

WP2 Regional Profiles

Template protocol

Introduction

The bioenergy sector requires a wide promotion for strong investments in regional sustainable supply chain solutions. Work Package 2 facilitates an open Innovation Voucher Competition for regional SMEs to identify sizeable pilot projects that strengthen bioenergy supply chains from regional sources. The best pilot proposals will be selected by an international Evaluation Committee using a set of 6 criteria.

The purpose of Task 2.1 ‘Supply chain opportunities mapping’ is to compile a short regional profile report that will act as a baseline for the assessment of the proposals submitted for the Innovation Voucher competition. It shall provide basic background info on each model region’s bioenergy market situation, to facilitate the comparison and prioritization of proposals – within one region, and across different regions.

The template is structured in five sections. The first one will provide a description of the region. The following three sections have the purpose to map the supply, refinement and final-use of the bioenergy. The last section has the purpose to describe the regional priorities and evaluate how the funds used for the innovation vouchers would be most effective in the current region.

1. Introduction

Please provide a description of the model region (no more than 500 words) including a map.

Småland consists of forests, meadows, pastures, sparkling lakes and exciting coast line. Forests are enormous and inviting for hiking, mushroom and berry picking. Here you can experience absolute silence, broken only by the chirping of birds and possibly tramping from king of the forest - the moose. Småland is one of Sweden's more lakes landscape with over 5,000. Among them, there are plenty of fishing lakes and rivers for canoeing. All are clean and safe to swim in. Trails for hiking and cycling are virtually everywhere. Småland is also design landscapes with glassworks and Scandinavian design of furniture to name a few examples. The Småland culture is easy to experience the sights and museums as well as the Småland food with authentic ingredients.

Småland is one of Sweden's larger landscape and greatest in southern Sweden with an area of 31,070 square km. It offers 758,551 inhabitants, meaning 24.4 people per square km. As a comparison, Netherlands with 395 inhabitants per square km.

Småland comprises of three counties:

Jönköping County: 10,000 square km, 339,000 inhabitants

Kalmar County: 11,000 square km, 234,000 inhabitants

Kronoberg County: 9,000 square km, 186,000 inhabitants

The largest towns are Jönköping, Kalmar and Växjö, all of which have airports and train.

The biggest owner category of productive forests are "Non-industrial private individual or family owners" with a share of 80 %. The state owns 10 %. A forest owner owns in average 45 hectares.

Mean value of forest owner age: 58 years.

63 % male owners and 37 % female owners.

Total productive area by age class (hectares)						
0-20 years	20-40 years	40-60 year	60-80 years	80-100 years	100-120 years	> 120 years
544,000	439,000	332,000	302,000	228,000	143,000	75,000

