

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

## Pellet market country report

### AUSTRIA



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## 1. Introduction

47 % of Austria is covered with forest with spruce being the main tree species. In 2002 the stock of wood per hectare amounted to 325 solid cubic meter. This high density of wood in the forest enabled Austria to establish one of the most important wood industries worldwide. In 2005 Austria ranked directly behind Canada, Sweden, USA, Russian Federation and Finland in the ranking of the biggest wood export countries.

There is a long tradition of forestry and woodworking industry which leads to a multitude of sawmills scattered over Austria. These sawmills directly provide the raw material for pellets and thus were the basis for the development of the pellet industry, predominantly small- and medium-sized plants.

The pellet market is characterised by its local nature, which means that there are no long transports of raw material to the pellet plants and of the pellets to the endconsumers. In Austria a well established home market for pellets exists. Nevertheless the production capacity of the pellet plants exceeds the national consumption, which leads to trade flows between Austria and the neighbouring countries.

Initiated through strict air pollution legislation the pellet market in Austria has been continuously growing since the mid 1990ies and has reached by now a highly developed level regarding pellet quality as well as the quality of the heating devices (boilers, stoves). The pellet consumption market is mainly confined to the residential heating sector, the main heating device for pellets being an automatically stocked pellet boiler with a heat output of up to 50 kW.

To aid development of the pellet market the national association proPellets Austria was founded in 2005 with the aim to promote the distribution of pellet heating systems. The existence of this strong and well organised association in combination with long-term financial incentives through politics is why pellets are highly successful in Austria.

The current economic crisis has led to a significant decline in timber sales. As a consequence fewer raw materials for pellet production are available. To widen the raw material base on a sustainable basis and a nation-wide storage concept will be the main challenges for the Austrian pellet industry for the next few years.

## 2. History of market development

Being a heavily forested country the traditional use of wood for heating has always been important in Austria. The kick off for technology development in this market segment came from the introduction of strict air pollution legislation in the beginning of the 1980ies. This forced companies to make significant efforts to reduce the emissions of wood boilers.

At the same time Austria had started to enforce the installation of biomass district heating facilities - especially in rural communities, where households are provided with heat made from wood chips.

In the 1990ies Austrian researchers and companies looked for a solution to make a fully automated heating system for domestic use based on wood because over the last few decades through the rising demand for comfort many wood boilers had been replaced by oil or gas boilers.

The idea and the first technical solutions for pelletising wood and combustion of pellets came from the USA and Scandinavia. With the introduction of wood pellet boilers and stoves in the mid 1990ies a new high comfort solution for heating with biomass was introduced into the market and quickly became a huge success. The technological innovation in pellet boilers was the basis for the success in the Austrian market and in the export.

The growing market for wood pellets is shown by Figure 1. Already in the year 2000 subsidies were given for the replacement of old heating systems with pellet heating systems causing at that time a doubling in pellet consumption.

Until 2006 the sales of pellet boilers had further increased (Figure 2) and that together with a cold winter in 2005/2006 suddenly led to a shortage of pellets. As a consequence the pellet prices ran up and the confidence of the customers in pellets was damaged. In 2008 the pellet market recovered again, still the real production 2008 was lower than 2007. The reason for this gap: In the first months of 2008 the oversupply caused very low prices and producers reduced the production as a consequence.

The pellet production capacity increased from 410.000 tonnes in 2004 to about 1 million tonnes in 2008 (Figure 1); for the earlier years no data are available.

