

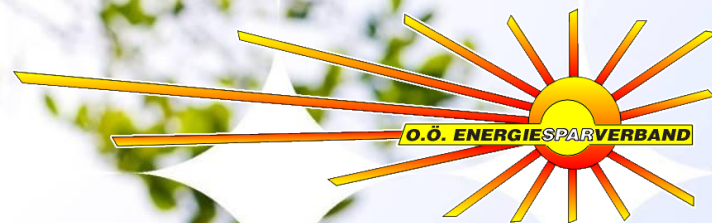
Transformation of the Austrian High-Efficiency Biomass Heating Market

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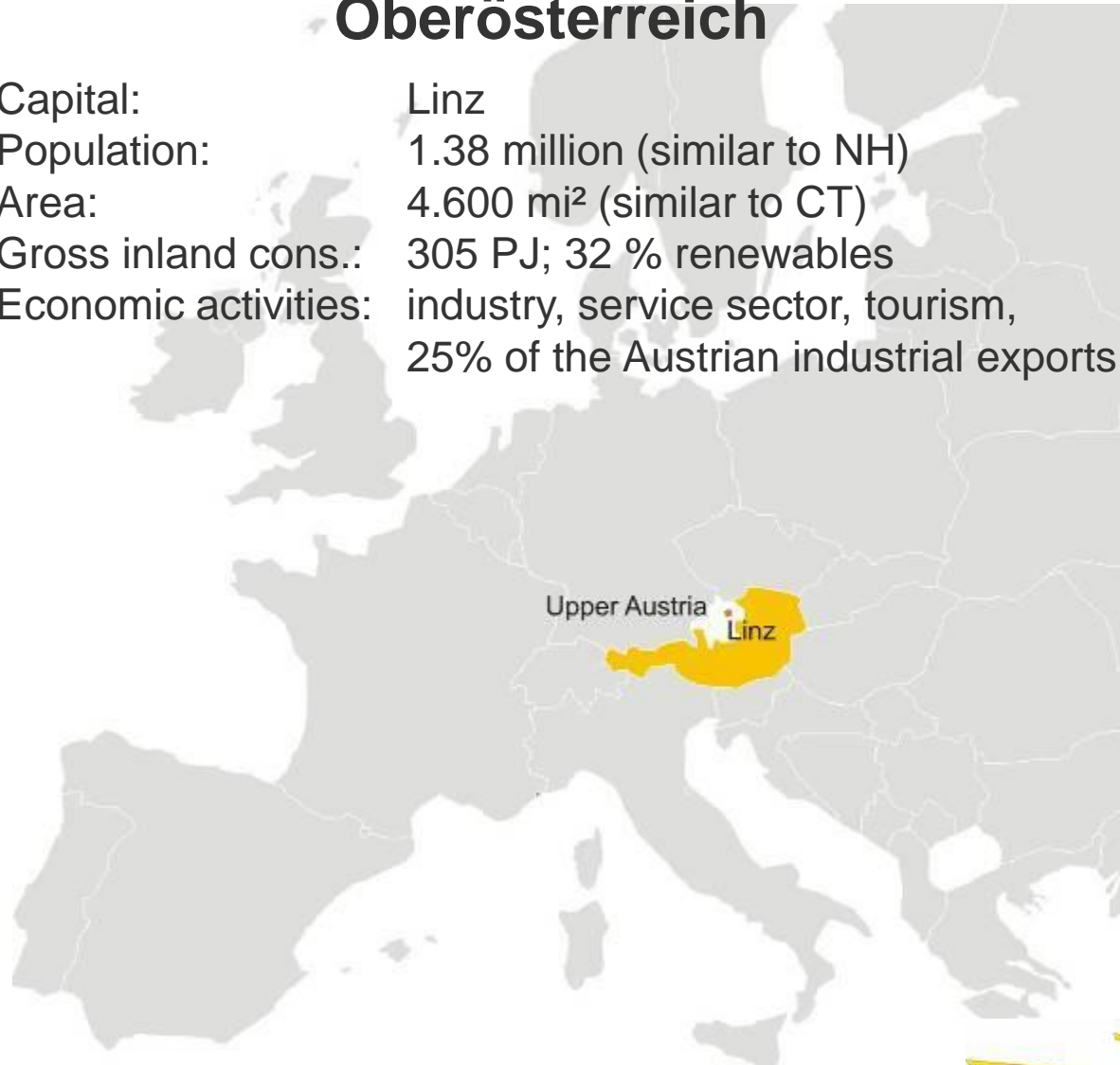
www.esv.or.at, www.oec.at, www.wsed.at



