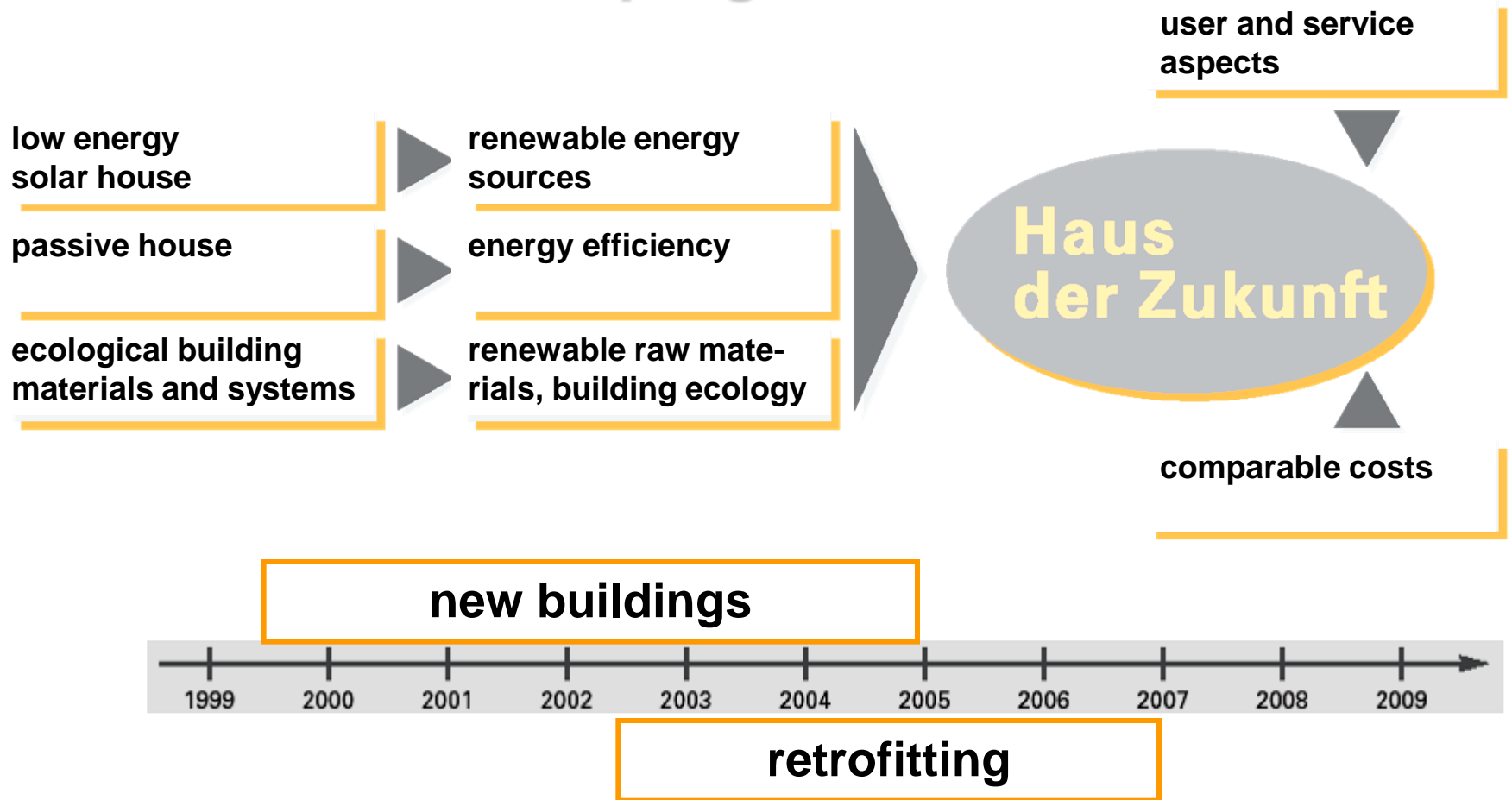


Austrian Research, Technology and Innovation Program

Haus der Zukunft PLUS

Building of Tomorrow PLUS

Overall aims of the programme



Results and Experiences from *Building of Tomorrow*

– *Haus der Zukunft* (1999–2007)

- 250 research projects
- 25 Mio EUR project funding
- 25 demonstration projects
- Austria has the highest density of passive houses