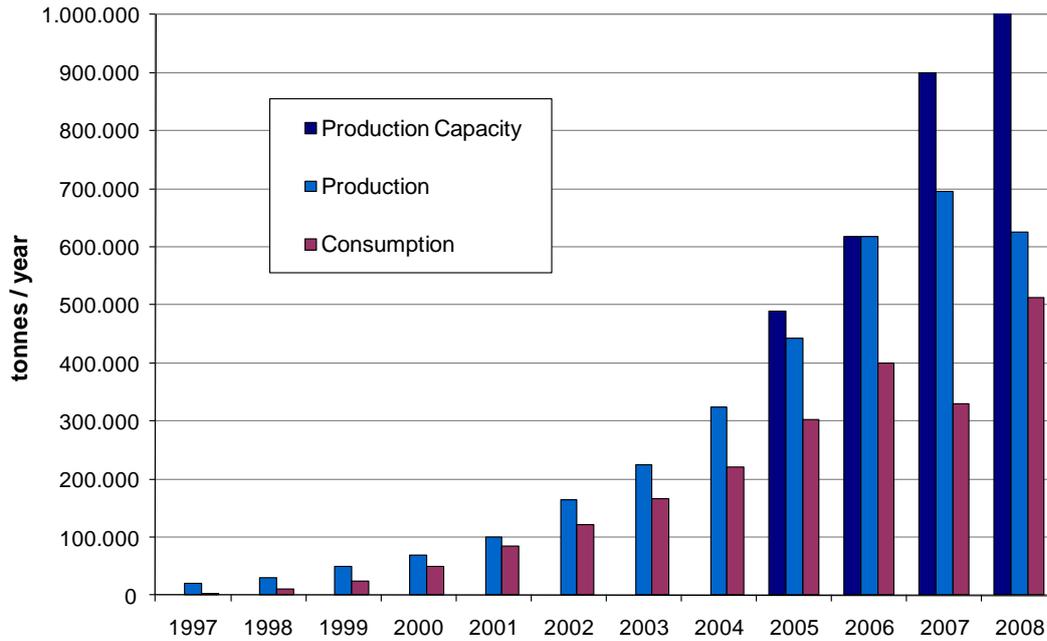


Figure 1: Development of production capacity, pellet production and consumption in Austria (source: proPellets Austria)

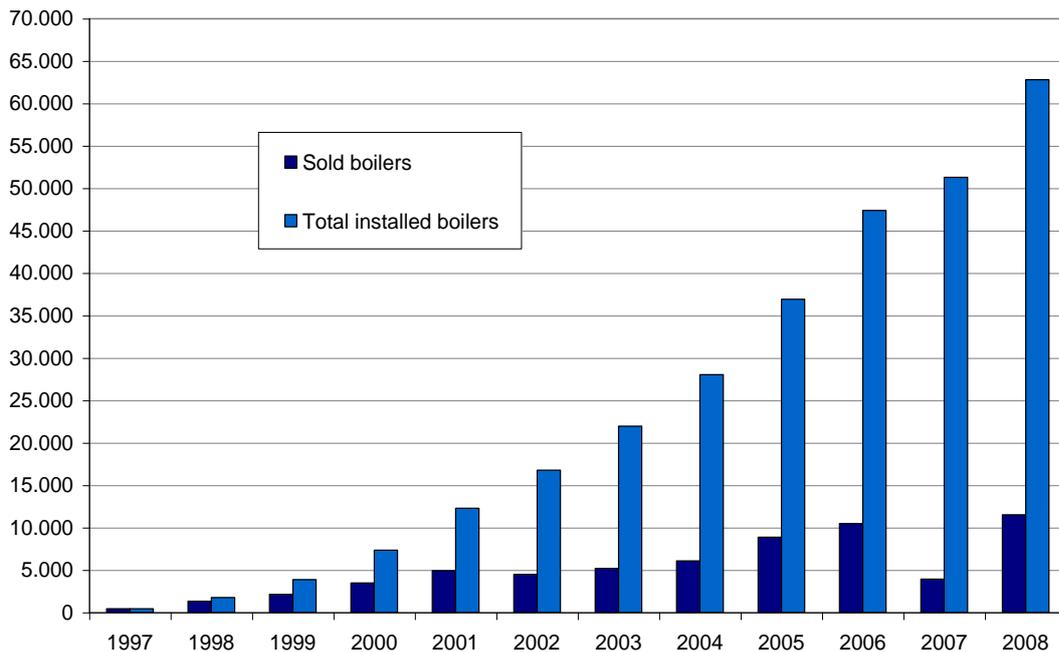


Figure 2: Development of the boiler market (< 50 kW) over the past years (source: proPellets Austria)

### 3. Pellet production

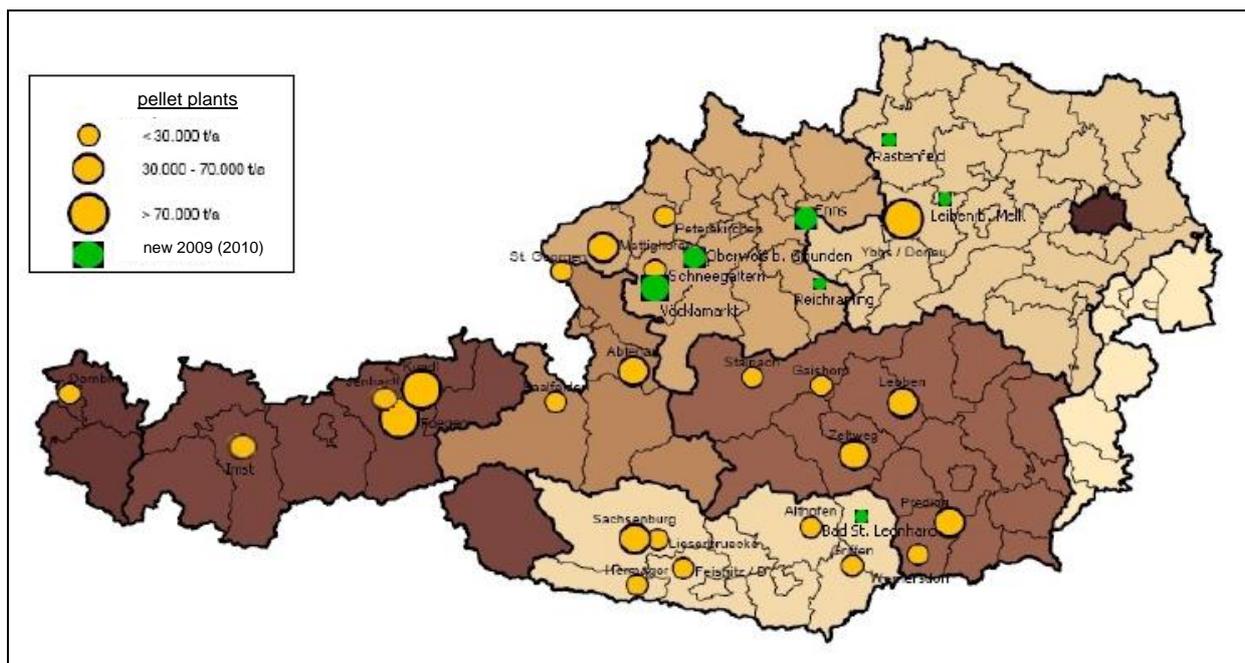
47 % of Austria is covered with forest with spruce being the main tree species. There is a long tradition of forestry and woodworking industry which leads to a multitude of mostly family-run sawmills scattered over Austria (leaving out only the eastern part). These sawmills directly provide the raw material for pellets and thus were the basis