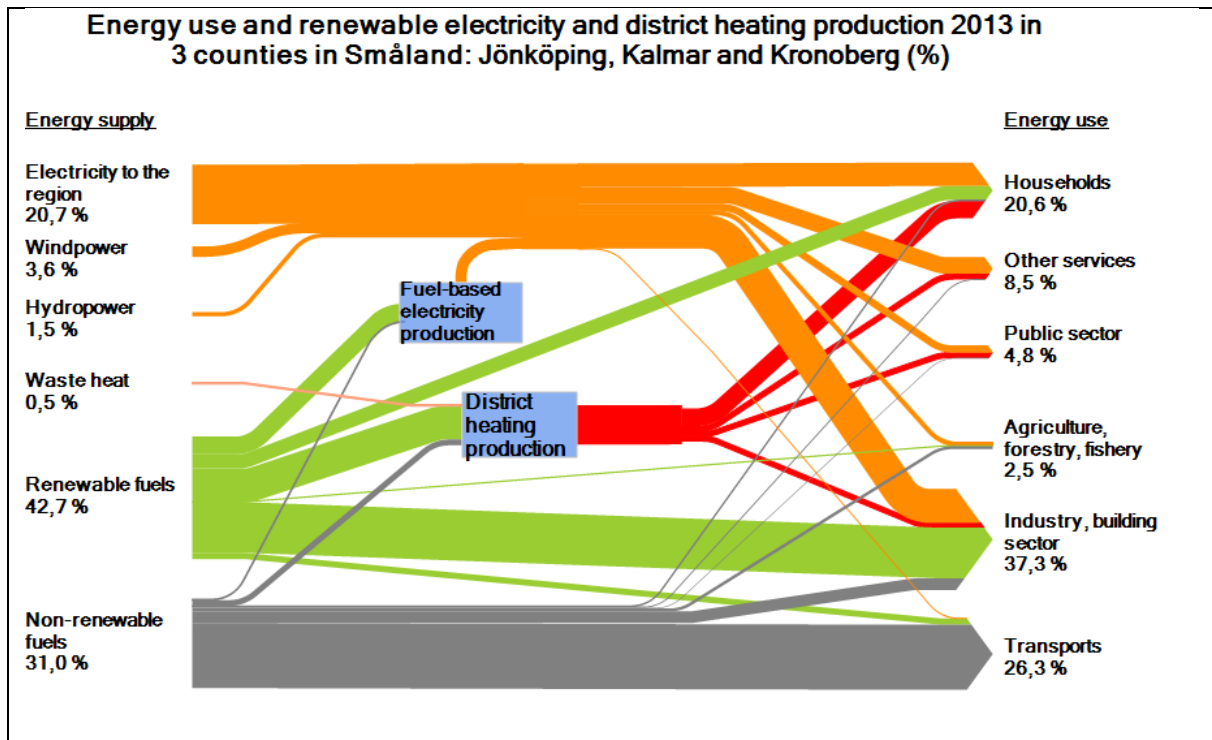
The total annual increment for hardwood is 3,100,000 m³ and 15,100,000 m³ for softwood. Forests in the region are very important for the provision of game animals, and important for mushrooms, berries and fish.

The forest type is hemiboreal. The standing volume on productive forest land in the south part of Sweden consists of 47 % Norway spruce, 30 % Scots pine, 11 % birch, 3 % oak, 3 % alder, 2 % beech and 2 % aspen. Individual plans for management of forests are used up to 100 % for the public sector and approximately for 75 % of the private forest owners. The method for timber sale in the region is Roadside for up to 96 % of the total volume and 4 % from Standing.



Sankey-chart

The Sankey-chart here below is developed in order to get an overview of energy supply to Småland, conversion in the region and final energy use.



2. Solid biofuels production

2.1 Sources

What kinds of solid biofuels are derived/refined in the region? How large are the quantities? Make a complete list of the main sources to produce solid biofuels, e.g. forest residues, whole trees, sawdust, log woods, pruning, landscaping, agrofood wastes, etc.

Annual harvest volume (in m³ over bark) in 2012.

Annual harvest volume	Total
Solidwood	7 360 000
Pulpwood	4 940 000
Fuelwood (forest residues)	1 250 000
Total	13 550 000

All the wood from region is not refined in our region. Parts of it is exported to other regions and other regions import to Småland. The net flow is export from Småland, especially for solidwood.

The bark from the solidwood represents 1,000,000 m³.

3,300,000 m³ of the solidwood becomes saw-dust and wood-chips at sawmills in the sawing process. The very most of the sawdust is used for pellet production. The wood-chips are more often transported to the heat plants.

The bark from the pulpwood represents 700,000 m³. Much of the energy content in the pulpwood becomes black liquor, used for burning in a recovery boiler. The waste-heat from that process is distributed to a municipality nearby and exchanged into the district heating grid.

Very small quantities are coming from pruning, landscaping and agrofood wastes.

In summary the quantities of biofuels derived in the region:

3,300,000 m³ saw-dust and wood-chips, 1,700,000 m³ bark and 1,250,000 m³ forest residues, and in addition also black liquor. When we exclude black liquor we will get a summary of 6,250,000 m³ bioenergy. As you can see in the Sankey diagram in paragraph 1, very much, roughly 50 %, is used in in the industry sector, it means by sawmills and pulp mills themselves. Almost all the bark is used that way.

