Julius Bär

FUTURE CITIES

Special Report

Mexico City reclaims its lost rivers – and creates an urban oasis in the middle of a highway

Vertical Forests: Tackling climate change through innovative architecture

Future-proofing our cities: Infrastructure solutions for urban prosperity

IESE Business School
University of Navarra

Cities in Motion INDEX 2019

This index measures key global cities' **sustainability and the quality of life for inhabitants.**

174 cities

80 countries

79 capitals

TOP-50 CITIES THAT HAVE ADVANCED THE MOST SINCE 2016

	Places gained	Principal strength
11th Hong Kong	+8	
45th Dallas	+11	
49th San Diego	+8	

Europe, with 28 cities ranking among the top 50 in the world, continues to be the best positioned geographical area

New York (2nd), Los Angeles (16th) and Chicago (17th) are the smartest U.S. cities overall

The size of the city matters, but it is not an essential condition to achieve good results

Top 50 Ranking

- Cities that have advanced since 2016
- Cities that have stayed in the same place
- Cities that have fallen back

+3 Places gained
-3 Places lost

	CITY	PRINCIPAL STRENGTHS	PRINCIPAL WEAKNESS
0 1	London		
0 2	New York		
+3 3	Amsterdam		
-1 4	Paris		
-1 5	Reykjavík		
+1 6	Tokyo		
+1 7	Singapore		
+4 8	Copenhagen		
-4 9	Berlin		
+5 10	Vienna		
+8 11	Hong Kong		
-2 12	Seoul		
-4 13	Stockholm		
+4 14	Oslo		
-2 15	Zurich		
0 16	Los Angeles		
+3 17	Chicago		
-4 18	Toronto		
+3 19	Sydney		
-3 20	Melbourne		
-10 21	San Francisco		
+3 22	Helsinki		
+1 23	Washington, D.C.		
-3 24	Madrid		
+1 25	Boston		
-3 26	Wellington		
0 27	Munich		
+2 28	Barcelona		
+6 29	Basel		
-2 30	Taipei		
+3 31	Bern		
+1 32	Geneva		
+3 33	Frankfurt		
-2 34	Hamburg		
+2 35	Auckland		
-7 36	Gothenburg		
-6 37	Dublin		
+1 38	Montreal		
+7 39	Ottawa		
+3 40	Miami		
-3 41	Milan		
+7 42	Phoenix		
+7 43	Rotterdam		
+1 44	Lisbon		
+11 45	Dallas		
+2 46	Edinburgh		
+4 47	Prague		
-7 48	Brussels		
+8 49	San Diego		
-6 50	Dusseldorf		

WINNERS' PODIUMS BY DIMENSION:

Human Capital	1 London 2 Los Angeles 3 New York
Social Cohesion	1 Zurich 2 Bern 3 Taipei
Economy	1 New York 2 Los Angeles 3 Tokyo
Governance	1 Bern 2 Geneva 3 Taipei
Environment	1 Reykjavík 2 Wellington 3 Copenhagen
Mobility and transportation	1 Shanghai 2 Beijing 3 London
Urban planning	1 Toronto 2 New York 3 Vancouver
International outreach	1 London 2 Amsterdam 3 Paris
Technology	1 Singapore 2 Hong Kong 3 San Francisco

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WHAT POWERS THE GLOBAL ECONOMY?

Cities – they are the growth engines of the global economy. Which is what makes them so important to investors. And they generate not just quantity, but quality of life, too. Balancing the two is their challenge ahead.

Cities are home to just over half of the world's population, yet they generate four-fifths of the world's output. Why the imbalance? Because cities draw people together, which is more productive than living at a distance and allows them to specialise. Productivity, like a rising tide, lifts all boats: output climbs, incomes climb, supply meets demand, knowledge expands. All this attracts even more productive people – rinse, repeat and grow some more.

Still, cities aren't perfect. If they are too big or too congested, they can sink under their own weight. Transport can be torture: an average driver in the USA spends 100 hours a year stuck in traffic. Water is too often wasted: cities lose as much as half of their supply through leaky pipes. Then, especially in the developing world, there are power cuts, disappearing parks and smoggy air.

Today's leading cities mostly know this. So they are looking to boost infrastructure and amenities. They aim to be more efficient, to cut environmental footprints and to reduce waste. These goals call for high tech, but also for residents to change their mindsets – to want to live differently. That's at the heart of this special report – profiles of how people are trying to live differently in five iconic cities: Mexico City, Dubai, Berlin, Hong Kong and Johannesburg.

Also in this report, we examine critical issues facing nearly every metropolis: how urban areas are getting smarter; high-rise architecture with built-in trees; the challenges of water, energy, waste and infrastructure; the global effort to improve road safety; and an update on the technology behind the all-electric racing series, Formula E. The last topic is relevant to cities because what's developed for the racetrack is also being applied to conventional cars on our streets.

All told, it seems that cities hold many joys and many worries. Whichever, they have no choice but to face them head on. Because in the long haul, succeeding in liveability means succeeding economically. Unbearable cities will fail, liveable cities will win: the people will choose.

Carsten Menke

Head of Next Generation Research
Julius Baer

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CITIES LOOK TO THE FUTURE

It's no exaggeration that humanity's biggest challenges over the coming decades will be tackled in the cities. As cities grow, they face the difficult task – and the opportunity – of creating solutions to reduce global poverty as well as chronic air pollution, gridlocked streets and mounting crime. Preparing for the future requires nothing short of a transformation in the way cities are managed.

Author Rupert Bruce

The world is in the midst of a great migration from rural to urban life. Already, there are signs of what's to come. Urbanisation is credited with increasing prosperity across much of Asia, where the city-dwelling middle classes are expanding fast. But it can also lead to congested streets, life-threatening pollution and sprawling slums, not to mention social inequality and corruption.

Underpinning the benefits of urbanisation are economies of scale as well as fruits of diversity. Large cities enjoy scale in areas such as energy, mobility, distribution of goods, housing, healthcare and so on. Culturally, they are melting pots that catalyse the rich exchange of ideas, spark innovation and stimulate economic growth. This can create wealth and higher standards of living, though at their most extreme, megacities can become excessively complex, descending into polluted urban sprawls that seem ungovernable.

Alert to the challenges they face, mayors across the world are working to transform cities. Success depends on implementing and scaling up holistic strategies spanning socio-economic issues, the environment, technology and transportation. With such a large proportion of the world's population moving to cities, nothing less than the United Nations' 17 Sustainable Development Goals (SDGs) are at stake. These have targets for tackling wealth inequality, health, education and prosperity, climate change and environmental degradation by 2030.