for the development of the pellet industry. The production plants are predominantly small- and medium-sized (Table 1) but often part of a large company structure, in most cases sawmills are the main business field. Sawdust and wood shavings, by-products in a sawmill, are dried on the spot and pelletised. The energy for drying is generated through combustion of bark provided by the sawmill. In some cases biomass-fired CHP-plants provide the total energy for the production of pellets, which in that case is CO<sub>2</sub>-neutral.

**Table 1: Production of wood pellets 2008 based on the size of the pellets plants (source: proPellets Austria)**

Size of pellets plants	Production capacity 2008 [tonnes/year]	Total production 2008 [tonnes/year]	Number of pellets plants 2008	Utilisation rate 2008 [%]
<b>small-scale (&lt; 30000 tonnes/year)</b>	195000	128960	13	66
<b>medium-scale (30000 – 70000 tonnes/year)</b>	411000	270000	8	66
<b>large-scale (&gt; 70000 tonnes/year)</b>	400000	227000	4	57

The rapidly growing interest in pellets as an alternative to oil and natural gas has led to extensive investments in pellets production in the past years. Currently pellets are produced at 25 sites in 7 Austrian provinces (Figure 3). In 2008 the production capacity of about 1 million tonnes per year was nearly twice as high as the domestic demand. The real production amounted to 626.000 tonnes. For 2009 and 2010 the start-up of 7 more pellets plants is planned.



**Figure 3: Location and size of wood pellet plants March 2009 (source: proPellets Austria)**

## Standards

In 1998 the Austrian standard “ÖNORM M 7135: Compressed wood or compressed bark in natural state – Pellets and briquettes – Requirements and test specifications” was introduced and replaced in 2000 with the still valid version. Due to the high quality requirements (Table 2) the labelling “ÖNORM M 7135” is a commonly accepted sign of high pellets quality, not only in Austria but throughout Europe. 98 % of the production capacity in Austria could be traded as pellets tested according to this standard. In addition to the ÖNORM certificate many producers (corresponding to 50 % of the production capacity) are certified according to the German certification programme DINplus, which is based on the ÖNORM M 7135 and “DIN 51731: Testing of solid fuels – Compressed untreated wood – Requirements and testing”.

**Table 2: Requirements for HP1 Woodpellets according to ÖNORM M 7135**

Characteristics	Unit	HP1 Woodpellets
Diameter D	mm	$4 \leq D < 10$
Length	mm	$\leq 5 \times D$
Gross density	kg/dm <sup>3</sup>	$\geq 1,12$
Water content	%	$\leq 10$
Abrasion	%	$\leq 2,3$
Ash content	%	$\leq 0,5$
Net calorific value	MJ/kg	$\geq 18$
Sulphur content	%	$\leq 0,04$
Nitrogen content	%	$\leq 0,30$
Chlorine content	%	$\leq 0,02$
Pressing aids	%	$\leq 2$

## Raw material

As far as the raw material is concerned pellet production is in direct competition with the woodbased panel industry (e.g. particle boards) and the paper industry.

The current economic crisis has led to a significant decline in timber sales. As a consequence less feedstock for the pellet production is available. For that reason a number of producers are starting to use cutter chips for pellets production as well. Small producers without attached sawmill could be affected by the lack of raw material, which is currently the critical point in the pellet increase. Some producers have made their production ready to convert wood logs into pellet feedstock.

