Chapter 9
Government policies increasingly promote renewable energy sources: Wood energy markets in the UNECE region, 2009-2010[52]

Highlights

- Sustainability issues about wood fuels are increasingly being debated, but the European Union has decided not to impose EU-wide sustainability criteria for solid biomass.
- United Kingdom energy companies plan massive increases in their utilization of wood energy, further fuelling European demand for wood energy.
- In order to increase control of the value chain, European energy companies are investing in large-scale wood pellet production facilities, particularly in North America.
- Wood energy use and pellet production levels are increasing in the Russian Federation, despite the overall regression of the Russian forest sector up to 2010.
- Russian federal and regional governments are actively implementing policies on energy efficiency and renewable energy supply, increasing wood energy use and production.
- The United States has suddenly become the world's leading producer of wood pellets through the construction of a number of the world's largest pellet plants.
- The US Biomass Conversion Assistance Program introduced in 2008 as a tool to promote the use of wood residues for energy purposes has been put on hold in 2010 due to high costs and fears that it causes market distortion.
- The large export-oriented Canadian wood pellet industry is evolving with increased utilization of non-traditional raw materials (i.e. not sawmill co-products) and growing domestic pellet demand.
- Although federal policy measures about wood energy are largely absent in Canada, provincial governments are becoming increasingly proactive in promoting bio-energy market development.

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Secretariat introduction

As the world emerges from the economic and financial crisis of 2008-2009, demand for energy is rising, as well as the costs. Increasing fossil fuel costs provide incentive for lower-cost wood-based fuels. In addition to these market forces, government policies to promote renewable energy continue to promote wood for energy. Sometimes these policies raise competition for readily available wood supply. However, in the medium and long term, the forests in the UNECE region can support greater harvests to satisfy the growing need for paper and wood products, as well as wood energy.

In addition to this chapter, the UNECE/FAO Forestry and Timber Section has other activities in the wood energy field. We conducted a second Joint Wood Energy Enquiry in the UNECE region and expect to publish results in 2010. Then we intend to launch a third enquiry for our region. We held a workshop in 2009 and 2010: "Estimating potential sustainable wood supply"[53], "Strategies for increased mobilisation of wood resources from sustainable sources."[54], "Current and future woody biomass for energy – Monitoring use and understanding technology"[55], and "Policy options for wood energy"[56] in Croatia and "Policy options for wood energy"[57] in Belarus. We are embarking on a new long-term outlook study for the forest sector, which will include scenarios for wood-energy supply and demand, something not included in the 2005 outlook study.

We are pleased to have the wealth of expertise of the authors and contributors to this chapter. The lead author of the European section and chapter coordinator again was Mr. Olle Olsson,[58] Ph.D. student, School for Forest Engineers, Swedish University of Agricultural Sciences (SLU). His advisor Dr. Bengt Hillring,[59] Associate Professor, SLU, continues to inject his knowledge.

The Canadian analysis was thanks again to Dr. Warren Mabee,[60] Assistant Professor, Energy & Environmental Policy, Queen's University, Ontario, together with Dr. Christopher Gaston,[61] National Group Leader, Markets and Economics, and Ms. Antje Wahl,[62] Scientist, both FPInnovations-Forintek Division, Vancouver, British Columbia. They highlight the important trade links between Canada and Europe, as well as the fast developing domestic market.

Dr. Kenneth Skog,[63] Project Leader, Economics and Statistics Research, USDA Forest Service, Forest Products Laboratory, led the US analysis again. He was joined again by Mr. Henry Spelter,[64] Research Scientist, who also works in the Economics and Statistics Research Unit, and also by Dr. Francisco Aguilar[65], Assistant Professor at the University of Missouri, Columbia, Missouri.

The Russian Federation energy section was written again by Dr. Rens Hartkamp[66]. He works together with Mr. Hans Jansen of the UNECE Economic Cooperation and Integration Division on a project on development of biomass action plans in Russia. They have been active in this field since 1998. Supplemental information was provided by Dr. Nikolai Burdin, Director, OAO NIPIEIlesprom, as he does to other chapters in this *Review*.

Our sincere appreciation goes to all of these experts.

9.1 General energy market developments

In oil markets, prices have recovered in mid-2010 to a high but relatively steady level of $70-80 per barrel (graph 9.1.1). This is in contrast to the considerable fluctuations in 2008-2009 (IMF, 2010). It is expected that prices will

53 http://timber.unece.org/index.php?id=128

54 http://timber.unece.org/index.php?id=158

55 http://timber.unece.org/index.php?id=195

56 http://timber.unece.org/index.php?id=256

57 www.fao.org/regional/SEUR/events/minsk/minsk_en.htm

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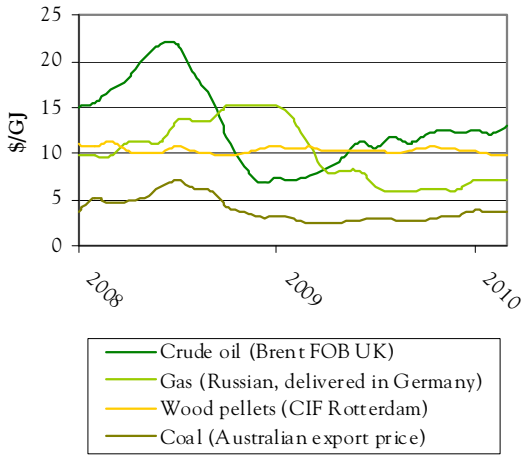
remain or increase from this level in the medium term as the global economic recovery picks up speed (Baldwin, 2010). Another factor that might affect oil markets in the coming years is the large oil spill in the Gulf of Mexico beginning in April 2010. It could result in tougher environmental standards for deep-sea projects, which in turn may increase production costs (Doggett, 2010).

In the increasingly global natural gas market, the boost in the United States production of unconventional natural gas – especially shale gas – has made the US surpass the Russian Federation as the world's leading country in natural gas production (Upstream Online, 2010).

GRAPH 9.1.1

Fuel price development, 2008-2010



Sources: IMF for coal, crude oil & natural gas prices; and Pellets@las for pellets, 2010.

