Comparing different wood fuels – which types of wood fuels fit to which heat markets?

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What types of wood fuels are used for heating?

- **Logwood**: for traditional heating, also with modern logwood gasification boilers
- **Wood briquettes**: for traditional stove heating
- **Woodchips**: for automatic heating of wood, 50 kW – 10,000 kW: commercial heating, district heating
- **Wood pellets**: for automatic heating of wood for residential heating, commercial heating 5 kW – 1000 kW
Logwood: for residential use

» Established and well known technique

» Low cost

» BUT: low efficiency in conventional heating stoves!

» High emissions of smoke

» SOLUTION: efficient modern boilers and stoves
Wood Briquettes

- Have been a traditional way of upgrading sawmill wastes before pellets
- Simple production process
- Very dry, good burning properties
- Can be an alternative to logwood for small stoves or fireplaces
Modern Logwood heating systems

» **Logwood gasification boiler**: 20 - 70 kW

» Efficiency > 90%

» Very clean combustion

» Producers: Fröling, Köb, Herz, Windhager, Hoval …

» **High Efficiency wood stoves**: e.g. Tiled stove

» Contact: Österr. Kachelofenverband: [www.kachelofenverband.at](http://www.kachelofenverband.at)
Improvement of combustion by technology development in Austria – emission reduction
Average efficiency of wood boilers increased from 50% in 1980 to 92% in 2004
Wood chips

- From sawmill residues or from forestry wood
- Can be used in automatic boilers
- Very low cost fuel
- No consistent quality: varying humidity & wood quality
- Low density
Where can wood chips be used

- In large boilers constructed for high humidity fuel
- Commercial use in sawmills for heat production
- Use in small to medium scale district heating (500kW-20 MW) in Austria (>1000 projects!)
- Possible for smaller residential projects (100-500 kW). www.regionalenergie.at
- For Farm heating
Preconditions for wood chip use in smaller units

» Quality control of chips (humidity, size !)
» Heat plant operation by fuel supplier
» Large storage space or closeby suppliers
Wood pellets

» Made from sawmill byproducts

» High density

» Clearly defined quality

» Can be used in small scale and medium scale heating
## Differences between Chips and Pellets

<table>
<thead>
<tr>
<th></th>
<th>Pellets</th>
<th>Chips</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heating Value</strong></td>
<td>per kg</td>
<td>4,7</td>
</tr>
<tr>
<td></td>
<td>per m3</td>
<td><strong>3077</strong></td>
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<tr>
<td><strong>Water content</strong></td>
<td></td>
<td>8%</td>
</tr>
<tr>
<td><strong>Density</strong></td>
<td></td>
<td>650</td>
</tr>
<tr>
<td><strong>Ash content</strong></td>
<td></td>
<td>0,50%</td>
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Key advantages of pellets

» High energy density
  • Easy transport
  • Small storage volumes

» Homogenous quality: high operating security

» Can be used in households

» Very clean fuel (handling, combustion)
Anually installed pellet and chips boilers <100 kW

Source: NOE Landeslandwirtschaftskammer 2005
Pellet Stoves

- filled with bagged pellets
- Electric ignition
- fully automatic operation, 90% efficient
- Ash removal every 2 weeks
- Costs > 1500€
- Also as central heating device
Pellet stove with central heating function

» Heat exchanger for water
» approx. 12 kW
» For central heating and hot water preparation
» Best combined with solar
» Stands in the living room
» Costs approx. 5.000,- €
Pellet boilers for domestic heating in single family houses

» 10 - 30 kW
» automatic feeding, ignition and ash removal
» > 90% efficiency
» very low emissions
» Investment: approx. 10,000 €
Pelletburner: for existing oil boilers

Low cost: > 3.000,-€

Disadvantage: frequent manual cleaning, lower efficiency
Fully integrated renewable energy system: Energy Cabin

- pellet boiler & storage
- flat plate solar collector
- Storage tank for hot water
- For individual houses, groups of houses or large buildings
- All integrated in a container

www.energycabin.com
Specific investment costs of biomass heating systems

Quelle: Steirische Landwirtschaftskammer 1998, E.V.A. 1999
Full cost comparison of heating a single family house with chips, pellets, oil and Gas (current fuel prices)

Annual Costs

Chips

Pellets

Oil

Gas

Betriebsgebundene & sonstige Kosten
Verbrauchsgebundene Kosten
Kapitalkosten
Development of worldwide pellet production

<table>
<thead>
<tr>
<th>Year</th>
<th>Million tons</th>
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<tbody>
<tr>
<td>1980</td>
<td>0.10</td>
</tr>
<tr>
<td>1990</td>
<td>0.75</td>
</tr>
<tr>
<td>2000</td>
<td>3.0</td>
</tr>
<tr>
<td>2007</td>
<td>7.5</td>
</tr>
<tr>
<td>2010</td>
<td>9.0</td>
</tr>
<tr>
<td></td>
<td>15 (?</td>
</tr>
</tbody>
</table>

Quelle: F.N.Jensen, Andritz 2007
Europe is the centre of global pellet production

» Global production 2006: 8.3 Mio. Tonnen

» European production 2006: 6.3 Mio. Tons
Pellet use can grow very quickly: sales of pellet stoves in Italy
Outlook

» Global oil production is starting to decline

» Wood fuels are a very important opportunity to substitute oil

» Austria has technology and experiences for efficient use of wood fuels

» We are happy to cooperate with you!
Thank you for your attention

Wir sind pro pellets Austria