

The next Chinese boom is called sustainability

Eco-town Dongtan symbol of the New China

In order to accommodate the anticipated migration of hundreds of millions of people from rural to urban areas during the coming decades, China needs to develop a new way of thinking about building cities. Dongtan, a city under development on Chongming Island, near the buzzing metropolis of Shanghai, is a showcase example of the sustainability push by the Chinese government.





One solar panel costs as much as a sheep (excluding subsidies) and provides enough power for a lamp, radio or tv. Photo: Frans Schellekens

| By Bert van Dijk

At the mouth of the Yangtze River, just off the coast of Shanghai, lie an eighty-kilometer stretch of land full of rice and watermelon fields, a bird sanctuary, a small neglected fishing harbor, and many green wetlands. If it were not for the construction workers that are building the world's largest suspension bridge, you would not suspect this island to be the centre of one of the most ambitious urbanization projects the world has ever seen. The ten-kilometer bridge is part of a massive infrastructure project that also includes a nine-kilometer tunnel to connect Chongming Island, the name of this stretch of land, with Shanghai.

When it is completed in 2009, people will be able to travel to the island by car instead of by ferry, as they do now. However, anyone who is planning a trip to Dongtan, a city under construction on the easternmost part of the island, will have to leave his car behind just outside the city limits. That is unless the car runs on clean fuel like electricity or hydrogen, because Dongtan, about three quarters the size of Manhattan, will be the world's first carbon-dioxide neutral city.

Today, Dongtan still merely exists as a master plan, as a vision in the heads of engineers, urban planners, and Chinese

officials. Chongming Island is still the oasis of rural peace and quiet that attracts thousands of tourists and visitors who want to escape the hectic business life of Shanghai. When the anticipated final green light will be given later this year, a Chinese building boom will transform this empty rural area into a modern ecological society within just a few years. That is the plan at least.

The owner of the land that will become the new city of Dongtan is project developer Shanghai Industrial Investment Corporation (SIIC), a large real-estate company. In the late nineties it held an international competition and invited urban planners from all over the globe to submit their ideas for the development of Dongtan. London-based Arup came up with an integrated master plan and won the competition. Witnessed by Tony Blair and Chinese President Hu Jintao, Arup and SIIC signed the contract in 2005, making Arup responsible for the overall design and implementation of the master plan for Dongtan.

'SIIC had the idea to create an ecodemonstrator', says Roger Wood, Associate Director for Urban Planning of Arup and responsible for the master plan. 'We stretched that idea a little further.

We envisioned a city that minimizes pollution with room for recreation, tourism, an attractive site for high-end research, and development facilities, a residential area, education, and space where the birds could live undisturbed near the city.'

Utopia |

The first phase of the development of Dongtan covers an area of 6.3 square kilometers and consists of three adjacent villages, serving as a multifunctional development zone for tourism, innovative science & technology, and health, respectively. The village with the tourism theme will be built first in order to be presented as a live model of

'This is the most ambitious urbanization project the world has seen'

an integrated ecological town during the Shanghai World Expo 2010. This town will be capable of accommodating 80,000 people, although the population will be around 10,000 in 2010, according to Wood. Public transport in the village will



Windmill park in western China.
Photo: Frans Schellekens



Nomads are cleaning a solar panel in Erdaoshui. Photo: Frans Schellekens

be easily available for the residents.

In order to create such a utopia, Wood and his team started working with models that calculate the optimum composition of all these facilities. 'We needed lots of residential area to maximize the results. With the model we calculated the amount of utilities that would be designated to each inhabitant.'

Furthermore, Dongtan needed to be energy efficient. 'So we planned to build three wind turbines, and we use solar power and biomass as a means of creating energy. This would enable us to make Dongtan significantly more energy

are harvested on the island itself and could be brought in over sea by large barges, could create green warmth and electricity. The idea got an extra fillip in January 2006, when a new law in China came into effect that allowed private companies to sell excess electricity to the grid. 'Suddenly all the numbers added up and our business model worked. All the messages we got from the Chinese authorities were also pointing in the right direction for us', says Wood.

Apart from a carbon-dioxide neutral city, all the city's waste will be recycled through an ingenious vacuum system that is already used in the Swedish town of Hammerby. Combustible waste is sucked through a system of tubes instead of being taken away by traditional waste trucks, and is burned in a combined power plant to provide electricity and heat. Waste-collection points are situated inside apartment blocks and in public areas. The waste builds up inside the tubes where sensors monitor and detect when a storage area is full. Once that happens, the system will suck the waste through the tubes to a centralized area outside the city center where it is either taken away or used in the power plant as fuel.

