



The Smart Green Tower will have a building envelope made of glass/glass photovoltaic modules with Perc cells.  
© Frey Gruppe

Building facade as an energy source

24.05.2018

## Smart Green Tower becomes an energy producer

The Smart Green Tower is being built in the city of Freiburg. The 51-metre-high building will provide living, residential and working space. Depending on the solar radiation, a building envelope made of photovoltaic modules generates more energy via the photovoltaic system than can be consumed directly. In order to utilise the surplus electricity, the designers are using a flexible internal energy storage system with lithium-ion batteries.

The residential and commercial building, consisting of a main tower and two side wings, will be built on a roughly 5,600 m<sup>2</sup> plot on the site of the former freight yard in Freiburg. 70 one- to four-room apartments will be built on the upper 16 storeys. The apartments will be mostly for rent. In addition, an additional 3,200 m<sup>2</sup> of office and commercial space is also planned.

The energy supply for the tower shall be largely based on renewably generated electricity for self-consumption. The aim is to achieve a climate-neutral building. This will be largely achieved through the use of solar radiation incident on the building envelope as well as the grid-based supply of heat based on renewable energies. This approach will be supported by the integration of a highly efficient battery storage system in the megawatt range in order to increase the self-consumption and, at the same time, compensate for peak loads. This should relieve the power grid and improve the grid stability.

The Smart Green Tower is set to be completed in 2019. It will then undergo detailed monitoring with a comprehensive scientific analysis of the components used. Of particular interest are the interactions between the systems and the behaviour of the overall system.

### Photovoltaic facade will be used for power generation and shading

The photovoltaic facade will be simultaneously used for generating power and providing shading. To this end, the project partners are developing a multifunctional facade solution with integrated PV solar shading louvres. Special wiring concepts and power optimisers should ensure efficient operation even if the modules are partially shaded. The facade structure with the integrated PV louvres will therefore be adjusted to the heat and cooling provision for the rooms behind them so that optimal thermal and visual comfort is achieved. In order to save costs for the facade construction, a lightweight structure is envisaged. One aim of the project is to show that the direct substitution of building elements makes sustainable building economical.

### The Solar Construction / Energy-Efficient City support initiative

The project is being funded as part of the Solar Construction/Energy-Efficient City support initiative set up by the

German Federal Ministry for Economic Affairs and Energy and the German Federal Ministry of Education and Research. Module 1, called "Solar Construction", focuses on projects concerned with energy-efficient buildings and building ensembles. The presented scheme focuses on coupling an energy management system with intelligent operational management strategies in order to optimise the energy flows in the building and enable the building to be integrated into smart district concepts.

A detailed description of this research network can be found on the portal for the ENERGIEWENDEBAUEN research initiative.

*(mm)*