

The Building of Tomorrow Program – Background and Results

Herbert Greisberger^{1*} and Claudia Dankl¹

¹ ÖGUT – Austrian Society for Environment and Technology, Hollandstraße 10/46, 1020 Vienna, Austria

* Herbert Greisberger, herbert.greisberger@oegut.at

Abstract

"Building of Tomorrow", a research and technology program of the Austrian Federal Ministry of Transport, Innovation and Technology, took its start in 1999; the 5th and last call for proposals was launched in 2007. In 2008 the Ministry started "Building of Tomorrow Plus" as subsequent program, with the overriding goal to achieve the technological preconditions for constructing buildings that do not consume energy, but generate it. The new program comprises instruments of research promotion, instruments of investment as well as improved project coaching, therefore "Building of Tomorrow Plus" is managed by the Austrian Research Promotion Agency (FFG), the promotional bank of the Republic of Austria (aws) and the Austrian Society for Environment and Technology (ÖGUT). The following pages give a short overview of results and strategies of "Building of Tomorrow" and "Building of Tomorrow Plus".

1. Introduction

In Austria, one third of the consumption of raw materials and 57 % of waste generated is caused by the construction industries. The development of strategies towards an efficient use of resources in this sector of the economy is of great importance. The improvement of resource-efficiency requires high-quality, technologically mature building concepts, which require low material input, produce little waste, ensure minimum of land consumption, long-term supply with renewable energy as well as operation of the building with a minimum of energy consumption. Architectural concepts are needed that guarantee a long service life and facilitate flexible use profiles of the building.

2. Building of Tomorrow

The program "Building of Tomorrow" was launched in 1999, starting from the low-energy solar building approach and the concept of the passive building, and incorporating ways of using environmentally friendly and renewable materials in construction.

2.1. Aims and Criteria

"Building of Tomorrow" aimed to develop marketable building components and concepts for residential, office and commercial buildings – for new construction as well as for renovation – and to realize them in demonstration buildings. These new sustainable developments and products should meet the following criteria as compared to still widespread building and renovation concepts:

- Reduction of energy and materials input
- Widespread use of renewable energy sources
- Use of renewable and ecological materials

- Consideration of social aspects
- Improvement of the quality of life
- Costs comparable to conventional construction methods

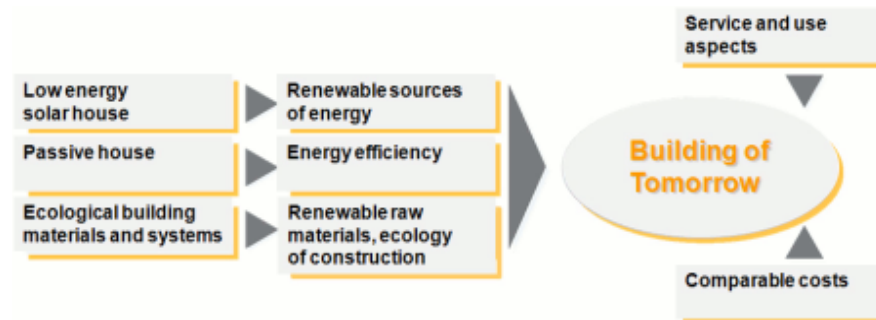


Fig. 1: Overall criteria to be met by “Building of Tomorrow” projects

2.2. Project Types

With regard to the aims and criteria mentioned above different types of projects were supported within the research and technology program “Building of Tomorrow”:

- Research studies (socio-economic as well as technical)
- Development of technologies, systems and components
- Technology related basic research
- Innovative building and reconstruction concepts
- Support for pilot and demonstration projects that have been developed within the program
- Evaluation and monitoring of demonstration projects
- Support for dissemination and know how transfer.

