

# **Trends and Market Effects of Wood Energy Policies**

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## **Highlights**

- Wood fuels, traditionally used in local domestic heating, are now also traded internationally thanks mainly to new energy promotion policies in Europe.
- In the past decade the industrial use of wood for energy production has increased significantly in different regions and individual countries.
- Increased prices for fossil fuels make it more profitable to use alternatives, among them wood for energy.
- In past years environmental concern has also become a strong driver behind the increased interest for wood energy.
- Bioenergy promotion policy in certain countries and within the European Union indicate an increased competition between traditional users of wood fibre, round wood and manufacturing by-products and users of wood fuel.
- A new actor has appeared on the scene for wood raw material – the modern bio-fuel energy production industry.
- What this will lead to in the future is an open question, the development of the future energy and forestry policies as well as market prices and the availability of woody biomass for energy purposes will impact the answer.
- Forest landowners and sawmillers benefit from this extended market of their products, on the other hand pulp and paper industries and panel manufacturers may face increased competition for their raw material.

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## Introduction

Wood fuels are traditionally fuels that have been used in the local economy for cooking and heating houses for centuries. In general, both use and production are local. Even in the past, strong competition appeared between wood for energy use and other uses of timber (shipbuilding, charcoal for iron industry etc.). Traditional wood energy use still accounts for approximately 10% of the world's energy supply.

The use of industrial wood fibre has increased significantly in past years. Pulp and paper mills, panel industry and sawmills are today's traditional users. The raw material values in general are low and decreasing. However with increased international competition in the global marketplace, wood products manufacturers in the UNECE region are always attempting to reduce costs. The competition between companies is not only for market share, but also for raw materials, i.e., wood fibre in various forms.

In the 1950s after the World War II, oil became the most important international fuel. This over-dependence on oil became evident in the 1970s when oil crises occurred, that doubled the price of crude oil over night. That sent a shockwave through western economies and started an interest in alternative energy sources.

In recent years there has been an increased awareness of environmental issues both in the scientific community, among decision makers and in the general public. Today a sustainable energy supply is of highest priority to most people on this planet. In Europe both, the European union, national governments, industry and energy and oil companies are actively developing renewable energy sources, technologies and infrastructure. Nevertheless, oil and other fossil fuels dominate by far the world's supply of energy.

Climate change due to emissions of greenhouse gases is one of the greatest environmental challenges of today. Greenhouse gas concentration in the atmosphere will continue to rise unless there are major long-term reductions in greenhouse gas emissions. Utilisation of energy is one of the major sources of greenhouse gases. Carbon dioxide (CO<sub>2</sub>) is the most important greenhouse gas and therefore increasing the use of biomass for energy is an important option for reducing CO<sub>2</sub> emissions.

The European Union (EU) has no common energy policy but there are different common goals mainly given in the European Commission's "*White Paper for a Community Strategy*" of 1999 which sets out a strategy to double the share of renewable energy in gross domestic energy use in the EU by 2010<sup>2</sup>, including a timetable for actions to achieve this objective. The Commission's Green Paper "*Towards a European Strategy for the Security of Energy Supply*" of 2000, introduced the objective of substituting 20% of traditional fuels by alternative fuels in the road transport sector by 2020. A proposal for a directive "*on the promotion of the use of biofuels for transport*", adopted by the Commission in November 2001, requires that an increasing proportion of all diesel and gasoline sold in the Member States need to be biofuels, starting with 2% in 2005 and progressively increasing so as to reach a minimum of 5.75% of fuels sold in 2010. One possible source of biomass-based fuel is ethanol produced from wood.

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<sup>2</sup> From the present 6% to 12%, with some 85 percent of the renewables being bioenergy.

