

Solar energy for the less privileged



Solar thermal systems are able to reduce energy costs. To realise such savings, government programmes in Turkey, Brazil and Mexico are promoting the integration of solar installations in social housing.

If you have ever driven through a megacity like Istanbul, Hong Kong or Mexico City, you will probably never forget the seemingly endless sea of houses. The millions of inhabitants all need appropriate living space. Where no land remains for further settlements on the periphery, the buildings grow higher and higher. But irrespective of whether the expansion is vertical or horizontal, the population figures continue to increase. To be able to offer those with low incomes an affordable home, and at the same time to combat illegally erected dwellings, the governments invest considerable sums in the construction of social housing. At the same time, governments are becoming increasingly obliged to protect their citizens from exploding energy prices and to

help preserve the environment. Solar water heating is one way to combine these aims. SUN & WIND ENERGY would here like to present three examples of programmes for solar thermal systems in social housing in Turkey, Mexico and Brazil.

State commission in Turkey

Turkey is a perfect example for how demographic developments drive social housing construction. Population figures have been rocketing since the middle of the 20th century. Despite the fact that population growth is now slowing once more, Turkey is today still one of the most rapidly urbanising countries in the world, with currently around 78 million inhabitants. The major cities Istanbul, Ankara and Izmir continue to draw waves of rural-to-urban migration, and the settlements in coastal regions and a number of other medium and large-sized cities in Anatolia are also experiencing rapid urban growth.

It was not long before housing construction was unable to keep pace with this development. At the same time, more and more households found them-



Israeli solar manufacturer Chromagen supplies solar thermal systems for social housing projects in Mexico through its distributor Heliocol de Mexico.

Photos (2): Chromagen



Installation of gravity systems as part of the Brazilian “Minha Casa Minha Vida” project. The tank holds 200 L and the collector area is approx. 2 m².

Photos (2): Renan Cepeda/GTZ

selves without the means to rent or purchase accommodation on the open market. The consequence was a proliferation of illegally erected settlements. “Many end up settling in unauthorised squats, bringing along many problems like urban exclusion, urban poverty, degradation of the urban environment and the loss of natural resources,” as the Housing Development Administration of Turkey (TOKI) writes on its website.

TOKI was founded in 1984 with the aim of bundling the resources of social housing projects in Turkey. In the meantime, the government agency has evolved into a veritable real estate giant, and is at the same time responsible for actual construction in the social housing sector. In 2009, TOKI set itself the target of increasing its national housing stock to 400,000 units. A focus is placed on the project “Urban renewal and transformation of the ‘gecekondu’ neighbourhoods”. The Turkish word ‘gecekondu’ describes a house in any of the countless illegal settlements and shanty towns which have been erected without official permission since the 1950s. The new housing is



Thermosiphonic systems by Chromagen each with a 150 L tank and one collector.

to be made available above all to the lower income groups.

Construction projects are spread across the whole of Turkey. In some cases, the integration of solar thermal systems is a mandatory requirement, though TOKI is rather sparing with information on such activities. “We are realising two major projects in Istanbul and in Ankara,” says Hüdaverdi Yazar, project manager at Solimpeks Enerji. The Konya-based manufacturer of solar collectors and storage tanks supplies systems to TOKI. One of these projects is located in the Istanbul suburb Kayabasi, where TOKI is currently building 60,000 flats. The second project is being realised in the Yapracik district of Ankara and comprises 9,000 units. Yazar states that “solar thermal projects are obligatory for middle and upper-class construction projects at TOKI. The prescribed area of solar thermal is one square metre for each flat.” As both the above projects target the middle class, solar thermal installations are obligatory in both cases.

“The collector must also satisfy certain requirements,” Yazar adds, and names the two most important ones. “The efficiency must be at least 74 % and the collector must incorporate a meander absorber.” The sizes for the hot water tanks are staggered. They start at 600 L for buildings with up to 20 flats, and go up to 1,250 L for buildings with 51 to 60 flats.

