Another green world

Architect Winy Maas heads a research group known as 'The Why Factory'. According to them, while cutting consumption is all very well, we are too focused on individual 'green' behaviour. We need to think bigger to solve our problems. Big cities are the key to a greener future.

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Winy Maas

Photo: Sam Rentmeester/Fmax

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They look like spaceships that landed silently, in the dead of night, in the main thoroughfares of Barcelona. Long rows of identical, elongated greenhouses, three stories high, and constructed across the roofs of houses, block after block. They are lined up neatly in rows, as if their arrival was as logical as it was self-evident.
This vision of the future, known as 'The Hanging Gardens of Barcelona', was created by The Why Factory, part of the faculty of Architecture. But while these white greenhouses do not conceal any shuffling Martians, they can grow enough crops to meet a large part of the population's food requirements. A helium balloon is used when harvesting these crops.
The major feat of urban planning featuring in this green dream is literally and figuratively hanging over the heads of Barcelona's residents. Big problems require big solutions? It clearly takes an astonishingly large area of land to feed an affluent Western city. The following is one of the numerous 'Eco Factoids ' in the 'Green Dream', a book published this year by The Why Factory. 'An area of land 150 times the size of Manhattan would be needed to grow enough food for all the residents of that borough.' There are many good reasons for moving food production into the city: it involves less waste, less transport (so less CO_2 is emitted), and has less of an impact on surrounding areas of land. In short, Barcelona is reducing its ecological footprint. But where can a city find sufficient space to grow enough crops to meet its own food requirement? The Hanging Gardens of Barcelona were conceived by Master's students Nicola Placella and Magnus Svensson, who have done their best to reduce the spatial impact of food production. Meat has been banned. Barcelona will rank among the 'Self-Sustaining Cities of the Totalitarian Vegan Order', assert Placella and Svensson with a wink. Yet even such 'Vegan Cities' would not be able to achieve full food autarky. A harsh conclusion for plucky urbanites practising urban farming on balconies and in back gardens. 'Green Dream' smashes many more green illusions to smithereens. Did you know, for example, that the 26,000 trees in Central Park compensate for the combined CO_2 emissions of no more than 37 of Manhattan's 1.6 million residents?

Future fantasies

The Why Factory's first publication was entitled 'Visionary Cities' (2009), in which architects were required to develop their own vision of the cities of the future. Winy Maas pointed out that architects often avoid major projects, for fear of going down in history as the mastermind behind an urban planning disaster of terrifying proportions. 'Visionary Cities' called upon architects to return to creating vast future fantasies, pleading for honour to be restored to collective and to large-scale endeavours.

'The 26,000 trees in Central Park compensate for the combined CO_2 emissions of only 37 of Manhattan's 1.6 million residents'

The book was a sample sheet of themes to be worked out in detail in subsequent volumes. Its style was quite striking. Brief, sleek chapters that get straight to the point. The statements are supported by copious amounts of numerical data, often rendered into incisive visual forms. Much of the story was told using images.
'Green Dream: How Future Cities Can Outsmart Nature' continues in the same vein, but with a more in-depth treatment. The sub-title alone is provocative. You can almost hear some sustainability gurus sighing about the desire to outsmart Mother Nature, the same old arrogance that has led ever-destructive mankind to cause one environmental disaster after another. Maas and co-authors Ulf Hackauf and Pirjo Haikola deny this, claiming

Stations for solar energy, shaped as waterlilies.

that technology and innovation are essential for true sustainability. Nature will therefore continue to change, as a result of human intervention.
They also see 'natural', as a tricky concept. Why shouldn't big cities be a more natural setting for 21st century Homo sapiens than a pristine area of wilderness? After all, man is better able to survive in urban surroundings. "Perhaps we should abandon our romantic ideals about the countryside, and embrace the science and innovation that cities have to offer," the authors suggest.
Cities may be a solution rather than a problem. Green metropolises may actually be one way to reduce humans' adverse impact on the climate and on the natural environment. The Why Factory urges the use of new, sustainable technology in this setting, on an unprecedented scale.
While they are concerned about climate change and diminishing biodiversity, the Why Factory's researchers are pushing ahead with the development of progressive concepts. They place great emphasis on technology and innovation. There are also massive infrastructure projects such as 'Green Dream', which shows how a network of magnetic levitation (maglev) trains could be used to link all European cities together.
We are too focused on our own eco-sins, say the researchers. Major interventions such as new transport and energy networks and stricter laws are more effective than cutting consumption and sorting household waste, praiseworthy though these measures may be. Green consumers are also being misled by marketing ploys in which unrealistic claims are made about the sustainability of certain products. Experts have neatly categorised these methods as the 'seven sins of green washing'.

