

Development and promotion of a transparent European Pellets Market
Creation of a European real-time Pellets Atlas

Final Report

Summary of pellets@las results

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TABLE OF CONTENTS

1. Executive summary.....	4
2. The pellets@las project	6
3. European pellet markets.....	7
3.1. Residential heating markets	8
3.2. Scandinavia.....	13
3.3. Industrial pellet use.....	16
3.4. Southern Europe	20
3.5. Eastern Europe	22
3.6. Summary	27
4. International pellet trade.....	30
4.1. Russia, Ukraine, Belarus	30
4.2. Western Balkan area.....	30
4.3. North America.....	31
5. Pellet quality – standards and certification	33
5.1. Quality requirements on pellets	33
5.2. Pellet quality: Standards and certification	34
5.3. Existing national certification schemes.....	35
5.4. Development of European pellet-related standards.....	39
5.5. New pellet certification (ENplus).....	43
5.6. Summary	44
6. Mixed biomass pellets (MBP).....	47
7. Policy recommendations.....	49
8. www.pelletsatlas.info	51
9. The pellets@las consortium	53
10. Basic project data	54

1. Executive summary

The importance of wood pellets for small and medium scale heat production and large scale power generation is continuously increasing across Europe. Pellet use can contribute substantially to renewable heat and electricity targets set by the EU Renewable Energy Directive.

Besides the established national pellet markets (e.g. Sweden, Austria), which are still growing strongly, additional pellet markets are emerging across Europe. This diversity regarding market development stages is accompanied by the development of heterogeneous demand and trade structures.

The European pellet market can be characterised as young, heterogeneous, and quickly growing, partly driven by political support. At this stage, lacking information in combination with a lack of professionalism, established processes and legal frameworks, can lead to severe inconsistencies. For instance, supply shortages and the resulting price increase in several countries had harmful effects on market development in the past. Other inconsistencies, e.g. concerning overproduction, misguided investments or pellet quality, can occur.

The major aim of the pellets@las project was to avoid such inconsistencies by providing public market intelligence to pellet market stakeholders such as pellet producers, traders, retailers and consumers of pellets in Europe.

Market information was acquired by questioning large numbers of market actors across Europe. Data collected included prices as well as produced/traded/consumed volumes. In addition, legal, political and economic frameworks were analysed in the EU27+2. The raw data gathered is provided freely in databases at the project website (www.pelletsatlas.info) and detailed background analyses were used to produce country reports.

Besides this central outcome, the following activities shall be mentioned:

- Provision and updates of market actors lists,
- Analysis of pellet logistics management systems,
- Assessment of international pellet trade and global pellet markets,
- Analysis of pellet supply chains regarding cost, energy and GHG efficiency,
- Analysis of markets for mixed biomass pellets (MBP), including related legal frameworks in several countries,
- Pre-feasibility studies for the implementation of MBP production projects,
- Analysis of future developments,
- Input to ongoing standardisation process for solid biomass fuels,
- Policy recommendations,
- Creation of a handbook for wood pellet combustion in several languages and a tool for calculating the financial benefit of switching to pellet heating,
- Large dissemination activities, including presentations, articles, newsletters, brochures, seminars and hotline,
- Transfer of knowhow to less developed pellet markets by organising several workshops.

The main lessons learned in the project can be summarised as follows:

- Wood pellet supply continues growing rapidly both in countries with developed supply structures and in countries with emerging wood pellet production. The data provided by the pellets@las project proved to be very valuable as a basis for investment decisions for market actors. Especially the overview of end consumer prices in many European countries is unique in its kind, has significantly added to increased market transparency, and has enabled producers, retailers and end users to make informed decisions. Also, the publication of wood pellet prices for the Rotterdam harbour area (CIF ARA prices) from 2007 onwards has met a large demand from the industry for such data – only recently, several initiatives from commercial companies have started similar indices. In addition, the pellets@las market actors' database is a valuable business networking tool for market actors looking for e.g. technology providers, buyers or other cooperation partners. Both services (data provision and business contacts) were supported by a very busy hotline service. The feedback received through this hotline was very positive and showed the usefulness of project results to market actors.
- The development of the demand side on the other hand depends largely on policy support (e.g. subsidies for householders or feed-in-tariffs / obligations in the power production sector), and therefore shows significant heterogeneity across Europe.
- Raw material availability showed to be the main (current and future) barrier to further wood pellet production development in most European countries. The results are competition for raw materials (within the industry as well as with other utilisation routes), competition for pellets produced (residential heating vs. power production) and finally increasing pellet prices. This implies the utilisation of other raw materials with high potential, such as agricultural residues. However, the production of MBP (mixed biomass pellets) is developing very slowly, mainly due to technical problems during combustion. Instead of the mobilisation of alternative raw materials, the international trade with wood pellets gains importance with significant speed and will be an important pillar for pellet supply security in the future.
- The European pellet sector professionalises continuously. Additional national data collection initiatives are under preparation, commercial price indices have been developed and national industry associations are formed.
- Many market barriers have to be addressed on a European level. Initiatives such as the development of European quality standards, European quality certification schemes or the beginning formation of a European industry association are important steps in the right direction. These and other EU-level initiatives should be supported.

2. The pellets@las project

As a young and rapidly growing industry, the European pellet sector faces several challenges. Inconsistencies concerning e.g. supply security, fuel quality or sustainability of pellet supply chains are the main barriers to stable market development, hindering investments and affecting consumers' confidence. A general lack of market intelligence at the European level used to be the main reason for harmful developments in the past. Both pellet producers and end-consumers need information on demand, supply, prices and quality as a basis for investment decisions. In addition, knowledge about market participants involved is necessary to facilitate market development in Europe.

The general aim of the pellets@las project is to promote the development of a transparent and stable European pellet market. Therefore, the main action of the pellets@las is the collection and provision of pellet market data such as prices and production volumes.

For data collection in EU27+2, specific questionnaires were elaborated and sent quarterly to producers, traders and large consumers of wood pellets and mixed biomass pellets (MBP). In addition, existing data was used, wherever available.

In order to provide easy access to the produced results, all information is disseminated via a project homepage with public databases including all collected data as well as a comprehensive contact list of involved market actors.

In order to provide background information to raw data, several analytical reports were produced, including country reports, analyses of international pellet trade developments and updates on recent relevant developments such as the ongoing European standardisation of solid biomass.

Furthermore, the stakeholders' need for information and advice was addressed by providing hotline services and information was transferred to less developed pellet markets by organising several workshops. The wider public was provided with general information on pellet usage by translating an existing pellet handbook to several European languages.

The project ended in December 2009. This report provides a summary of the main project results. The information presented here and on the project website will be kept up-to-date.

3. European pellet markets

The annual pellet production in Europe amounted to more than 7 million tons in 2008. The data collected during the pellets@las project suggests that even more than 7.5 million tons were produced. However, this data is partly based on estimations and therefore, uncertainties must be considered. Around 60 % of the produced pellets were of high quality, suitable for usage in small-scale residential combustion. Main producing countries are Sweden, Germany, Austria and Italy. The other 40 % were “industrial” pellets of lower quality. Again, Germany and Sweden contribute large shares but also countries such as Belgium and the Eastern European countries (e.g. Poland and Estonia) are important industrial pellet producers.

Even more pellets were consumed in Europe in 2008. The pellets@las data suggests that the total demand in Europe amounted to around 8 million tons. Again, uncertainties occur. Another independent (confidential) study estimates 8.2 million tons. However, it can be estimated that the consumption of high quality pellets in the heat sector (mainly Italy, Germany, Austria, Sweden and Denmark) roughly equals the consumption of industrial pellets by the power production sector (mainly Sweden, the Netherlands, Belgium, UK and Denmark).

In summary, the European demand for high quality pellets is currently covered by the domestic production while the use of industrial pellets partly depends on imports from countries such as Canada and Russia.

Concerning the future development, the demand for high quality pellets in the residential sector and particularly in the medium scale sector (e.g. community solutions) is likely to continue growing strongly, not only in the traditional markets (Germany, Austria, Italy) but also in currently small markets such as France, Spain and also in Eastern Europe. On the other hand it is unclear how the demand for industrial use (e.g. in CHP applications) will develop. In this sector, growth is anticipated in countries such as Poland but plants using pellets for co-firing are usually very flexible concerning the fuel used. Changes in pellet prices or other factors such as changes in support policies could have large influence on the future demand in this sector.

The uncertain demand development in the large-scale sector is accompanied by an ongoing build-up of additional production capacities for industrial pellets (Canada, USA and Eastern Europe, incl. Russia) while the increasing demand for high quality pellets is challenged by a difficult raw material supply situation in Europe.

Currently, the international trade with high quality pellets is of minor importance. High quality pellets are often exchanged between neighboring countries within cross-boarder retail and logistics networks. Long-distance transports of high quality pellets are rarely reported. The logistics of pellet supply to the residential sector therefore still seems to be mainly based on national or even regional supply chains. Exceptions are the pellet trade from e.g. the Baltic States to Denmark or the pellet transport from various European countries to Italy.

In contrast, the international trade with industrial pellets has reached impressive volumes. One reason for this of course is the fact that large-scale pellet consumption mainly occurs in countries without significant domestic pellet production (e.g. the Netherlands, UK and Denmark).

This picture might change in the future and the long-distance trade with high quality pellets (e.g. from Canada or Russia to Europe) might become necessary.

3.1. Residential heating markets

Austria is still the most developed market concerning residential pellet heating. Germany and Switzerland also have strong pellet industries and large consumer numbers but both countries considerably lag behind Austria when per capita values for e.g. consumption are compared. France and Ireland are only at the beginning of market development.

These countries have in common that wood pellets are currently exclusively used for heating purposes in the residential sector where central pellet heating appliances combined with loose pellet delivery and storage prevail. However, in France pellet stoves might be equally important and might become the main pellet appliance in the next years as it is the case in other Southern European countries.

Austria

In 2008, pellets were produced at 25 sites in Austria. Pellet producers are mainly family-run sawmills whose by-products (Sawdust and wood shavings) are dried and pelletised on the spot. These pellet production plants are predominantly small and medium-sized but are often part of a large company structure. In most cases sawmills are the main business field¹.

In addition, some of the larger Austrian wood processing companies have subsidiaries in Eastern Europe (e.g. Romania and Slovakia) where they produce high quality pellets for the Austrian market.

The pellet production capacity increased from 410,000 tons in 2004 to about 1 million tons in 2008 which is twice as high as the domestic demand in 2008 (about 500,000). The real production amounted to 626,000 tons. For 2009 and 2010 the start-up of 7 more pellets plants is planned. Currently, the over-production is mainly bagged and exported to Italy.

The competition for raw materials intensifies due to a significant decline in timber sales. For that reason a number of producers are starting to use cutter chips for pellets production and some have made their production ready to convert wood logs into pellet feedstock.

This of course also affects end-consumer prices (Figure 1). While pellet prices were comparably low in 2007 and 2008, price levels are high in 2009.

¹ Steiner M. & Pichler W., *Holzforschung Austria, Pellets@las country report Austria*, May 2009.

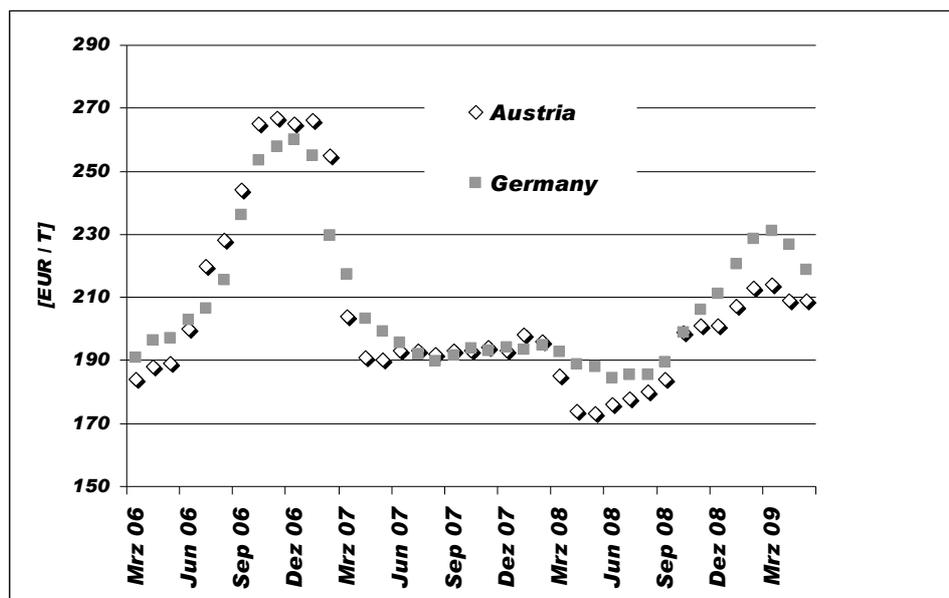


Figure 1: Pellet price development in Austria² and Germany³; Loose delivery of 5 tons; incl. transport of max 50 km; incl. VAT; ÖNORM M 7135 or DINplus.

In Austria the pellet consumption market is mainly confined to the residential sector. With the end of 2008 nearly 63,000 boilers (automatically stocked; heat output of up to 50 kW) were installed in total. Until now, pellet stoves are of minor importance. Consequently, wood pellets are mainly traded in bulk and delivered by blower lorries.

Germany

The German pellet market is in many respects similar to the market in Austria⁴. This is particularly so in relation to consumption, which displays the same structure with the exclusive use of pellets for heating, mainly delivered in bulk to households (In 2008, around 140,000 boilers, incl. central heating stoves were installed in total⁵).

With an annual pellet production of 1.46 million tons in 2008 and a production capacity of 2.4 million tons, Germany is considered to be one of the largest pellet markets⁵. However, with a pellet use of around 11 kg per person per year (50-60 kg in Austria), there seems to be potential for further market development.

After the boom years 2005 and 2006, when 17,000 and 26,000 pellet heating systems were sold in Germany per year, supply shortages and a rise of prices occurred in the winter of 2006/2007. The resulting loss of consumer confidence cooled down the market in 2007 so that only 13,000 pellet heating units were sold. The number of new installations increased again to 23,000 in 2008⁵.

² proPellets Austria, www.propellets.at.

³ C.A.R.M.E.N. e.V., www.carmen-ev.de.

⁴ Hiegl W. & Jansen R., WIP Renewable Energies, Germany, Pellets@las country report Germany, May 2009.

⁵ Deutscher Energie Pellet Verband (DEPV) www.depv.de.

In 2008, 50 wood pellet producers were registered by the pellets@las project. However, there are certainly a number of non-registered small-scale producers. The total number of pellet producers might be around 70.

Around 70 % of the registered companies produce in a small scale with production capacities of less than 30,000 tons per year. On the other hand, the large-scale producers (capacity: > 70,000 tons per year) represent around 60 % of the total pellet production capacity installed in Germany.

