

Climate Resilient Cities

A Primer on Reducing Vulnerabilities to Disasters

I/ CITY DESCRIPTION

Dongtan on Chongming Island will be the world's first carbon-neutral city built intentionally. Dongtan is located at the mouth of the Yangtze River on Chongming Island, situated on 8,600 hectares (86 square kilometers) of agricultural land (three-fourths the size of Manhattan) adjacent to an internationally important wetland. The city design incorporates a 350 hectare (3.5 square kilometer) wide buffer zone between the city and the wetland to minimize the impact of the development. The city is planned to take up just 40 percent of the total site area with the remaining land to be used for agriculture and energy production or preserved as wetland.

Dongtan was presented at the United Nations World Urban Forum by China as an example of an eco-city. It is the first of four such cities to be designed and built in China.¹ The planned cities will be ecologically friendly, with no greenhouse gas (GHG) emissions, and completely self-sufficient in water and energy. The city will be completed in 3 phases:

- **Phase 1.** 100 hectares (1 square kilometer) will accommodate up to 10,000 people by 2010.
- **Phase 2.** 650 hectares (6.5 square kilometers) will accommodate 80,000 people by 2020.
- **Phase 3.** 3,000 hectares (30 square kilometers) will finally accommodate 500,000 people around 2050.

Population

The current population, a small community of fishing and agricultural workers, will be integrated into the city design, and no one will be displaced or moved. The plan for attracting the new population and how to help them move into Dongtan is still being developed. Upon completion of Phase 3, the total population is estimated upwards of 500,000 people.

Components

Dongtan is being designed as three "village neighborhoods" concentrated at the southern tip of the site. The infrastructure (roads, public transport, schools, hospitals, commercial areas, green spaces) will be designed to encourage inhabitants to travel by bicycle or public transport rather than car. Social, cultural, and commercial activities



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will be concentrated in one of the village neighborhoods, the “city center.”

Only emission-free vehicles will be allowed to drive within the city

Dongtan is designed to have only green mobility along its coastline. The site will be connected to Shanghai via bridge and tunnel. People will arrive on the coast and asked to park their cars, and then will travel by foot, bicycle, or other sustainable public transport. The city will be linked by a network of pedestrian walkways. Several transport measures have been planned:

- *Car pooling.* People who want to share cars will be connected through an intranet system.
- *Zero-carbon vehicles.* Only emission-free vehicles will be allowed to drive within the city.
- *Pollution-free mass transit.* Pollution-free buses, trams, or water taxis, powered by fuel-cells or other zero-carbon technologies, will be allowed to run in the city;
- *Electric scooters or bicycles.* Traditional motorbikes will be replaced by electric scooters or bicycles.

III/ PRIORITY HAZARDS/VULNERABILITIES

As urbanization in China grows at unprecedented rates and the urban built-up area expands, minimizing GHG emissions and reducing air pollutants is crucial. According to a recent OECD report, Guangzhou and Shanghai are among the top 10 cities in terms of exposed populations to climate change impacts. While the Dongtan project follows a clear agenda of adaptation and climate-proofing agenda, serious attention also needs to be devoted to mitigating climate change in China to minimize the country’s contribution to the global stock of greenhouse gases and its own future vulnerability to climate impacts.

China has witnessed a 0.5-0.8°C increase in temperature in the past century (more than the global average rise), and most notable in western, eastern, and northern regions; extreme weather (droughts, floods); rise in sea level of 2.5 millimeters per annum (more than global average); and disappearance of glaciers. These trends are expected to worsen by 2050. According to the World Watch Institute, 16 of the world’s 20 most polluted cities are in China.²

China has established a National Coordination Committee on Climate Change and a China National Climate Change Program (CNCCP) outlining objectives, principles, actions, and policies to address climate change up to 2010 and to promote a circular economy. The Government has also established legislation on energy conservation and is undertaking studies to inform further policy in this area, including on energy-saving buildings and urban spatial design. Local strategies to tackle climate change will be coordinated with the National Leading Group on Climate Change (NDRC).

III/ ADAPTATION AND MITIGATION MEASURES

Dongtan’s goal is to become the world’s first carbon-neutral sustainable city. Annual carbon dioxide (CO₂) reductions are planned to be 750,000 tons of carbon per year for 80,000 people. The scheme will utilize the following main planned activities in designated sectors:

- **Buildings.** The buildings will be dense, but not more than eight stories high. Green roofs made of turf and vegetation--a natural form of insulation that also reduces run-off and recycles wastewater--will be installed. Photovoltaic panels and small-scale windmills will be integrated into the building designs to provide up to 20 percent of the power.
- **Waste and energy.** Up to 80 percent of solid waste will be recycled. Organic waste will be re-used for compost and energy generation. Rice husks, which are a plentiful waste product in China, will be burned in combined heat and power plants to generate heating, cooling, and electricity. Outside the city center, carefully positioned

wind turbines will produce electricity. An energy center will manage all energy generation via wind turbines, bio-fuels, and recycled organic material, and also serve as an information resource center for inhabitants and visitors.

- **Flood protection.** A bridge, a tunnel, and high-quality roads are currently being built by the Shanghai Municipal Government to connect Chongming Island and the Dongtan site to the Shanghai mainland. There are existing flood walls around the site and space has been built into the design to increase the height of the defenses should sea levels rise. Protective cells have been designed within the city's basements as an additional measure against flooding.
- **Energy efficiency.** Dongtan is designed to use 64 percent less energy than a comparable city of its size built and run in a business-as-usual way.

The master planning and design of the city is complete. At the time of this writing, construction had not yet commenced on the site.

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Notes

This “City Profile” is part of *Climate Resilient Cities: A Primer on Reducing Vulnerabilities to Disasters*, published by the World Bank. The analysis presented here is based on data available at the time of writing. For the latest information related to the Primer and associated materials, including the City Profiles, please visit www.worldbank.org/eap/climatecities. Suggestions for updating these profiles may be sent to climatecities@worldbank.org.

¹ Dongtan was designed by Arup, a U.K.-based design and engineering firm.

² World Bank, *World Development Indicators 2008*, table 3.14.



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