Federal Ministry
of Education
and Research

Future
Megacities
Megastädte von morgen

Young Cities – Developing Energy-Efficient Urban Fabric in the Tehran-Karaj Region

Overview

Today the population of Iran numbers about 69 mio. inhabitants, having doubled within 30 years. The average age is 23.5 years. About 60 % of the population is younger than 26 years. Due to the rapidly increasing population an enormous number of young families is seeking accommodation, jobs and perspectives. This has led to massive urbanization in the last decades which is due to continue for the coming years. An area of symbolic evidence regarding these tremendous challenges is the western growth corridor between the cities of Tehran and Karaj and beyond. The area is crucial for energy use and production and a major driver of climate change and contributing to greenhouse gas emissions on a large scale. The reasons are to be found in inefficient building and urban design structures, high emissions from transport, inefficient urban infrastructure systems and inadequate implementation mechanisms of codes and regulations. Problems are increased by the semi-arid climate and the effects of climate change. Due to large potential to reduce energy consumption by more efficient regional urban structures as well as the large pressure on the Iranian housing market – there is an estimated need of about 1.5 mio. new housing units per year for the next five years. The project aims at developing, implementing and evaluating building and planning schemes and technologies, which allow sustainable urban development in semi-arid regions.

Objectives of the Project

The project aims at achieving substantial improvements in energy-efficiency through a change from linear mass and energy flows to an interlinked urban system of urban form, technical infrastructure and object planning, accompanied by assessment and management actions. The project's approach is constituted by a particularly close integration of conceptualization, strategy and evaluation of realization and dissemination. The project follows a "Research by Design" approach, deriving scientific results from planning and realization processes of pilot projects on different scales, all to be applied successively in the project area in Hashtgerd New Town in the Tehran-Karaj Region. This area extends over 35 ha, located in the southern central part of Hashtgerd New Town. It will act as a unique demonstration ground for real-life innovations and processes. Within this area, tailor-made concepts and pilot solutions shall be developed. Findings and technologies shall later be transferred to industrialized housing production in other fast growing Iranian New Towns or settlements. The outcomes of the project will be new technologies, methodologies and several pilot housing areas with energy-

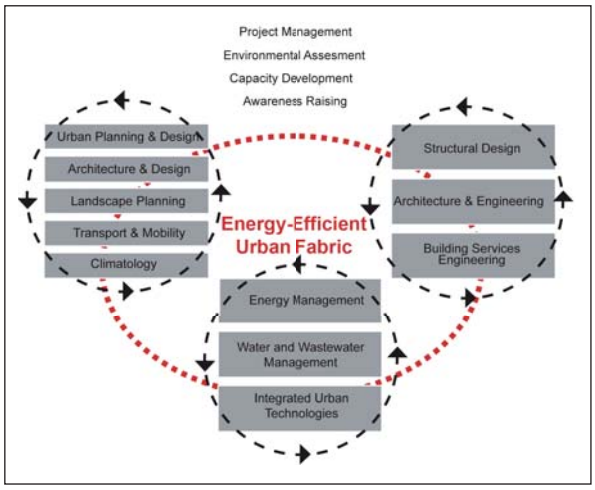
efficiency structures. The project focuses on three strategic dimensions:

1. "Urban Development and Design": Developing and applying energy-efficient planning and management concepts in urban design, architecture, transport and landscape planning to be tested and implemented in the 35 ha project area in Hashtgerd New Town. About 210 residential units shall be realized in two revolving development and construction cycles, starting in late 2009 and late 2011 respectively.
2. "Urban Infrastructure Systems": Modeling and implementing integrated water and waste water systems together with energy supply systems based on in-depth field investigations on consumption patterns and user behavior in Hashtgerd New Town to be integrated in the 35 ha Area.
3. "Buildings and Objects": Designing objects and buildings focusing on optimized structural design and efficient building technologies, materials and installation systems to be part of the 35 ha Area development.

A Supporting Module will accompany the implementation through measures of awareness raising and qualification combined with monitoring and assessments of action taken. To achieve the results more than 22 German-Iranian "Expert Twin Teams" collaborate in their respective fields of expertise.

