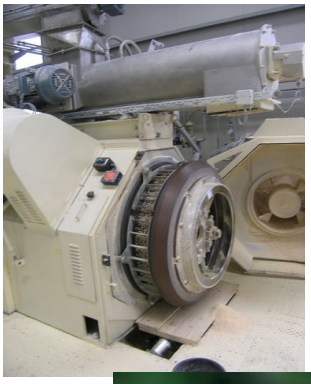

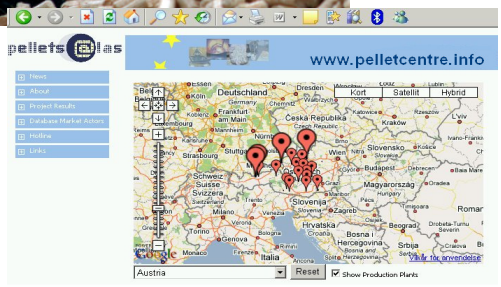

Development and promotion of a transparent European Pellets Market

Creation of a European real-time Pellets Atlas

Pellet market country report

GERMANY

Intelligent Energy Europe

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September 2009

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1. Introduction

Germany is one of the largest pellet markets worldwide in terms of produced and consumed volumes and installed production capacities. However, in terms of per capita values there seems to be great space for development when the situation is compared to the situation in Austria.

The idea of using wood for heating purposes is widely spread and accepted in Germany and large amounts of wood (e.g. as split logs) have been being used in (tile) stoves in the past. Large forest areas and a strong wood processing industry produce large amounts of raw material for pellet production and the potential of wood pellet heating is immense.

Furthermore, there is no lack of political support. The new renewable heat law provides a legal framework that favors further market growth. The target for the share of renewable heat in the total heat demand is set at 14 % in 2020. The largest part of this target will be reached with biomass applications including wood pellet heating. The law introduces or continues a number of programmes that will help reaching this target.

The German Market Incentive Programme (MAP) provides subsidies to house owners that want to install pellet or other renewable heat applications. In addition there is now the obligation for using renewable heat sources in new houses.

These instruments target at the residential heating market which produces the demand for pellets in Germany. Large scale consumption is insignificant at the moment. In 2008, the installed production capacities were more than sufficient to satisfy the domestic demand so that large amounts of mainly industrial pellets have to be exported in order to better utilize the capacities.

It is clearly anticipated that the boiler market and with it the demand for high quality wood pellets will further grow during the next years. In order to meet this growing demand properly the pellet industry has to address several issues. To some extent the raw material basis has to be broadened in a sustainable way. Storage capacities have to be developed and consumers have to be made aware of the advantages of buying their fuel in the summer months. This is necessary to avoid supply shortages during the winters and would allow pellet producers to produce high quality pellets for the domestic heating market throughout the year.

2. History of market development

The production of wood pellets in Germany started around 1996/1997. In 1997, the installed annual production capacity amounted to 6500 tonnes[1]. Mainly agricultural drying collectives accounted for these capacities. The installed capacities increased slowly until they doubled from 2000 to 2001 and almost tripled from 2001 to 2002 (Figure 1).

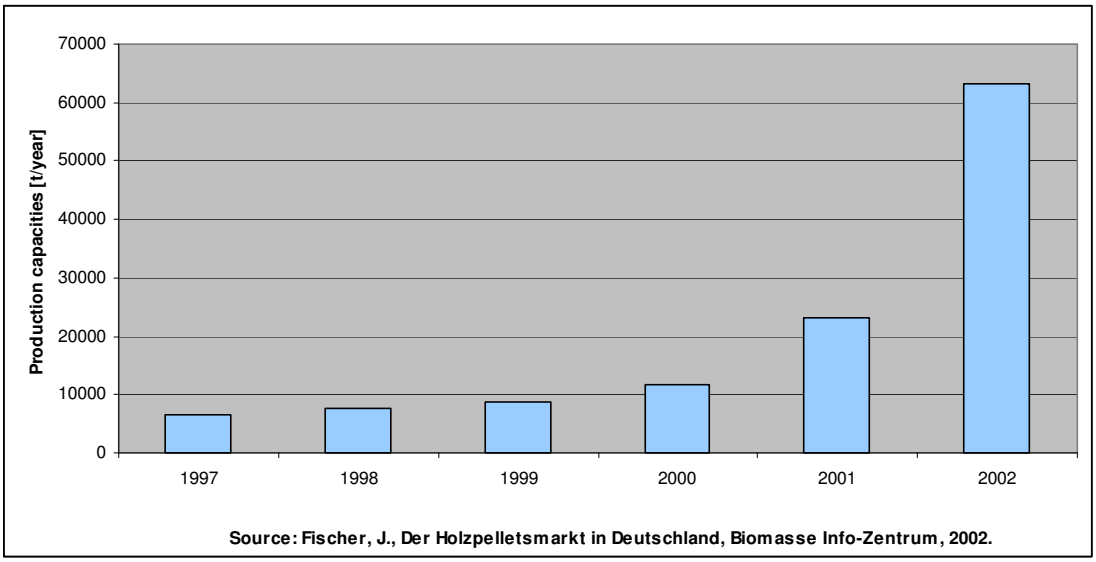

Figure 1: Early development of installed wood pellet production capacities in Germany.

