

RESOURCE EFFICIENCY IN URUMQI (CHINA)



ACTION BRIEF

FIRST PASSIVE HOUSE IN WEST CHINA

CODE: URU-AB1

TOPICS:
ENERGY
PLANNING
CAPACITIES

CHALLENGE

More than 7 million tonnes of coal are burned per year for heating of buildings in the City of Urumqi (population 3.1 million); accounting for a large share of the CO₂ emissions and a major cause of air pollution in the very cold winters. The total building area will double to about 210 million m² by 2034, accounting for the increase in population

as well as the per-capita housing area. Hence, the City of Urumqi adopted an *Integrated Heating and Building Energy Efficiency Master Plan* in 2010 that calls for implementing higher energy efficiency targets into the construction of new buildings.

ACTION

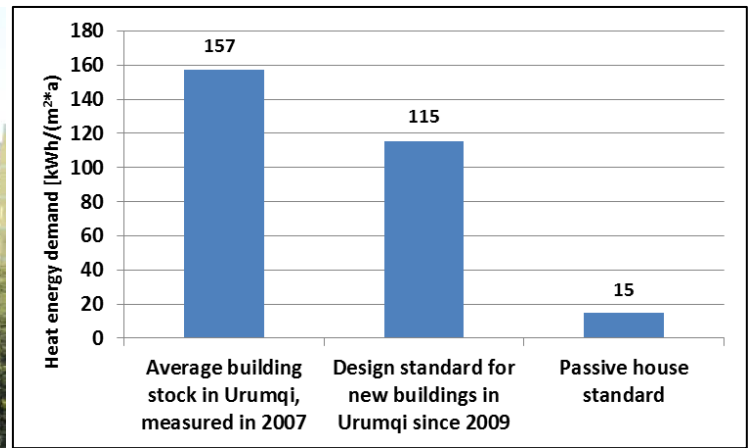
Together with the Construction Committee of the City of Urumqi and Dacheng Industries Inc. (a private investor) many extra-low energy buildings in Germany were visited. As a result, it was jointly decided to build the first passive house in West China with just 13% of the heat demand required for new buildings in Urumqi. Located at *Xingfu Lu* (Happiness Road), the 7.700 m² mixed-use building called *Xingfubao* with an underground garage, supermarket, restaurants, shops, offices and residential areas is currently under construction. It will be insulated with 30 cm XPS and features windows with a u-value of 0.8 W/(m²*K) as well as an efficient heat recovery system. Solar collectors on the roof will provide warm water during summer; natural gas will be used for heating and warm water during winter. Together with Culturebridge Architects and the Darmstadt-based Passive House Institute, the IFEU prepared the initial passive house design. The detailed design is being developed by the Xinjiang Architectural Design Institute. The ground-breaking ceremony took place on May, 3rd 2012, completion by October 2014. Construction costs

are estimated to be around 34 million RMB (4.2 million €), the City of Urumqi provides funding of 2.5 million RMB (300.000 €). The project had to master various challenges:

- A specific passive house standard for Urumqi does not yet exist; this required extensive communication.
- Even though district heating is available, the inflexible fee system makes the use of natural gas more economical.
- Highly efficient passive house windows were produced in China for the first time by REHAU.
- Excellent air tightness of 0.2 h⁻¹ at 50 Pa was achieved for the first time in Urumqi.
- Heat recovery units with efficiency of >80% are not available in China and may have to be imported from Germany.
- The investor accepted the risks associated with the project. Training of engineers and foremen was required to meet the building quality required for the passive house design standard.



Front view



Heat energy demand (relative to net heated area)

RESULTS

STATE OF IMPLEMENTATION:

- The building was certified as passive house on 25 September 2014. Details include a façade with low heat bridges, passive house windows, and an efficient heat exchanger. Training and course materials were developed and applied.

LOCAL USERS / TARGET GROUPS:

- The extra-low energy construction project in Urumqi benefits architects, energy consultants, construction companies, workers and producers of components.

IMPACTS:

- The *Xingfubao* project has the demonstrated support of political leaders in the City of Urumqi and the province of Xinjiang.
- The energy demand reduction by 87% relative to the design standard is a major step to lower the emissions of fossil fuels in Urumqi.
- Local production for high-efficient/high-quality building components was triggered in Urumqi.
- The long-term economic feasibility of high-quality ultra-low energy houses is considered by stakeholder to be high. The economic benefit is two-fold: in demonstrating that there is a market for such buildings, companies providing innovative solutions will develop including etc. In addition, there is the indirect benefit resulting from energy savings.

- *Xingfubao* demonstrates the opportunities for energy efficient products made in Germany and paved the way for joint ventures.

MULTIPLICATION:

- A China Passive House Network has been established: <http://www.cphn.com.cn/>
- News about the project has spread across China. Other projects build on the experience with *Xingfubao*, e.g. by the City of Karamay.
- On-going cooperation with by GIZ and dena provides further dissemination of results.
- Stricter energy performance standards for new buildings in Urumqi including a passive house standard by the Urumqi government have been passed effective September 2014.

LONG-TERM CONSOLIDATION:

- The City of Urumqi is developing a standard for passive houses and provides funding for their construction. Ultra-low energy houses (passive houses and others) will be constructed in a larger number in Urumqi and other Chinese cities, provided that the technology can be successfully demonstrated and that economic incentives are being developed.
- The demand for high-quality buildings is growing in China and the central and local governments accelerate activities to improve the energy efficiency in the building sector.

CONTACT

Project: RECAST Urumqi - Meeting the Resource Efficiency Challenge in a Climate Sensitive Dryland Megacity Environment - Urumqi as a Model City for Central Asia

Web: www.urumqi-drylandmegacity.uni-hd.de

Bernd Franke

Institute for Energy and Environmental Research (IFEU)

Email: bernd.franke@ifeu.de; Web: www.ifeu.de

SPONSORED BY THE



Federal Ministry
of Education
and Research



Future
Megacities
Megastädte von morgen

www.future-megacities.org



RECAST URUMQI
中国·乌鲁木齐