

# The sustainable energy programme of Upper Austria



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## The Federal State of Upper Austria Oberösterreich

Capital: Population: Area: Gross inland cons.: Economic activities:

Linz 1.38 million (similar to NH) 4.600 mi<sup>2</sup> (similar to CT) 305 PJ; 32 % renewables industry, service sector, tourism, 25% of the Austrian industrial exports

Upper Austria











## **Energy Action Plan of Upper Austria**

### 1994 - 1999

- 30 % renewable energy (hydro, wood biomass, solar)
- energy consumption in new housing reduced by 30 %
- 15,000 jobs

## 2000 - 2010

- double biomass & solar: wood biomass 13 % (2007)
- 1 % energy saving/year
- 1.5 % energy savings in the public sector/year

## 2010-2030

- 100 % space heating & electricity from renewable energy
- reduction of heat demand by 39 %
- minus 65 % CO<sub>2</sub> emissions







## Energy Agency of the State of Upper Austria O.Ö. Energiesparverband

### Organisation

- founded (in 1991) and mostly funded by the state government
- promotes energy efficiency and renewable energy
- provides services

   to private households,
   public bodies &
   businesses



- manages programmes on behalf of the state government
- supports development of legislation and policies

## Services

- Energy advice (15,000 sessions/a)
- Building rating (> 70,000 buildings rated since 1993)
- Training programmes
- Management of state subsidy programmes
- Public awareness campaigns, events, publications
- Pilot projects
- Municipal energy strategies
- European cooperation
- OEC network







## The Oekoenergie-Cluster Upper Austria (OEC)

- network of renewable energy & energy efficiency companies in Upper Austria
- presently 150 partners
- since 2000, managed by O.Oe. Energiesparverband
- <u>www.oec.at</u> also in English
- main business fields:
  - biomass heating
  - solar heating
  - energy efficient buildings



- Turnover:
- Employees:
- Export share:

2.2 billion US \$ ~ 4,500 > 50 %





## "Booming Business"

- Investment in new buildings & production facilities:
   > 200 million US \$
- New staff: > 500









## Solar thermal, Biomass, Efficient Buildings





















# Renewable energy and energy efficiency are a "big business" in Upper Austria

#### Annual investments & turnover (estimates):

- 160 million US \$ in new renewable installations
- 1,100 million US \$ turnover for renewable heating & el.
- 600 million US \$ investments in energy efficiency measures in new and renovated buildings

### Employment (estimates):

- 4,000 jobs in producing equipment and materials
- 4,000 jobs in energy efficiency investments
- 4,000 jobs in related actions

#### Other regional benefits:

- less imports
- new professions
- technological innovation
- export opportunities

- 3 billion US \$/year
- > 500 in education
- > 110 R&D projects
- > 50% export rate







## Biomass innovation along the value chain









- innovation in policy
- innovation in R & D support and products
- innovation in business development support
- innovation in promotion, training and awareness raising
- ... based on the tradition of sustainable forestry and a longer-term vision for the economic development of farmers
  ... making Upper Austria one of the leading biomass regions in Europe and world-wide





## **Biomass heating technologies**



- automatic wood pellet heating systems
- biomass district heating networks

 large-scale combined heat and power plants





## **Biomass heating in Upper Austria**







## Wood pellet heating

- CO<sub>2</sub> neutral, standardised fuel
- very clean combustion (comparable to a natural gas boiler) due to twostage combustion
- local fuel (Austria is a net exporter of wood & wood pellets)
- produced from a waste product (saw dust), in the future also directly from wood chips
- very user friendly:
  - bulk delivery
  - automatic operation
  - ash cleaning 3-4 times/year
  - comparatively low fuel costs
  - good combination with solar thermal & buffer storage







## Wood pellet heating system feeding systems

### transport auger



## vacuum suction system









## Wood pellet heating system feeding systems

transport auger

vacuum suction system









## Wood pellet heating system Container Solution







# Biomass boiler producers – company headquarters in Upper Austria & OEC partners









# GUNTAMATIC

















## Biomass boiler producers – From Upper Austria & OEC partners available soon on the US market







# Heizen mit Pellets

## heimisch und klimafreundlich

www.pelletskampagne.info



Emergie LAND OBERÖSTERREICH













The end of the oil-era?