The German Biomass Information Centre (BIZ) registered seven pellet production plants in 2000[2] and already 24 producers in 2002[1]. At the same time, the actual production for 2001 was estimated at 6000 tonnes[3]. The installed production capacities were not used fully.

This can be explained by a slow development at the demand side. The few small-scale pellet producers were not able to take any marketing measures. Neither were the few pellet boiler and stove manufacturers, of which six were registered in Germany in 2000[4]. These were small and medium sized companies with low production capacities so that most of the weak demand for pellet appliances was satisfied by imports from Austria, Denmark or Sweden.

Also the distribution network was hardly developed. In 2000, only 30 distributors were registered who sold pellets mainly in bags and only four producers together with six traders offered the service of loose pellet delivery.[2] In 2002, already 400 traders offered wood pellets but the distribution network was still not sufficient.

[1] Fischer, J., Der Holzpelletsmarkt in Deutschland, Biomasse Info-Zentrum, 2002.

[2] Fischer, J., Innovative Energieträger aus Holz, Biomasse Info-Zentrum, 2001.

[3] Mantau, U. et al., Pellets – domestic market and neighbour countries, BFH-Nachrichten, 2006.

[4] Viak, a. et al., Woodpellets in Europe, Thermie B project, 2000.

Due to a lack of visibility of the pellet technology and an insufficient distribution network the number of installed pellet appliances and therefore the pellet demand grew slowly. In total, 200 automatic boilers (< 35 kW) were installed in 1998, in 1999 800 new installations were recorded, 2400 in 2001 and 4800 in 2002.[1]

In 2001, the German energy-pellet association (DEPV) was founded.[5] The association, together with the Solar Promotion GmbH, evaluates monthly pellet prices and annual production, production capacity and consumption statistics. Furthermore, the German Federal Office of Economics and Export Control (BAFA[6]) grant subsidies for the installation of pellet appliances and provide data on approved proposals. Assuming that the vast majority of pellet appliances is installed with the help of subsidies, the DEPV use this data and provide statistics on the number of installed pellet boilers in Germany. Regular pellet stoves are not included in the statistics. Both data on annual pellet consumption and the total number of installed pellet boilers are presented in Figure 2.

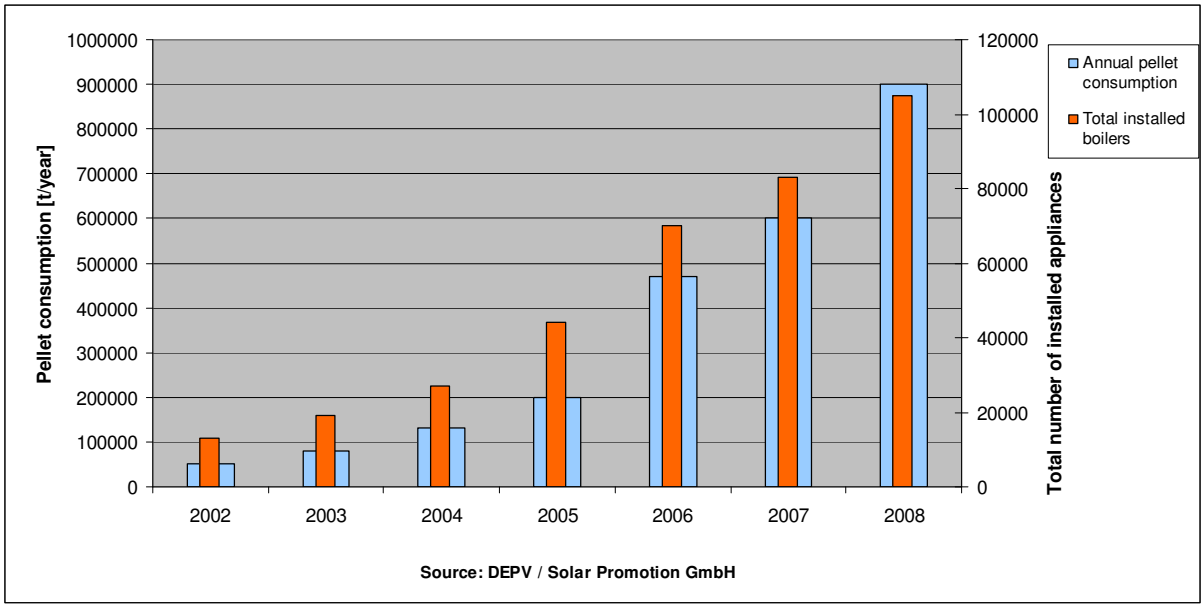

Figure 2: German statistics for annual pellet consumption and total installed pellet appliances, including automatic boilers and stoves for water heating, excluding regular stoves.

Figure 2 shows the further development of the German pellet market with very strong growth in 2005 and 2006, decreased market growth in 2007 and the stabilization of the market in 2008.

Both the production and the production capacity doubled in 2005 and 2006. This trend continued in 2007 although the growth of the consumption slowed down significantly. After the massive build-up of additional production capacities in 2007, the industry stabilized in 2008. But still, around 40 % of the installed capacity is not used and the production exceeds the domestic consumption by almost 600.000 tonnes.

