



## Modular building solutions with carbon reinforced concrete

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### 1. Challenges in house building

#### 1.1 House building in Germany

The building activity in Germany has remained dynamic for an unusually long period. This economic situation forecast was provided by researchers of the world economy institute in Kiel, Germany. Above all, the upward trend in house building continues in this scenario until 2019. This is a result of the further increasing trend of urbanization, the moving of the rural population into the cities. A closer look of this development reveals a prevailing imbalance, because, above all, high-price residential property is created. The need for new flats in all price levels in Germany rises every year. Per year 400,000 new flats would have to be built to cover the need. It is a fact that in 2015 approx. 140,000 flats were built which was not enough (Günther, 2015 [2]). Primarily concerned by this housing shortage are social flats. These make up approx. 60% of the needed flats. To create payable flats and to close this gap, about 6.4 billion euros more should be invested per year. However, rising property prices break the creation of this flat segment in most of German cities. Up to now the house building concentrated with priority upon conurbations and cities exclusively on high-priced flats. Towards this stands an uncovered need for reasonable-priced flats.

The lack of flats is not new. Already in the post-war period there was in Europe a shortage of housing, which was distinct especially in Germany. In Eastern Germany this was eliminated by the house building program of the GDR as new construction methods and ground plans were developed which made the construction more efficient. The prefabricated construction as well as state subsidies solved this problem. The prefabricated construction method has contributed to cutting the costs and reducing the construction time. It also promoted an industrialization of the construction process with which the traditional construction method could not compete. However, this prefabricated building method of the GDR had its limits. The buildings showed no individuality and no adaptation possibilities which led to a falling acceptance of this construction method by users and owners.

#### 1.2 Building industry and house building in China

The Chinese economy has registered a substantial development during the last years, besides, the Chinese building industry was one of the reliable impulse givers of the GDP growth. In fact, the carried out real estate investments made up about 14.9 % of the Chinese GDP in 2014. In addition, 7.0 % came from the building industry. However, a downward trend emerges in the Chinese economy which will also include the construction sector. The construction activity decreased in 2015 by 10 % compared to 2014 (Bösch, et al., 2015 [1]). This weakness will have major consequences in the long term for the whole economy, because the building sector is considered to be one of the most important backbones of the Chinese economy. However, positive impulses are to be expected in the form of further demands for affordable living space because of the constant urbanization. Exactly as in Germany it is important to provide reasonable low-cost housing. In addition, the construction with carbon reinforced concrete with its material efficiency, space savings and the free forming together with the modularisation in the house building can set positive impulses.