EPBD implementation: optimising towards nearly zero buildings

Gerhard Dell
Energy Commissioner Upper Austria
Director O.Ö. Energiesparverband
Oberösterreich – Upper Austria

Capital: Linz
Population: 1.38 mio
Area: 12,000 km²
Gross inland cons.: 270 PJ; 34% renewables
Economic activities: industry, service sector, tourism, 25% of the Austrian exports; cluster-oriented policy approach
## 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
- 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

- Energy advice (15,000 sessions/a)
- Energy certificates for buildings (> 93,000 since 1993)
- Training programmes
- Management of regional subsidy programmes
- Public awareness campaigns, events, publications
- Pilot projects
- Municipal energy strategies
- European cooperation
- OEC network

- 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
EPBD: Setting of minimum energy performance requirements

“Member States shall take the necessary measures to ensure that minimum energy performance requirements for buildings or building units are set with a view to achieving cost-optimal levels.”

EPBD Art. 4
The energy performance of a building shall be expressed in a transparent manner and shall include an energy performance indicator and a numeric indicator of primary energy use.

**Primary energy**

“...”

EPBD Annex I
Existing buildings

“Member States shall take the necessary measures to ensure that when buildings undergo major renovation, the energy performance of the building or the renovated part thereof is upgraded in order to meet minimum energy performance requirements in so far as this is technically, functionally and economically feasible.“

EPBD Art. 7
Major renovation

a) the **total cost** of the renovation relating to the building envelope or the technical building systems is higher than 25 % of the value of the building, excluding the value of the land upon which the building is situated; or

b) more than 25 % **of the surface** of the building envelope undergoes renovation

EPBD Art. 2
High-efficiency alternative systems

“Member States shall encourage, in relation to buildings undergoing major renovation, the consideration and taking into account of high-efficiency alternative systems, in so far as this is technically, functionally and economically feasible.”

EPBD Art. 7
Energy performance certificates

“The energy performance certificate shall include recommendations for the cost-optimal or cost-effective improvement of the energy performance of a building or building unit, unless there is no reasonable potential for such improvement compared to the energy performance requirements in force."

EPBD Art. 11
Upper Austria's sustainable building strategy
3 Pillars

- "stick" (Legal measures)
- "carrot" (Financial measures)
- "tambourine" (Information activities)
Upper Austria's sustainable building strategy

**Legal measures**
- Energy performance certificates
- Minimum requirements heating & cooling
- Inspection of boilers & AC systems
- Renewable heating obligations (public buildings)

**Financial measures**
- Soft loans for efficient renovation
- Grants for renewable heating & efficiency measures
- Pilot projects, regional R & D programme, contracting

**Information & training**
- Energy advice
- Training & education programmes
- Campaigns & competitions
- Publications
- Media activities

刺激需求
支持供应

Policy Packages
Recent changes in building legislation (renovation) in Upper Austria

- tightening of energy efficiency standards for residential buildings
- significant tightening of energy efficiency standards for non-residential buildings, also for cooling
- obligation for measures against summer overheating
- regular inspections of heating and cooling systems
Legal measures to decrease the cooling demand

• Non-residential buildings (renovation):
  - either “proof of prevention of summer overheating”
    (Nachweis ÖNORM-B 8110-3 Nachweis der Vermeidung der sommerlichen Überwärmung)
  - or “max. externally-induced cooling demand”
    (“max. außeninduzierter Kühlbedarf):
    - max ≤ 1kWh/m³a (new construction)
    - max ≥ 2kWh/m³a (complete renovation)
Sustainable housing programme (renovation) in Upper Austria 1998 - 2010

- managed by O.Ö. Energiesparverband
- soft loan programme linked to an energy performance indicator
- 40,000 homes:
  - energy performance indicator
  - energy certificate
  - individual energy advice session
- recent changes:
  - only low energy buildings (below 75 kWh/m²,a)
Sustainable housing programme for renovation 2010

- renovation programme 2010: 5,500 one-family homes
- energy savings: 235 GWh/a
- cost savings: 20 million €/a
- average life span: 20 years
- total savings: 5,000 GWh

- average indicator before renovation: 242 kWh/m²,a
- average indicator after renovation: 61 kWh/m²,a
Typical renovation project
Single family home

- Heating: 31%
- Roof: 15%
- Walls: 32%
- Basement: 8%
- Ventilation: 7%
- Window: 7%
- Solar gains: 3%
- Internal gains: 5%
Typical home "before & after renovation"

Measures

- Outside walls → add. 14 cm insulation
- Attic floor → add. 26 cm insulation
- Basement ceiling → add. 10 cm insulation
- Heating system → exchange of boiler
- Windows → new windows (U-value = 1.2 W/m²k)

<table>
<thead>
<tr>
<th></th>
<th>before</th>
<th>after</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy consumption (heating)</td>
<td>68,000 kWh/a</td>
<td>20,000 kWh/a</td>
</tr>
<tr>
<td>Heating costs</td>
<td>4,500 €/a</td>
<td>1,200 €/a</td>
</tr>
<tr>
<td>Energy Performance Indicator</td>
<td>213 kWh/m²,a</td>
<td>63 kWh/m²,a</td>
</tr>
</tbody>
</table>
Sustainable buildings programmes for non-residential buildings

• Support from the national and regional governments

• amount depends on energy performance indicator achieved after renovation, e.g. 15% if half of the required energy performance indicator is achieved

• energy performance certificate to document reduction of heat demand by 25% → 30% support

• minimum investment of 35,000 €

• typical measures: insulation of building shell, renovation of windows, heat recovery for ventilation systems, shading to reduce cooling load
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 households (up to 1.5 hrs.) and public bodies, companies pay 25 % (100-300 Euro)
- typical issues:
  - new construction of a home,
  - renovation of a school, optimisation of an industrial process etc.
Average energy performance indicator
multifamily buildings, major renovation

\[
A/V=0.5
\]