9.2 European wood energy developments

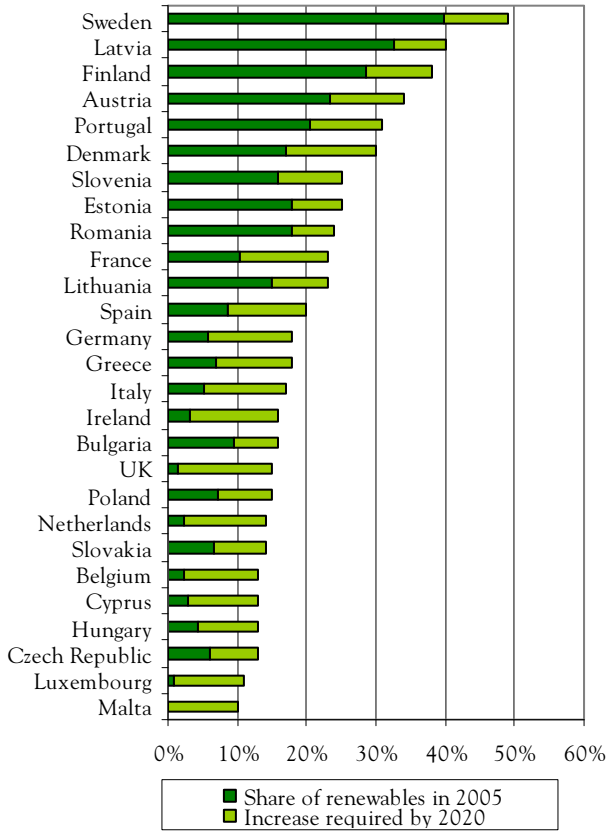
9.2.1 Europe: policies driving markets

9.2.1.1 Policies promoting renewable energy

According to the goals of the European Union energy and climate package, by the year 2020, the 27 Member States are to achieve a 20% reduction in greenhouse gas (GHG) emissions, a 20% share of renewable energy in gross final consumption and a 20% reduction in primary energy use. The EU Renewables Directive (2009/28/EC), laying out the details for the planned increase in the share of renewables, is to be implemented in the national legislation of the respective Member States in December 2010. For the 27 Member States to meet their targets, current shares of renewable energy in gross final consumption of energy will have to increase dramatically (graph 9.2.1).

GRAPH 9.2.1

EU-27 targets for renewable energy in 2020



Source: Renewables Directive (Directive 2009/28/EC 2009), 2009.

Most countries expect to reach the goals that have been set and several countries forecast that they will reach even higher levels than are required by the Renewables Directive (EurActiv.com 2010a). Eventually, the Renewables Directive will also be implemented in Iceland, Liechtenstein and Norway, but discussions on how this is to be done are still ongoing (EEA Council, 2009).

In the countries of southeastern Europe (SEE) – Albania, Bosnia and Herzegovina, Croatia, The FYR Macedonia, Montenegro and Serbia – wood energy is garnering increasing attention, especially as a means to reduce the region's dependence on expensive fossil fuel imports. Feed-in tariffs for renewable electricity production have been introduced in all the SEE countries except Albania and Montenegro, which are currently in the process of designing appropriate policy programmes (Glavonjic, 2009).

9.2.1.2 Sustainability criteria and standardization

The EU Renewables Directive defines sustainability criteria for liquid biofuels but does not specify criteria for

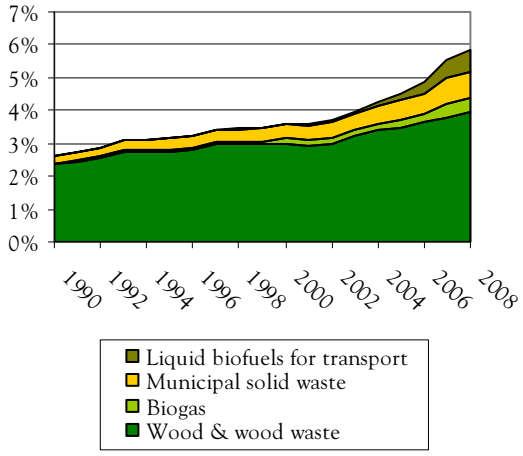
solid and gaseous biomass. Instead, in February 2010, the European Commission provided recommendations for the individual Member States to use in the development of national criteria (European Commission, 2010). This could, however, lead to development of heterogeneous systems in the EU Member States, which may well become a barrier to international bioenergy trade (Junginger, 2010). Aiming to establish globally harmonized sustainability criteria for bioenergy, the International Organization for Standardization (ISO) initiated a project, ISO/PC 248, *Sustainability criteria for bioenergy*, in January 2010 (ISO, 2010). Another important development in the field of bioenergy standardization is the publication of a Europe-wide standard for solid biofuels, EN 14961, that will supersede existing national standards (Alakangas, 2010).

9.2.2 *Europe: market developments*

The share of biomass and wastes in the gross inland energy consumption of the EU-27 countries increased from 2.7% in 1990 to 5.85% in 2008 (Eurostat 2010a). The majority of the use of biomass for energy is made up by wood energy (graph 9.2.2).

GRAPH 9.2.2

Development of the share of biomass and wastes in gross inland energy consumption in the EU-27 countries, 1990-2008



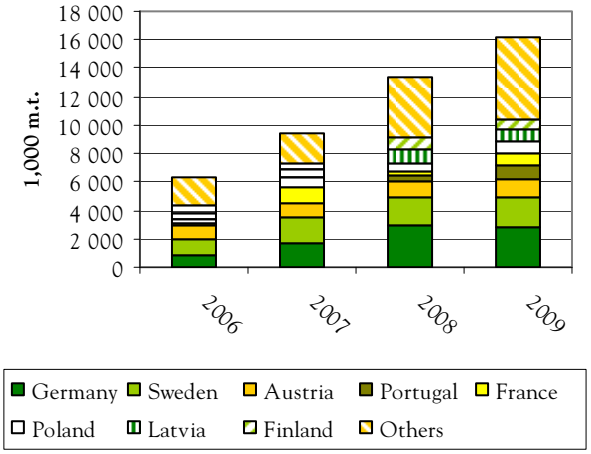
Source: Eurostat, 2009.

9.2.2.1 *Wood pellet market development*

In the European market for wood pellets, production capacity continues to increase (graph 9.2.3). According to Ljungblom (2010), wood pellet production in Europe (excluding the Russian Federation) was about 16 million metric tons (m.t.) in 2009, which means that production capacity has almost doubled since 2007.

