added chains in conjunction with the biomass production. Making an assessment of the present business and industrial activities within the biomass and bioenergy sector in the region, including SWOT-analysis per sub-sector (Forestry, Agriculture, Biogas/Liquid biofuel, Peat/sea-grass, Biowaste and Other). Analyzing the barriers for introduction or further development of bioenergy or biomass production".

The task leader of 4.4 developed a template to be filled out (deadline in November 2009), and a report summarizing the Task was published online January 30, 2010[4].

The resources were classified and different business options

- according to their land-use origin (agriculture BE, forestry BE, other land-use BE, not land-used BE),
- Production/processing companies, Supporting Service and Business and Industrial Data

Peat as an energy resource was excluded from the investigation.

Good examples

Bioenergy from agricultural land-use.

In Kaunas region, as well as in all Lithuania, there is a strong focus mainly on production and use of liquid biofuels (bioethanol and biodiesel), production of biogas using agriculture residues, and production of solid biofuels using residues from agriculture or food industry, although it is has recently started. In a lot of countries these kind of focus is strongly influenced by various support schemes for agriculture development in the EU.

As for Region Zealand, Denmark there are three main sources for bioenergy production straw, slurry and slaughterhouse waste. On top of this there are additional by- and waste products from different agricultural based productions. Today straw is combusted in combined heating and power plants. These are both within the region and outside the Region Zealand. Hence there is a flux of bioenergy sources in and out of the region. In Region Zealand, there are 6 decentralised heat and power plants, 4 are running on straw consuming 134.000 tons of straw every year and producing 34,3MW of power and 82MJ/s of heat. Like anywhere else in the country and Europe the tendency goes towards that the amount of fulltime farmers decrease whilst the farm size increases. A very important farmers group is the hobby farmers. This is an important point when developing support schemes, incentives and technology for the agricultural bioenergy sector. Development in Zealand region is focused on;

1. Combustion mainly of straw and bioenergy crops.
2. Fermentation of slurry and slaughter house waste.
3. Chemical-thermal processes e.g. Fisher-Tropsch processes for developing biodiesel.

[4] Gärds, G. 2010. Task 4.4 BUSINESS AND INDUSTRY ANALYSIS Summary Report. 22 p + annex

Common for all of these new initiatives is that the raw material they use mainly comes from agricultural by-products and leftovers like straw, slurry and slaughter house waste.
In order to promote bioenergy production from agricultural based products there are a number of paths to follow not only in Denmark but in the rest of Europe as well a development of extending the capacity of existing and new CHP plants for combustion of straw, and equipment over all.

Bioenergy from forestry
In Jämtland/Västernorrland, Sweden the region has a long history of forestry and forest industry, 60 % is considered forestland, although bioenergy from forestry is an expanding industry in the region, both as residues from saw- and pulp-mills but even more from wood slash recovered from final felling. Generally in Sweden bioenergy represents 20 % of Sweden's energy consumption. In the southern part of Sweden there is also a lot of forest covering the area, 51% in Västra Götaland region which provides the bioenergy sector in this region with a lot of opportunities for biomass in both agricultural and forest aspects.

Concerning *Lithuania* the production at present of heat and electricity from forestry biomass is fast-growing branch of economy in. A number of measures and supporting policies have been implemented for development of this sector. The bioenergy potential of a country is defined by natural resource availability, as well as expertise and managerial capacity to organize a reliable and sustainable biomass supply chain and energy generation. During conversion of the heavy oil fuel boilers in district heating and industry the demand for biofuels was enhanced, this was because of the Conversion process adapting fossil fuel boilers for biomass started in Lithuania since the end of 1993. Forests provide a good base for biofuels supply. District heating sector is the main sector, involved in development of forestry bioenergy Part-financed by the European Union (European Regional Development Fund and European Neighbourhood and Partnership Instrument) in Lithuania. During the period of 1990-2008, the share of biofuels in this sector developed from 0 to 18%, and is being strongly promoted via Lithuanian District Heating Association, and Lithuanian Association of Biofuel Producers and Users.

In Belarus in Grodno region there is a planned transition to the use of local fuels for heat production. Volumes of supplies of wood chips for Housing and communal services (HCS) increased from 7.2 thousand cubic meters in 2008 to 55.0 thousand cubic meters in 2011. The main suppliers of wood chips are the forestry enterprises of Grodno region, which are major holders of forest resources.
The development of biofuel production (production of briquettes & wood chips) made it possible to expand export markets for the range of sold products (Poland, Lithuania, Germany).

Bioenergy from other land-use
This is not a well-developed area in the participating partner regions

Bioenergy from other not land-use, water related
The Water related BE sector includes for instance sea weed and water waste sludge. Within the Region Zealand as well as in other parts of *Denmark* there are experiments going on with growing of the Macro algae species Seaweed. The experiments are promising as production rates can reach up till 45 tons of dry matter/ ha. In Latvia there are waste water treatment systems for waste water sludge, which for example is sufficient to establish about 650 ha of willow plantations with annual growth capacity 36-62 th. LV m3. Mainly envisages energy from incineration of municipal waste, biogas from landfills and water treatment plant sites, as well as from industry.

Key findings and lessons learned

In regions where heating has been provided by oil fuel heaters for industry as well as household more focus have set on biofuels and the development of biofuels and biogas. This is the case for both forest and agricultural land though a development of biofuels from agriculture seem to have been in focus, strongly influenced by various support schemes for agriculture development in the EU.
Another point is that regions with larger areas have more companies and businesses using biomass/bioenergy as their product.

In the regions investigated in Sweden the forest dominates the area, however, there are several companies dealing with agricultural biomass. This seems to be the case for the region in Norway as well probably as a result of ownership. Private land owners especially those with an occupation in farming also owns forest land.