Small and medium-scale producers can be agricultural drying collectives and wood processing companies that use residuals for pellet production. Another type are small or medium companies that buy their raw materials from wood processing industries in their vicinity. Both types often operate their own regional distribution system and in some cases a brand name is used. In the small and medium scale there is a tendency towards forming networks. Several independent sites produce for a distribution network that sells pellets under well-established brand names. These networks can operate on regional or national level. The network not only provides the brand name and corporate identity but also a fleet of blower lorries and a network of retailers. Sometimes also a network of storage facilities is provided.

In the large scale, only three sites are known that are operated by wood industry companies. The other large-scale producers are dedicated pellet companies.

At least 90 % of the total pellet production capacities are certified for the production of DINplus pellets and it can be assumed that most of the pellets consumed in Germany are DINplus certified (around 900,000 tons in 2008⁵). At least another 600,000 tonnes were exported in 2008. This fraction probably was of lower qualities, certainly those exported to be burned in large co-firing plants in Scandinavia, Belgium and the Netherlands.

In 2008, saw dust and chippings were still the mainly used raw material for pellet production in Germany. It can be assumed that small and medium scale producers mainly use these side-products, especially when they are operated in combination with other wood processing sites. However, it can be observed that a number of larger pellet producers broadened their raw material base in 2008 and used chipped wood as a major raw material source. This was inevitable in order to avoid raw material shortages in some areas. Some companies are also actively preparing for the use of short rotation wood in the near future.

The effect on end-consumer prices is the same as in Austria and shown in Figure 1.

Switzerland

Switzerland is considered one of the smaller and less developed pellet markets⁶. This is true when only absolute numbers are taken into account: The Swiss association "Holzenergie Schweiz"⁷ estimates the installed production capacities at 170,000 tons and the consumption in the winter of 2008/2009 at 90,000 tons⁸. However,

⁶ Hiegl W. & Janssen R., WIP Renewable Energies, Germany, Pellets@las country report Switzerland, May 2009.

⁷ www.holzenergie.ch

⁸ Keel S., Holzenergie Schweiz, Nationale und internationale Märkte, 8. Schweizer Pelletforum, Bern, Switzerland, November 2008.

considering the resulting per capita values of pellet consumption of almost 12 kg per person, Switzerland becomes comparable to Germany.

Similar to Germany and Austria, wood pellets are mostly used in small scale applications for heating purposes in the residential sector. This market has great potential due to good raw material availability and a professional wood energy image campaign organized by “Holzenergie Schweiz”. The pellet trading infrastructure is well developed and end-consumers are supplied reliably.

One difference to Germany is that there are no large pellet producers (> 100,000 tons per year). Pellet production takes place mainly at wood processing businesses that use their own by-products. Consequently, there are a number of small producers (< 10,000 tons per year) and two medium scale producers of which one buys raw materials for pellet production. Some of the producers will expand their capacities while all of them state that their current capacities are not fully used.

Nevertheless it is estimated that 10 – 20 % of the domestic demand is satisfied by imported pellets⁸. This can be explained by looking at the price development of pellets. The prices as evaluated by the organisation “Transan”⁹ show relatively stable prices with reasonable fluctuations between summer and winter. The price in February 2008 was the same as it was in February 2009. Looking at the same prices converted to EUR shows that due to fluctuations of exchange rates the prices for wood pellets rose by € 20 per ton within one year and are extraordinary high compared to prices e.g. in Germany. Therefore pellets import to Switzerland becomes attractive.

Ireland

Before 2006 there was no significant market for wood pellets in Ireland, and no indigenous production of wood pellets. Two significant developments promoted the market in 2006^{10,11}.

Firstly, a sawmill and timber products company based in Enniskillen, Northern Ireland, built a combined heat and power plant (CHP), 10MW heat, 3MW electricity, with assistance from the UK government of £3 million. They also built alongside it a pellet production plant with a capacity of 50,000 tons per annum. This was commissioned in 2005 and initially exported pellets to UK power stations for co-firing. They now have a supply network across Ireland (north and south) and a distribution centre at Cork. Loose pellets are sold directly by the company, whilst bagged pellets are sold through a network of independent distributors. In the Autumn of 2008 they reported that they had 2500 domestic customers and 100 commercial customers across the whole of Ireland.

Secondly, setting up of Sustainable Energy Ireland (SEI¹²); an agency of the Irish government in 2002 to “promote and assist the development of renewable energy”. Their brief consisted of reducing dependence on fossil fuel, reducing greenhouse gas emissions and encouraging the development of renewable energy technologies. Under the “Greener Homes Scheme”, introduced in 2006, SEI provided financial

⁹ www.transan.ch

¹⁰ Hayes S., The National Energy Foundation, UK, Pellets@las country report UK, April 2009.

¹¹ Dicken P., Loughborough University, Irish wood pellet market analysis 2008.

¹² www.sei.ie

assistance to householders in the form of grants to install renewable energy systems. With the help of these grants, over 2400 biomass boilers and stoves (mostly wood pellets) were installed.

A significant further development has been the establishment of two pellet manufacturers in the Republic of Ireland. The larger of these is based near Kilkenny which became operational in the summer of 2008. With three pellet presses and a reported production capacity of 75,000 tonnes (estimated utilisation in 2008 15,000 tonnes) they can supply both loose and bagged pellets to a wide range of customers. The other, smaller producer is based in Co. Meath who produce bagged pellets and briquettes to local consumers on a domestic scale.

France

The large potential for pellet production and consumption in France is not reflected by the comparably slow market development. On the other hand, the slow growth in France avoided inconsistencies concerning pellet supply^{13,14}.

The climate in France is variable depending on the region which offers opportunities for both pellet boiler and stove usage. Barriers to stronger growth in this sector are that the use of wood for energy purposes does not have a strong tradition in urban and sub-urban areas and that the prices for electricity and gas are regulated at a comparably low level. Furthermore, pellet appliances are produced only by a few companies in France and installers (who are a main driver in other countries) do not promote pellet heating systems. In 2008, the total pellet consumption in France was around 200,000 tons. This is accounted for exclusively by the residential sector since pellet use for power generation is not reported.

This demand is satisfied by numerous small and medium scale companies who produced around 240,000 tons in 2008. They can be saw millers or feed producers but more recently, also dedicated pellet producers are emerging who collect raw materials from a number of small saw mills.

The quality of French production was heterogeneous in the past and did not promote a good development of the market. An important evolution has occurred and most of the current producers are in the process of quality certification. Since early 2009, French standards are now also available, associated to the brand name "Norme Française" better known by the French consumers than the German DINplus. This development is also supported by the newly founded French pellet producer organisation (SNPGB: *Syndicat National des Producteurs de Granulés de Bois*).

France imported around 20,000 tons of wood pellets last year (from Germany, Spain, etc) and exported around 35,000 tons to Italy, UK and some other countries. French production is currently mostly dedicated to serve the French market, imports and exports acting more as balancing tools between offer and demand.

Luxemburg

Similar to the German market the consumption of wood pellets in Luxemburg is limited to residential heating. Customers use automated pellet appliances for central

¹³ De Cherisey H., Syndicat National des Producteurs de Granulés de Bois (SNPGB), France, 5th pellets@las newsletter, June 2009.

¹⁴ Barel C., ADEME, France, Pellets@las country report France, August 2009.

heating purposes so that pellets are mainly delivered in bulk by blower lorries. The trade with bagged pellets is of minor importance.

With around 10 kg of wood pellets consumed per capita and year, the development of the market is also comparable to Germany. The total annual consumption in Luxemburg is around 5,000 tons.¹⁵

However, on the other hand, no domestic pellet producer was identified. This means that all pellets consumed are imported. Around 50 % of the pellets consumed are imported by traders based in Luxemburg, while the other 50 % are directly delivered to the end-consumers by traders / producers operating in Germany or Belgium.

3.2. Scandinavia

Scandinavia is characterised by heterogeneous market development. Currently, Sweden is the only country in Scandinavia with a significant domestic pellet production industry. Pellet production in Denmark is limited by the availability of raw materials and pellet production capacities in Finland are just about to be increased.

Denmark and Sweden belong to the largest pellet markets worldwide regarding per capita pellet consumption and in both countries, pellets are used for the whole spectrum of scale.

The pellet market in Norway is currently of minor importance while the market in Finland is rapidly developing towards a significant size.

Sweden

The Swedish wood pellet market is one of the worlds largest and especially in relation to the number of inhabitants the consumption of wood pellets is enormous^{16,17,18,19}. In 2008 the total consumption was around 1.85 million tons²⁰.

Strong drivers provide for wood pellets being used in all sizes of combustion plants from small boilers in single family houses (680,000 tons²⁰) and small heating centrals for multi-unit dwellings, public service buildings and industry over medium sized district heating plants up to large power plants producing power and heat for large district heating systems.

In 2008 around 120,000 households had pellet boilers. Another 20,000 had pellet stoves. In addition, around 4,000 medium sized boilers were in operation in Sweden.

Large scale consumption of pellets takes place in large district heating plants and CHP plants. These plants have gradually reduced their consumption of fossil fuels during the 1970-90'es due to energy taxes on fossil fuels. Many district heating plants

¹⁵ Junginger M. & Sikkema R., University Utrecht, the Netherlands, Pellets@las data collection.

¹⁶ Hansen M.T., FORCE Technology, Denmark, Pellets@las country report Sweden, July 2009.

¹⁷ Höglund J., The Swedish fuel pellets industry: Production, market and standardization. Swedish University of Agricultural Sciences, Examarbeten Nr 14, 2008. ISSN 1654-1367, 2008.

¹⁸ Selkimäki M. & Röser D., Pellet Markets in Sweden, METLA, Joensuu, 2008.

¹⁹ Hector B., Country Report Sweden, IEA Bioenergy Programme Task 40, 2007.

²⁰ Pelletsindustrins Riksförbund (PiR), www.pelletsindustrin.org

switched from combustion of oil to coal, and after the introduction of the CO₂ emission tax in 1991, they are now switching from coal to biofuels, such as pellets.

Currently around 94 companies/plants produce pellets in Sweden. The capacity is currently increasing as large market actors - energy companies and paper companies - are commissioning facilities each with capacities over 100,000 tons. In 2008, the total installed capacity was around 2.2 million tons and the actual production was around 1.5 million tons. Production is to a large extent based on residues from the numerous wood processing industries. Even though some producers are experiencing decreasing production due to changes in the feedstock availability the capacity is expected to increase in the years to come.

As mentioned above the Swedish wood pellet manufacturing companies vary in size and comprise small, locally based pelletising plants as well as large dedicated pellet plants.

Apart from being a large manufacturing country, Sweden also is a large wood pellet importing country. For the last five years, Sweden has imported between 300,000 and 400,000 tons per year. The pellets are mainly imported from Canada, Poland, Finland and the Baltic Countries.

Some Swedish manufacturers also export pellets. Up to 150,000 tons per year have been exported during the last years - the majority being shipped to Denmark and to the United Kingdom.

Pellet prices in Sweden have remained constant at a high level for a long period and have not been sensitive to the changing crude oil prices during 2008. From the end of 2008 the pellet industry has seen increasing prices of around 13 percent²⁰.

With an annual wood pellet consumption of 1,850,000 tonnes and a population of 8 million, the per capita wood pellet consumption in 2008 exceeded 230 kg per person. Although this figure provides evidence for the mature character of the Swedish pellet market, there is still a high potential for the market to grow.

The growth will take place in the residential sector and in medium sized industrial heating appliances, while in the utility sector wood pellets seems to be replaced by other solid biofuels.

The growth in the Swedish wood pellet market is expected to mainly be supplied via domestically produced pellets. The sector is furthermore expected to grow to export for the increasing pellet demand elsewhere in Europe.

Denmark

The Danish wood pellet market belongs to the largest worldwide. Similar to the situation in Sweden, wood pellets are being used in all sizes of combustion plants: Small boilers in single family houses, small block heating centrals, medium sized district heating plants and large power plants producing power and heat for large district heating systems²¹.

More than half of the residential heat demand in Denmark is supplied via district heating. The utilisation of wood pellets started in the district heating sector in the late 1980's and the annual pellet consumption quickly reached around 100,000 tonnes

²¹ Hansen M.T., FORCE Technology, Denmark, Pellets@las country report Denmark, July 2009.

and since the beginning of the 1990's this has been the consumption in the district heating sector.

The wood pellet consumption in individual boilers for space heating in private dwellings, public institutions and other large buildings also increased rapidly. The drivers would be biofuel tax exemption in combination with high taxes on fossil fuels for heating purposes and from 1995 a subsidy scheme for wood fired combustion systems with a nominal capacity below 250 kW. Since spring 2007 the pellet prices in Denmark have remained constant at a level which is low enough to encourage consumers to change for pellets and high enough to be attractive for suppliers.

Based on a variety of drivers parts of the Danish utility sector started to show interest in co-firing wood pellets into coal fired dust burners in the beginning of the new century. This resulted in a significant amount of wood pellets being utilised mainly in the advanced Avedøre 2 power plant south of Copenhagen. In the near future other large plants will follow.

Wood pellet production in Denmark is to a large extent based on dry wood residues from the numerous wood processing industries. Only recently some manufacturers have invested in facilities for drying feedstock. A utility based large pellet production plant was commissioned in 2003. The capacity of the plant was 180,000 t/y wood pellets based on logs and wood chips from a nearby wooden floor manufacturer and 120,000 t/y straw pellets. Currently, the wood pellet part is closed down and the equipment is for sale.

In the beginning of the century the national production capacity and the actual production of around 200,000 t/y was able to cover half of the demand. Currently the production is decreasing due to changes in the feedstock availability and as the demand has increased rapidly, Denmark has become a large importing country.

Finland

Pellet market development in Finland lags behind the markets in Sweden or Denmark²². The annual production is remarkably low considering the huge technical potential. Total production figures vary considerably depending on the source. It is clear that production volumes increased steadily over the past years. In 2008, production might have exceeded 370,000 tons. This was accompanied by the development of additional pellet production plants. Today, pellets are produced at more than 20 sites. Most of the producers work with small production capacities (< 30,000 tons), only one site has a capacity of more than 70,000 tons. The total production capacity in Finland may reach 680,000 tons in 2009²³. It is important to note that rapid growth of installed capacities (and actual production) can be expected for the near future. It is estimated that the Finnish pellet productions might reach volumes of 1,000,000 tons by 2010²⁴.

In contrast to the anticipated fast growth on the supply side, domestic consumption is growing slowly in Finland. Total consumption was around 150,000 tons in 2008²³. This is roughly equally distributed to the residential heating sector and to medium

²² Muiste M. & Habicht M., LETEK, Estonia, pellets@las country report Finland, August 2009.

²³ Alakangas, E., VTT, Finland, personal communication.

²⁴ Sikanen, L., University of Joensuu, PELLETtime report: Pellet markets in Finland and Europe – An overview; 2008.

scale heat applications such as community solutions. Large scale pellet combustion for power generation is not reported. Although further growth of domestic consumption (heat applications) can be foreseen, it will not meet the fast growing Finnish pellet production during the next years.

This means that Finland will remain / become a major pellet exporting country in the near future. Pellets are typically exported to Sweden, but also to Denmark and other pellet importing countries such as the UK and Belgium.