2.3. Results

More than 250 research and development projects as well as demonstration and diffusion measures, gave new impetus to innovation. Research and development work has provided a firm basis for innovative, sustainable concepts both for new buildings and for renovating existing ones. About 25 demonstration buildings have been built in Austria up to 2010. In 2007 the Austrian Ministry of Transport, Innovation and Technology published a map of Austria that shows the demonstration projects with short descriptions. Some of the highlights are listed here below [1]:

S-House in Böhleimkirchen: Passive house office and exhibition building built as timber construction with straw bale insulation; recyclability of all building components after service life; innovative technologies, e.g. “Treeplast Screw“ (lignin and wood fiber) to mount the ventilated facade or other items directly to the straw bales.

Schiestlhaus at the Hochschwab (at 2,154 m altitude): Ecological alpine passive house refuge in island position, built with timber-prefab system – building elements delivered and mounted by helicopter; use of rain water gathered from the roof and refined for human use; solar water heating, PV installation.

Utendorfsgasse in Vienna: Social housing development with only approximately 4 % additional costs for passive house standard through optimization of building components and integrated planning as well as building simulation.

Makartstraße in Linz: Retrofitting of a multi-story residential development to meet near passive house standards with prefabricated facade elements with transparent thermal insulation and glazing with passive house windows with integrated sun shading and mechanical ventilation for individual rooms; the renovation was carried out while tenants were still living in.

School building in Schwanenstadt: Renovation of a school building to passive house standard without substantial disturbance of school operation through use of prefabricated facade elements; improvement of daylight quality with reduction of power consumption. Additional costs for passive house standard, lighting management and ecological measures approximately 13 %; reduction of heating costs 90 %

ENERGYbase in Vienna: 7,500 m² office building in passive house standard with use of a solar cooling system, indoor air quality control by means of plants in "green buffer spaces" and 400 m² photovoltaic installation.

There are also a lot of successful examples for other project categories of the program. For applied research projects to develop or improve technologies and components these are e.g. the development of solid passive house windows or facade-integrated solar collector for water and space heating.

To meet the focus of increased consideration of service and user needs also basic research on socio-economic issues was supported within "Building of Tomorrow", dedicated to e.g. analysis of user behaviour in innovative buildings, analysis of acceptance of ecological energy efficient buildings or analysis and theory of users participation in refurbishment processes.

2.3. Successes of Building of Tomorrow

With the planning and implementation of innovative residential and office buildings, "Building of Tomorrow" has pointed the way for eco-efficient construction and the sustainable use of resources in Austria. Successes of the program are:

- A great deal of scientific competence in this field has been accumulated in Austria.
- The program supported community building and networking among researchers and practitioners in the building sector
- Austria now has the highest density of passive buildings world-wide.
- Austrian firms have taken the lead in the technology of sustainable construction world-wide.
- Support has been provided for the process of adapting the Austrian system of subsidizing the construction of accommodation to take account of the latest developments in construction.
- The Austrian Ministry of the Environment's program klima:aktiv (see www.bauen-sanieren.klimaaktiv.at) has incorporated the results of "Building of Tomorrow" and is supporting further implementation.

2.4. Further information

More information on the program as well as on the ongoing and finished research projects can be found at www.HAUSderZukunft.at. Short abstracts describing each project are available in German and English. Detailed project reports of finished projects are available in German – to be found at the German project description – only.

3. Building of Tomorrow Plus

In phase 2 of the program Building of Tomorrow Plus the following aims are prioritized:

- Creating the technological basis for the building of tomorrow, especially the plus-energy house.
- Adapting innovative technologies and products for large-scale industrial manufacture.
- Initiating large demonstration projects, called “Leitprojekte” in German, (buildings, settlements, networks ...) to put new technologies and approaches on the map.
- Supporting the interlinking of the key Austrian providers of know-how internationally, boosting the transfer of know-how across borders, accumulating human resources and integrating existing knowledge into suitable training schemes.

By summer 2010 two calls for tenders have been carried out within “Building of Tomorrow Plus”. More than 200 projects have been submitted at the two calls, more than 50 of these have received funding so far.

The long-term vision for "Building of Tomorrow" is to increase the energy efficiency of building construction and use to a point where the emissions of greenhouse gases over the entire life cycle of buildings are reduced to zero overall.

References

- [1]BMVIT (2007). Austrian map with project descriptions, Vienna.
<http://www.hausderzukunft.at/publikationen/view.html/id605>