

# PELLET HEATING SYSTEMS

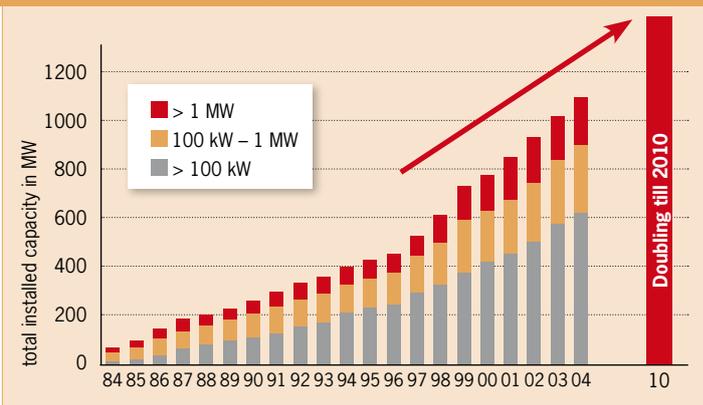
## for larger buildings

Biomass is a popular, environment-friendly and domestic fuel. In Upper Austria, more than 22,000 modern, automatic wood heating systems are already in operation, at the moment mainly in one-family homes. But pellet heating systems are also very well suited to heat larger industrial and public buildings.

In Upper Austria, biomass covers already 13 % of the total energy consumption and is therefore an important factor in the energy supply.

Biomass is a CO<sub>2</sub>-neutral fuel, which as a domestic energy source contributes to security of energy supply. Heating with pellets creates regional jobs and supports Austrian companies, which have specialized in the production and the distribution of pellets and pellet boilers. There is no contamination risk during transport and storage. The price of pellets was relatively stable in the past years and has not followed the price fluctuations of fossil fuels.

### Biomass heating plants in Upper Austria – target



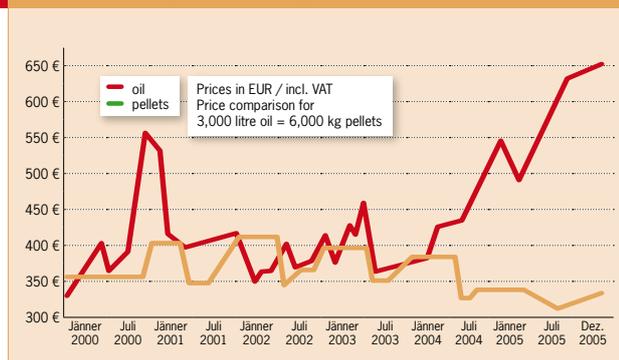
Even though pellets are a relatively “young” fuel, there is already a large number of pellet producers in Austria and in many parts of Europe. 3 million tons of pellets are produced in Europe, alone in Austria 336,500 tons. The production capacity increased up to 526,500 tons in 2005. Presently, there are about 20 pellet producers in Austria, 15 of them have an annual production capacity of more than 10,000 tons.

In pellet central heating systems, the fuel is transported automatically to the boiler. The pellet boilers are connected with the pellet storage by an auger (mechanical fuel system) or a suction system (pneumatic system), from which the pellets are transported fully automatically into the boiler. No manual work is necessary for the fuel supply.

In most cases, the fuel is stored in a dry and dust proof storage room. The size depends on the fuel demand and the number of deliveries per year. A “rule of thumb” is: 1 kW of heating load = 0.9 m<sup>3</sup> storage room (included empty space) and 0.6 m<sup>3</sup> (400 kg) pellets.

Furthermore, there is still the possibility of pellet storage in a fabric- (sheet steal -) or an earth tank or in an outside container.

### Price development oil – pellets



The O.Ö. Energiesparverband, the energy agency of Upper Austria, is the central contact point for energy information for businesses, municipalities and private households on renewable energy sources, energy efficiency measures and innovative energy technologies. No matter if business, municipality or private household – the energy experts of the O.Ö. Energiesparverband advise you gladly with all questions around the topic energy.