## Associations

In 2005 a group of stakeholders founded the pellet association proPellets Austria, an association with the aim to promote the distribution of pellet heating systems (the former organisation “Pelletsverband Austria PVA” had disbanded 2004). Association members are companies operating in the field of pellet economy. These include pellet producers, pellet traders, manufacturers of pellet boilers/stoves, energy service

companies, manufacturers of storage systems and other companies working on the pellet market.

The main tasks of proPellets Austria are:

- Information about heating with pellets.
- A better political framework for pellet heating systems.
- To ensure optimum quality for endconsumers (all members produce pellets according to ÖNORM M 7135).
- Market monitoring and publishing of market data (e.g. monthly price data)
- International cooperation.
- Information hub for the member companies.

The existence of this strong and well organised association is one of the reasons that pellets are highly successful in Austria.

## 4. Pellet trade and logistics

### Storage and Logistics

The storage capacity at the production plants amounts to about 65,000 tonnes in 2008. This figure excludes the storage capacities of the major trading companies, which were not evaluated. Nevertheless storage of pellets is always subject to additional costs and efforts and therefore the stored amount of pellets is traditionally kept at a minimum.

Due to the fact that the stability of the pellet market is strongly depending on the ability to assure supply security a group of stakeholders is about to elaborate a storage concept for the whole country.

In Austria the main heating device for pellets are automatically stocked pellet boilers. Therefore the sales of loose pellets are nearly 10 times higher than for pellets in bags. Pellet producers either sell pellets to end consumers themselves or retailers act as the link between pellet producer and the final customer and they are responsible for the shipment as far as loose pellets are concerned. The pellets are delivered directly with special trucks from the pellet plants to the customer (mostly without intermediate storage). A usual order for a private household is a quantity of 6 tonnes of loose pellets. To assure that the quality of the pellets is maintained throughout the delivery the terms of transport and intermediate storage are specified since 2002 by the Austrian standard "ÖNORM M 7136: Compressed wood in natural state – Woodpellets – Quality assurance in the field of logistics of transport and storage".

In recent years producers and retailers started to promote the storage at the private buildings in the beginning of spring with lower pellet prices to avoid a bottleneck in delivery during winter. The demanded quantity of 6 tonnes per year is common in Austria for a heating period, for there still are many houses with very inefficient thermal insulation. For newly built houses 3 tonnes would be sufficient.

Pellets in bags are offered by various retailers; the enduser is responsible for the transport.

### Import and Export

With a production of 626.000 tonnes meeting a national consumption of more than 500.000 tonnes in 2008 Austria is a largely self-sufficient market. Still there is an important flow of pellets between Austria and mostly neighbouring countries. In fact nearly 100 % of the export goes to Italy. In 2008 this was an amount of about 250.000 tonnes (in bags) whereas the import of pellets is estimated at 146.000 tonnes (Figure 4). The most important import countries are Germany (~ 70.000 tonnes) followed by Czech Republic (~ 43.000 tonnes) and Romania (~ 27.000 tonnes). In addition to that small amounts of pellets are imported from Slovakia and Slovenia (~ 3.000 tonnes each). The transport is done by trucks.



Figure 4: Pellet trade 2008 (source: proPellets Austria)

## 5. Pellet consumption

### Small-scale consumption

In Austria the pellet consumption market is mainly confined to the residential sector. The main heating device for pellets is an automatically stocked pellet boiler with a heat output of up to 50 kW. With the end of 2008 nearly 63,000 boilers were already installed.

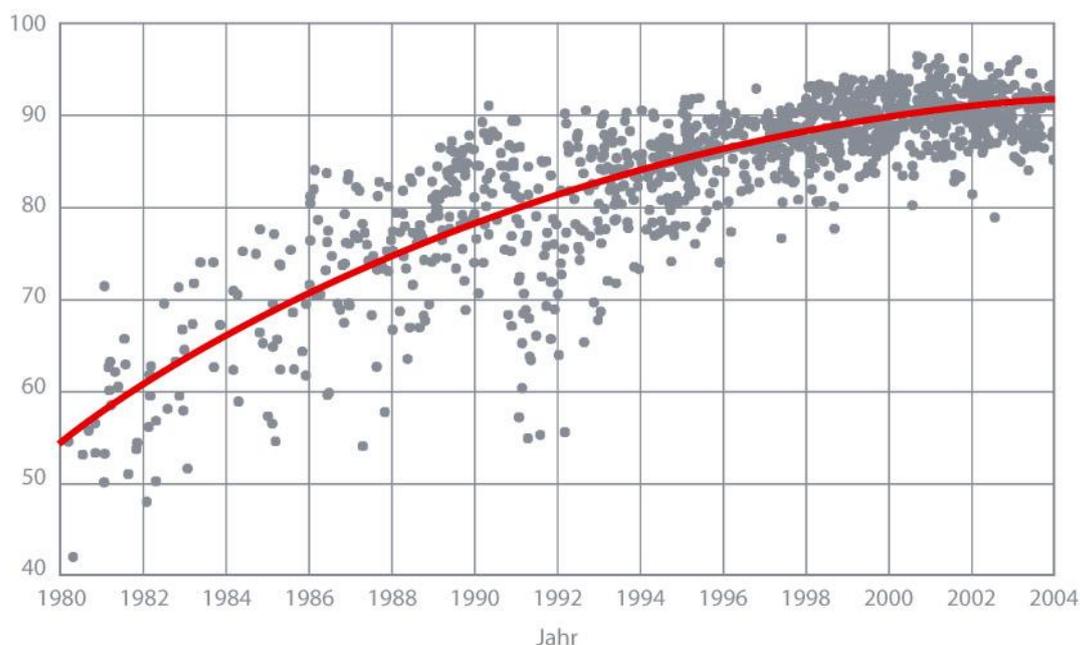
The Austrian boiler market is highly developed. The technological innovation in pellet boilers, which started in the 1990ies, was the basis for the success in the Austrian market and in the export. Most of the Austrian boiler producers have an export rate