Legislation supports the use of wood for energy production in several EU countries (Sweden, Finland, Austria, Denmark among others). Policy instrument in the form of targeted research and development, investment support, energy taxation of fossil fuels and fixed prices for energy produced with renewables are some examples of support. There are plans on European level, as well as on national level to increase the use of biomass. The member countries have a common EU policy to fulfil the Kyoto agreements which the EU has signed. The member countries of the EU shall jointly decrease the emissions of six different greenhouse gases with on average 8% during the period starting in 1990 and ending in 2008-2012 (depending on type of action and type of gas). The different member countries have different goals and it is up to each country to design their own policy to target the goals. Another example of this policy is the EU-funded research programmes, where focus is on non-fossil fuels and non-fossil techniques to reduce emissions of green-house gases.

The use of renewable energy has increased in past years, especially of wood fuels. The development differs for different regions and countries. What is really increased are the plans to use renewable energy. If these plans will be fulfilled is a matter of economy, price development of competing fuels, technological development, policy issues etc. In other words, there is a rather long list of uncertainties.

Experts disagree on how long we can rely on oil as the dominant energy source. We know oil resources are limited and some forecasters give about 40 years supply at today's production levels, other experts less time. The energy companies and especially oil companies have realised this of course and are searching for alternatives today.

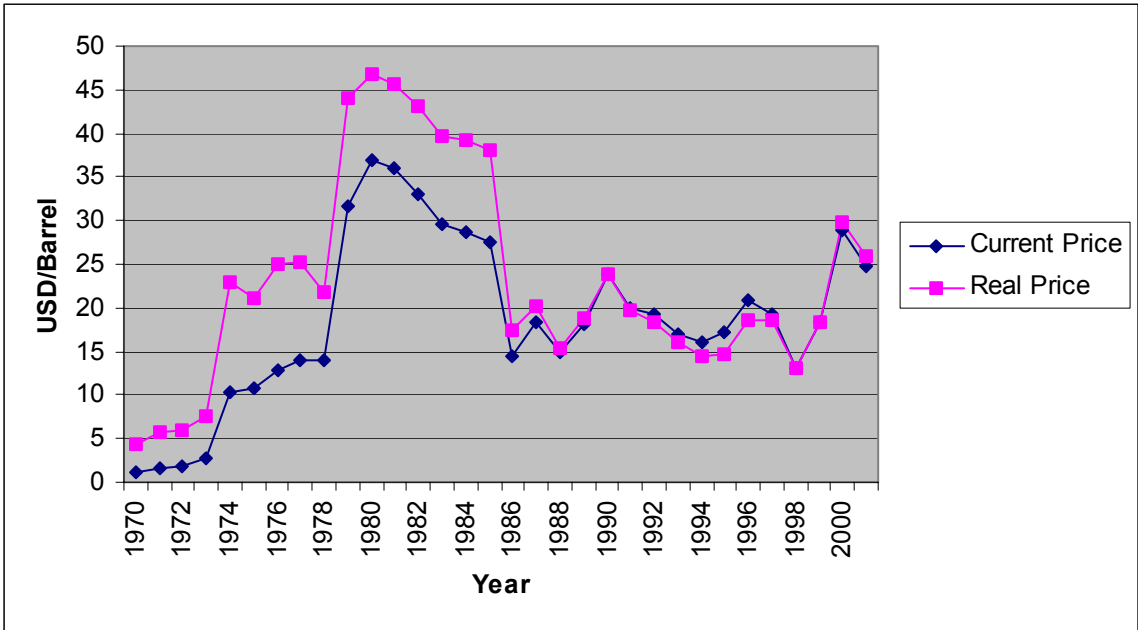


Figure 1 Crude oil in current (nominal) and real prices (base 1990). 1970-2001. STEM, 2002

We have seen an increase in energy prices over the past 30 years as in figure 1 above. During the past 3- 4 years we have seen unstable and increasing prices which also gives more incentive for alternatives like wood for energy.

## **Wood for energy**

Expanded interest in renewable energy and alternative energy sources, has resulted in increased competition for raw material. Traditional industries, as well as the energy industry, are looking for new resources.