The O.Ö. Energiesparverband is also responsible for the management of the Ökoenergie-Cluster (OEC), the network of green energy businesses in Upper Austria. In the Ökoenergie-Cluster, more than 140 companies co-operate in the fields of renewable energy and energy efficiency, with a total turnover of 390 Million Euro.

### Fuel characteristics

Pellets can be bought from the fuel trade companies and there is a great number of suppliers. A list of suppliers and producers of pellets is also available at [www.energiesparverband.at](http://www.energiesparverband.at) (Info & Service/Pellets).

Pellets are produced from untreated wood under high pressure and without addition of chemical adhesives. They have a diameter of approx. 6 – 8 mm and a length of 1 – 3 cm. Raw material are mostly residues of the wood industry such as sawdust and wood shavings. The quality of the fuel is regulated by the Austrian industrial standard ÖNORM M 7135.

### Pellets in comparison

2 kg pellets	approx. 1 litre oil
1 m <sup>3</sup> pellets	approx. 320 litres oil
1,000 kg pellets	approx. 1.5 m <sup>3</sup>

### Quality criteria for pellets

Heating value	4,8 kWh/kg
Piled density	min. 650 kg /m <sup>3</sup>
Density	1.12 kg /dm <sup>3</sup>
Water content	max. 10.0 %
Ash percentage	max. 0.5 %
Length	max. 25 mm
Diameter	5 – 6 mm
Abrasion (dust)	max. 2.3 %
Aids for pressing	max. 2 %



# EXAMPLES

## Heat from wood pellets in the community centre St. Marienkirchen/Polsenz

### Overview

The community centre in St. Marienkirchen/Polsenz was newly constructed and officially opened in June 2005. Since autumn 2003, the 150 kW wood pellet boiler is in operation. Not only for sustainability and environmental protection reasons but also for financial considerations, fossil fuels were out of the question.

### Background

St. Marienkirchen/Polsenz is a natural park municipality in the district of Eferding. The community centre accommodates – among others – the municipality administration, a conference hall, a library, music rooms, a big event hall (550 seats), a kitchen, one youth room and the natural park office.

“Three reasons led to the choice of a pellet heating system: for environmental protection reasons, fossil fuels were not considered, due to the way the building is used, a flexible, high-capacity heating system is necessary (at events the heating energy demand can triple compared to normal operation) and the operation should be as automatic and trouble-free as possible”, explains chief officer Baumgartner. The decision for the fuel pellets was finally made because pellet systems are reliable, the quality control is easy and biomass residues are being used.



The base load heating is done by a floor heating, the heating of the library and other rooms by radiators. The music room and the event hall have mechanical ventilation, the air can be pre-heated. When the weather is very cold, short-term peak power is provided by two buffer storages with each 2,750 l capacity.

Roland Feischl from the technical office in Taufkirchen/Trattnach congratulates the municipality on their decision to use a biomass fuel.

Installed power	150 kW
Fuel	pellets
Heated area	2,600 m <sup>2</sup>
Third Party Financing (TPF)	no
Total investment costs	200,000 € excl. VAT

### Economical aspects

The investment costs were about 200,000 Euro excl. VAT (boiler with control system, supply auger for pellets and wood chips 33,800 Euro; heating - heat exchanger and storage 5,900 Euro; heating appliances 12,000 Euro; floor heating 14,000 Euro; piping, pumps, distributor, measuring and control instruments and fittings for the heating 50,000 Euro; control systems 66,000 Euro, flue gas system, sealing etc.). The pellets are bought at a price of approx. 144 Euro per ton inclusive VAT (2005) and are delivered in intervals of 2 years.

### Technical aspects

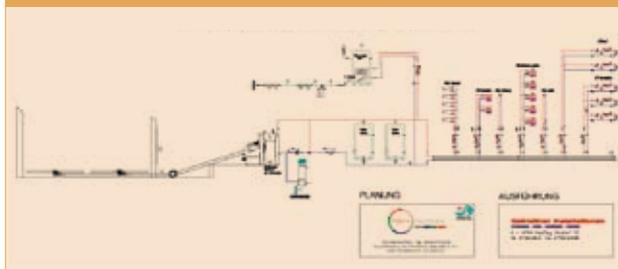
In total, a surface of 2,600 m<sup>2</sup> is heated by a 150 kW wood pellet boiler (Sommerauer & Lindner, system-type SL-150 T for normal wood chips and pellets). The 86 m<sup>3</sup> volume of the storage room provide space for approx. 50 t pellets. From November 2004 to January 2005, 40 t pellets were needed. After offers from several suppliers the pellets are sourced from the best bidder, they are delivered by a tank truck and blown into the storage room.