"A smart city is much more than technology."

Kari Aina Eik

While the commonly-used phrase 'smart cities' suggests technology is the answer, it is in fact just a tool for bringing together the solutions that make cities prosperous, happy places. Kari Aina Eik, Executive Director of the United Smart Cities programme, explains: "For me, a smart city is much more than technology. It has to do with intelligent systems and how you build a city that is smart for the people. And now with the Sustainable Development Goals, and people

becoming much more conscious that we need to save our planet for future generations, cities need to be smart and sustainable."

43 megacities by 2030

Already, more than half (55 per cent) of the global population lives in cities, with that proportion expected to increase to more than two thirds (68 per cent) by 2050, according to the UN World Urbanization Prospects report. As recently as 1950, there were just 751 million city dwellers, according to the UN, while today, there are 4.2 billion and that number is expected to increase by another 2.5 billion by 2050.

As cities grow fast in countries such as China, India and Nigeria, they will have opportunities to maximise and difficulties to mitigate. In just over 10 years, by 2030, the world is projected to have 43 megacities – defined as having more than 10 million inhabitants – most of them in developing regions. But some of the fastest-growing will be cities with fewer than one million citizens, where economies of scale are easier to achieve.

The bigger cities become, the more complex they are and the more difficult to manage. Some of today's megacities are already verging on the dysfunctional, with air pollution at emergency levels, water shortages and slum housing. New Delhi, the world's second largest city with 29 million inhabitants, and Shanghai, the third largest with 26 million, both have smog problems. Mexico City and São Paulo, each with 22 million inhabitants, have high crime rates. And Cairo, Mumbai, Beijing and Dhaka – with close to 20 million inhabitants each – all face some of these problems.

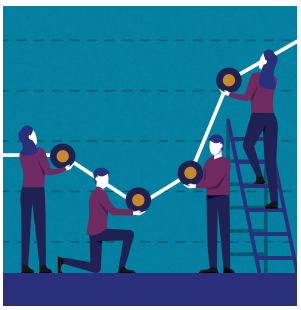
Scaling up and connecting solutions

Future-proofing cities is an urgent and multi-faceted task. The IESE Business School at the University of Navarra has defined nine dimensions for the model behind its Cities in Motion Index. Cities must implement solutions for each dimension, and connect them, to achieve their full potential. Every city will require a different answer, depending on its specific circumstances, with technology often playing a role.

"The introduction of technology brings opportunities for the interaction of different systems, which is

Future-proofing cities is a multi-faceted task. [...] Every city will require a different answer depending on its specific situation.

The nine dimensions of the Cities in Motion Index



The economy

The economic development of a city, using measures such as gross domestic product as well as labour productivity, time to start a business and so on.

Human capital

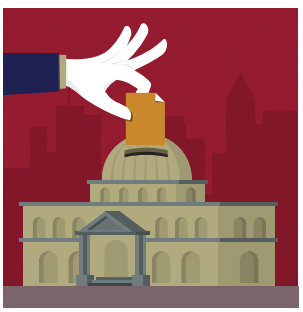
A city's ability to attract and retain talent, create plans to improve education, and to promote creativity and research.

Social cohesion

Different groups of people with varying cultures, incomes, ages and professions must co-exist if a city is to be sustainable.

The environment

Measures such as anti-pollution plans, support for green buildings and alternative energy, water management and policies to counter the effects of climate change.



Governance

Governance encompasses how well the city is administered, including the public finances, strength of legal rights, perceptions of corruption and democracy.

Urban planning

Urban planning affects quality of life. It includes the design of green spaces and creation of compact, well-connected cities with accessible public services.

important," says Professor Joan Enric Ricart, co-director* of the IESE Business School's Cities in Motion Strategies. "Now there is an opportunity to do trade-offs. For example, energy and mobility happen to be quite connected."

Mobility and energy show the need for connections. Tomorrow's autonomous shared vehicles will not work without a charging network. But the rewards for success are enormous: with shared – rather than owned – vehicles rarely lying idle, congestion will be relieved and energy saved.

Cities need long-term strategies, as well as specific solutions in areas as varied as affordable housing, waste management, air pollution, the creation of high-value employment, crime prevention, energy and mobility. While complex solutions play a big part, often the simplest ideas like harvesting rainwater from rooftops are invaluable. Many cities are having success in individual dimensions, yet creating a single multi-dimensional solution is far more difficult.

* Professor Joan Enric Ricart and Professor Pascual Berrone are co-directors of IESE Cities in Motion Strategies.

"We need to find better ways to scale it up," asserts Eik. "That is a challenge. How do you scale this up and how do you get everybody around the table? How do you engage with the companies that have these solutions in a good, strategic way?"

Borrowing best practices

Cities have much to learn from each other and from business. All top 50 cities in IESE's 2019 Cities in Motion Index were in the developed world although most urbanisation today is taking place in the developing world. Cities in Africa and Asia can adopt the leaders' best practices while seeking to avoid their mistakes.

IESE's top three cities for 2019 were London, New York and Amsterdam respectively, each scoring well in dimensions such as international outreach, the economy, mobility and transportation and urban planning. By contrast, all three had weaker performance on governance, with New York also judged to have a poor environmental record.

"We have seen some real improvements in cities in economic and environmental terms, but progress is slower when it comes to social

"We have seen some real improvements in cities in economic and environmental terms, but progress is slower when it comes to social cohesion."

Professor Joan Enric Ricart

The UN estimates that between USD 5–7 trillion in annual investments will be required to meet the SDGs by 2030.

cohesion," remarks Professor Ricart. "It looks like the trade-off between economics and social cohesion is difficult."

Over the six years that IESE's index has tracked cities, those that have climbed the index tend to encourage different stakeholders working together, including business, communities and universities, according to Professor Ricart.

The four P's of financing

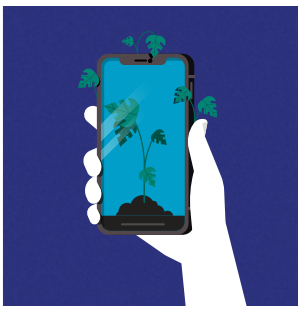
Private sector finance is essential for the huge task of transforming cities. In fact, the UN estimates that between USD 5–7 trillion in annual investments in areas such as infrastructure, clean energy and water and sanitation will be required to meet the SDGs by 2030. "It is known that it is a make-or-break situation for the SDGs, the Paris Agreement [on climate change] and all of these challenges that the Earth is facing, if we cannot build this bridge between the public and the private sector," says Eik.