[5] Website: www.depv.de

[6] Website: www.bafa.de

The further development of the supply side in Germany is illustrated by Figure 3.

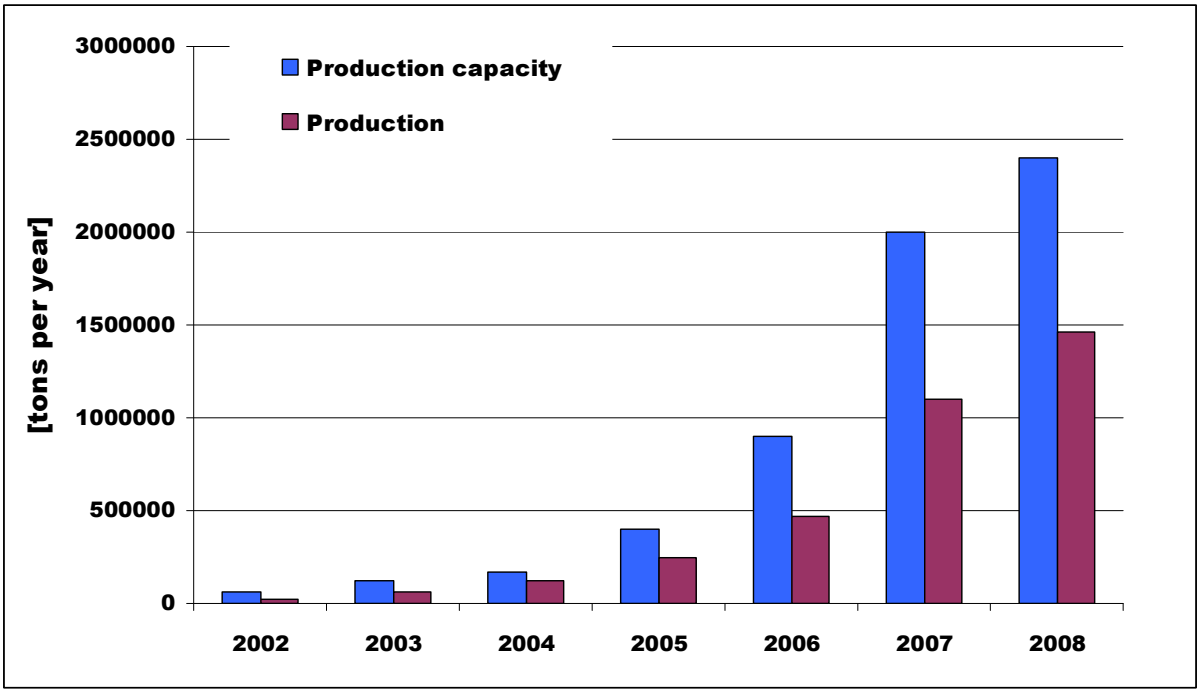

Figure 3: Installed wood pellet production capacities and real production (Source: DEPV).

3. Pellet production

In 2008, 50 wood pellet producers were registered by the pellets@las project. However, there certainly are 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 tonnes per year. On the other hand, the large-scale producers (capacity: > 70.000 tonnes per year) represent around 60 % of the total pellet production capacity installed in Germany (Figure 4).