## emissions

## Legal requirements in Austria

Small scale heating systems for solid fuels must not exceed the following <u>emission limits</u>:

| Heating systems for solid fuels |               | Emission limits [mg/MJ] |       |     |      |
|---------------------------------|---------------|-------------------------|-------|-----|------|
|                                 |               | CO                      | NOx   | VOC | Dust |
|                                 | Biomass fuels | 1100                    | 150*) | 80  | 60   |
| manually operated               | Fossil fuels  | 1100                    | 100   | 80  | 60   |
|                                 | Biomass fuels | 500**)                  | 150*) | 40  | 60   |
| automatically operated          | Fossil fuels  | 500                     | 100   | 40  | 40   |

\*) The NOx limit is valid only for wood heating systems

\*\*) The limit can be exceeded up to 50% in part load operation (30% of the heat capacity)





## emissions







## efficiency

## Legal requirements in Austria

Small scale heating systems for solid fuels must not go below the following <u>efficiency values</u>:

| Small scale central heating systems for solid fuels |                       |  |  |  |
|---|-----------------------|--|--|--|
| manually operated                                   |                       |  |  |  |
| ≤ 10 kW   | 73 %                  |  |  |  |
| > 10 – 200 kW                                       | (65.3 + 7.7 log Pn) % |  |  |  |
| > 200 kW  | 83 %                  |  |  |  |
| automatically operated                              |                       |  |  |  |
| ≤ 10 kW   | 76 %                  |  |  |  |
| > 10 – 200 kW                                       | (68.3 + 7.7 log Pn) % |  |  |  |
| > 200 kW 86 %                                       |                       |  |  |  |







## **European Pellet Conference 2010**



www.wsed.at

**3.** – **4. 3. 2010** Wels / Austria

European Pellets Conference
Building Renovation – towards low
Energy Consumption
Solar Thermal Conference
Energiesparmesse - trade show (1,600 exhibitors, 100,000 visitors)





## Solar thermal in Upper Austria



















## Solar thermal in Upper Austria

#### cumulated

EU 2007: Germany 2007: Austria 2007: 0.04 m<sup>2</sup> / 0.4 ft<sup>2</sup> per capita 0.11 m<sup>2</sup> / 1.1 ft<sup>2</sup> per capita 0.35 m<sup>2</sup> / 3.5 ft<sup>2</sup> per capita















## Energy efficient buildings Energy Performance Indicator





## fuel consumption: e.g. 3 liter/100km

energy consumption (heating): e.g. 30 kWh/m<sup>2</sup>,year





## The Building Performance Certificate

- since 1999, legal obligation for new and renovation of residential buildings
- since 2009, obligatory for:
  - new construction & renovation of any domestic & non-domestic building
  - for sales and renting of any building/buildin part
  - publicly displayed in any public bu.
- allows comparison & empowers building owners & users

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# Results sustainable housing programme 1993-2007

- managed by O.Ö. Energiesparverband
- 65,000 homes (new & renovation):
  - energy performance indicator
  - energy certificate
  - energy advice session
- 95 % of all new homes in the region



|   | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|------|------|------|------|------|
| energy efficient homes                    | 67%  | 45%  | 24%  | 15%  | 0%   |
| low energy homes                          | 31%  | 52%  | 71%  | 78%  | 80%  |
| lowest energy/passive homes               | 2%   | 3%   | 5%   | 7%   | 20%  |
| average indicator (kWh/m <sup>2</sup> ,a) | 56   | 53   | 50   | 48   | 44   |





## **Building Trends in Upper Austria**



## **Renewable Heating and efficient buildings in Upper Austria**

- covers 45 % of the heating demand
- more than 140 million US \$ investment in new installations annually
- reduces energy bill for imported fossil fuels by more than 700 million US \$ annually
- employs more than 5,000

• to meet our objective of 100 % renewable heating in 2030, heat demand has to be decreased by 39%









