



## Green Buildings and Sustainable Cities

Countries that experience rapid growth such as China are now at an important crossroads in deciding how to continue to grow while continuing efforts to improve air quality and other environmental concerns. One particularly useful solution is adopting green building and smart community practices, providing both the necessary economic growth with critical improvements in energy efficiency and air quality.

### Green Building Practices Can Protect China's Air, Land, and Water

Each year, the construction and day-to-day activities of commercial and residential buildings account for 50 percent of global energy and 42 percent of fresh water usage.<sup>1</sup> At the same time, building-related activities are responsible for 50 percent of the world's air and water pollution, 42 percent of global greenhouse gas emissions, 48 percent of solid wastes, and more than 50 percent of ozone-depleting substances.<sup>2</sup>

To preserve the planet's habitability, we must vastly increase the usage of green building and sustainable community techniques. Luckily, one of the easier ways to mitigate the negative impacts on the environment from building construction and operation is the adoption of a set of "green" practices, including energy efficiency, sustainable land use, water and resource conservation, and

creating healthy indoor environments. Taken collectively, these elements make up the concept of green buildings.

NRDC has promoted green buildings in China since 1998, supporting state and local administrations in developing energy-efficiency standards for buildings and advocating green building strategies through workshops, trainings, and technology demonstration.

In 1999, NRDC began to coordinate a green building demonstration project jointly sponsored by the U.S. Department of Energy and China's Ministry of Science and Technology. The goal of the project was to demonstrate how green building strategies can be successfully implemented in China and to showcase the environmental performance of green buildings. The project broke ground in 2002, and the building's official opening ceremony took place in February 2004.



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The success of this demonstration project, which earned LEED Gold certification, led to the adoption of China's first green building standard in 2005. The building's remarkable performance—72 percent energy savings, 40 percent water savings, 60 percent wastewater reduction, and exemplary indoor environmental quality—has set a great example for China's governmental building retrofitting program.

Data on the demonstration building's operational costs for the past few years indicate savings of more than \$120,000 annually, alongside reductions of CO<sub>2</sub> emissions by nearly 1,900 tons per year. Inspired by this project, the Beijing Municipal Government plans to retrofit all existing governmental offices and large commercial buildings with green technologies, and has invited NRDC to provide technical advice. This plan has the potential to eliminate 33 million tons of coal burning and 23 million tons of CO<sub>2</sub> emissions each year.



### Sustainable Cities Through Smart Growth

Urbanization is often regarded as a sign of modernization, but unrestrained and poorly planned urban expansion in many regions of the world have led to wasteful land use, inefficient development, traffic congestion, resources depletion, and social problems such as poverty and crime.

Sustainable urban development, also known as smart growth, is not only an important concept, but also a practical solution to sprawl and car dependency. Smart growth means compact yet comfortable communities and city designs that emphasize mixed land use and good public transportation. Smart growth helps to preserve farmland and ecosystems, reduce oil consumption, and cut pollution. Smart growth also stresses green buildings and the revitalization and redevelopment of existing urban areas before breaking new ground.

While China's rapid economic growth since 1978 has accelerated urbanization and improved living standards, it has also brought about countless examples of environmental disruption, intensified energy and water scarcity, and accelerated farmland loss, carrying consequences for China's environmental sustainability.

Over the past 30 years, China has seen its urban population surge from 18 percent of the total national population in 1978 to nearly 40 percent of the current population of 1.3 billion. In the past seven years, China has lost 7.6 million hectares of farmland to urban development. Almost 40 percent of China's territory—3.56 million square kilometers of land—suffers from soil erosion. There are 110 Chinese cities facing drinking water shortages, totaling 40 billion tons. Energy demand continues to rise sharply. The consumption of coal and oil increased 9.6 percent and 7.1 percent respectively from 2005 to 2006. In 2004, total CO<sub>2</sub> emissions amounted to 5,070 million tons.<sup>3</sup> Unsustainable urban expansion threatens both the environmental stability of China and that of the world.

In order to foster sustainable urban development strategies in China, NRDC is introducing smart growth principles to Chinese urban planners, in addition to promoting green building designs and construction. In the next few years, NRDC will work with China's Ministry of Construction and local governments to promote several sustainable city projects intended to help China achieve its national goals of 20 percent energy intensity reduction by 2010 and 65 percent energy-efficiency improvement in new buildings by 2020.

Lessons learned from past experiences make a strong case for smart growth: it is a proven effective approach to sustainable urban development. The strategies of smart growth should be made an integral part of any national and regional development plans, so as to ensure an environment-friendly and resource-efficient urban future for China and the world in the 21st century.

<sup>1</sup> Qiu, Baoxing, "Promoting Green Buildings and Accelerating Resource-Efficient Social Development," speech at the Third International Green Buildings Conference, Beijing, April 2007.

<sup>2</sup> Edwards, Brian (ed.), *Green Architecture*, John Wiley & Sons Inc, New Jersey, USA, September 2001.

<sup>3</sup> China's National Climate Change Programme, June 2007.