GRAPH 9.2.3

European wood pellet production capacity, 2006-2009



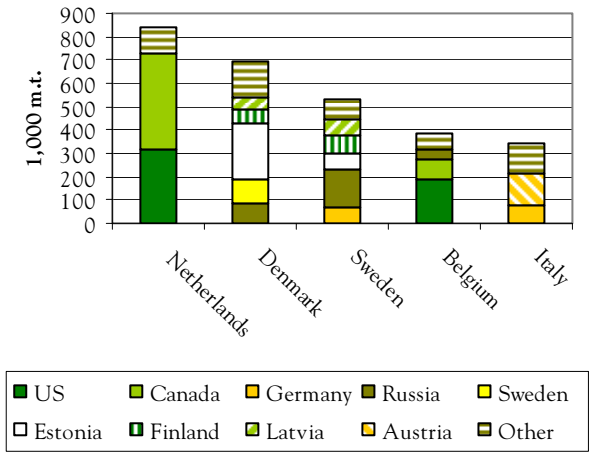
Source: Ljungblom, 2010.

However, it is important to distinguish between production capacity and actual production, and exact production volumes are hard to find. The average utilization rate – i.e. the ratio between production and production capacity – for Germany, Sweden and Austria, the European countries with the largest production capacity, was roughly 65% in 2009 (Rakos, 2010; DEPI, 2010; PiR, 2010).

Since January 2009, Eurostat has reported trade flows of wood pellets. Since there still seem to be some discrepancies in the statistics, the figures should be treated with caution (Sikkema et al., 2009). Nevertheless, this is an important development in wood fuel market transparency. According to the reported data, international internal and external EU-27 trade in wood pellets was approximately 3.8 million m.t. in 2009. The EU imported wood pellets amounting to 1.76 million m.t. Three countries – the US, Canada and the Russian Federation – are the sources for more than 80% of the wood pellets imported into the EU. However, there is also a large trade of wood pellets between EU countries (graph 9.2.4) (Eurostat, 2010b).

GRAPH 9.2.4

Major European pellet importing countries and their suppliers, 2009

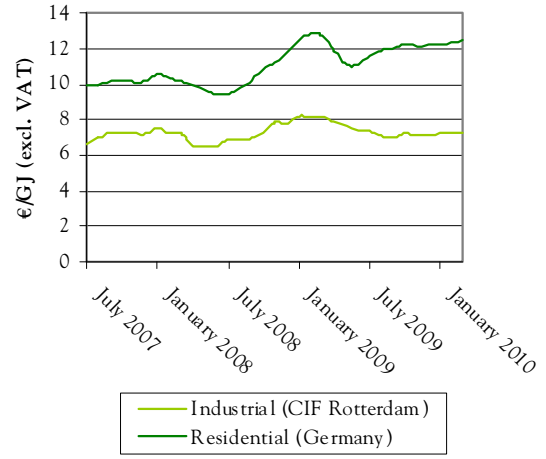


Source: Eurostat, 2010b.

The prices for industrial pellets in Rotterdam – a market dominated by imports from North America – have remained fairly stable in recent years (graph 9.2.5). This is especially true if compared to the volatile prices of oil, natural gas and coal, as shown in graph 9.1.1.

GRAPH 9.2.5

Price developments for residential and industrial wood pellets, 2007-2010



Sources: Pellets@las 2010; DEPV, 2010.

Prices for pellets used in small-scale residential heating have been on the increase since summer 2009 in Germany, the country with Europe's largest pellet market. Increased costs of raw material have pushed production costs upwards and reduced producer profit margins (EUWID, 2010). In 2009, 30% of the raw material supply for German wood pellet production consisted of roundwood (DEPI, 2010).

9.2.2.2 Market trends

Europe's energy companies continue to invest heavily in wood energy. This strategy is carried out both through a continuation of the established procedure of replacing existing power stations using fossil fuels with new plants using wood fuels and through investment in the wood energy value chain. Examples of this trend are the German RWE company's $148 million (€120 million) investment in a wood pellet production facility in the southern US, French company GDF Suez's joint venture with Pacific Bioenergy, and Swedish Vattenfall's 50% stake in a wood pellet plant in Miramichi in Canada (McDavid, 2010; Comfort, 2010). According to Mr. Leonhard Birnbaum of RWE, "If you don't control the value chain, you can't make money in biomass" (Comfort, 2010).

Although wood pellets have been dominating international wood fuel trade, there is a growing interest in long-distance international trade in wood chips. UK production of electricity from biomass is expected to increase greatly in the coming years as a response to the country's ambitious 2020 targets for renewable energy as shown in graph 9.2.1. This is expected to bring about a fivefold increase in UK biomass power generation capacity by 2013, compared with 2009 levels (Argus Biomass, 2010). Many of the planned projects are to be based on chips rather than pellets (Moore, 2010; Shankleman, 2010). Also, the company *Biowood Norway* will use wood chips imported from Canada and Africa to supply raw material for its 450,000 m.t. wood pellet plant on the west coast of Norway (Markhus, 2010). Although wood chips are less costly to produce, they are much more expensive to transport, as pellets have a four times higher volumetric energy density. In effect, this means that the choice of wood chips over wood pellets comes with an increased vulnerability to freight cost volatility (Reesinck, 2010).

9.3 Russian Federation wood energy developments

9.3.1 *Russian Federation: policies driving markets*

The Russian federal and regional governments are actively implementing policies on increasing the nation's energy efficiency and on stimulating the use of renewable energy sources (RES). The basis for this development was formed by Presidential Decree No. 889 of 4 June 2008 on "Various measures aiming to increase the energy and ecological efficiency of the Russian economy" (Rossiyskaya Gazeta, 2008). The federal government

targets are to improve the nation's energy efficiency by 40% and to increase the share of RES (excluding hydroelectric power) in electricity generation to 4.5% by 2020. During the past year, President Medvedev repeatedly stressed the high priority of these issues (at official meetings and in the mass media). In relation to these targets, one of the main topics of importance is the reconstruction and modernization of the municipal heating sector. At present, it consumes a substantial part of the fossil fuels the country produces. The district heating plants and transportation networks are in general extremely wasteful. These often old and worn systems provide heating to the homes of 73% of the population (Mezhevich, 2010).

One of the most important, recently-issued laws is Federal Law No. 261 on "Energy saving and energy efficiency, and on implementing changes in several Russian laws" (Russian Government, 2009). Accordingly, regional executives are to adopt a list of measures leading to energy savings and increased energy efficiency, which are to be integrated into regional and municipal programmes and should stimulate the use of RES.

The Ministry of Energy states the draft bill on "Heat Supply" will address measures for development of RES. On 18 February 2010, a roundtable of the Council of Federation of the Federal Assembly was held on the regulatory framework of the district heating sector. Over the years, many district heating plants have been privatized. The draft bill stipulates that the sector shall provide high quality, efficient and reliable heating supply (Ministry of Energy, 2010). In order to increase district heating efficiency, the draft bill recommends managing the district heating providers by putting in place supervising organizations. Moreover, draft bill 111741-5 on "Implementing changes in several legislative acts, in order to increase the energy and ecological efficiency of the Russian economy" is now in second reading in the Duma. This draft bill proposes transferring the responsibility of the heating supply sector to the regional governments.

