

A photograph of the Shanghai skyline at night, featuring the Oriental Pearl Tower and other illuminated skyscrapers against a dark, cloudy sky. The lights from the buildings reflect on the water in the foreground.

Around the World in 80 Case Studies

China

Around the World in 80 Case Studies

Welcome everyone to the third in our 'Around the World in 80 Case Studies' series. Inspired by the adventures of Phileas Fogg in French novelist Jules Verne's novel, published in 1872, we are embarking on our own adventure around the world.

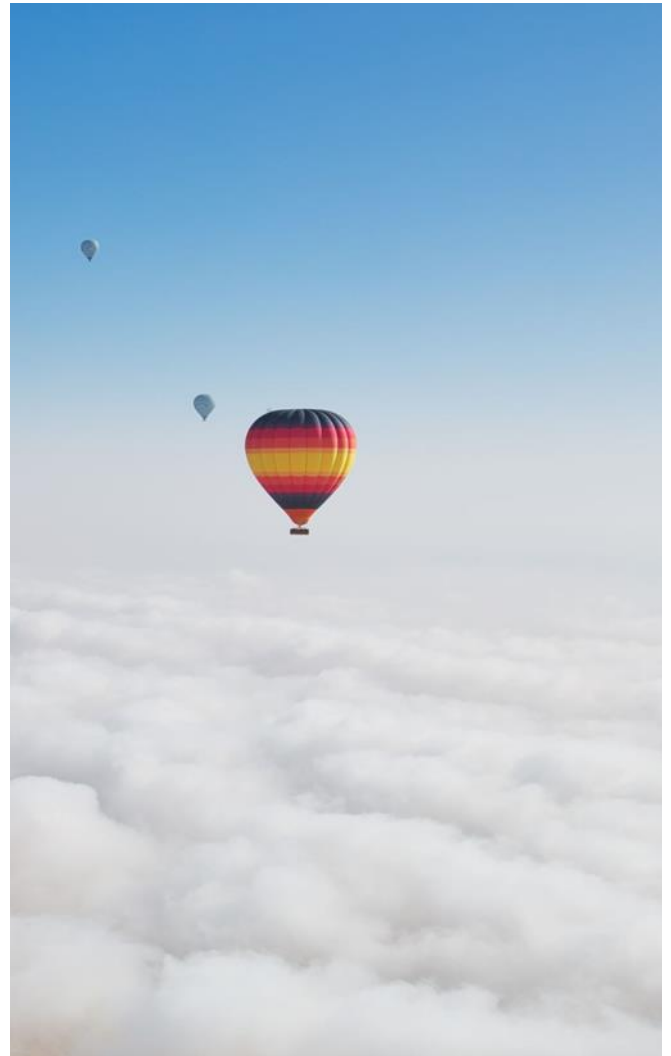
Since 1872 when Phileas Fogg set off, CO2 have risen from 288ppm to today's 418ppm – which sets the context for our modern circumnavigation.

Nearly 150 years on from Fogg's original journey, ours is an architectural, virtual and covid-safe adventure, that will explore some of the buildings and places responding to the challenges of global warming in the year leading up to what we hope will be another landmark COP Summit in Glasgow in next month.

We started our journey in Paris, home of the landmark 2015 COP21 'Paris Agreement' before heading to Costa Rica, home of Christiana Figueres one of the key figures in securing the Paris Agreement, and now we head on to China who will be so instrumental in determining the success or failure of any climate agreements with their large

population, representing quarter of world emissions – and ability to turn on a dime when they want to change direction.

Please get in touch if you would like details on our Paris and Costa Rica events, and join us for future tour stops by keeping up to date with our [Courses and Events](#) webpage.



Welcome to China

Setting the Scene...

For this section of the journey, we are heading to China. A country with one of the oldest civilisations and the [largest population](#) of any country on earth – 1.4 billion people – 18.5% of the world's population.

Critically China accounts for [27% of the world's global CO2 emissions](#) and we are visiting China on the eve of COP26 because China's action on climate change will be critical to the success of global efforts to reign in emissions and stay within 1.5 degrees.

So far, China has committed to [peak emissions by 2030 and achieve net zero before 2060](#). Encouragingly, and in contrast to many Western political commitments, and as noted in a [recent Outrage and Optimism episode](#), China tends to under-promise and over-deliver on such commitments.