between 70 and 80 %. Compared to other countries Austrian technology is rather high-priced but based on a very high level of automation.

Any boiler to be sold on the market needs to have a type approval in Austria that states the efficiency and the emissions of the product. As type approvals were published, a heavy competition between boiler producers developed regarding better technical performance. As this competition proceeded over more than two decades current products on the market represent the world wide best available technology.

The high performance and the impressive improvement of biomass combustion technologies was not only a result of strict emission limits and sharp competition for better products. It was also a result of a long term focus of R&D policies. In the meanwhile an excellent cooperation base between industry and academic research has been established. The Bioenergy 2020+ GmbH (the former Austrian Bioenergy Centre) has become a world wide renowned centre of competence that supports commercial boiler producers in developing ever better products (Figure 5).

Most boiler manufacturers require ÖNORM M 7135 or DIN *plus* certified pellets as a fuel.



**Figure 5: Development of efficiency of residential wood boilers in Austria (source: BIOENERGY 2020+ GmbH)**

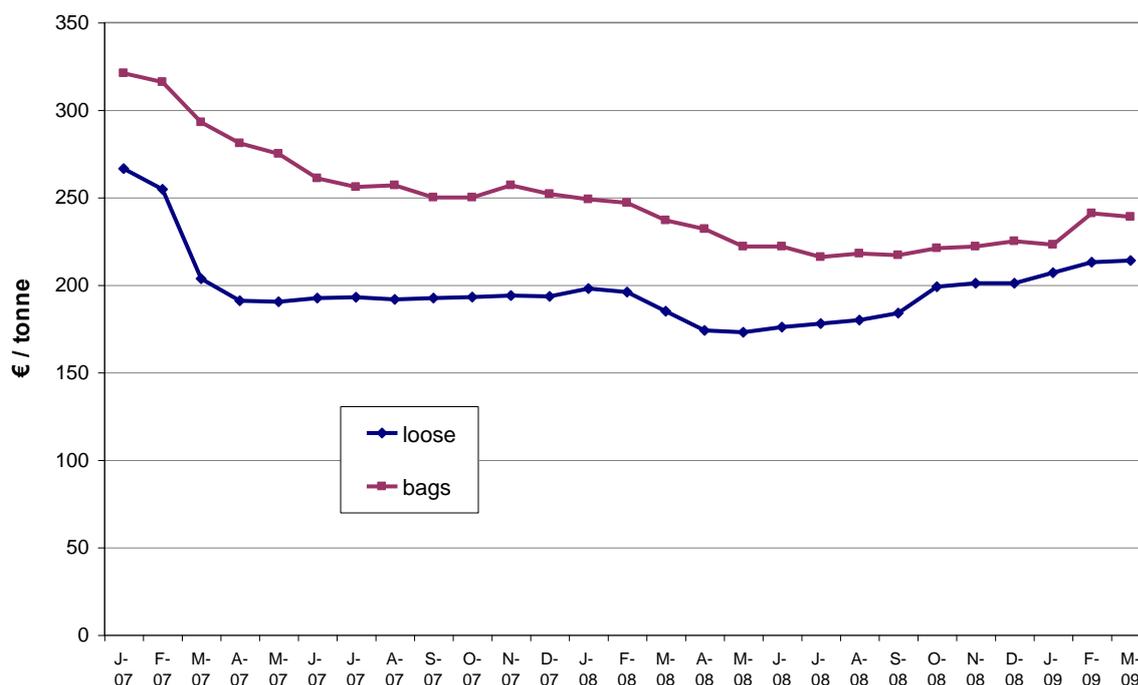
The total number of pellet stoves in use is not known because there are a huge number of different products (including low-price quality) on the market, which is impossible to track. Up till now pellet stoves used to serve as additional heating systems only. This is about to change because different studies showed that pellet stoves are a cheap and environment-friendly alternative to stoves operated with e.g. oil, coal or electricity used as main heating system. For homeowners who live below the poverty threshold and receive a winter fuel payment special support programmes were developed for switching to pellet stoves.