Forest resources are identified as one of the major supplies of renewable energy as wood-fibre in different forms. Round-wood is used for domestic heating all over Europe. Sometimes it is purchased on the open market but it is more common for local forest land owners to cut their energy supply for the cold season and may be for cooking from their own small wood lots. Controlled firewood cutting also occurs on public lands by local users. This small scale use of wood for energy has a high value for the user and cumulatively in the UNECE region constitutes a significant level of cuttings and energy.

Commercially, logging residues like tops and branches are used in some Nordic countries. The forest products industry, i.e. sawmills, the panel industry and the pulp and paper industry, are the main users of timber and wood fibre in Europe. The industry produces wood and paper products but also produces by-products during the processes. By-products trade and use are complex in rather complicated trade patterns. For example, in the production of sawn wood the mill produces significant amounts of sawdust and chips, which are used in the pulp industry. Sawdust is also used in chipboard industries. Bark is mainly used for internal energy use at the mill, and sometimes by local municipalities. At worst it is deposited in landfills.

What is “new” in this market balance is the increased demand of wood for energy. This creates competition between traditional users and the energy industry, mainly regarding small-diameter wood and by-products.

The waste sector has grown strong in recent years, mainly due to legislation (for example EU waste regulations). The result of this is that large amounts of fibre are being recycled for use in the paperboard industry and for energy use.

Unfortunately there is a lack of reliable and detailed statistics in the field of wood for energy, which makes the comprehensive and detailed analyses and discussions sometimes rather difficult. We have to rely on case studies and a partial official statistics.

In the figure below a brief overview over the market is given. As we can see there is a diverse market with fuels of different qualities and of different origin. Technology could also differ quite much for combustion of the fuels and cleaning of the flue gases. Outside the figure we have the regular use and utilisation of raw materials like pulpwood, other types of waste (municipal solid waste etc.), other energy sources (like fossil fuels or nuclear power) and of course traditional industrial products from forest industry (like paper, panels or sawn wood).