"There has been so much talk about it.There has been a lot of testing of PPPs (public-private partnerships), but it's not really working at scale. So, you need better models. Actually, you need PPP – P's; you need the people to be involved, too."

Managing the historic megatrend of urbanisation is critical. How cities do so, learning from each other, will determine whether mankind leverages the benefits of scale to solve its looming challenges or lets urban decay proliferate.

International outreach

Cities that want to progress must secure a privileged place in the world, which involves improving the city brand and international recognition.



Technology

Technology allows cities to become sustainable, improve the competitiveness of their economies and the quality of employment.

Mobility and transportation

Cities of the future must ease movement through often congested cities and improve access to public transport.

Antonieta Peregrina,
spokesperson at Ecoducto,
Executive Director of
Cuatro al Cubo

MEXICO CIT

Mexico City has always had an uneasy relationship with its water resources. Once the pre-Hispanic floating metropolis of Tenochtitlán, the city grew against all odds by draining its surrounding lakes and burying its rivers. But now, a grassroots initiative wants to open up the city's waterways and turn them into parks – bringing Mexico's rivers back to life.

Author Alan Grabinsky

In Mexico City, the name Viaducto Río de la Piedad conjures images of a noisy, polluted, traffic-ridden six-lane highway that turns into hell-on-wheels, with cars inching by at a mere six kilometres per hour during rush hour. It's not a place to go for an afternoon stroll, let alone hang around.

Yet in 2012, that's precisely what a group of activists led by environmentalist architect Elias Cattan did. After scaling a fence on a bridge, they sat down in a circle on the concrete structure that cuts through the middle of the avenue and had lunch. When asked what they were doing, they replied: "We're having a picnic by the river."

The initiative was meant to draw attention to what was inside the concrete structure: the Piedad River. In 1942, this waterway became the first urban river in Latin America to be encased in a pipe. Ten years later, an avenue designed to connect to the newly inaugurated airport was built over it and, since then, the only reference to the river has been the name of the highway – *río* meaning 'river' in Spanish.

Those present at the picnic that day wanted to raise awareness about a more significant issue: "We need to relate to water in a more systemic and profound manner", the group's manifesto at the time stated, "and stop considering it merely as a consumption resource and more as a force that transforms and gives life."

The city's historic battle against water

Initially called *Anahuac* by the Aztecs – meaning 'close or next to water' – the Mexico City valley boasted 45 rivers running down from the mountains into various bodies of water, creating a vibrant ecosystem of marshes and wetlands. The entire city of Tenochtitlán, now Mexico City, was built on top of a lake that was later drained by the Spanish conquistadors to make way for the colonial city.

In the twentieth century, and under pressure from a rapidly expanding city, pollution and waterborne diseases like polio, urbanists followed this anti-hydric tradition by burying many of the valley's waterways underground. The end result

"We need to stop considering water merely as a consumption resource and more as a force that transforms and gives life."

Picnic en el río manifesto

Aerial view of the 1.6-kilometre Ecoducto park

was an increase in floods during the rainy season (Mexico City receives more annual rainfall than London), when the streets become rivers due to a lack of ground porosity – as if nature were fighting back.

The irony is that today, this once water-rich valley – now home to 22 million people – is one of 11 megacities around the world running out of water. The resource needs to be pumped up from lower basins – Mexico City is located 2300 metres above sea level – through the Cutzamala System, a costly infrastructure running hundreds of kilometres.

In this sense, 'Picnic by the river' had a particular message: the basin is still alive, and Elias Cattan and his partners had a vision of what the rivers could become.

The birth of the Ecoducto project

Before he began organising the picnics, Cattan had spent over three years working with a team of biologists and urbanists under the mentorship of the Regenesis Group – a US-based thought leader in ecological design. Inspired by cases like Cheonggyecheon Park – an urban renewal project in downtown Seoul that transformed a stream once covered by transportation infrastructure into recreational space – Cattan's group proposed a project to clean the river, open it up and turn it into a public space.

Cattan's early version of what would later become the Ecoducto won the prestigious Holcim Award for Sustainable Construction for Latin America in 2011, which drew attention from specialists and environmental activists who then also started doing the picnics. But to a larger crowd, the idea seemed quixotic, at best.

Still, they continued organising picnics year-round. Eventually, their intervention was replicated nationwide by activists like Antonieta Peregrina, who teamed up with local NGOs and activists to stage her own picnics at the polluted Atoyac River, near the city of Puebla.

In 2017, things took a dramatic turn. Environmental activists, including Antonieta Peregrina, civic groups such as Isla Urbana (see p.14) and small businesses, including local restaurants and cinemas, joined forces to create Cuatro al Cubo (Four Cubed), an urban in-

Elias Cattan, architect, founder of Taller13 Arquitectura Regenerativa

Ecoducto: a dog's and runner's paradise in the middle of a six-lane highway

tervention association designed to revitalise the city's public spaces in a sustainable manner. With this extended quorum, the picnics attracted massive crowds, and Miguel Angel Mancera, the mayor at the time, mobilised the police to expel the activists. Armed with mobile phones, the activists posted the images and videos on social media, catapulting the #picnicenelrio hashtag into a trending topic nationwide.

The tide had turned in favour of the activists, and caving under public pressure, the city's Urban Development Agency finally agreed to build the park. "At first, they wanted to light up the park with lines of blue lightbulbs to show that a river runs beneath it," Cattan told me during an interview. "We said that's fine, but why don't you actually show them the water, instead?"

As momentum for the Ecoducto project grew, Cuatro al Cubo reached out to Dr Alejandro Federico Alva, a hydrobiologist at the Universidad Autónoma Metropolitana and a specialist in designing biofilters for polluted water. He created a small, energy-efficient water treatment plant in the middle of the highway, the only one of its kind in Mexico, which primarily relies on gravity to filter 30 000 litres of heavily polluted river water per day.

> "We used to have four species of birds coming here; now we have seventeen."
>
> Dr Alejandro Alva

The 1.6-kilometre park opened in 2018, and although it uses just a small fraction of the river's water, it's already having an impact: "We used to have four species of birds here," says Alva. "Now we have 17 species interacting with 13 types of water plants and 47 species of insects."

Dr Alejandro Alva, technical project leader at Ecoducto

Maria Marquez, sustainable impact specialist

The new park's foliage has reduced the traffic noise levels by ten decibels and, according to sustainable impact specialist, Maria Marquez, the project will recoup its cost within the first year. It gives back to the city MXN 80 million (about USD 4 million) a year in the form of ecological services such as water filtering, CO_2 capture, smog reduction and ambient temperature regulation, and social services such as public spaces, greenery and playgrounds. And the group's work is far from over: Peregrina, who now runs Cuatro al Cubo, is in charge of turning the place into a laboratory to educate people about the natural conditions of Anahuac. She has recently inaugurated a Water Pavilion located at the intersection of two streets and the park, where workshops on water treatment, urban farming and social activism will take place.