Expected Contributions to an Energy- and Climate-Efficient Development of Future Megacities

Taking into account the expected impacts of climate change and examining the huge potentials of mitigation measures in Iran the project findings will offer solutions to mitigate climate relevant factors in new urban settlements. As the quality of current residential buildings is prevalently poor but the pressure on the urban housing markets exorbitant, improvements in this sector should reduce energy consumption significantly. Participation of and cooperation with high-ranking political actors, companies and academia involved in planning and construction will secure the long term implementation of energy-efficiency in the built environment.



Knowledge, Technologies and Performance

Expected technical-scientific innovations will be obtained through the systemic production of urban structures integrating the different requirements: urban development concepts will be interwoven with object planning and adjusted with energy and water infrastructure technologies. This will include different approaches on various levels in order to achieve optimization and advancement of the existing systems. Since intersectoral approaches are not yet common in Iran, the project aims at creating flagship projects in order to visualize new approaches as well as technical and procedural innovation. The German-Iranian partnership will allow results to be incorporated into long-term planning and build capacities and knowledge on the Iranian side.

Applicable Instruments, Tools and Methodologies

Due to the project results based on the development and implementation of pilot projects the application potential has been high from the project's outset.

Products expected from the project are:

- Test and analyses of new technologies (e.g. efficient HVACs supported by solar energy), new objects (e.g. optimized residential buildings) and urban spaces (e.g. "low rise – high density" urban design) in pilot projects. (Pilot projects)

- Methodologies for sustainable planning, the development of new urban fabric, documentations of infrastructures and buildings in rules and manuals. (Consulting products)
- Conclusions on the possibilities of integrated planning and infrastructure development to increase energy-efficiency considerably disseminated through publications and conferences. (Knowledge base)

Capacity Building, Integration and Networking of Institutions

Due to comparable cultural, climatic, geological, political and religious framing conditions and the similar challenges of fast growing urban agglomerations, the project actively aims at transferring results achieved within the project to other countries in the MENA region. In the longer term the Iranian partners will initiate "south-south" knowledge transfer to the adjoining countries. This approach is supported and coordinated by a specific coordination unit at TU Berlin's Faculty VI, the "West Asia North Africa Coordination Unit" (WANACU). WANACU's operational goal is the development and support of cooperation activities in and together with the countries of Western Asia / Northern Africa. Its integration in the project management will foster capacity development in Iran and of regional networking with other countries. The project's internal integration is safeguarded by project centers on each side, a joint project steering committee accompanied by a high-ranking project advisory board.

Socio-Economic, Integrative and Overall Sustainability Aspects

Results of the first project phase (2005-2008) have shown that the guiding principle of sustainable urban development is crucial to achieve the vision of an "energy-efficient city". This is especially due to complex and reciprocal ecological, economic and social problems in Iranian New Towns. Therefore, the project incorporates technical questions into measures of capacity building, awareness raising and environmental, management and economic assessment tools considering the whole life cycle of the urban structures to justify ecological, social and economic sustainability. The large German-Iranian project consortium with a high variety of involved disciplines and the strong project management through central project centers in Berlin and Tehran respectively ensures the application of this ambitious approach.

German Partners

The German consortium involves twelve chairs from different fields of the TU Berlin together with researchers from FU Berlin, Berlin University of Arts and the Fraunhofer Institut FIRST. The scholars are joined by experts from companies (e.g. p2m GmbH, inter3 GmbH) and associations (e.g. nexus e.V., Vocational Training Institute Berlin-Brandenburg). Together these partners form a strong interdisciplinary consortium with specific regional experience.

Cooperative Partners in the Host Country

The Iranian consortium is formed by the Building and Housing Research Center, Tehran (Iranian lead-partner), the Ministry of Housing and Urban Development, Tehran, and the New Towns Development Corporation, Tehran, and other institutions from administration, academia and civil society. These institutions will not only safeguard the implementation of the pilot projects but, moreover, guarantee the access to other relevant decision making bodies on the regional and local level.

Coordination/Contact

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