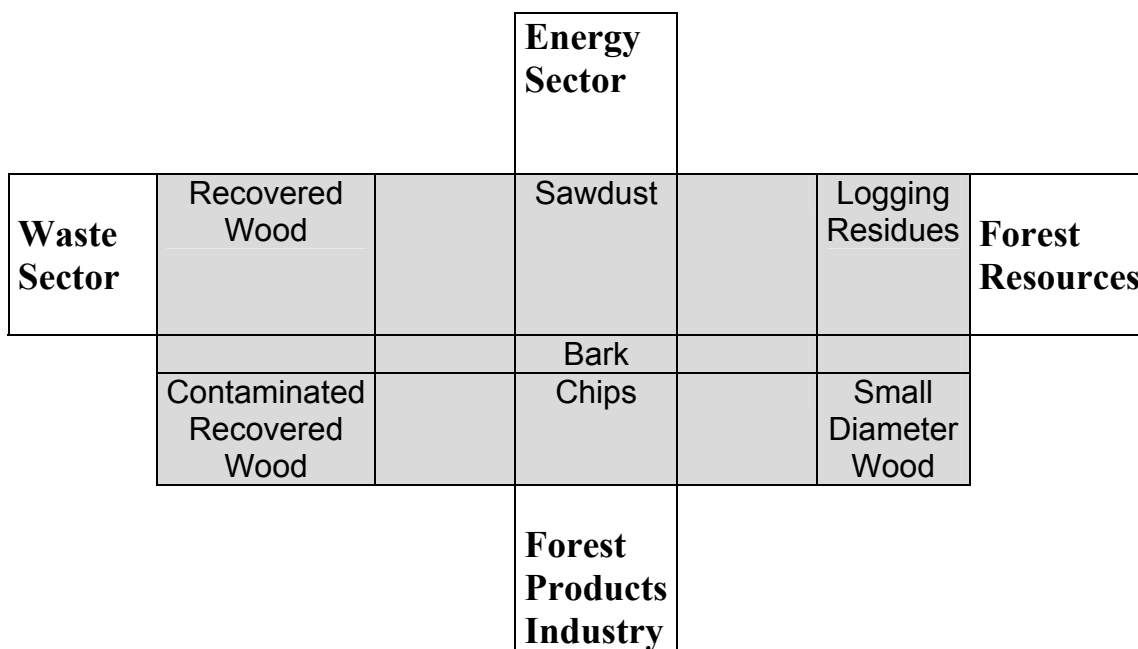


Figure 2 Overview of wood market actors.

Note: Forest resources on the right. Some actors demand one quality of timber and produces by-products which are very essential for others (Source: EU COST E31 action, 2003).

What are the driving forces behind this new situation? In many countries legislation has been changed in order to target a more diverse supply to the energy production system. There are of course many alternative energy sources and wood for energy is a significant resource ready for use today and there are modern, efficient technologies in existence to utilise wood.

International agreements and programs meeting environmental threats are under way. The Kyoto Protocol calls for a reduction of green house gas emissions. Programs are established and here wood for energy is also very important and its use is being stimulated. Another, more regional agreement or program, is the trade of emissions that is planned for the EU and some other linked countries such as the Russian Federation. This will put additional demand on wood resources in the future.

One very powerful instrument for this is the introduction of energy taxation. Carbon-dioxide taxes have proved to be very efficient to change the fuel supply. One example comes from Sweden where the district heating sector has changed from fossil fuel domination to a mixture of different biofuels. This has been developed over a rather short time period (10-15 years) and on a commercial basis under the shelter of the legislation. Different national interests now question these kinds of taxes and some Governmental inquiries have been carried out recently.

## Sawdust markets

There are significant market questions for the forest products industry behind the use of wood for energy. In many cases wood is a niche fuel and very profitable for certain sectors. A typical example is the domestic heating with firewood or with wood pellets in single-family houses. Another example is the use of wood fuels for internal use in the forest products industry, which has developed even without any incentives, driven by increased fuel prices, availability of on-site waste disposal problems and low-value by-products.

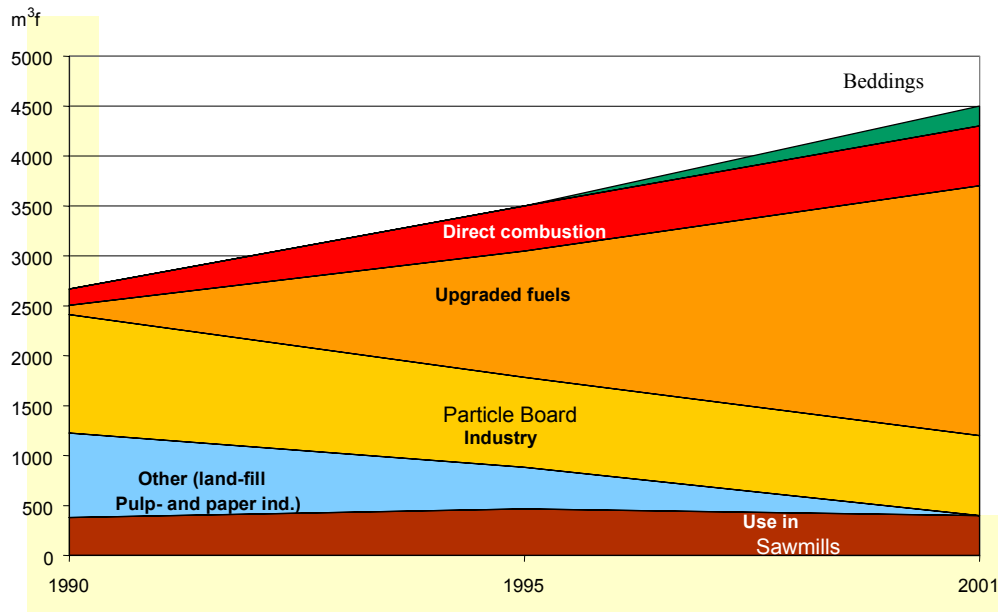


Figure 3 Use of sawdust in Sweden, 1990-2001.  
Source: STEM, unpublished.