The park is a long walkway dotted with benches, infographics and small gardens. It's divided into four parts – the first is the water treatment plant, from where the water flows down to a thematic section on the valley's wildlife and fauna, continues towards an urban farming plot and ends up at a recreational centre with playgrounds and exercise machines. According to Marquez, the neighbours were initially hesitant to use the park for fear of pollution from the cars, but now it has become an iconic space. In the morning, one can see neighbours jogging, walking their dogs and riding their bikes on their way to work – and the value of the properties near the Ecoducto has increased.

Future vision of Ecoducto, designed by the architects of Taller13

One busy Tuesday afternoon, we meet with Cattan at the park – in the distance, one can see the small stream making its way through gardens and plants. A tourist couple stroll along, a man dressed in a suit sits on a bench talking on the phone, and a young kid skateboards on the walkway. "If it were up to me", Cattan tells me, overlooking the stretch, "we would open the whole river and have this replicated all over the city. But first, we need to change the relationship of *chilangos* (Mexico City dwellers) with their environment. This is a good start."

ISLA URBANA: the simplest solutions are the smartest

Despite its heavy rainfall and natural disposition towards water, Mexico City suffers from severe water shortages. Most of the rainwater ends up mixing with polluted sewage, rendering it useless for human consumption.

Enrique Lomnitz, the founder of Isla Urbana (Urban Island), devised a simple, cost-effective solution to the problem. By installing cheap rainwater harvesting and filtration systems on the rooftops of the city's most marginalised neighbourhoods, he has been able to provide over 50 000 people with clean water (in some cases, all year round).

These systems are broadening the meaning of a smart city, moving away from a digital-centric approach and embracing a more tactical use of existing resources. Thanks to his water filtration solution, Lomnitz was named one of Mexico's most innovative leaders by the MIT Technology Review.

While Dubai once pursued its vision through magnificent real estate, today it is harnessing technology to drive a pioneering investment programme designed to make it a Middle Eastern technology hub and transform the lives of 3.1 million citizens. This city is nothing if not ambitious.

DUBAI

Dubai is building the world's largest solar park to harness one of its most abundant resources: sunshine

Author Rupert Bruce

DUBAI not only has the world's tallest building, it is also assembling the world's largest solar park and is investing substantially in creating a state-of-the-art city through technologies such as the Internet of Things (IoT), data analytics, blockchain, autonomous vehicles and drones, robotics and artificial intelligence (AI) applications.

Digital technology lies at the heart of 'Smart Dubai 2021', Dubai's future city initiative. In the run-up to 2021, the year of Dubai's golden jubilee, the government aims to improve residents' lives and bolster its position as a model global city by hardwiring technology into its fabric, adding to its status as a leader for smartphone usage. Highlighting the importance of technology, His Highness Sheikh Bin Rashid Al Maktoum, Vice-President and Prime Minister of the UAE and the Ruler of Dubai, has described technology as enabling his vision, noting that technology development is not an end in itself.

Evidence suggests that the large-scale application of new technology can yield major socio-economic benefits. High rates of

The futuristic 'Volocopter', an autonomous, fully electric air taxi, made its maiden flight over Dubai in 2017

digitisation can lead to not just higher economic growth but also social inclusion and poverty reduction, access to quality healthcare and education, and lower CO_2 emissions, according to the McKinsey report 'Digital Middle East: Transforming the region into a leading digital economy'.

The overall strategic intention is to make Dubai a happy place. "The Smart Dubai initiative fulfils the vision of His Highness 'to make Dubai the happiest city on Earth'", wrote Dr Aisha Bin Bishr, Director General of the Smart Dubai Office, in a 2017 article published by the World Economic Forum.

A grand ambition

Dubai's large-scale future city programme is in character. It is no accident that Dubai hosts the Arab world's most important financial centre, the world's busiest international airport and is the fourth most-visited city. Without the oil riches of its neighbours, Dubai has long sought to differentiate itself in other ways.

Today's Smart Dubai 2021 technology initiative is just the latest and most large-scale. It continues a journey that began in 1999, when the government announced the first information and communication technologies (ICT) strategy. This was followed by the launch of Dubai Internet City, Dubai e-government, Dubai Smart Government and, in 2014, the Smart Dubai initiative. And government has not been alone on this journey; it has been accompanied by business.

A technology leader

The results speak for themselves. While Dubai ranks 99th globally in the 2019's Cities in Motion Index, compiled by Spain's IESE Business School, it is fifth in the technology dimension. It is also number one for technology in the Middle East. IESE describes technology as "an aspect of society that improves the present quality of life and its level of development. In addition, technological development is a dimension that allows cities to be sustainable over time, and to maintain or extend the competitive advantages of their production system and the quality of employment."

The high consumer uptake of digital technology in Dubai is not unique in the Middle East's Gulf region. While the United Arab Emirates – where Dubai is one of seven emirates – ranks second globally for mobile broadband subscriptions, according to the World Economic Forum's Global Competitiveness Report 2017–2018, its neighbours Bahrain and Qatar rank one and seven respectively. More unusual is the high level of digitisation by both business and government, which sets Dubai apart in the region, according to McKinsey.

At Jumeirah Beach, a solar-powered Smart Palm provides shade, free Wi-Fi, a charging station, city information, and is equipped with LED lighting and security features

Smart Dubai 2021

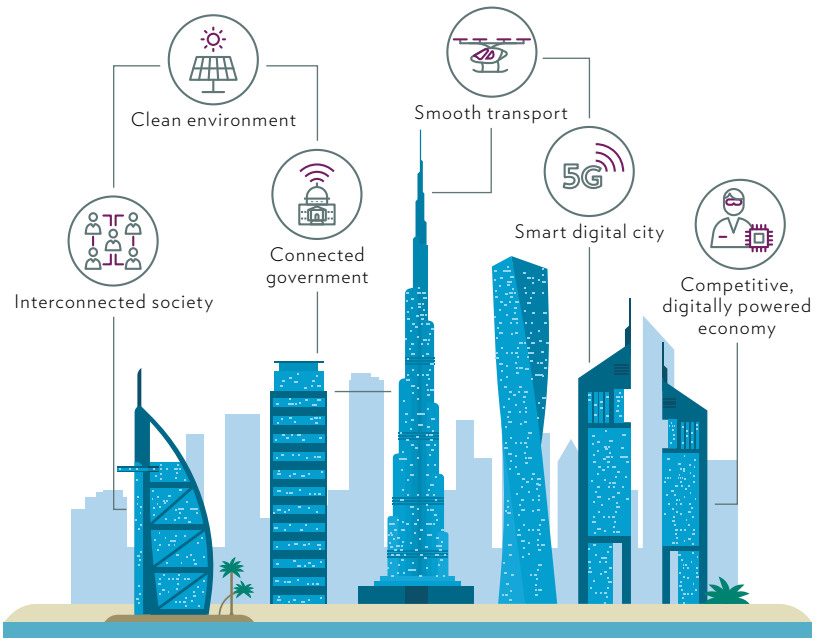
Looking forward over the three years to 2021, technology is key to all six of Smart Dubai 2021's strategic objectives. By leveraging the potential of new technology, Dubai aims to create a smart digital city, connected government, an interconnected society with easy access to social services, smooth transport

backed by autonomous and shared mobility, a clean environment, and a competitive economy powered by disruptive technologies.

