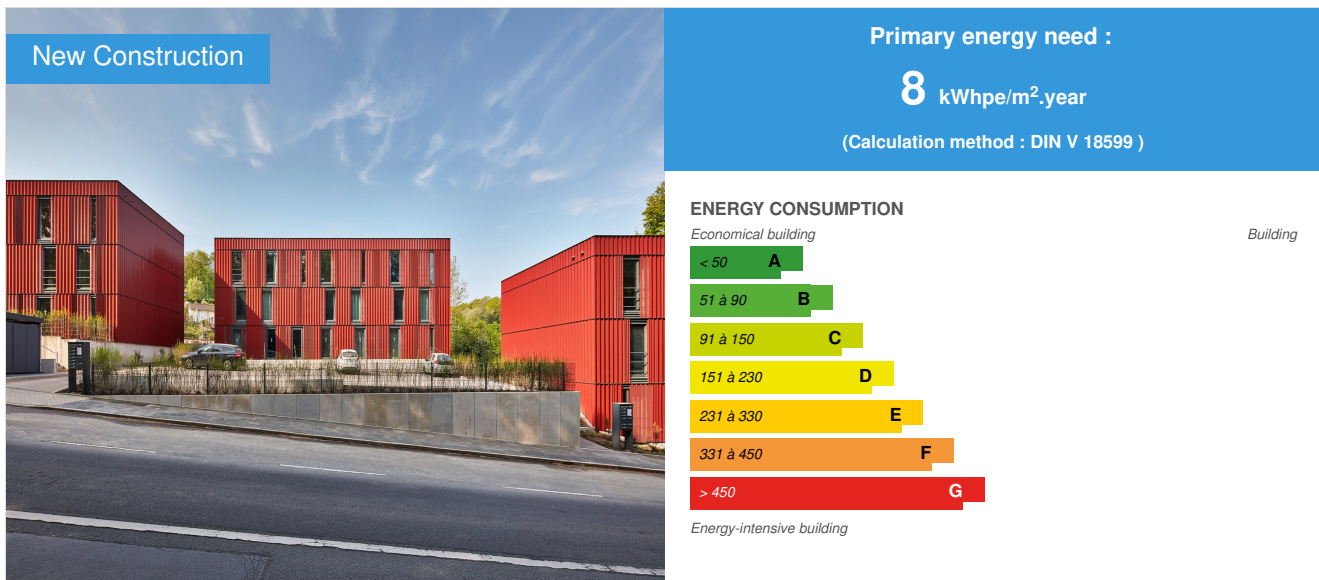


# Wood hybrid construction: 132 new residential units in passive house standard - Variowohnen Wuppertal

by [Markus Kersting](#) / 2021-03-19 21:02:30 / Deutschland / 3261 / DE



**Building Type** : Student residence  
**Construction Year** : 2020  
**Delivery year** : 2020  
**Address 1 - street** : Max-Horkheimer-Str. 160-168 42119 WUPPERTAL, Deutschland  
**Climate zone** : [Cfb] Marine Mild Winter, warm summer, no dry season.

**Net Floor Area** : 4 230 m²  
**Construction/refurbishment cost** : 9 195 278 €  
**Cost/m2** : 2173.82 €/m²

## General information

### Design concept

In the immediate vicinity of the Bergische Universität Wuppertal, a remaining plot of land was used to provide 132 student housing units. The site was considered undevelopable due to its very narrow layout and extreme slope (18m difference in height). The design transforms the specific features into an advantage: the slope is used to offset the height of the houses and to minimise the built-up areas. The narrowness of the site is compensated for by means of designed boundary transgression. The greenery of the adjacent allotment garden settlement flows between the houses into the outdoor facilities of the student accommodation. The existing infrastructure of the university with public transport, car parks, catering, computer centre and connection to district heating is used. The profiled and partially perforated façade elements are laid over the basic structure like a curtain that is opened in different ways. This allows a balance between openness and discretion and creates a differentiated design of the building type.

### Innovation

With the Variowohnen funding programme, the BMUB aims to create affordable housing for students, trainees and senior citizens as part of the Zukunft Bau research initiative. The amount of funding is based on the innovation potential. This project meets many of the funding criteria and was therefore classified as an outstanding model project by the funding body. The buildings realised in publicly funded housing achieve the DBNB Gold Standard. 70% of the housing units are handicapped accessible, the rest are adjustable. The living space of 30m² per person is 40% below the national average. By means of e-mobility, car sharing and public transport, the parking space requirement was reduced to 20%. The levels of use can be reorganised without interfering with the supporting structure. Grey energy was significantly reduced by means of wooden panel constructions and lightweight construction methods; the savings in the façade constructions, for example, amount to over 200 tonnes of CO2. In order to document the innovative approaches from the Variowohnen funding programme, the entire planning and

construction phase was scientifically supported and evaluated.

### Certification

These buildings, realised as part of publicly subsidised housing, achieve the DGNB Gold Standard. The design in passive house quality exceeds the current requirements of the Energy Saving Regulation (EnEV).

Near enough pollutant-free interior: Here, the highest standards according to DGNB were once again significantly undercut.

