

## Sustainable Buildings in Upper Austria

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The state of Upper Austria, one of the nine federal states in Austria, is implementing an aggressive policy to change the housing market: a comprehensive building program has cut energy consumption in 95 % of all new homes by 50 % and every year, the efficiency requirements for new buildings are increased by about 5%. This was achieved with a combined approach of progressive building standards, financial incentives, targeted training of professionals and a comprehensive program to raise awareness of the general public and decision makers.

Main activities include:

- energy efficiency requirements for new and renovated buildings which are regularly updated.
- very attractive funding programs which incentive homeowners and housing associations to go beyond the legal requirements. Due this program, several hundred passive buildings were built in recent years
- about 20 different courses and training programs target professionals in the building sector and motivate them to learn more about energy efficiency and renewables in buildings
- about 15,000 face-to-face energy advice sessions are held every year, supporting home and business owners in building-related making decisions.

Upper Austria is the fourth largest of Austria's nine federal states with 1.4 million inhabitants. It is situated in the northern part of Austria, bordering Germany and the Czech Republic. In Upper Austria, energy efficiency and renewable energy sources have a high political priority. Currently, renewable energy source account for about 30 % of the total primary energy demand of this highly industrialized state. Recently the regional government decided that by 2030 all electricity and space heating in the State will be covered by renewables energy sources. In order to achieve this very ambitious targets, significant efforts in energy efficiency, especially in the building sector, will be necessary as well as increasing renewable energy production. As one of the first measures, the state government has adopted legislation which obliges all new homes to be equipped with a solar thermal system.

The O.Oe. Energiesparverband is a state agency in Upper Austria to promote energy efficiency, renewable energy sources and innovative energy technologies located in Linz/Austria. Main target groups are private households, business and public bodies. For more information [www.esv.or.at](http://www.esv.or.at)

soft loan program which combines a financial incentive with targeted information. The calculation of an energy performance indicator, the participation in an obligatory individual energy advice session of the homeowners and an energy performance certificate for every building are the most important program elements. If the requirements are met, the homeowners receive an additional soft loan.

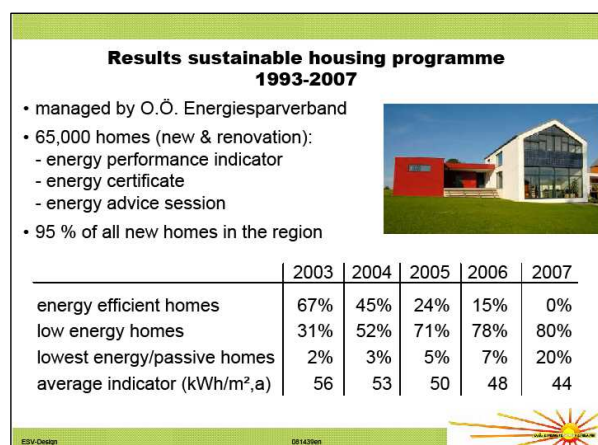
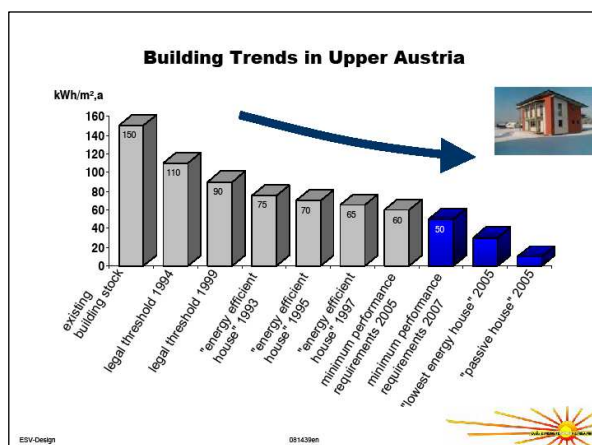
From 1993 to 2007, more than 74,000 homes met the program requirements, achieving an energy saving of 350 million kWh/year. In 2007 for example this led to a CO<sub>2</sub> reduction of 147,000 tons. The program is also very attractive in economic terms: using the least-cost-planning calculation method, every kWh saved through energy efficiency measures costs only 1.8 Eurocent.

### Background:

The buildings sector accounts for 40% of the European energy requirements. Two thirds of energy used in European buildings is consumed by private households, and their consumption is growing every year. Research shows that more than one-fifth of the present energy consumption and up to 30-45 mio. t CO<sub>2</sub> per year could be saved by 2010 by applying more ambitious standards both to new and refurbished buildings - these savings would represent a considerable contribution to meeting the European Kyoto targets. Without comprehensive measures, energy consumption and CO<sub>2</sub> emissions of the building sector will continue to grow.

Based on the Upper Austrian energy strategy and implemented by O.Oe.

Energiesparverband, a sustainable buildings program is being implemented in Upper Austria.