As a first step, creating a smart digital city requires all people and organisations, including businesses, to have fast internet connectivity. To this end, free high-speed Wi-Fi will be provided across the emirate. Measures are also being taken to protect sensitive and private information in cyberspace.

Turning to the strategic goal of having a connected government, every part of the city's infrastructure will need to be connected to the internet. Water, energy, sewage, drainage, waste distribution, buildings and traffic lights will all be monitored through IoT platforms. This will foster more reliable and efficient services. It will also minimise waste through the timely detection of leaks in water and electricity networks, as well as allowing citizens to monitor their energy and water consumption.

Smart Dubai 2021: Six strategic objectives



Free high-speed Wi-Fi will be provided across the emirate.

In a related field, 90 per cent of citizens' daily services will be delivered digitally. These include: healthcare, education, culture, housing, entertainment, community services and volunteering.

Ambitions for improving transport in the emirate's congested streets range from autonomous car technology and shared trips through to smart parking, smart tolls and smart traffic lights. The digitisation of public services alone is likely to reduce the trips to run errands. More futuristically, the 'Volocopter', the world's first fully electric autonomous air taxi, made its maiden flight over a Dubai beach in 2017.

When it comes to cleaning up the environment, the city has many goals. It has targeted reducing greenhouse gas emissions by 16 per cent by 2021 through a range of measures. Among them, solar power is being harnessed to increase the proportion of energy from renewable sources to seven per cent, thanks to the new 77 km² solar park.

Finally, the city is leveraging digital technology to improve the competitiveness of its already fast-growing economy. It plans to boost research and development, enhance digital services and introduce training programmes to improve digital skills.

Technology for the common good

So, will Dubai achieve its ambitions for 2021 through the application of new technology? Dr Bin Bishr from the Smart Dubai Office clearly thinks so: "Urban challenges in our Middle East and North Africa region are also significant opportunities for our cities," she writes. "Technology provides myriad potential solutions that address urban issues in different ways."

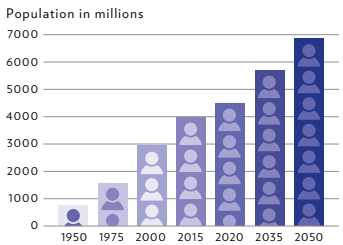
Her office has devised 100 different benchmarks, going by the technical jargon of key performance indicators that will be used to judge progress. But ultimately, the success of this broad programme will be evident for all to see in the growth of the economy and health of society.

When twinned with the enthusiasm for smartphones among Dubai's residents, the city's drive to harness technology for the common good may well turn it into a model future city. From data analytics to blockchain and AI, technology is replacing bricks and mortar as the foundation for the emirate's vision.

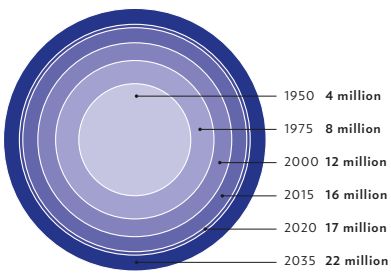
URBANISATION IN NUMBERS

The world's urban population has been growing steadily since 1950 and shows little sign of slowing down. By 2050, 6.7 billion people – or over two-thirds of the global population – will be living in urban centres. Why is this so significant? Though cities make up only three per cent of the Earth's surface, they are disproportionately responsible for the world's environmental impacts. But they are also engines of economic growth, and many of the solutions to our global challenges are likely to come from cities.

Growth in total urban population

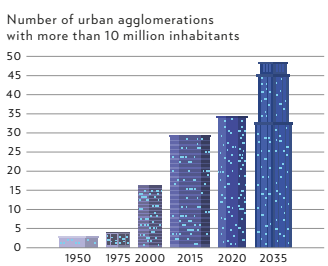


Cities are getting bigger



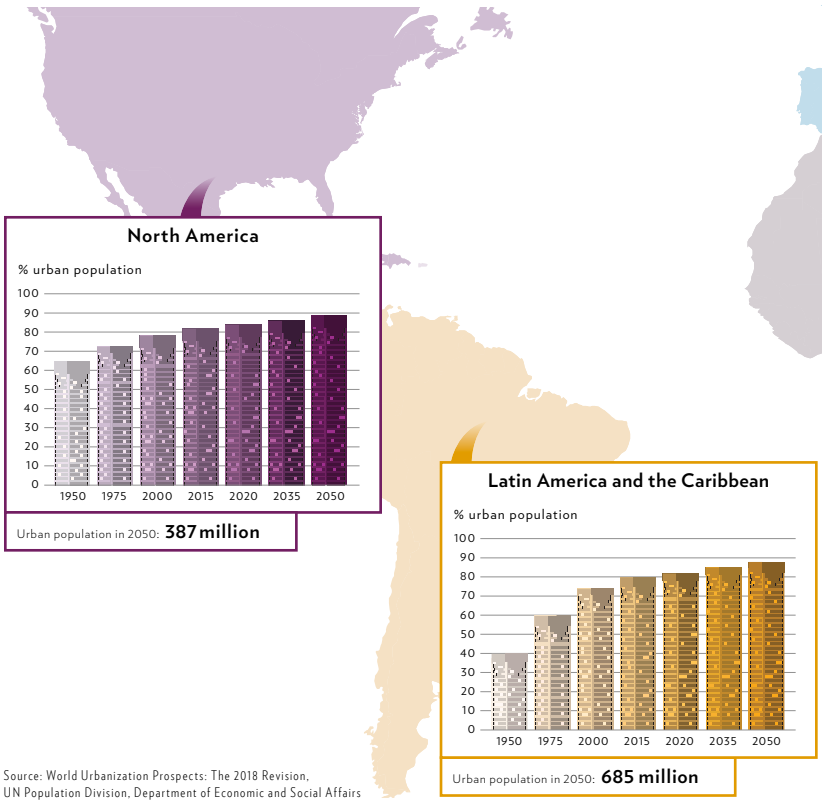
Average population size of the world's 30 largest cities

The rise of the megacities



By 2035, 865 million people will be living in one of 48 megacities of over 10 million people. 32 of these megacities will be located in Asia.