Lessons learned from the project and the Task are that the partners involved should have had an equal amount of time and money to spend in the task in order to get similar information and reports.

Task 4.5 Pilot Projects

Jan-Hendrik Aust, Potsdam Chamber of Commerce and Industry

Objectives and main deliveries

The identification of Pilot Projects is one of the central tasks of Bioenergy Promotion. The Partners had to name and describe possible pilot projects based on the assessment of the regional potentials of bioenergy resources, the economic opportunities and the political and societal framework conditions. Each subregion choosed 1 to 3 good practices which were evaluated to identify 3 good practices for the Baltic Sea Region. The Pilot Projects should contribute to the development of bioenergy provision or use within the particular sub-region but also be a role model for the development within other sub-regions. The partners were also asked to elaborate pre-feasibility studies on their proposals or other likewise projects. These studies were meant to support early-stage projects or to improve already implemented ventures. This part of the task was optional. Based on the assessment report and the identified good practices the partners elaborated decision tools for investors. These tools serve the purpose to inform possible investors about the bioenergy market in each sub-region.

The whole Task went step by step as follows:

- Identification and description of pilot projects
- Identification of sub-regional good practices
- Evaluation of good practices and identification of BSR-Good practices
- (pre-feasibility studies)
- Decision tool for investors
- Final Report (Summary report on Investment opportunities in the sub-regions)

Three good examples

Three good practices for the Baltic Sea Region were identified via an internal evaluation of the pilot projects. These were:

Production of biodiesel from organic waste with focus on 2nd generation biofuels
(Norway - The Inland Region)
The household waste in the region of Mjøsa is recycled, and sent to Mjøsa processing plant (Mjøsanlegget). The plants have a capacity to process 14 000 tons of waste per year. They transform the waste into biogas and organic fertilizer. The waste is grounded, and boiled up to 138 degrees. After this it is pumped into a 2000m³ tank that produce biogas. The gas produced in this first stage is mixed with the gas produced at the waste disposal. The gas produced is used to produce damp stream, which again is used to produce electricity and warm water. After the production of biogas, the liquid solution in the tank is filtered and mixed with garden waste. The result of this last step is a high quality organic fertilizer. By adding other types of organic material into this mix a new fertilizer for different purpose made available to the market. The combination of different processes is unique in this kind. The owner of the Mjøsaplant is Glør from Lillehammer (Glør is an inter-county company between Lillehammer County, Gausdal County and Øyer County), Hiasiks from Hamar, and GLT-Avfall iks from Gjøvik. Glør is building up a biodiesel plant where the methane gas produce from the waste disposal will be used to produce synthetic biodiesel. This can be the first plant in this type in Norway. However, due to the lack of the external financial support the construction of the plant is delayed.
Glør is confident in the idea of producing biodiesel from biogas is the way to go. The technological aspect of producing biodiesel from biogas is well known but the structure and process back the company makes this project unique. More information about Glør activities is available in Norwegian at www.glor.no These commercial plants have a high level of transferability among region and site. However, it is important to consider the cost and distance between the household and the plant. In the region of Hedmark and Oppland there are still areas where a project like that can be beneficial.

Energy Independent Village Feldheim
(Germany – Westbrandenburg)
The energy independent village Feldheim is situated in the southwest of the federal country of Brandenburg as part of the municipality Treuenbrietzen. The idea of energy indenpendency was promoted by the mayor when a company (Energiequelle GmbH) asked him to build wind turbines on the municipalitie's land. The mayor and the company agreed, that Feldheim will exclusively buy the electricity generated by the turbines at the price of the german feed in tariff for renewable energies. The villagers and the municipality formed an enterprise which on the one hand rents out the land for the wind turbines and on the other hand buys the electricity. Energiequelle benefits of a stabilized income even when the grid is closed due to overcapacity. This is possible because Feldheim owns an exclusive electricity grid.
To reach the goal of energy independcy Feldheim needed to stabilize the volatile power generation of the wind turbines. Hence a biogas plant was build. This was a source for heat, too which is distributed via a local heat grid. The demand for heat is dynamic (high by day, low by night). Therefore a short time heat storage was built which is augmented by a factory for solar modules – the production hall works as a storage. For times of high demand a wood chips boiler was installed.

Investigations on production and utilization of biogas in Study and Research Farm "Vecauce"
(Latvia - Jelgava area)
Aim of the ongoing pilot project is to provide efficient co-utilization of cattle manure and plant biomass (mostly corn) silage for round year biogas production in cattle farm „Līgotņi", in Study and Research Farm (SRF)„Vecauce" of Latvia University of Agriculture (LLU).
Biogas cogeneration plant operation was comissioned in the October 2008 and energy output reaches rated power (360 kW heat and 270 kW electricity in spring 2009.

Facility is only biogas plant utilising agricultural plant biomass and manure for biogas production in Latvia at a moment. The project consists of following parts:
1. Realization of biogas production process from manure and biomass silage, and utilization of digestate in Study and Research Farm „Vecauce“ (LLU).
2. Analysis of input substrates in fermenter for maximization of biogas production;
3. Analysis of output substrates for utilization of fermented digestate utilization for soil fertilization, that demonstrates the savings of costs on mineral fertilizers;
4. Restructuring of sowing areas in Study and Research Farm “Vecauce” (LLU) to provide both valuable fodder for livestock or raw material for biogas production.
5. Investigation of operational parameters of biogas cogeneration plant;
6. Assessment of economic and energetic effectiveness of biogas cogeneration plant operation within scope of Study and Research Farm „Vecauce“.