Utendorfgasse: social housing in passive house standard, Vienna



- 🏠 construction costs had to meet requirements of social housing:
less than 1055 €/m²
- 🏠 passive house standard ($\leq 15 \text{ kWh/m}^2\text{a}$, $\leq 10 \text{ W/m}^2$, $n_{50} \leq 0,6/\text{h}$)
- 🏠 primary energy consumption $\leq 120 \text{ kWh/m}^2\text{a}$

Schiestlhaus:

Ecological alpine refuge hut, Hochschwab area, Styria (2153 m)



- Autarkic building maintenance
- Collection of rain water from roof
- Warm water / flat thermal collectors integrated in the façade
- Electricity generated by 70 m² of façade integrated photovoltaic panels

Renovation single family house in passive house standard, Pettenbach, Upper Austria



- 🏠 first renovation of a single family house in Austria to passive house standard, reduction of energy consumption 95 %
- 🏠 use of prefabricated timber wall elements
- 🏠 thermal bridges of the existing rising brickwalls were compensated by a circumferential umbrella-shaped insulation
- 🏠 insulation of the floor by using vacuum insulation

Makartstrasse:

Renovation to meet Passive House Standard, Linz, Upper Austria



- 🏠 renovation of a multi-storey-building from the 1950s
- 🏠 use of prefabricated wooden façade elements
- 🏠 central element of the facade system is a special solar comb, which is mounted on the outside wall in form of a panel (gap solution)
- 🏠 controlled ventilation with single room ventilators

Demonstration building „Tschechenring“, Felixdorf, Lower Austria



- 🏠 renovation of a historical workers' development from 1880
- 🏠 extension of housing space by attic development
- 🏠 thermal optimization of the envelope with interior insulation due to the protected facade
- 🏠 comparable costs to conventional building methods
- 🏠 use of renewable energy (central wood chips heating)

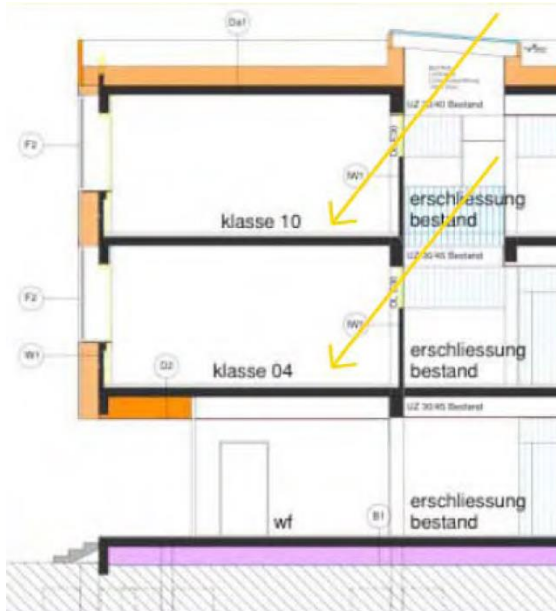
Renovation of the School in Schwananenstadt, Upper Austria



- 🏠 first passive house renovation of a school in Austria
- 🏠 use of prefabricated wooden elements
- 🏠 reduce of heat use of 400 MWh/a compared to existing building
- 🏠 additional costs of 8 % for renovation to passive house standard
- 🏠 substantial gain of quality for users



Daylighting system



Testing of ventilation system in one class room



Mounting of façade elements



Building of Tomorrow **PLUS**

„From Zero-Energy-Buildings to **PLUS**-Energy-Buildings“

- from 2008 – 2013
- Budget 35 Mio. EURO

- PLUS** buildings as generators of energy
- PLUS** strengthening technological leadership
- PLUS** from the building to the settlement
- PLUS** from single to series manufacturing
- PLUS** visible demonstration projects
- PLUS** intensified networking and education
- PLUS** ...