## Development of consumption, scenarios and potentials Heating\*, Upper Austria 2000 - 2030



\*final energy Source: TU Wien, LEB OÖ







**Potentials - renewable energy sources 2030** 

| RES-el: | Biomass (electricity) | 484 GWh    | $\rightarrow$ | 1,370 GWh  |
|---------|-----------------------|------------|---------------|------------|
|         | Biogas                | 50 GWh     | $\rightarrow$ | 600 GWh    |
|         | Hydro power           | 11,700 GWh | $\rightarrow$ | 12,200 GWh |
|         | PV                    | 5 GWh      | $\rightarrow$ | 150 GWh    |

| RES-heat: | "Green heat"<br>(incl. district heating) | 38 PJ | $\rightarrow$ | 62 PJ    |
|-----------|--|-------|---------------|----------|
|           | Biomass (heat)                           | 23 PJ | $\rightarrow$ | 40 PJ    |
|           | Heat pumps                               | 1 PJ  | $\rightarrow$ | 2 - 3 PJ |
|           | Solar thermal                            | 1 PJ  | $\rightarrow$ | 4 PJ     |





## Upper Austria's sustainable energy strategy 3 Pillars



# Upper Austria's sustainable energy strategy – example biomass heating

| Legal<br>measures  | Financial measures   | Information<br>& training   |
|--|--|---|
| <ul> <li>Renewable heating obligations (public buildings &amp; buildings &gt; 10,000 ft<sup>2</sup>)</li> <li>Inspection of boilers &amp; AC systems</li> <li>Energy performance certificates</li> <li>Minimum requirements heating &amp; cooling</li> </ul> | <ul> <li>Soft loans for<br/>efficient renovation</li> <li>Grants for renewable<br/>heating</li> <li>Pilot projects</li> <li>Contracting</li> <li>Regional R &amp; D<br/>programme</li> </ul> | <ul> <li>Energy advice</li> <li>Training &amp; education programmes</li> <li>Campaigns &amp; competitions, media actvitivies</li> <li>Local energy action plans</li> <li>Publications</li> <li>Oekoenergie-Cluster</li> </ul> |
|  |  |   |

## **Policy Packages**







## **Regional R&D programme**

- state support programme for R&D
- research, development and demonstration of innovative energy technologies (energy efficiency & renewable energy sources)
- new products, methods and procedures
- > 110 R&D projects implemented in Upper Austria
- 50 million US \$ investment triggered by 10 million US \$ public support
- Examples: condensing pellets boiler, industrial biomass ORC application, very small scale-biomass boilers (for lowest energy buildings, combined solar-biomass solutions), innovative control system for biomass boilers, biogas transport systems etc.









## Training programmes along the value chain

Target groups for training:

- producers of equiment and materials
- installers and construction workers
- users of buildings and installations

New professional education:

- University degree "green energy engineers" (since 2002)
- "Green energy installers" (since 2002)

Trainings offered by O.Ö. Energiesparverband

- 25 courses/year, 70 training days
- 500 participants
- focus on energy efficient buildings & renewable heating













## **Energy advice programme – Upper Austria**

- programmes for private households, public bodies and companies managed by O.Ö. Energiesparverband
- 15,000 individual advice sessions, face-to-face
- supports energy and building-related investment decisions



- free for private housholds (up to 1.5 hrs.) and public bodies, companies pay 25 % (150-400 US \$)
- typical issues: new construction of a home, renovation of a school, optimisation of an industrial process etc.







## **Pellet quality and standards**

- Austrian pellet fuel standard since 1998 (ÖNORM M 7135)
- 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 to be adopted soon
- Austrian pellet fuel standards sets technical fuel requirements for pellets:
  - diameter: 6 mm, length: 5-30 mm
  - density: min. 1.12 kg/dm<sup>3</sup>, bulk weight: min. 650 kg/m<sup>3</sup>
  - water content: max. 10%, amount of ash: max. 0.5%
  - heating value: min. 4.6 kWh/kg, dust content: max. 1%
  - no binder, no purification
- standards for transport, storage, transport vehicles, training of staff





## multifunction buffer tank

Capacity range: 600 litres, 800 litres, 1000 litres and 1500 litres



including:

- continuous-flow heater for domestic hot water
- solar heat exchanger
- distributor incl. heat pump and mixer
- pre-assembled
- ready to plug-in