As an example of the development of competition between traditional use of wood fibre and energy use is the sawdust market in Sweden. Traditionally the particle board industry used most of the sawdust but significant amounts also used to go to land-fills, be combusted as fuel or used in the pulp- and paper industry. In early 1990's the industry for refined wood fuels started producing pellets. Wood pellets may be used for large-scale energy production in the district-heating network but also in small-scale burning in single-family houses. We can see that there is a tremendous growth for the pellet industry but so far it has been developed along with the particle board industry (figure 3). Landfilling and other uses have decreased. Note that the use of sawdust has almost doubled during the period. The reduction of use of sawdust in the pulp and paper industry is connected to new production technologies that requires more specified and fresh raw material.

If the pellet industry growth continues, the competition will be sharper on the market for sawdust and prices will increase. The particle board industry may suffer from this but the saw-mills are winners when they can get a better price for their by-products. This could also effect timber prices and give the forest owners a better margin.

## Trade

The variable forest resources and the varying use of wood for energy are the factors behind the trade which has grown rather fast in Europe in the past years. Incentives to increase the use of biofuels will also increase the interest for trade in the near future.

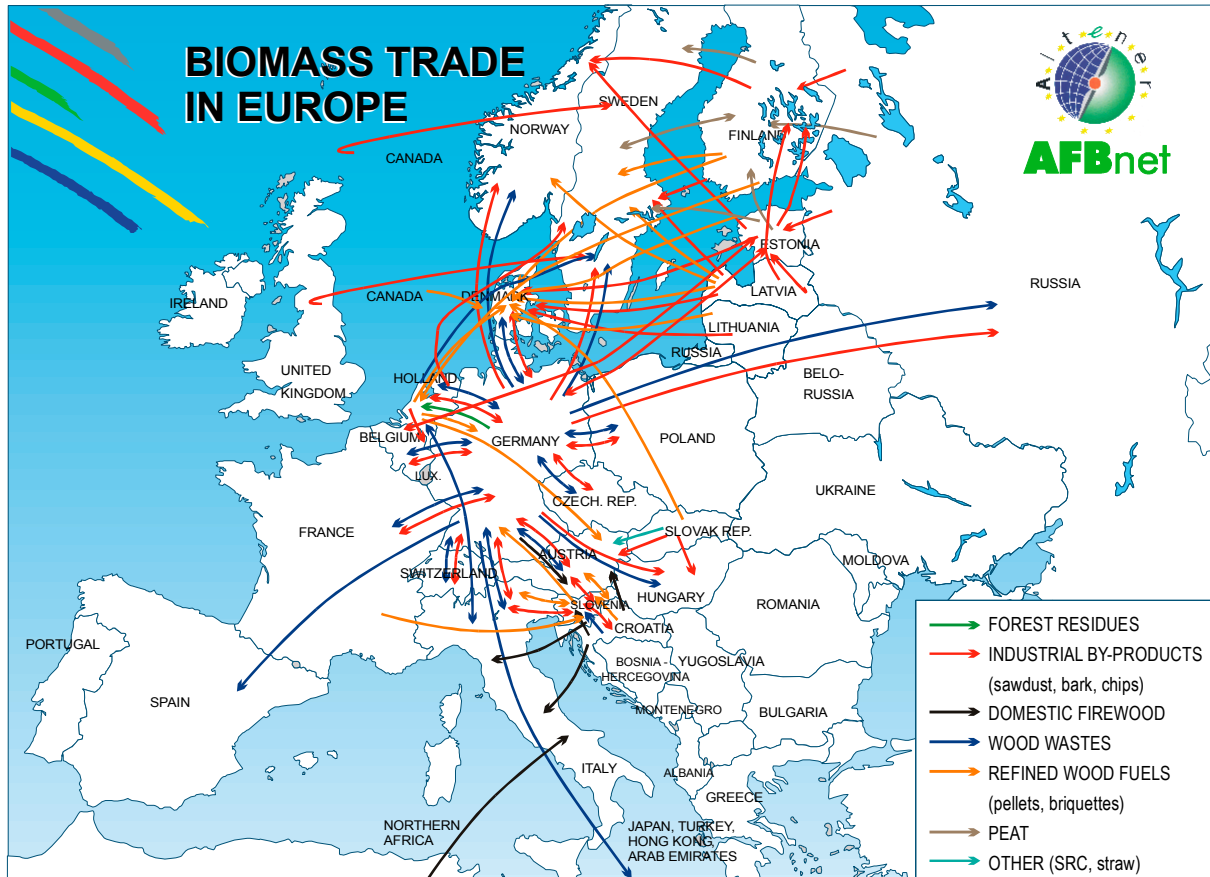


Figure 4 Import and export of solid biofuels in Europe, 1999.  
Source: Alakangas, et al., 2002.

The Baltic Sea area is one market area (figure 4). This is also true for other wood raw materials as timber and chips for the pulp industry.