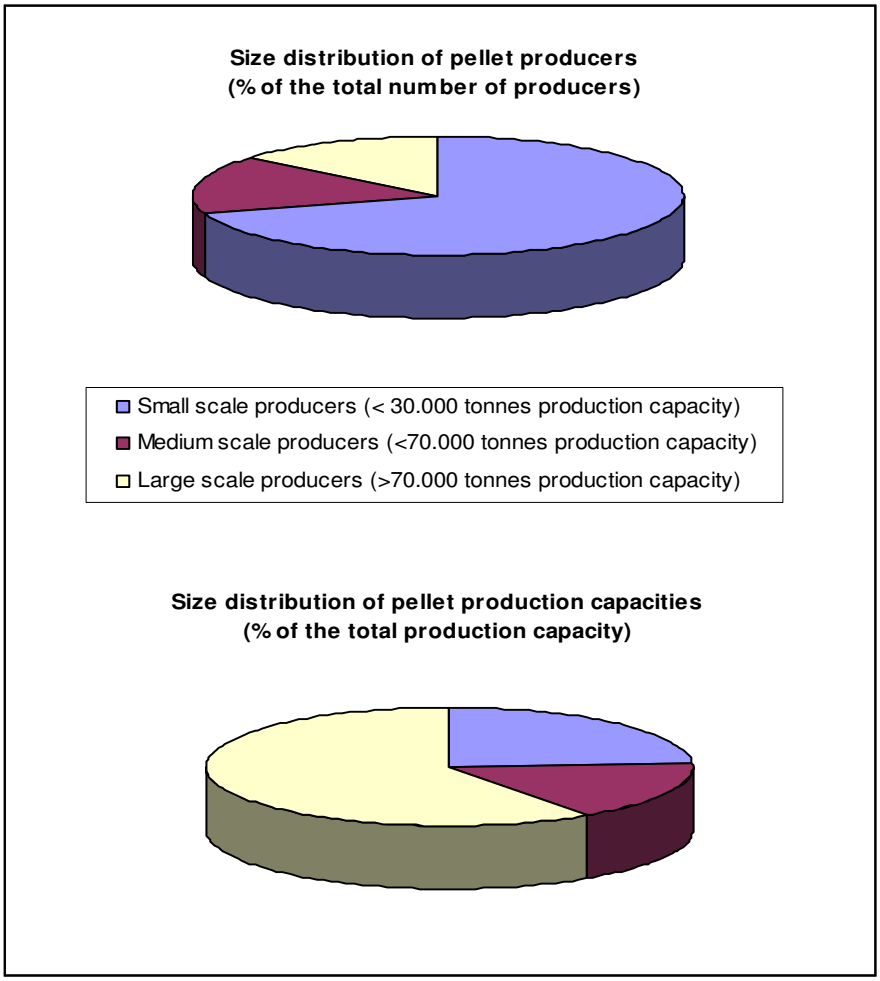

Figure 4: Distribution of pellet producers and pellet production capacities to the small, medium and large scale.

The pellet production in Germany is concentrated in the South and in the South-West, around the well-wooded low mountain ranges with high wood industry activity (Figure 5). The distribution of installed pellet appliances follows a similar pattern.

Figure 5: Geographical distribution of pellet producers in Germany

According to the DEPV, the total pellet production capacity in Germany amounted to 2.4 million tonnes per year in 2008, while around 1.46 million tonnes were produced. The resulting utilization rate of around 60 % is low, but the production still exceeds the national consumption of 900,000 tonnes as estimated by the DEPV.

Small and medium scale production

Two main types of small- and medium-scale producers can be discriminated. The first is the prototype from the beginning of the pellet market development: Agricultural drying collectives and wood processing companies that use residual wood materials and sometimes residual heat for pellet production. Of another type are the more and more emerging dedicated pellet producers. These 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 with one to three own blower lorries and in some cases a brand name is used. Other small scale producers do not provide logistics and sell their pellets via a regional network of retailers.

In the small and medium scale there is a tendency towards forming networks. Several independent or dependent production sites produce for a distribution network that sells pellets under well-established brand names. These networks can operate on regional, supra-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. The two largest networks of this kind are marketing pellets under the brands “Westerwälder Pellets©” and “Firestixx©”. The sum of pellets produced and marketed in these networks amounts to volumes that exceed by far the production of some of the large-scale companies.

Large scale production

In the large scale, only three sites are known that are operated by wood industry companies. One of these produces for the Firestixx©-network, while the others seem to distribute their product via traders and retailers.

The other large-scale producers are dedicated pellet companies. This sector shall be described by some examples:

“German Pellets” is the market leader and produces pellets at three major sites in Germany with a total production capacity of more than 600.000 tonnes annually. Raw materials used are bought in the respective vicinity of the production sites (Maximum radius 100 km). A share of the raw materials is shipped from e.g. Scandinavia. In the winter of 2008/2009, a good part of their pellets was produced from round wood in order to avoid raw material shortages due to the weakness of the construction and wood industries. “German Pellets” produces DINplus pellets for the German residential heating market as well as industrial pellets for the export to BeNeLux and Scandinavia. More than half of the pellets produced in 2008 were exported as industrial pellets. Therefore, it can be assumed that “German Pellets” accounts for a large part of industrial pellets produced in Germany and for a large part of exported pellets in general. The marketing of DINplus pellets for the domestic residential heating market is done under their own brand name. They maintain a large network of retailers but do not provide logistics themselves.

“HPS Schwedt” produces in Eastern Germany with a capacity of around 100.000 tonnes. The production site is operated in a joint venture with “VIS NOVA Trading”. The whole production is marketed by “VIS NOVA” which is a biomass trading company active mainly in Northern Germany. The raw materials are bought from wood industry companies around the production site but the importance of round wood increased significantly in 2008. The greater part of the pellets produced are not of DINplus quality. These pellets are mainly exported.

The “European Pellet Company” in Torgau started the pellet production in 2008 by producing industrial pellets for the export exclusively. The product is marketed via traders such as VIS NOVA. Since this plant is sited next to a large wood processing site, only wood by-products such as saw dust and chippings are used for pellet production. In the winter of 2008/2009 there was no need to use other raw materials. For 2009, the production of DINplus pellets is also considered.

The “Gregor Ziegler GmbH” in Eastern Bavaria produces pellets exclusively from wood processing by-products. Two large wood industry companies are sited in the vicinity of the pellet plant. From other business activities the company has a large logistic system at their disposal. It is used to export around 25 % of the production as industry pellets and another 40 % as DINplus pellets to Austria and Italy. The DINplus pellets are sold under their own brand (“Thermospan©”) by a network of retailers. The distribution of pellets for the German residential heating market is concentrated in Eastern Bavaria.

“Compactec” in Eastern Bavaria also buy their raw materials from local wood industries, but they mainly produce for the German residential heating market. They operate their own fleet of blower lorries and market their pellets nationwide under their own trademark, partially in cooperation with larger regional fuel traders.

Quality standards

Wood pellets are a standardized fuel in Germany. The German standard DIN 51731 quality requirements on pellets are given in Table 1. Soon, problems occurred with this standard. It became clear that the standardisation of abrasion characteristics was necessary and that stricter requirements should be set for the application of wood pellets in the small scale. Furthermore, pellet producers could have their products tested and then mark their products as according to “DIN 51731” for one year without further external control.

