How Biomass Thermal became the Leading Residential Heat Source in Austria

Christiane Egger
OÖ Energiesparverband/Ökoenergie-Cluster
christiane.egger@esv.or.at
Clean biomass heating - WHY?

- A good heating option
- Support for local forestry sector
- New business opportunities & local jobs
- Energy independence
- Environmental and climate goals
Clean biomass heating - IF

- Sustainable forestry
- Effective fuel production and distribution
- Efficient and low-emission heating equipment
Clean biomass heating - WHAT DO WE NEED?

- Informed policy makers & authorities & media
- Functioning markets
- Fuel supply chains for wood pellets and chips
- Customers
- Sales and installation of equipment
The State of Upper Austria Oberösterreich

Capital: Linz
Population: 1.4 million (similar to NH)
Area: 4,600 mi² (similar to CT)
Economic activities: industry, service sector, tourism, 25% of the Austrian industrial exports
The Energy Agency of Upper Austria
OÖ Energiesparverband

Organisation
• founded (in 1991) and mostly funded by the state
• promotes energy efficiency and renewable energy
• provides services to private households, public bodies & businesses
• manages programmes on behalf of the province
• supports development of legislation and policies

Services
• Energy advice (10,000 sessions/a)
• Building rating (> 100,000 buildings since 1993)
• Energy Academy
• Energy information, competitions
• Management of regional energy programmes for households, businesses, municipalities, schools, contracting, R&D etc.
• European cooperation
• World Sustainable Energy Days
• Oekoennergie-Cluster

Smart about energy!
The Oekoenegie-Cluster Upper Austria (OEC)

• the network of renewable energy & energy efficiency companies in Upper Austria
• 170+ partner companies
• since 2000, managed by the OÖ Energiesparverband
• www.oec-en.at

Revenue: 2.5 billion US$
Employees: 9,300
Export share: > 50 %

We put our energy into innovation!
Solar thermal, biomass heating, efficient buildings
The growth of the OEC businesses 2000 - 2014

Number of OEC partners doubled (x 2)

- 74 → 170

Export countries x 9

- 12 → 108

Overall staff x 6

- 1,620 → 9,300

Combined revenue all partners x 10

- 250 Mio $ → 2.5 billion US$
Biomass boiler + equipment manufacturers in Upper Austria
(partners of the OEC)

More info: www.oec-en.at
Renewable energy sources in Upper Austria

• Share of renewable energy: **35 % of total primary energy demand**
  (16 % clean biomass, 14 % hydro,
  5 % solar & other renewables)

• Avoided imports of fossil fuels: **>1.5 billion US$** per year

• Biomass heating
  **50,000 automatic systems installed:**
  26,000 pellets, 24,000 wood chips,
  330 biomass district heating plants

By 2030, all electricity and space heating will come from renewables!

➤ reduction of heat demand by 39 %
➤ reduction of electricity demand by 0.5 %/year
➤ minus 65 % CO₂ emissions
## Economic impact of biomass heating in Upper Austria

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total employment in biomass heating</td>
<td>4,500 jobs</td>
</tr>
<tr>
<td>Annual revenue of biomass boiler/ stove industry in Upper Austria (production, sales, installation)</td>
<td>730 million US$</td>
</tr>
<tr>
<td>Annual investments in new biomass heating systems</td>
<td>150 million US$</td>
</tr>
<tr>
<td>Annual sales of biomass heating fuels</td>
<td>260 million US$</td>
</tr>
<tr>
<td>CO₂ emissions avoided</td>
<td>1.7 million tons</td>
</tr>
</tbody>
</table>
## Biomass heating technologies

<table>
<thead>
<tr>
<th>technology</th>
<th>modern stoves</th>
<th>automatic pellet heating</th>
<th>modern firewood boilers</th>
<th>automatic wood chip boilers</th>
<th>district heating</th>
<th>combined heat &amp; power stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>fuel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>typical installed capacity</td>
<td>4-8 kW</td>
<td>5-15 kW</td>
<td>20-40 kW</td>
<td>50-150 kW</td>
<td>100 kW-3 MW</td>
<td>&gt;1 MW&lt;sub&gt;el&lt;/sub&gt; &gt; 10 MW&lt;sub&gt;th&lt;/sub&gt;</td>
</tr>
<tr>
<td>users, customers</td>
<td>high efficiency homes, auxil. heating</td>
<td>single-family homes</td>
<td>farm buildings</td>
<td>public &amp; commercial buildings</td>
<td>all buildings</td>
<td>all buildings</td>
</tr>
<tr>
<td>fuel supply</td>
<td>retailers (pellets), farmers (firewood)</td>
<td>bulk delivery by tank trucks</td>
<td>usually from own forest</td>
<td>often by local farmers-forest owners</td>
<td>cooperative members &amp; form sawmills</td>
<td>farmers &amp; sawmills &amp; other channels</td>
</tr>
</tbody>
</table>
Heating in Upper Austria
% of all dwellings

- Biomass (incl. biomass district heating)
- Heating oil
- Natural gas
- District heating (fossil fuels, mostly CHP)
- Heat pumps
- Electricity
- Coal

0% 10% 20% 30% 40%
Carrots, sticks and tambourines
Upper Austria's sustainable energy strategy

3 Pillars

- Regulatory measures: "sticks"
- Financial measures: "carrots"
- Information activities: "tambourines"
Upper Austria's sustainable energy strategy – example biomass heating

