



## ECOPOLIS: Model for sustainable cities of the future?

### Definitions of ecopolis

- An **ecocity** is a human settlement that enables its residents to live a good quality of life while using minimal natural resources, whilst an **ecopolis** is a large city that follows ecological principles.
- An **ecopolis** can feed and power itself with minimal reliance on the surrounding countryside, and creates the smallest possible eco footprint. This goal implies using a range of eco technologies in the fields of construction, energy production and use, water, waste management etc.
- The origins of name can be credited to the architect Paul Downton, in 1991, who put together the terms: **ecology** = interactions between environment and living organisms and **polis** - a city state.

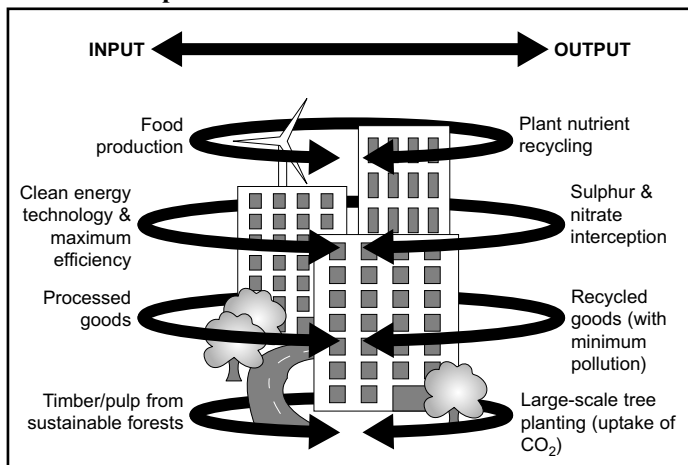
### Background to ecopolis:

- Sustainability in urban areas is now the buzz word in all scales and facets of planning and decision making as stress, ill health and loss of revenue arises directly and indirectly from air pollution, traffic congestion and inadequate housing.
- 50% of the world's population live in cities and by 2035 the figure could be 80%. Urban areas dominate earth systems and create most of its environmental problems, including global warming.
- **Sustainable urbanisation** is one of the most pressing challenges facing the global community in the 21<sup>st</sup> century. According to the United Nations a sustainable settlement is one which meets the needs of its present and future inhabitants and has a minimal ecological footprint.
- Is a radical programme of making our cities greener places to live in a sustainable way which might allow us to keep living in cities? Can new ecocities point the way?

### The threats to sustainability

Urban areas create the largest demands for resources of all types, energy, minerals, food and people. They also create vast waste products emitted into the environment, and affect a far greater area than their immediate surroundings.

Fig. 1 The ideal in city systems: a circular metabolism with minimised impacts on earth resources.



### The background to China's quest for a sustainable city system

In Asia, China's urbanisation has followed the traditional 'drivers' experienced by the West but its industrial revolution is the most rapid the world has seen. Since economic reforms began in 1978, an estimated 150-200 million people have migrated from rural to urban areas to fill the jobs generated by the economic explosion with a projection of at least 200m more. This has been called '*the biggest migration in human history!*' China now has 90 cities of more than one million inhabitants, often 'grey places', little known to the outside world. Shanghai, the largest, has an officially estimated population of 17 million, expected to rise to 23 million by 2020. However, according to a recent World Bank report, China has 16 of the world's 20 most polluted cities, and these are actually reducing the economic potential of the country. In 2003 the new policy started by President Hu Jintao emphasised: '*harmony between humanity and nature*' and to build '*a conservation orientated and environment-friendly society*'.

### Dongtan

Dongtan, China, is to be the world's first ecopolis, where 80,000 will live in a car-free, carbon-neutral zero-emission recycling city with an ecological footprint one third of that emitted by people 45km north in Shanghai by 2020. It is probably the biggest single building project in the world, taking place in a country many see as the biggest risk to the planet's green future. As China is planning to build 400 new cities in the next 20 years, Dongtan's success is of crucial importance!

Fig. 2 Location of Dongtan and Huangbalyu - eco settlements.