2.2 Market actors

Describe and list the key stakeholders e.g. the largest companies and market actors regarding their business and their market share. If possible, briefly describe they key financial players fueling this companies/actors.

The bioenergy markets in southern Sweden dominated by a few big companies. These companies are acting in different parts of the value chains for bioenergy. They have for instance market shares in the pulp industry, in sawmills and also in the biomass refining industry (e.g. pellet production). The biggest companies acting in our region are Södra and Vida.

Sawmills

The company "Vida" has five sawmills in the region with a total yearly capacity of around 950 m³. It accounts for 40 % of the wood sawn in Småland. The company "Södra" has three sawmills in the region with a total yearly capacity of around 750 m³. It accounts for 33 % of the wood sawn in Småland.

More in detail we have one mill with a capacity of approximately 500 000 m³, four mills with a capacity of 200 000 m³, six mills with 100 000 m³. Seven mills between 50 000 and 100 000 m³, 18 between 10 000 and 50 000 m³ and more than 50 with a capacity lower than 10 000 m³/year. This latter category are sawmills for production for the most nearby needs and they are not operating the whole year.

Pulp mills

There is one very big pulp mill in the region, owned by Södra. It has a yearly capacity of more than 400,000 tonnes pulp. There are two other pulp mills in the region, but considerably smaller.

Primary biofuels (forest residues)

Sawmills and pulp mills are big units, on contrary to the market for extraction of forest residues. Södra and Vida are acting in this market as well. Another big company in this market is Stora Enso Bioenergi. These companies are acting together with a lot of other small and – medium sized companies. It is a diversified market.

Södra

There is a membership organisation in the region to help woodland owners make decisions about woodland management. It is named "Södra" (The south Swedish Forest Owners organization). More than 51,000 forest owners in southern Sweden are members of the economic association that is Södra. They own just over half of all privately owned forest in the area, as well as a group of companies that are successful in both Swedish and international markets. This gives them a market for their raw materials from the forest and at the same time provides the foundation for profitable forestry.

Södra is also a large employer. 3,800 people work for the Group, in areas that range from forestry management and environmental conservation to accounting, sales and product development. The Group's four business areas produce sawn and planed timber goods, interior products, paper pulp and biofuel. In recent years Södra has also become such a large producer of electricity that the Group now produces more electricity than it uses.

Södra is an economic association, our members own the industries that refine their forest products and as the owners they also get to share the profits of their industries. Together the members are the ones that decide on the direction Södra will take. It is a democratic organization in which each member has an equal voice.

Vida

With some 900 employees at 17 production facilities, VIDA AB is Sweden's largest privately owned sawmill company. Production is primarily focused on structural timber for a large assortment of different markets. Around 85% of production is exported to Europe, USA, Australia, Africa and Asia. Sales of sawn wood products are via a sales company, VIDA Wood. Operations also include the manufacture of packaging, pellet manufacture, house manufacture and biofuel trading. The plants are strategically located near forest owners in Småland and Västra Götaland regions of Sweden. Since 1999, the group has grown rapidly. Over the past seven years, turnover has quadrupled with maintained profitability. Via its own purchase company (VIDA Skog), VIDA buys most of its raw materials from private forest owners. A total of around 3 million m³ solid timber excluding bark is acquired

annually.

2.3 Barriers and opportunities

What are the main barriers and opportunities to increase the quantities (also referring to policy support)?

Currently only 50 % of the forest residues (branches and tops) from clear cutting areas are extracted and delivered to heat plants.

Barriers

- The damages in the soil and the loss of fertilization are too important factors in relation to the low income of extraction of forest residues.
- The increased damages in the soil has led to an introduction of a guarantee from some entrepreneurs to decrease the damages in the soil in the extraction processes. This guarantee is fulfilled by utilizing branches and tops in order to fill up the deep tracks and cavities.
- There is a knowledge gap. The forest owners are in general not aware that the fertilization is enough even when extracting the forest residues.