Energy Surplus House Weber in Hermagor (Carinthia)

Haus der Zukunft PLUS

Renovating the Weber farmstead of historic cultural value to energy surplus standard



Copyright:
Architekten
Ronacher ZT GmbH

- Opening of the building facade to the South (glassing)
- New roof meeting Passive House Standard
- Interior insulation with 30 cm cellulose
- Plus-energy standard reached by erecting a photovoltaic system and solar collector panels on the nearby greenhouse oriented towards South
- Demonstration project aimed at reaching a wide public via utilization as holiday apartments and lecture room

Innovative modernization of late 19th century buildings



- Basic research and feasibility studies
- Development of a window type and facade elements (GRUEFF) and a portfolio management tool
- 4 demonstration buildings: residential building Wißgrillgasse (finished), „David’s Corner“ and Eberlgasse as well as a listed building in Kaiserstrasse (ongoing)
- Documentation, monitoring and dissemination



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Energy surplus renovation in Kapfenberg

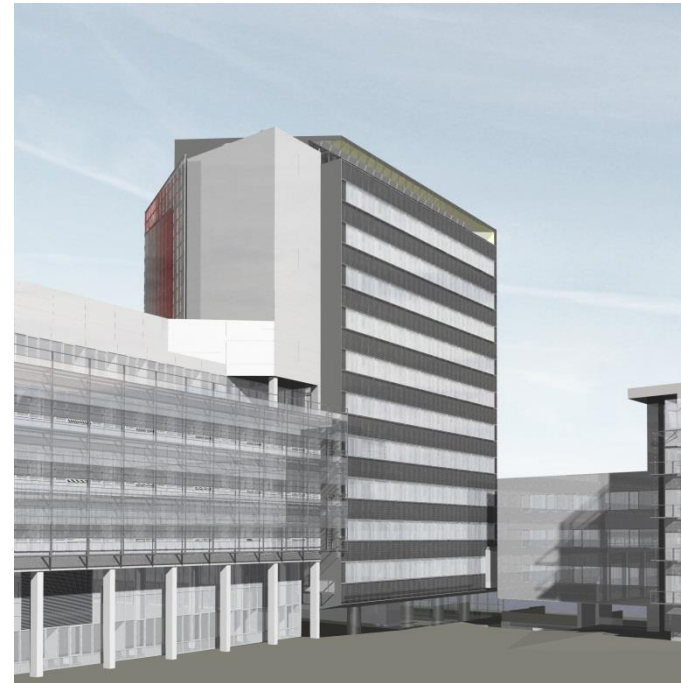
Haus der Zukunft PLUS

Renovating with prefabricated roof and facade elements with integrated building services, to be finished in summer 2013



Copyright
AEE INTEC

- Vertical prefabricated facade elements including windows and prefabricated utility modules for heating and ventilation ductwork etc..
- Active elements as PV modules, solarthermal collectors and passive elements like honeycomb solar cells (gap solution) are integrated in the facade
- Utility modules can be serviced/ added to at any time
- 200 m² solar collector and 1000 m² PV modules