In 2009, the financial crisis had a major impact on the Russian forest and woodworking sector. Fewer investments were made in the forest sector than in the years before, and many important projects were cancelled. In 2009, domestic demand was minimal. In comparison to 2007, forest harvesting volumes dropped by 30%. But the situation improved in 2010. According to the Russian Ministry of Industry and Trade, the production index in the woodworking sphere rose by 12.1% in the first quarter of 2010, as compared to the first quarter of 2009 (Ministry of Industry and Trade, 2010).

Regardless of the poor investment climate and reduced availability of wood waste, the wood-energy market was one of the branches of the forest and woodworking sector that has had rising demand and supply since 2007.

In reaction to the investment malaise in the forest and woodworking sector, several regional governments have developed subsidizing mechanisms, which directly or indirectly stimulate the wood-energy market. Some international organizations are also actively supporting investment and development programmes in Russia. The European Bank for Reconstruction and Development is lending $37 million to modernize heating systems in the Khanty-Mansiysk region. At present, there are several European and bilateral projects on the development of the wood-energy sector, and, for example, UNECE is assisting Russian regional governments in developing biomass action plans.

In line with the developed legislation, the economic availability and possible production and use of wood energy are being studied in several regions of Russia. Two such studies have been done for the Arkhangelsk region: one by the St. Petersburg Forest Research Institute (commissioned by the federal "Fund for Information on Forest Resources") and another by the Finnish PBI Research Institute (commissioned by NEFCO) (Arkhangelsk Government, 2009). Several regional governments have started implementing concrete plans for developing the wood-energy market and for modernizing of boiler plants. In Arkhangelsk such a project has begun, with the support of the federal and regional governments (Arkhangelsk Government, 2010a). The regional development programmes will certainly contribute to a gradual increase of domestic wood-energy production and use.

Source: Metsäliitto, 2010.

The Russian pellet market is developing steadily but still depends mainly on exports to Europe. Therefore the RES policy of the EU, as mentioned in section 9.2.1.2, is of great importance for this market.

Several biomass certification schemes have already been developed. At present, some large Russian and European pellet producers and electricity companies are already demanding sustainable forest management certificates. FSC certification already has been possible in the Russian Federation for a decade. The first PEFC certificate was issued in February 2010 (PEFC, 2010).

Joint implementation projects under the Kyoto protocol and transfers of Renewable Energy Certificates are not possible in the Russian Federation yet. In November 2008, the Ministry of Energy issued Regulation No. 187 on the "Transfer and redemption of Renewable Energy Certificates". This regulation came into force in 2009 and is expected to be reviewed later this year.

9.3.2 *Russian Federation: market developments*

The export price for pellets has been stable and at present is $140 (€115) per ton FOB (port of St. Petersburg) (Ivin, 2010). Some studies state the annual production level of wood pellets rose to 960,000 m.t., and export levels to 700,000 m.t. in 2009 (RBC, 2010). However, professionals working in the field find the data used for these estimations inexact and optimistic.

Production capacity is much higher than production and has been growing. New enterprises are founded while others close and this evolution occurs in all regions, including those with good export possibilities.

The trend of increased production capacity per enterprise continues. Not only are larger production plants being built, but existing ones are expanding too. Additionally, small production sites are more prone to go bankrupt. The larger sites are being equipped with high quality wood pelletizing machinery (Glukhovskiy, 2010).

There are a few enormous pellet enterprises under construction. In the Arkhangelsk region two pellet plants are planned with a capacity of half a million m.t. a year (Arkhangelsk Government, 2010b). In the Leningrad region the companies Vyborgskaya Cellulose and Ekman & Co are building the world's largest pellet plant, with a production capacity of one million m.t. (Vyborgskaya Cellulose, 2010). The company is located near the Finnish border with good access to export routes However, it seems unfeasible to concentrate such enormous quantities of raw material. The company plans to transport roundwood by train from distant regions of the Russian Federation and Belarus. Considering the distance from raw material supply, a production capacity of 250,000 m.t. a year would already be a great challenge.

Domestic demand for all kinds of wood waste, pellets and wood briquettes is growing steadily. The trend of enterprises, cottages, and homes using small-sized wood-fired boilers (with automatic feeders) is continuing. Furthermore, production levels of products with higher added value, such as charcoal and litter granules, can be expected to rise.

The increased export tariffs on unprocessed wood, and the decline in wood processing, resulted in a surplus of roundwood in 2009. Some of these logs were chipped and exported as wood fuel.

Forest operations with the goal of harvesting energy wood are becoming more common. This makes sustainability an increasingly topical issue. Large amounts of wood for energy can be harvested after forests have been hit by fires and disease, or to improve forest stand development. The "forest reconstruction" management category regulations can, however, be misused to purchase wood easily and inexpensively (they are less demanding than for regular harvesting).

In 2009, the Finnish Forest Research Institute "Metla" issued a detailed, pioneering study on the economic availability of wood for energy in northwest Russia (Metla, 2009). It considered, among others, the use of stumps and branch and top wood, which are not used in Russia yet but possibly will be in the near future.

Source: Metsäliitto, 2010.

The drop in prices for fossil fuels, and especially the low price for natural gas, had a negative impact on the wood-energy market. The gas supply network is being expanded and several new gas-fuelled electricity plants have been built in 2009-2010. Additionally, since the 2009 *Review*, the exchange rate of the ruble recovered by 13%, constraining export revenues. Nonetheless, considering the feasibility of wood-energy use in Russia and the government policy on stimulating the use of RES, the domestic wood-energy and export-driven pellet markets can be expected to develop steadily in the coming years.

9.4 US wood energy developments

9.4.1 US: Policies driving markets

This section reviews three aspects of evolving federal policy and provides an overview of state policies. At the federal level we consider the Biomass Crop Assistance Program (BCAP) to support use of biomass for energy, developments concerning "carbon neutrality" of biomass bioenergy, and developments in the US Senate on climate change legislation on the definition of wood biomass and its role in reducing GHG emissions.

9.4.1.1 Biomass Crop Assistance Program

The federal BCAP was set up in 2008 to expand biomass energy use by offering incentives for the collection, harvest, storage and transport of biomass feedstock, and offering incentives to grow crops for bioenergy. The intention was to increase use of biomass left on the forest floor or cropland and stimulate production of energy crops for power and heat generation or liquid fuel production. The programme began in 2009 and goes to 2012. The initial estimated cost was $70 million over three years.

