

# Introduction

More than half of the world's population currently lives in cities, and another 2.5 billion citizens are expected to join them by 2050.<sup>1</sup> The United Nations (UN) predicts that nearly all population growth up to 2030 will be in cities, with 96 per cent of this increase occurring in Asia and Africa.<sup>2</sup> This incredible surge in the urban population demands that we urgently re-evaluate how cities are designed and built to best meet the needs of future inhabitants.

Cities have tended to evolve gradually in response to incremental changes in their population, density, wealth, trading opportunities and availability of resources, as well as to trends related to lifestyle choices, affordability, transportation, infrastructure, education and safety. In recent decades, however, many conurbations have developed at breakneck speeds as people gravitate to places experiencing booms in trade, commerce and industry.

The rate at which cities are growing presents numerous challenges for stakeholders involved with urban development. The following are just some of the many complex questions that planners, policymakers and designers are required to address. How can established metropolises continue to expand while offering the same quality of life to all future inhabitants? Can we quickly create new districts or entire cities to successfully accommodate increasing numbers of urbanites? How might new technologies make city living smarter and more efficient? And how can we achieve all of this while preventing further damage to our planet's fragile ecosystem?

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1 United Nations, Department of Economic and Social Affairs, Population Division, *World Urbanisation Prospects: The 2018 Revision*.

2 UN-Habitat, *World Cities Report 2020: The Value of Sustainable Urbanization*.

# 2.

By 2030 the world is projected to have at least 43 megacities – defined as having more than ten million inhabitants.<sup>1</sup> The majority of these will be located in developing regions, with Delhi predicted to become the most populous city in the world around 2028.<sup>2</sup> However, some of the fastest-growing cities will be those with fewer than one million citizens, many of which

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1 United Nations, Department of Economic and Social Affairs, Population Division, *The World's Cities in 2018 – Data Booklet* (ST/ESA/SER.A/417), 2018.

2 United Nations, Department of Economic and Social Affairs, Population Division, *World Urbanisation Prospects 2018: Highlights* (ST/ESA/SER.A/421), 2019.

and

# Masterplans

will be in Asia and Africa.<sup>3</sup> Both megacities and smaller urban settlements present opportunities for supporting people out of poverty by providing better housing, education, healthcare and employment. However, if not regulated properly, urban spread can result in increasing numbers of people living in overcrowded slums or shanty towns with high rates of disease, malnutrition and a lack of basic healthcare.

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3 Ibid.

# Megacities

# BiodiverCity Penang

— BIG +  
Hijas +  
Ramboll



In 2020, Bjarke Ingels Group (BIG) won an international competition organised by Penang State Government to design a masterplan for Penang South Islands in Malaysia. Its proposal, called BiodiverCity, responds to the region's cultural diversity and unique ecosystem by providing space for people and nature to coexist. A cluster of artificial islands will accommodate urban districts connected by natural corridors providing habitats for native species. In total, the development will extend over 1,800 hectares and will be home to between 15,000 and 18,000 residents. It will include 4.6 kilometres of public beaches, 240 hectares of parks and a 25-kilometre waterfront.

The masterplan developed by BIG in collaboration with architecture firms Hjjas and Ramboll, is designed as a mixed-use city, with each zone focusing on specific functions. One island will contain governance and research institutions, along with a creative district and an area for conferences and education. A second island will be dedicated to businesses, and a third will contain housing organised around a central marina.

Eight smaller islands will form a miniature archipelago with additional accommodation and straightforward access for fishermen to a network of waterways. Sustainability is a key focus of the project, which will see buildings constructed using low-carbon materials such as bamboo and local timber. Green roofs, facades and parks will contribute to the creation of new habitats, while a water-, air- and land-based transportation network will make roads and cars redundant, creating safer and cleaner neighbourhoods.