### Summary

“We are highly pleased with the pellet heating system, it works very well”, says chief officer Josef Baumgartner. From a user’s point of view, he recommends to check the control system in the beginning and to watch closely, which rooms are too warm or too cold. In periods, when no heating is needed, the system should be better shut down completely, because the high power of the system produces relatively much heat in the stand-by mode, which cannot be used. Attention should also be paid on a high quality of the fuel because high dust proportions can lead to operational faults.

For future projects, where the constant load (approx. 50 kW) is also clearly below the peak load (150 kW), chief officer Baumgartner recommends to consider two boilers, one for covering the base load and a second for covering the peak load.

### Scheme



# EXAMPLES

## Pellet heating system for the health hotel Aspach



### Overview

The "Revital Aspach", a health centre, was opened in June 2004. The hotel is located in an area in the municipality Aspach in the district Innviertel. The motivation for the pellet heating system with 500 kW power came from Dr. Gerhard Beck, managing director of Revital Aspach: "We opted for a sustainable solution in order to be independent of fossil fuel."

Installed power	500 kW
Fuel	pellets
Heated area	app. 3,000 m <sup>2</sup>
Third Party Financing (TPF)	no
Total investment costs	€ 70,000 excl. VAT

### Background

The therapy centre "Reha Sport Aspach" was opened in 1991 and was expanded in 2004. It offers rehabilitation and physical medicine, preventive medicine, sports medicine as well as a "Medical Spa". The Revital Aspach has 63 single rooms and 21 double rooms, a restaurant, a café, a garden with sun terrace, a modern medical-therapeutical infrastructure, a therapy pool as well as large areas for medical training therapy.

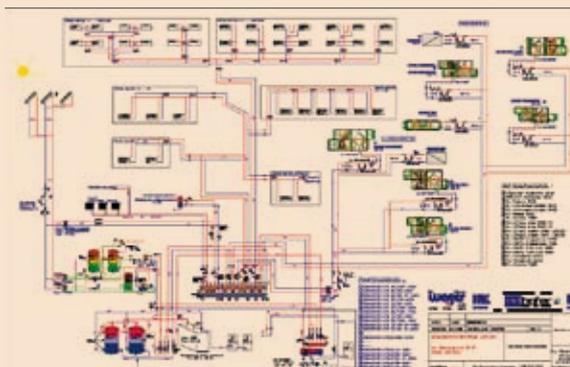
Since two separate energy supply sources are necessary, the health hotel would have liked to install a second pellet boiler, however the building was connected to the biomass district plant which delivers heat from wood chips.

### Technical aspects

In total, an area of approx. 3,000 m<sup>2</sup> has to be heated. During the summer months the 500 kW pellet boiler (KÖB) is used for the hot water supply. In winter, primarily the biomass district heating plant delivers the required energy, the pellet heating works as a support system. Every 3 to 4 weeks 16 t of pellets are delivered. A tank truck blows the fuel in the storage room, from where it is carried by an auger to the boiler. The size of the storage room is 40 m<sup>3</sup>, has a capacity of 24 tons and is equipped with a sloping ramp. The boiler, the district heating transfer station, the distributor and the control system are located in the boiler room which has a size of 5 x 8 m.

In spring 2006, about 30 m<sup>2</sup> solar collectors will be installed. They will be used for hot water preparations for the rooms (2 x 2,000 l storage) and the kitchen (1,000 l storage).

### Scheme



### Economical aspects

The investment costs of the pellet heating system were about 70,000 Euro. A biomass system installed in a company receives up to 44 % public support of the investment costs by the federal and regional government of Upper Austria.