However, the development of the domestic demand will be one of the most important tasks for the Finnish pellet industry. Stable domestic demand has to be developed in order to reduce the risks of depending on pellet export which will gain importance due to increasing pellet production (and export) capacities in Eastern Europe (incl. Russia) and North America.

Norway

The Norwegian wood pellet market is very limited considering the amounts of forest in the country. The reason is that Norway has based the electricity production on hydropower and that Norway is also self-sufficient with oil and gas from the North Sea.

Almost all electricity is generated at hydro power plants in the north. Electricity is used for heating purposes in 75 percent of the houses. Annually only around 40,000 tons of wood pellets are used in Norway. Pellets are used solely for heating purposes - in pellet stoves and in a few district heating systems.

The national energy policy includes measures that will support use of bioenergy and the consumption of pellets can be expected to increase in the coming years.

The pellet production capacity is more than 160,000 tons annually, however only a small share of this capacity is currently used as the feedstock availability limits the production. In 2008 the Norwegian wood pellet production was 35,000 tons.

In close future - from 2010 - Norway can be expected to become a large exporter of wood pellets as the production capacity is currently increasing. Especially a mega-size plant with an annual capacity of 450,000 tons will change the current picture.

3.3. Industrial pellet use

In addition to Sweden and Denmark, Governmental incentives and obligations have lead to the use of wood pellets in co-firing in countries such as the UK, the Netherlands, Belgium and others like Poland.

Apart from this, pellets are hardly used for other purposes (i.e. residential heating) in the UK and Netherlands and also the domestic production in these countries is rather marginal (as in Denmark) so that large quantities of pellets have to be imported.

In contrast, Belgium is developing a considerable residential pellet heating market and pellet production capacities, besides the enormous pellet co-firing market.

The Netherlands

The Dutch pellet market is characterised by minor domestic production at only a few production sites (production capacity: 130,000 tons in 2008), a negligible market for

domestic pellet heating and a large demand for wood pellets for co-firing in coal fired power plants²⁵.

Production is mainly hampered by the lack of raw material, because most sawmill residues have a dedicated use in Belgian particle industry or in the extensive Dutch dairy sector while the development of a residential pellet heating market is hindered by lacking policy support for residential pellet boilers and the nation-wide availability of cheap and domestically produced natural gas and advanced gas boilers.

Wood pellet consumption has increased from less than 200,000 tons in 2002 to over 900,000 tons in 2008. The use of wood pellets for co-firing started in the late 1990s, when the utilities started to use larger amounts of biomass for permanent co-firing. After 2000, all production companies intensified their co-firing activities, the main reason being a covenant between the power producers and the Dutch Ministry of the Environment (2002) and beneficial policy support schemes for the production of renewable electricity from biomass. The MEP ("Environmental quality of the electricity production") feed-in premium, which was in place between 2003-2006 provided a subsidy of between 6 to 7 €ct per kWh electricity produced from clean woody biomass.

Co-firing capacity is still eligible for MEP support. The government, however, has limited its long term support to a maximum of 10 years. Because most contracts were made for the full period of ten years, it is likely that current wood imports and co-firing levels can be maintained up until 2012. After 2012, when first contracts from 2003 will be terminated, a starting decline in the consumption of wood pellets is expected, unless new subsidy schemes are put in place in the meantime.

Given the large contribution of wood pellet co-firing to the overall Dutch renewable electricity production, it is likely that a new instrument will be devised to continue the use of wood pellets.

However, as wood pellet co-firing requires very little investment costs, and depends largely on the costs of wood pellets and the cost of coal (the fuel to be substituted), it is questionable whether the currently applied SDE support system (*stimulerings duurzame energie*: feed-in premium for renewable electricity, currently not promoting pellets) will be used to stimulate future wood pellet use.

Alternatively, this could also be achieved by obliging power companies to produce a minimum share of renewable electricity from biomass. It is expected, that during 2009, more clarity on this issue will be provided by the Ministry of Economic Affairs.

Until then, the main barrier for further increase in wood pellet consumption is the uncertain future policy support. Based on the current long term grants until the period 2012-2015 (inherited from 2003-2006 governmental obligations), it is expected that current wood pellet consumption may remain more or less stable until 2012.

Today, more than 95% of all wood pellets consumed in the Netherlands are co-fired in large coal power plants. While the maximum theoretical co-firing capacity is not yet reached, the market is quickly getting mature. In about 6 power production units, wood pellets are co-fired (between 1% and 20% of total input). The substitution happens only at co-fired power plants. On average 2.8% of coal (in terms of electricity production) is substituted by wood pellets in 2008. The largest single

²⁵ Junginger M. & Sikkema R., University Utrecht, the Netherlands, Pellets@las country report Netherlands, April 2009.

consumer by far is the utility Essent, which has co-fired several hundred thousand tonnes of wood pellets annually at its Amer coal power plant. Furthermore, another large scale consumer has switched since the 1st quarter of 2008 from waste wood to wood pellets. In total, electricity consumption in the Netherlands in 2008 was about 119,000 GWh and the contribution of power production from wood pellets is about 1,700 GWh (CBS Statline 2009).

In order to satisfy this demand the Dutch utility sector started to import large amounts of pellets from e.g. Eastern Europe or North America. The wood pellets are handled almost exclusively in bulk. Typically, they are imported by large dry bulk carriers to harbors such as Rotterdam and Amsterdam, where they are transferred to smaller river barges, which transport the pellets to the final consumer, large coal power plants.

The Dutch ports of Rotterdam, Amsterdam, Flushing and Delfzijl/Eemshaven have a clear interest to become bioenergy-hubs, a scenario which is not unlikely. With increasing amounts of wood pellets being imported from North America (but possibly also from other continents), and raw material becoming scarce in North-West Europe, it is foreseen that e.g. the Rotterdam harbor could become a major hub where wood pellets are transferred from large ocean-going dry bulk carriers to smaller river vessels and coasters.

Belgium

The Green Certificate Scheme in Belgium contributed to stimulating the demand for solid biofuels, including pellets, for electricity generation in (co)combustion in Belgium which is largely satisfied by pellet imports.²⁶ Electrabel (GDF Suez) is the major consumer of industrial wood pellets in Belgium with a large demand in Les Awirs (80 MW, 100 % biomass), 4 co-firing facilities and a number of smaller units.²⁷

The total demand for industrial pellets was around 800,000 tons in 2008. Electrabel states to use 1 million tons in 2009 and expects to increase the use to 3 million tons until 2014.

In contrast to the Netherlands, the consumption of high quality pellets for household heating does play a certain role in Belgium. In 2008, private consumption in Wallonia is estimated at 40,000 tons.²⁸ The total consumption in the residential sector in Belgium might have been around 120,000 tons. Federal tax reductions and a grant system in Wallonia promote the development of this sector which was insignificant in 2006 and grew strongly, especially in 2008. Further growth can be expected especially in the pellet stove sector, stoves being the main pellet appliance in total numbers in the past.²⁹

Domestic pellet production in Belgium currently cannot satisfy this huge demand. The largest part of the industrial pellets used is imported, among others from Germany. In 2009, Electrabel signed a three-year pellet supply deal with Plantation Energy Australia worth € 39 million.

²⁶ Barel C., ADEME, France, Pellets@las country report Belgium, August 2009.

²⁷ www.electrabel.be (August 2009)

²⁸ ValBiom, Pellets Wallonia (06/2009); www.valbiom.be

²⁹ ValBiom, Pellets in Wallonia (Belgium); www.valbiom.be

While in 2006, only minor amounts of pellets were produced in Belgium, significant production capacities were installed in 2007 and 2008. In Wallonia, around 210,000 tons were produced by at least 6 producers in 2008, of which around 60,000 tons were dedicated to the residential market. A number of additional production plants are planned.

United Kingdom

Having started in the late 1990's the pellet market in the UK is beginning to reach a developed stage, with approximately 68 suppliers of pellets and 13 manufacturers (the first of whom started manufacturing in 2002)³⁰.

Pellet production and use remained relatively small in the UK until the commissioning (in 2005) of the Balcas Ltd pellet plant at Enniskillen in Northern Ireland with a production capacity of 50,000 tons (now increased to 55,000 tons). This combined with the introduction of a number of grant programmes has meant that the pellet market really started to gain momentum in the UK from 2006 onwards. However, the potential for further development of UK based pellet production is limited due to a lack of raw materials.

Consumption of pellets in the UK occurs on both the large and small scale. On the small scale pellets are consumed by householders and on the large scale they are co-fired in power stations for the production of electricity. What pellets are not generally used for in the UK is the production of heat and power in Combined Heat & Power Plants and for the production of heat in District Heating schemes, both of which are relatively rare (especially fuelled by biomass).

The consumption of high quality pellets in the residential sector is marginal so that significant amounts of these pellets are exported to e.g. Ireland or Italy. On the other hand large amounts of wood pellets are used for co-firing. The exact amount of pellets consumed however, is unknown and hard to estimate. Industry representatives have estimated that around 750,000 tons were consumed in total in 2008. The UK Forestry Commission estimates consumption in 2008 at around 539,000 odt³¹ (oven dry tonnes). However, only around 125,000 tonnes were produced by UK manufacturers in 2008 and Eurostat, in 2009, only recorded surprisingly low imports of wood pellets. Therefore, the national consumption in 2008 might have been as low as 176,000 tonnes, at least when only proven amounts are considered.

This development was driven by the Government's targets for the generation of electricity from renewable sources, as implemented through the Renewables Obligation. This will continue to be a driver for the use of pellets in co-firing although their use in existing coal fired power stations might start to tail off as the value of the ROCs (Renewables Obligation Certificates) from burning non-energy crop pellets are reduced and existing coal fired power stations close down rather than implement the environmental reforms required by the Large Plant Directive from 2015.

The largest share of pellets co-fired in the UK is imported. It is difficult to determine trade patterns for co-firing since imported feed stocks are typically purchased on spot markets and operators have the ability to switch between different suppliers and

³⁰ Hayes S., The National Energy Foundation, UK, Pellets@las country report UK, April 2009.

³¹ Forestry Commission, Woodfuel statistics (2008 provisional figures), June 2009.

different feedstocks to pursue best value for money. However, it is clear that pellets are imported from the Baltic States, but possibly also from other European countries (e.g. Germany) and North America.

Looking forward the main driver for residential market development is likely to be the Renewable Heat Incentive which has been proposed by the UK Government for implementation in 2010. Set at an appropriate rate, for a reasonable length of time, it should act as a major incentive to prospective customers for pellet fuel systems as it will help compensate them for the additional costs involved in having such a system installed as against the cost of having a gas or oil boiler installed.

3.4. Southern Europe

Pellet market development in Southern Europe is generally hampered by limited availability of raw materials and a lower heat demand in households due to warm climates. The use of high-tech pellet central-heating appliances does not seem to be feasible in these countries. However, the market in Italy has shown the potential of pellet stove heating under these conditions but also that domestic pellet production in these countries cannot fully cover a large demand.

Other countries in Southern Europe (Greece, Spain and Portugal) are currently developing production capacities. Produced pellets however, are still exported due to a lacking domestic demand.

Italy

The Italian wood pellet market developed almost exclusively for domestic heating with pellets typically packaged in small bags (15 kg)³². This market has experienced a fast growth since around 2000. The annual pellet consumption in Italy has grown from 150,000 tons in 2001, to at least 850,000 tons in 2008. However, other sources estimate the consumption in 2008 at around 1.1 million tons³³.

The prevailing pellet appliances are pellet stoves and Italy has become the biggest pellet stove market in Europe, with an estimate of 700,000 units sold until 2009.

Also the production has constantly grown from 160,000 tons in 2001 to approx. 650,000 tons in 2008. A large number of small to medium size producers is active in Italy. Currently more than 90 companies produce pellets but only 20 of them exceed an annual production of 5,000 tons. Most of them started their activity using own sawmill waste (sawdust, shavings etc.) as raw material and selling the pellets in their region. Now they are experiencing a shortage of raw material and they are forced to import wood, especially from the Balkans (e.g. Romania and Bulgaria) or pellets from Austria, Slovenia and a number of other countries.

In summary, Italy is not only the most important market (and an important producer) for pellet stoves but also the largest (import) market for bagged pellets.

³² Vivarelli F. & Ghezzi L., ETA Renewable Energies, Italy, Pellets@las country report Italy, July 2009.

³³ Paniz, A., Associazione Italiana Energie Agroforestali, Italy, Current developments on the Italian pellet market, European Pellet Conference, Wels, Austria, February 2009.

Spain

The Spanish market for wood pellets is just developing, starting around 2005. The production capacity increased significantly from approximately 75,000 tons per year in 2006 to more than 250,000 tons per year in 2008. Production capacities are likely to further increase in the next years, since the construction of new pellet production plants is planned in several regions³⁴.

The increasing production capacity is not accompanied by an increasing domestic pellet demand. Domestic consumption remains very low with less than 10,000 tons consumed in 2008 in Spain. As less than 5 % of the total annual production are consumed in Spain; the obvious consequence is that large quantities of pellets are exported.

The pellet price is lower than the European average and quite steady during the last two years. It slightly decreased from € 125 in summer 2007 to € 122 per ton in autumn 2008. So the Spanish market is very interesting at European level, moreover a new pellet plant with a production capacity of 150,000 tons per year is foreseen to start production in 2009.

Portugal

The situation of the Portuguese pellet market is comparable to Spain in many aspects.³⁵

Since 2005, significant pellet production capacities have been installed. Several major production plants have been commissioned in 2008, increasing the total capacity to around 400,000 tons. However, the actual production in 2008 was around 100,000 tons as some of the major plants will start production in 2009 only. In addition, the existing producers face challenges such as low feedstock availability and lacking domestic demand. Besides some smaller producers, mainly large-scale plants are in operation.

Currently, more than 90 % of the produced pellets are exported, mainly to Northern Europe. The domestic pellet consumption in Portugal is very limited. The annual consumption in 2008 is estimated at 10,000 tons.

Greece

Greece is one of the less developed pellet markets in Europe. The total production during 2008 was around 30,000 tons, while the installed production capacity was 87,000 tons. The first production plant started in 2006 and six more producers started pellet production in the meantime. Two more companies are planning to start pellet production in 2009³⁶.

However, there is currently no residential pellet heating market and only a marginal use of industrial pellets so that Greek producers are trying to export the largest share of their product, Italy being the most important import country.

³⁴ Vivarelli F. & Ghezzi L., ETA Renewable Energies, Italy, Pellets@las country report Spain, July 2009.

³⁵ Vivarelli F., ETA Renewable Energies, Italy, Pellets@las country report Portugal, August 2009.

³⁶ Voulgaraki S., Balafoutis A., Papadakis G., Agricultural University of Athens, Greece, Pellets@las country report Greece, July 2009.