Source: World Urbanization Prospects: The 2018 Revision, UN Population Division, Department of Economic and Social Affairs

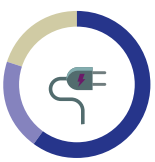


Source: World Urbanization Prospects: The 2018 Revision, UN Population Division, Department of Economic and Social Affairs

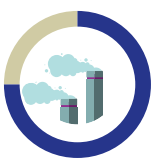
Cities and climate change

Cities:

Occupy 3% of the Earth's surface.



Account for 60–80% of energy consumption.

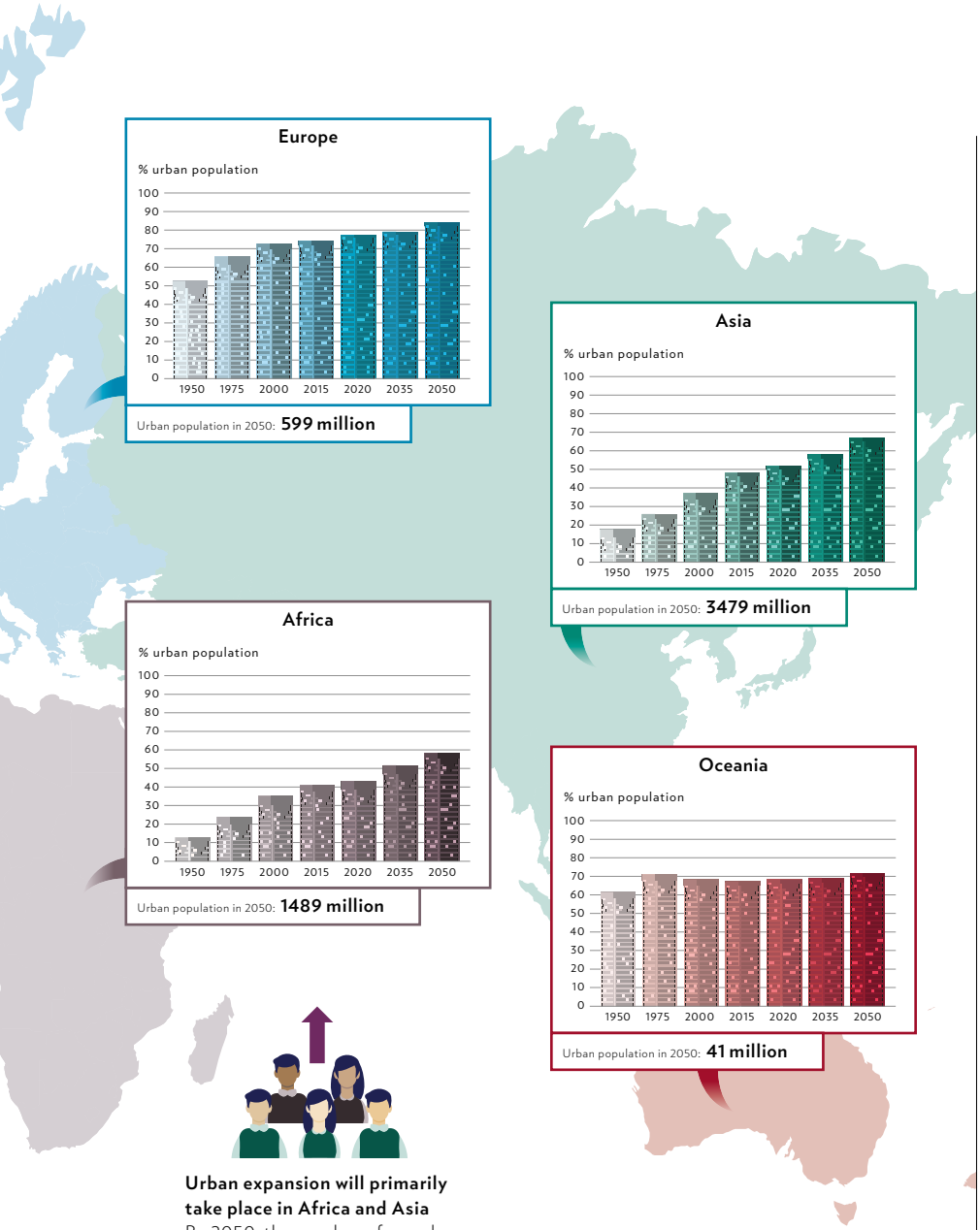


Are responsible for 75% of CO_2 emissions.

Pollution:

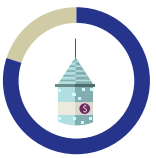
Air pollution is responsible for about 3.8 million deaths annually. 80% of the world's urban population lives in cities where pollution levels exceed the World Health Organization's air quality guidelines.

Source: www.un.org/sustainabledevelopment/cities/



Urban expansion will primarily take place in Africa and Asia
By 2050, the number of people living in cities will grow by 2.3 billion. 87.7% of these new urban dwellers will be in either Asia or Africa.

Cities as engines of economic growth



80% of GDP is generated in cities

The world's 300 largest metropolitan areas account for:

49.1% of the world's GDP

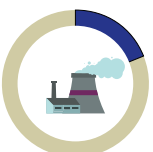
23.3% of employment

24.1% of the world's population

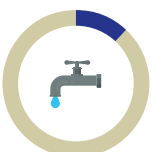
Sources: World Bank/Brookings analysis of Oxford Economics data

Cities and water resources

Rapid urbanisation is putting pressure on the world's freshwater supplies. By 2050, global demand for water is expected to increase by 50%, driven by manufacturing, electricity generation and domestic use.



Industry, including power generation, accounts for 19% of the world's water consumption.



Household use accounts for 12% of the world's water consumption.

37% of the world's urban population (1.4 billion urban dwellers) lack a connection to a sewerage system.

Water scarcity in urban areas is primarily a result of poor management of water resources: 11 megacities are at risk of running out of water.

