



Urban Innovations and Best Practices

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SUSTAINABLE URBAN DEVELOPMENT IN THE PRC*

Retrofitting Sustainable Urban Development Practices –Renewable Energy

Urbanization in China

Urbanization in the People’s Republic of China (PRC) has been on extensive and accelerated path. In 2008, more than 600 million were residing in 655 cities, pushing the urbanization level to 45.7%. Based on current trends, the urban population in the PRC is projected will cross the 1 billion mark in 2030 and 8 megacities each with population of over 10 million would appear in the country by 2025 (Woetzel et. al., 2008).

However the rapid rate and sheer scale of urbanization is associated with increasingly pressing social, economic and environmental problems. Clearly new models of sustainable urban development are needed to cater to this phenomenal urban growth for the coming decades.

Retrofitting renewable energy technologies in Rizhao

Rizhao, a coastal city located in Shandong province is a leading example of retrofitting sustainable practices in an urban context, rather than developing a greenfield eco-city project. The city has been recognized for as one of the top ten cities in the PRC for air quality. Rizhao has also received international recognition with a World Clean Energy Award in 2007. Rizhao receives abundant solar radiation and renewable energy technologies were deployed extensively to reduce the city’s dependency on conventional energy sources such as coal.

- 99% of households in the central district and more than 30% of residences in the rural areas have installed solar water heaters.
- More than 500,000 sq m of PV panels have been installed within the city for heating, saving the city an estimated 0.5 megawatts in electric water heaters (see Figure 1).

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- More than 6,000 households use solar cookers.
- Most traffic signals, street and park lights use low-energy technologies such as LED lights and are powered by solar PV cells.

In addition, methane gas generated from agricultural and industrial waste water is used in place of coal as an energy source by more than 15,000 households in Rizhao. The city produces



SOURCE: KWAN, 2009

Figure 1: Rooftops installed with solar panels in Rizhao

* This is one of a series of case studies in sustainable urban development in the PRC.



4.5 million cu m of methane gas annually, which replaces the burning of 3,100 tons of coal a year. The installed methane gas power generators have a total production capacity of 13,500 kWh and can potentially replace 36,000 tons of coal in a year.

The large scale solar power and methane capture applications have directly benefited 1.5 million residents, out of a city of about 3 million and lowered the city's carbon footprint (Kwan, 2009).

Making renewable energy technologies work

The city had an early start in implementing renewable energy technologies when the Rizhao local government started promoting renewable energy technologies in the early 1990s. The Shandong provincial government supported the use of solar energy through renewable-energy friendly policies and regulations such as the Regulations on Implementing Solar Energy and Construction Integration which standardized the use of solar energy (especially solar water heaters) in new buildings. Subsidies are also provided to encourage retrofitting of existing buildings, for example PV panels are attached to exterior walls.

The government funded R&D efforts of the local solar PV and solar thermal heating industry. This helped to make the technology more affordable in Rizhao while developing the capabilities of local manufacturers. Education and awareness campaigns are also regularly held to promote solar energy technologies.

To support the methane gas energy system, the Rizhao government offers tax rebates and credits to encourage businesses to treat their wastewater before discharging in order to improve the quality of the wastewater. This in turn raises the energy production efficiency of the methane gas while improving the local environment. The local government also encourages the local industry to develop new methods of production and utilization of methane gas.

References

- Kwan, C. L. (2009). Chapter 14 – Rizhao: China's Green Beacon for Sustainable Chinese Cities. In Clark, Woodrow W. (ed), *Sustainable Communities*, New York: Springer.
- C40 Cities. *Rizhao, China - An Extensive Solar Program in China*.
- Mukherjee, I. (2007, July 11). *Mainstreaming Clean Energy: Achievements in Rizhao, China*.
- Ren, Z. (2010). 60 years of Chinese urban planning. *China Urban Planning Development Report 2009–2010*, 3–11. Beijing: China City Press.
- United Nations Environment Programme (UNEP). *Climate Neutral Network. Rizhao*.
- Woetzel, J., Devan, J., Jordan, L., Negri, S., Farrel, D. (2008, March). *Preparing for China's Urban Billion*. McKinsey Global Institute.

The policies in Rizhao are clearly aligned with the national push for renewable energy technologies found in the PRC's 10th and 11th Five-Year Plans. The Renewable Energy Law which enacted in January 2006 also introduced various incentives, subsidies and funds to promote the development and use of renewable energy technologies. The PRC has set a target of 16% of energy coming from renewable sources by 2020.

Sustained Impacts, Positive Results

It is estimated that through the use of solar energy, methane gas and other forms of renewable energy technologies, Rizhao can save 3.8 billion kWh of conventional electricity a year. This is