CHAPTER 17

ECO-CITIES OF THE FUTURE

Now we bring all these sixth wave initiatives together to discuss their integration in the creation of new eco-cities. There is no difficulty in describing the features or elements needed to define an eco-city: it is one where energy is as renewable as possible; resources are regenerated and waste disposal approaches zero; where water is regenerated from waste flows or produced via renewable desalination; where food is grown in enclosed spaces again powered by renewable energy; and where there is as much green open space as is physically compatible with a city. Even more simply, the eco-city is itself a sixth wave innovation drawing on all the other sixth wave advances.

The key to comprehending the emergence of eco-cities is to view these features as working off each other, capturing synergies that truly make the whole greater than the sum of the parts. Water regeneration utilizing renewable energies sparks creative ways of providing renewable power; renewable solar energy and desalinated water enable urban food production to be conducted on a grand scale. Resource regeneration through urban mining promotes initiatives in energy and resource efficiency enhancement. And what captures all these features and brings them together is eco-imagination. It is the eco-imagination of local entrepreneurial talent that is the real driver of the emergence of eco-cities, and that defines them – better than any particular set of features or elements. And it is worth noting that this approach to defining an eco-city is perfectly consistent with the view of cities as generators of wealth through synergies captured, based on density of development. In this case, the ‘wealth’ generated is a green economy, one that brings economic and ecological forces and systems closer together.

There are advanced eco-cities approximating this description found around the world – with mixed success so far. There is Masdar City in the UAE, which is planned as an eco-sphere or eco-garden in the middle of the desert. But by late 2016 it was struggling to get started, with only the students at the
Masdar Institute being permanent residents. There is Songdo, an advanced international business district created at Incheon, Korea. Here the airport is closely linked to the city through a 7-mile bridge spanning the beautiful waters off the Korean coast, and making a ride to or from the airport simply a 10-minute affair through breath-taking vistas. Songdo enjoys facilities such as an advanced waste collection system operating underground and driven by compressed air. It is certainly more successful at this stage than Masdar.

As befits a country looking to leapfrog to a new twenty-first century industrial civilization, China has figured prominently on the eco-city front. There have been many projects proposed—and not a few failures. The proposed eco-city of Dongtan on Chongming eco-island, at the mouth of the Yangtze river near Shanghai, was heavily promoted in the first decade of the twenty-first century as a completely new kind of eco-city; it has since floundered and come to nought.¹ In its wake have come a legion of new cities that have badged themselves ‘eco-cities’ as a means of putting an acceptable face on otherwise naked property speculation ventures.²

But there are three outstanding Sino–Singapore joint ventures that are genuinely raising the bar on future urban eco-developments in China. These ventures are creating new eco-cities in Suzhou, in Tianjin and in Guangzhou. Others are likely to follow—sparking emulation around the world.³ The first of these was the joint venture known as the Suzhou Industrial Park (SIP), which was begun as a joint venture between the governments of Singapore and China at central state level and at provincial level. There were grand ambitions on the part of Singapore, led by former PM Lee Kwan Yew, to create a genuine replica of Singapore in China, focusing more on the ‘software’ of good administration and legal procedures than the hardware of buildings and land development. But there were well known hiccups encountered along the way, and while private sector players were involved at every step, the whole Suzhou development never made a profit until Singapore had handed over 65 per cent of the equity to local provincial and municipal interests in China. Once the new ownership arrangements were in place the venture began to attract investment on a large scale and it started to return a profit—so much

¹. Dongtan figures prominently in the Julie Sze’s account of Chinese ‘eco-fantasies’ (Sze 2015). For other comprehensive and critical accounts, see for example Chang and Sheppard (2013).
². See the useful analysis by Taiwanese geographer Shiuhsen Chien in Chien (2013).
³. See the exposition and historical analysis in Chien et al. (2015). The point is that the Sino-Singapore eco-city joint ventures are viewed in China as candidates for replication—not as the last word in eco-cities themselves.
The next initiative came from Singaporean Senior Minister Goh Chok Tong and Chinese Premier Wen Jiabao in April 2007, culminating in a government-to-government agreement of November 2007 to create a new eco-city. Here the lessons learned by both sides in the Suzhou development were put to good use. The China side insisted that the Tianjin development was not to take up valuable arable land, and would have to be sited on degraded land that could be improved by eco-urbanization. In the event, the site chosen was salt pans and land ruined by toxic waste discharges on the Bohai Bay industrial region. This had the indirect advantage that it would make the Sino-Singapore Tianjin Eco-city a model of land regeneration: if it could be achieved in such an unpromising setting, then it could be achieved anywhere. For its part the Singapore side insisted that there had to be real business opportunities for Singaporean firms as well as other foreign investors, with a formula developed to frame this approach – private sector driven and government facilitated. In this second initiative, the Singaporean side learned the importance of involving the local Chinese provincial and municipal authorities at the outset, and calling for no more than 50 per cent of the equity in the SSTEC joint venture administrative entity. In this joint venture, the Singaporean side provided the capital, while the Chinese side provided the land.