Masdar City

Not back to nature then, if The Why Factory has anything to say about it, but onward to a new green world in the big cities. What would this world be like, and have such high-tech eco-cities already been built?
With regard to the latter, it remains to be seen. In recent years, China and the United Arab Emirates have generated a great deal of favourable publicity with their plans for relatively small but sophisticated eco-cities. Dongtan was to have been the ecological jewel in Shanghai's crown. A city running entirely on renewable energy, where everyone would be within walking distance of public transport. After five years the worldwide enthusiasm had turned to cynicism – Dongtan was simply never built.

'It takes an astonishingly large area of land to feed an affluent Western city'

After this debacle, the construction of Masdar City was followed more critically. This was certainly the case when ▸▸

the completion date for this eco-city beside the airport in Abu Dhabi was postponed from 2016 to 2020. However, this project still appeals to the imagination. Masdar is not only intended to be the first CO_2-neutral, zero waste city in the world, it will also have a university of its own, and will be able to serve as a testing ground for scaled-up technologies for various types of renewable energy.
According to the authors of 'Green Dream', Masdar is an unsuitable example for eco-cities in cooler regions. " The city has been specially designed for a hot, dry and sunny location." This involves a strong focus on solar energy, and an urban design with considerable emphasis on shade and natural cooling. The construction of Masdar City will cost around 22 billion U.S. dollars, a sum of money beyond the wildest dreams of developing countries with similar climates.
Nevertheless, they see the city as an interesting test case. " The combination of renewable sources of energy and energy-efficient planning can be a very promising example. The city will be free of cars. An automated personal rapid transport system [involving electric taxis – ed.] will be introduced, the first time this has been done on a city-wide scale. Once the technology has proven itself, other cities will be more inclined to use the system too."
If they are to achieve the benefits of scale, green cities like the one The Why Factory has in mind must have at least 1-million inhabitants. On an abstract scale, researcher Haikola has identified ways in which green cities of this kind, located in tropical climatic zones, might work. Rough sketches, as it were, but based on simple calculations of things like food production and energy supply.

Compact city

Haikola first looked into the number of square kilometres of agricultural land required, and the total amount of waste, which is modest compared to rich countries.
She conceived a very compact city, with narrow streets (for shade), and buildings mostly 25 stories high. Cooling wind flows are generated by differences in elevation between the buildings.
Haikola's green city is linked to other regions and

The Hanging Gardens of Barcelona.

Luminescent bacteria make the Amsterdam canals glow blue.

countries by a fast maglev train system, which makes travelling by air less attractive. Maglev trains are also used for freight transport, thus reducing CO_2 emissions.
When designing the food production system, Haikola also encountered the space-shortage problem. Hydroponics involves growing crops in water with added nutrients (including minerals), rather than in the soil. This method of cultivation potentially uses only one third of the agricultural land required by other methods. This technique could conceivably be used in green-roofed city flats, but it does have a number of drawbacks. For instance, it tends to boost the heat-island effect, which makes cities significantly warmer than the surrounding areas, even at night.

'Perhaps we should abandon our romantic ideals about the countryside'

This can be solved by creating four artificial hills around the city, each 135 stories high. Together, they cover an area of 22 square kilometres. Here, not in the city but close to it, there is room for food production. Haikola has also sited the energy supply system close to the city. There is a solar power station covering an area of well over 100 square meters, a wind farm covering 379 square kilometres (using the largest wind turbine in the world, the German Enercon E126) and some third-generation nuclear power plants. All to supply energy to a vertical city that takes up less than half the space of Delft, but which nevertheless has one million inhabitants.

Green City Calculator

If both old and new cities are soon to form the vanguard of sustainability, we will need an instrument capable of measuring and comparing the green performance of entire cities, rather than individual homes. The Why Factory is attempting to develop just such a 'Green City Calculator', which must also be able to calculate the effects of new policies on a city's green goals.
Here too, The Why Factory stresses the importance of reason and hard data in the sustainability debate. At the same time, this think-tank occasionally dreams up some outwardly enticing visions of the future. In one of these, luminescent bacteria are used to make the canals of Amsterdam glow blue. Giant water lilies around the Thai island of Phuket attract tourists and provide solar energy. Taipei is bathed in white light during the day and in green light at night. A new aesthetic is emerging.
But those cold frames above Barcelona will take some getting used to. ◂◂

Further details:
The Why Factory, 'Green Dream, How Future Cities can, outsmart Nature', NA publishers, 408 pages, 35 euro