
Bèla is the first of six residential/commercial blocks in the Neue Weststadt urban district in Esslingen. The three buildings have 132 residential units. The roof's coverage with a roughly 250-kWp photovoltaic system enables the utilisation of renewable energy that is marketed using a tenant electricity model.

Energy-efficient city 31.07.2018


Site plan of the Neue Weststadt urban district currently under construction in Esslingen

Hydrogen for the urban energy transition

A new, almost climate-neutral urban district is being built on the site of a former freight yard in Esslingen. Over a period of five years, scientists in the planned Neue Weststadt district are experimenting with an innovative energy supply concept with which electricity surpluses from intermittent renewable energies will be converted into hydrogen, stored and, if necessary, returned to the grid. The district will also serve as a real-world laboratory for the system-supportive coupling of the heating, cooling, electricity and mobility sectors.

The Neue Weststadt urban district, which is situated on a 12-hectare site directly on the Neckar River, comprises more than 600 apartments, office and commercial space as well as a new-build scheme for Esslingen University of Applied Sciences. The research project builds on the findings of a preparatory study in which the necessary foundations for a climate-neutral urban district were developed. One of the goals in implementing the concept is to realise solutions for utilising renewably generated surplus electricity and waste heat. The coupling of the various sectors such as electricity, heating, cooling and mobility should relieve national supply structures and enable a climate-neutral supply of the district.

Special attention is being paid to grid-supportive operation and the optimisation of the balancing group when using renewable electricity surpluses. The use of grid- and market-based electricity surpluses helps to better balance the increasing periods with generation and load peaks in the electricity grid. Electricity grid stabilising measures are becoming increasingly important with the further expansion of renewable energies in order to be able to integrate them into the electricity grid and guarantee a renewable supply security.

Electrolyser produces hydrogen in the district

The technical potential for renewable electricity production on site will be exhausted as far as possible. However, owing to the high building density, this will not be sufficient to balance out the entire demand. For this reason surplus electricity from renewable sources, which might not have been able to be utilised previously, will be used to cover this unmet need. This will relieve the electricity grid. The fluctuating surpluses make it necessary to store the electricity, for example in the form of hydrogen. This task will be carried out by an electrolyser in the district, which is located in the energy centre. Most of the hydrogen produced will be fed into the existing natural gas network, which will serve as long-term storage. The climate-neutral hydrogen can also be used for mobility purposes to decarbonise this sector. If electricity is needed in the grid, it is also possible to re-convert the gas into electricity. The renewable electricity surpluses will therefore be utilised to stabilise the grid. In addition, it is planned to feed the waste heat generated during the conversion processes into a district heating network and use it in the district.

Energy for system-supportive mobility

The district is also being equipped with a comprehensive provision of e-charging stations for both private vehicles and car-sharing within the district. It is planned to network the charging and booking technology for the vehicles and to implement system-supportive operation. In future it should also be possible to feed energy from the vehicles back into the district network.

Trolleybuses drawing power from overhead electric cables already provide around 30% of the public transport in Esslingen. In the course of the project it is planned to replace additional diesel buses in the fleet with electrically powered trolleybuses. Since the overhead cable network cannot be fully expanded, this will require trolleybuses with additional batteries. These hybrid trolleybuses can quadruple the number of electrically driven routes if the overhead lines are expanded by 20%.

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 2, “Energy-efficient city”, focuses on districts that utilise innovative ideas to combine energy efficiency and renewables.

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

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