The latest of these involves a new city built in a beautiful location featuring a lake and mountains in the southern Guangdong province, just a few kilometres from the city of Guangzhou (the former Canton, now a small pocket of colonial history in a booming megalopolis). This venture, the Sino-Singapore Guangzhou Knowledge City (SSGKC), is framed within a government to government agreement (the province of Guangdong and the city-state of Singapore) that gives it political credibility and clout. Within this framework it has a private sector driven strategy (once again) involving an overall government-to-government coordinating committee and consortia of corporations on both the Singapore and the China sides. This pattern of private–public cooperation between two countries has been found by experience to be the most practicable means of driving genuine eco-city

4. For a study of the Tianjin eco-city project as compared with other Asian and European developments, as the next stage in the evolution of clean production systems, see Hu et al. (2016). I visited the Tianjin eco-city in October 2016 to see the development at first hand; my thanks to Professors Jinhui Li and Xianlai Zeng at Tsinghua University for their arranging the visit and to Professor Zeng for accompanying me.
development. It builds on earlier experiences firstly in Suzhou and then in Tianjin.

While the Tianjin-based eco-city has been relatively slow to take off, with few large international companies stepping forward as yet to invest in the venture, the Guangdong-based development promises to be up and running almost as soon as the basic infrastructure (transport, communications, water and waste services) is completed and initial housing is constructed. The reason is that there is a clear economic imperative to the Guangdong initiative, which is designed to house not only the first intellectual property office in China outside Beijing (for activities such as patent application and examination, and copyright registration) but also the first Intellectual Property Office of Singapore to be built outside the city-state. Thus the plan to develop a ‘knowledge city’ is being taken quite literally in this case, where knowledge assets (IPRs) and the services that go with them (such as training in IP activities), universities and patent and copyright-based legal services, together with courts for hearing cases, promise to provide specialist employment that will in turn spark accelerated development of the city. This will be expected to create the demand for advanced social services encompassing education and health, including child care, and entertainment and leisure services, so that the city would be expected to transition to a real city with the ‘buzz’ of an existing metropolis like Hong Kong, Shanghai and Guangzhou itself.

THE ECO-CITY INFRASTRUCTURE

Drilling down into the details of the Sino–Singaporean eco-city projects, what emerges is an approach that may be viewed as consistently practicable, replicable, and scalable – as stated explicitly by the Tianjin eco-city plans. The implementation of waste collection, recycling and waste-to-energy systems is eminently practicable, based as it is on technology for underground movement of wastes via pneumatic traction and their capture at central sorting locations built entirely under cover. This is a commercially available (practicable) technology, marketed assiduously for example by the Swedish firm Envac – and yet in China’s eco-cities developed by Chinese–Singaporean interests the

5. I visited the site of the SSGKC in September 2016 and saw the progress being achieved in building the infrastructure, as well as landscaping around the central lake. I am grateful to Mr Jason Tay of the SSGKC administrative office and Professor Zheng Yongnian for facilitating this visit.
technology is being scaled up and thereby made replicable for all cities and not just for a handful of affluent estates.

Likewise for energy matters, we find in the Tianjin eco-city that whole industrial ‘parks’ like the National Animation Facility are now served by their own energy centres, which provide shared power supplies and shared heating and cooling flows – in what is technically known as a trigeneration facility. If you look up trigeneration on Wikipedia you find that it is a technically abstruse development confined to a few experimental locations, particularly in Scandinavia. But in the Tianjin eco-city it is being scaled up so that all firms involved in the animation ‘park’ are provided with shared power (largely sourced from renewables), stores of hot water for heating in winter and of cold water for cooling in summer – all delivered via a self-contained, modular, energy centre that can be scaled up to any dimension, from that of a neighbourhood to an entire city.