Transformation potential with regard to ecological sustainability

The special importance of the reusability of buildings arises from the realisation of the high environmental impacts from the manufacturing and recycling phases. Even with the approach of a building structure designed on the basis of the circular economy concept (cradle to cradle), new resources are generally used in each change phase of the cycle. The most environmentally advantageous scenario is therefore the direct re-use of buildings or as large a part of the building structure as possible. This applies in particular where there is a lack of clarity about subsequent recycling possibilities.

In the area of after-use scenarios, different use variants were presented and examined for their advantages and disadvantages. At the time of planning, the Variowohnen programme specified student housing as the initial use and developed the floor plans accordingly. Due to the increasing number of students and a higher demand for affordable housing, a tighter housing market for students is to be expected in urban conurbations in the coming years. It was already taken into account in the planning phase that various living concepts can be implemented in the later stages of use of the building. The axial dimension is designed in such a way that a divergent use, such as office use, would also be possible as a conversion scenario.

### Economy

The buildings are designed as a modular system. Various prefabricated elements are organised in such a way that a variable design of the individual buildings as well as flexible subsequent use, are possible. In detail, the following systems were chosen:

- Shell made of prefabricated reinforced concrete elements and hollow prestressed concrete planks.
- Façade made of wooden panel elements with integrated, decentralised ventilation systems with heat recovery
- Sanitary cells made of self-supporting sandwich elements of sheet steel.

Thanks to the prefabrication of the timber panel elements in the factory, wood as a building material contributes to a reduction in construction time and ensures a significantly improved CO2 balance. Thanks to the hybrid construction method, thermal bridges can be minimised and potential energy losses minimised, which has a positive effect on operating costs.

### Social

The future users were involved in the processes at an early stage; the buildings were planned not only for the owner, the Hochschul-Sozialwerk Wuppertal, but for and with the users. An essential success factor for such small spatial conditions is to create the greatest possible acceptance, which can be achieved above all through high-quality design, but also through high interior variability and various possible uses. The high-quality partial furnishing in terms of design and quality offers space for personal development and a personal touch. It uses a colour scheme that creates identity but is not obtrusive.

Reducing the living space per person to a maximum of 30m² including communal areas presupposes that, in addition to the guaranteed individual spaces, variably usable communal areas are offered. In this building project, these are provided as decentralised zones in the residential groups, at a central location for larger events and by incorporating the open spaces. In the basement of House 168, for example, there are spacious communal areas and a study room.

In the ecologically designed open spaces, there are both communal and individually usable areas. Here, a differentiated offer is provided in the form of recreational areas and kitchen gardens for self-sufficiency (urban gardening). The character of the neighbouring allotment garden settlement is continued in the plant terraces provided.

## See more details about this project

<https://acms-architekten.de/detailseiten-projekte/variowohnungen-wuppertal>

## Data reliability

3rd part certified

## Photo credit

Sigurd Steinprinz, Düsseldorf

## Stakeholders

### Contractor

**Name** : Architekt: ACMS Architekten GmbH

**Contact** : Markus Kersting, m.kersting@acms-architekten.de; Wuppertal

<https://acms-architekten.de>

### Construction Manager

**Name** : Architekt: ACMS Architekten GmbH

**Contact** : Markus Kersting, m.kersting@acms-architekten.de; Wuppertal

<https://acms-architekten.de>

## Stakeholders

Function : Contractor

Hochschul-Sozialwerk Wuppertal A.ö.R.

Geschäftsführer: Assessor jur. Fritz Berger, hsw@hsw.uni-wuppertal.de, Wuppertal

<https://www.hochschul-sozialwerk-wuppertal.de>

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Function : Structures calculist

T|S|B Ingenieurgesellschaft mbH, Darmstadt

Herr Alfredo Barillas, info@tsb-ing.de, Darmstadt

<http://www.tsb-ing.de>

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Function : Others

TGA-Planer: Wortmann & Wember GmbH, Bochum

Dipl.-Ing. Klaus Wember, info@wortmann-wember.de, Bochum

<https://wortmann-wember.de>

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Function : Others

Landschaftsarchitekt: studio grüngrau Landschaftsarchitektur GmbH, Düsseldorf

Dipl.-Ing. (FH) Jörg Weisser, info@studiogruengrau.de, Düsseldorf

<https://www.studiogruengrau.de>

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Function : Others

Farbplanung: Farb-Bau, Prof. Friedrich Schmuck, Dinslaken

Prof. Friedrich Schmuck, info@farb-bau.de, Dinslaken

<http://www.farb-bau.de>

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Function : Others

Fotograf: Steinprinz Fotodesign, Sigurd Steinprinz, Düsseldorf

Herr Sigurd Steinprinz, mail@steinprinz.de, Düsseldorf

<http://www.steinprinz.de>

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Function : Certification company

MNP Ingenieure

Dr.-Ing. Hendrik Müller, mueller@mnp-ing.de, Lübeck

<https://www.mnp-ing.de>

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## Contracting method

Separate batches

## Owner approach of sustainability

The buildings realised in the publicly funded housing sector achieve the DBNB Gold Standard. The design in passive house quality exceeds the current requirements of the German Energy Saving Ordinance (EnEV).