Like Solimpeks, the company Eziñç from Kayseri also provides solar systems for TOKI projects. One of the projects in which Eziñç is involved is directly in Kayseri itself. It comprises 24 blocks, each with 40 residential units. Eziñç has installed 432 highly selective collectors with a total area of 994 m². In addition, there are three coated 1,000 L tanks in each of the residential blocks. “According to our calculations, the systems together deliver 1,021 MWh of thermal energy per year,” says Kutay Ülke, Export Department

Manager at Eziñç. "That is sufficient to heat 23,177 m³ of water, representing overall annual savings of 113,931 m³ of natural gas for the residents."

Minha Casa Minha Vida

Brazil is not only the fifth largest country in the world, but with more than 200 million inhabitants also the most populous country in South America. Two of the world's 30 megacities are to be found in Brazil. The largest Brazilian city, São Paulo, is home to more than 11 million people, with around 20 million living in its metropolitan region. Rio de Janeiro follows with 6 million inhabitants and a metropolitan population of over 11 million. One of the major problems of these megacities is the chronic lack of adequate housing. But even in the rest of the country, there is often no less of a housing shortage. Overall, the housing deficit in Brazil is estimated at around 7 million units. Out of necessity, families build themselves provisional huts from cardboard or corrugated metal plate, and consequently live under frequently life-threatening hygienic conditions.

Brazil is thus another country in which a diversity of government housing programmes seek to promote decent and affordable accommodation. One current project is entitled 'Minha Casa Minha Vida' (My house, my life). This programme is funded by the Caixa Econômica Federal, the development bank of the Brazilian federal government, and assists families up to a threshold equivalent to six times the national minimum income (presently 550 BRL/Brazilian real = approx. € 240).

For low-income families with earnings less than three times the minimum, the bank takes care of up to 80 % of the housing construction costs. That can amount to up to BRL 50,000 (approx. € 22,000), depending on the region. The new home-owners, mainly families with children, then pay the remaining 20 % of the costs. In many cases however, this share is also contributed by the local housing offices.

The first phase of the Minha Casa Minha Vida project ran until the end of 2010 and encompassed a total of 400,000 flats. No general provisions were made for the integration of solar thermal systems. Nevertheless, an agreement between the Caixa Econômica and the German Agency for International Co-operation (GIZ, until the end of 2010

still under the name 'German Agency for Technical Co-operation, GTZ') enabled solar thermal systems financed by the Brazilian federal government to be provided to the residents of max. 10 % of the newly built houses. GTZ realised the "1,000 Roofs" programme on behalf of the German Federal Ministry for the Environment within the framework of the International Climate Initiative (ICI).

"Together with the energy efficiency programme PROCEL, we have developed technical standards defining the quality and installation of solar thermal systems," says Andreas Nieters, project manager and deputy programme director for the GIZ in Brazil. The concept envisages a system with a minimum yield of 150 kWh per month (with approx. 2 m² collector

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area), and this system must satisfy the demands of energy efficiency class A or B as specified by the Brazilian standards authority INMETRO. The storage tank for each residential unit holds 200 L. Such systems qualify for a 100 % grant. The residents thus gain the benefits of solar water heating without additional investment on their own part and can in this way reduce their energy costs by up to 50 %. “Of the 40,000 possible systems, 30,000 had been approved by the end of November,” Nieters reports.

To obtain approval, the contractor must submit plans for integration of the solar thermal system together with the construction project. Once it is granted, he must then prepare a tender and organise purchasing and installation of the hot water collectors.

The framework has in the meantime already been specified for a second phase of the housing programme. From 2011, it is planned to build 2 million new residential units in Brazil, of which 1.2 million are to be reserved for low-income families. The Brazilian government is presently discussing the possibility to provide between 300,000 and 400,000 of these homes with solar thermal systems. At the same time, a working group at the Brazilian environment ministry is debating a strategy concept which proposes increasing the installed solar thermal capacity in the country to 15 million m² of collector area by 2015. That would correspond approximately to a doubling of the current area. Nieters hopes that this will trigger a broad market expansion for solar thermal, a development from which the German solar industry could also benefit.

