

ZEROCO 2- Study visit in Berlin

On the 14.09.2017 the ZEROCO2 Project visited the German “Umweltbundesamt” (Federal Environmental Agency) and its new zero-energy office building „Haus 2019“ at Berlin-Marienfelde, Germany

A few years ago, the German Federal Environmental Agency was faced with a situation whereby it required at one of its locations (Berlin-Marienfelde), room for an additional 31 workplaces. However, the new building should not only provide space for employees, but also include some improvements and additional features like showers to improve the laboratory infrastructure. To meet these demands, a sustainable building, which works as an ecologically optimised zero-energy-house, was chosen to be built in a wooden construction. The energy requirement of the building in operation is to be covered entirely on the spot by sustainable regenerative energy generation (within the balance sheet of a year). The building already meets the requirements of the EU Directive on Total Energy Efficiency (2010/31 / EU) of buildings - the standard as a low-energy building from 2019 onwards.

Holistic Planned

The project aimed to follow the architectural idea, the ecological-energetic requirements and their realization in a holistic approach. The building is to be integrated into the construction environment, but at the same time create new spatial qualities. For reasons of resource protection and to allow a quick construction period, the building is realized as a wooden construction in prefabricated panel construction and thus with a high proportion of regenerative building materials. The roof is extensively landscaped (to provide shadow for the offices and rain cover).

Sustainable and lifecycle-oriented

The criteria for sustainable construction are to be applied on the basis of the evaluation system for federal buildings of the Federal Ministry of Building, which was introduced in December 2009. The entire process - planning, execution and operation – had to meet the sustainability requirements. For example, investment costs and usage costs are systematically used as a basis for decisions in the context of a life-cycle analysis. Particularly the so-called strategic components.

Energy provided by renewables

The energy supply concept has developed future-oriented solutions for the areas of heat supply, cooling supply, ventilation, lighting and power supply. The main pillars of this concept are photovoltaics for the power supply, the heat pump for the heat and cold supply as well as the free cooling. On the roof of the building, 380 PV elements will be installed, delivering the annual final energy demand of 48,000 kWh



Building automation and monitoring

For the "Haus 2019", a very high degree of building automation is provided. This means that all the control parameters required for the operation of the building are centrally controlled and, if possible, linked to efficiency parameters. In order to achieve an optimized building operation at an early stage, the implementation of a monitoring is planned.

With groundwater-based heat pump

Large quantities of groundwater are regularly produced at the site for on-site work, including the operation of ponds. With a heat pump the energy of the water is the same. In summer, the lower temperatures of the water are used for cooling, in the winter to heat the rooms. This is supported by a thermal solar system on the roof of the building for hot water supply.

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Highly efficient building equipment

A power-controlled ventilation system with heat recovery minimizes the building's heat loss. The electricity (lighting, office machines, etc.) needed for the energy supply on site (in the course of circulating pumps) and during the use of the building is produced by means of photovoltaic panels on the roof. Therefore, highly efficient equipment and equipment are used in all plant parts. Particularly effective illuminants are used for lighting. All office machines (computers, monitors, printers, etc.) will meet the requirements of the Federal Government's green IT initiative and be especially resource-conserving.





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Optimized energetically from the star

In order to achieve the standard of a zero-energy house, systematically all possibilities have to be used to reduce the primary energy requirement, in particular the cooling and current requirement to a minimum. First of all, a very compact building envelope, as small as possible a ratio of surface area to volume) should be selected with a very high structural thermal protection. The following energy values are to be achieved:

- Outside wall: 0,10 W/(m²K)
- Roof: 0,08 W/(m²K)
- Floor panel: 0,11 W/(m²K)
- Window: 0,80 W/(m²K)

As a further step, the demand requirements were critically tested and the energy requirements for their realization were minimized by the sensible interlinking of different functions. On the basis of a dynamic simulation, the energy requirement was determined in terms of space and plant engineering. The result is the basis for a needs-oriented and energy-efficient building technology.



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