Driving Urban Transitions

EUROPEAN PARTNERSHIP

Urban Challenge

Wernigerode

Innovative Cost Optimization in Municipal Housing Construction

(Wood Construction and Energy Concept)

Task definition, November 2024

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Driving Urban Transitions to a sustainable future

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1 Site Information

Wernigerode is a town in the „Harz" mountains in the Federal state of Sachsen-Anhalt. The old town is characterized by historic half-timbered houses, narrow streets and pitoresque squares. Tourism plays an important role and contributes to economic development.

Like many similar regions in Germany, Wernigerode is struggling with demographic change, which is characterized by an ageing population and a lower birth rate. However, the town's population has remained comparatively stable, with around 35,000 inhabitants. Further information on the town of Wernigerode can be found at https://www.wernigerode.de/ and https://www.wernigerode-tourismus.de/.

2 Problem Owner

Central problem owner in the URBAN CHALLENGE Wernigerode is the municipal housing association GWW Gebäude- und Wohnungsbaugesellschaft mbH. The GWW accounts a total of 2,961 apartments with a total living space of around 176,000 m². The majority of the apartments were built in the post-war period and more than 80% of all apartments are supplied with district heating. This means that around 7,500 of Wernigerode's 35,000 residents are GWW tenants. The average basic rent is €5,57/m². Further information on the municipal company can be found at https://gww-wr.de/.

In addition, the municipal administration of Wernigerode (100% owner of GWW) and the public utility Wernigerode https://www.stadtwerke-wernigerode.de/ are involved in all key decisions relating to this project.

3 Overall Objective

In addition to renovating the existing building, the creation of new living space is a major challenge for the municipal housing association. In the current construction project „Casa Verde" and „Casa Duet", a total of seven new buildings with 63 apartments are to be built.

Wood construction plays a key role in both projects. This means that less concrete is used, less CO_2 is produced and the ecological footprint of the buildings is improved. The highest standards are also aimed for in terms of energy supply, floor plans and open space design, which cannot normally be achieved in municipal housing construction.

The municipal housing association GWW is facing huge challenges:

- How can a high level of energy efficiency and the most climate friendly construction method be achieved, despite constantly rising construction costs and increasing cost pressure?
- What options are there for reducing costs, without noticeably sacrificing architectural and structural qualities?

4 Previous Work

As part of the EUROPAN competition https://www.europan.de/archiv/e16/ a sustainable master plan and two initial smaller construction and development sections were developed for an 8-hectare project area. The winners, two Italian teams of architects, entered the competition with bold architectural ideas that won over an international jury.

In order to transform the daring planning ideas into detailed plans ready for submission, the winning teams of architects were supported by experienced German planning offices, which worked on the construction projects over a period of more than a year. The results are impressive:


„Casa Verde" on Veckenstedter Weg (left) and „Casa Duet" on Gießerweg (right)[1] (Image source: Project teams from Europan; Francesco Baggio, Erasmo Bitetti, Federico Giorgio, Clara Faccio and Paul Schaeger, Natalia Vera Vigaray, Josep Garriga Tarres, Patxi Martín Domínguez, Moritz Ahlers)

For example, the different needs of multi-generational living have been taken into account in the floor plan design and care has been taken into the design of the open spaces to ensure that climate-friendly gardens can withstand future climatic changes.

However, it is also clear that not all of the ideas from the EUROPAN competition were able to be implemented in the detailed planning due to economic constraints:

Example building with wood In the „Casa Verde" project, the walls and ceilings are made of reinforced concrete. Everything else is made of wood frame components that are prefabricated on site. Wood is a renewable raw material, a carbon sink and reusable. In the interests of sustainability, wood is sourced locally to avoid long transportation routes. In the „Casa Duet" project, the walls are to be bring-built and the ceilings are made of solid wood. There is no need to install lintels, and the use of wood makes the building lighter and more sustainable. However, these design are compromises and deviate from the actual plans for solid wood constructions. These changes to the EUROPAN designs are due to the economic constraints.