Key findings and lessons learned

The Partners were quite active within this task and provided a wide variety of topics, approaches and stages of implementation. This reflects the different stages of development of bioenergy usage within the partner countries. The bioenergy market in north and middle Europe is developing at intense speed but in different directions. While silvicultural areas focus on wood fuel the more agricultural areas put a lot of effort into biogas (but also here wood fuel is of high importance). In the eastern partner countries the development is in early stages. The pilot projects are often under the first national ventures of this kind. In all countries the public opinion is more or less an obstacle in developing bioenergy projects. The reason is quite diverse. In regions with a high density of implemented projects people fear damage of the environment while in less developed regions the technology is quite exotic what makes it hard to find investors.
In most regions biomass availability is no limiting factor for implementing new projects.
Most projects were developed by local actors. In less developed regions public authorities could play a crucial role by implementing demo sites.

Main conclusions

Modern bioenergy applications are not yet competitive to fossil fuels or traditional bioenergy usage. Therefore public authorities should steer development by incentives and own investment (e.g. demo sites). Lay people / the public are often badly informed which enables unmotivated fears against new technologies. In more developed regions with a high density of implemented projects there is also a need for public participation. It is necessary to open up the discussion to all levels of the society to gain wide support. National authorities are not equipped to implement a decentralised energy system. Local stakeholders gain importance but often lack of financial power.
The bioenergy market is still in an early stage of development but, also brings forth less sustainable structures like long transports of biomass which does not comply with the low energy density of most biomasses. This happens when big investors implement oversized plants which can’t be supplied by the surrounding area. This also leads to enforced competition between biomass for energy usage and food or fodder. National authorities should enact rules for a sustainable use of biomass.
In nutshell this means more information and participation on all societal levels and accurate incentives basing on a bottom up approach.

Task 4.6 Strategic Management Plans

Gabriella Gärds, Regional Association of Jämtland (former JiLU, Insitute of Forestry, Jämtland County Council)

Short descriptions of objectives and main deliveries

The objectives of Task 4.6 are described as follows in the application:
"*Development and implementation of strategic management plans for an integrated and optimized use of biomass / bioenergy. The main focus on this juncture is the integration of the land surfaces or locations into the regional structure of the rural areas. Specific developing strategies of the region as well as the effects of the European policy are important factors that have to be analysed. This will pin point development scenarios. Interpretation of the gained information and pinpoint the strong and weak points of the region*"

Key findings and lessons learned for Task 4.6 Strategic Management Plan

"This task is a summary of all the others"

Key findings

- One point which has been discussed and pointed out many times during the project period is that "strategic management plan" is not the best expression. Management action plan is a better expression that makes sense.
- It is of importance that the report is finished after the other tasks.
- To compare differences and how to use it
- The more biomass used might threat other environment.
- Sustainability criteria is of great importance for the strategic management plan
- The main goal with this task is to be able to make necessary adjustments to promote bioenergy and it is the summary of the whole work package
- There are great differences between regions and it is a challenge how to produce a strategic management plan and get it implemented. In some countries there is a plan for the country but not for the region.
- The most important task is to start develop strategic management plans in the countries which have not come so far. In such cases experienced countries have a task to provide knowledge to those countries.

Regarding approach for policy guidance paper;

- Reality transfer of instruments to reality depends on person.
- Focus on implemented instruments and motivation of people
- Networking is a key point of promoting bioenergy.
- Emphasize differences in point of resource efficiency.
- Elaborate policy guidance on local level.
- Focus on areas where it can make a difference.
- Important with strategic management plans on regional level.
- All regional management plans must follow the national strategic management plans.

Lessons learned

- Our task is to support the authorities with information for deciding i.e. support for updating of the plan within bioenergy development.

- It might be necessary to change and update strategic management plans.
- Good to include environmental assessment reports. What´s possible on regional level might not be possible on national level.
- The focus has been on implementation, but maybe it should be more policy guidance.
- It is hard to transfer between different countries on this level. It is important with experience exchange. Assist to strategic management plans. Good examples are essential. Collect information from showcases.
- The conditions change during time which is very important to remember.

The sub-regional experiences

The sub-regional partners was asked which are the most important key-findings and lessons learned of WP4 sub-regions, and how they will use the findings and results of WP4 sub-regions beyond the project lifetime. The answers follow below (alphabetical order by country).

Grodno, Belarus

Andrei Bui, Yauheny Herasimovich, GPLHO

Which are the most important key-findings and lessons learned of WP4 sub-regions?
As part of the project carried out:

1. Forests resources are a critical resource of the region to provide regional consumers renewable fuel source. Production of biofuels can be sustainable form of business.
2. Fuel chips production from firewood is the most effective technology for the production & consumption biofuels in the industrial scale.
3. The use of forest residues for production of wood chips is a promising technology that needs further investigation for practical implementation.
4. Have done the analysis of capacity raw from forest to produce biofuels in Grodno region, also a classification of forest biomass for biofuel production
5. Analysis and proposals for the optimal production technology and logistics of biofuels in accordance with the requirements of forest management regulations and the sustainable development of forestry
6. An analysis of regional and export markets for biofuels from forest resources
7. Implemented full production cycle of wood chips (harvesting, transporting, wood chips production, delivery to the consumer)
8. Information about Bioenergy Promotion Project, kinds of biofuels, prices and amounts shown on the sites of Grodno GPLHO and forestry enterprisesa.
   a. Website Grodno GPLHO - http://gplho.by/bioenergy.php
   b. Website Skidel forestry http://www.skidles.by/prod/index4.html
   c. Website Ostrovets forestry http://ostrovles.by/ru/production/briquettes/

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

- For the development the production of wood chips to meet the growing demand for biofuels on local and regional markets.
- Further study of biofuel technology of forest residues,

- Development of proposals for the adaptation of national legislation to the production of biofuels from forest residues, attracting investments to develop and implement a pilot project for the production of biofuels from forest residues.