Clean technologies will also be used to power public transport and all the cars on the road in Dongtan. 'People from outside the city will have to leave their cars behind at the city limits and transfer to public transport or other green vehicles', says Wood. He does not think this will alienate or annoy visitors. 'We have designed the city in such a way that residents do not need private cars necessarily. Every city block will have all the utilities and facilities within a couple of minutes walking distance', he explains. 'There will be little need for cars as the main transportation method inside the city', he projects. 'It will be easy to move around with the absence of any thoroughfares.'

Wood also hopes that the Shanghai Mayor's plan to get 10,000 hydrogen-powered vehicles on the road will give green transportation on the island a big boost. In fact, Shanghai has already opened a hydrogen fuel station at the edge of the city. More stations will be built in the coming years as the city prepares for the World Expo in 2010. With its main theme 'Better city, better life', Shanghai has many projects under construction that aim to boost the city's green image. Hydrogen-fueled cars is just one of those projects, greener

Chinese cities are competing in greenness

efficient than other modern cities. But in November 2005 our client SIIC wanted us to create a system that would allow the whole city to be 100% energy efficient. They were even more ambitious than we were at that time', recalls Wood, who was pulled back to the drawing table.

The solution he came up with was more biomass. Burning rice husks, that

buildings, the promotion of electrical or LPG-fueled motorbikes, taxis and buses, and doubling the subway network to more than 500 kilometers are other such initiatives.

Master plan |

The current Dongtan master plan is designed to provide housing for approximately 10,000 people in 2010. That number will eventually grow to more than half a million in 2040, when phase 2 and 3 are concluded, projects Wood. The houses are not just for the rich. 'Not at all', says Wood. 'A lot of affordable houses will be built to create a mixed social society. Apart from the residents, Wood expects 15,000 visitors to come to experience Dongtan every day. The city will be one of the main attractions during the six-month Expo in 2010. The visitors will not only be able to 'feel' this new ecotown, they can also visit the wetlands where a large bird sanctuary provides ample space for migrating birds.

The urban area will occupy only one third of the total site that SIIC owns, with the remaining land being retained for agriculture and to create a buffer zone of 'managed' wetland between the city and the 'natural' wetland. In fact, over the coming years the wetland will increase in size as land is being deposited naturally at its edges.

In many ways, Dongtan is what President Hu Jintao envisioned when he spoke of the rather vague concept of 'Scientific Outlook on Development' during his speech at the 17th party congress last October. This concept states that economic growth should be more balanced and sustainable. Instead of quadrupling the economy by 2020, Hu now aims to quadruple GDP per capita - a much more ambitious goal.

The fast-growing Chinese economy has burdened the rural areas in recent years - pollution, shortage of drinking water, forced evacuations, and bad social conditions to name but a few. In fact, next year China is set to overtake the United States as the most polluting country on the planet. In 2010, more than half of the 1.3 billion people of China will live in cities. No wonder Chinese leaders are increasingly talking about sustainability and the environment. 'Our economic growth is realized at an excessively high cost of resources and the environment', President Hu said. 'We will develop and extend advanced and appropriate technologies to preserve, substitute, and recycle energy and resources, we will develop clean and renewable energy sources, protect land and water resources, and set up a rational scientific system for using energy and resources more efficiently', says Hu.

It's not just rhetoric anymore, says Tiffany Tsui. She is the International Business Development Manager for Sustainability and Innovation at Dutch

Cleantech is the third largest sector for venture capital investments

engineering firm DHV. The company has undertaken many sustainability projects in China. 'China faces a couple of large problems as a result of its staggering economic growth', says Tsui. 'Therefore it is good that the Chinese have put the environment and sustainability at the top of the agenda. And when the Chinese decide on a policy, it can be implemented very quickly.' But it is not the Chinese government alone that talks about sustainability. Many private companies are also recognizing that sustainability can improve their image in China. 'For them it has become an important marketing tool', says Tsui. 'Chemical company DSM, Siemens, General Electric, and even a couple of Chinese real-estate firms use sustainability, because it boosts their corporate image.'



Supervisors at an open coal pit in the mountains near Urumqi. Photo: Frans Schellekens



Petrochina oil pumping station in the Tuha oilfield outside of Turpan in the province of Xinjiang. Photo: Frans Schellekens



Dongtang as it is now. Photo: Bert van Dijk

China has the unique opportunity to turn its biggest challenges, how to deal with pollution and its rising energy consumption, into a competitive advantage. 'The country could bypass all existing technologies and apply the most advanced available. China can become a very attractive market for western companies to test the most advanced cleantech technologies', believes Tsui.