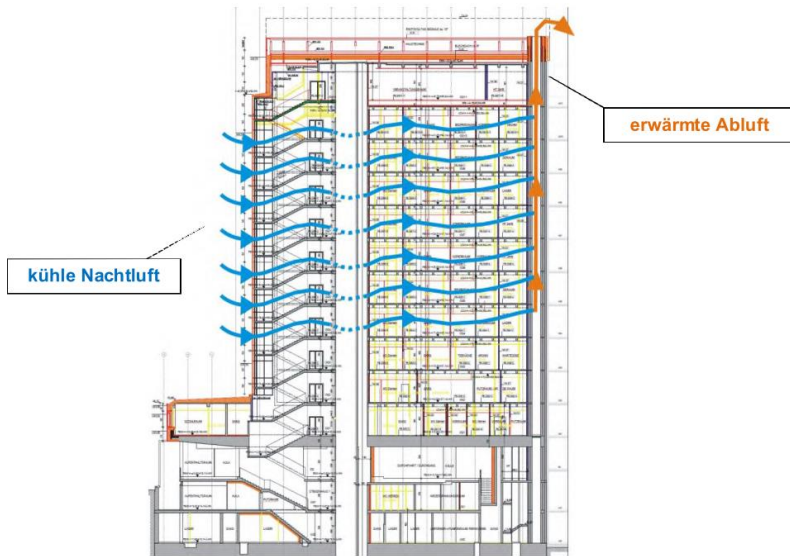


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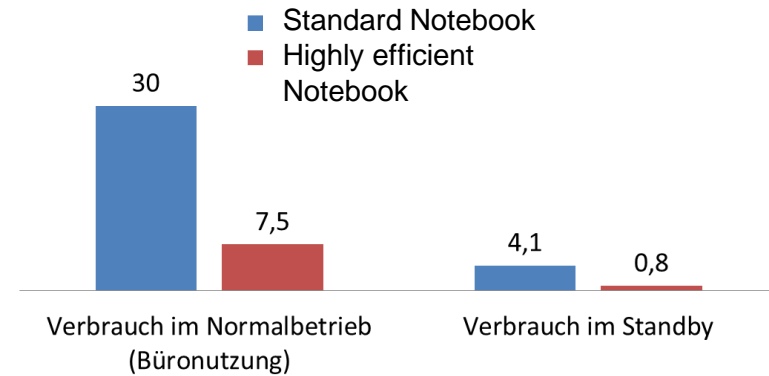
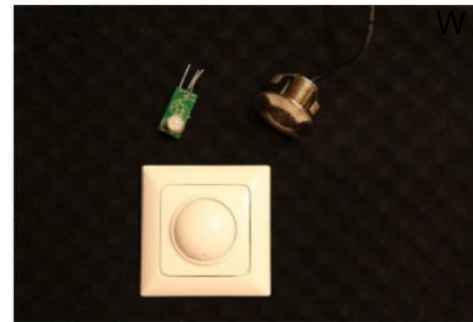
- Comprehensive thermal renovation to Passive House Standard
- Core airing at night with individual rooms coupled in thermally
- Ultra efficient building services components with low electricity consumption in standby and operation, optimized lighting and ultra-efficient ventilation with optimal heat and moisture recovery
- Green IT (servers, laptops, PCs)
- Extreme optimization of all office and kitchen appliances



Free cooling



motion sensor standby < 0.05



BIGMODERN – Renovation „Amtshaus Bruck“

Haus der Zukunft PLUS

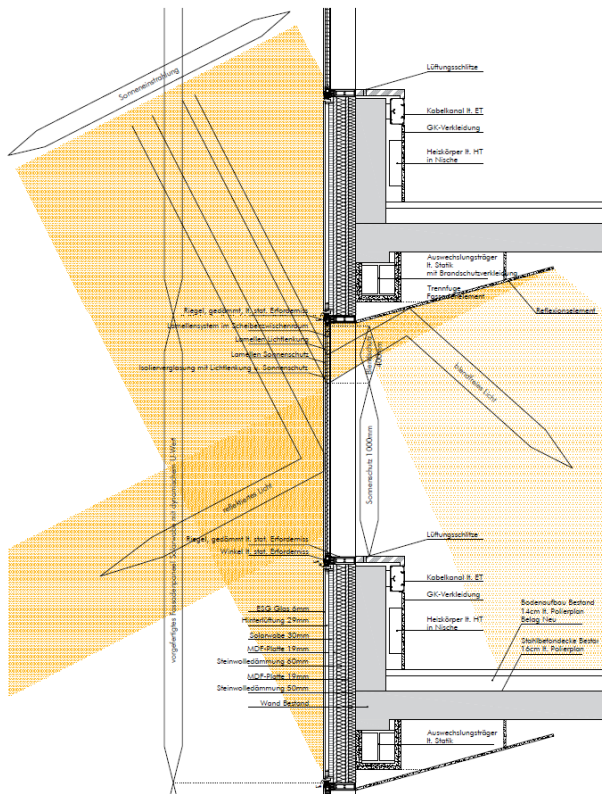
Renovation of Amtshaus Bruck – county court, Inland Revenue offices and Federal Office of Metrology and Surveying



Copyright: BIG

- T-shaped floor plan with different level of renovation of the two wings
- Prefabricated metal cladding panels with solar “honeycombs” for passive solar exploitation
- ventilation with highly efficient heat recovery in the wing of the district court
- bivalent heat pump with a deep drilling system for cooling and part of heating
- lighting by presence and daylight dependent controlled floor lamps

- Cross section of wall and window



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International dissemination of research projects and findings:

- Internet Platform with abstracts and reports of all research projects:
 - www.HAUSderZukunft.at
- Publications and Presentations:
 - Technical Guide
- Events and Workshops
- Participation in IEA Programmes and Tasks (ECBCS, SHC)



**Thank you
for your attention!**

www.HausderZukunft.at

**Claudia Dankl, ÖGUT – Austrian Society for
Environment and Technology**

claudia.dankl@oegut.at