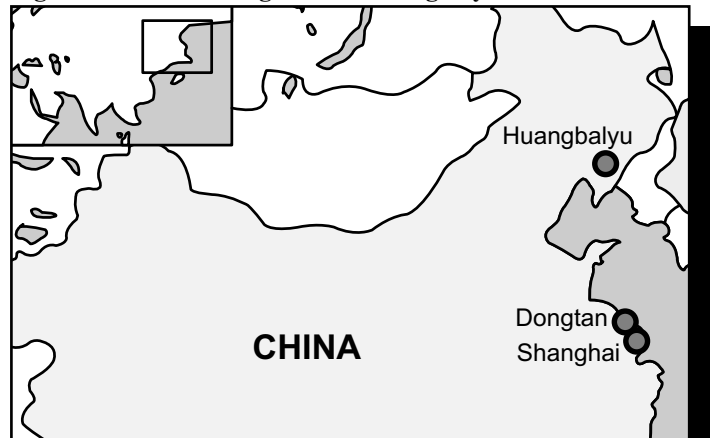
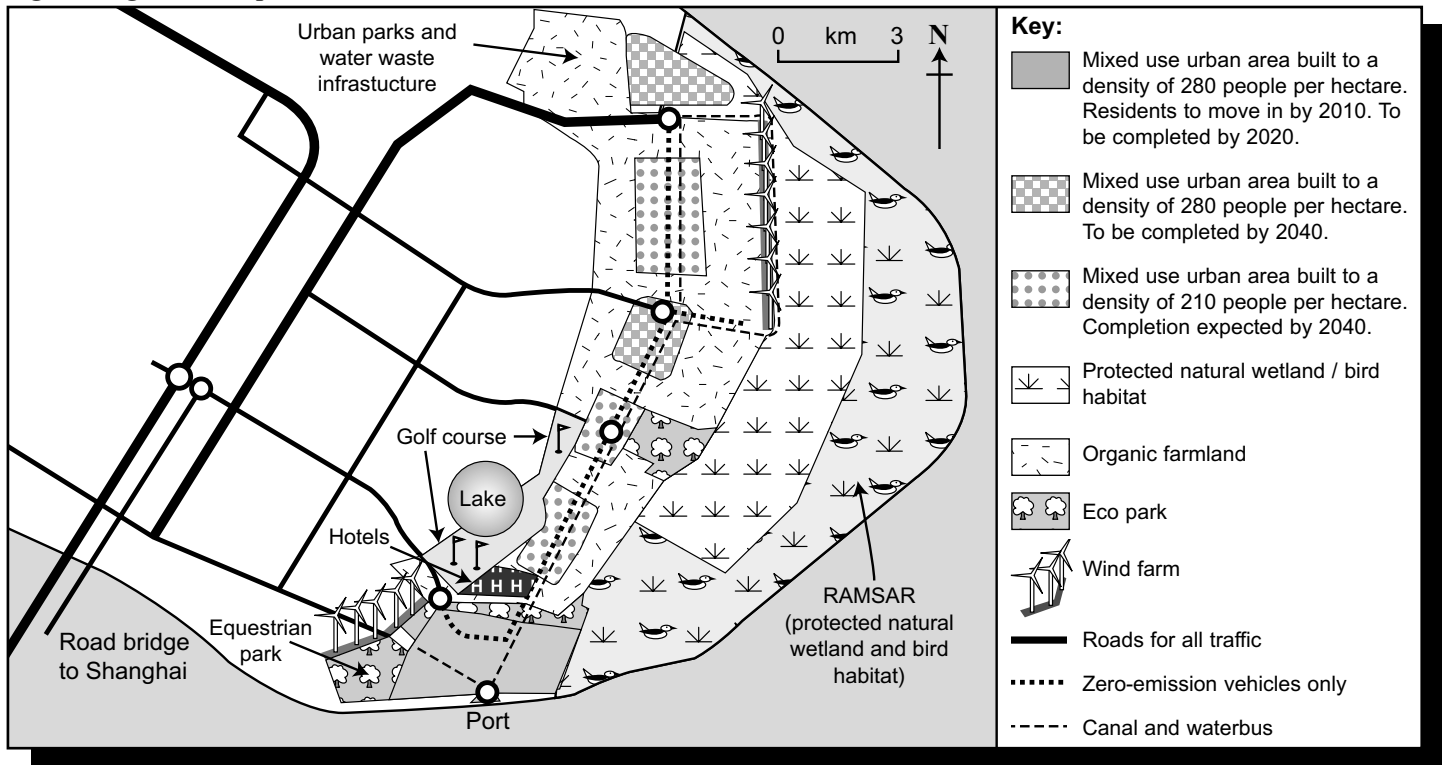


Fig. 3 Dongtan: town plan.



**Background to Dongtan**

After various visits to small scale eco-orientated projects abroad, such as Bedzed in London and collaboration between UK architecture and engineering firms, such as ARUP (famous for the Sydney Opera House, Pompidou Centre, Tate Modern, Beijing Olympic stadium and airport ) the Shanghai Industrial Investment Corporation decided to create Dongtan on Chongming Island. At present it is mainly paddy fields, corn fields, crab ponds, and a designated RAMSAR wetland with a rich wildlife. Building started in summer 2006, by 2010 it will be three quarters of the size of Manhattan with 50,000 population. A space 10 times the size has been set aside for continuous development to 2050.