The Federal State of Upper Austria

Oberösterreich

Capital: Linz
Population: 1.38 million (similar to NH)
Area: 4.600 mi² (similar to CT)
Gross inland cons.: 305 PJ; 32 % renewables
Economic activities: industry, service sector, tourism,
25% of the Austrian industrial exports





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 % CO₂ 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**

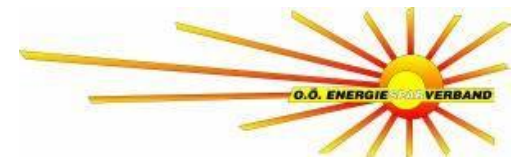


The Oekoenergie-Cluster Upper Austria (OEC)

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



- | | |
|------------------------|-------------------|
| • Turnover: | 2.2 billion US \$ |
| • Employees: | ~ 4,500 |
| • Export share: | > 50 % |



"Booming Business"

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



Solar thermal, Biomass, Efficient Buildings



Biomass heating technologies



- automatic wood pellet heating systems



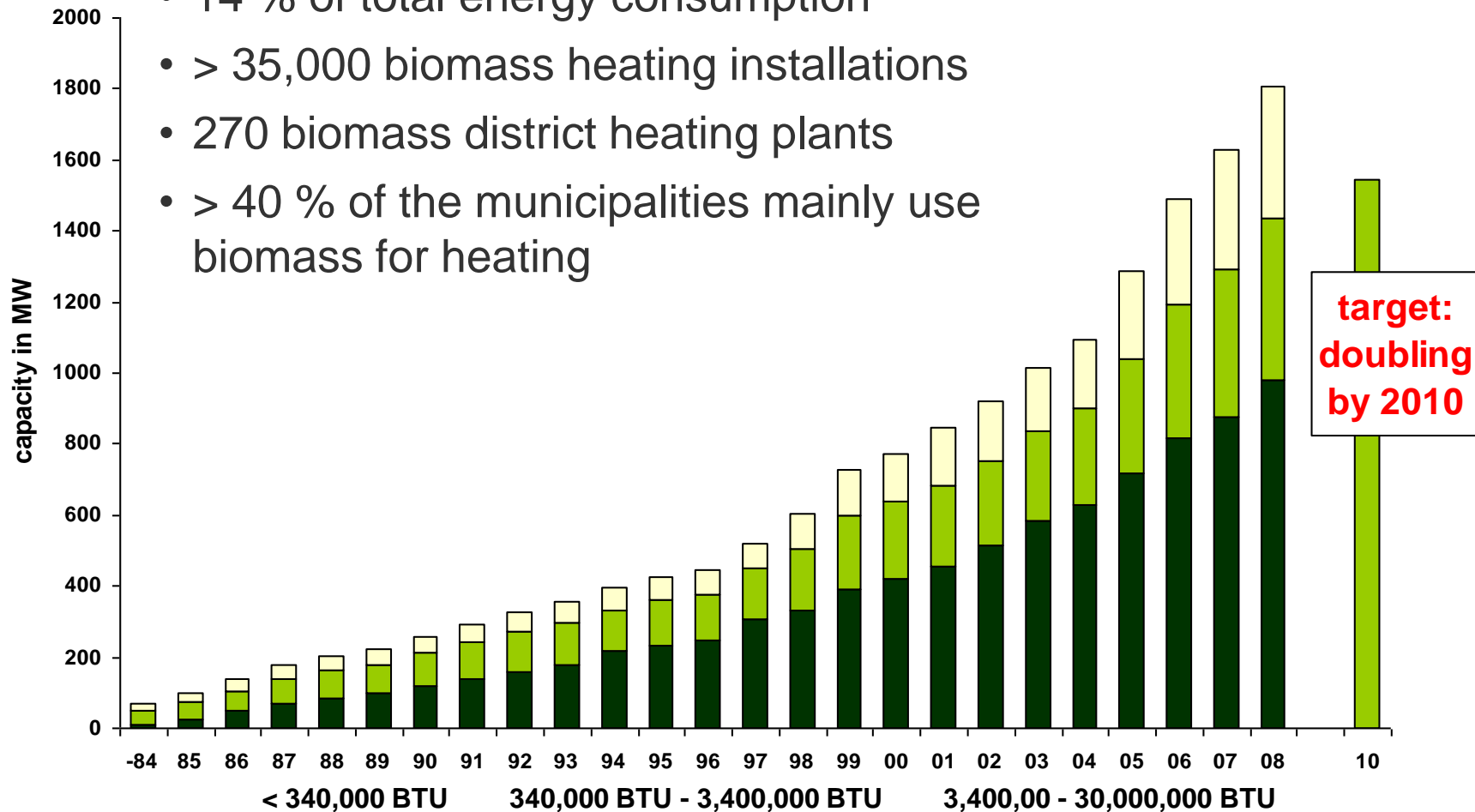
- biomass district heating networks



- large-scale combined heat and power plants

Biomass heating in Upper Austria

- 14 % of total energy consumption
- > 35,000 biomass heating installations
- 270 biomass district heating plants
- > 40 % of the municipalities mainly use biomass for heating

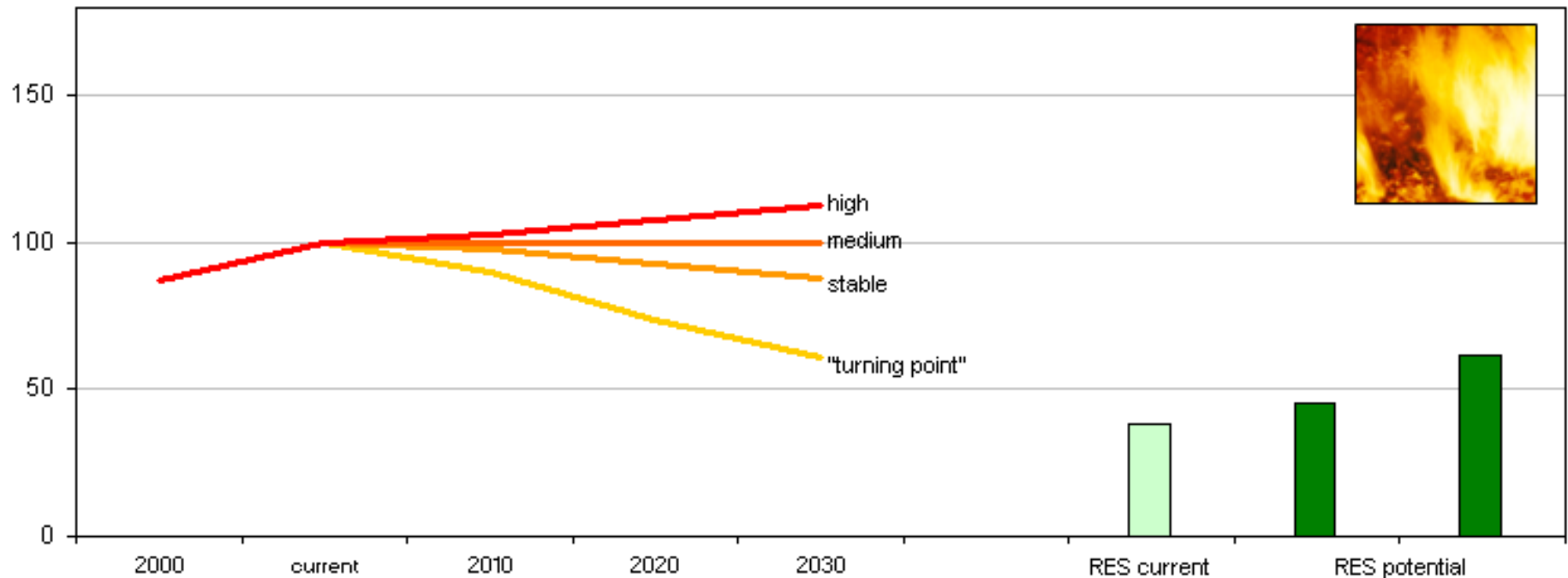


Renewable Heating in Upper Austria

- 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	→	1,370 GWh
Biogas	50 GWh	→	600 GWh
Hydro power	11,700 GWh	→	12,200 GWh
PV	5 GWh	→	150 GWh

RES-heat:

"Green heat" (incl. district heating)	38 PJ	→	62 PJ
Biomass (heat)	23 PJ	→	40 PJ
Heat pumps	1 PJ	→	2 - 3 PJ
Solar thermal	1 PJ	→	4 PJ

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



Upper Austria's sustainable energy strategy

3 Pillars



"stick"



"carrot"



"tambourine"