Therefore, a certification programme was initiated by DIN CERTCO in 2002. Pellet producers can have their products certified according to the stricter requirements of DINplus (Table 1). This quality seal not only guarantees a higher quality than the original DIN. Also the abrasion characteristics are standardised. It also ensures high consumer satisfaction and confidence by making frequent production controls, both internally and externally, mandatory.

Table 1: Quality standard requirements of DIN 51731 and DIN plus [7], [8]

		DIN 51731	DIN plus
Diameter	[mm]	4 ≤ d < 10	4 ≤ d < 10
Length	[mm]	> 50 mm	≤ 5 x d
Density	[kg / dm^3]	> 1	≥ 1.12
Water content	[%]	< 12	≤ 10.0
Ash content	[%]	< 1.5	≤ 0.50
Energy content	[MJ / kg]	17.5 – 19.5	≥ 18.0
Sulphur content	[%]	< 0.08	≤ 0.04
Nitrogen content	[%]	< 0.30	≤ 0.30
Chlorine content	[%]	< 0.03	≤ 0.02
Abrasion	[%]	--	2.3

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 tonnes in 2008, DEPV). 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.

Raw material utilisation

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 processings. Forest residues and other bark containing wood materials are rarely used for the production of DINplus pellets in any case. However, it can be observed that a number of larger pellet producers broadened their raw material base in 2008 and used round 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.

Saw dust and chippings will be in great demand in the next years and in order to allow for further market growth the use of alternative feedstocks will become inevitable soon.

[7] DINplus Zertifizierungsprogramm, DIN CERTCO, 2007.

[8] Hartmann, H., *Normierung von Halmgut,* Technologie- und Förderzentrum Straubing, 2008.

4. Pellet trade and logistics

International pellet trade

Exact figures on pellet import to and export from Germany are hard to tackle. The size of the market does not allow tracing all volumes traded across borders. However, the main trends are known.

DEPV figures for 2008 (Production: 1.46 million tones; consumption: 900,000 tonnes) show that Germany is a large exporter of wood pellets. Disregarding pellet imports, this means that at least 560,000 tonnes were exported. Interviews with selected producers and traders showed that at least this amount was exported as industrial pellets. Not all stakeholders were questioned and the export of industrial pellets is probably much higher. It is known that industrial pellets are mainly exported to Scandinavia, Belgium and the Netherlands.

Exact data on the international trade with DINplus pellets is even harder to come by. The pellets@las sub-contractor CARMEN e.V. questioned 79 traders / retailers representing total sales of almost 300,000 tonnes. Around 20 % of the total volume was sold to other traders / retailers, around 10 % were sold in bags to end-consumers and almost 70 % were sold loose to end-consumers. Only one trader stated to have 30 % of the volume exported to large-scale end-consumers. Therefore, the trade with industrial pellets was under-represented in this survey.

None of the questioned companies is specialized in exporting and none of them exported more than 10 % of the total sales volume to foreign countries. In total, less than 2 % of the total volume is sold in foreign countries, mainly in France and Austria. However, it is known that significant volumes are also traded to Italy and it can be assumed that DINplus pellets are also exported to Switzerland.

According to this survey, 3 % of the total purchase volume were imported from Austria and another 0.5 % from the Czech Republic. It can also be assumed that small amounts are also imported from other Eastern European states. Furthermore, a representative of VIS NOVA trading stated that they imported significant amounts of DINplus pellets from Sweden.

In summary the most important trade flow in Germany is the export of industrial pellets. In many cases producers switch to the production and export of industrial pellets during the summer months when the domestic demand in the residential heating sector is low. Industrial pellets are mainly exported via ships and most of the large-scale producers have direct access to river or sea harbours.

The international trade with DINplus pellets seems to be of less importance. In many cases, small and medium scale producers are located near borders and their retailer networks are reaching across those borders. This way, small amounts are sold to foreign countries. Some of the marketing networks mentioned above also operate in more than one country and pellets are transported across borders according to the respective demand in the countries. Much of the international trade is certainly done by specialized traders who were not part of the CARMEN survey so that some trade flows are not detected. Hence, import and export of wood pellets is underestimated.

Pellet logistics

The 79 traders / retailers questioned by CARMEN e.V. sold around 220,000 tonnes of wood pellets to end-consumers in 2008. 87 % of these pellets were delivered loosely. Pellet boilers represent the larger part of installed pellet applications and most of them are installed together with storage facilities while pellet stoves are of less importance in Germany up to now.

Although many producers also offer the direct delivery to the customers, most of the wood pellets are marketed via trader and retailer networks which are in most cases on a regional level. Only few large scale producers, large traders and producer networks operate on a national level.

5. Pellet consumption

The total annual pellet consumption amounted to 900.000 tonnes in 2008, according to estimations of the DEPV. This is a growth of 50 % compared to the estimated consumption of 600,000 tonnes in 2007.

These pellets are exclusively consumed by the residential small scale heating sector. If there is any consumption by co-firing plants it is insignificant Therefore, most of these pellets are assumed to be of the highest quality DINplus. If pellets of lower quality are produced they are likely to be exported.