For low-energy houses central-heating stoves are increasingly popular because they combine the atmosphere of a stove with the warm water supply of boilers without the need for an own installation room.

Total annual consumption in 2008 was about 500.000 tonnes whereas in 2007 it was only 330,000 tonnes, a result of the warm winter in 2006/2007 and the fewer boiler sales (Figure 2).

However, a new government aid for domestic wood boilers and the oil price development have initiated a strong boom for pellet boilers. For the pellet boiler manufacturers 2008 was the best year ever with sales of about 11,000 domestic boilers (4,000 in 2007).

Since March 2007 the pellet prices remained constant at a low level. In early summer 2008 the oversupply of pellets led to a further decline of prices. The shortage and as a consequence the high prices for raw material led to increasing prices in the end of 2008 (Figure 6). The price is now expected to stay on a moderately high level. Figure 7 shows the price development since 2000 as inflation-adjusted price index.



**Figure 6: Price development over the past years. Weighted average price per tonne wood pellets (source: proPellets Austria)**

Loose: Pellets delivered as loose; purchase volume of about 5 tonnes; incl. transport of max 50 km; incl. VAT (10 %); ÖNORM M 7135. Price represents approx. 80 % of the total consumption in the country

Bags: Pellets in bags < 25 kg on pallets; excl. transport; incl. VAT (10 %); ÖNORM M 7135. Price represents approx. 80 % of the total consumption in the country

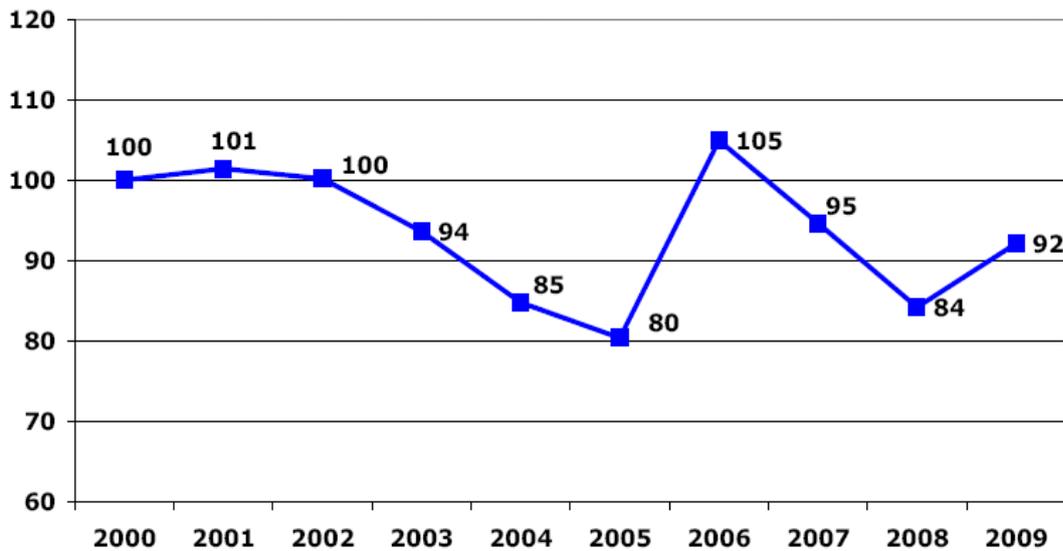


Figure 7: Pellet price index; PPI 2000, annual average price (source: proPellets Austria)

### Large-scale consumption

The large-scale consumption of pellets for the production of electricity (as it is already common in northern Europe) is of no importance in Austria. Large-scale power plants (CHP) or district heating is usually done with wood chips. The raw material is easily available without long ways of transport; that’s the reason that wood pellets are not going to be successful in this market segment.

Still there is a firm market for industrial pellet heating systems up to 1000 kW (total heat output 2008: ~ 360.000 kW) and a growing market for pellet heating systems in multiple family dwellings in suburban areas (often combined with solar systems for warm water supply). For this field of application contracting companies are gaining more and more in importance.

## 6. Mixed biomass pellets

At the moment a MBP market hardly exists in Austria. There is only one company selling straw pellets as heating material (production started only in the end of 2008).

Following there are some other examples of MBP-projects:

In Upper Austria Miscanthus is cultivated on an area of nearly 400 hectare already. A project group called “ARGE Elefantenwärme” was formed to promote their product. It is sold as horse bedding, burned directly or worked to briquettes. The pelletizing process was too expensive.

Another company produces straw pellets with a production capacity of 4000-5000 tonnes/year but cannot sell them because of the still missing legal regulations to burn them. The straw pellets are granulated again and sold as horse bedding.