Forest resources are not available to the same extent in every European country while other countries has an over supply. The trade is projected to increase in the near future when the EU policy is to be fulfilled to target the Kyoto agreement.

A very important work of standardising solid biofuels has started as the European Committee for standardisation (CEN) co-operation in 2000. One reason for this is to stimulate good competition between companies in different countries and thus also enhance more effective work and cheaper energy. Nineteen countries are participating in the work supported by national funding bodies and the European Union.

## Energy production

For heat and steam production biofuels are well established. Modern, efficient techniques are available and the production competes very well even with other energy options. Co-combustion with fossil fuels is also an alternative becoming attractive for some countries.

A key question for the future energy system is the electricity production. A very efficient way to produce electricity with biofuels is combined heat and power production (CHP). However, electricity production in CHP is not very successful so far except for some countries like Finland, Denmark, Austria and the Netherlands. The deregulated electricity markets around Europe do not favour CHP. Cogeneration cannot compete well based on any fuel with conventional electricity production technology like coal-condense techniques or hydro or nuclear power. When electricity markets are deregulated the experience has been lower prices in the first years due to increased competition and lower transaction costs. These are some factors behind the negative projections for the future.

However, EU-policies to meet the Kyoto agreement favour CHP with biofuels (post Kyoto forecast). It is unclear what impact this policy will have on electricity production with biofuels in the future. In the end it is a question of profitability for the investor.