Figure 2 shows that in 2008, around 140,000 boilers and stoves for water heating were in operation in Germany. According to the DEPV, around 10 % of the newly installed pellet appliances in 2007 were stoves including stoves with space heating function only. Correspondingly, loose delivery to storage tanks is the predominant way of pellet supply for the residential sector. Sales in bags are of minor importance.

The price development for DINplus pellets is shown in the following figures. The shown prices include VAT and charges for loose delivery. The assumed delivery radius is 50 km and the delivery amount is 5 tonnes. These prices are evaluated by the pellets@las sub-contractor C.A.R.M.E.N. e.V. and are also available via their website at www.carmen-ev.de.

Figure 6 shows the price situation in the winter of 2006/2007, when a strong demand exceeded the availability of wood pellets. This led to a severe rise of prices and even to supply shortages.

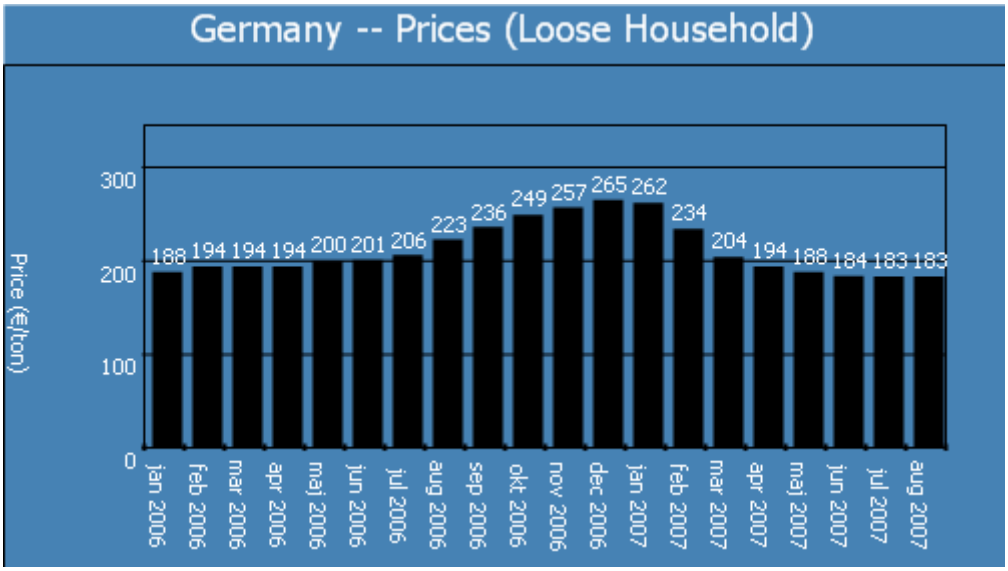

Figure 6: Price development for wood pellets (Quality DINplus, VAT and charges included, delivery of 5 tonnes, radius 50 km) from January 2006 to August 2007.

The resulting loss of consumer confidence became manifest in a drop of newly installed pellet appliances in 2007 (Figure 2) and a general weakness of the German pellet market. While large additional pellet production capacities were installed in 2007 and production was more than doubled compared to 2006, the demand and the consumption grew slowly. As a result, an oversupply with pellets stabilized the prices in the winter of 2007/2008 (Figure 7).

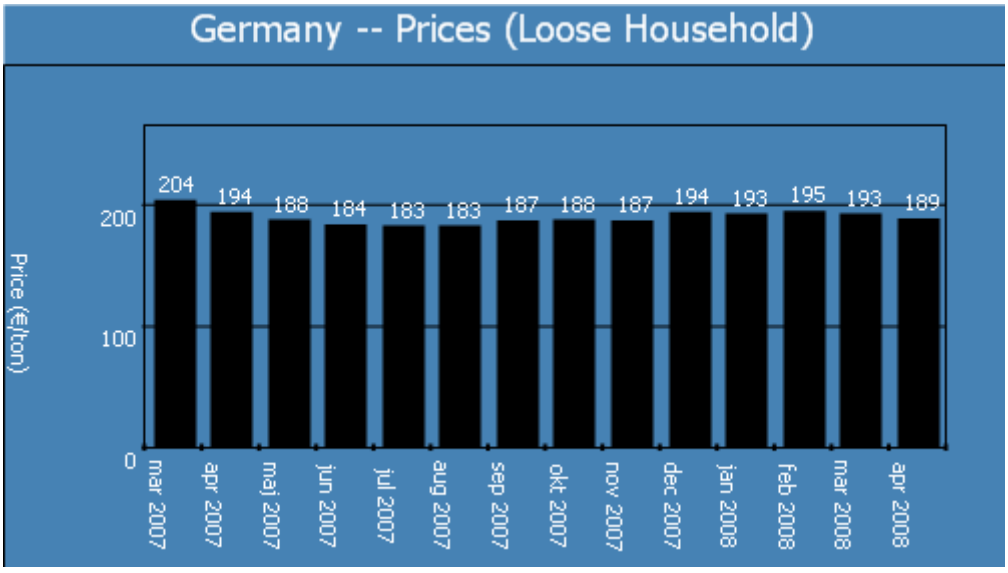

Figure 7: Price development for wood pellets (Quality DINplus, VAT and charges included, delivery of 5 tonnes, radius 50 km) from March 2007 to April 2008.