By early 2010, 450 facilities had been approved as eligible biomass conversion facilities. These included not only intended users such as combined heat and power facilities and power plants, but non-energy producers that burn biomass for process steam or heat including about 85 pulp and paper plants, 40 sawmills and a dozen plywood mills.

By May 2010, the cost had grown to $185 million; 80% was for forestry waste but included 16% for other waste, including $10.4 million for "sawdust and shavings" that was possibly diverted from use by existing industries.

Given the unexpected direction of the programme and criticism from the wood industry whose inputs were disrupted, the US Department of Agriculture stopped accepting applications in February 2010, and will not accept more until the final BCAP rule, expected in mid-2010. The final rule may contain modifications that allow the wood supply only from debris that has no or little market value and will stimulate growth of new bioenergy feedstocks.

9.4.1.2 Carbon neutrality of biomass energy

In the national GHG sinks and emissions accounts prepared by countries as called for by the UN Framework Convention on Climate Change or accounting required under the Kyoto protocols, the emissions from wood biomass burning are contained in the land area portions of the accounts. The reduction of biomass on the land accounts for their emissions of CO_2 to the atmosphere. The emissions from wood burning for energy do not appear in the industrial emissions accounts and it appears that wood-energy emissions do not cause a net CO_2 emission to the atmosphere.

Searchinger et al. (2009), however, point out that this type of accounting is not sufficient when assessing the net emissions effect of individual activities such as biomass burning for energy. Accurate accounting must include the effect of changes in land emissions (or carbon changes) and bioenergy emissions, in addition to fossil fuel emissions offsets. They note that some sources of wood used for energy, such as logging residue, or wood plantations established on non-forestland could result in net reductions in emissions. However, wood that comes from forestland disturbed to establish an intensive plantation for energy may release soil carbon that negates the benefit of fossil fuel emissions offsets for many years depending on existing stand and soil conditions.

Whether or not use of wood energy from existing forests in place of fossil fuels results in a net emissions reduction depends on a range of factors identified by Marland (1992). Attaining a net decrease depends on the age of the forest when harvests begin, the forest growth rate, the maximum carbon the forest can store, the efficiency of converting wood to energy, the efficiency of converting the replaced fossil fuel to energy, and the time span of forest growth used to compute the change in net emissions. The longer the time period considered, the greater the likelihood of a net emissions decrease.

Source: M. Fonseca, 2010.

Biomass carbon neutrality is being considered in rulemaking by the US Environmental Protection Agency (EPA). Without federal legislation to control GHG emissions, the EPA is required by a 2007 US Supreme Court ruling to consider GHG emissions as pollutants under the Clean Air Act and to control their emission. EPA actions have included development of guidelines to restrict emissions from certain stationary sources, such as electric power plants. The uncertainty about the carbon offset benefits of wood sources was considered in a rule

released by EPA which identifies stationary GHG emissions sources that need to have permits to emit GHGs (USEPA, 2010).

EPA received requests for exemptions for biomass combustion/ biogenic emissions but decided not to allow any exclusions. The special life cycles of many biomass sources were considered but it was determined that the information available does not provide a sufficient basis to exclude emissions of CO_2 from biogenic sources. EPA will seek more information on the life cycles associated with biomass emissions.

9.4.1.3 *US Congress discussion on greenhouse gas emission regulations and the role of biomass*

Senators Kerry and Lieberman have released a discussion draft climate change bill (US Senate, 2010) that would be the companion to the Waxman-Markey Bill (H.R. 2454) passed by the US House of Representatives. A number of provisions address concerns about the definition of renewable biomass and the impact of expanding bioenergy use on indirect emissions.

The draft definition of renewable biomass allows for more biomass use than under the Energy Independence and Security Act of 2007, but it calls for a report from the National Academy of Sciences to evaluate how sources of renewable biomass contribute to the goals of increasing energy independence, protecting the environment, and reducing GHG emissions.

It asks for the Administrator of the EPA and Secretary of Agriculture to review the report and submit recommendations concerning possible modification of the non-federal land portion of the definition of renewable biomass.

9.4.1.4 *State policies*

Common policy instruments that influence wood biomass use for energy include: (a) rules and regulations including renewable portfolio standards, (b) financial incentives, and (c) programmes supporting research, outreach and education (Aguilar and Saunders, 2010). In addition states have policies to support sustainable use of wood biomass including: (a) definitions of biomass that can be used for energy to meet regulatory targets or qualify for subsidies, (b) establishment of mandatory or voluntary best [forest] management practices for supplying wood biomass, and (c) requirement for a professional forest management plan before biomass can be removed and used to meet regulatory targets or qualify for subsidy.

Financial incentives are the most common policy instrument and used by at least 40 states, most commonly to support feedstock demand or supply or to lower cost of capital investments. Almost all are designed to support a range of renewable energy sources including wood or agricultural biomass, wind energy, or solar energy and do not focus exclusively on wood.

Rules and regulations are the second most common type of instrument. Thirty-six states and the District of Columbia have requests for proposals, which set targets for the percentage of energy generated (or publicly purchased) in the state that must come from renewable sources by certain dates. These targets are most commonly for percent of electric power from renewables but sometimes for percent of transportation fuels from renewables. In most cases they are fixed percentages for given years. In some cases targets are flexible.

Public service programmes including education, research and outreach are provided by 18 states, are least common, and are not specifically directed to support wood energy. Support is given to develop a range of technologies and for programmes to provide technical assistance to a range of businesses.

State policies supporting sustainability of wood-biomass supply include biomass definitions which are intended in part to limit competition for wood inputs with the forest products industry and to support use of underutilized material. A minority of states have developed wood biomass harvesting best management practices, including Maine, Michigan, Minnesota, Missouri and Wisconsin.

Source: M. Fonseca, 2010.

9.4.2 *US: Market developments*

In 2009, wood use for energy in the US was 2,094 petajoules (approximately 230 million m^3), down from 2,174 petajoules in 2008. Overall, use has been declining since 2006 and falls short of the peak of 2,848 petajoules in 1985 (USDOE, 2010b). The decline is due primarily to decreased industrial wood energy use – primarily in forest products industries. Since 2000, wood biomass has

accounted for about 3% of US energy production. Wood energy consumption has declined steadily as a share of all renewable energy consumption, from 45% in 1981 to 28% in 2008 to 25% in 2009.

