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# CHINA'S EMERGING ECO-CITIES

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I like to introduce my study of China's emerging eco-cities. This is part of a larger research project I am currently engaged in and focusing on the ongoing new town movement in China. The background of this research project is the country's massive urbanization. China's national development agenda has set a goal of sixty percent urbanization by 2030, which means that each year about sixteen million of its rural inhabitants are moving into cities of different sizes. This trend has continued for more than two decades in what sociologist David Harvey regards as "the largest mass migration the world has ever seen."<sup>1</sup>

From a recent statistics, in 1985 less than 20 percent of Chinese people were urban residents. Since then the urban population has grown at a rate of around 1 percent each year. Urban residents reached 47 percent of total population in 2010, and it is expected to reach 60 percent by 2030. Because of China's family control policy, this growth results mainly from mass migration. Indicated in the statistics, the rural population drops concurrently with increase of urban population. One of the outcomes of this massive urbanization has been seen in numerous infrastructural and large-scale building projects across the country, from dams, bridges, and highways to gated communities, shopping malls, and spectacular civic buildings, which have fundamentally changed China's urban landscapes. Similarly, this dramatic demographic shift and construction boom has seen ambitious plans to create new towns to house the swelling population and sustain economic growth.

In addition, China's new town "great leap forward" also has to do with local government's search for new areas of economic growth. There are over 150 so-called National Economic Development Zone or High-tech Industrial Parks, as well as numerous similar arrangement on the provincial level. Although originally created for industrial use, most of them shifted the focus to residential and commercial development in the last decade under the real estate boom. These new towns are often associated to the decentralization of large cities. For instance, there are about ten new towns in Zhejiang Province, most of which are located around the large cities like Hangzhou and Ningbo. Chinese government announced that it would build 20 cities each year for 20 years, therefore 400 new cities would emerge by 2020.<sup>2</sup>

My research focuses on a series of so-called "model new towns" through the lens of urbanism and utopianism. They are often con-

ceived as exemplary pieces of urbanism, showcasing the latest technologies in town building and exploring various themes of planning. Created in response to the globalized economy, architecture and urban design in such new towns have become productive forces in differentiating, branding, and marketing the city to attract investment and create social capital. I examine the design and social aspects of this new town movement, and try to reveal the link between these new urban forms and the nation's transforming social structure under the current massive urbanization. The study is organized around a series of place-types such as industrial parks, eco-cities, and themed towns, representing a cross-section of the planning and building practices in this rapidly transforming society.

The eco-city became the late development in the new town movement. China surpassed the US to become the world's largest emitter of greenhouse gas in 2007. Many projects have tried to address the environmental issues. China has become, in many ways, not just a global factory, but also a laboratory for new technologies and designs where global talents seek to realize their futurist visions, as the recent Beijing Olympics and Shanghai World Expo testified. China's economic marketization and centralized governance have stimulated tremendous investments in previously untried environmental technologies and ideas that are usually harder to implement in the West. This is one reason that China has been the focus of many recent eco-city experiments.

One of such experimental projects is Huangbaiyu, an eco-village in Northeast China designed by William McDonough, then Dean of University of Virginia School of Architecture, aiming to invent a new type of agricultural town. Forty-two houses were built in 2006 based on the sustainable design. Another project is called Eco-Block, designed for the city of Qindao by a team of the University of California at Berkeley's College of Environmental Design led by Professor Harrison Fraker. Since 2007, the Berkeley team has used this project to explore an alternative to the super-block approach of development. The Eco-block would be completely off the grid, generating its own power, processing its own water, and treating its waste. Both projects try to establish a model that could be duplicated in China.

What I want to focus on in this paper are couples of more ambitious flagship eco-city initiatives in China, comparable to Masdar of the United Arab Emirates. They are Dongtan New Town in Shanghai and

Binhai new district in Tianjin. Dongtan was created in 2004 and boosted as the world's first carbon-neutral eco-city. It was endorsed by Chinese and British central governments, and Arup was hired for its master plan. The 630-hectare site is located at the tip of Chongming Island, an alluvial island in the Yangtze River. The new city is expected to house 400,000 by 2050.



Figure 1. Plan of dongtan new town, with the first phase on the lower side.

The Arup team introduced the latest environmental technology and laid out a fairly ambitious agenda. The goal is to use 60 percent smaller footprint than in conventional Chinese cities, and to achieve 66 percent reduction in energy demand. Dongtan would be run on 100 percent renewable energy, including 40 percent of the energy supplied from bioenergy. The city would recycle and reuse all waste water. Landfill waste is marked down by 83 percent. No fossil-fuel transportation is allowed; only hydrogen and electric vehicles will be permitted within the city. Those driving conventional petrol-fuelled cars would be forced to leave their cars outside Dongtan and take public transit.<sup>3</sup>



Figure 2. A Rendering of Dongtan Eco-city with midrise dwelling and institutional buildings.

The first phase of the city would be organized into three villages around the city center. All housing would be located within seven minutes' walking distance to public transport. Moving away from the prevalent highrise typology in Chinese cities, the plan of Dongtan proposed midrise dwellings of five- to eight-story, resulting in a density of 75 units per hectare. It would also create expansive green and water features across the city. To support employment within the city, an institute of environmental study was proposed as the central program for the first phase, along with commercial, entertainment, and culture.