Example energy supply Innovative low-emission energy supply concepts were also developed as part of the EUROPAN competition. For example, heat pump systems with ice storage were discussed. However, the German planning offices also had to take investment costs into account here, as reasonable rents for Wernigerode had to be presented. As a result, various innovative approaches have been replaced by solutions with lower investment costs, such as district heating and photovoltaic systems.

5 URBAN CHALLENGE Wernigerode – Questions and Tasks of a Possible Joint Project Proposal

The planning of the two construction projects is now largely complete. There are concrete proposals for both, the use of wood and the neighbourhood energy concepts, which represent compromises for the CO_2 footprint and efficiency due to economic constraints. The „Casa Verde" project, for example, was redesigned from an all-wood construction to a hybrid construction for economic reasons. The aim is to re-evaluate the economic construction and sustainability parameters. The architecture is not to be redesigned due to the specifications of the EUROPAN competition. The following questions therefore arise:

- *How can the two construction projects be implemented despite increased construction costs and limited budgets – with a lower carbon footprint and the highest possible energy efficiency?*

[1] See here:
1. https://gww-wr.de/europan-europaeische-architektur-moderne-fuer-wernigerode-in-den-startloechern/
2. https://hartung-ludwig.de/projekte/projekt/neubau-einer-wohnanlage-in-holzbauweise-in-wernigerode
3. DW0723_34-39_Europan-Architekturwettbewerb-GWW.pdf

- *Could the ratio of wood in the overall building materials be increased at the same time?*
- *Which technical approaches and components could help to implement the energy concept in the most climate-friendly way possible under the given economic conditions?*

This task goes well beyond the competence profile of technical planning offices or complements them. **Experts** from research and development are therefore sought to develop answers to these questions. The research partner can take on the task of answering the questions, e.g. as part of a joint project, and the questions can be dealt with scientifically[2].

The following aspects (and possibly others that you can contribute as an expert) can be used to answer the overarching questions:

- What measures can be taken to achieve further cost reductions without noticeably compromising the quality of the construction projects?
- What measures could be taken to increase the proportion of timber construction in the two building projects (with cost neutrality in terms of construction costs)?
- What possibilities are there to improve the existing energy concepts (district heating and solar thermal energy or district heating and photovoltaics) in terms of their energy performance and cost-effectiveness?
- What possibilities are seen for using other technical approaches and components – e.g. heat pumps, (ice)storage, PV/solar thermal – to optimize the energy concept? Which concept will bring the highest CO_2 and ancillary cost savings in the future, taking into account economic constraints?

6 Next Steps

You are an expert in one of these fields and can contribute to answering these questions?

If you are interested, please send an informal expression of interest to

mail@urbanchallenge.org. web: **www.urbanchallenge.org**

You are also welcome to use this e-mail address to contact us if you have any questions.

We would then invite you to present your ideas and project proposals in an online meeting. You will have 15-minutes for your presentation. Afterwards, there will be a maximum of 15-minutes for Q&A and a discussion of the proposed methodological approaches.

The presentation will take place virtually in front of representatives of the client and the organization team (PtJ or DUT). Power point slides can be shown, whereby the following key point should be observed:

- The presentation should focus on possible project approaches of the potential research institution (max. 5 PP slides), i.e.: How can the challenges and questions be addressed? What methodological approaches are available? What could a possible work plan look like?
- In addition, the cost of the proposed work and the possible project formats (e.g. microproject, collaborative project) should be roughly estimated (project duration, personnel costs, etc.) – max 1 PP slide
- Please limit the presentation of the institution, references, etc. to a maximum of one PP slide [3].

[2] Development is to be carried out in ongoing coordination with the client (Stadtwerke Borkum) and the municipality of Borkum.
[3] Reference lists, Info-brochures, Annual reports or similar can be sent additionally.