They have also [recently announced](#) that they will no longer be building coal fired power stations outside of mainland China. This represents a key change to the [Belt & Road Initiative](#), and a significant reduction in the forecast fossil fuel infrastructure (and consequent built in emissions) globally.

And like most countries, for every good news story, there is a contrary bad news story: China accounted for over a quarter of global wind-[energy generation](#) in 2018, China is home to two-thirds of the world's solar-production capacity however, China is currently [running 1,058 coal plants](#) - more than half the world's capacity.

In terms of [emissions per capita](#), China has increased drastically over the last two decades from 2.6 tonnes per person in 2000 to 7.4 tonnes in 2018. This number now exceeds the UK's 5.4 tonnes but still falls significantly short of the USA's 15.2 – or at the very top end – Qatar's 32.4.

But this is also a tricky statistic given that so much of China's emissions - [an estimated 22%](#) - are generated in industries producing goods that are exported. If China were to reduce production these emissions

would likely just shift elsewhere rather than be abated, unless demand, largely from developed countries diminishes.

China's recent history is one of rapid urbanisation -it has urbanised more than the total population of the USA in the last 30 years and a population the size of Estonia is projected to urbanise *each month* till 2030.

Along with transporting the population from country to city, this urbanisation has moved millions from poverty to middle class prosperity.

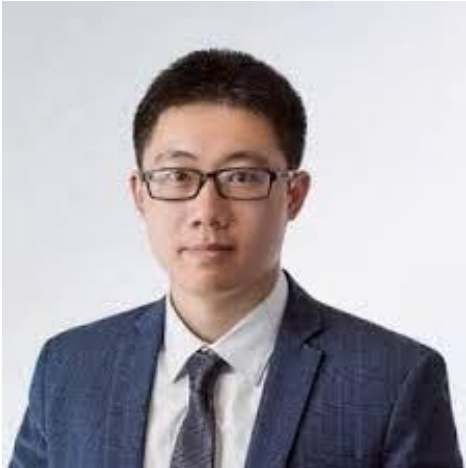
But the transition had come at a cost to the natural environment, and the health of the people it supports. Air pollution is a major cause of premature deaths, with a report in [The Lancet](#) estimating that estimated that 1.24 million deaths in China were attributable to air pollution in 2017. This rate is now [falling from a 2013 peak](#).

All eyes will be on China this week when the [Biodiversity COP15](#) is held in Kunming (on-line), at the Glasgow Climate Change COP26 in November, and again at the postponed element of the Biodiversity COP to be held in-person in May 2022 to see whether the speed and energy at which they have transformed in the last 20 years will now be directed to green and sustainable growth.



Our hosts

Our guide for our tour of China



Gary Zhao

General Manager, BRE China

Gary has Masters degrees in Engineering and Sustainable Energy from Chinese and Norwegian Universities respectively. His professional experience in the private sector includes roles for Arup, Tianhua and Savills in Engineering and business development. He joined BRE China in 2018 and is now General Manager, based in Shanghai. Along with being familiar with BREEAM certification Gary is also experienced in LEED and WELL accreditation.



Peter Duncan

SOM, Shanghai

Peter has more than 28 years of experience and an extensive portfolio of projects realized throughout China and a commitments to sustainability, design excellence, and client collaboration.

Prior to joining SOM, Duncan served as Chairman, Board Director, and China Managing Director of HASSELL. Duncan has lectured regularly at universities throughout Asia, and is a Fellow of the Hong Kong Institute of Landscape Architects. He holds degrees from the International Real Estate Business School in Frankfurt, Germany, Newcastle University in the United Kingdom, and the Royal Melbourne Institute of Technology in Australia.



Anna Hollyman

Sustainability Advisor, UKGBC

Anna has worked as an Architect in a number of practices in the UK as well as in Hong Kong, Dubai and a number of years in China. Anna has expertise in energy efficient and sustainable design, and a strong interest in biophilic design and healthy environments.

Anna is now part of UKGBC's Learning and Development Team with a focus on tailoring bespoke programmes for our members, as well as continuing to champions health and wellbeing.

1

Tianjin Eco City

Sino-Singapore Tianjin Eco-City Investment & Development Corporation

Key facts



30km²



2008 - 2020



Mixed Use



Climate Change - Resource Use -
Health & Wellbeing - Socio-
Economic Impact - Nature &
Biodiversity



Project overview

Tianjin Eco city is 40km from downtown Tianjin and 150km from Beijing. Prior to development the site was salt pan, beach and water, now reclaimed. A response to environmental degradation as a result of rapid urbanisation, the eco city is a joint venture between the Chinese and Singaporean governments, and is designed as a replicable model for [other eco cities](#) across China - of which there are now hundreds with varying degrees of measurable success.