The market recovered in 2008 and the growth in consumption and the amount of newly installed pellet appliances lead to a stronger demand in the winter of

2008/2009. However, no supply shortages appeared and the rise of pellet prices was reasonable (Figure 8).

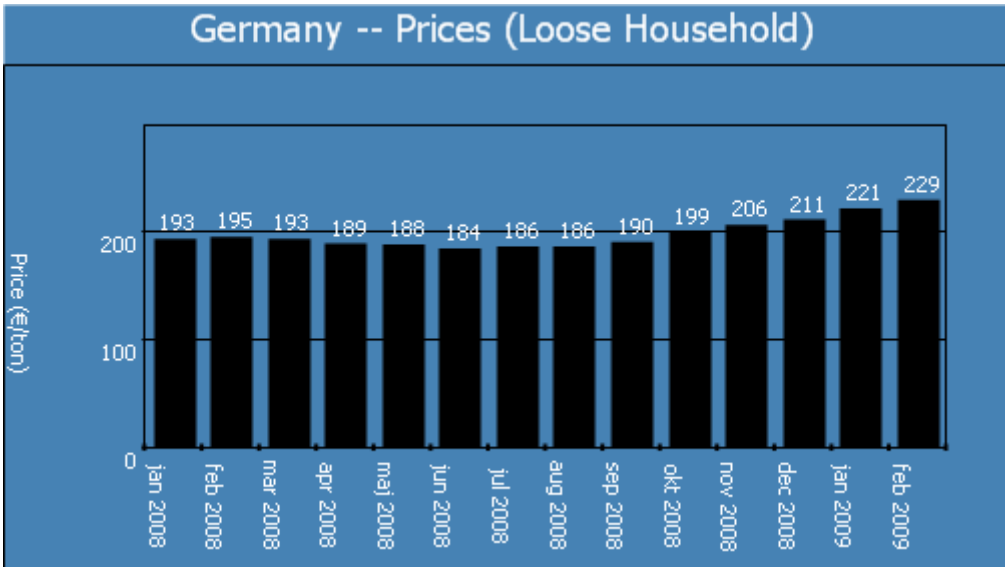

Figure 8: Price development for wood pellets (Quality DINplus, VAT and charges included, delivery of 5 tonnes, radius 50 km) from January 2008 to February 2009.

Figure 9 shows the comparably high prices for wood pellets delivered in small bags.

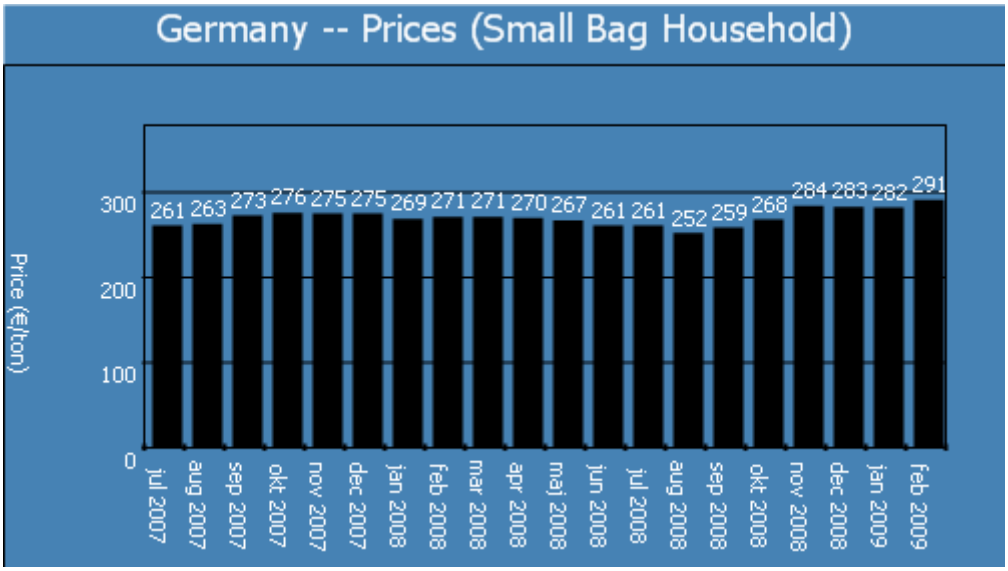

Figure 9: Price development for wood pellets in small bags (Quality DINplus, VAT and charges included, delivery of 1 tonne, radius 50 km) from July 2007 to February 2009.

Pellet boilers are available from more than 200 manufacturers. Most of them are small or medium sized companies and only some are large companies which often operate internationally. Many Austrian boiler manufacturers entered the German market during the last years.

Prices for pellet appliances were evaluated in a brochure issued by the FNR[9]. Prices exclude VAT and installation. Stoves cost between EUR 2500 to 5500, stoves including water heating can cost up to EUR 7000, depending on the heat output. Small and medium boilers (< 50 kW) are already available for less than EUR 5000 and can cost up to EUR 15,000.

6. Mixed biomass pellets

The MBP market in Germany is still at the initial stage.

MBP, mainly straw pellets, are produced by several small producers and the annual production capacity is probably still below 20.000 tonnes. The produced straw pellets are mostly used for purposes such as littering and the use for heat and energy production is insignificant.