Wood use for residential heating increased 20% for 2008 and 2009 over prior levels back to 2000. Wood use in commercial buildings has been stable since 2000. Industrial wood energy – primarily in the wood product industries – has declined about 18% since 2006. Wood-based electric power production increased from 136 petajoules in 1990 to 187 petajoules in 2008 and was 182 petajoules in 2009.

Source: M. Fonseca, 2010.

In contrast to these modest increases or declines, the intermediate wood energy product, wood pellets, used primarily for residential heating and export markets, has seen US production capacity increase from 600,000 m.t. in 2003 to over 4 million m.t. in 2009. Exports increased from under 50,000 m.t. in 2006 to more than 250,000 m.t. in 2008 with further expansion of capacity in 2009 for export markets (Spelter and Toth, 2009).

The 2010 Annual Energy Outlook projects that the current outlook for expansion of ethanol production into use of cellulosic feedstocks could be limited to 8-12 billion litres by 2022 if subsidies are not continued but could expand to the 61 billion litre target for 2022 by 2035 if subsidies are renewed and continued (USDOE, 2010a).

9.5 Canadian wood energy developments

9.5.1 Canada: Policies driving markets

In Canada, few national policies exist which act as incentives for greater wood energy use. Two important developments at the national level include the Pulp and Paper Green Transformation Program (announced August 2009) and the mandate for renewable fuels in the gasoline pool, which is scheduled to come into force in 2010. One federal policy that may have a large impact on biomass-to-energy projects in future is the recently announced phase-out of coal-fired electricity generation Canada-wide. This announcement, made by Environment Minister, Jim Prentice, in April 2010 would affect 21 plants across Canada. No legislation is currently in place to enforce this policy (McCarthy, 2010).

The Pulp and Paper Green Transformation Program is designed to provide funding for forestry companies to finance projects that will in turn deliver real environmental benefits, including renewable energy production and/or increased energy efficiency. The maximum funding is capped at Can$1 billion (US$ = 950 million) and at the individual company level is calculated based on a Can$0.16/litre credit for the volume of black liquor produced by their mills between 1 January 2009 and 31 December 2009. Firms have until 31 March 2012 to draw on funding to finance approved capital projects (Natural Resources Canada, 2010). This programme was largely introduced in response to alternative energy credits offered within the US for black liquor based energy production, which Canadian firms felt created an unfair advantage for their US-based competitors.

Canada's national Renewable Fuels Strategy (RFS) mandates an average of 5% renewable fuel content within the gasoline pool, which will provide an estimated incremental reduction of GHG emissions of about 1 million m.t. of CO_2-equivalent per year, over and above the reductions attributable to existing provincial requirements already in place. A second part of the RFS requires 2% renewable fuel in the diesel fuel pool by 2012, and regulations have also been proposed to enforce this mandate (Canada Gazette, 2010). Provincial mandates for renewable fuels are also in place in British Columbia (5% by 2010), Saskatchewan (7.5% since 2007), Manitoba (8.5% since 2008), and Ontario (5% since 2007). However, none of the renewable fuel mandates currently in place, at the provincial or federal levels, specify second-generation biomass to liquid biofuels that might be sourced from forest biomass.

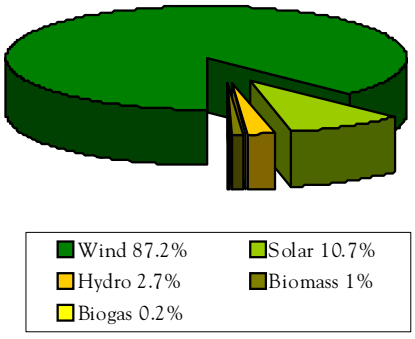
Provincial strategies are becoming more important in the development of bioenergy in Canada. The British Columbia government initiated the Bioenergy Call for Power, which so far has resulted in four electricity purchase agreements in 2009 with Canfor Pulp and PG Interior Waste to Energy in Prince George, Domtar Pulp and Paper Products in Kamloops, and Zellstoff Celgar Limited Partnership (Mercer International) in Castlegar. Also in British Columbia, the University of Northern British Columbia (Prince George, BC) has partnered with Canadian firm Nexterra to supply and install a turnkey biomass gasification system to heat its Prince George campus and anchor its new Northern Bioenergy

Innovation Centre, as part of a Can$14.8 million bioenergy programme. Nexterra is also partnering with the University of British Columbia (Vancouver, BC) on a 2 MW gasification demonstration project.

In Ontario, the Green Energy and Green Economies Act (Ontario Bill 150) was tabled at the Legislative Assembly on 23 February 2009 and passed into law on 14 May 2009. This Act spurred significant industrial activity in the first half of 2010, largely due to the inclusion of a Feed-In Tariff (FIT) programme, which provides incentives for electricity generation from a variety of renewable sources. The value of these incentives ranges from a low of Can$0.103/kWh (for landfill gas installations greater than 10 MW) to a high of Can$0.802/kWh (for roof-mounted solar panel installations under 10 kW); biomass-to-electricity (including wood-to-electricity) projects have been offered a relatively low incentive of Can$0.138/kWh (for projects less than 10 MW) to Can$0.13/kWh (for projects greater than 10 MW). On 8 April 2010, a total of 184 large-scale renewable energy projects were announced under the FIT programme, totalling slightly more than 2.4 GW of installed electricity generating capacity. Of these 184 projects, only two projects totalling 18.6 MW of installed capacity are based on woody biomass, while another five projects totalling 58.5 MW are awaiting the electrical connectivity test to determine if grid access is feasible (graph 9.5.1).

GRAPH 9.5.1

Ontario's renewable electricity portfolio by type, 2009



Source: Ontario Power Authority, 2010.

The Ontario government continues to be committed to closing coal-fired electricity generation in the Province by 2014. Ontario Power Generation (formerly the provincial power utility) has called for a sustainable supply of wood pellets for the Atikokan Power Plant, located in north west Ontario, targeting 150 million kWh and requiring approximately 100,000 m.t. of dried wood pellets annually (Energy Today, 2010). Ontario Power Generation is targeting 2012 as the year it will begin using renewable biomass as a replacement fuel for coal in some of its electricity generating units, including Atikokan. As a complement to this activity, the Province of Ontario has initiated a staged competition to provide access to available and unutilized Crown forest resources in the northwest, northeast and southern regions of the province, targeting wood supply that can be sustainably harvested but has not been used traditionally, including unused merchantable wood (timber) and unmerchantable wood (harvest residues or slash) such as tops and branches, cull and undersized wood.