**What is so special about Dongtan?**

The ecocity has become a showcase for foreign urban planners and managers because:

- it differs markedly from China’s track record of urbanisation involving pollution, traffic congestion and often social unrest.
- it is **politically significant** as shown by the contract signed in 2006 at 10 Downing Street in the presence of the British prime minister, Tony Blair, and the visiting Chinese president, Hu-Jintao.
- the **wetlands**, instead of being drained and built on, will be its focus. Canals, lakes and marinas will run through the city, with solar-powered water taxis.
- **housing**, rather than just luxury flats for the new rich, will include low-cost ‘affordable’ apartments. The first phase of Dongtan Eco-City is conceived as a town consisting of three compact, pedestrian “villages”, each with its own distinct character: Marina, Lake and Pond. The city will then continue to grow as a collection of towns connected by cycle routes and public transport corridors, allowing inhabitants access to different parts of the city by tram, bus and bicycle, as well as on foot.
- the aim is to ensure that people will have to walk for no more than 7 minutes from any part of the city to reach a bus or tram stop.
- developers will have to prove they are using **sustainable materials**, such as wood from sources that are being replenished. China is criticised by environmentalists worldwide because of its timber imports from deforested Indonesia and Burma.
- **waste** will be treated, rather than discarded into the Yangtze. No landfills will be allowed, and sewage will be processed for irrigation and composting.

- only **clean-fuel vehicles**, such as hydrogen cars, will be permitted. Visitors will park their cars outside the city and use public transport to travel inside the city.
- **renewable energy** has priority: the STAR Project – Sustainable Technologies and Renewables Project – will try to keep emissions as near to carbon neutral as possible. Buildings will have photovoltaic solar panel cells, with large wind turbines outside the city area and smaller ones on/next to buildings. Low rise buildings will reduce the ‘heat island effect’ which will reduce global warming emissions. Turf and vegetation will cover roofs as insulators.
- **local food sourcing** – from Chongming’s existing local farming and fishing communities. In Shanghai, about a third of the land within the city limits is still used for agriculture, and almost a million of its inhabitants still work on the land.
- **grey water** will be recycled.
- buildings will be for **mixed use**, since combining work and residential areas minimises commuting.

A sustainable footprint is said to be 2.18 global hectares of land area (gha) used to support a person. However huge inequalities in the earthshare of footprints occur. *Table 1* shows how Dongtan’s footprint will compare with others.

**Table 1 Estimated average footprint (gha per capita) 2003.**

Country	Estimated average footprint (gha per capita)
USA	9.5
Switzerland	4
China	c. 1.5
United Kingdom	5.6
London	6.63
Shanghai	>7
Dongtan	<2.5

### Fears for Dongtan's success

- The vitality and sustainability of an ecosystem depends on its self-regulation ability - can the planning and managing authorities act as effective regulators in this ecocity?
- Water resources - there may be a conflict with plans for golf courses which use huge amounts of water resources.
- Dongtan's first phase, by 2010, will mainly house tourism industries - it is believed millions of people will want to visit the city. Other sectors will cater for education and research as well as service industries. Is this a sustainable base for any economy?
- Commuting out to Shanghai is inevitable, indeed some fear Dongtan will become a 'middle class ghetto'.
- The extensive area of fresh and salt water marshes, tidal creeks, and intertidal mudflats will face great pressures from the growth of a new city.
- Yang Ailun, climate and energy specialist at Greenpeace China, warns that Dongtan may be doomed since Global warming and associated rising sea level threatens all Chongming island!
- The initial phase will cost around £1.5bn, but the figures are expected to rise into the double-digit billions.

