



Bags, fabrics, fuel, chemicals. "Everything that can be done with oil can be done better with wood" says Clas Engström, CEO of Processum Biorefinery Initiative. Photo Mats Hannerz

Örnsköldsvik – a centre for green conversion

“Does Europe really want the bio-economy”? When the SNS board met entrepreneurs and innovators from the bio-economy business cluster in the north-Swedish town of Örnsköldsvik, everyone we talked to mentioned the political obstacles and insecurities associated with investment.

Bio-economy is the focus of one of the three themes in the current SNS strategy plan. It was therefore natural to arrange a board meeting in a place where the future economy is taking shape. Örnsköldsvik is home to a cluster of innovative companies and organisations, searching for products in which forest resources can replace oil.

The cluster is built around the pulp mill in Domsjö, which was established in 1903 by Frans Kempe's Mo and Domsjö AB. The industry was one

of the first, during the Second World War, to combine pulp production with production of ethanol and a large number of chemicals. It also produced dissolving pulp, the basis for the textile viscose. Production of dissolving cellulose ceased in 1979, but began again in 1993. Today, the industry has evolved into a biorefinery making additional products such as lignin, bio-ethanol and biogas. The owner since 2011, the Indian company *Aditya Birla*, controls almost one quarter of the world's production of viscose.

Lars Winter, CEO of Domsjö Fabriker, sees an increased



Lars Winter. Photo: Domsjö fabriker.

world demand for viscose textiles, which could replace cotton in many products. From a single tree, 15.000 km of thread can be made. This is enough to make 200 pairs of trousers. He also stresses that cotton production has to be reduced since it relies heavily on pesticides and excessive amounts of water. Furthermore, cotton production competes with food production.

Growing market for renewable products

SEKAB is one of Europe's leading players in the ethanol market. The ethanol is either produced or imported, and is refined into various biofuels, paints, pharmaceuticals and cleaning products. **Ylva Alwarsdotter**, responsible for strategic market development, foresees a growing demand for green



products. For example, polyethylene, the most common plastic, can be based on wood as well as on oil.

“Consumers are willing to pay 15% more for green plastic packaging, and the market is growing by 20% per year,” she says.

She sees a problem in converting the EU to a biobased society.

“We still do not have enough raw materials, and the politicians have placed high levies on world market ethanol. Politicians only discuss energy crops on farmland, but it is not possible to produce the required quantities with straw harvest from small and scattered farms. We need to be able to use forest products, and meanwhile, we need to be able to import ethanol. Fossil feedstocks are available at world market prices, so why not bio-based feedstocks? Does Europe really want the bio-economy?” she asks.

Magnus Matisons, project leader for Forest Refine, adds to what Ylwa Alwarsdotter says. “We need to be able to use our forest resources for the green conversion. Politicians in Brussels must rethink putting restrictions on using wood for bioenergy.”

Forest Refine is a cooperative project involving Sweden and Finland, aimed at analysing and improving the raw material supply to biorefineries. One important task is to disseminate information about



Ylwa Alwarsdotter.
Photo: SEKAB

its activities and highlight the importance of using the forest. Magnus Matisons still sees a need to destroy many of the myths that are spread among decision makers, particularly from southern Europe. Examples of such myths are that bioenergy creates a CO₂ debt; that it is better for the climate to leave the trees in the forest and that forests are declining in Europe. All these statements are untrue, but are still accepted by many European politicians, according to Magnus Matisons.

Political risks

Clas Engström is CEO of the Processum Biorefinery Initiative. Processum is a hub that supports research and development, innovation and up-scaling of biorefinery processes for its member companies and institutes.

Clas Engström blames both the politicians and green lobbyists for negative attitudes towards forest use and ethanol imports. There are plans to build a large gasification plant for

producing biofuel, but investors are afraid that politicians will move the goalposts. The political risk is too high.

Clas Engström also mentions the “avalanche of wood”, expected due both to increased yield and stocks in the forest and lower demand for pulp production. This means that there are large quantities of environmental friendly raw material to be used for the benefit of the society. The list of products in which wood can replace oil is long. Examples, just to mention a few in which Processum is involved, are: Aircraft fuel based on turpentine, proteins for fish fodder, torrefied pellets (“green coal” with twice the energy content of ordinary pellets) and car fuel made with biogas.



Clas Engström.
Photo: Håkan Nordström

Liisa Saarenmaa from SNS board with the cellulose solution and the viscose. One tree can give enough textiles to produce 200 pair of jeans. Photo: Mats Hannerz



Nordic strengths

"The Nordic countries have rich forest resources and a strong tradition of research related to wood and wood products, which provide robust foundations for the long-term development of innovative forest products and materials. The Nordic countries are all supporting national efforts that can jointly secure research on the forest's potential for sustainable biomass production."

from SNS strategy plan 2014–2017. see www.nordicforestresearch.org



Magnus Matisons.
Photo: Mats Hannerz

New network will highlight the role of dead wood in the carbon cycle

In the old, natural boreal forest, there could be as much as 59–148 m³ of dead wood per hectare, or 18–33% of the volume present in live trees. The managed forests of today contain about 4–12 m³/ha dead wood.