In the course of a project hay pellets were produced and their quality was investigated. Costs were high throughout the production chain and it was impossible

to fire the hay pellets in standard commercial wood pellet firings due to higher ash contents and a lower ash softening point of the agricultural biomass. Boiler firms are working on new developments to control these properties.<sup>1</sup>

A main factor hampering the market development of MBPs in Austria is the fact that the feedstock for woodpellets was until now easily available with no need to look for alternatives. Furthermore there exists no logistic system for the production of agro pellets at the moment.

Apart from that the current legal situation in Austria inhibits the heating of non-wood biomass due to strict emission requirements. A new agreement on limiting values of emissions for heating systems is still waiting for implementation. Some heating system manufacturers already offer special boilers for agro pellets with which it should be possible to meet these proposed requirements for the maximum emission values.

The quality of agro pellets is usually compared with the requirements for wood pellets according to ÖNORM M 7135.

Since 2007.11.01 there exists the standard "ÖNORM C 4000: Compressed miscanthus – Requirements and test methods (National supplement referring to Pre-standard CEN/TS 14961)", in which Miscanthus is classified as A 4.0 / A 6.0 (ash content  $\leq 6\%$ ), N 0.5 (nitrogen  $\leq 0,5\%$ ), Cl 0.07 (chlorine  $\leq 0,07\%$ ) and S 0.05 (sulphur  $\leq 0,05\%$ ).

## 7. Legal framework & Policy

In the 1970ies and 1980ies Austria had two highly emotional debates on energy policy, which are part of the reason for the high market penetration of renewable heating technologies in Austria. One debate was concerning the first nuclear power plant built in Zwentendorf. The conflict about the power plant just after construction was finished culminated in a popular vote which led to the closing down of the plant and the constitutional law banning the production of nuclear energy. The second debate was about a large scale hydro-power plant to be located in an area of high importance for biodiversity. Again this debate involved the entire country and created a high awareness regarding energy issues and their role for environmental protection. These discussions created a whole generation of young people that were aware of energy issues and open and interested in the use of renewable energies. As this generation of consumers gradually entered the phase of establishing families and building houses, they became a market for renewable energy technologies. These customers were willing to take risks and accept imperfections typical for any new technology.

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<sup>1</sup> Rathbauer J. 2006: Nutzungsalternative Gras als Brennstoff, FJ-BLT Wieselburg.

## Emission thresholds

To fire something legally in Austria you need a heating system and combustible material which are both tested and meet the legal requirements.

The “BGBI. 331/1997: Decree on heating systems (FAV)” deals with industrial heating systems with a nominal heat output of 50 kW and higher. This decree sets the maximum emission values for different kinds of fuels including wood, bark and logging residues (Table 3).

**Table 3: Maximum emission values [mg/m<sup>3</sup>] of heating systems for wood, based on nominal heat output [MW]**

	<=0,1 [MW]	>0,1-0,35 [MW]	>0,35-2 [MW]	>2-5 [MW]	>5-10 [MW]	>10 [MW]
Dust	150	150	150	50	50	50
CO	800	800	250	250	100	100
NOx <sup>*)</sup>	250-500	250-500	250-500	250-500	250-350	200-350
HC	50	50	20	20	20	20

<sup>\*)</sup> Depending on the kind of material (wood species, bark, wood based composites, ...)

Biomass, apart from wood, is not mentioned and must be handled individually by the authority (approval procedure) as “Special Fuel”.

Since 1995 the “Art. 15 a B-VG agreement: Precautionary measures regarding small-scale heating systems” controls the implementation of heating systems with a nominal heat output up to 400 kW for residential heating or warm water supply. Table 4 shows the maximum emission values for such units for the combustion of solid biofuels.

**Table 4: Maximum emission values [mg/MJ] for small-scale heating systems (< 400 kW) fired with solid fuels.**

Combustion of solid biofuels	CO	NOx	OGC	Dust
Hand stocked	1100	150 <sup>*)</sup>	80	60
Automatically stocked	500	150 <sup>*)</sup>	40	60

<sup>\*)</sup> The NOx-limit is valid only for the combustion of wood.

This existing legal agreement on limiting values of emissions for heating systems had to be redrafted within the last three years because the emissions of non-wood biomass fuels did not succeed to meet the strict requirements on wood. Still the quick implementation of this new agreement fails because of the slow process of acceptance by all 9 Austrian provinces (“Bundesländer”). In the meantime the footnote for the NOx-limit provides a loophole for the combustion of non-wood biomass.

Table 5 shows the proposed maximum emission values in the revised “Art. 15 a B-VG agreement”.

**Table 5: Proposed maximum emission values [mg/MJ] for heating systems for combustion of solid biofuels (automatically stocked)<sup>2</sup>**

	Woodfuels	Other Standardized Biofuels
CO	500	500
NOx	150	300
OGC	30	30
Dust	50	60

Heating systems for “Other Standardized Biofuels” are going to be tested referring to “ÖNORM EN 303-5: Heating boilers – Part 5: Heating boilers for solid fuels, hand and automatically stocked, nominal heat output of up to 300 kW – Terminology, requirements, testing and marking”.