Source: UN World Water Development Report 2019

BOERI AND THE TREES

In an act of pre-adolescent rebellion, 12-year-old Baron Cosimo Piovasco di Rondó – the protagonist of Italo Calvino's *The Baron in the Trees* – abandons his oppressive family by climbing a tree and vowing to spend the rest of his life among the branches. Today, in an effort to combat climate change, Italian architect Stefano Boeri is doing just the opposite – he's bringing the trees to the people.

Author Adriana Wattengel

With a twinkle in his eye and a pair of eyeglasses propped on his forehead – his personal trademark – Stefano Boeri proclaims, "I've always been obsessed with trees." This fascination dates back to his childhood, when his mother, also an architect, built a house in the woods near Milan. Designed "to embrace the trees", as Boeri puts it, the construction avoided the felling of trees, resulting in the home's meandering layout.

At roughly the same time, Boeri read Italo Calvino's novel *The Baron in the Trees*. Set near his father's ancestral hometown of Badalucco, the novel's rich descriptions of olive trees and lush orchards captured a young Boeri's imagination. Of course, he may have also been drawn to Cosimo's rebellious streak and penchant for radical, irreversible decisions. Years later, Italian singer Adriano Celentano's *Un Albero di Trenta Piani* decried the skies blackened by factories but ended on a hopeful note with visions of a thirty-storey tree.

A desert epiphany

All of these memories must have been at the back of Boeri's mind when, during a trip to Dubai, he was struck by the dozens of skyscrapers rising from the desert, completely covered with glass that reflected the sun's heat onto the pedestrians below. "It seemed like a paradox to me," he says. It was 2007 and Boeri was in the early stages of designing a pair of residential towers in Milan when the idea occurred to him quite naturally: "Why don't we create a biological ecosystem in a high-rise building instead of covering it with glass?" The Vertical Forest was born.

"I've always been obsessed with trees."

Completed in 2014 and standing 110 and 76 metres tall respectively, the two towers are now home to over 20 000 plants including trees and shrubs, and over 20 species of birds. During the summer, shade from the trees keeps the apartments approximately three degrees cooler than the outdoors, eliminating the need for air conditioning. Boeri describes his Vertical Forest as "a prototype of a new generation of buildings that will help cities clean their air, absorb CO_2 and other pollutants, and reduce energy consumption. So there's a social utility in what we have done, which is very important for us."

Standing 76 and 110 metres tall, the Vertical Forests in Milan are a prototype for a new type of building that will help cities absorb CO_2 and reduce energy consumption

Convincing the sceptics

But building the first Vertical Forest was not without challenges. Boeri was surrounded by sceptics along the way who questioned the feasibility of his seemingly crazy idea. How would the trees survive in windy conditions? How could the balconies support the weight of the trees? How would the plants be watered? Would the roots damage the buildings' structure?

To convince the detractors, Boeri set out to work with a multidisciplinary team of botanists, engineers and architects, and he believes they came up with good solutions for each of the technical challenges. Careful thought and research determined the selection and placement of each plant. The balconies that host the greenery were specifically designed and positioned to give the trees enough room to grow and give plants the ideal amount of sunlight according to each species' needs.

For each new iteration of the Vertical Forest being built elsewhere, this research process begins anew to take into account the climatic conditions and species native to each location: "I like to say that I'm designing a house for the trees. But humans happen to live there, too."

When it comes to maintenance, "we have worked so hard to make sure the plants are well cared for," he explains. The trees are watered using a sophisticated Israeli irrigation system, which also recycles the buildings' greywater. A central monitoring system tracks moisture levels and the plants' overall condition. To avoid the use of pesticides, ladybirds were introduced to control pests. And, he adds proudly, "we have invented a new profession – the flying gardeners." Three times a year, a team of flying gardeners dangle from the top of the buildings to inspect and prune the plants.

The culprit and the solution to climate change

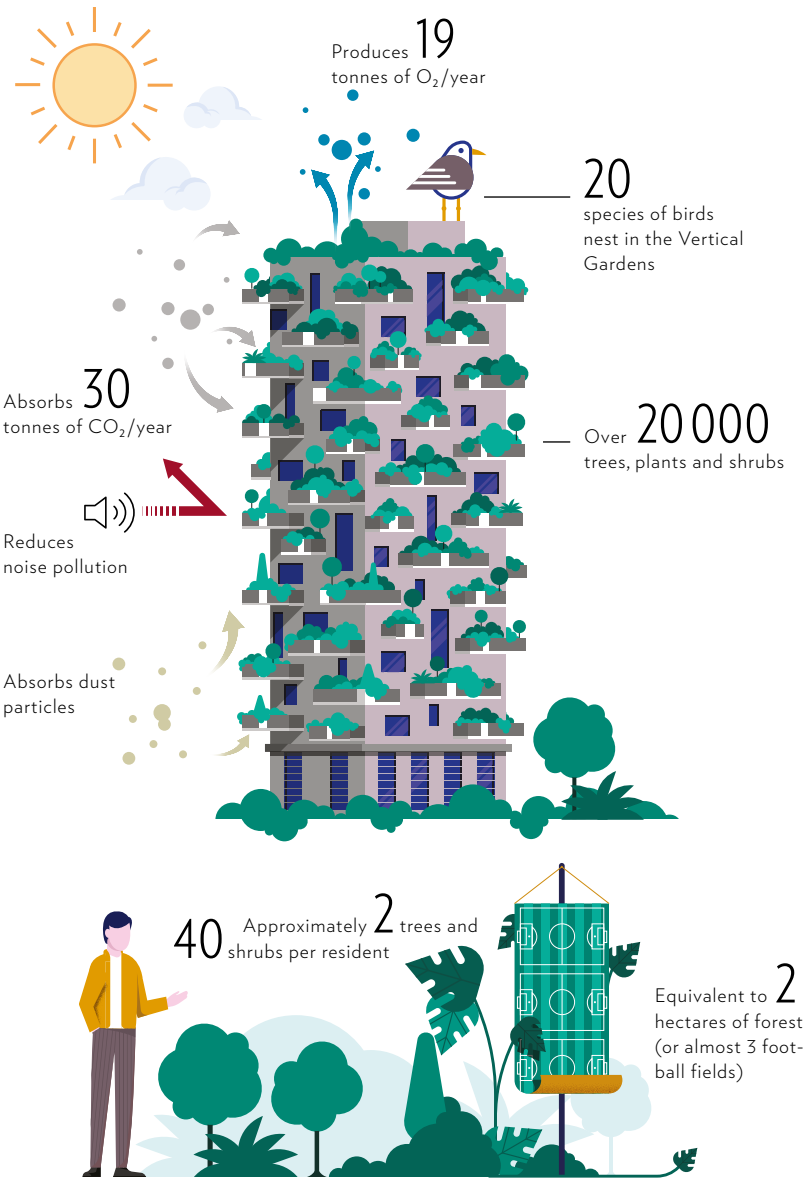
Boeri wasn't always driven by purely environmental motives, "but at a certain moment in my life, these two things – trees and architecture – came together, and I could see how this vertical forest approach could help me and my firm to improve the quality of our architecture, transforming the relationship between humans and trees within an urban centre."