While there is no official definition of an Eco City, [KPIs](#) in Tianjin include air and water quality metrics, co2 emissions, green building and transport standards, renewable energy targets and socio-economic equity.

Tianjin eco city forms only part of the rapid expansion of China's 4th largest urban whose [population](#) has nearly doubled to approx. 15 million in the last 20 years, and is expected to house 350,000 on completion. While there is [debate](#) about how environmentally sustainable China's eco cities actually are, there is no doubt that they represent a significant shift away from urban planning whose sole metric was quantity, towards a more ecologically responsible and liveable urban paradigm.

Notable achievements



✓ 2018 Green Solutions Award

Further resources



Find out more about [Tianjin here](#).

Watch this short [video](#), or longer [video](#)

2

Meishe River Greenway & Fengxiang Park, Haikou Turenscape Landscape Architects

Key facts



13km, 80ha



Completed 2016



Landscape, infrastructure



Nature & Biodiversity, Climate Change, Health & Wellbeing



Project overview

The Sponge City concept was conceived in 2013 by [Professor Kongjian Yu](#) and has since been widely adopted across China. Similar in concept to SUDS - but on an altogether larger scale - the Meishe River Greenway was designed to address issues of water pollution, storm water and flood management, as well as improving quality of life for the city's inhabitants. Resilience is a key consideration for this and other low-lying coastal cities as sea levels rise.

The project involved the reversal of the philosophy of concrete channelling the city's waterways as flood protection, and aimed to alleviate the sewage and non-point source pollution from run-off that occurred in monsoon and other peak flow periods.

Meishe River Greenway is one of [29 Sponge City](#) projects listed on Turenscape's website and one of [30 pilot schemes](#) implemented by the government in 2015-16. It was aimed to act as a replicable demonstration project and has succeeded in restoring fish, birds, mangroves and clear water to the once heavily polluted waterway. In addition to slowing waterflows, sponge cities can help to restore clean water sources in depleted aquifers, mitigating water shortages exacerbated by rapid urbanisation.

[This article](#) gives a critique of the pros and cons - including governance, design and financing.

Notable achievements



- ✓ 2021 Cityscape Iconic Landscape Award
- ✓ One of the 18 International Wetland Cities by the Contracting Parties to the Ramsar Convention in 2018.

Further resources



[Find out more here.](#)

Watch a [video flyover](#) here.

3

Electric Bus Network

Shenzen Bus Group Co.

Key facts



17,000 buses



In use, completed 2017



Infrastructure



Climate Change - Health & Wellbeing



Project overview

The total transformation of Shenzhen's bus and taxi network to electric is the poster child for the scale and speed of change that can be achieved in China. What began as a demonstration project in 2009-11 for the Shenzhen Bus Group Co. grew into small pilots in 2012-15 (of less than 1,000 buses), and resulted in the full conversion of all 6,000 SBGC buses during 2016-17. The city now has 17,000 electric buses across its entire network of bus operators, and 22,000 electric taxis.

Shenzhen chose to opt for a scheme that meant minimal changes to routes, and adopted a single bus typology allowing all day operation and overnight charging. A central control system and real-time monitoring means bus deployment can be optimised, keeping an eye on battery life, delays, passenger numbers and (no infrequent) break downs.

The taxi service has also been completely electrified, with driver amenities built in at charging stations increasing the wellbeing of drivers. Along with driver wellbeing other benefits reported include passenger comfort, reductions in air pollution and greenhouse gas emissions, noise and cost to fuel.

Cons include the higher up-front cost of e-buses and the transformation of the electricity infrastructure required to power them, but other cities across the world are looking to Shenzhen as an inspiration for their own moves towards electrification.

Notable achievements



✓ World's first fully electric transport city

Further resources



Watch this episode of [Fully Charged](#)
Read this [article](#) and this [Case Study](#)

4

Gui'an Innovation Park, Beijing BRE, Tsinghua University

Key facts



20 plots



in progress



Campus



Climate Change - Resource Use - Nature & Biodiversity - Health & Wellbeing



Project overview

The Gui'an Innovation Park incorporates elements of the Eco-City, Sponge City and innovations in transport in the previous examples. The Park was conceived as a demonstration project over 20 plots and incorporates real-time monitoring, smart controls and long-distance assessment to create an exemplar smart city, combining green ecological sensors and an intelligent management centre together with other software and hardware.