The original timetable called for the first phase to be completed by 2010, the year Shanghai hosted the World's Fair, enabling the city to showcase its commitment to building a green future. However, no construction ever took place and the project was cancelled in 2009. Among other factors like political scandal and protest of environmentalists, there is a conspicuous gap between a radical vision and the concrete design and financial measures to realize it.<sup>4</sup> The worldwide recession in 2008 also raised the concern whether the project can afford the extremely high cost when international funding became unavailable, and if it could be a valid model for other cities to imitate.

The Chinese governments soon created another model eco-city, Binhai Eco-city, under a new partnership with Singapore. About forty kilometers from another mega-city Tianjin, it occupies a total area of thirty square kilometers and will be home to some 350,000 residents when fully completed in 2020. The choice of the site with its majority being saline-alkali land and wasteland indicates the government's determination of targeting ecological challenges. This new town learned from the lessons of Dongtan, and was able to move forward in development with well-laid out plans, higher density, yet less ambitious environmental agenda.

The design guidelines of Tianjin Eco-city called for 26 Key Performance Indicators (KPIs). It refers to national standards of China and Singapore as well as international standards like LEED. Buildings are to be insulated, double glazed and made of materials that abide by the government's green standards. Sixty percent of waste will be recycled. Tap water would be potable. Fifty percent of water supply in the eco-city would be from non-traditional sources such as desalination and recycled water by 2020. A comprehensive mass transit will be established, including a light rail system, aiming to cut car journeys by ninety percent by 2020. Although these goals are impressive considering China's current environmental conditions, compared to Dongtan's ambitious agenda, Binhai's approach to the eco-city concept is much more pragmatic, even a bit low-key in terms of environmental performance. For instance, the renewable energy would account for only 20 percent of the total energy consumption by 2020, compared to China's national plan that requires 15 percent for renewable energy by 2015.

The plan of Binhai Eco-city calls for developments to take place around a central core of rehabilitated wetlands, with four neighborhoods connected by the light rail line. The primary use is residen-





Figure 3. Master plan of Binhai Eco-city

tial, but there would be a business center for the city, a commercial sub-center in each neighborhood, and some industries. Several green building measures were adopted that include double glare skin, various PV panels, rooftop gardens etc.

The administrative building, one of the first structures, showcased most of the building standards, including a nice rooftop garden, solar-powered lighting fixture and solar-powered parking facility. The first neighborhood was completed in March 2012, and the first 60 families have moved in this residential area. Numerous solar panels and wind turbines have been erected along major roads across the city, indicating the distinction of this city from other new districts in China.

However, when it comes to planning and architecture, Binhai Eco-city turns out to be fairly conservative. The updated plan indicates that residential neighborhoods and business centers are designed as clusters of free-standing towers indifferent to the site and con-



Figure 4. Model of the plan of Binhai Eco-city indicates fairly conventional approach to urban form.

text. The highrise buildings are laid out on super blocks along wide avenues where automobiles are apparently the dominant means of transportation, and cyclers and pedestrians occupy little space. The same attitude is present in the community design. The residential buildings are elevated to sit upon a one-story podium of parking deck that occupies the entire block. As a result, the shared outdoor spaces of the community, which in this case is on the rooftop of the deck, is completely isolated from the surrounding streets and sidewalks. The design reflects gated-community mentality that dominates Chinese new towns.

Buildings are designed to a minimum green building standard. The limited technological improvement was unfortunately compromised by the conservative approach to urbanism. The brand of eco-city largely becomes a form of technical legitimization for promoting conventional solutions.



Figure 5. Residential buildings were elevated on a parking deck, separating community open spaces from the urban context.



To conclude, Dongtan and Binhai represent different approaches to the eco-city concept, one more idealistic and the other more pragmatic, reflected in their respective environmental agendas. Both projects, as well as other eco-city attempts in China, tend to focus on the scientific aspect of energy and environment, and are less concerned about needs of social sustainability. The effort of pursuing environmental and social balance is further subordinate to economic growth and local politics.

Apparently for a project like Binhai, the eco-city is developing with a Chinese characteristic. There are many things that should be done in order to make it a livable and truly sustainable city. Instead of showcasing uses of environmental technologies, planning of eco-cities should play a more fundamental role as a comprehensive social project in changing the urban pattern toward a more holistic development of society, economy, and environment.

### ENDNOTES

- 1 David Harvey, *A Brief History of Neoliberalism* (New York: Oxford University Press, 2005), 127.
- 2 Jean-Pierre Langellier and Brice Pedroletti, "China to Build First Eco-City," *The Guardian*, May 7, 2006. <http://english.cri.cn/811/2006/05/07/301@85444.htm>. Accessed 7/12/2012.
- 3 Helen Castle, "Dongtan, China's Flagship Eco-city: An Interview with Peter Head of Arup," *Architectural Design* 78 (2008): 68-69.
- 4 The site of Dongtan is one of the important habitats of migratory birds in the east coast of China. Therefore, environmentalists had protested the new town project there although Arup's plan reserved large areas of wetlands. Chen Liangyu, the former CCP chief of Shanghai, was arrested in 2007 for economic issues. He endorsed Dongtan and the other new town projects in his tenure, and his stepping-down was widely regarded as one of the reasons of cancelation of Dongtan new town project.



Figure 6. A thoroughfare in Binhai Eco-city, with wind turbines along the road.