

Implementation of Ecological and Energy-Efficient Building Concepts

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Abstract : A relatively large percentage of energy and resource consumption occurs in the building sector. This concerns the production of building materials, the construction of buildings and also the energy consumption during the use phase. Therefore, the overall objective of this EU LIFE project "LIFE Cycle Habitation" (LIFE13 ENV/AT/000741) is to demonstrate innovative building concepts that significantly reduce CO₂emissions, mitigate climate change and contain a minimum of grey energy over their entire life cycle. The project is being realised with the contribution of the LIFE financial instrument of the European Union. The ultimate goal is to design and build prototypes for carbon-neutral and "LIFE cycle"-oriented residential buildings and make energy-efficient settlements the standard of tomorrow in line with the EU 2020 objectives. To this end, a resource and energy-efficient building compound is being built in Böhleimkirchen, Lower Austria, which includes 6 living units and a community area as well as 2 single family houses with a total usable floor surface of approximately 740 m². Different innovative straw bale construction types (load bearing and pre-fabricated non loadbearing modules) together with a highly innovative energy-supply system, which is based on the maximum use of thermal energy for thermal energy services, are going to be implemented. Therefore only renewable resources and alternative energies are used to generate thermal as well as electrical energy. This includes the use of solar energy for space heating, hot water and household appliances like dishwasher or washing machine, but also a cooking place for the community area operated with thermal oil as heat transfer medium on a higher temperature level. Solar collectors in combination with a biomass cogeneration unit and photovoltaic panels are used to provide thermal and electric energy for the living units according to the seasonal demand. The building concepts are optimised by support of dynamic simulations. A particular focus is on the production and use of modular prefabricated components and building parts made of regionally available, highly energy-efficient, CO₂-storing renewable materials like straw bales. The building components will be produced in collaboration by local SMEs that are organised in an efficient way. The whole building process and results are monitored and prepared for knowledge transfer and dissemination including a trial living in the residential units to test and monitor the energy supply system and to involve stakeholders into evaluation and dissemination of the applied technologies and building concepts. The realised building concepts should then be used as templates for a further modular extension of the settlement in a second phase.

Keywords : energy-efficiency, green architecture, renewable resources, sustainable building

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