MBP are rarely used for heating purposes in households because most boilers are optimised for the use of wood pellets and the use of e.g. straw pellets can cause technical problems although some boiler producers are working on the adaptation of boilers to the use of MBP.

The use of MBP in larger combustion units (> 100 kW) does not seem to be feasible compared to the direct use of straw bales.

Most other raw materials (e.g. grain, oilseed rape cake) are not allowed as fuel in household heating (< 100 kW) without special permission (BImSchV1). Only “straw and similar plant materials” (BImSchV1) and pellets thereof are allowed as fuel in household heating (< 100 kW). Emission thresholds for straw are sometimes higher than for wood in order to stimulate the use of alternative biomass. The State promotes the use of MBP in the same way as it is done for wood fuels. Financial advantages from the use of MBP, compared to the use of wood pellets, can only result from lower prices.

Although straw is available in large amounts in Germany, the prices for straw are volatile depending on the harvest period. Thus, the production of MBP might not be feasible in unfavourable harvest years. This does not promote consumer confidence.

There are still technical problems with MBP combustion to be solved. Otherwise, higher costs for the unproblematic combustion and the limitation of emissions are hindering MBP market development. For a further promotion of the use of alternative biomass fuels, the inclusion of other plant materials as regular fuels in BImSchV1 might be an appropriate tool.

7. Legal framework & Policy

The targets of the Federal Government for 2020 include the increase of the share of renewable heat generation from 7 % today to 14 %[10]. An important share of this target will have to be achieved in the residential heating sector mainly by an increased use of biomass and solar thermal technologies.

[9] Marktübersicht Pelletzentralheizungen und Pelletöfen, Fachagentur Nachwachsende Rohstoffe e.V, 2007 (Brochure available at www.nachwachsende-rohstoffe.de)

[10] Roadmap Energiepolitik 2020, BMU, 2009.

In order to reach this target a renewable heat law is in force since 2009. It obliges owners of new houses to provide a certain share of their heat demand from renewable sources. Heating with wood pellets is one option. The law also includes the continuation of the established and successful Market Incentive Programme (MAP). This programme provides subsidies for for the installation of renewable heat appliances in new and old buildings which was one of the main drivers for the growth of renewable heating markets in the past.

Other support measures included reduced VAT rates on wood fuels (7 % instead of 19 %) and several information portals on renewables in general.

The legal framework for wood heating is provided by the German Law for the protection against harmful effects on the environment (BImSchG). According to this law, small-scale heating installations do not need special approval. If units are operated with regular fuels, including wood pellets, approval is not necessary for units up to 1000 kW. In case other fuels (e.g. straw) are used, units need approval above the size of 100 kW.

The operation of small units without the need of approval is regulated in BImSchV1. This order describes all fuels that may be used in small units. Amongst wood pellets and fossil fuels, this list also contains “straw and similar plant materials”. This includes, according to most commentaries, *Miscanthus*, hay and reed but excludes grain, husks and rape cake.

BImSchV1 is under amendment at the moment. It is expected that the list of allowed fuels might be extended, but emission restrictions might also be tightened.

8. Projections on future developments

With an annual wood pellet consumption of 900,000 tonnes and a population of around 82 million, the per capita wood pellet consumption in 2008 amounted to around 11 kg per person. Compared to an annual per capita consumption of around 40 kg in Austria (2008), there seems to be a lot of potential for further market growth.

According to the DEPV, more than 3 million heating installations in Germany are older than 20 years. Furthermore, the German renewable heat law stipulates the use of renewable heat sources (e.g. pellets) in new houses and it is anticipated that the novel emission law (novel 1. BImSchV) will stipulate the modernization or the decommissioning of old heating units that do not meet the new and demanding emission threshold values. Given these factors and other political support (e.g. the Market Incentive Programme), further strong growth of the renewable heating market, including the pellet market, can be expected. In contrast, no development towards a significant use of pellets in co-firing is observed. In the near future this sector will be limited further on to less processed biomass fuels such as wood chips.

In 2009, the pellet demand of the residential heating sector will grow due to another significant increase of installed pellet appliances. However, this demand can be met without the installation of additional production capacities and even without increasing the pellet production compared to 2008. The large amounts of pellets that were exported in 2008 could also be consumed by the domestic market.

Problems however might occur with raw material supply. Low activity in the wood processing and construction industries might force pellet producers to broaden their raw material basis. In fact, some pellet producers seem to have prepared themselves already by adapting their production processes to the use of wood chips. Other

options for alternatives such as straw pellets, torrefied pellets or the use of forest residues are no hot topics at the moment.

The DEPV long-term future scenario estimates 650,000 pellet appliances to be installed in 2015. Although the average annual production of wooden process residues and by-products such as saw dust amounts to at least 5 million tones in Germany, this raw material is also used for other processes. At the latest when the wood pellet production in Germany reaches 2 million tones annually and saw dust cannot be redirected from other uses, a significant use of wood chips or short rotation energy wood is likely to become necessary.

This might also cause slight rises of wood pellet prices which used to be independent from fossil fuel prices and comparably stable in the past. The few harmful price fluctuations in the past resulted mainly from supply shortages. These have to be avoided by the application of suitable storage regimes. This will be one of the most important challenges for the German pellet sector in the two or three years to come.