Cyprus

The Renewable Energy sector is starting to grow in Cyprus, but the biomass sector is not developed significantly. Consequently, wood pellets are not recognized as an alternative fuel for energy production at the moment and the domestic pellet consumption in Cyprus is insignificant. There is also no pellet production in the country.³⁷

The Institute of Agricultural Research of Cyprus carries out research in order to determine the energy plants that can be cultivated in Cyprus for biofuel production. Other organizations involved in energy and bioenergy research and marketing are:

- Cyprus Institute of Energy (CIE)
- Applied Energy Centre (AEC)
- Cyprus Association of Renewable Energy Enterprises (SEAPEK)
- Cyprus Energy Agency (CEA)

Malta

Malta is a country with a negligible potential of agricultural and forestal biofuel production. Limited freshwater resources (50% of potable water is supplied from desalination), high population density and poor soil fertility are the reasons for low productivity.³⁸

The major part of all wood products, including wood pellets, used in Malta is imported. Wood pellets are mainly imported from France, Italy and Germany. However, the use of wood pellets in Malta increases the diversity of fuel imports and therefore limits the risks of energy import dependency.

In 2008, around 650 tons of sawdust, wood wastes and scraps (including pellets made thereof) were imported to Malta. Pellets are mainly used in the residential sector in stoves and pellets are bought by the customers in small bags (15 – 20 Kg).

Organizations that are involved in energy and bioenergy research and marketing are:

- Institute of Agricultural and Energy Technology
- Malta Resources Authority (MRA).
- Commercial Department of Malta Embassy.

3.5. Eastern Europe

Pellet markets in Eastern Europe are generally characterised by insignificant domestic demand and small but rapidly growing pellet production. This means that, at the moment, most of these countries are exporting the largest share of their production to better developed pellet markets.

³⁷ Voulgaraki S., Balafoutis A., Papadakis G., Agricultural University of Athens, Greece, Pellets@las data collection.

³⁸ Voulgaraki S., Balafoutis A., Papadakis G., Agricultural University of Athens, Greece, Pellets@las data collection.

However, the demand side at least in some countries (e.g. Poland) is foreseen to catch up regarding both residential and industrial use of pellets.

Poland

Pellets production, mainly for the export, has started in Poland in 2003. In 2008, the installed production capacity already amounted to 674,000 tons and the production to 340,000 tons. Around 20 pellet producing companies are operating in Poland. Most of them work with capacities below 30,000 tons³⁹.

With a total domestic consumption of around 120,000 tons, Poland was a large pellet exporting country in 2008. This might change in the future since the pellet demand in Poland is increasing rapidly both in the residential and in the industrial sector. Currently, there is a legal duty concerning obligatory production of “green energy” (both heat and electricity) which results in the increased interest of both district heating companies and CHP plants in biomass utilization.

A new regulation given by the Ministry of Economy (dated 14 August 2008) states, that energy producing units (5-20 MW) claiming to produce (partly) renewable electricity in co-generation have to assure that agricultural biomass (energy crops, agricultural residues and residues coming from food processing industry) cover at least 5% of the energy produced (2008). This share is supposed to grow constantly up to 100 % in 2015. Similar regulations exist for larger plants (> 20 MW).

Czech Republic

Currently 7 companies in the Czech Republic are producing pellets as their primary activity. Pellets are also produced by a few companies for which the pellets production is of marginal interest and which usually use residues from their wood or agricultural production⁴⁰.

The total installed production capacity in 2008 is estimated at almost 78,000 tons, the actual production at almost 27,000 tons⁴¹. In addition, some manufacturers produce agropellets.

Wood pellets are produced with very high qualities and some manufacturers possess the certificates Önorm M 7135 or DINplus. High qualities are necessary to allow for the export of pellets, mainly to Germany and Austria. Only approximately 10% of the total pellets produced in the Czech Republic are used in the domestic market. For large-scale combustion mainly agropellets are considered.

For the domestic market, pellets are mainly bagged (small and big bags). High investment costs for residential pellet boilers are the main barrier to market growth in the residential sector. Other obstacles for the expansion of the pellets market are the fluctuation of the pellet prices, missing distribution channels and missing delivery systems to small customers.

³⁹ Bastian M. & Wach E., Baltycka Agencja Poszanowania Energii SA, Poland, Pellets@las country report Poland (July 2009).

⁴⁰ Bastian M. & Wach E., Baltycka Agencja Poszanowania Energii SA, Poland, Pellets@las country report Czech Republic (August 2009).

⁴¹ Habart J., CZ BIOM, Pellets in Czech Republic – opportunities and drivers, European Pellet Conference, Wels, Austria, February 2009.

However, further strong market growth is supported by the national policy framework: A RES Electricity Act facilitates the use of biomass (often agropellets) in CHP plants and the installation of small-scale pellet appliances as well as the investment in pellet production plants is subsidized.

Slovakia

In Slovakia gas accounts for approximately 95% of the heating demand although heating with pellets today is already cheaper than heating with natural gas. Therefore, the potential of pellets as a major energy carrier is huge⁴².

However, only 117,000 tons of pellets are produced in Slovakia per year and hardly 15 % of this is consumed in the domestic energy market while the raw material potential is estimated to allow for the production of 1,000,000 tons of wood pellets per year. The same amount of pellets can be expected for pellet production from agricultural residues.

In Slovakia pellets are used mainly in small and middle boiler-rooms in areas where no gas connection is available. Medium scale users are usually schools, municipal offices, companies, hotels and bigger residential units with demands of 10-1000 tons per year. This market share is growing most rapidly.

Expansion of the market started in 2006, when the sale price of pellets exported mainly to Italy and Austria was very high. In 2007 pellet prices fell significantly and as a consequence several pellet production plants were shut down temporarily or perpetually. The pellet production began to recover gradually in 2008.

All pellet production plants in Slovakia are small in comparison to the European average. Therefore production costs are relatively high. Pellets which are exported to the power plants are sold for € 100 per ton which means that the profit margins for pellet producers are very low. Nevertheless, it can be expected that 2 or 3 additional large wood pellet production plants and 4 or 5 large agropellet production plants will be established in the near future.

Hungary

The pellet market in Hungary is one of the smallest in Europe⁴³. There is no significant domestic demand (Some hundred pellet appliances installed in 2008) and the production of pellets is just starting. In 2008, only 5000 tons were produced and a significant share of this was agripellets⁴⁴. Especially in South-Eastern Hungary, the production of pellets from mixed biomass might play a role in the future.

A positive step towards further development was the foundation of the Hungarian Pellet Association in 2008⁴⁵. According to this source, a number of additional pellet plants are being developed so that Hungary's production will multiply in 2009. One of these projects alone will establish additional production capacities of 80,000 tons.

⁴² Bastian M. & Wach E., Baltycka Agencja Poszanowania Energii SA, Poland, Pellets@las country report Slovakia (August 2009).

⁴³ Gyuris P. & Csekö A., Geonardo Ltd., Hungary, Pellets@las country report Hungary, June 2009.

⁴⁴ Zsolt Kazai, Technical University of Vienna, Austria, The pellet Market in Hungary, 2009.

⁴⁵ www.mapellet.hu

Bulgaria

The wood pellet market in Bulgaria is just starting to develop. Domestic consumption is mainly hindered by high investment costs in pellet appliances. Accordingly, the pellet consumption in the residential sector is insignificant. Few pellets are sold in small bags either directly at the pellet plants or through retailers. Prices for bagged pellets were slightly above € 150 per ton in early 2009 (excl. transport, incl. VAT). There is no market for loose pellets and also pellet use in large-scale applications is negligible⁴⁶.

Pellets are produced by 17 small-scale manufacturers with a total estimated production capacity of about 62,000 tons/year. Since the domestic demand is small, 80-90 % of the pellets are exported, mainly to Italy by truck transport.

Due to the existence of a well-developed wood processing industry and the abundance of unused quantities of dry wood shavings it is expected that pellet production and use will gain speed in the next years. Furthermore, with the "National Long-Term Programme to Encourage the Use of Biomass for the Period 2008-2020" the Council of Ministers through the Minister of Economy and Energy established a favourable policy framework to support further growth of biomass (and pellet) use for energy purposes.

Romania

Romania has 6.3 million hectares of forestland, which accounts for 28 % of the total land area and the demand for energy from renewable raw materials is growing in Romania due to high dependency on fossil fuel imports and especially in view of the EU Renewable Energy Directive. Within the country, the biomass energy sector is divided. Wood production is concentrated in the Carpathians and the lower Carpathians, while agricultural by-products are produced in the south of the country and the region of Moldavia⁴⁷.

Biomass is predominantly used in rural areas and at the town outskirts for heating and food preparation by means of traditional technologies. Only a small amount of the energy from biomass is used in modern and low-emission facilities.

Pellets are produced by at least 21 manufacturers with a total estimated production capacity of about 260,000 tons/year.

Although the number of pellet plants had increased rapidly within the last few years, the use of wood pellets in Romania especially for private heating is still very limited. At least 80 % of the production is exported. The most relevant export countries are Italy followed by Austria, Hungary and Germany.

There is no private end-consumer market for loose pellets at the moment. Pellets are sold in bags (15 kg) either directly at the pellet plants or they are offered by various retailers (e.g. Metro, baumax, Praktiker); the end-user is responsible for the transport. Pellets in stores are said to be nearly twice as expensive as bought directly at the pellet plant. The price data shown on the pellets@las website represents only prices of pellets sold directly at the plants.

⁴⁶ Steiner M. & Pichler W., Holzforschung Austria, Pellets@las country report Bulgaria, May 2009.

⁴⁷ Steiner M. & Pichler W., Holzforschung Austria, Pellets@las country report Romania, May 2009.

To promote the development of a national pellet market a Romanian pellet association was founded in 2008.

Slovenia

In Slovenia, four pellet producers with a total production capacity of 185,000 tons are operating in Slovenia⁴⁸. Three of these producers rely on exports to the Italian market as they produce according to Italian standards / certifications. At least six major traders are exporting pellets. At the moment, the biggest share of wood pellets is exported.

Pellet consumption is relatively small in Slovenia except for two power plants which are purchasing pellets to substitute charcoal. The two power plants are in Trbovlje and in Sostanj and use low quality pellets for combustion.

Slovenia has a great potential regarding wood biomass resulting from the abundance of forestland. The domestic consumption is also rising and large-scale consumers, namely several power plants, use low quality pellets for co-combustion.

The Baltic States: Estonia, Latvia and Lithuania

Pellet production in Estonia, Latvia and Lithuania started around 2000, when the rising pellet demand in Scandinavia brought mainly Swedish companies to invest in pellet production plants in the Baltic States. Accordingly, the pellet markets in these countries are, until today, very oriented to exporting pellets, again mainly to Scandinavia⁴⁹. The local pellet production not only relies on the large wood resources produced domestically but also on raw materials derived from large amounts of timber imported from countries such as Russia.

The pellet industry was quickly growing until 2007. In 2008, many companies disappeared from the market and produced and traded volumes decreased. The general weakness of international markets, decreasing energy prices and decreasing timber imports from Russia were the main reason for this unfavorable development. Due to this development, market volumes are hard to estimate for 2008. It can be estimated that produced volumes stagnated or even decreased slightly as compared to 2007, when e.g. in Estonia, more than 300,000 tons of pellets were produced. Today, around 6 producers are left in Estonia, around 24 in Latvia and around 12 in Lithuania.

As already said, the largest share (80 – 90 %) of the pellets produced is exported via Baltic Sea ports. In addition, these ports have become important as transits for pellets produced in Ukraine and Russia.

The amounts of pellets produced make the Baltic pellet markets belong to the largest in terms of per capita production. In contrast, there is no significant consumption. Consumption for residential heating is negligible and the use of pellets for electricity production is not reported.

High investment costs for pellet appliances and the availability of cheaper alternatives are the main barrier to the development of residential pellet heating markets. The potential for bioenergy production is enormous in these countries.

⁴⁸ Gyuris P. & Csekö A., Geonardo Ltd., Hungary, Pellets@las country report Slovenia, July 2009.

⁴⁹ Muiste M. & Habicht M., LETEK, Pellets@las country report on the Baltic States, July 2009.

However, it is more likely that less expensive forms of biomass (e.g. wood chips) are used in large-scale applications in the near future.

3.6. Summary

As it was shown in this report, the European pellet market is characterised by heterogeneity at several levels: Mature markets have developed in Central and Northern Europe while pellet markets in e.g. Eastern Europe are just starting to develop.

In addition, the consumption structure varies largely. While in some countries (e.g. Austria and Germany) wood pellets are exclusively used in residential heating, they are mainly used for electricity production in other countries (e.g. the Netherlands). In Sweden and other countries, both usage types are developed equally.

Countries where the pellet production is significantly higher than the domestic consumption (e.g. Germany and countries in Eastern Europe) became pellet exporters to countries with a net pellet demand such as the UK.

A common characteristic of all pellet markets in Europe is the ongoing rapid growth on the demand and supply sides that even occurs in mature markets. On the other hand, the availability of raw materials becomes more and more limited due to the competition with other industries. This effect is currently intensified following the low activity of the construction sector and other wood processing industries and, as a consequence, decreased timber sales.

Even if the recovery of these industries can be foreseen, the European pellet industry will have to meet two major challenges in order to provide for further market growth.

Firstly, a broader raw material basis is necessary to increase pellet production in Europe. Further R&D effort is needed to facilitate the use and to show the environmental and economical viability of alternative wood and non wood feedstocks. Namely, forest thinnings, wood chips, short rotation coppice, agricultural residues (e.g. straw) and dedicated herbaceous energy crops are considered.

Secondly, pellets are traded internationally in significant amounts already today. With growing demand this source of pellet supply will gain importance. Reliable and cost-effective trading schemes need to be developed in order to ensure stable pellet markets in Europe.

Above all, the sustainability of all current and future supply chains needs to be assessed. Trading schemes and production systems that are environmentally or socially harmful must be avoided.