9.5.2 Canada: Market developments

With strong demand from western Europe, the wood pellet sector in Canada continued to expand in 2009, despite the fact that the large number of sawmill closures has affected feedstock supply. The majority of Canada's wood-pellet capacity remains in British Columbia, with nine facilities producing almost 1 million m.t. annually (British Columbia Ministry of Energy, Mines, and Petroleum Resources, 2010). New capacity is rapidly being developed in eastern Canada, driven by a reduction in the cost of shipping pellets overseas, which is crucial for an industry that exports over 80% of its production, and increasing domestic demand driven by policy in Ontario. While European demand for pellets is expected to remain strong given the aggressive EU renewable energy targets for 2020, Canadian producers may not be able to rely almost entirely on the European market for growth. Production capacity is building within and outside Europe. Domestic demand may become more important in future years, as indicated in Ontario with prospective co-firing of wood biomass at the Atikokan plant presenting the first large-scale domestic use of wood pellets.

Several new pellet plants should open in the next year in Ontario. Woodville Pellet Corporation plans to open a plant near Kirkfield, Ontario which will produce 60,000 m.t. of wood pellets annually based on wood waste material, mostly serving the Ontario market. Canadian BioPellets (CBP) has proposed the country's largest bio pellet plant in Ingleside, Ontario. This plant is partially supported by the Ontario government, which is investing Can$5.3 million from the Forest Sector Prosperity Fund in the plant. The plant will consume up to 600,000 m.t. of wood fibre per year and produce at least 450,000 m.t. of pellets. The mill may be operational as soon as spring 2011.

Across Canada, dozens of sawmills have closed since the downturn in the economy, with British Columbia

facing the largest decline (17 mill closures as of summer 2009, representing 3.9 million m^3); overall, the sawmill industry has declined by more than 18% since 2008 (Butzelaar, 2010). Faced with declining sawdust supplies, many pellet producers now source at least part of their feedstock directly from the forest, mostly in the form of roadside logging residue and non-commercial roundwood. Even when timber markets improve, wood pellet producers and other biomass users are likely to continue to employ forest residues in their operations. The operating sawmills and other wood-processing plants increasingly install internal biomass energy systems, reducing the supply of co-products available to external users. Making the transition from low-cost sawmill co-products to higher-cost forest residues will be the biggest challenge for Canadian wood pellet manufacturers, especially those exporting to Europe, according to John Swaan of the Wood Pellets Association of Canada.

The Government of Canada, the Forest Products Association of Canada, and FPInnovations have joined forces to explore new market opportunities for bio-products. The Bio-Pathways project is investigating ways in which the Canadian forest products sector can build on its existing capacity and is assessing a range of options for renewal of the Canadian forest products industry. This project has involved Canadian experts in fields as diverse as bio-technology, investment banking and carbon pricing.

The project places wood products, especially sawnwood and pulp, at the heart of a new, green business model that has the potential to make the forest products industry a pivotal force in Canada's effort to become a clean energy super-power. One estimate is that the forest sector in Canada could eventually supply energy to meet the energy needs of 2.5 million homes, or one out of every five homes across Canada (FPAC, 2010).

9.6 References

1st Forest Industry Portal. 2009. Website 1st Forest Industry Portal. Available at: www.wood.ru/ru/lonewsid-26329.html

Aguilar, F.X. and A. Saunders. 2010. Policy instruments promoting wood-to-energy uses in the continental United States. Journal of Forestry 108(3):132-140. Available via: http://www.ingentaconnect.com/content/saf/jof/2010/00000108/00000003/art00009

Alakangas, E. 2010. European Pellet Standards – MultiPart Standard EN 14961. Bioenergy International, (44), pp.24-25.

Arkhangelsk Government. 2009. Official website Arkhangelsk Government. Available at: www.dvinaland.ru/prcenter/release/9836/?sphrase_id=1724

Arkhangelsk Government. 2010a. Official website Arkhangelsk Government. Available at: www.dvinaland.ru/prcenter/release/11323/

Arkhangelsk Government. 2010b. Official website Arkhangelsk Government. Available at: www.dvinaland.ru/prcenter/release/11768/?sphrase_id=1720

Baldwin, C. 2010. Oil price to average $80.22 a barrel in 2010. Reuters UK. Available at: http://uk.reuters.com/article/idUKLNE64O01A20100525

British Columbia Hydro. Bioenergy Initiatives. 2010. Available at: www.bchydro.com/planning_regulatory/acquiring_power/bioenergy_call_for_power.html

British Columbia Ministry of Energy, Mines and Petroleum Resources. 2010. What is bioenergy? Available at: www.empr.gov.bc.ca/RET/RenewableEnergyTechnologies/Bioenergy/Pages/default.aspx

Butzelaar, P. 2010. Canadian lumber producers go through the wringer. Logging & Sawmilling Journal, March 2010. Available at: www.forestnet.com/LSJissues/march_10/Lumber%20Producers.pdf

Canada Gazette. 2010. Renewable Fuels Regulations. Canada Gazette Part 1: Notices and Proposed Regulations, Vol. 144, No. 15, April 10, 2010. Available at: http://www.gazette.gc.ca/rp-pr/p1/2010/2010-04-10/html/reg1-eng.html

Comfort, N. 2010. RWE to Build World's Largest Pellet Plant to Cut Carbon Output. Bloomberg. Available at: http://www.bloomberg.com/apps/news?pid=newsarchive&sid=a30Bq95dIVeU

DEPI. 2010. Marktreport Heizen mit Pellets. German Pellet Institute. Available at: http://www.depi.de/depi-veroeffentlichungen.php

DEPV. 2010. Webpage of the German Energy Pellet Association. Available at: www.depv.de/

Doggett, T. 2010. Scenarios: BP spill to prompt many new regulations. Reuters. Available at: http://www.reuters.com/article/idUSN049453520100504

EEA Council 2009. Conclusions of the 32nd meeting of the European Economic Area Council. Brussels. Available at: www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/.../111177.pdf

Energy Today. 2010. Major conversion. Available at: www.energytodaymagazine.com/index.php?option=com_content&task=view&id=7089&Itemid=31

EurActiv.com. 2010a. EU nations confident on renewable energy goals. Available at: http://www.euractiv.com/en/energy/eu-nations-confident-renewable-energy-goals/article-189170

European Commission. 2010. Commission adopts biomass sustainability report (press release). Available at: europa.eu/rapid/pressReleasesAction.do?reference=IP/10/192

Eurostat 2010a. Share of renewables in gross inland energy consumption – %. Available at: http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdcc110

Eurostat 2010b. External trade detailed data: EU27 trade since 1998 by CN8. Available via: www.eurostat.com

EUWID. 2010. Depletion of high pellet stocks is taking longer than originally expected. EUWID Wood Products and Panels (8/2010). Available at: www.euwid-wood-products.com

FPAC. 2010. The Bio-Pathways Project: Major Findings. Forest Products Association of Canada. Available at: www.fpac.ca/index.php/publications/publication-viewer/166/.