Opportunities

- There is a high potential for increased extraction from clear cutting areas.
- Development of GIS to find where at the clear cutting areas it is most appropriate to extract the forest residues.

3. Value chains

3.1 Steps

Describe the various intermediate steps of the region's key bioenergy value chains (e.g. processing, refinement).

The forest residues

It is collected and put in heaps at the clear cutting areas, preferably in the winter. (Only a small quantity origins from thinnings). In the summer, preferably, the forest residues are transported to a chipper, either in forest or on site at the heat-plant. The very most of it are used in the combustion process in a heat -, or CHP, plant.

Sawdust and wood-chips

These two fractions origins from sawmills. It can be used as fuel in a boiler on site, it can be transported to a pulp mill as a raw material for pulp, it can be transported to a heat plant and used as fuel or it can be transported to a refiner and used as raw material for

manufacturing of pellets or briquettes. The former are used in small or medium-sized boilers often for heating individual homes, the latter as fuel for boilers in a nearby district heating plant.

Bark

Much of the bark is used at pulp – or sawmills, in boilers designed for bark. A small amount is used in heat plants.

3.2 Market actors

Briefly describe the largest companies and market actors regarding their business and their market share. If possible, briefly describe they key financial players fueling this companies/actors.

There are around 25 companies operating in the chipping market. These companies has a fairly uniform size.

There are 11 pellets – briquettes producers in the region. One company, Agroenergi Neova Pellets” is regionally dominating with 55 % of the market. This company owns the two biggest plants, together producing 170,000 tonnes yearly. In total, the companies in the region produce more than 300,000 tonnes.

3.3 Barriers and opportunities

What are the main barriers and opportunities in these steps to increase the efficiency of the chain?

Barriers

- There is a knowledge gap by the entrepreneurs (practitioners) in the forests. The process for extraction is not optimized for all practitioners.
- There is an increased demand for biofuel providers to deliver a more homogenous fuel for heat plants. They currently get wood chips which differ from what they ordered, concerning the size of the wood chips. We can see a future need of separating the different fractions also to obtain a more uniform fuel for gasification plants for the production of fuels for vehicles.

Opportunities

- There is still a potential for decreasing the number of transports. The sawdust can be refined to pellets on site at sawmills to a greater extent than today.

4. End-users

4.1 Fuel refinement

In what ways different kinds of refined and/or unrefined biomass fuels are used in bioenergy production? How large are the quantities? Describe the possible need for further refinement of the fuel.

There are 15 – 20 heat - and CHP plants with a yearly thermal energy production of more than 100 GWh, and there are 40 – 50 heat - and CHP plants with a yearly thermal energy production of between 10 and 100 GWh. The number differ from one year to another depending on e.g. the temperature during the winter. Beside these plants there are several which produce less than 10 GWh/year.

It is relevant to realize that also the pulp-mills and sawmills are using bioenergy in their combustion processes. Sawmills are burning tree bark and sawdust and the pulp-mills are burning tree bark and black liquor. Fire-wood is also burned directly in homes, especially of forest owners living on the countryside.

In the figure below you can see totally installed thermal power and yearly produced energy in biofuel boilers in all district heating grids in Småland. The boilers are divided into bigger, or equal, to installed thermal power of 3 MW and smaller than installed thermal power of 3 MW. The former are, almost exclusively, fuelled by unrefined fuels (forest residues, wood-chips, bark and saw-dust). The latter are, almost exclusively, fuelled by refined fuels (pellets and briquettes).

Type of plant	Totally installed thermal power (MW)	Yearly produced energy (GWh)
Bioboilers with thermal power \geq 3 MW	810	3000
Bioboilers with thermal power $<$ 3 MW	90	250
Summary	900	3250

There is an increased demand on supplies of more uniform fractions of e.g. forest residues. This demand is, among other, based on the necessary conditions for new categories of products. The different fractions may be extracted. The new fractions may be developed by using sievings.

4.2 Market actors

Briefly describe the largest companies and actors regarding their business and their market share.

