

Building the Future

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Building the Future

Further Research Projects









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Activities Serving the SDGs

The SDGs are involved into various activities in the context of cities, urban neighbourhoods and buildings as well as the individual behaviour of citizens. BBSR's Global Urban Transformation Project shows that all these activities are part of integrated and interdisciplinary local transformation paths in cities of different sizes, e.g. in

- Hamburg (1.800.000 people) Green, Fair and Growing City on the Waterfront
- Leipzig (560.000 people) Integrated Urban Development Leipzig 2030 Concept
- Jena (110.000 people) Jena 2030 Mobility Concept
- Finsterwalde (18.000 people) Future City in a predominantly rural area



SDGs in Germany: Multi-Level Analysis and Monitoring



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SDG Indicator Set for Municipalities

In a joint initiative in Germany institutions developed the SDG Indicator Set for Municipalities as a set of specific indicators, which is compatible with the Sustainability Strategy of Germany and may be aggregated across levels:

- Association of German Cities (DST)
- German Association of Towns and Municipalities (DStGB)
- German Association of Counties (DLT)
- German Institute of Urban Affairs (DIFU)
- Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)
- Bertelsmann Stiftung
- Service Agency Communities in One World (SKEW)

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Energy-Efficient Urban Redevelopment programme



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Programme-Related Research of KfW 432 Implementations

Since its establishment in 2011, the Energy-Efficient Urban Redevelopment programme (EnSanQ KfW) has been making important contributions to the localized realization of goals towards energy-transformation in Germany. Experiences with the implementation of KfW programmes 432 have been analyzed through supporting research since mid-2013.

The projects vary in terms of neighborhood size, ownership structures, and types of housing markets.

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Energy-Efficient Urban Redevelopment programme



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Programme-Related Research of KfW 432 Implementations

The projects are supported and analyzed based on their varying goal sets, and may be categorized as follows:

- **Reference projects**: which illustrate differentiation in local conditions depending on the municipality as well as diverse possibilities for the application of the programme.
- Representative projects: which provide examples for successful implementation of integrated development methods.
- **Focus projects**: which are of interest for "Energy-Efficient Urban Redevelopment" insofar as specific aspects, such as incorporation into the entire city development strategy, citizen participation, of building culture, may be thoroughly examined and provide practical knowledge.

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Office and Administration building: Zero-Energy-Building Berlin Client: Federal Republic of Germany Design: Werner Sobek Stuttgart

Support programme for Housing and Educational Facilities

The German Federal Ministry of Building launched a first support programme in 2012 for a housing prototype that fulfils the Efficiency House Plus Standard.

The Efficiency House Plus Standard is true if a building provides:

- Negative annual primary energy demand: $\sum Qp < 0 \text{ kWh/m}^2a$
- Negative annual final energy demand: $\Sigma Qe < 0 \text{ kWh/m}^2a$







Network and Built Projects

The map gives an overview of the buildings in the network Efficiency House Plus. All buildings have either been extensively evaluated already or will be monitored in the near future. The researchers also evaluate the extent to which the Efficiency House Plus Standard relieves the environment of greenhouse gas emissions. Overall, the projects of the network can thus save approximately 1,000 t CO2eq annually in Germany. The Efficiency House Plus standard can thus make a significant contribution to climate protection.

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Residential Buildings
Apartment Blocks
Refurbishment









Residential Building: Effizienzhaus Plus HO Immobilien & Baukonzepte Client: Brigitte von Engelbrechten, Holger Osterloh Design: Gruppe GME, HO Immobilien + Baukonzepte GmbH

Detached and Semi-detached Houses

The Federal Ministry of Building supported 26 small residential buildings in the Efficiency House Plus Standard. The buildings provide a compact design and a very low heat and electricity consumption.

The majority of energy needs are covered by environmental heat and photovoltaics. This generates more energy than is consumed.







Apartment Block: Aktiv-Stadthaus Frankfurt am Main Client: ABG Frankfurt Holding Wohnungsbau- und Beteiligungsgesellschaft mbH Design: HHS Planer + Architekten AG, Kassel / Energy Design: EGS-Plan

Apartment Blocks

During the first phase of the support programme the implementation of the concept concentrated on detached houses. Over the years the possibility of transferring the design method to apartment blocks emerged. For this purpose, a number of large housing complexes was built in Berlin and Frankfurt as Efficiency House Plus.







Refurbishment of Residential Buildings: Pfuhler Straße 12 -14 Client: NUWOG Wohnungsgesellschaft der Stadt Neu-Ulm Design: o5 architekten bda

Refurbishment of Residential Buildings

A great challenge in Germany is the refurbishment of the existing building stock, particularly in the sector of small private residences.