Country	Production/Storage 2008				Produced standards			Consumption 2008		
	Number of registered producers	Production capacity (tonnes)	Production (tonnes)	Storage capacity (tonnes)	ÖNORM M 7135	DINplus	DIN 51731	Total consumption (tonnes)	Number of registered largescale consumers	Largescale consumption (tonnes)
Austria	25	1.006.000	626.000	65.000	X	X		509.000		
Belarus	8	60.000	40.000*					< 3.000		
Belgium	10	450.000	325.000			X		920.000	2	800.000
Bulgaria	17	62.000	27.000	11.000				3.000		
Cyprus										
Czech Republic	14	260.000	170.000		X	X	X	17.000		
Denmark	12	313.000	134.000			X		1.060.000	2	355.000
Estonia	6	485.000	338.000*					< 3.000		
Finland	19	680.000	373.000					150.000		
France	54	350.000	240.000	10.000		X		200.000		
Germany	50	2.400.000	1.460.000	168.000	X	X		900.000		
Greece	5	87.000	28.000					11.000		
Hungary	7	5.000	5.000					1.000		
Ireland	2	78.000	17.000					30.000		
Italy	75	750.000	650.000	170.000	X			850.000		
Latvia	15	744.000	379.000					39.000		
Lithuania	6	153.000	120.000			X		20.000		
Luxembourg	0	0	0	0				5.000		
Malta										
Netherlands	2	130.000	120.000	12.000				914.000	5	876.000
Norway	8	164.000	35.000					40.000		
Poland	21	665.000	350.000	73.000		X	X	120.000	5	
Portugal	6	400.000	100.000					10.000		
Romania	21	260.000	114.000	22.000	X	X		25.000		
Russia	77	1.200.000	550.000*					100.000		
Slovakia	14	142.000	117.000					18.000		
Slovenia	4	185.000	154.000					112.000		
Spain	17	250.000	100.000			X		10.000		
Sweden	94	2.200.000	1.405.000					1.850.000		800.000
Switzerland	14	171.000	70.000*		X	X		90.000		
Ukraine	15	140.000	60.000*		X			10.000		
United Kingdom	15	218.000	125.000	57.000		X		176.000	5	166.000

not part of EU 27

no pellet market

*) Data of 2007

Data origin: -) Country reports of the Pellets@las project
 -) Rakitova O., Ovsyanko A. 2009: Wood Pellets Production and Trade in Russia, Belarus and Ukraine
 -) Bioenergy International 6 (2008)

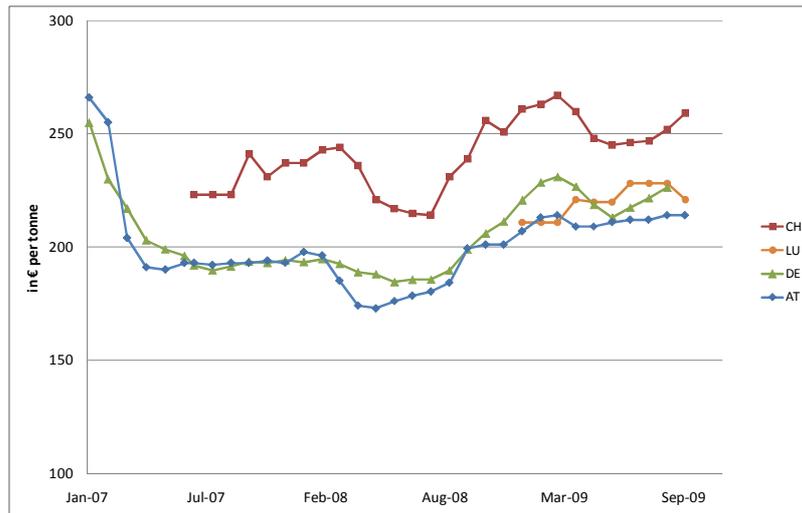


Figure 2: Prices of loose pellets for small scale (residential) heating in Central Europe (including delivery and VAT)

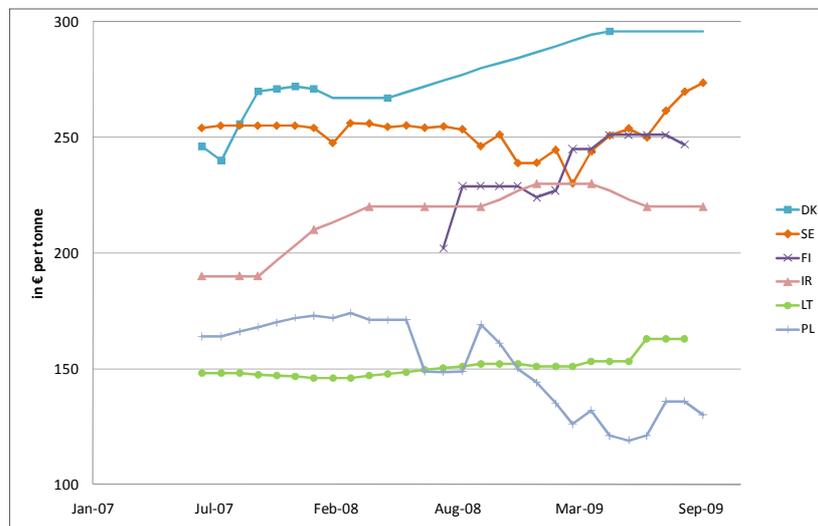


Figure 3: Prices of loose pellets for small scale (residential) heating in selected countries (including delivery and VAT)

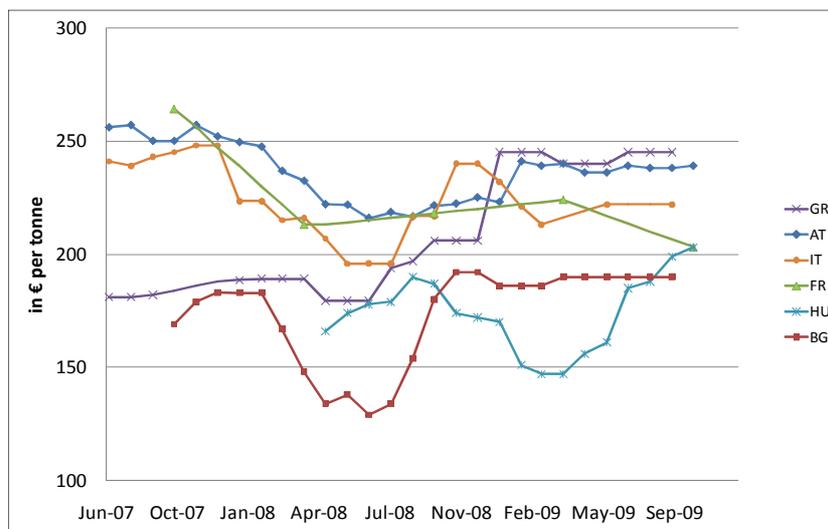


Figure 4: Prices of pellets in bags (< 25 kg) for small scale (residential) heating (without transportation, including VAT)

4. International pellet trade

The following chapter describes the status of international pellet markets by the end of 2008.

4.1. Russia, Ukraine, Belarus

The three pellet markets in Russia, Ukraine and Belarus are similar on one hand and different on the other hand. The Russian wood pellet market is the most developed. Russian pellet companies are concentrated mostly in the North-West and the central part of Russia, in regions with developed forests or woodworking industry. In general, pellet production started in the North-West of Russia in the presence of both forest industry and required export logistics (harbors). Consequently, it spread to central Russia and the Ural region. In addition to wood pellet production plants, some sunflower husk and peat pellet producers are also present in Russia but so far their numbers are limited. Similarly, in Belarus, producers also prefer woody material as feedstock for pellets. In the Ukraine, the situation differs. As agriculture is more developed here than the wood industry, sunflower husk pellet producers have approximately the same share in pellet production as wood pellet producers. Based on interviews with pellet producers, it seems that Russia and Ukraine use about 5-15% on their domestic markets, while domestic use in Belarus is non-existent.

Most pellet producers in all three countries are oriented toward exporting to Western Europe. There are no export duties on wood pellets so far, but the price crisis of 2007-2008 led to a fall in the rate that production was increasing in all countries as well as to a temporary decrease in the level of interest in investing in projects related to pellet production. Pellet producers are reported to be operating at or below break even point at the moment, meaning that their production costs exceed actual revenues. Other factories confirm that they are still profitable, but that business is not as attractive as it used to be when they had 100% profitably. Currently the profitability level of pellet production rarely exceeds 10-15%.

4.2. Western Balkan area

Currently, in Serbia there are 5 pellet plants located ranging between 10-35 ktonnes capacity per year, using hardwoods such as beech for pelletizing. The domestic market is not well developed, with only a few supermarkets in Novi Sad and Belgrade offering wood pellets.

In Montenegro, there is currently a single pellet plant, with a capacity of 25 ktonnes/year. The wood pellets produced are used both for sale to households and for the needs of the company itself.

In Bosnia-Herzegovina there are several pellet plants, ranging between 3-45 ktonnes/year. There is no significant domestic market yet, as a rough estimate 10-15% of the pellets produced are sold on the domestic market. Most of the export goes to Italy and Slovenia. The entire capacity is 120 ktonnes/year.

The largest production capacity in the western Balkan is situated in Croatia; in mid-2008, a total of 7 pellet plants had a combined capacity of 194.5 ktonnes/year, ranging from 7.5-40 ktonnes/year. Feedstocks for pellet production consist (amongst others) of sawdust from oak, beech and ash, and spruce and fir wood. The total potential of the forest biomass for the production of briquettes or pellets is estimated

to be about 1 million cubic meters, so there is ample room for further expansion. As there is again a small domestic market, the large majority of wood pellets are exported.

As discussed above, basically all countries in the western Balkan produce pellets mainly for export. The main export markets are Italy and Austria. Export by truck is especially attractive to Northern Italy for pellet plants situated close to motorways in the North-western part of the region (i.e. Slovenia, Croatia and parts of Bosnia-Herzegovina).

While no data was available as to how large exact export volumes to Austria and Italy were in 2007 or 2008, as a rough estimate, between 300,000-350,000 may have entered these two markets (based on production capacities and estimated domestic consumption).

4.3. North America

The following text mainly describes the situation in 2007.

Canada and the USA both have a domestic pellet production capacity which no single European country can match at the moment, with the possible exception of Sweden.

It is noteworthy how weak the domestic Canadian market has been for biomass, including pellets, and is expected to remain so under the absence of national climate change and energy policies. This situation would however change quite rapidly if Canada were to implement their commitment under the Kyoto Protocol. However, the eastern part of Canada including the Maritime Provinces, has seen growth in domestic use during 2008. Unlike the rest of Canada, this region does not have a natural gas distribution network, and primarily uses heating oil and propane to meet heating demands. Wood pellets have been very competitive against these 2 options, and there has been increased demand for free standing stoves.

The North American market has developed in symbiosis with the European market, and they have to a certain degree become mutually dependent. Until the end of 2007, there had not been any influx of pellets from other markets to speak of. The export from North America (Canada) is matching the import numbers in Europe. However, as more recent data shows, the increase in wood pellet exports from Canada to Europe in 2007 has been far more moderate than initially expected. This is probably due to the fact that 2007 was a very bad year for the European pellet market with very low prices, coupled with a very strong Canadian dollar and skyrocketing freight costs, in 2007 vs. 2006. Also, growth projections to 2010 will largely depend on the market development in Europe.

In British Columbia (BC), the pellet export potential is almost limitless. The annual surplus of mill residues is still 1 million bone dry tonnes, and vast amounts of harvest slash from Mountain Pine Beetle harvest are available. Domestic markets in BC are growing only marginally, so most of this new production would be exported. BC pellets destined for Europe are loaded onto 100 tonne rail hopper cars headed for the coast and then loaded into cargo ships holding 4,000-15,000 tonnes. The Fibreco Terminal and Kinder Morgan Terminal in North Vancouver have the capacity to handle 1 million tonnes of pellets annually and can be expanded to 2 million tonnes. Northern BC pellet plants would use rail to reach the Ridley terminal in Prince Rupert. The trade route is through the Panama Canal to Europe, with most in 2007 going to

the Netherlands, Belgium, and Sweden, with some exports also to Denmark, the UK, Ireland and Italy. Next to exports to Europe, supply contracts for wood pellets have recently been signed between manufacturers in British Columbia and Japan and deliveries are now under way at a rate of 60 ktonnes per year. On the eastern side of Canada, Mactara in Nova Scotia exports primarily to Europe via the port of Halifax. Quebec mills also export by way of the port of Montreal; however, Montreal is not a winter port (Bradley, 2008).

Up until the end of 2007, the USA have been mainly producing and importing wood pellets for domestic consumption. However, several projects are under way in Southeastern USA, amongst which is the largest pellet production plant in the world. This and other plants may lead to the export capacity from the USA reaching possibly up to one million tonnes, depending on how much of the projected increase in capacity will actually be implemented.

5. Pellet quality – standards and certification

Standardisation aims at removing trade and application barriers by establishing unification (of concepts, procedures and products) within a national or international community of concerned stakeholders. Standards increase economization, compatibility, user-friendliness and security in the application and exchange of products and services.

Quality is a central issue for the further development of pellet markets. Especially the residential heating sector depends on reliable fuel quality since it is crucial for a reliable and economic use of small-scale pellet heating systems.

The importance of quality standards and assurance became obvious in the last years in Germany and Austria where the early introduction of pellet-related standards and certification systems certainly was a stimulating factor for the dynamic development of residential pellet heating markets.

Now, a set of European standards related to solid biofuels is under preparation. This is a positive step towards the unification of the European pellet market and will contribute to enhancing market development all over Europe.

However, standards alone are not sufficient. Certification and the control of products and of the whole supply chain are desirable. Existing national and international certification systems such as DINplus contributed a lot to quality assurance and to gaining consumers' confidence. However, they all have certain drawbacks and none of them covers the whole supply chain within one system.

Based upon the new European standards, the German Pellet Association (DEPV), together with other partners, is currently developing a new certification system (ENplus) with a European scope and a more holistic approach. The system claims the potential to replace the other existing certificates that are partly well accepted by stakeholders such as boiler manufacturers and end-consumers.

5.1. Quality requirements on pellets

Chemical and physical properties of solid biofuels have manifold effects on their thermal utilization. Besides the energy content, end-consumers are mainly concerned with two problem areas: Emissions and boiler/stove function.

Emissions relevant for small-scale wood combustion are mainly NO_x, SO_x, HCl, PCCD (polychlorinated dibenzo-p-dioxins) and fly ash. The amount of NO_x and SO_x emissions correlates directly with N and S contents in the fuel. Fuels with N contents below 0.6 % and S contents below 0.2 % usually do not cause emission problems and problematic HCl (and PCCD) emissions are characteristic for biofuels with chlorine contents above 0.1 %.⁵⁰ However, much lower thresholds are recommended. In countries with demanding NO_x emission thresholds, N contents below 0.3 % are preferable. Newer findings also show that corrosion problems in chimneys can already occur with chlorine contents as low as 0.01 %. Therefore, this is the recommended threshold. The formation of inorganic fly ash increases with higher contents of elements such as K, S and Cl while the formation of organic fly

⁵⁰ Obernberger et al., Chemical properties of solid biofuels – significance and impact, Graz University.

ash usually only occurs independently from fuel quality when old combustion technology is used or when pellet appliances are poorly installed or controlled.⁵¹

The combustion of clean wood fuels generally does not produce problematic emissions of any kind since contents of critical elements are very low. Raw materials containing larger amounts of bark or herbaceous raw materials on the other hand have higher ash contents and therefore cause higher emissions.

Besides problematic emissions, low-quality biofuels can also cause harmful effects on combustion equipment such as slagging, corrosion and interference with process control.

The ash that is not emitted as fly ash (see above) deposits in the combustion chamber. The melting point of this deposited ash is an important fuel characteristic. Ca and Mg usually increase the melting point, while K and Na decrease it.⁵¹ During the combustion of fuels with unfavorable ash composition (such as straw) and therefore low ash melting temperature, high temperatures in the combustion chambers can lead to melting and sintering of deposited ashes. Corrosion of metal parts of the boiler/stove is usually caused by chloride salts and HCl derived from high Cl contents in the fuel.

Finally, the content of fine particles in the fuel can disturb the regulation of highly automated heating systems or interrupt automated fuel feeding. In addition, fine particles burn quicker and the resulting higher temperatures can favor ash melting. The content of fine particles depends on the mechanical durability and on logistics and storage issues.