It will be used as an assessment base for new technologies and new standards within the Chinese market.

While it has not yet been fully developed, one of the first buildings constructed was the [nearly-zero energy building](#) by SUP Atelier. This building is BREEAM Outstanding has low energy design and incorporates a wind tunnel system to passively ventilate the space. An innovative façade of rattan weave on steel frames combines traditional materials and techniques with industrial prefabrication.

The structural system is comprised of two different elements, the double-glazed façade can adapt to the seasonal and daily changes of the outdoor environment, solar PV has been incorporated as roof top solar and as thin-film on the veranda.

Notable achievements



- ✓ BREEAM Outstanding - [Science and Technology Demonstration Building](#)

Further resources



Find out more [here](#).

5

Liuzhou Forest City

Stephano Boeri



Key facts



1.75km², 30,000 residents



Design 2016



Residential, mixed use



Climate Change - Nature & Biodiversity - Resource Use - Social Value

Project overview

In another grand concept to address some of the ecological impacts of rapid urbanisation, a Forest City is proposed near Liuzhou in the mountains of Quangxi. The Liuzhou Forest City is a residential-led community that builds on the success of Architect Stephano Boeri's other greenery-draped towers built in [Milan](#) and elsewhere around the world, by taking the tower up to city scale. Projects by Boeri in [Huanggang and Nanjing](#) are underway, but others such as one in Chengdu that did not respond to local context, or failed in design and execution have been deemed a '[fail](#)'.

The concept promises to reduce air particulate pollution, act as a carbon sink, increase resident wellbeing, as well as increase biodiversity and habitats. The project in Liuzhou will host 40,000 trees and almost 1 million plants of 100 different species. This city is projected to absorb around 10,000 tons of CO₂ and 57 tons of pollutants while producing about 900 tons of oxygen per year.

Issues that will need to be resolved to ensure that this project succeeds in the long-term - and is therefore widely replicable - include where the burden of maintenance falls (residents, building managers, Municipality).

Notable achievements



- ✓ [Eccellenza Italia](#) award at the 2017 China Awards

Further resources



- Watch a short video [here](#)

6

EQuota Energy

Smart Building Management System

Key facts



3,000,000m² floorspace



In use



Any



Climate Change



Project overview

As China has rapidly urbanised it has faced the same challenges with a gap between building design and performance. EQuota is a technology that utilises existing building infrastructure to monitor energy use. Data is harvested in a non-intrusive way by connecting to existing smart meters, building management systems and other sensors. Without having to retrofit or install new monitoring hardware building managers are able to achieve significant performance improvements.

Harvested data is transferred securely to EQuota Energy's cloud computing facility, where intelligent software is used to process it. Disaggregated data from smart meters is broken down to identify individual pieces of machinery switching on and off, which is achieved by making use of data from other sources in the building and by the software learning from experience in other buildings.

They then use the disaggregated data to identify where energy is being wasted, where the building's environment is not ideal, and where maintenance is required. Information can be accessed remotely, e.g. by smart phone.

With this initiative EQuota are providing \$7m and 110,000 tonnes of CO₂ savings to clients each year.

Notable achievements



✓ Ashden Award winner 2019

Further resources



Find out more and watch a short video [here](#)

7

Jin Mao Tower, Shanghai

JINMAO Group, SOM



Key facts



289,500 m²



1999



Mixed use, office, hotel



Climate Change - Health & Wellbeing



Project overview

This office building is an icon of the modern Shanghai skyline combining modern skyscraper with traditional pagoda-style staggered design. Once the tallest building in China, the Jin Mao Tower is now one of a trio of super-tall skyscrapers in Lujiazui, Pudong, Shanghai, next to the Shanghai World Financial Centre and the Shanghai Tower.

Now 20 years old, the tower is the first building in China to be certified BREEAM In-Use, achieving an Outstanding rating of 87%. The management of this building is complex, incorporating hotels, offices, retail facilities as well as a viewing deck amongst its 88 floors.

The Outstanding rating places the tower as an exemplary in terms of green and low carbon buildings within the Chinese market. For the operations team, the user satisfaction within the building is a key focus of their work. Deep cleaning of carpets to reduce respiratory disease risk, water cleaning to prevent Legionella and regular fire inspections all formed part of the assessment.