A semi-detached house located in Mühltal, which had originally been built during the 1970ies, was one of the first existing buildings to be transformed into an Efficiency House Plus in 2013.

As a next step, an architectural competition was held with the task of refurbishing two identical rows of houses towards a positive carbon footprint. The two winning concepts have been put into practice in Neu-Ulm between 2013 and 2016.







Educational Building: Louise-Otto-Peters-Schule Hockenheim, 2017 Client: Eigenbetrieb Bau und Vermögen Rhein-Neckar-Kreis, Neckargemünd Design: Roth Architekten, Schwetzingen | Energy Design: Ing.-Büro Wilhaug GmbH

Educational Buildings

After successfully introducing the Efficiency House Plus approach for residential buildings, the next step was to apply it to non-residential structures. Therefore, in 2015 the German Federal Ministry of Building launched a support programme for the construction of Efficiency House Plus educational buildings.

Educational buildings are especially suited for the concept of using on-site generated renewable energy that is produced by solar cells, since these buildings consume most of their energydemand during daytime. The support programme was open for all kinds of schools, for kindergartens, universities and other research institutions.





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Affordable Housing as a Challenge in Urban Spaces

In recent years, the influx into cities has increased significantly, having an impact on real estate and rental prices. The funding programme "Model projects for the sustainable and affordable construction of vario apartments" is a support and search for high-quality solutions concerning these challenges.

18 pilot projects, examine different strategies and their concepts are currently being tested, showing how affordable housing can be provided. The main issues on a glance:

- Reducing Construction Time
- Affordable Construction
- Adjustable Construction
- Quality of Use
- Sustainable Construction













Reducing Construction Time

With the use of prefabricated elements, components such as entire facades, sanitary cells or space modules, the construction process can be accelerated. This is an advantage, especially in inner-city locations. Restrictions on residents are kept low, and logistics are potentially simplified.

For the Hamburg-Steilshoop model building project, entire room cells were prefabricated. 48 room units with a gross capacity of 8,400 m³ were assembled within 10 working days. The material for interior fittings was delivered directly to the construction site, included in the respective space modules.













Affordable Construction

In order to reduce construction costs, the projects pursue various strategies, including simplified construction, standardized components, serial floor plan designs and reduced fit-out standards.

After more than 20 years of vacancy, 247 dwellings have been created for students in the former dental clinic in Erfurt. The production costs amounted to $1,775 \notin /m^2$ living area and were thus significantly lower than the costs for a comparable new building.











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Adjustable Construction

The model projects have different approaches towards adaptability. All of them are considered for elderly friendly living. Sufficient widths, movement areas and mostly barrierfree bathrooms allow the use even with handicaps. Targeted breakthroughs enable a precisely defined re-use at low costs. Skeleton constructions with large spans allow a very high flexibility of floor plans, though associated with higher manufacturing costs.

In Chemnitz, due to pre-planned possible breakthroughs and non-load-bearing lightweight walls, a variety of floor plans is guaranteed in case of subsequent use at minimal cost.









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Sustainable Construction

All model projects have been subjected to a sustainability certification. Their ecological, economic, socio-cultural, technical and process qualities were considered.

The buildings' entire life cycle is considered through Life Cycle Assessment (LCA) and Life Cycle Costing (LCC).

In Meschede, the former job center (left figure) was refurbished sustainably to a large extent after more than 16 years of vacancy. Here, the continued use of the embodied energy contained in the shell structure, the consistent supply of renewable energies and smart building technology is essential to the concept.











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Quality of Use

An essential requirement in the funding programme is the creation of community spaces. These give room for informal meetings and enable activities which are not possible within the individual living units.

In Berlin-Marzahn, more than $5m^2$ of common area is available per resident. The common spaces are connected by an air space between two floors and have a high spatial quality. The furnishing allows a wide range of possible uses and the appropriation by the tenants.









Vario Apartments: Collegium Academicum



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Flexible Timber Structure for Student Housing

Since 2016 a group of students and 'DGJ Architektur' have been planing a self-managed student housing project 'Collegium' Academicum' in Heidelberg. The project is not only a model project of 'Variowohnungen' but also project of the International Building Exhibition IBA Heidelberg.

The constructional design approach for the building is to utilize the ecological benefits of wood, being a locally available and renewable resource, as much as possible. To achieve this a newly developed timber construction system is applied as the main load bearing structure. Its skeleton frame design allows high levels of spacial flexibility as well as the use of modular elements easy to disassemble and recycle.





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For more detailed information see Poster 18 - 24



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