Region Zealand, Denmark

Bjarne Rasmussen, Region Zealand

Which are the most important key-findings and lessons learned of WP4 sub-regions?

1. Bioenergy is playing a pivotal role in the creation of the new energy supply structure of Region Zealand. The major sources of energy will be wind and biomass, and bioenergy systems will be in the unique position to balance the fluctuating wind-based electricity production.
2. A sustainable energy system must be based on a common strategic approach shared by all key actors in the region, and developed through participatory processes. By the means of a regional bioenergy strategy the regional biomass resources can be mobilized, and a more focused path for development of bioenergy technologies can be created.
3. The long-term change and restructuring process of the energy system calls for regional facilitation, both with regard to specific bioenergy solutions and with regard to integration in the overall renewable energy system.

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

1. The developed Regional Bioenergy Strategy will be used as a policy frame and a practical development and implementation guideline.
2. Concrete development, demonstration and dissemination projects will emerge, a.o. inspired by the bioenergy strategy.
3. Region Zealand will support relevant bioenergy projects, especially through the regional business development funding scheme, and by serving as a support structure for sustainable energy planning and implementation processes in the municipalities in Region Zealand.

Saaremaa og Jögevamaa, Estonia

Indrek Jakobson, Foundation Private Forest Centre

Which are the most important key-findings and lessons learned of WP4 sub-regions?

The main key finding for us was that if we are talking about small pilot rural areas then they probably have more or less enough resources to make changes in heating systems. Also, what is very important, too, there is enough willingness to do something new and good in their region (parish/municipality). What they lack, is knowhow and just small push from outside and that is exactly this, why this project was so important for us. When to resources and willingness is added knowledge, then is quite good opportunity to do something better.

What we did, was exactly mentioned above. We brought together people and resources. In "people" we keep in mind forestry associations, forest owners, heat producer, raw material (woodchips) provider, local entrepreneurs. The people exist there before and after the project. Our task was to influence on them. If we are talking about resources, then during the project there were provided some researches (and similar activities).

If we are talking about sustainability of the project, then if there are some real changes in pilot area, it means, those changes remain for quite a long time. If system is working on renewable energy sources (woodchips), then it remains so and will continue itself, without help and assistance from outside.

North Karelia, Finland

Pradipta Halder, University of Eastern Finland

Which are the most important key-findings and lessons learned of WP4 sub-regions?

North Karelia is already an advanced region in bioenergy development. Therefore, many of the activities that are in initial stages in other regions cannot be started in North Karelia once again. However, there is still need for improving the investment climate in bioenergy projects in this region. Regional networking among different regions are not well developed and it needs to be addressed properly. For example, the expertise of North Karelia was underutilized to transfer to other regions. Similarly, North Karelia could have learned from other regions the developments in the biogas field.

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

Apart from strong networking between the regional bioenergy actors there is need to increase the use of biomass in regional energy purposes. For example, the Vapo Pellet Factory that many of the WP4 partners visited in the North Karelia workshop will be shut down. The reason is that it is not economically competitive. People should be motivated to use bioenergy and this needs further policy interventions. Bioenergy education will be important to have enough skilled people to take the challenges in this field. Regional bioenergy policies should also include this educational and awareness rising issues more specifically.

Nordwestmecklenburg, Germany

Yvonne Rowoldt, Landkreis Nordwestmecklenburg and Andrea Schüch, University of Rostock

Which are the most important key-findings and lessons learned of WP4 sub-regions?

1. building up a region is a question about people and data
    - find the right people, driver for the region; producer, politicians, interested inhabitants, linked regional government, like environmental services department, building department, partial planning department … network! (needs time)
    - get relevant data about the region, nearly more important: keep them new! … analysis!(needs time, money)
2. collect all related projects to a strategic regional management plan (who, what, how)
3. bring it into public (in that case into county council)
4. reorganise the organisation (needs money)

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

We are now in step 3, after setting up the framework of the strategic regional management plan, we now synchronise the activities and planning how we can work on it without the project (needs decision of the county council). Probably we can bring our conception in practice, which would be real output of the project!

For the waste sector: Based on the results of our pilot projects we got the task from the state government to investigate the possibilities of a better management and combined energetic utilisation and recycling of organic waste(step 3). The results will used for the reorganisation of the organic waste management inclusive the financing in the counties in the next year(s) and to give input for the revision of relevant laws and regulations on state level (step 4).

Idea of the bioenergy village in short:
Our idea is to **bring the inhabitants into action**, to motivate thinking about their situation, in case of energy, dependency of fossil energy costs, unemployment properly. That means to bring the village (municipal council) to the **decision** to go the way to bioenergy village, to make an **analysis about the potentials** (not only bioenergy, even solar or geothermic), to **develop with engineers projects** for use of bioenergy (wood chips or biogas plant) for heating and electrical energy, to **convince** other inhabitants to join the project and contract this energy using, to **collect money** and funds to build the facilities, to **organise a cooperative** to operate or to control the operating service.

These (only a handful) steps are describing a process, which takes about 2 years. The coaching by the Akademie für Nachhaltige Entwicklung MV (academy of sustainable development) covers only the first step, to make a decision and using the organised funds for first potential analysis. But if we do bring the villages to run, we have to have solutions for all other steps. That's why we coach the villages with decisions in North West Mecklenburg by "Bioenergy Promotion" and working on the step of **project development** for municipalities, with the aim to bring partners, like municipal energy supplier and municipal net operators, together, to **cover risks and professionalise the project**, because mayors and members of the municipal councils are usually volunteers.

