



Research is important — transfer into practice is key: some 350 researchers and experts at the first ENERGIEWENDEBAUEN conference discussed how the energy supply system for buildings and districts could be designed in a future-proof way.
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First ENERGIEWENDEBAUEN conference

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Besides keynote talks and project presentations, there were plenty of discussions.
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"We have to increase our efforts!"

The first ENERGIEWENDEBAUEN conference took place in Berlin from 30 - 31 January, 2017. Some 350 participants from research, academia, architecture and planning offices, politics, energy suppliers, cities and municipalities as well as the real estate industry discussed how the energy supply of buildings and districts could be made future-proof. The aim of the German federal government is to create a climate-neutral building stock by 2050. This will not be easy to achieve.

The event took place in the Gasometer Schöneberg landmark. Built by Berliner Gaswerke one hundred years ago, it initially supplied Berlin's street lighting and the rising number of residential gas stoves. Today, it is the landmark of the EUREF campus, a CO₂-neutral model district with a decentralised energy supply system and, at the same time, it is the site of research facilities and companies working on the energy transition.

The objective set by the German federal government to make the entire building stock climate-neutral by 2050 requires a reduction of energy consumption in the building sector by 80 per cent compared to today's levels. During his welcoming speech to the conference participants, Dr Frank Heidrich from the German Federal Ministry for Economic Affairs and

Gasometer Schöneberg is over one hundred years old. Today, it is the landmark of the EUREF campus and a flexibly used event location in the CO₂-neutral showcase district.
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Energy emphasised the enormous efforts that would be required to reach this goal. He said that the energy transition had already made some good progress, which was due not least to exemplary research projects. However, the actual application of concepts and technologies developed in research still required a great deal of attention. "We have to increase our efforts," he added.

Bundling research and cross-linking topics

The German Federal Ministry for Economic Affairs and Energy aims to achieve this goal with the new research initiative ENERGIEWENDEBAUEN. It consolidates the fields of research of Energy-Optimised Building (EnOB), Energy-Efficient City (EnEff:Stadt), and Energy-Efficient Heating and Cooling Networks (EnEff:Wärme) and supplements the bundle with the topic of thermal energy storage systems and low-temperature solar thermal

energy systems, thereby cross-linking and focussing all these research activities. In the future, buildings will interact far more closely with the grid. The boundaries between electricity producers and consumers are set to become more fluid. In the future, so-called grid-friendly buildings are to cooperate more closely with the public grid, which is increasingly supplying regeneratively generated electricity.

There will also be major changes in heating networks: in urban areas, individual buildings will be linked to form larger energy units, and a rising amount of renewable energy will be moved by the necessary heating networks. In addition, electricity and heating systems will become increasingly coupled, for example via electrically driven heat pumps and thermally activated component systems. Complex, systemic concepts must therefore be planned and built. There are hardly any off-the-shelf solutions since the energetic framework conditions in individual districts and cities differ too greatly.

Technological trends and public acceptance

In four keynote talks, the participants were introduced to the challenges associated with the energy transition, and opportunities and trends were identified. For Kamel Ben Naceur, Director for Sustainability, Technology and Outlooks of the International Energy Agency (IEA), energy-efficient cities are the key to lowering greenhouse gas emissions. In this context, the transition from internal combustion engines towards electrically driven transport systems was crucial. He added that cogeneration and urban heating networks were to make just an important contribution to decarbonisation as renewable energies would. On a global scale, Ben Naceur sees a dominant role for biomass if the two-degree target is to be achieved by 2050.

For Christian Stolte from the German Energy Agency (dena), the energy transition is a general public issue that has hitherto been treated only piecemeal per sector and specific interest. Paul-Georg Garmer from the transmission network operator Tennet TSO reported on the expansion targets of the Südlink project. He identifies this HVDC transmission line, which will connect Germany's North and South by 2025, as the main artery of the energy transition. However, such a massive grid expansion required acceptance, he noted. Mr Garmer considers the citizens' participation model a success, which is now being applied in the area of grid expansion with web-based tools and on-site events.

Dr. Fiona Williams from the mobile communications supplier Ericsson said the next generation of mobile communication in the form of 5G was ready to get off the starting blocks. This technology is also very interesting for networked applications in the areas of energy technology and transport. In just a few years, 5G would permit extremely high transmission rates (factor of 1,000) with energy savings by a factor of 10, improved coverage and building penetration (20 dB) and extremely low latencies for real-time applications (<5 ms). The new mobile communication standard could therefore become the technological foundation of smart grids and future buildings and districts as smart, networked energy units.

Fields of action for research and application

Pilot research projects were presented at the conference: several energy-plus and grid-friendly buildings, different decentralised energy supply concepts for urban districts, new approaches to heating and cooling networks, as well as methods and tools for the simulation and integral planning of buildings, districts and cities. The following key findings emerged during the following discussion:

In the future, building refurbishment will focus on cost-effective and minimally invasive refurbishment concepts. This is the only way to render the entire building stock effectively climate-neutral.

The networking of buildings and districts to form grid-friendly units that cooperate with electricity and heating networks is a new step qualitatively speaking, and it still requires some research and development effort. Further accompanying technological developments are required in order for buildings to interact flexibly (depending on demand) with networks, and to carry out generation, storage and distribution functions in the energy supply system.

On the district level, locally adapted, decentralised heating supply solutions must be developed and the integration of renewable heat has to be tested — technically, organisationally and economically.

When planning and operating networked buildings and districts, new planning methods, tools and participation processes are called for in order to be able to effectively and efficiently exploit the efficiency potentials. Reliable, less complicated and harmonised framework conditions are required in several areas in order to make new concepts economical and practical. For example, in the area of construction legislation or network tariffs for the provision of decentralised grid services.

Research is indispensable to develop and test new ideas moving forward to market readiness. Ultimately, and all participants agreed, it is about the broad application of energy efficiency and renewable energies. New concepts and technologies would therefore have to be made available, as Professor Norbert Fisch from TU Braunschweig emphasised in his presentation of "Zukunftsraum Wolfsburg" as an energetically networked district of the future.

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