Upper Austria's sustainable energy strategy – example biomass heating

Legal measures

- Renewable heating obligations (public buildings & buildings > 10,000 ft²)
- Inspection of boilers & AC systems
- Energy performance certificates
- Minimum requirements heating & cooling

Financial measures

- Soft loans for efficient renovation
- Grants for renewable heating
- Pilot projects
- Contracting
- Regional R & D programme

Information & training

- Energy advice
- Training & education programmes
- Campaigns & competitions, media activities
- Local energy action plans
- Publications
- Oekoenergie-Cluster

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 equipment 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



Wood pellet heating

- CO₂ neutral, standardised fuel
- very clean combustion (comparable to a natural gas boiler) due to two-stage 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





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

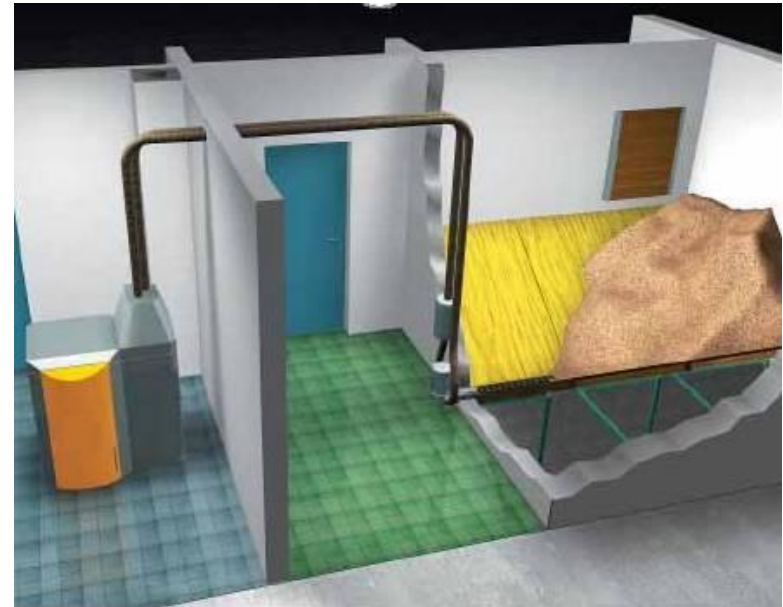
- Austrian pellet fuel standards sets technical fuel requirements for pellets:
 - diameter: 6 mm, length: 5-30 mm
 - density: min. 1.12 kg/dm³, bulk weight: min. 650 kg/m³
 - water content: max. 10%, amount of ash: max. 0.5%
 - heating value: min. 4.6 kWh/kg, dust content: max. 1%
 - no binder, no purification
- standards for transport, storage, transport vehicles, training of staff

Wood pellet heating system feeding systems

transport auger



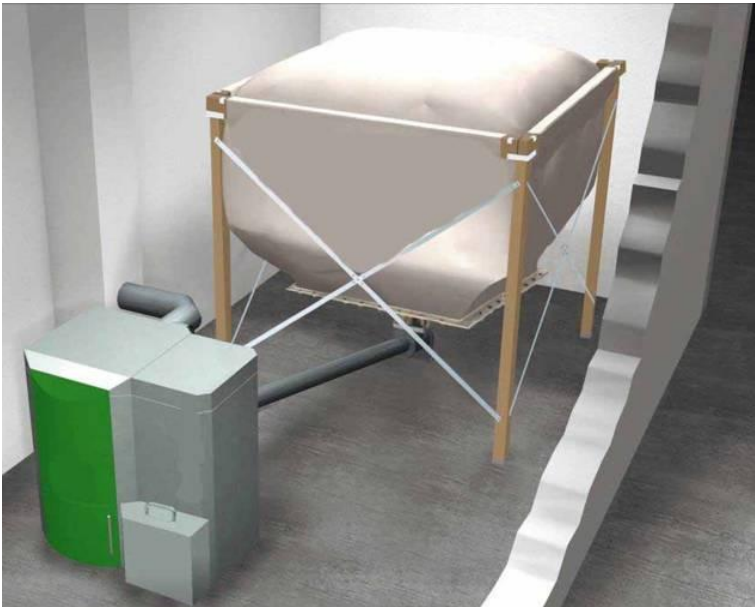
vacuum suction system



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**



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 | 3 billion US \$/year |
| • new professions | > 500 in education |
| • technological innovation | > 110 R&D projects |
| • export opportunities | > 50% export rate |



The end of the oil-era?