The project partner investigates by the strategic regional management plan the way of **implementation a holding** by the Country of North West Mecklenburg and municipal suppliers.
With all these effort we aim to establish bioenergy villages, where inhabitants and municipality build and own a district heating net, where local farmers produce the inputs and formerly unemployed people working in the service, and all are more autonomous, even not only in case of energy.

Rotenburg, Germany

Alexander Rosenberg, Chamber of Agriculture Lower Saxony

Which are the most important key-findings and lessons learned of WP4 sub-regions?

A. PP 04 concentrated on wood-based bioenergy in the Rotenburg region

- A potential investigation was carried out, assessing the resource for woody biomass from private forests and hedgerows along public roads, which resulted in a an impressive figure. Depending on price-cost-relation for BE harvest and transport, no restrictions above the biological potential (as accessiblity) are given, but, as there is no bigger end-consumer for wood-based bioenergy in the region, transport costs currently are a limitation for increased use of biomass. Moreover, harvesting methods for biomasss are underdeveloped, although techical solutions are existing in e.g. Scandinavia and the alpine region.
- There is only a weak database for estimating the potential from tops and branches, mainly originating from Scandinavia. For woody biomass from landscape maintenance, comprehensive strategies are needed and will more precisely determine biomass volumes from operations e.g. in moors and hedgerows.

- In some cases, forestry support schemes contradictory to biomass utilisation

B. Nutrient sustainability is a key issue for forest-based bioenergy

- So far, there are only few recommendations available from research for the question, which sites are suitable for BE extraction. In the Rotenburg region, currently, no site mapping available. The potential inventory therefore calculated different scenarios. Options for woodash recycling could enlarge the potential, but this issue is still undeveloped in the region and in Germany (diferent from e.g. Sweden)

C. Energy wood is an ambitous product, when sustainability principles are taken into account, and is linked to many issues as biological potential, technology and companies, public adminstration etc, which results in an interlinkage of all Tasks of WP4.

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

A. PP04 CoA will be partner in BIOENERGY PROMOTION 2

B. Contributing to national and EU-programs, linked to bioenergy, as

- Proposals for integrating bioenergy aspects in forest support schemes, co-funded by EU (European Agricultural Fund for Rural Development) - the CoA is responsible for administration of most EU support for agriculture and forestry in Lower Saxony
- Proposals for bioenergy aspects in support schemes, related to landscape maintenance and nature protection thus as NATURA 2000
- Identification of research issues for FP7 (Strategic Reasearch Agenda for the Forest Technology Platform)

C. Continous work on improvement of database on logging residue (tops&branches) volumes and adapated harvesting methods

- Observing research in more advanced countries as Scandinavia and Alpine regions and transfer of knowledge
- Cooperating with on-going north German research on growth models for crown and branch biomass and knowledge transfer to other demo regions/regions in general
- Cooperation with research and companies adaspted harvesting technologies

D. Work on sustainability strategies, mainly in terms of nutrient supply

- Supporting efforts to get a site inventory for finetuning of biomass extraction and comparison with related sustainability approaches in other regions
- Work on improved knowledge about woodash recycling, mainly through information transfer from Nordic countries

E. Promoting BE-based regional investments

- Companies (e.g. food processing)
- Public buildings

Part-financed by the European Union (European Regional Development Fund and European Neighbourhood and Partnership Instrument).

Westbrandenburg, Germany

Jan-Hendrik Aust, Potsdam Chamber of Commerce and Industry

Which are the most important key findings and lessons learned in WP 4 sub-regions?

Westbrandenburg is one of the more developed sub-regions concerning the use of bioenergy:

- there is a strong political will for increasing the share of bioenergy what is stated by the biomass strategy of the land of Brandenburg
- there are several scientific institutions (public and private) which focus on bioenergy applications
- there are several enterprises which are active in the branch running and planning projects
- implemented projects are highly developed
- the regional network point ETI is working successfully since 1998 and is well known along the stakeholders

Still there is a long way to go: the most urgent challenges are

- the integration of bioenergy plants in the common energy market
- use of excess heat (especially in peripheral sites) of biomass power plants
- decreasing biomass potentials (especially forest wood)
- identifying yet untapped biomass resources (e.g. short rotation coppices of fast growing trees, biogenic waste from landscape maintenance)
- decreasing public acceptance of bioenergy projects (NIMBY)

Also it proofed not useful to develop Westbrandenburg (the chamber's district of Potsdam CCI) as bioenergy region: There are several activities and planning authorities on federal country level as well as on county level. While the project was running the regional planning communities (mostly consisting of two to three counties) started developing their own regional energy concepts in the frame of the energy strategy of the country of Brandenburg. In West-Brandenburg these are two (Prignitz-Oberhavel, Havelland-Fläming). ETI itself is an implementation organisation for the energy strategy in the whole of Brandenburg and is supporting the development of the regional energy concepts by assisting the stakeholders through networking and Know-How-transfer.

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

In Germany the high feed in of volatile renewable energies such as wind and solar power leads to a destabilization of the energy grid. One option is to create virtual power plants by combining volatile feed in plants with stable bioenergy plants. There will be a strong focus on promoting these solutions within the development of regional energy concepts.

The use of excess heat in remote places where biogas plants are installed will be the topic of an additional output within bioenergy promotion. In future we will hint at this problem when assisting planning activities of new projects in such places and support solutions of local heat grids or alternative heat use (e.g. drying biomass). Another important finding was about the limited (or decreasing) biomass potentials. We will promote research and development of alternative biomass resources as well as the development of the regional and crossborder (especially Poland) biomass market. There was a strong interest in the elaboration of (pre-) feasibility studies. This was an important hint that there are a lot of projects in early planning phases which are in need of more case specific information. We will use this to promote existing information supply and strengthen the networking process. The decreasing public acceptance will be dealt with by promoting well working pilot projects like Feldheim and supporting dialogue in conflict situations.