Central underground pneumatic waste collection systems with conversion of waste-to-energy, and localized trigeneration energy centres serving whole city modules, are just two of the ‘hardware’ features found in these Sino-Singaporean eco-city projects. Others include water regeneration and recycling; green building codes and green transport; green open spaces and modular development around ‘eco-cells’ that retain a human scale everywhere. The ‘software’ involved includes administrative procedures, ‘one-stop’ facilities for opening businesses, and the tax collection procedures introduced by the Singaporean organizations. These features are eminently practicable, utilizing technologies and social practices that are commercially available – and the Sino-Singaporean ventures scale them up so that they become replicable, as models for the rapid urbanization of the whole of China. The fact that they are being pursued at such scale protects them from the charge that they are merely fiddling at the edges. And the fact that they are based on Singaporean administrative and business capabilities protects them from the charge that they are utopian. But the question remains: can they really be scaled up in time throughout China – and then in other countries beyond – to meet the demands of exploding urbanization?

**CHINESE ECO-Fantasies?**

There is a prominent stream of argument that holds that China’s eco-imagination is running ahead of itself, and that plans for eco-cities and eco-islands like Dongtan (near Shanghai, now defunct) have been driven by Western fears of China’s rise. Julie Sze (2015), for example, argues that
Dongtan (and by extension other eco-projects) are mere eco-fantasies; they need to be viewed (she says) as part of a discourse of an ‘ecological Shanghai’ that insists that development and environmental responsibility proceed hand in hand – rather than development first and ecology second. She argues that Dongtan promoted a grand ecological vision that in the end outran itself: ‘Dongtan was evoked as a new phase of development, one that took ecology seriously, and which foretold a different pathway for the Chinese nation’ (2015: 9). The Arup design company, the British master planner of Dongtan chosen by the Shanghai Industrial Investment Corporation, described the projected eco-city as ‘the quest to create a new world’. That this world came crashing down is beyond dispute. But was it because of excessive and over-ambitious ecological dreaming?

There is another, more prosaic explanation for these failures. The Chinese state authorities have been mindful of food security, and correspondingly wary of conversion of farmland to city development. So they have imposed quotas on such farmland conversion on municipal authorities – and career paths are shaped by officials’ ability to work within these quotas. In the case of Dongtan it seems that the eco-city was promulgated with the last remaining quota of farmland conversion – and that land speculation away from Dongtan reduced the quota available – which in turn led to the demise of Dongtan itself.6 By this argument, Shanghai municipal authorities simply failed to provide for the land needed by Dongtan despite all the international publicity, and the proposed city languished as a result. One would like to see more research on an issue as pressing and fundamental as this.

Sze’s argument is beguiling. She sees Dongtan, even if it had been successful as a business and technological development, as irrelevant – as artificial as Thames Town, the UK replica built as a fantasy in the precincts of Shanghai, and which today serves merely as a backdrop for wedding photos.7 She is right that eco-cities sometimes can be nothing more than glorified real estate speculations. But they can be so much more – as demonstrated emphatically by the Sino–Singaporean joint ventures in Suzhou, Tianjin and Guangzhou and possible further locations. These ventures all involve new creations – since it is clearly so much easier to create new infrastructure as

6. The Taiwan economic geographer Shiuh-Shen Chien has an argument along these lines (see Chien 2013), as do Chang and Sheppard (2013).
an investment project rather than through retro-fitting an existing city. They do not call for specific innovations; rather they bring together best practices and ‘package’ them in a new system or combination that is scalable and replicable.

Above all these eco-cities are exercises in imagination – and it is imagination that the world needs in creating cities that will prove to be economically and ecologically successful – at scale. While the West plays with mini-projects and fashionable inner-city conversions, it is China that is imagining green cities at scale, as real prospects for a rapidly urbanizing world. This is the significance of the eco-city projects that promise a model of the green future that is practicable, scalable and replicable.\(^8\)

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8. These are the descriptors utilized by the planners of the Tianjin eco-city development – and they apply to all such eco-city developments and indeed to sixth wave innovations generally.