High freedom from pollutants in the interior: Here, the highest standards according to DGNB were once again significantly undercut.

## Architectural description

### Design concept

In the immediate vicinity of the Bergische Universität Wuppertal, a remaining plot of land was used to provide 132 student housing places. The site was considered undevelopable due to its very narrow layout and extreme slope (18m difference in height). The design transforms the specific features into a positive: the slope is used to offset the height of the houses and to minimise the built circulation areas. The narrowness of the site is compensated for by means of designed boundary transgression. The greenery of the adjacent allotment garden settlement flows between the houses into the outdoor facilities of the dormitory. The existing infrastructure of the university with public transport, car parks, catering, computer centre and connection to district heating is used. The profiled and partially perforated façade elements are laid over the basic structure like a curtain that is opened in different ways. This allows a balance between openness and discretion and creates a differentiated design of the building type.

### Innovation

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## Building users opinion

The future users were involved in the processes at an early stage; the buildings were planned not only for the owner, the Hochschul-Sozialwerk Wuppertal, but for and with the users. An essential success factor for such small spatial conditions is to create the greatest possible acceptance, which can be achieved above all through high-quality design, but also through high interior variability and various possible uses. The high-quality partial furnishing in terms of design and quality offers space for personal development and a personal touch. It uses a colour scheme that creates identity but is not obtrusive.

## Energy

### Energy consumption

Primary energy need : 8,00 kWhpe/m<sup>2</sup>.year

Primary energy need for standard building : 45,00 kWhpe/m<sup>2</sup>.year

Calculation method : DIN V 18599

Final Energy : 37,00 kWhfe/m<sup>2</sup>.year

## Renewables & systems

### Systems

Heating system :

- Urban network

Hot water system :

- Urban network

Cooling system :

- Others

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic

## Environment

### GHG emissions

GHG in use : 13,00 KgCO<sub>2</sub>/m<sup>2</sup>/year

Methodology used :

LCA

GHG before use : 8,00 KgCO<sub>2</sub> /m<sup>2</sup>

Building lifetime : 50,00 year(s)

, ie xx in use years : 0.62

GHG Cradle to Grave : 21,00 KgCO<sub>2</sub> /m<sup>2</sup>

### Indoor Air quality

The tests were carried out within the 28-day period after completion. On the day before sampling, the rooms were ventilated again and then the windows and doors were kept closed to limit outside air influences and cross-contamination. The ventilation system ran at base load.

The measurements were carried out in previously defined rooms, nine in total. The VOC measurements (room air sampling for later laboratory analysis) were carried out using Tenax tubes, the formaldehyde measurements using DNPH cartridges.

The external laboratory commissioned to carry out the analyses is a testing institute accredited by DAkkS (Deutsche Akkreditierungsstelle GmbH) according to DIN EN ISO/IEC 17025. Sampling and analysis were carried out according to DIN ISO 16000-6 (VOC) and DIN ISO 16000-3 (formaldehyde). One field blank value was taken for each type of analysis (1x Tenax, 1x DNPH).

## Costs

## Building Environmental Quality

### Building Environmental Quality

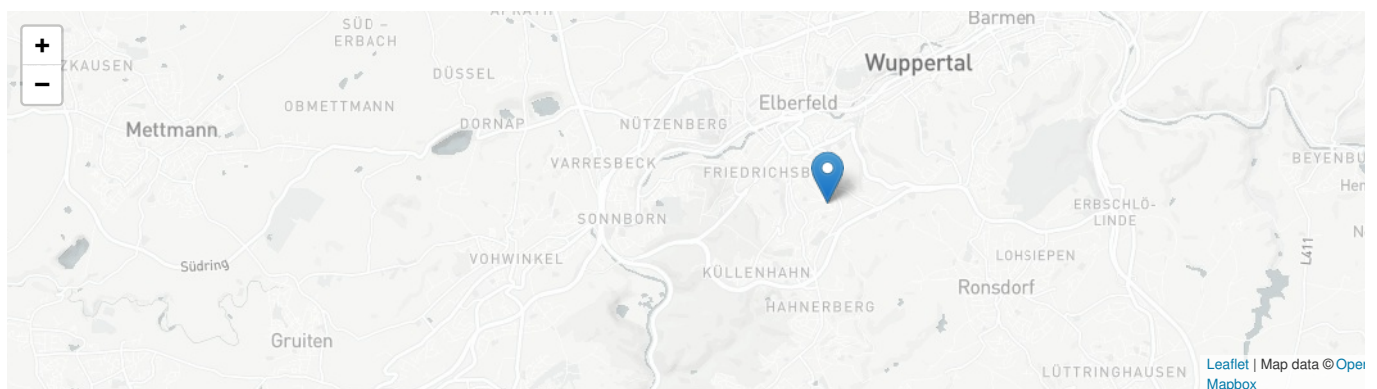
- Building flexibility
- indoor air quality and health
- comfort (visual, olfactive, thermal)
- energy efficiency
- renewable energies
- integration in the land
- mobility
- products and materials

## Contest

### Building candidate in the category



Alle Kategorien



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