It is one of the reasons Wood likes to focus on China and other developing countries. 'The positive impact on the environment, by implementing new and cleaner technologies in developing countries such as China, is far greater than to try and clean up the environment in developed countries. The rewards are much greater here in China', says Wood.

On the road to a more sustainable economy China still faces many challenges. One of the main problems is the relative autonomy of local authorities, who often ignore directives from the national government in Beijing. To them protecting the environment is not necessarily more important than economic growth. Stimulating investment in clean technologies does not always benefit them in the short term and could hamper economic growth and make the results they report back to Beijing look poor. 'Some primary party organizations are weak and lax. A small number of party officials are not

honest and upright, their formalism and bureaucracy are quite conspicuous, and extravagance, waste, corruption, and other undesirable behavior are still serious problems. We must pay close attention to these problems and continue our efforts to solve them', President Hu acknowledged during his opening speech at the 17th Party Congress.

To deal with these lax party officials, the communist party has endorsed a program that measures local authorities not only on hard economic results but also on achieving certain green goals. If those environmentally friendly challenges are not met, local governors will find it harder to realize a successful career within the Party.

China's push for more sustainable technologies in combination with a relatively stable political and economic climate proves to be fertile ground for western companies. General Motors recently announced an investment of \$250 million in a highly advanced research center for alternative vehicle technologies, including biofuels and hybrids. 'We believe China has the potential to become a leader in the adoption of alternative propulsion systems', Rick Wagoner, ceo of General Motors recently said at a press conference in Shanghai. GM picked China for the research center partly because of the government's push to develop alternative energy sources.

Not only the large multinationals endorse cleantech in China - in 2006, the investments by venture capital firms in clean technology firms increased by 147% on 2005 to \$420 million in 26 deals. During the first quarter of this year alone, the investments in green technologies totaled \$154 million. After IT and telecom, cleantech is already the most important market for venture capital investments in China.

Arup's Wood believes the Chinese are very serious about achieving a more sustainable economy. 'Incentives and legislation are being put in place. In some municipalities buyers of environmentally friendly houses are granted cheaper mortgages for example. As a result of the new incentives and directives issued by the Chinese government, municipalities now are competing with each other in "greenness"', says Wood.

Coal mines |

In 2020, clean technologies must account for 15% of China's total energy production and lessen the dependence on oil and coal, which still account for nearly 70% of all energy in China. The far western Xinjiang province is one of the most important energy-producing regions of China. It has rich oil and coal resources and is therefore of great strategic importance. Billions of dollars are invested in new oil and coal plants in Xinjiang to ensure a steady flow of energy from this region to the growth engine of the Chinese economy in cities like Shanghai, Beijing, and Chongqing.



Employee at Shell-partner Sinoasis assembles a solar panel in a factory in Urumqi. Photo: Frans Schellekens

'People from outside must leave their cars behind at the city limits'

And although the mountainous landscape of Xinjiang is still scattered with thousands of oil production and pumping stations and old-fashioned coal mines high in the mountains, this is also the region where Asia's largest wind-turbine power station is situated. An hour's drive from Urumqi, the province's capital, two hundred 50-meter tall wind turbines with a capacity of 100 megawatt are lined up. Some 50 kilometers to the west, another large wind-turbine park is being developed. This already makes Xinjiang China's top three for wind-power development. Other expansion projects for green energy are currently underway in the province.

In 2006, China installed 1,347 megawatt of wind power, bringing the total installed capacity to 2,604 megawatt, according to LM Glasfiber, a Danish producer of blades that recently opened a second factory in China. China is now the world's 5th largest wind-turbine market. Since China's act on renewable energy was adopted in 2006, there has been a boom in the wind-power market with annual growth rates in excess of 100%.

China's National Development and Reform Commission recently projected that the 8,000 MW target for installed capacity by 2010 will be exceeded by a margin of 25% and that, by the end of 2020, the total installed capacity could be as high as 120,000 MW - four times the current official target. China already is the largest consumer and producer of solar energy.



Artist's impression of Dongtang in future. Photo: Bert van Dijk

Despite the apparent momentum for sustainability projects in China, Wood and his team still face many challenges in Dongtan. 'One of the main challenges we face with our project is to educate all our contractors to build in a sustainable way. We have to make sure that the right materials are used and that all quality controls are in place.'

If Dongtan eventually lives up to its expectations, the island can leapfrog from being one of the poorest areas in Shanghai to become one of the world's most modern cities. In the process, it will turn China into an important market for western companies that want to capitalize on the country's push towards a more sustainable economy. ■