Sub-metering of energy consumption (incl. electricity, gas, tap water and steam), ensures energy consumption can be monitored, reduced, and planned for annually. Compared to similarly operated buildings around the world, its carbon emissions are at relatively low levels.

Notable achievements



- ✓ BREEAM Outstanding - In Use
- ✓ 1st certified BREEAM In Use Project in China
- ✓ Shanghai Tower LEED Platinum

Further resources



[BREEAM case study](#)
[Video](#) on Shanghai Tower



COFCO Landmark, Beijing

Beijing Kunting Asset Management Co. Ltd,
SOM



Key facts



46,000m²



2018



Office, Retail



Climate Change - Health & Wellbeing

Project overview

The COFCO Landmark building in Beijing consists of 3 towers of differing heights and a basement retail centre.

Energy efficiency technologies include chilled water thermal storage, managing inlet water temperature differentials, BIM design and energy monitoring and management. In addition to this, the façade has been designed with materials of low heat transfer and with a curtain wall that reduces heat transfer between outdoor and indoor environments.

Surface water runoff is controlled to reduce flood impacts on-site and within the city infrastructure, as well as being stored for use in on-site irrigation and cleaning. Roof gardens and a water reservoir assist in this process as well as providing amenity space for office occupants.

Internal Air Quality monitoring assesses CO₂, VOC and PM 2.5 in real time to ensure indoor health and comfort. Water supply is also monitored using real time sensors, and smart technology allows property management from off-site via smart phone which has resulted in greatly reduced energy consumption.

Further resources



[BREEAM Case Study](#)
[Virtual Tour](#).

Also by SOM - [Poly International Plaza](#)

Notable achievements



✓ BREEAM Excellent - Design and Post-Construction

9

Living Building, Changsha

Broad Group

Key facts



10 storeys



In use, completed 2019



Residential



Climate Change - Resource Use -
Health & Wellbeing



Project overview

The Living Building by Broad Group is a 10 storey apartment building that was constructed in just over a day. Built over the space of 28 hours, the factory-made modules were transported to site, lifted into place by crane and bolted together.

Due to its stainless steel structure, Broad are claiming that it is a "1,000 year building" as well as being 10 times lighter and 100 times stronger than conventional alternatives. Resistant to earthquakes and typhoons, the modules come complete with plumbing and electrical conduit and fittings which are then fitted together once in place.

As well as this fairly typical apartment building typology, Broad had been planning to use this methodology to build the "world's tallest building", Sky City in Changsha in only 90 days. Including factory time the entire construction period was projected to be 210 days but the project never progressed beyond foundations due to controversy over approvals. However the 57 story "Mini Sky City" was built in 2015 with a total build time of 19 days.

As well as build time benefits, cost savings come from the efficiencies of factory building. Low energy consumption due to thermal insulation also mean savings of 1/5th to 1/10th of conventional buildings, and it can be disassembled, modified and relocated with ease.

Further resources



Find out more [here](#) and watch this [timelapse video](#)

Notable achievements



✓ "World's shortest construction period"

10

Dali-Mayr Wellness Hotel

AIM Architecture



Key facts



22,350m²



2017



Hospitality



Health & Wellbeing

Project overview

A luxury boutique hotel focussing on wellness, this 70 room retreat is at the other end of the spectrum from most of the examples we have shown. Nestled into the landscape, all rooms were designed to have a view over the surrounding lake while being sheltered from prevailing winds and screened from the neighbouring commercial resort. [Feng shui](#) was also an integral part of the design process.

In contrast to the rapid urbanisation and technological (western) advancements in China's cities, there is a counter movement to protect local traditional lifestyles and buildings elsewhere in the country. The Dali Mayr incorporates traditional landscaping and feng shui, while the Well House, also in Dali - a 600 year old traditional village - attempts to provide modern amenities within a traditional-style structure. Timber was the predominant material used, but with additional insulation and wind scoops to ensure passive thermal comfort.

Also focussing on the retention of the Dong community's heritage, the Mutation House aims to continue the tradition of self-building from local timber materials using prefabricated components, rather than continue the move towards concrete modern alternatives.

Further resources and notable achievements

[Find out more here](#)

[The Well House](#) by Atlas

[Mutation House](#) by Condition Lab won a Future Project Award 2021



Around the World in 80 Case Studies

Thanks for joining us in China. We hope to see you on future expeditions in this ongoing series.



Next tour date: January 2022