As already said, clean wood (and especially soft wood) pellets contain very low amounts of the problematic elements mentioned above, so that most of the problems described above (except problems related to fine contents) are not relevant for high quality wood pellets. However, with increasing use of bark, forest residues, SRC wood or herbaceous biomass, the described problems gain relevance.

5.2. Pellet quality: Standards and certification

Several European countries such as Austria (ÖNORM M 7315), Sweden (SS 187120) and Germany (DIN 51731) have introduced pellet-related standards in the past, but experiences in these countries showed that standards need to be accompanied by a control system that certifies pellet production and minimum pellet quality. In Austria, for example, the pellet standard is connected to a certification label (“ÖNORM tested”) that certifies pellet producers and guarantees unproblematic pellet usage for the end-consumer.

This did not work in Germany where production in agreement with DIN standards is usually certified by the “DIN tested” label. However, this label is granted without external controls at the production site. Furthermore, the minimum requirements of DIN 51731 are not always strict enough for unproblematic pellet combustion in small-scale applications. This standard also lacks a threshold for mechanical durability.

This led to the development of the standard-independent certification scheme DINplus for wood pellets by DIN CERTCO which combines features of the German

⁵¹ Obernberger et al., Aktuelle Erkenntnisse im Bereich der Feinstaubemissionen bei Pelletsfeuerungen, Graz University.

and the Austrian standard, including external controls and strict quality requirements. Today, it is the best known certification label for wood pellets in Europe and worldwide.

The situation will change largely after the introduction of European standards for solid biofuels (EN 14961). National standards have to be adapted or taken back. Therefore, they will lose their relevance soon and will not be addressed in detail in this report.

Existing certification schemes do not have to comply with the new standards but the certification bodies acting in a unified European framework will still face the necessity to adapt their requirements. Both end-consumers and appliance manufacturers will look for a certification system that ensures the compliance of pellet quality with European standards.

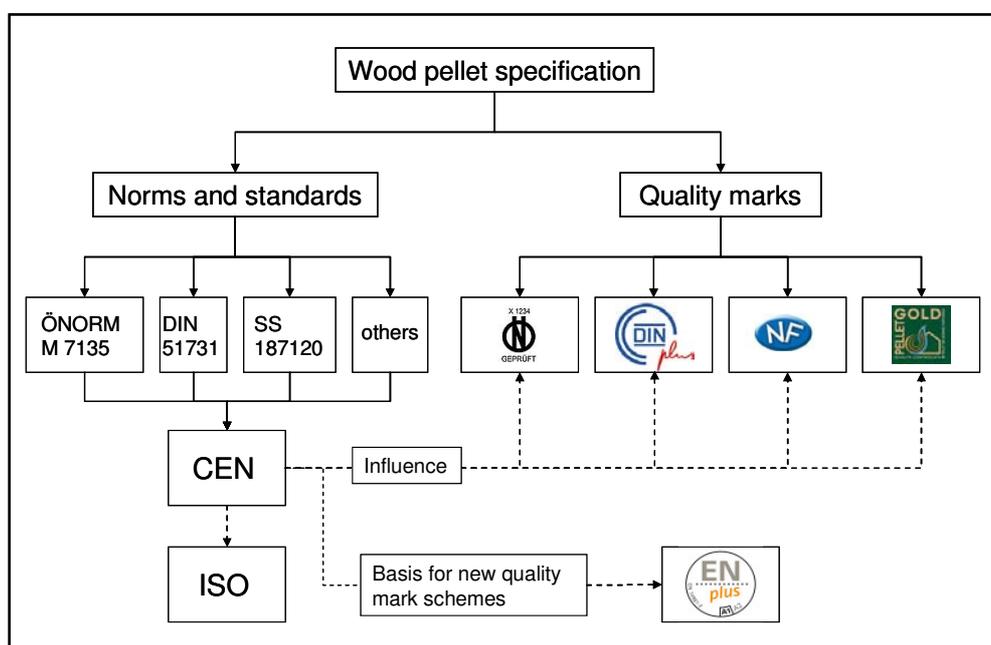


Figure 5: Overview on existing and future systems for wood pellet quality specification⁵²

5.3. Existing national certification schemes

DINplus (Germany)

In 1996, the DIN 51731 on compressed wood was introduced in Germany. As already said, the usability of this standard for the small-scale pellet heating sector is limited. Main reasons for this are high maximum ash contents (1.5 % ash might already cause combustion problems) and the absence of a maximum for abrasion (Figure 6). Furthermore, the certificate that attests production according to this standard is awarded without external control. That means that end-consumers cannot always be sure that certified pellets actually comply with the requirements of

⁵² Figure modified; Original from: Englisch, M. (ofi, Austria); Europäische Normen für Biomassebrennstoffe;

DIN 51731. This system is still in use today (October 2009). However, it is mainly used for briquette production rather than pellet production.

				
				
	Unit	DIN plus⁵³	DIN 51731⁵⁴	Ö NORM M 7135⁵⁵
Diameter	mm	4 - 10	4 - 10	4 - 10
Length		< 5 x D	< 50 mm	< 5 x D
Density	Kg / dm ³	> 1.12	1.0 - 1.4	> 1.12
Water content	%	< 10	< 12	< 10
Abrasion	%	< 2.3	--	< 2.3
Ash content	%	< 0.5	< 1.5	< 0.5
Energy content	MJ / kg	> 18	17.5 – 19.5	> 18
Sulphur content	%	< 0.04	< 0.08	< 0.04
Chlorine content	%	< 0.02	< 0.03	< 0.02
Nitrogen content	%	< 0.3	< 0.3	< 0.3
Heavy metals	%	regulated	regulated	not regulated

Figure 6: Comparison of selected German and Austrian requirements on wood pellets

As the DIN standard did not show to be useful, DIN CERTCO developed the DINplus certification scheme for high quality wood pellets in 2002. It combines characteristics of both the German DIN 51731 (e.g. testing of heavy metal contents) and the Austrian ÖNORM M 7135 (e.g. high quality requirements in general) (Figure 6). This scheme includes the establishment of internal quality management and annual, external controls without announcement.

⁵³ DINplus Zertifizierungsprogramm – Holzpellets zur Verwendung in Kleinf Feuerungsstätten, DIN CERTCO, 2007, available at www.dincertco.de

⁵⁴ DIN 51731 „Presslinge aus naturbelassenem Holz – HP 5“; available at www.beuth.de

⁵⁵ ÖNORM M 7135 „Presslinge aus naturbelassenem Holz oder naturbelassener Rinde, Pellets und Briketts – HP 1“, available at www.as-plus.at

DINplus contributed a lot to the promotion of the residential pellet market in Germany and today, it is the most important quality label for high quality wood pellets worldwide.

In total, 102 pellet producers are DINplus certified (October 2009) and 61 of these are based in Germany. The DINplus certified producers with known production capacity represent a total capacity of around 3.5 million tons. Considering the other 40 small and medium scale producers with unknown capacity, the total production capacity for DINplus pellets certainly exceeds 4 million tons.

Most of the producers in use DINplus certification only. However, most DINplus certified producers in Austria have obtained DINplus certification following a successful ÖNORM certification. This possibility is also often used in the Czech Republic.

The German DINplus producers with known production capacity represent a total capacity of at least 2.2 million tons. In addition, 25 producers with unknown capacity are certified. This means that the largest part of the German production capacity (in total: 2.4 million tons in 2008⁵⁶) is DINplus certified.

For producers e.g. in France, Belgium and Switzerland, the DINplus certificate certainly is a marketing instrument for selling pellets in their own home countries, while it provides access to Central European residential pellet heating markets to export-oriented producers in e.g. Poland, the Czech Republic, Romania and Argentina (So far, DINplus pellet exports from Argentina to Europe are rather rare).

Additional information

In addition to pellet quality certification, DIN CERTCO offers DINplus certification for wood briquettes and pellet stoves.

Furthermore, producers, traders and retailers with their own pellet distribution can get certificates for their pellet logistics (complementary to ÖNORM M 7136). However, only 8 companies are certified (all of them based in Germany) and this certification does not seem to be well accepted by relevant market stakeholders.

ÖNORM M 7135 (Austria)

Pellet standardization and certification started in 1990 in Austria. The standard ÖNORM M 7135 was modified twice in the meantime and became the model for other standards / certification systems in Europe (incl. DINplus).

As in Germany, the compliance with standards can be certified. In Austria this is done by "Austrian Standards plus" who can award the "ÖNORM tested" label. In contrast to Germany, this system worked and no additional certification scheme had to be established. The Austrian certification system also includes both internal and external (annual and unannounced) control mechanisms.

In Austria, 18 pellet producers (October 2009) are ÖNORM certified. 11 of them are additionally DINplus certified. The ÖNORM certified producers represent the largest part of the pellet production capacity installed in Austria.

Furthermore, 7 German producers have ÖNORM certificates in addition to their DINplus certification (If compliance with DINplus is certified by an Austrian testing

⁵⁶ www.depv.de

institute, the testing report is also valid for ÖNORM certification). The ÖNORM pellet certification is particularly popular in the Czech Republic, but also producers in Romania, Ukraine, Italy and Switzerland are certified.

Additional information

Other pellet-related standards in Austria are concerned with pellet logistics (M 7136) and pellet storage tanks (M 7137). Furthermore, standards for non-wood biomass pellets were or are being developed: M 7139 on energy grains, C 4000 on Miscanthus pellets and C 4002 on straw pellets.

NF Granules Biocombustibles (France)

In France, the Technology Institute FCBA, together with ITEBE, developed a new quality label for fuel pellets which was introduced in 2009. AFNOR is the managing organization that awards the NF quality label (*Norme Francaise*).

The scheme includes the establishment of internal quality management by the producer and annual, external controls of production sites.⁵⁷ The development of this system was supported by ADEME and the newly founded SNPGB (*Syndicat National des Producteurs de Granulés de Bois*). The aim is to overcome existing problems with pellet quality in France. Although the German DINplus system has been used in France for some time, acceptance problems with the rather unknown DIN label occurred. The NF label as a general product quality label is well known in France and it is expected that its impact on French pellet quality might be higher.

The quality requirements of this system are based on CEN/TS 14961, as far as values were available. In addition to common requirements, maximum values for heavy metal contents are set. For agropellets there is also a threshold for ash melting temperature.

Three quality categories for wood pellets are described: High, standard and industrial, following the European categories of prEN 14961-2 (A1, A2 and B; see chapter 5.4).

The high quality standard resembles EU quality A1, except for values of e.g. ash and chlorine contents. However, there are many differences between standard quality and prEN 14961-2 A2 and between industrial quality and prEN 14961-2 B. The reason for this is that prEN 14961-2 is still under discussion and has undergone many changes during 2009.

With two categories on non-wood pellets, the French system is ahead of the development of the European CEN/TS 14961-6 on “non-woody pellets for non-industrial use”. With these standards, the French NF system currently is the only existing quality certification for non-wood biomass pellets. Taking into consideration the chemical properties of herbaceous biomass, these categories allow for very high ash, chlorine, nitrogen and sulphur contents. However, the usability of these categories is questionable since at the moment, these values are certainly too high for unproblematic combustion in small-scale pellet appliances.

Consequently, no company uses these agropellet categories for certification of their pellets until now while the wood pellet certification already started. In October 2009, 5 French pellet producers use the quality label for high quality wood pellets (*Bois*

⁵⁷ NF Granules Biocombustibles, Référentiel de certification, AFNOR/FCBA, 2009.

Qualité Haute Performance) and one uses the standard quality label (*Bois Qualité Standard*).

These certified companies do not use the DINplus label at the same time. In the future, there might be several competing quality labels in France.

Pellet Gold (Italy)

Already in 2006, AIEL⁵⁸ introduced the Pellet Gold quality label in order to promote pellet quality in the Italian market and to increase consumer confidence. The scheme is called an “attestation system” since there is no official certifying body involved. AIEL states that the requirements of the label are based on CEN/TS 14961, DINplus, ÖNORM M 7135 and limits introduced by PFI (American Pellet Fuels Institute).

Besides the common parameters, formaldehyde contents are measured. More recently, following an incident with possibly radioactive pellets, AIEL also introduced a maximum value for radioactivity. The requirements of Pellet Gold take into consideration the raw material situation in Italy. The widely available wood materials are characterized by higher ash and slightly higher chlorine content. Therefore, the threshold values are higher than foreseen by the European standard for A1 quality.

In October 2009, 11 Italian wood pellet producers are certified. Certification might not appear to be feasible for the numerous small-scale producers in Italy. However, despite the small number of certificates, Pellet Gold still is the most successful quality label in Italy since there is no DINplus certified and only one ÖNORM certified producer.

5.4. Development of European pellet-related standards

Introduction

Against the background of strong pellet market growth in Europe with a rapidly increasing number of market participants, international standardisation activities aim at supporting further market growth. The large number of producers using a variety of raw materials and the use of pellets in a variety of applications, from highly automated small-scale boilers to large scale industrial co-firing, cause the development of separated markets for pellets according to usage and pellet quality.⁵⁹

Furthermore, European and international pellet trade is an important factor for securing pellet supply in pellet importing countries in Europe. In order to further develop the European and the international pellet market, the interaction between market actors along supply chains needs to be facilitated. Pellet standardisation (and certification) proved to be suitable instruments for defining markets, facilitating trade and thus promoting market development in countries such as Germany or Austria.

In order to provide this support for the whole European pellet market the European Commission mandated the Standardisation Committee CEN TC 335 “Solid Biofuels” to develop a set of standards for the definition of fuel classes, test and sampling methods and quality assurance schemes for supply chains.

⁵⁸ Associazione Italiana Energie Agroforestali, www.aiel.it.

⁵⁹ Mohrig V. et al. (DBFZ); Pre-normative research on solid biofuels for improved European standards; 17th European Biomass Conference and Exhibition; 29 June – 3 July 2009, Hamburg, Germany.

The main outcome of these efforts will be two multipart standards that will be explained below.

Fuel specification and classes – prEN 14961

This standard will consist of 6 parts. The first part provides the framework for a common and clear classification method for solid biofuels. The aim is to create a common language for biomass suppliers, processors, customers and also e.g. equipment manufacturers. The other 5 parts are product standards for commonly traded forms of biofuels such as wood pellets, agropellets, briquettes and chips (Figure 7).