Jelgava and Tukums, Latvia

Latvia University of Agriculture

Imants Plume

Most important key-findings and lessons learned of WP4 sub-regions Jelgava and Tukums?

1. Agricultural biomass usage for bioenergy production (biodiesel, biogas, straw briquettes) became an important factor for regional development, due to added value for energy production, new jobs, investments and innovative technologies in both Jelgava and Tukums sub-region.
2. Straw briquettes production is the most cost-effective biomass-to-energy business, featuring short payback period, large market capacity, and not requiring special supportive measures in both Jelgava and Tukums sub-region. However, only part of straw can be utilized for solid biofuel production, due to necessary condition on unchanged soil organic matter content in long-term period.
3. High concentration of agricultural resources (large land area owned, availability of agricultural machinery) and state's supportive financing measures (e.g. quota on obligatory purchase of electricity, feed-in tariff, aid for new biogas plants construction) was primary reasons for commissioning of 4 new biogas plants in Jelgava sub-region during years 2010-2011. However, every successful biogas cogeneration plant project should be well justified in terms of available biomass feedstock resources, financial resourses and implementation activities, to get the necessary credit for implementation.
4. Rape seed growing for biodiesel production is more favorable in Jelgava sub-region compare to Tukums subregion, due to improved soil quality and widely implementation of advanced growing techniques (fertilization, crop protection, machinery, management).

How will you use the findings and results of WP4 sub-regions Jelgava and Tukums beyond the project lifetime?

1. Obtained positive experience in agricultural biomass usage for energy production will be disseminated between other farmers and entrepreneurs through ongoing operation of plants, media, research and study practices.
2. Research activities on different biomass to energy technologies ongoing in Latvia University of Agriculture will provide different data (e.g. CO2 emissions, economical effectiveness, sustainability) utilizable for regional planning purposes.
3. Implementation and assessment of different biomass to energy technologies will constitute a basis for verification of effectiveness of political and legal decisions in both regional and in national level.

Vides projekti & Latvian State Forest Research Institute "Silava"

Ilze Neimane & Andis Lazdins

Which are the most important key-findings and lessons learned of WP4 sub-regions?

1. Renewable energy (with relation to climate change) should be more considered as planning aspect in development planning documents in local and regional level.
2. It is important to consider potential consumption, when evaluating regional availability of forest biomass for bioenergy resources - small demand requires small deliveries.
3. Forest resources in both pilot regions are nearly equal, inspite, Jelgava region is supposed to be agricultural area and Tukums region - forest area (don't blindly follow to general assumptions!)

4. Forest resources in both of the region are close to maximum of utilization ate potential - more than half of forests are older than the most valuable commercial harvesting age. This means that in longer future additional measures (afforestation, plantations of fast growing trees) are necessary to secure sustainable deliveries of forest goods.
5. Private forest owners reduced considerably their forest management activity and commercial value of forests by introduction of (cheap) natural regeneration of forests, which in future might decrease economic availability of forests.
6. Considerable areas of forests in Tukums region are in protected and nature conservation areas, where forest management is prohibited. Sustainable and feasible management policies should be elaborated for these forests to secure deliveries of forest goods and services from these areas and to motivate forest owners to manage their forests.
7. There is considerable area of abandoned farmlands in both pilot regions, which under traditional forest management practices can deliver forest biomass, which is equal or even overreach potential of utilization of the biomass in district and individual heating systems. However no measures are implemented to organize management of these lands. Advanced management practices (plantations) could increase contribution of these lands by 300-500% in compare to traditional forestry in long run prospective.
8. Completely non-utilized resource is short rotation coppice crops, which can be used as an output for wastewater sludge and wood ash produced in centralized systems.
9. Lot of unutilized heat, produced in electricity production process from biogas due to the limited possibilities of utilization.

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

1. The obtained information of value for municipalities and regional bodies will be used in regional planning documents.
2. Information of scientific value, like methodologies of evaluation of prospective standing volume in afforested lands, will be used in relevant studies.
3. Experiences in development of regional strategic planning documents in bioenergy sector will be utilized further.
4. Information about situation in the regions' forests will be used in dissemination events.

One point additional point concerning forestry (Andis): “Municipalities in Latvia really don't care about situation in forests as well as about potential resources in their region. Generally it is due to abundance of resources so there is no motivation to mobilize unused resources, including lands suitable for energy wood production.”

Kaunas, Lithuania

Romualdas Skema, Lithuanian Energy Institute (LEI)

Which are the most important key-findings and lessons learned of WP4 sub-regions?

1. Statistics Lithuania provides statistical indicators for all country and statistical information on regional level are absence.
2. Few municipalities have full inventory of their energy economics, which enables to produce viable action plan.
3. Very few and mainly large municipalities have energy experts, who have sufficient knowledge and expertise for developing of such plans.

4. Available financing sources do not allow small municipalities to hire skillful experts to elaborate action plans and monitor implementation of such plans.
5. Municipalities leave all responsibility on planning and implementation of actions to municipal energy and transport companies.
6. Municipalities of the region implement the tasks which are assigned to them by law ONLY!
7. New law on Renewable Energy Sources (12.05.2011) empowers all Lithuanian in municipalities to produce and adopt municipal RE Action plans. It will be the main factor stimulating preparation Action, Strategic Management Plans for RES and specific RES developments programs from 2012 in Lithuania.
8. New Law on Renewable Energy Sources also will empowers municipalities to prepare and implement public awareness and information measures, to provide consultations and programs for promotion of RES.
9. National contact point and regional network for Kaunas Region, established executing "Bioenergy Promotion" project, will continue work, supporting Lithuanian municipalities in they work implementing new Law on Renewable Energy Sources, beyond the project lifetime.