# Self Sufficient City

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WOHA





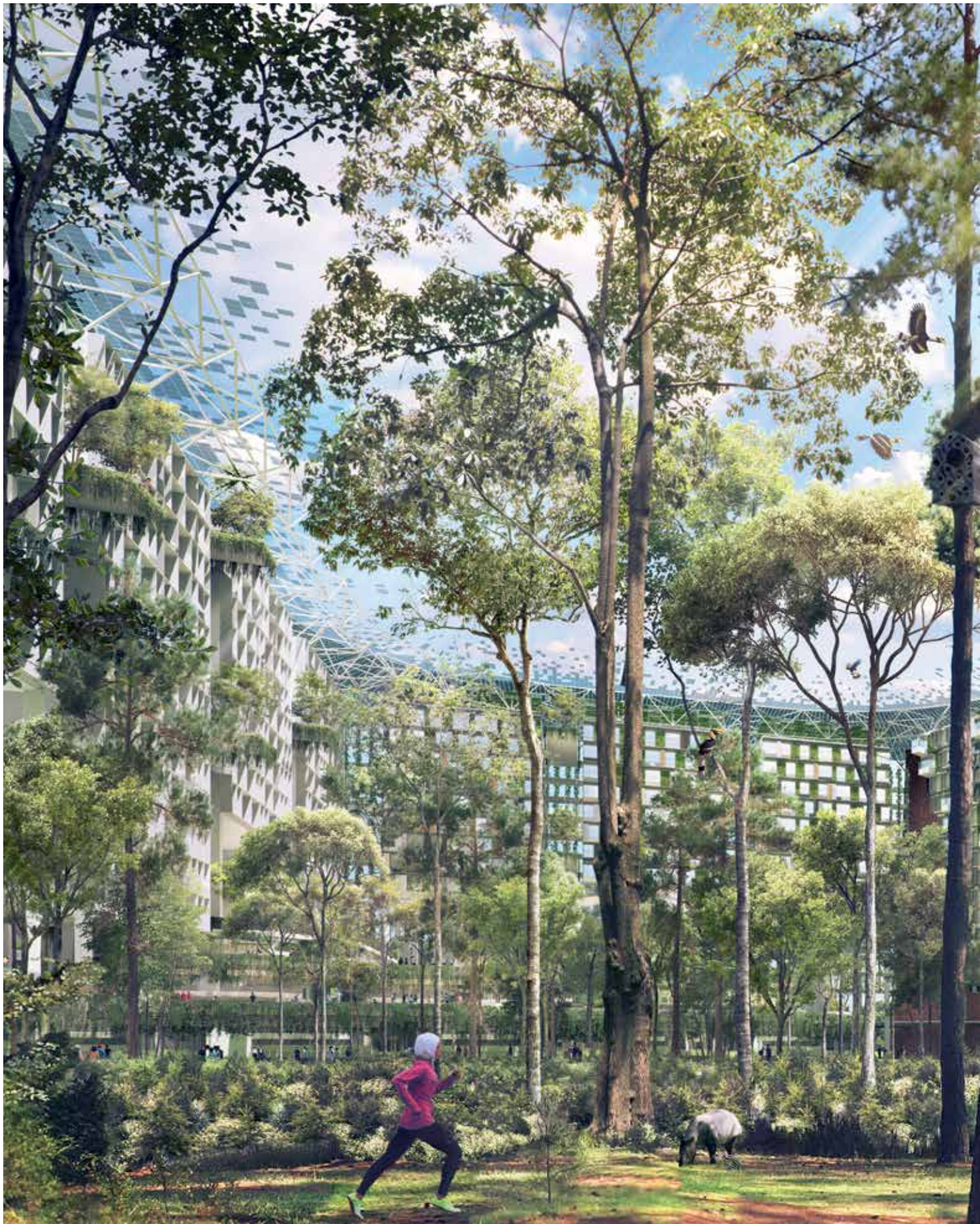
The work of Singapore architecture office WOHA consistently addresses issues relating to sustainability and community in urban planning. The firm's approach to tropical architecture utilises biophilic building practices to maximise green coverage in an attempt to combat the urban heat-island effect, while also reintroducing biodiversity and green relief into the city.



This conceptual design for a Self Sufficient City accommodating 210,000 inhabitants in northern Jakarta would retain over half of the existing green landscape and incorporate it into a layered 'eco-town in a forest'. The proposed 730-hectare site is overgrown with secondary rainforest, which would form the basis for parkland traversed by paths and tramlines. This diverse topographic landscape would provide a safe, car-free environment containing waterways, pavilions, event spaces, shops and cafés.

Aerial neighbourhoods comprising 'sky streets' and 'sky parks' built into and on top of residential and workplace buildings would create an inverted skyline with rooftops capped at the same height. A canopy comprising more than three square kilometres of photovoltaic panels would cover the seamless rooftops, and would generate enough electricity to support the fully net-zero-energy city. The panels would also act as a sun shade, protecting 'sky fields' where produce could be grown to feed the city's inhabitants. Ideas contained within this speculative proposal inform many of WOHA's built projects and provide a blueprint for more sustainable and sociable urban development.