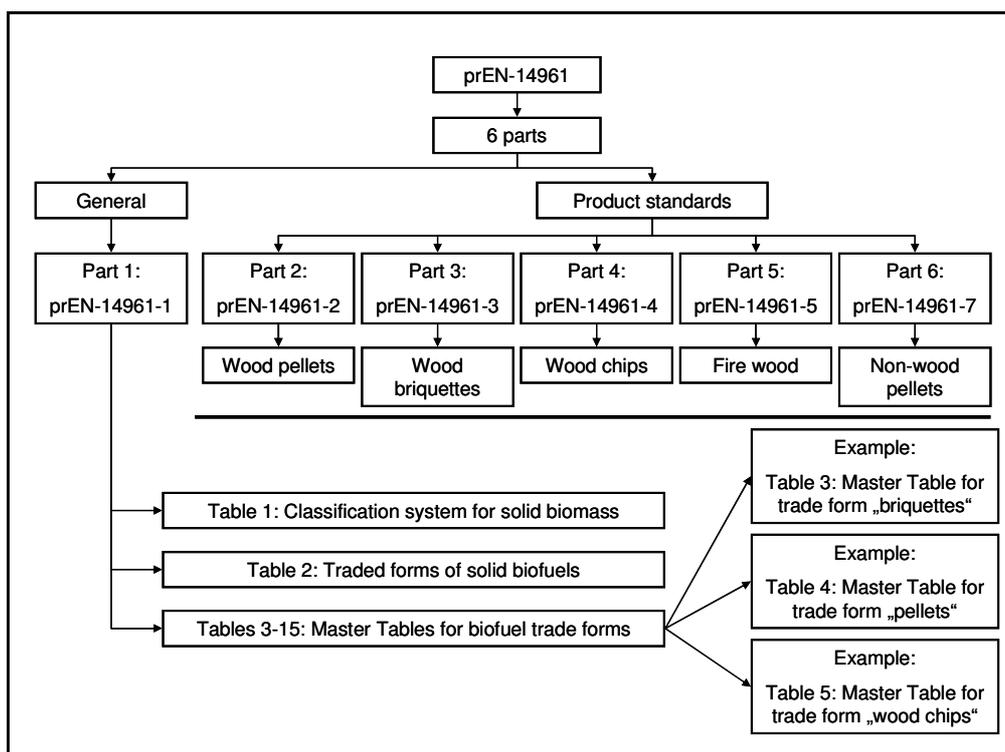


Figure 7: Structure of prEN 14961

Part 1 (General requirements), part 2 (Product standard for wood pellets) and part 6 (Product standard for non-wood pellets) are briefly described below.

Part 1: General requirements (prEN 14961-1)

To accomplish this, prEN 14961-1 contains 15 tables (2 general tables and 13 “Master Tables” for different biomass trade forms).

prEN 14961-1-Table 1 provides a hierarchical classification system for the origins and sources of biomass, distinguishing four basic types of biomass: woody biomass, herbaceous biomass, fruit biomass as well as blends and mixtures thereof. With this system, the origin and source of biomass can be described with a four-digit number.

prEN 14961-1-Table 2 defines a number of commonly used trade forms of solid biofuels (briquettes, chips, bales, etc) and refers to the respective Master Tables that specifically address one trade form and define normative (mandatory) and informative (voluntary) fuel properties that have to be or can be stated by the fuel supplier.

prEN 14961-1-Table 4 is the Master Table for pellets (wood and other). The Master Tables define a number of classes for each parameter across a wide range. Again, this shall provide a common language to European market participants who can arrange flexible agreements on biofuel properties with these definitions.

Part 2: Product standard for wood pellets (prEN 14961-2)

As already said, the standard prEN 14961 is planned to consist of 6 parts. The general part 1 was described above.

Parts 2-6 are product standards similar to e.g. ÖNORM standards, defining product quality requirements by means of minimum/maximum thresholds for certain parameters. The trade forms addressed are wood pellets (Part 2), wood briquettes (Part 3), wood chips (Part 4), firewood (Part 5) and non-wood pellets (Part 6).

The product standard for wood pellets consists of three quality classes. For class A1-pellets only stemwood and untreated by-products can be used as raw materials. For class A2 also materials with higher bark contents (e.g. residual wood) can be used. Class B allows for a broad range of raw materials including chemically treated wood by-products and used wood. The major differences between the three classes (ash, nitrogen and chlorine contents) are mainly a result of the broader raw material spectrum.

Compared to existing standards and certification schemes, the new European standard in general does not demand a higher pellet quality. However, some changes (compared to ÖNORM and DINplus) have to be considered:

- Requirements on pellet dimensions are now better defined.
- Instead of abrasion (in %), the European standard asks for the measurement of durability and introduces the fine content as an additional criterion.
- The abrasion threshold of 2.3 % is now changed to a durability of at least 97.5 %.
- Maximum sulphur contents are increased.
- The ash content is measured at 550°C according to EN 14775 instead of 815°C (ÖNORM and DINplus). At 550°C, higher ash contents are measured. However, a maximum ash content of 0.5 % is demanded in both cases. This means that the European norm is stricter here. It is possible that there will be another change in the European norm.
- Thresholds for fines, ash melting behaviour and bulk density are newly introduced.

Part 6: Product standard for non-woody pellets (prEN 14961-6)

By now, there is a first draft for this standard. It includes two tables, each similar to the table in prEN 14961-2 (wood pellets). The tables describe quality classes for:

- a) pellets produced from herbaceous biomass and
- b) pellets from fruit biomass and blends and mixtures.

Each table contains specifications for three quality categories (A1, A2, B). The major differences are related to different raw material characteristics that make higher thresholds for ash (3-7 %), nitrogen (0.5-2 %), sulphur (0.1-0.3 %) and chlorine (0.1-0.4 %) necessary.

Next steps

The general part 1 of prEN 14961 was approved in September 2009 and will come into effect with the beginning of 2010. The product standards (incl. prEN 14961-2 for wood pellets) have been under internal commenting. Comments were discussed at the last meeting in Leipzig, Germany, in November 2009. Details on prEN 14961-2 on wood pellets will be further discussed and shall come into effect by the end of 2010. The product standard for non-wood pellets needs further coordination and will be published later.

Fuel quality assurance – prEN 15234

This multipart standard defines the basis of a quality assurance system for the whole biofuel supply chain. It includes general definitions of specifications necessary for agreements between actors along the supply chain, needs for documentation and traceability and critical control points.

In addition to general guidance, specific parts corresponding to prEN 14961 are being developed. Part 2 for example will give an overview on critical quality issues specifically for the wood pellets supply chain.

Next steps

The general part of this standard (prEN 15234-1) is already well developed and might come into effect in 2010 while work on specific parts (incl. prEN 15234-2 on wood pellets) just started. It is planned to finalize them for 2011.

International standardisation (ISO/TC 238)

In addition to the European standardization initiative, the International Organization for Standardization established the ISO/TC 238 Solid Biofuels in 2007. The first meeting of the committee was in May 2008 where six working groups were set up. Afterwards a work programme for TC 238 was elaborated.

The second meeting was in October 2009, where, based on CEN Technical Specifications, the working groups were supposed to present first drafts of new ISO standards.

Working Group 2 (Solid biofuels – Fuel specifications and classes) discussed the status of CEN standards (prEN 14961). It was decided to use these standards as a basis for ISO standards. In addition there shall be one ISO product standard for non-woody briquettes for non-industrial use. Also the scope of new ISO standards was discussed. It was decided that ISO standards (in contrast to CEN standards) will also cover aquatic biomass as a raw material for fuels.

Next steps in the work of ISO/TC 238 are the preparation of draft standards by the end of 2009, the acceptance until mid 2010 and the publication of standards in 2011. In WG 2, members will comment on European documents until February 2010. Based upon this, first ISO working drafts for all 7 standards shall be prepared until May 2010 which will be discussed in the next meeting in June 2010.

By now, only 6 countries are represented in WG 2. The members now seek the participation of experts worldwide who can be nominated by National Standardisation Bodies to the ISO Global Directory.

5.5. New pellet certification (ENplus)

As already discussed above, the effectiveness of a pellet standard in the market is largely increased by an accompanying certification and quality control scheme. An example is the Austrian ÖNORM M 7135 in combination with the “ÖNORM tested” label.

Following the development of new European standards for solid biofuels (and pellets), existing quality labels can be upgraded and adapted in order to control and certify the compliance of pellets with the European standard. However, new European standards suggest the introduction of a European certification system not only targeting national markets but all 30 CEN member states. The new standards imply also to set up a certification system with a wider scope, i.e. addressing the whole pellet supply chain instead of pellet production only.

Against the background that the German pellet industry never was completely satisfied with existing certification schemes, the German Pellet Industry Association (DEPV), together with the German Biomass Research Centre (DBFZ), proPellets Austria and other European partners are developing a new certification system based on prEN 14961-2 (Product standard for wood pellets) and prEN 15234-1 (Quality assurance). “ENplus” is designed as a European certification system to be supported and distributed by all European pellet associations. The certification process will be carried out by national certification bodies together with national accredited laboratories. Similar to other international quality labels, like FSC or PEFC, the certification system is developed and supervised by an international supervision committee.

“ENplus” is intended to be a quality label for the whole pellet supply chain. Pellets can only be sold as ENplus pellets when every actor in the supply chain (pellet producer, traders, and retailers) is individually certified. Additionally, ENplus covers not only quality issues but also criteria for sustainability and supply security – which are crucial for the future development of the pellet market.

Details on the certification procedure, internal/external control and documentation modalities, costs and sanctions will be presented in a handbook. So far, the following features became apparent:⁶⁰

- As already mentioned, every actor along the supply chain has to be certified.
- The scheme is an international European certification system.
- Similar to prEN 14961-2, there are three quality classes: ENplus-A1, ENplus-A2 and EN-B; Pellet quality requirements are based on prEN 14961-2 with only one difference: Chemically treated material is not allowed in any quality class;
- Sustainability of pellet use shall be guaranteed by an obligatory minimum share of certified wood (PEFC or FSC) in pellet production.
- Quality management (at production plants, storage sites, and logistics providers) is important. The system foresees the setup of internal quality management with a quality representative, documentation and control.
- An identification system shall facilitate the traceability of pellet sources.

⁶⁰ Behr, H.M. (DEPV); Umsetzung der europäischen Norm für Holzpellets in Deutschland; 9. Industrieforum Pellets; October 2009, Stuttgart, Germany.

- Certified actors are obliged to document (see QM) and report on produced/marketed volumes on a monthly basis. The aim is to improve the monitoring of available volumes in the market and thus increase supply security.
- It is also discussed to include a minimum storage space as a precondition for certification. This might further increase supply security.
- External controls of production sites are performed once per year by testing institutes accredited according to ISO 17020 and ISO 17025. Additional controls are foreseen if necessary.

The system was presented to European pellet actors at the pellet industry forum in Stuttgart, October 2009. Until November 2009, details are discussed with European stakeholders. The certification process shall start in 2010.

5.6. Summary

Pellets@las data collections showed how inadequate the current status of pellet standardization and certification is in Europe. The existing national standards with individual quality requirements were not accepted by all stakeholders and did not spread within Europe. In most European countries, pellet quality standards are not used at all. Thus, national standards may have contributed to the development of single national pellet markets but the absence of common European standardisation was an important barrier to further development of the European pellet market in general and to increased international pellet trade in particular.

It can be expected that this situation will improve greatly with the implementation of new European standards for solid biofuels, including pellets. The pellets@las consortium follows and supports the European standardisation process and directly contributes to the process: Pellets@las partner *Holzforschung Austria* is a member of CEN/TC 335 and pellets@las partner FORCE Technology is a member of the Danish mirror group.

One experience gained during the pellets@las project was that standards alone are not sufficient to promote European pellet markets. The diversity of raw materials, the rapidly increasing number of producers and the critical importance of pellet quality for consumer satisfaction and therefore for market growth in general make the reinforcement and communication of compliance with standards necessary. In order to reinforce the compliance with quality standards, internal quality management needs to be accompanied by regular, external and unannounced controls at the production sites. Concerning communication, the end-consumer needs a reliable and recognisable quality label facilitating buying decisions. Quality labels also are an important marketing instrument for pellet producers. Finally, quality labels are used by pellet appliance manufacturers in warranty conditions that exclude the use of pellets without quality label.

All this can be delivered by quality certification schemes that award a reliable and recognizable quality label following regular external controls. Therefore, already in 2007, pellets@las partners recommended to use prEN 14961 and prEN 15234 as a basis for a pan-European certification system that could be used across Europe and facilitate international pellet trade and market development.

This recommendation will be followed by national certification bodies who decided to adapt their systems to the framework set by European standards. Two of these certification systems (ÖNORM and DINplus) have reached a certain level of international acceptance in the past but none can be characterized as a European quality label. One barrier to the European usage of these national systems is that quality labels which are well known in their country of origin (DIN in Germany; ÖNORM in Austria) may not be recognized and accepted in other countries. This led, for example, to efforts for replacing DINplus with the French NF label in France. Besides this, also language barriers and deficiencies in the certification process hinder the expansion of national certification systems. For DINplus this means that there is only one certification body (DIN CERTCO in Germany) without a representation or a sufficient number of control and testing organizations in other countries.

Finally, existing certification systems are lacking close cooperation between certification bodies and the pellet industry. AIEL may manage its own system and ITEBE and SNPGB may have contributed to the setup of the French system but the risk of certification systems developing against markets' needs remains as long as the pellet industry is not directly involved in the management of certification systems. Besides this, the pellet industry does not necessarily have to accept that profits with certification are made only outside the industry.

Based upon these arguments the pellets@las consortium recommended developing a new European certification system, based upon new European standards and with the following characteristics:

- The system should have a clear European focus from the beginning. This means involving experts and associations from all European countries (or as many as possible).
- The involved national associations should serve as the managing authorities of the certification system in their countries.
- In addition, a European pellet association should be established, not only to serve as the managing authority on the European level, but also as a platform for the discussion of pan-European issues such as policy development, R&D strategies, trade facilitation, market monitoring, supply security and sustainability.
- A new pellet certification system should include sustainability criteria.
- A new system could also be used for market monitoring and securing supply security.

With ENplus, the German Pellet Industry Association (DEPV), together with the German Biomass Research Centre (DBFZ) and the pellets@las member proPellets Austria developed a new certification system that aims at combining the recommended features mentioned above.

In October 2009, the system was presented to European actors at the pellet industry forum in Stuttgart and discussed with a number of other national pellet associations. In addition, first steps towards the formation of a European pellet industry association were taken.

These measures will be followed and fully supported by the pellets@las consortium.

Outlook

The development of a new French certification system will certainly cause some competition for pellet producers with DINplus, which has already been used by French producers for some time. In the same way, ENplus will have to face the competition of all the existing certification schemes. Certification bodies such as DIN CERTCO (Germany) and FCBA/AFNOR (France) may not be willing to abandon already established or recently developed quality labels and to integrate in the new system.

On the one hand, competition may be good for the certification business in general. On the other hand, it is also thinkable that there is only the need for one European quality label since pellet producers may have to decide between a trade mark that grants access to the pan-European market and trade marks that confine their activities to the respective national markets.

Within this process, the European boiler/stove manufacturers play an important role. By recommending a certain quality label in their equipment quality conditions, they substantially influence consumers' buying decisions and directly influence the pellet producers' decision for a certain quality label.

6. Mixed biomass pellets (MBP)

The growing consumption of wood pellets in Europe, especially in developed pellet markets such as Austria, raises the question of raw material supply for the pellet producing industry. The availability of the widely used sawdust and other wood wastes is limited. One option discussed is the production of pellets from raw wood, which might be unfavourable in means of sustainability, energy balance and a higher consumer price.

Furthermore, countries without large forestry industries and therefore a lack of sawdust sources will be forced to serve their domestic markets with pellets imported from countries with a better wood raw material base. Again, the energy and cost balances of the necessary supply and logistic chains are disadvantageous compared to the consumption of locally produced biomass fuels distributed over short distances.