Glavonjic, B. 2009. Wood energy: definition, objectives and challenges in South East Europe (Presentation at UNECE/FAO Workshop on wood energy in Southeastern Europe). Available at: http://www.fao.org/regional/SEUR/events/dubrovnik/docs/wood_glavonjic_en.pdf

Glukhovskiy, V.M. 2010. Technical Director "LesInTech". Personal Communication.

Hein, T. Beetle–Wood Mania. Canadian Biomass, Jan-Feb 2010. Available at: http://www.canadianbiomassmagazine.ca/index.php?option=com_content&task=view&Itemid=132&id=1555

IMF. 2010. IMF Primary Commodity Prices. Available at: http://www.imf.org/external/np/res/commod/index.asp

ISO. 2010. ISO standard to make bioenergy sustainable (Press Release). Available at: http://www.iso.org/iso/pressrelease.htm?refid=Ref1282

Ivin, E.L. 2010. General Director "LesInTech". Personal Communication.

Junginger, M. 2010. Biomass power & trade – conference summary. Available at: www.bioenergytrade.org/.../biomasspowerandtradeconferencesummary.pdf

Ljungblom, L. 2010. The Pellets Map 2009/10. Bioenergy International, (41).

Markhus, T., 2010. Presentation in Averoy, Norway, April 2010.

Marland, G. and S. Marland. 1992. Should we store carbon in trees? Water, Air and Soil Pollution. 64:181-195. Available at: www.springerlink.com/content/r1u44n2215284601/

McCarthy S. 2010. Ottawa tells energy firms to start powering down coal-fired plants. Globe & Mail, Sunday, 25 April 2010. Available at: http://www.theglobeandmail.com/report-on-business/ottawa-tells-energy-firms-to-start-powering-down-coal-fired-plants/article1546314/?cmpid=rss1

McDavid, K., 2010. Miramichi to construct wood pellet plant. Telegraph Journal. Available at: http://nbbusinessjournal.canadaeast.com/journal/article/1032784

Metla. 2009. Official website Metla. Available at: www.metla.fi/julkaisut/workingpapers/2009/mwp123.pdf

Ministry of Energy. 2010. Official website Ministry of Energy. Available at: www.minenergo.gov.ru/activity/vie/

Ministry of Industry and Trade. 2010. Official website Ministry of Industry and Trade. Available at: www.minprom.gov.ru/activity/avia/stat/26/4

Moore, C. 2010. The Future? A practioners ramble (Presentation at the Argus Biomass Markets Conference in Brussels, April 2010).

Natural Resources Canada. 2010. Pulp and Paper Green Transformation Program webpage. http://cfs.nrcan.gc.ca/subsite/pulp-paper-green-transformation

Ontario Power Authority. 2010. Renewable Energy: Feed-In Tariff program. Available at: http://fit.powerauthority.on.ca/Page.asp?PageID=1226&SiteNodeID=1058&BL_ExpandID=260

Pellets@las 2010. Pellet Market Database. Available at: www.pelletsatlas.info.

PiR. 2010. Swedish Association of Pellet producers. Available at: www.pelletsindustrin.org.

Rakos, C. 2010. Aktuelle Entwicklung des österreichischen Pelletmarktes. Presentation at the European Pellet Conference in Wels, Austria. Available at: www.propellets.at/images/content/pdfs/marktdatenwels.pdf

Reesinck, R. 2010. The choice between wood pellets and wood chips for large scale users. (Presentation at the Argus Biomass Markets Conference in Brussels, April 2010).

RBC, 2010. Official website of RBC. Available at: //marketing.rbc.ru/news_research/26/05/2010/562949978558963.shtml

Rossiskaya Gazeta. 2008. Decree of the Russian President of 4 June 2008, No. 889. Available at: www.ieej.or.jp/aperc/CEEP/Russia.pdf

Russian Government. 2009. Federal Law of the Russian Government of 23 November 2009, No. 261. Available at: //www.rg.ru/2009/11/27/energo-dok.html

Searchinger. T.; Hamburg, S.; Melillo, J.; Chameides, W.; Kammen, D.; Likens, G.; Lubowski, R.; Obersteiner, M.; Oppenheimer, M.; Robertson, G.P.; Schlesinger, W. and Tilman, D. 2009. Fixing a critical climate accounting error. Science. 326:527-528. Available via: www.sciencemag.org › Science Magazine › 23 October 2009

Shankleman, J., 2010. Biomass boom threatens UK wood chip shortage. Available at: http://www.businessgreen.com/business-green/news/2261205/biomass-boom-threatens-fuel

Sikkema, R, Steiner M, Junginger M, and Hiegl W, 2009. Pellets@las: Final report on producers, traders and consumers of wood pellets. Available at: http://www.pelletcentre.info/pelletsatlas_docs/showdoc.asp?id=091222195350&type=doc&pdf=true

Spelter, H. and D. Toth. 2009. The North American wood pellet sector. Research Paper RP-FPL-656. USDA Forest Service, Forest Products Laboratory, Madison, WI. 21 p. Available at: www.fpl.fs.fed.us/products/publications/specific_pub.php?posting_id=17545

USEPA. 2010. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule. Available at: www.epa.gov/nsr/documents/20100413final.pdf

USDOE Energy Information Administration. 2010a. Annual energy outlook. 2010. Report DOE/EIA-0383(2010). Available at: www.eia.doe.gov/oiaf/aeo/

USDOE Energy Information Administration. 2010b. Monthly energy review, April 2009. Available at: www.eia.doe.gov/emeu/mer/renew.html

US Senate. 2010. Discussion draft of the "American Power Act". Available at: http://kerry.senate.gov/americanpoweract/pdf/APAbill.pdf

Vyborgskaya Collulose. 2010. Official website Vyborgskaya Collulose. Available at: http://vybcell.ru/en/news.html

Olsson, O.; Hillring, B.; Hartkamp, R.; Skog, K.; Spelter, H.; Ahuilar, F.; Mabee, W.; Gaston, C.; Wahl, A. 2010. Government policies increasingly promote renewable energy sources: Wood energy markets in the UNECE region, 2009-2010. In: Forest products annual market review, 2009-2010. United Nations Economic commission for Europe (UNECE) and Food and Agriculture Organization of the United Nations (FAO). Geneva, Switzerland. Chapter 9. 166 p. 2010.