How will we use the findings and results of Kaunas Region beyond the project lifetime: new Law on Renewable Energy Sources (12.05.2011, No XI-1375) empowers all Lithuanian municipalities to produce and adopt Municipal Action plans for RES and specific RES developments programs. Also according new Law, municipalities must implement public awareness and information measures, to provide consultations and programs for promotion of RES. Executing "Bioenergy Promotion" project the regional network point for Kaunas Region was established in Lithuanian Energy Institute. Institute has good experience for compiling, analyzing and transferring the knowledge in renewable energy for specialists and society.

The main goals of established regional network point:

- Increase knowledge about bioenergy.
- Promotion of sustainability of development of viable and environmentally friendly, social acceptable biomass production and utilization chains.
- Increase usage of biomass in the region.
- To strengthen jobs in rural areas.
- Reduction in dependency on imported fuel (Russian gas and oil).
- Selection to transferring best practice from Lithuania and project partners countries to Lithuanian expert and society.
- Support of demonstration projects.
- Communication with public, where the public can easily access information on biomass, bioenergy etc.
- Organization international, national, regional workshops, conferences, public relations.

Expertise areas of National contact point:

1. Evaluation of biomass potential.
2. Efficient use of soil and other agricultural resources.
3. Biofuels properties and production technologies.
4. Biomass combustion technologies.
5. Biomass co-firing technologies.
6. Biofuels combustion equipment and its producers.
7. Environmental impact of bioenergy.
8. Cultivation of energy (willow) plantations.

National contact point had big number individual meetings and discussions with organizations interested in bioenergy production in Kaunas Region After meetings, consultations were received agreements from big number organizations to join to the Kaunas regional network:

- Country authorities.
- Region municipalities.
- Educational facilities.
- NGO's.
- Forestry enterprises.

Region Inland, Norway

The Energy Farm / Arena Bioenergy Inland

Ole Helmer Bjørlien

Which are the most important key-findings and lessons learned of WP4 sub-regions?

- The system with a region and a regional network point is a very efficient system for introducing bioenergy in the energy system. The network point is important for the interest and how the participants in the cluster is focusing on the project and how clusters develops.
- To establish a network or cluster takes several years. The typical Norwegian project period of 3 years is too short, and is much shorter than what they have in many other countries.
- There are many interesting networks or clusters and companies/R&D institutions/Universities and public institutions working with bioenergy in Europe.
- There are big differences in laws, public support and tradition in the different clusters and countries.
- There are a lot of subjects of common interest among the participants in the project.
- Bioenergy Promotion has created a big potential for R&D and other projects between some of the regions.
- The whole chain from ”root to soot” is important. This also includes market, R&D, dealers of equipment, consultants and public authorities.
- It is a challenge to compete with fossil and hydro power energy.
- Growing forest binds more carbon.

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

- The findings must be used by the counties Hedmark and Oppland, The Energy farm and other participants in the Norwegian network.
- We should try to keep the networks within R&D, education, raw-material and small scale bioenergy still working together in Norway.
- We should establish projects of common interest between some of the regions for example in bioenergy and tourism, technology development in small scale heat and power plants, biogas plants, exchange of knowledge and other R&D projects of common interest.
- We could arrange guided bioenergy tours for groups from other regions to learn.
- Keep contact with regional network points and regions that is in front in special subjects.
- Try to spread knowledge about laws, rules and best practices in other countries so that we can adapt and reach our own goals in bioenergy for the year 2020.

Norwegian Forest and Landscape Institute

Gunnhild Søgaard

Which are the most important key-findings and lessons learned of WP4 sub-regions?

During the process on assessing biomass potentials we learned about strengths and weaknesses in the methods used for this assessment, and thereby about the uncertainties in the quantitative data. We also experienced the challenged connected to applying the developed sustainability criteria.

Through the work in identifying and establishment of innovative pilot projects we learned that there exists many good projects/ideas/concepts, but it is hard to realize them. This goes for both large scale biofuel projects to smaller scale projects. This might have several reasons, in which challenges connected to development of new technologies is obviously one of them.

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

The experience gathered from the project may be utilized in the future development of bioenergy strategies in Hedmark and Oppland counties. In addition the project has led to the identification of possible projects which may be realized.

Pomorskie Voivodeship, Poland

Katarzyna Bogucka, Institute of Fluid Flow Machinery (IMP PAN) and Baltic Eco Energy Cluster (BKEE)

Which are the most important key-findings and lessons learned of WP4 sub-regions?

- there still exist a need for sharing knowledge, examples of good practice and experiences between regions;
- stemming from above, there still exist a need for tailored training/seminars/events regarding different aspects of biomass utilisation (on possible technologies, on funding schemes, on law issues etc.);
- we have observed increasing interest in the topics mentioned above among participants of the events we have organized so far under BP project;

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

- the experiences from the WP4 sub-regions confirm that there exist a need for further education and consulting in the field of biomass utilization, therefore we will continue our activities in the region in this aspect;
- we will definitely take advantage of the international contacts made within the project;
- IMP PAN also strenghened its position in the region and is now better recognized as an actor in the biomass arena - as an example, Institute was asked for consultancy by the solid waste landfill in Gdynia in terms of biogas production and other energy and environment related issues

West Pomerania, Poland

Patrycjusz Zarebski, Technical University of Koszalin

Which are the important key-bridge Findings and lessons learned of WP4 sub-regions?