Obligations for energy suppliers

Another opportunity to further popularise solar thermal systems in Brazil is embodied in the Programa de Eficiência Energética (PEE) initiated by the regulatory authority for electrical energy ANEEL. The programme obliges the Brazilian energy suppliers to pay over at

least 0.5 % of their net profits each year to projects aimed at reducing the national electricity consumption.

This requirement can be met in two ways: the energy suppliers can support either relevant research and development or “social” projects. In this context, the retrofitting of solar water heating systems in existing social housing is also considered a social project. Figures from ANEEL show that a total of 21 solar thermal projects with an investment volume of around BRL 60 million were approved up to September 2010. The planned total energy savings amount to some 16 MWh per year. According to Marcelo Mesquita from the national solar industry association DASOL/ABRAVA, 15,000 units each were installed in 2010 in the states São Paulo and Minas Gerais alone. Within the framework of PEE-financed projects, the government housing associations CDHU (São Paulo) and COHAB (Minas Gerais) cooperate closely with the corresponding energy suppliers.

25,000 solar roofs for Mexico

In Mexico, housing is needed for over 110 million people. Some 20 million live in Mexico City and the surrounding conurbation alone. When it comes to the provision of adequate housing, however, there are still major deficits. In response, the Mexican Federal Institute for Worker’s Housing (INFONAVIT) has drawn up an action plan to promote affordable accommodation. The institute has specialised on the granting of home-building loans to workers with low incomes. The programme bears the title “Green Mortgage”.

Under this programme, INFONAVIT offers its clients an additional loan with particularly favourable terms for the installation of “eco-technologies”. The funds can be used for a variety of water- or energy-

The demonstration project Mangueira in Brazil was sponsored by the German Environment Ministry in connection with the International Climate Initiative.



saving products, including solar thermal systems. The intention is to overcome the barrier of a high initial investment. “The Green Mortgage scheme also incorporates investment grants awarded under the ‘25,000 Solar Roofs’ project,” explains Wiebke Mai, a coordinator of the Sustainable Energy for Mexico programme at the local GIZ office.

“25,000 Solar Roofs for Mexico” is a project of the German Federal Ministry of the Environment. The political partner in Mexico is INFONAVIT. Following the model of German market incentive programmes, the bank offers grants towards the purchasing of a solar thermal system. A maximum of 25,000 families are to receive on average 1,700 Mexican pesos (corresponding to approx. € 100).