One way to face these problems is the broadening of the raw material base for the pellet production. Technically, a wide range of agricultural wastes and herbaceous crops are suitable as raw materials for the pelletizing process. Namely agricultural residues such as straw, wastes of the food industries, dedicated biomass fuel crops (e.g. *Miscanthus*) and even wastes from other bio-energy processes (e.g. bio-gasification) have been used successfully for the production of mixed biomass pellets (MBP).

The availability of straw alone is enormous even when it can vary significantly between regions and the harvest seasons. Other biomass wastes are produced continuously and in constant amounts and could serve as more reliable raw materials. The use of biomass wastes of course would also allow keeping the pellet prices at low levels since most of the materials mentioned can be acquired at low costs.

The major drawback coming with the utilisation of MBP as fuel is the unfavourable chemical composition of most of the potential herbaceous MBP raw materials. Straw shows, compared to wood, high contents of e.g. chlorine and ash, posing technological problems during the combustion process. Corrosion of burner equipment, slagging and fouling are damaging and cost-intensive processes documented often during MBP combustion trials.

In addition, high contents of certain elements lead to high emission values for related pollutants. For example high ash contents can result in elevated dust emissions while high HCl emissions are caused by high chlorine contents in the fuel.

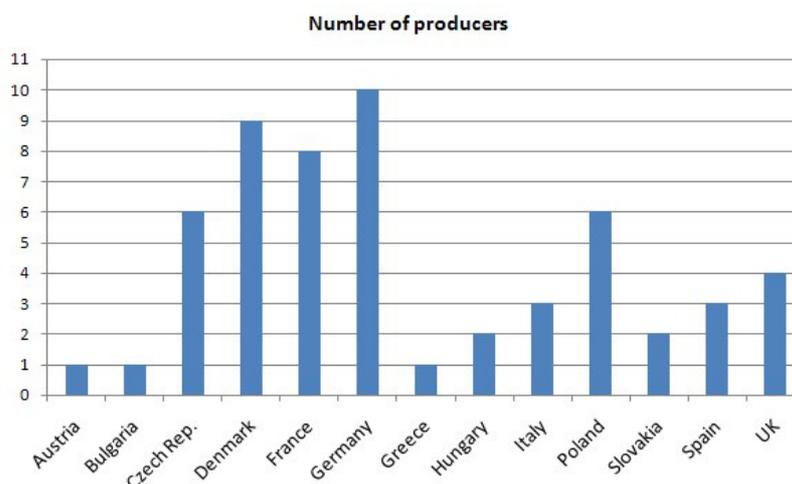
Today there are efficient ways to face both these problems. However, the application of such technologies is highly cost intensive and is no option for the small scale. Therefore the use of MBP as fuel in small boilers for heating purposes in the residential sector is hardly possible at the moment. Many boiler producers at the same time state that they are working on the development of boilers especially designed to fire MBP.

Until the addressed problems with the use of MBP in the small scale are solved the combustion of MBP is limited to large scale applications where the investment in gas cleaning technologies can be cost-effective. MBP seem to be an interesting alternative to wood pellets for co-firing, ideally in CHP plants.

MBP markets

Despite the large potential of pellet production from herbaceous biomass, MBP markets in Europe are developing very slowly.

During the pellets@las project, 56 companies were found producing MBP in 13 countries.



In most cases, these companies have small production capacities below 5000 tons per year. In addition, many of them produce MBP mainly for non-energy purposes such as animal feeding or littering. Only a small share is sold for combustion.

In France, for example, large MBP production capacities are installed but the capacities dedicated to fuel MBP production remains insignificant.

The most significant activity concerning MBP was found in Denmark and the UK, where large amounts of straw pellets are produced for co-firing. In some cases, the utility co-firing MBP is also producing them.

In Poland, energy producers are obliged to produce an increasing share of their energy from agricultural biomass. This promoted the installation of significant MBP production capacities (around 60,000 tons per year), which are used in medium-scale appliances and for co-firing.

Similar developments could be observed in other Eastern European countries such as the Czech Republic. Another large wood pellet producer in Latvia encourages farmers to produce large amounts of reed canary grass and switchgrass. It is foreseen to produce pellets from wood mixed with a certain amount of herbaceous biomass.

On the demand side, co-firing plants currently are the most important MBP producers. Consumption in Denmark, UK and Poland was already mentioned. In addition, Dutch utilities imported some 10,000 tons of various MBP (e.g. from soy husks) for co-firing purposes.

Finally, in countries such as Germany, France or Denmark, MBP are used in small and medium scale appliances in the residential or agricultural sectors but in insignificant amounts. This market probably will not develop rapidly in the next year, due to technical limitations.

7. Policy recommendations

With its Directive on the promotion of the use of energy from renewable resources (2009/28/EC), the European Union provided strong support for the further development of renewable energies, including biomass pellets. Besides setting mandatory targets and requiring action plans from Member States, the Directive addresses many issues with great relevance for the further development of pellet markets.

Namely, the need for better **information** of end-consumers and for **training** schemes for e.g. installers is covered properly. In order to implement these requirements efficiently in the Member States, transfer of knowhow from countries with experience in these fields will be important. The Intelligent Energy Programme is a suitable tool for addressing this and other issues mentioned in the following.

The same applies to the introduction of mandatory shares of renewable heat use in new and renovated buildings (see also Directive 2009/91/EC). Several European regions and countries such as Spain, Germany and Ireland have already gathered first experience with such **building regulations** which should be transferred to other regions and countries.

However, the largest potential for the deployment of renewable heat remains in the exchange of heating systems in existing buildings. In this sector, **financial incentives** (direct subsidies and tax measures) have proven to be effective and cost efficient support tools for renewable heat appliances in many regions and countries. National policy makers implementing such programmes can rely on numerous lessons learnt: Financial incentives must be long-term and reliable and are most effective in combination with other measures such as information campaigns. There are also numerous best practices showing how administration costs can be minimised and how both the total capacities installed and the quality and efficiency of equipment and installations can already be promoted by offering moderate incentives.

The **quality and efficiency of equipment** is also addressed by the RES Directive. The development of a European quality label for biomass heat appliances should be considered. The development of the Solar Keymark for instance was a strong driver for the development of the European solar thermal industry.

The points mentioned above show how demand for high quality pellets in the residential heating sector can be created by implementing proven policy measures. The same could be done by analysing existing policies for **the medium** (district heating and CHP) **and the large-scale sector** (power generation, co-firing). The way towards creating demand for pellets at several levels is very much straight forward.

Finally, past experience has shown how the policy-driven creation of demand leads to the formation of the **supply side**. Thus, financial support for e.g. pellet producers and other stakeholders along the supply chain may not be necessary while the necessary **legal frameworks** are already in place or being developed. Namely, the development of European **quality standards** for solid biomass fuels is an important step forward. Following the introduction of standards, the application of **quality certification schemes** should also be supported.

Other issues concerning the development of the supply side, especially the exploitation of additional **biomass potentials** and the establishment of reliable and

efficient **supply chains** can also be expected to be solved following the creation of demand.

Policy action may become necessary again at a later stage of market development. As soon as significant volumes are consumed, pellets become a strategic resource and **supply security** issues have to be considered. The introduction of mandatory storage regimes (similar to fossil fuel markets) should be considered for the future in order to secure pellet supply, at least for the residential sector.

Supply security is also connected to **international pellet trade**. Pellet imports to Europe will play an increasingly important role with growing demand. The dialogue with exporting nations therefore should be advanced.

Pellet imports to Europe can contribute to supply security but the **sustainability** of pellet supply chains, especially international supply chains, has to be ensured. The development of sustainability standards for biofuels (ISO 13065), including solid biofuels, through ISO/PC 248 is a positive step forward and the European standardisation initiative within CEN/TC 248 should be coordinated with ISO.

The inclusion of binding sustainability requirements on solid biofuels in the RES Directive on the other hand should be discussed very carefully.

Small and medium scale pellet users are often supplied by small and medium scale pellet producers. The production side within these supply chains can be assumed to be sustainable. Also GHG efficiency is usually high when pellets are supplied regionally. The only risk to be avoided is low or negative GHG efficiency through long-distance truck transports within Europe. Ways to avoid these without harming the whole sector should be discussed.

Most other risks (namely, pellet production from no-go areas and low GHG efficiency of intercontinental trade flows) apply to supply chains involving large actors and large scale power production from pellets. These actors should be able to comply with sustainability criteria and experience e.g. in Belgium (Green certificate scheme in combination with binding sustainability criteria) shows that such systems can be feasible.

In summary, this means that the majority of existing risks could be covered by setting binding criteria for large operators only. Also emerging risks, for instance those related to non-wood pellet production from energy crops are currently restricted to the large-scale sector as these pellets are not suitable for small and medium scale technology at the moment.

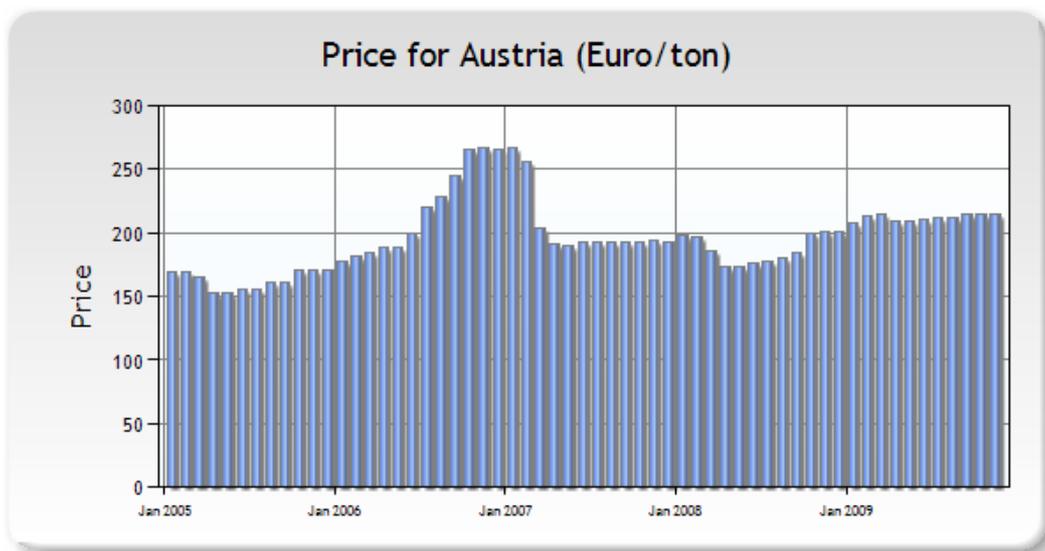
8. www.pelletsatlas.info

The central tool for the public provision of pellet market intelligence is the online information platform at www.pelletsatlas.info.

By selecting a country, all available data on market actors involved, pellet prices, produced and consumed volumes can be viewed without access restrictions.

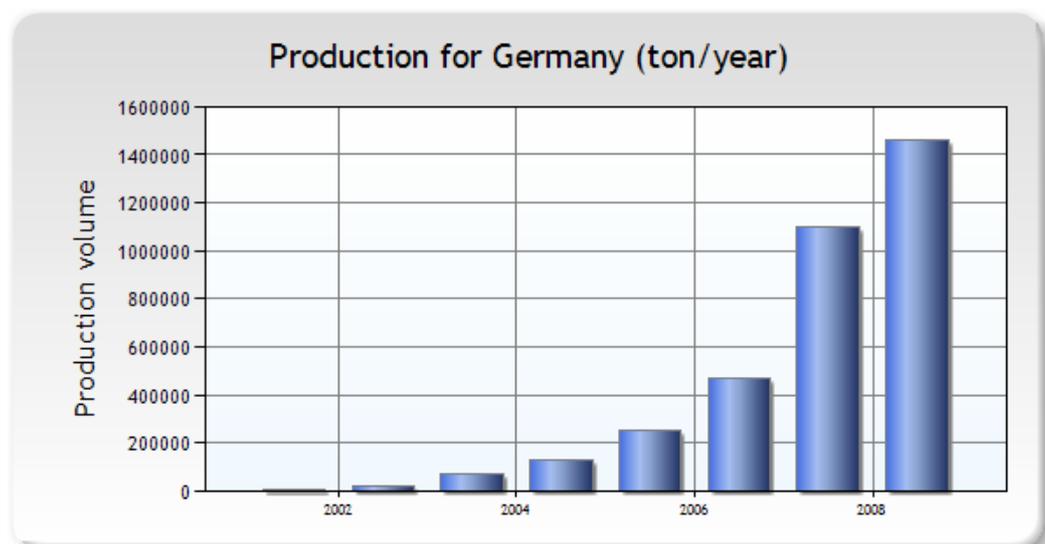
Pellets@las data collections included information on monthly prices for different usage types (from small to large scale) and delivery types (loose, bags, CIF).

The example below shows prices for wood pellets delivered loosely to residential end-consumers.



Besides prices, additional information for the country selected is presented. This information includes volumes produced and consumed, production capacities and pellet appliances installed.

The example below shows volumes of wood pellets produced in Germany.



Another important part of the information platform is the stakeholder database. By selecting a country and a stakeholder category, contact details of numerous European market participants can be viewed.

The screenshot below shows the localisation of pellet producers in Germany.



In order to keep this stakeholder collection up-to-date, interested market actors are invited to create an account which allows administering own contact details and company information.

Besides detailed market intelligence, interested users can find numerous background analyses:

- Detailed country reports for individual European pellet markets
- Overview reports presenting summaries of collected data
- A market study for Russia, Belarus and Ukraine
- An analysis of the global pellet market
- Information on wood pellet logistics
- Information on European MBP markets
- Feasibility studies for MBP production plants
- Wood pellet handbooks in several European languages
- A heat cost calculation tool
- Information on the development of pellet quality standards and certification systems

9. The pellets@las consortium

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10. Basic project data

Project acronym:	pellets@las
Full project title:	Development and Promotion of a Transparent European Pellets Market – Creation of a European Real-time Pellets Atlas
Agreement No:	EIE/06/020
Duration:	January 2007 – December 2009
Coverage:	EU27+2
Key stakeholders:	All stakeholders along pellet supply chains, including pellet producers, traders, retailers, and small to large end-consumers
Objective:	The main aim of the PELLETS@LAS project is to provide market intelligence to stakeholders in the European wood pellet sector.
Key result:	Market intelligence was provided through public online databases with access to detailed “raw data” such as prices, volumes, and market actors. In addition, this information was analyzed and used for the publication of detailed country reports, including background information on market developments, policy and legal frameworks, etc.
Value:	The information published in the course of the pellets@las project proved to be of great value to the European and the international pellet industry. Especially positive feedback and requests received from potential investors, consultancies and research organizations showed the interest of a large number of key stakeholders and the positive effect of the data for market development.

This document is the Final Report of the pellets@las project. It shall provide a summary of the results produced during the project. Therefore, it is based upon reports and analyses developed by various project partners. The main documents produced during the project were compiled and edited by the project coordinator (WIP Renewable Energies) in order to produce this Final Report.