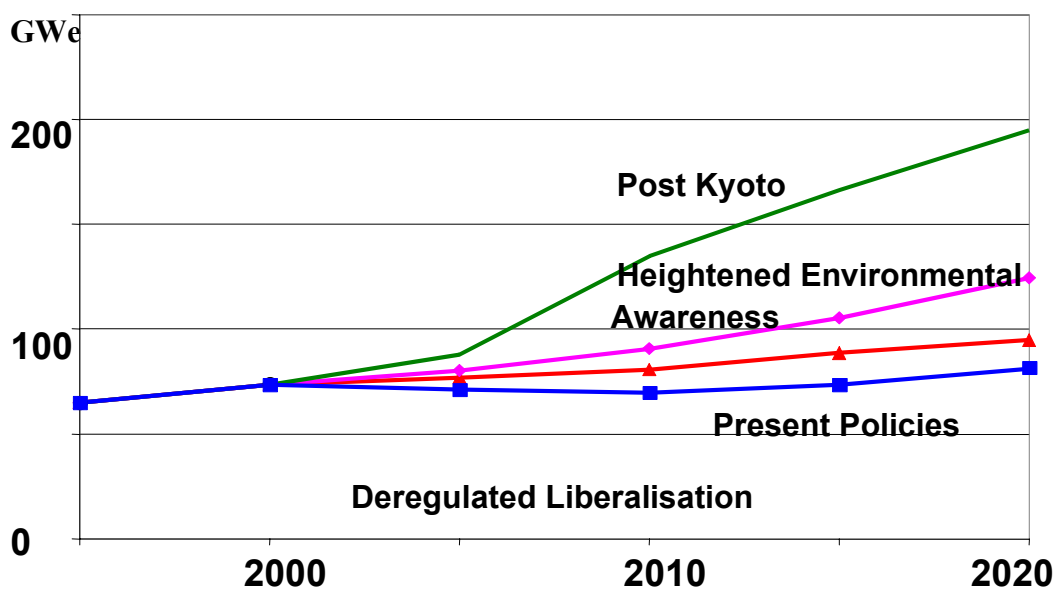


Figure 5 Future Cogeneration capacity in EU, all fuels. GWe  
Source: COGEN Europe, Brussels.

## Discussion

This short paper outlines a future with increased competition in Europe for forest resources and manufacturing by-products. What will that mean for the energy production, for the traditional industry, for the energy industry and for landowners and sawmills?

Wood-based energy production could be expected to increase for heat and steam production. However for electricity production in CHP, electricity prices must rise significantly or new



technologies would have to be developed to reach profitability. It leads to the conclusion of a short-term increase for heat production and a longer perspective for CHP to be economically advantageous.

The trend is an increased use of wood in different markets - first of low cost and lower qualities, and later of more expensive, processed products. This is true for both forest products industry and for the energy industry. New quality regulations or certification could also influence this trend. The competition starts with low-value fibre, possibly without any other commercial use and when demand rises, other wood- or better timber qualities will be affected.

The annual increment of the forests increases in most European countries, gives the opportunity to expand the market for wood. Annual cuttings are lower than the increment which also yields a potential for use of wood in new sectors or for expansion in traditional sectors.

Trade of raw materials from the forest has increased and is forecasted to increase in the near future. This trade could consist of more round wood or wood fuels from eastern European countries to Nordic or central European countries as well as wood for energy from the Nordic countries to the UK. For the energy use this will bring the focus on densification of the fuel, i.e. wood pellets or wood briquettes for more economical transportation. Shipping of wood is rather efficient and access to harbour locations is very essential. An example is areas around the Baltic Sea which today are one market area for both round-wood and wood pellets for quantities that are profitable to trade from sites with good infrastructure.

With this background the forest products industry feels strong competition on the traditional raw material markets. The key question for the industry is the level of payment for their raw material. This is connected to the demand of wood products and different paper qualities.

The forest owners can benefit of this new situation when they get another alternative for their products. They have had mainly one buyer of their timber for a long time. Forest owners may also get revenue for their pre commercial thinning when wood for energy is introduced. The same situation is for the sawmilling industry which often needs payment for its by-products to reach profitability in the company. The sawmills using newer technology to saw small-sized round wood may find new competition for their raw material from energy producers, in addition to their traditional competitors for the better quality pulpwood for pulp or panels.

The energy industries, where some are very powerful and financially strong, look for new fuels from the forest sector, from the waste-sector, from the agriculture sector and elsewhere. For them biofuels is one renewable energy source competing with other, i.e. solar panels, wind energy, small-scale hydro or other techniques.

The situation for the future is rather unclear and many things can happen, both calculated as the trends above and things that are impossible to project. This is the case now, where much of the wood energy developments are directly linked to legislation and policy. Future developments surely will be shaped by national and regional policy. A proactive reaction from the industry will strengthen the position for the use of wood and give their contribution to the questions around future risks for climate change. These are questions of high political concern which should be entertained at the Timber Committee Market Discussions and special topic discussion on October 7<sup>th</sup> 2003.

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