### Is Dongtan a completely new concept?

- Efforts at creating low footprint developments are all on a much smaller scale than Ecopolis.
- There are many examples of 'green buildings' from Melbourne city council building to the headquarters for the clothing retailer the Gap in California which has a roof with vegetation on it, a raised floor for better heating and in Japan the 110 flat complex in the Tokyo suburb of Matsudo eco-village created by the energy research institute, CRIEPI, is publicised as the country's first green housing project.
- In UK there are many small scale examples such as the Bedzed project (The Beddington Zero Energy Development), a mixed-use scheme in Wallington, S. London. This also involved the ARUP engineering group. The scheme was for 82 homes and community facilities with a workspace for 100 people and 2,500m<sup>2</sup> of commercial or living/work space. It was completed and occupied in 2002.
- In China, rural eco-settlements are encouraged, such as the Huangbaiyu (see Fig. 2) village project started from a group of Chinese and Americans who formed the China US Sustainable Development Group in 2002, to explore new thinking about energy-conscious building.
- On a slightly larger scale the planned development of Sociopolis, Valencia will provide 2,800 low-rise affordable housing integrated into traditional agricultural zones and irrigation systems.
- Many **shanty towns** in LEDCs already practice the principles of an ecopolis: efficient power use, recycling, private agriculture, and pedestrianisation.
- In the UK some of the ecopolis principles will be applied with the expansion of London via the Thames Gateway, Europe's most ambitious **regeneration project**. Indeed, Ken Livingstone, after his visit to the Dongtan site in 2006 plans for London's first mini 'ecocity' to be built in Newham for 1,000 homes.

Livingstone said: "Global warming was created in the West but it is increasingly to the East to which we look for a solution. Shanghai's Dongtan sustainable city project is breathtaking in scale and ambition and if it works it will be a beacon on how to achieve a low-carbon future."

### Conclusion

Whether megacities can ever achieve the aims of ecopolis is very doubtful. Given the **legacy of the past**, many cities have centuries of growth and complicated systems built up over time. The sheer scale and speed of growth will cause the greatest problems to any city aiming for a more sustainable future. But at least Dongtan is an optimistic signal from China that the 'world's factory' is serious about doing something on global warming and sustainability

2006: Professor Herbert Girardet, eminent researcher on sustainable cities and senior advisor to Dongtan:

*"Dongtan is intended to set an example. It will be a pioneering eco-city that could become a blueprint for sustainable urban development, in China itself and elsewhere in the world. It holds a promise of a high-efficiency, small-footprint urban design. By 2010, Dongtan will be a compelling model for how to build sustainable cities worldwide that may well be too persuasive to ignore."*

Fred Pearce, famous environmental reporter:

*"Far from being parasites on the world, cities could hold the key to sustainable living for the world's booming population - if they are built right."*

### Further reading

- Science Museum Making of the Modern World – Sustainable cities [www.makingthemodernworld.com](http://www.makingthemodernworld.com)
- BBC news on sustainable cities + interactive site 'Disposable Planet' [http://news.bbc.co.uk/1/hi/english/static/in\\_depth/world/2002/disposable\\_planet/cities/](http://news.bbc.co.uk/1/hi/english/static/in_depth/world/2002/disposable_planet/cities/)
- London ecological foot print, City Limits report for Mayor GLA [www.citylimitslondon.com](http://www.citylimitslondon.com)
- United Nations Sustainable Cities programme [www.unchs.org/programmes/sustainablecities](http://www.unchs.org/programmes/sustainablecities)
- Ecological footprints Global Footprint network: [www.footprintnetwork.org/gfn\\_sub.php?content=national\\_footprints](http://www.footprintnetwork.org/gfn_sub.php?content=national_footprints)
- Official Bedzed site Peabody Trust: [www.peabody.org.uk/pages/GetPage.aspx?id=179](http://www.peabody.org.uk/pages/GetPage.aspx?id=179)
- Cities in a global warming world [www.urbanecology.org.au/articles](http://www.urbanecology.org.au/articles)
- Audio lecture from economist on ecocities 2.9.06 (subscription needed) [www.economist.com/search/search.cfm?rv=2&q=ecopolis&area=1](http://www.economist.com/search/search.cfm?rv=2&q=ecopolis&area=1)
- 12.6.06 Guardian on Valencia's Sociopolis: [www.guardian.co.uk/spain/article/0,,1795496,00.html#article\\_continue](http://www.guardian.co.uk/spain/article/0,,1795496,00.html#article_continue)
- Ecopolis concept [www.ecopolis.com.au](http://www.ecopolis.com.au)
- BBC news on eco settlements in China 2006: <http://news.bbc.co.uk/1/hi/world/asia-pacific/5084852.stm>
- 6<sup>th</sup> Feb 2007 The Independent article on Dongtan: <http://news.independent.co.uk/environment/article2241450.ece>
- Girardet lecture on sustainable cities: [www.royalacademy.org.uk/architecture/urbanism/herbert-girardet-the-sustainable-city.217.AR.html](http://www.royalacademy.org.uk/architecture/urbanism/herbert-girardet-the-sustainable-city.217.AR.html)
- Fred Pearce, New Scientist 21.6.06: [www.newscientist.com/article/mg19025561.700](http://www.newscientist.com/article/mg19025561.700)

### Acknowledgements

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