### Sustainable buildings program for residential buildings:

The sustainable buildings program includes the following support activities:

- a financial incentive (a soft loan) is given depending on the energy efficiency of the building. There are 3 categories, the energy efficient building (45 kWh/m²,a), the low

energy building (30 kWh/m<sup>2</sup>,a) and the passive house building (10 kWh/m<sup>2</sup>,a), based on the respective energy performance indicator for heating

- for each participant in the program, an energy performance indicator is calculated and an energy performance certificate issued
- for each participant there is an obligatory individual energy advice session (1 - 1.5 hrs) in which practically all new homeowners participate.

In addition to the program for sustainable residential buildings, a similar program exists for apartment blocks and for retrofitting of buildings.

### **Sustainable public buildings**

Focal point of the energy efficiency activities is the public building sector because of its exemplary role. Due to their proximity to end consumers, community buildings can serve as a model for citizens. Most important measures are for example:

- minimum energy performance requirements for all new and renovated public buildings: public buildings (office buildings, schools, kindergartens)
- legal obligation for renewable energy sources for heating and hot water supply
- energy performance requirements in tender documents: a list of energy related criteria to be fulfilled by architects and planners is included in tender procedures
- legal obligation for energy accounting for municipalities: energy consumption can be monitored, targeted measures be developed and the results of their implementation be documented
- legal obligation to display the energy performance certificate of public buildings well visible for the general public.

So far the following was achieved for (office) buildings owned by the regional administration:

- annual benchmarking and monitoring for all buildings:
  - energy consumption per m<sup>2</sup> (heating & hot water) decreased by 18.5 % since 1994
  - electricity consumption stable despite “more IT”
- a large number of low energy public buildings in Upper Austrian municipalities
- since 2003 TPF-projects for the public buildings are being implemented. The recent TPF project includes 10 school & administration buildings, over 600,000 € were invested and annually 58,200 € energy costs and 278 t CO<sub>2</sub> are saved.

U-Values for important home types			
	passive home	low energy home	energy efficient home
windows	0.8	1.1	1.3
outside walls	0.12	0.2	0.35
upper ceiling	0.1 (40 cm)	0.15 (30 cm)	0.2 (24 cm)
basement	0.15	0.25	0.3

Benchmarking and monitoring of regional buildings				
Building types	1994	2002	2004	2005
vocational schools	117	90	90	85
district offices	117	95	88	80
administration buildings	105	104	98	93
agricultural schools	127	109	104	102
hospitals	218	160	147	140

Energy performance indicators for heating (kWh/m<sup>2</sup>, a)

- for all buildings owned by the regional administration
- energy consumption per m<sup>2</sup> (heating & hot water) decreased by 18.5 % since 1994
- electricity consumption stable despite "more IT"

Source: gbm, S. Hübner

## Sustainable commercial buildings

Based on the experiences and results with residential and public buildings, the following measures for commercial (office) buildings are implemented:

- Energy and auditing service: energy advice service for companies (1,800 advice sessions)
- Information & awareness raising activities: publications, events, campaigns, competitions
- Training seminars: e.g. "energy efficient cooling", "energy advice and energy management for companies", "energy efficient lighting for larger buildings"
- Supporting industry & companies:
  - "Oekoenergie-Cluster" (OEC): network of green energy businesses (149 companies, € 1,570 million/a turn-over, 4,000 employees) supporting business development;
  - ASiC (Austrian Solar Innovation Centre): research and development centre, solar R&D laboratory
- TPF: regional third party financing programme
- Financial support: up to 44 % support for solar thermal and biomass installations
- Tender for outstanding commercial buildings:
- R&D: technical and financial support provided by the regional energy technology program
- European projects: e.g. e-tools, Green Labels Purchase

## Examples of innovative buildings:

As a result of the sustainable energy buildings program, not only energy efficiency residential buildings have become a standard, but additionally a number of outstanding public and commercial buildings have been built recently, e.g.

- "Christophorus Building": Innovative 3 floor passive house office building in timber construction using only environmentally friendly building materials and including a 10 kWp PV plant.
- "Supermarkt Pfeiffer": First passive house supermarket with a 7 kWp facade integrated and a 20 kWp roof mounted PV system. The energy efficient cooling appliances consume 30 % less energy.

- "Biohof Achleitner":  
The "biohof" is an innovative farmer's building including an organic restaurant and a supermarket in passive house standard. The construction materials are among others wood, clay and straw. An innovative cooling system using plants was developed and plant oil is used for transport.
- "Office & residential building Schlager":  
The office building of Mr. Schlager, which serves also as residential building meets passive house standard. The innovative building concept uses phase change materials to increase the heat storage ability of construction parts. The results are monitored and compared with other buildings.
- "TZ Perg" ("Technology center" in Upper Austria):  
The low energy office building(3,000 m<sup>2</sup> heated area) achieves an energy performance indicator for heating below 20 kWh/m<sup>2</sup>,a.
- "Passive house music school Wolfers":  
For the first passive house music school building in Upper Austria an innovative energy concept was implemented. Due to the high insulation and construction standard, now conventional heating system is required and the energy performance indicator for heating is max. 15 kWh/m<sup>2</sup>,a.