### Subsidy schemes<sup>3</sup>

Most often the granting of subsidies is bound to the emission behavior of the heating facility (e.g. Ecolabel UZ37 Directive). There are different authorities in charge of subsidies.

i. Federal grants:

The Climate and Energy Fund of the Austrian Federal Government decided a nationwide promotion for wood central heating in private residential buildings (max. 50 kW). Pellet boilers are funded with 20 % (maximum of 2.500,- Euro) in combination with thermal insulation only (in addition to existing subsidies of Provinces).

ii. Provinces grants:

The 9 Austrian Provinces grant subsidies to private households if they switch to pellet heating systems in varying degrees and under different conditions. These subsidies amount to approximately 20 to 51 % of the installation costs up to a maximum of nearly 7000,- Euro (Vienna). The subsidies usually related to pellet boilers for central heating.

Recently the public sector strongly focuses on the support of pellet stoves as long as it is the main heating source for a household. In some Provinces this subsidy is only granted if the homeowner receives a winter fuel payment.

iii. Community grants:

Many of the 2359 Austrian municipalities provide additional funding for the installation of pellet heating systems.

### Information campaigns

In Austria there is a large number of qualified consultants available. These are the specially for biomass heating appliances trained installers and chimney sweepers (Biowärmeinstallateure, Biowärmerauchfangkehrer) and apart from that each Austrian province offers free energy consulting services.

<sup>2</sup> Lasselsberger L.: Energie aus fester Biomasse, BLT Wieselburg, 2006.

<sup>3</sup> <http://www.propellets.at>; 02.04.2009.

**klima:aktiv** is an initiative by the Lebensministerium (Ministry of environment) launched in 2004 to promote climate-friendly technologies. “Renewable energy” is one of 4 thematic areas.

## 8. Projections on future developments

The raw material is currently the critical point in the pellet increase. Due to the financial crisis all over the world the sawmill industry reduces their output and with this the residues used for pellet production. As a consequence producers proceeded to use wood chips as feedstock with the major disadvantage of higher energy costs for drying the material. Some producers have made their production ready to convert wood-logs. There is a growing interest in new technologies with which primary wood resources could be pelletized.

The development of the raw material supply is also depending on the economic situation of competitive industries like paper industry and wood based panels industry. To widen the raw material base will be the main challenge for the Austrian pellet industry for the next few years.

As long as only by-products of sawmills were used as feedstock for pellet production there was no need to discuss sustainability criteria. This may change with the widening of the feedstock.

In respect of the EU directive for renewable energy 2020 the switching to biomass heating in the course of renovation has been rewarded with raising subsidies during the last years. On the heating market there is to be noticed a continuous increase of installations of pellets boilers for old buildings. For new buildings pellets still have to compete with thermal heat pumps.

There is a tendency to combine wood pellets with solar thermal heating systems and the idea of “contracting” slowly gains access to the market.

One important point which has to be discussed further in the near future is the supply security of pellets. This year's winter has once again shown that there is always the danger of a shortage of supply even if the production capacity itself is sufficiently high.

The pellets price is expected to stay at the current level.

The European standard “EN 14961: Solid biofuels – Fuel specifications and classes” is going to be issued in the near future. As a consequence there has to follow either an adaptation of the Austrian standard ÖNORM M 7135 to ensure that the commonly recognised label “ÖNORM M 7135” can be used further on or there has to be developed a new quality label.

## 9. Summary and conclusions

With an annual wood pellet consumption of more than 500,000 tonnes and a population of 8.3 million, the per capita wood pellet consumption in 2008 amounted to around 60 kg per person. Although this figure provides evidence for the mature character of the Austrian pellet market, there is still a high potential for the market to grow.

A high number of heating installations is older than 20 years and need to be replaced in the coming years. This, in respect of the Austrian aim to provide 34 % of the total energy demand in 2020 from renewable resources, is going to be a major driver for the development of the pellet market. Nevertheless policy and industry have to face various barriers.

### Major barriers for further market growth

For pellet production:

- The economical situation of the woodworking industry (sawmills, paperindustry, wood based panels industry) and as a consequence the supply situation of the raw material.

For pellet consumption:

- The still high investment costs for pellet heating devices.
- Deficiencies in the installation of the pellet heating systems.
- The supply security of pellets as a fuel.

### Major drivers for further market growth

For pellet production:

- In view of the EU directive for renewable energies 2020 a considerable growth in pellet demand can be expected.
- R & D for “new” raw material.

For pellet consumption:

- Subsidies are increasing continuously.
- Special trainings for installers.
- Nation-wide storage concepts have to be developed to ensure supply security.