Dead wood is not only home to many threatened species, it has also been shown to be more important for the greenhouse gas balance than previously thought. Recent research has shown that aboveground wood becomes buried in forest soils resulting in slower decomposition rates, and this is increasingly more common from the southern to the northern boreal zone. Furthermore, wood decomposition does not only produce CO₂ as a carbon end-product, but also methane under aerobic conditions. New research has also led to a more robust understanding of the quantitative effects of temperature and wood properties on wood respiration and decomposition rates, as well as on carbon conversion factors for different dead wood categories.

The new network *Ecosystem services from dead wood in North European forests* receives funding from both SNS and EFINORD. Its main aim is to share experiences of measuring and modelling wood decomposition and dead wood dynamics. The joint experiences and collected data will build the foundations for a new model framework, which will capture essential aspects of wood decomposition under various climatic and other environmental conditions.

The activities in 2014 will include an open workshop and meetings

that will feed into a prototype of a database to parameterise the model framework, and an operational model framework for dead wood dynamics.

Participating countries include Denmark, Finland, Iceland, Norway, Sweden, Estonia, Latvia, Lithuania, NW Russia, Poland, Germany, the UK and Ireland.

Network: N 2014-09

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Photo: Mats Hannerz



Shortcuts from Nordic forest research

Norway

World's tallest wood building to be built in Bergen

A 14-storey timber apartment building will be built in Bergen, Norway. The building, called "The Tree" seems presently to be the tallest building in the world of its kind. The building will store carbon dioxide corresponding to more than 2,000 tonnes of CO₂ emissions, enough for 10 million kilometers driving in a petrol car.

Source: www.nordicforestry.org

Norway

***Usnea longissima* benefits from selective logging**

The lichen *Usnea longissima* has been back cornered by industrial logging and pollution. However, the lichen can benefit from gentle logging. A study in Norway showed that the number of thalli increased when the forest became more open. The authors suggest that gentle logging, securing lichen-bearing trees, may be a viable management option.

Source *Silva Fennica 2014 (Storaunet et al.)*

Norway and Sweden

New apps for firewood and frogs

Forest science is, to an increasing extent, part of everyone's life through new technology. The Norwegian Forest and Landscape Institute has launched an app, "*Vedkalkulator*", that calculates the energy content of firewood. The Swedish University of Agricultural Sciences has produced an app, "*Grodguiden*", that can be used to identify frogs and toads.

"*Vedkalkulator*" is described on the webpage of the Norwegian Forest and Landscape Institute. "*Grodguiden*" is described on SLU's website.

How much dead wood? Depends on definition

Great caution must be exercised when figures for dead wood volumes are compared among countries, due to different definitions. This was an important result of an analysis based on Swedish plot data.

Many countries base their recording of dead wood on fragments larger than 10 cm in diameter and longer than about 1 m. This means that considerable amounts of fine woody debris, and also stumps, are excluded. Still, these fractions of dead wood are important for many species that depend upon this resource. The differences also affect estimates of greenhouse gas emissions. If the finer fractions are included in the litter pool

instead of the dead wood pool, final estimates of total emissions may be different.

The analysis used a selection of 286 permanent plots from the Swedish National Forest Inventory (NFI), distributed throughout the country. In each plot, standing dead trees, larger than 5 cm, stumps more than 5 cm at their top end, lying stems coarser than 1 cm and dead lying branches above 1 cm were measured. Several other features were also recorded, such as degree of decomposition.

7 or 25 cubic metres?

Using the standard definition of the Swedish NFI, the total amount of dead wood amounted to 10.9 m³/ha.

In this definition, only wood coarser than 10 cm diameter and at least 1.3 m in length is included. Currently, some central European countries use a threshold of 20 cm, which, in the case of the measured plots, would give a dead wood volume of 7.3 m³.

If all fractions in the inventory are included, the dead wood volume rises to 25.0 m³. The difference is mainly composed of stumps (4.8 m³) and downed fine woody debris (7.5 m³), but standing trees and snags finer than 10 cm, and downed coarse woody debris shorter than 1.3 m also contribute.

Need for harmonisation

The authors argue for a harmonisation of international reporting on dead wood. In the boreal forests, smaller fractions are more abundant and are thus more important to include. A harmonisation of the internationally reported values requires that existing data be recalculated. This is sometimes easy, if a fraction is to be excluded, but more challenging when the data needs to be expanded to fractions not included in the existing inventories. Such recalculations could be done only with reliable conversion factors, which in turn, need to be based on specific studies.

Read more in Söderberg, U., Wulff, S. & Ståhl, G. 2014. The choice of definition has a large effect on reported quantities of dead wood in boreal forest. Scand. J. For. Res. 29, 252-258.

Dead wood: Should we count only the stem, or also the branches? And what about stumps and short pieces? Photo: Mats Hannerz



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News & Views is a newsletter from SNS containing short, popularized articles covering Nordic forest research and forestry. Articles presenting SNS-supported activities are prioritized. The newsletter is published eight times per year, and is available for download from the SNS and Scandinavian Journal of Forest Research websites.



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