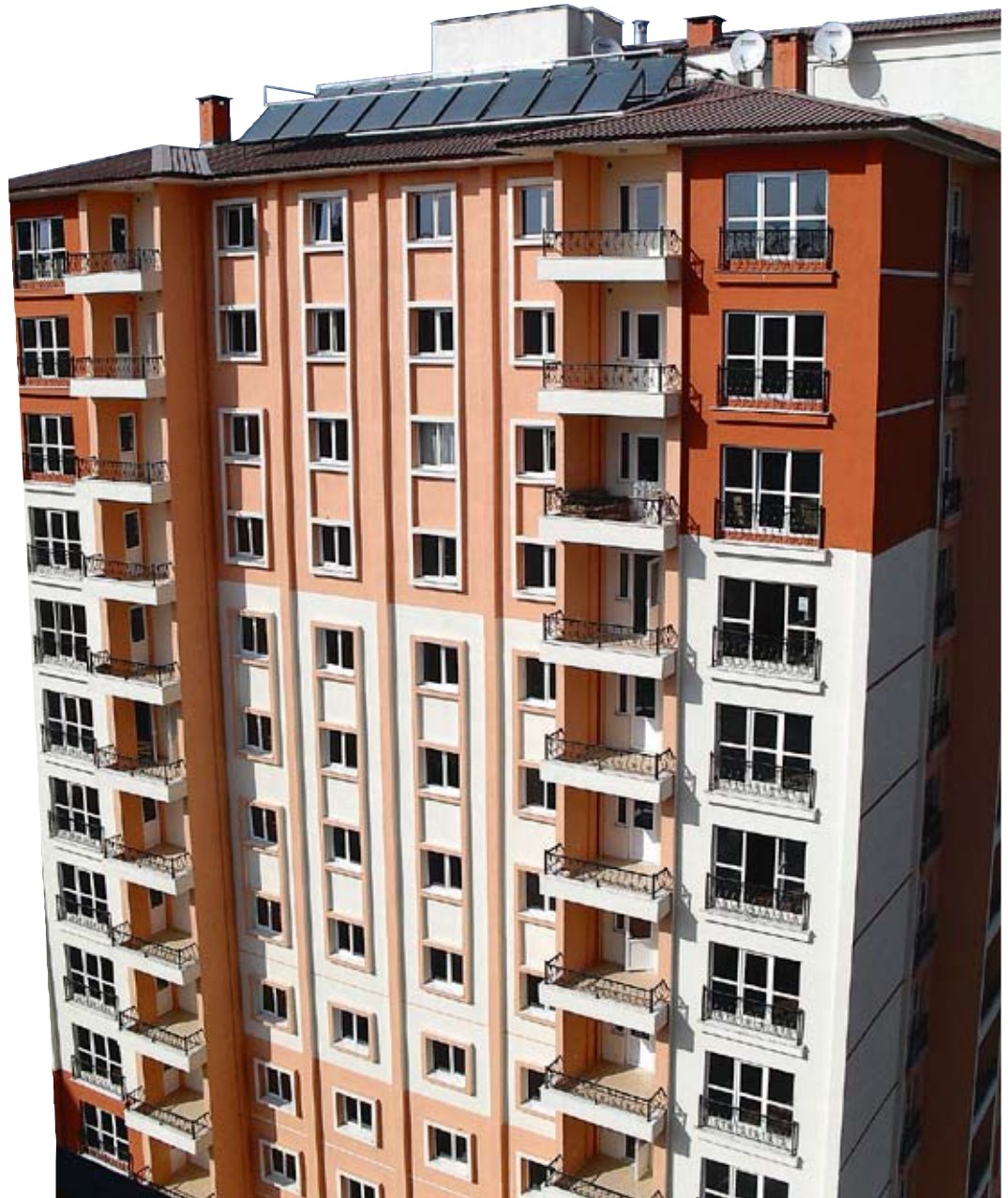
The programme is expected to stimulate the Mexican solar thermal market. After all, most of the houses which have been built to date by low earners in Mexico have no such installations. The Internet portal solarthermalworld.org names an example: in a new residential settlement in Héroes de Tecámac, approx. 2 hours from Mexico City, only 5 % of the 7,500 new family homes have a solar water heating system on the roof. As there was no incentive programme in the past, the costs of around 8,500 pesos (approx. € 500) would have been added to the loan required

to purchase the house itself – an investment which is for many in the emerging countries an insurmountable hurdle. The GIZ now offers grants for up to 25 % of the purchase costs.

The 25,000 Solar Roofs programme is part of the GIZ’s national campaign to promote solar thermal systems, which goes under the name ProcalSol. This programme is to run from 2007 to 2012. No further financial incentives are involved. With the objective of long-term market development, the GIZ team in Mexico is working with selected partners to establish quality standards, to reduce information deficits and to train qualified personnel. In this way, it is planned to install 1.8 million m² of collector area in Mexico by 2012. The first fruits are already visible. According to the market statistics of the Mexican national association of solar Energy ANES, the newly installed collector area was more than doubled from approx. 53,000 m² in 2008 to almost 133,000 m² in 2009.

There are thus a number of different programmes and cooperation projects to promote the integration of solar thermal systems in social housing in the emerging countries. Nevertheless, such systems are still far from standard, even though they would bring significant cost savings for low-income families.

Ina Röpcke



For this housing project in Kayseri in Central Anatolia, Eziñç supplied the solar systems for 24 blocks with 40 flats each. A total collector area of 994 m² was installed.

Photo: Eziñç