<table>
<thead>
<tr>
<th>&quot;sticks&quot;</th>
<th>&quot;carrots&quot;</th>
<th>&quot;tambourines&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory measures</td>
<td>Financial measures</td>
<td>Information &amp; training</td>
</tr>
<tr>
<td>• Emission &amp; efficiency standards</td>
<td>• Investment grant programs</td>
<td>• Energy advice</td>
</tr>
<tr>
<td>• Fuel requirements</td>
<td>• Renewable heating as a program requirement</td>
<td>• Training programs</td>
</tr>
<tr>
<td>• Renewable heating mandate</td>
<td>• Contracting program</td>
<td>• Publications, campaigns &amp; competitions</td>
</tr>
<tr>
<td>• Minimum requirements heating &amp; cooling</td>
<td>• Regional R &amp; D program, pilot projects</td>
<td>• Local energy action plans</td>
</tr>
</tbody>
</table>

Policy Packages

- stimulate demand
- support supply

Financial measures

- "carrots" stimulate demand
- "tambourines" support supply
Drivers for market development

Industry
• Outreach, training (e.g. legislators, media, heating professionals, insurances, general public)
• Standards for fuel & equipment
• Cooperation across the value chain

State/local governments
• Set targets for biomass heating (x % until...)
• Remove administrative barriers
• Well-designed incentive programs

Everyone:
• stress the multiple benefits
• right combination of "sticks, carrots and tambourines"
• take a longer term perspective
Drivers for market development of biomass heating

• Standards for fuels and equipment
• Cooperation across the value chains, alliances with other sectors, getting new actors into the biomass business
• Removing administrative/legal barriers
• Training & outreach
• Quality assurance program
• Well-designed incentive programs
• stressing the benefits (not "just" climate protection)
• the right combination of "sticks + carrots + tambourines"

taking a longer term perspective
Typical challenges in "early biomass heating markets"

- automatic biomass heating is unknown -> outreach programs
- low quality of fuels and installations -> quality assurance schemes
- investment in bulk delivery -> state programs
- high costs of boilers -> clever financing solutions
Different fuels - more opportunities

pellets

wood chips

firewood
The supply chain

**Pellets**

- saw mill
- ▼
- pellet pressing
- ▼
- delivery in bulk by pressurised tank truck
- ▼
- transferred into storage by filler pipe

**Wood chips**

- forest
- ▼
- chipping
- ▼
- tractor trailer, truck
- ▼
- fed into storage by pipe or poured off
## Fuel selection - pellets or wood chips?

### Example of Austria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Wood pellets?</th>
<th>Wood chips?</th>
</tr>
</thead>
<tbody>
<tr>
<td>size</td>
<td>smaller systems (&lt; 100 kW)</td>
<td>larger systems (&gt; 100 kW)</td>
</tr>
<tr>
<td>space requirements</td>
<td>limited storage capacity</td>
<td>ample storage capacity</td>
</tr>
<tr>
<td>boiler costs</td>
<td>typically lower</td>
<td>typically higher</td>
</tr>
<tr>
<td>fuel costs</td>
<td>typically higher</td>
<td>typically lower</td>
</tr>
<tr>
<td>frequent deliveries</td>
<td>sensitive issue</td>
<td>not a problem</td>
</tr>
<tr>
<td>staff for operation</td>
<td>no staff</td>
<td>staff on-site/close by</td>
</tr>
<tr>
<td>fuel preferences</td>
<td>standardised fuel</td>
<td>varying quality levels acceptable</td>
</tr>
<tr>
<td>fuel supply</td>
<td>preference for commercial fuel suppliers</td>
<td>own fuel resources/local suppliers/&quot;buying local&quot;</td>
</tr>
</tbody>
</table>
Driving the market through standards

Fuel
• early standardisation of pellet fuels: a important reason for Austria's pioneering role
• highly standardised fuel allows for high efficiency and low emission combustion technologies were developed based on and optimised for the standardised fuel
• warranty of the boilers only if standardised pellets are used
• European pellet fuel standard

Equipment standards (Upper Austria)
• efficiency and emission standards
• regularly up-dated to drive innovation
Driving the market through standards:
Fuels & Equipment

Example: Emissions & efficiency of biomass boilers: results from 1,000+ boiler tests

Efficiency factor of tested biomass boilers

CO emissions of tested biomass boilers

Source: FJ-BLT Wieselburg; Bioenergy 2020+
International Trainingsseminar
Biomass Heating – Market Development and technologies
September 14-17, 2015, Upper Austria

• 3-day international seminar: know-how on local market development & technologies
• small- to mid-scale automatic biomass heating systems (up to a few 100 kW)
• based on the experience in Austria
• interactive learning in an international group, educational site-visits, hands-on information from people who have done it

www.oec-en.at
European Pellet Conference: February 24-25, 2016

- The world's largest annual pellet-related conference
- Today's markets and tomorrow's technologies
- Young Researchers' Conference: Biomass
- B2B-Meetings
- Site-visits
- Trade show: 100+ biomass-related exhibitors
- held in Wels/Austria

Get involved:
Call for Papers, Projects & Speakers
Deadline: October 9, 2015
www.wsed.at
Challenges and opportunities for the next years

In Austria, 1,600,000 households (45 %) still heat with oil and with gas!