In order to track the energy consumption, an energy accounting is done on an excel-file. Through comparisons, valuations and readjustment by the technician they try to reach a constant decrease in energy consumption.

### Summary

According to the company's technician Mr. Ingo Kittl, since the initial start-up, there were no troubles or bigger break-downs. The Revital Aspach would again invest in a pellet heating system at any time.



# EXAMPLES

## With pellet-TPF to sustainability "Ariola" social centre in Peilstein

### Overview

The social welfare centre "Ariola" in Peilstein in the district Rohrbach exists since 2003. In the new building, a 60 kW pellet plant (2 boilers) was installed, which is financed by the innovative financing model TPF (Third Party Financing). The ARCUS Sozialnetzwerk GmbH (social welfare organisation) is the responsible organisation. Franz Stadlbauer is the manager: "Our principle is to work in sustainable manner and to live this philosophy in our daily work". This attitude was also an important motivation for the installation of a pellet heating system.

Installed power	2 x 30 kW
Fuel	Pellets
Heated area	1.000 m <sup>2</sup>
Third Party Financing (TPF)	yes
Price of heat	0.045 Euro / kWh

### Background

The centre offers "aid through employment" for approx. 30 people with mental and physical handicaps living in the district Rohrbach. They work for companies and private persons, e.g. simple putting work, sorting, manufacturing of packaging and the production of craft products such as carpets, candles or billets.

The project was already tendered as biomass TPF project, the possibility of geothermal heat use was excluded due to the high consumption of electric power.

### Technical aspects

The building of the centre was put up in 2003. The heating load is 55 kW, the annual useful energy demand 83,000 kWh and a surface area of 1,000 m<sup>2</sup> is heated by a pellet tandem plant with 2 x 30 kW. "The design of the plant was adopted hydraulically for an optimal use of the pellets and to ensure an economical operation", so Peter Freunschlag from the planning company. According to Mr. Herbert Ortner, managing director of the company Ökofen in Lembach, the advantages of a 2-boiler-plant lie in a better annual efficiency due to the improved partial load (there are approx. only 10 days a year when the full nominal load is needed), with less wear out and higher reliability.



The boiler manufacturing company Ökofen is the ESCO (Energy Service Company) of this project, Ökofen finances and operates the entire pellet boiler plant. "Nobody of our staff touches the boiler", so Mr. Stadlbauer. The fuel delivery is organised by the ESCO as well. The storage room has 36 m<sup>2</sup>, the heating room has 17 m<sup>2</sup>. In 2005, approx. 20 tons of pellets were consumed, this corresponds to the entire storage volume and a saving of 9,000 to 10,000 litres oil.

### Economical aspect

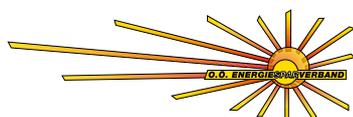
The project was financed by TPF. After the contract duration of 15 years, the boiler plant changes into the property of the Ariola social welfare centre. The ESCO is in charge of the complete support, maintenance and warranty of the boiler plant for the duration of the contract. The heat price, which is linked to the energy price index, amounts to 0.045 Euro per kWh.

A cost comparison of oil and pellets showed that pellets as a fuel save between 3,500 and 4,500 Euro per year.

### Summary

The experiences in the operation are very positive. In addition, Mr. Stadlbauer states: "Since the operator of the plant is the ESCO, nobody needs to care for anything, everything runs automatically. For organisations like us, user-friendly plants are very important, with pellets the system runs perfectly and without large effort."

Where the possibility exists, the use of biomass is also implemented in other organisations of the social network. Thus the "Arcus oasis" social welfare centre in Haslach in the district Rohrbach changes from gas to pellets in the heating season 2005/2006.



Edited by: O.Ö. Energiesparverband, Landstraße 45, 4020 Linz, Austria  
Tel. +43-732-7720-14380, Fax +43-732-7720-14383, office@esv.or.at, www.energiesparverband.at

The whole responsibility for the content of this publication lies with the authors. It does not represent the opinion of the European Communities. The European Commission is not responsible for any use that may be made of the information contained therein.