← Residential and workplace zones are layered above the existing tropical landscape



# The Farmhouse ————— Precht



The Farmhouse is a proposal to unite the fundamental human needs of food and shelter in a new form of urban architecture. According to the Food and Agriculture Organization of the United Nations (FAO), 80 per cent of all food produced globally is consumed in urban areas<sup>1</sup> and the predicted global population in 2050 will require food production to rise by around 70 per cent.<sup>2</sup>

In response to these challenges, Austria-based architect Chris Precht has developed a modular building system for creating dwellings that facilitate urban farming. Using these buildings to grow crops would offer an ecological alternative to current food supply systems and provide food security for the city's inhabitants.

The Farmhouse system would consist of prefabricated cross-laminated timber components that are straightforward to transport and install. Apartments based on traditional A-frame houses would contain gardening elements built into an outer layer, with hydroponics and solar power systems used to sustain the plants. The kits could be used to create small units for single-family use, with homeowners able to choose the layout, structure and gardening elements from a catalogue. Taller duplex units could combine to form residential clusters with spaces for gardening in the V-shaped voids between their angled walls. The units could also stack to form towers with a diagrid framework that would optimise the building's footprint. The Farmhouse would allow people living in cities to reconnect with nature and appreciate how food is produced, as well as reducing the need to convert natural environments into farmland.

1 [fao.org/urban-food-agenda/en/](http://fao.org/urban-food-agenda/en/)

2 [fao.org/fileadmin/templates/wsfs/docs/Issues\\_papers/HLEF2050\\_Global\\_Agriculture.pdf](http://fao.org/fileadmin/templates/wsfs/docs/Issues_papers/HLEF2050_Global_Agriculture.pdf)



# Smart Forest City Cancun

Stefano Boeri  
Architetti





Stefano Boeri Architetti developed this masterplan for a sustainable smart city on Mexico's Yucatán Peninsula, which would be driven by values of technological innovation and environmental quality. The metropolitan area near Cancun would cover 550 hectares and host up to 130,000 inhabitants, along with a high-tech innovation campus and research centre aimed at tackling issues related to climate change and creating a more sustainable future for the planet.



The Forest City would incorporate 362 hectares of planted surfaces spread across various parks, roof gardens and green facades. These would be sustainably irrigated using sea water that would be treated at a desalination facility at the city's entrance and distributed via a network of navigable canals. A photovoltaic ring encircling the built area would provide most of the city's energy. Solar panels positioned on raised canopies would also collect rainwater and shelter areas for food cultivation underneath.

Stefano Boeri Architetti worked with engineering and logistics specialist Transsolar to identify smart solutions for optimising the region's natural resources and climate to make the city as self-sufficient as possible. Sensors integrated within buildings would collect data that would be used to support energy management and provide inhabitants with advice on how to save energy and money. Residents would also have access to an app that would map the expected comfort of outdoor spaces, suggesting options for sunny or shaded spots at different times of day.

# Oceanix City

OCEANIX + BIG + Studio  
Other Spaces + UN-Habitat



Oceanix City is a proposal for a floating community housing 10,000 people, created in response to the imminent threat posed by rising sea levels. OCEANIX, a blue tech company, collaborated with BIG, artist Olafur Eliasson and architect Sebastian Behmann of Studio Other Spaces, UN-Habitat and a team of partners to develop the masterplan for a sustainable floating city that uses blue technologies to meet humanity's shelter, energy, water and food needs while regenerating marine ecosystems.

The city would consist of modular, self-sustaining neighbourhoods covering approximately two hectares each and housing 300 residents. The neighbourhoods would include mixed-use space for living, working and gathering, built around a central area for communal farming. Buildings would be capped at seven storeys to ensure a low centre of gravity and to reduce wind exposure. Clustering neighbourhoods around a protected central harbour would allow larger villages of 12 hectares to accommodate up to 1,650 residents. Social, recreational and commercial functions would be arranged around the inner ring to make it straightforward for residents to navigate the city on foot or using electrically powered boats.

Buildings would be prefabricated on shore using locally sourced materials and towed to the final site to reduce construction costs. The result would be an affordable housing solution that minimises ongoing disruption to Earth's fragile coastal regions.