Region of Western Pomerania has a fairly large and diverse potential of renewable energy including biomass, particularly agricultural origin. There should be appropriate tools for the efficient production and distribution of both biomass and energy.

How will you use the Findings and results of WP4 sub-regions beyond the project whole life?

The main aim which was achieved by the project is to look at renewable energy as a normal market process with all laws governing the market for the production, distribution and promotion of what is most important.
Each of the partners showed an interesting way to integrate producers and promoting renewable energy. Each of the approaches is important in terms of possession potentials.

Lead partner, Sweden

Mats Johansson & Sonja Ewerstein, KanEnergi & Energimyndigheten

Which are the most important key-findings and lessons learned of WP4 sub-regions?

The work with supporting bioenergy development on regional and local scale requires quite a lot of hands on activities such as networking with stakeholders throughout the value chain. This takes much time but is needed to close the gap between organizations with resources and organization with need of energy/fuel. This is especially evident in relation to newer bioenergy sources such as biogas and agricultural energy crops.

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

The actions taken to increase the capability and awareness are a key requisite for the continued development beyond the project. The good examples and showcases from other regions will be used in this work. In addition our knowledge and capabilities has strengthened which will benefit the long term development.

Jämtland and Västernorrland, Sweden

Gabriella Gärds, Regional Association of Jämtland, (former JiLU, Institute of Forestry, Jämtland County Council)

Which are the most important key-findings and lessons learned of WP4 sub-regions?

There are many ideas and projects concerning bioenergy developed all over Europe and exchange of experiences between the European countries in the field of bioenergy as well as between different regions on national level is of great importance.
Net-working and information sessions like workshops are of great importance to increase knowledge in the regions and the cooperation between different organisations is crucial to be able to reach all necessary people.
On sub-regional level it was interesting to find out that though the area is dominated with forest there are activities concerning bioenergy in agricultural land use.

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

Since the Regional Association of Jämtland is a new organisation it will be an opportunity to use the findings of bioenergy promotion in order to develop a management plan.
The intention is to continue the work to promote the use of bioenergy on regional level and start new projects in the field including partners both from the Bioenergy Promotion projects and other partners we have met during the time of the BP-project.

Part-financed by the European Union (European Regional Development Fund and European Neighbourhood and Partnership Instrument).

Västra Götaland, Sweden

John Andersson, Naturbrukskansliet

Which are the most important key-findings and lessons learned of WP4 sub-regions?

The process of converting Europe from fossil fuels to bio energy is proceeding in all countries and for the most part problems and solutions are the same. Therefore it is very important to have an exchange of ideas and projects much like the Bio Energy Promotion project.

The process of starting new projects are very time consuming and the time in which the Bioenergy Promotion project has been run, projects have been initiated but not realized.

Many of the necessary conditions are set at the national level and on regional level it can be difficult to create optimal conditions.

How will you use the findings and results of WP4 sub-regions beyond the project lifetime?

The pilot projects will continue.
The planned projects will hopefully be started.
The Management plan will work as a guideline for our organization in the future work.

Main conclusions from project work

Most of the selected sub-regions were taking part in the project because they were engaged in bioenergy in some sense already. The selected sub-regions has had opportunities to develop further as pilot regions on bioenergy, both through project related work in the sub-regions and through inspiration and knowledge gathered from the other sub-regions.

Building networks across borders, and also across fields within bioenergy, is of major importance for experience exchange, development of new ideas and in a long term perspective to increase communication, transparency and trade on bioenergy within the Baltic Sea Region. The project has built network amongst sub-regional actors within the field of bioenergy, both amongst the project partners in the different sub-regions and among the stakeholders within the sub-regions. These are networks which can be utilized far beyond the project period. Through the project and networks experience exchange in the field of bioenergy has taken place.

Work Package 4 has led to gathering of important data:

- Several of the partners point out that gathering of updated information on e.g. biomass potentials through the project has been an important part of the work on bioenergy promotion in their sub-region.
- Some sub-regions discovered a shortage in potential biomass resources, and started to explore/look for alternative sources.
- Some sub-regions state that information gathered will be used for research, strategy development, etc. in the aftermath of the project.

Work Package 4 has led to the building of knowledge and experience which can be utilized in future sub-regional work, e.g.:

- The importance of including all actors in the processes has been emphasized as important to succeed.
- The importance and need for education of the public and competence building among potential stakeholders, both in well-developed and less developed sub-regions.
- The knowledge that small demand requires small deliveries and that bioenergy production should be adjusted to the demand. The demand might also change seasonally according to production of wind and solar energy; bioenergy might be a valuable supplement.
- That 3 years is too short time span to both identify and establish new projects. However, such "short term" projects may still contribute significantly in the process towards increased production and use of bioenergy.
- That even if there are large differences between the sub-regions in the project, both in terms of resources available, type of resources, area, infrastructure and population, there are still many common challenges and important things to learn from each other.

The project has contributed to strategic work in the sub-regions, both through gathering of information and analysis of information, and through direct strategic work.

Many of the sub-regions has used and will use the output from WP4 in strategic work related to increased production and use of bioenergy, either by using the strategy/strategic plan developed in Task 4.6, or by using elements from this and other Tasks in WP4.

Work Package 4 has led to establishment and initializing of new projects:

- Several smaller, and some larger, pilot projects in terms of bioenergy has been identified, and also some of them developed.
- Some sub-regions state that established pilot projects will be continued, and/or that identified pilot projects established.
- Some of the output will be used in future research, and new research projects are expected to follow based on output from the project and through networks build through the project.

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