Heat plants and CHP accounts for 50 % of all end-use of bioenergy in Småland. 25 % is used in the industry sector, including sawmills and pulp-mills. Households accounts for 20 % (most fire-wood and pellets). 5 % is used for biofuel for transports. The use of bioenergy in the sector of households is extremely high in our region because of the geographically close access to the biomass.

District heating plants exist in 32 of the 33 municipalities in Småland. There are grids in different communities in most of the municipalities. The district heating company in Växjö accounts for 25 % of the regional production from biofuels. The district heating company in Kalmar accounts for around 20 % of the regional production from biofuels.

4.3 Barriers and opportunities

What are the main barriers and opportunities to increase the use at the expense of non-renewable fuels? What are the main barriers and opportunities to increase the efficiency of the use?

Barriers

- The prize for fossil oil and for electricity are very low, with the consequence that the number of heat costumers which have installed heat exchanger instead of district heating has increased.
- The import of household waste to Sweden has increased during the last years and many of the heat plants are using this as fuel in their combustion process.

Opportunities

- Some companies have converted from burning fossil fuels to biofuels because of changes in the Swedish tax system recently, which have led to higher expenses for businesses burning fossil fuels for their process.
- The energy companies have started the necessary process to find new business models for their heat e.g. varying prices depending on time of the day or of the year.
- Higher demand of the biomass when techniques for manufacturing other products are developed e.g. plastic and fuels for transports.
- The number of installation of pellet boilers is increasing in Europe, except Sweden. It is possible to export more pellets from Sweden to other countries.

5. Regional priorities and funding schemes

5.1 Export and imports

Describe the export and import of different biomass fuels to and from the current region. If there are large flows, describe the reasons for this.

The region is dominated by forests and the volume of growing stock is big compared to neighboring regions. Because of location of big plants for pulp mills, sawmills and refining, there are flows out from the region. There is a big flow of biomass from the southern parts of the model region, because of the location of a big pulp mill south of the boarder of Småland. There are two big pulp mills to the west of the region. They are also reasons for the export from the region of Småland.

5.2 Priorities and potentials

From a regional point of view: What value chains should be a priority to strengthen the bioenergy sector in the region and why? Which steps in the respective value chain have the greatest potential to strengthen the bioenergy sector in the region?

- Ash recycling is important in order to close the cycle for biomass. It is acting as fertilizer in standing forests and it lowers the expenses for the energy companies since they do not need to pay for the deposit of the ash.
- It is important to foster companies in the industry sector using fossil fuels today to convert to biofuels. Some energy companies are using heat oil for reserve and for peak load. Efforts are important for their conversion as well.
- It is possible to optimize operations of the practitioners in the extraction process in the forests.

5.3 Funding schemes

What kind of funding schemes and/or other support programs do exist in your model region, e.g. grants, subsidies, tax benefits to produce solid biofuels, renewable energy or climate protection, giving direct or indirect support for bioenergy? Give a short description for each scheme.

1. So called "forest accounts" which is a kind of bank account that means that even a forest owner with small areas can make a big harvest. A forest account makes it possible to spread the revenue over several years, in order to avoid adverse tax consequences.

2. One sub-project, called “diversity forests” under the European Union funded project “Rural Development Programme” (Landsbygdsprogrammet), which made it possible for the Swedish forest agency to give flat rate subsidies to forest owners for their conservation efforts.
3. It has previously been a tax credit for companies that use fossil fuels to produce their own energy, e.g. steam, for use in its own production process. This tax relief will gradually disappear.

6. Summary

Provide a SWOT analysis to summarize the key points of the above sections.

<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> • The extraction, refining and amount of end-use of bio fuels are highly developed in the region. 	<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> • Different knowledge gaps by forest owners and practitioners in different processes. • No experience or knowledge for biofuel providers to deliver a more homogenous fuel.
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> • There is a high potential for increased extraction from clear cutting areas. • Changes in the Swedish tax system, which makes it more expensive to use fossil fuels. • New business models for energy companies. • Development of new bioenergy based products. 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> • The low prices for fossil fuels and electricity gets even cheaper or stay cheap for a long time.