Speaking at lectures around the world, he frequently points out that cities cover less than three per cent of the Earth's surface, but produce 75 per cent of the planet's CO_2 emissions. Cities are primarily responsible for climate change, but are also the first to feel its effects through coastal flooding and the migratory influx of climate refugees. Therefore, cities must play a role in combatting climate change. How? The easy answer, of course, would be to plant more trees and expand parkland in our cities. But this isn't easy in densely packed urban centres with a lack of open spaces. Enter the Vertical Forest, which Boeri argues helps prevent urban sprawl by allowing people to live close to trees and plants in a crowded city – something that is usually only feasible in suburban environments.

The concept of rooftop gardens is not entirely new, however. After all, Austrian artist and architect Friedensreich Hundertwasser – another one of Boeri's early inspirations – was ahead of his time when he sketched out plans for apartment blocks that featured a grass-covered

"We have invented a new profession – the flying gardeners."

The Vertical Forest at a glance



Future visions: The Forest City in China will consist of 70 plant-covered buildings powered by solar and geothermal energy

roof and trees growing from inside the rooms back in the 1970s. But what is truly revolutionary about Stefano Boeri's Vertical Forest, is the density of a complex ecosystem on a relatively small footprint – the equivalent of two hectares of woodland. "If you really want cities to be part of the solution to global warming", he explains, "it's not enough to work only with horizontal surfaces. You need to work with vertical surfaces as well."

Green housing for all

Boeri concedes that an apartment in Milan's Vertical Forest might be out of reach for most people, but the towers needed to compensate the developers who took on the risk of investing in his architectural experiment. So he has now set his sights on affordable housing for lower-income urban dwellers. Boeri and his team have found ways to reduce the construction costs of his Vertical Forests, and the first of these green social housing projects is currently underway in Eindhoven. "This means that we can combine our capacity to deal with climate change with our capacity to deal with poverty," he says.

But Boeri's most ambitious project is in China, which is notorious for its poor air quality. Consisting of over 70 plant-covered buildings connected by parks and gardens covering 175 hectares along the Liujian River, the Forest City in China will be home to 30 000 residents. In addition to absorbing 10 000 tonnes of CO_2 per year, the Forest City will rely on geothermal and solar energy, making it energy self-sufficient. Ultimately, Boeri hopes to see more Vertical Forests replicated throughout the world. "We have not copyrighted the solution because we hope that there will be other architects who can do better than us."

Beyond the environmental benefits is the sense of well-being that residents get from living in the Vertical Forest. "The feedback we hear from people living there is extremely positive." Residents can look out of the window and see the world filtered through the leaves and observe the changing colours of the seasons. "When you live on, say, the twenty-third floor of the building", Boeri continues, "you feel as though you are in the forest." Would Cosimo consider living in the Vertical Forest? "Ah, that is a very good question. I don't know about Cosimo," he ponders, "but I think Italo Calvino would live there."

Article and Video
To see the flying gardeners in action, watch our interview with Stefano Boeri at: www.juliusbaer.com/insights/en/future-cities/boeri-and-the-trees/

BERLIN

Tempelhof's hangars are home to the annual Art Berlin show

When a remarkable, historic airport closed, Berliners were challenged to preserve its past while finding a new function for it. They've invented numerous novel uses – including that of a Formula E racetrack.

Author Eric Johnson

Open to the public since 2010, Tempelhof Airport's tarmac, runways and surrounding field offer Berliners three square kilometres of outdoor recreational space

It's hard to imagine Berlin and not think of Tempelhof. First, it's enormous. At three square kilometres, the site is twice the size of London's Hyde Park and nearly that of New York City's Central Park. Second, it is right in the middle of the city, a half-hour by bike or public transport, or 20 minutes by car from the magnificent mile known as the Kurfürstendamm. Third, Tempelhof is both infamous and famous – as a showcase airport of the Nazis and as a pillar of the Berlin Airlift.

Getting rid of Tempelhof would be akin to removing the Colosseum from Rome or razing the Kremlin in Moscow or erasing the Pyramids in Cairo – a no-go. But still, cities change, and Berlin has changed greatly since 1989, when its so-called 'Antifascist Protection Rampart' was breached. The city-divided-since-1945 reunited in 1990, its respective countries West Germany and East Germany reunified, and in 1999, Berlin was restored as capital of the entire country, which it had been up to the end of World War II.

In the three post-wall decades, Berlin's global stature vaulted with the return of central government. Prosperity soared. West Berliners' incomes doubled, while those of East Berliners nearly tripled. Most of all, two competing cities and regions became one. This prompted rethinks of all sorts, not least the configuration of regional airports.

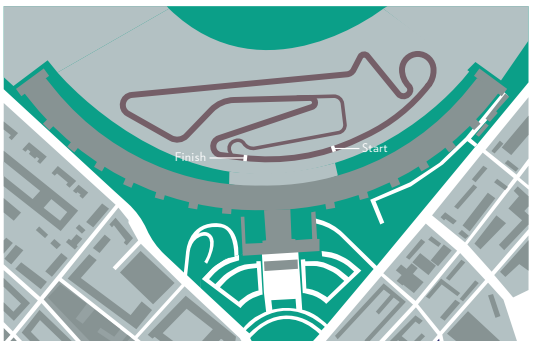
Even before reunification, Tempelhof's traffic had declined due to too-short runways and dated infrastructure. By the mid-1980s, most West Berlin flights flew in and out not of Tempelhof but Tegel, to the city's west, and most East Berlin flights went to Schoenefeld to the southeast. Fall-of-the-wall opened an opportunity to consolidate all commercial flights in one place: the pick went to Schoenefeld. A 2008 referendum to keep Tempelhof running as a city airport was rejected by voters, so later that year, flight operations were shut down permanently.

What now?

Suddenly, a huge, undivided, central plot was up for grabs. Various groups proposed various uses: park, arena for concerts or rallies, business incubator, museum, sports complex, vegetable garden and exhibition space. Rather than choosing one or a few, Berlin's city government punted and in 2010 began opening Tempelhof to them all.

For the open space, a public-private partnership was set up to manage development and use. Dozens of projects have since been realised: urban farms, mini-golf courses, impromptu theatres, bicycle-repair workshops, grill and picnic zones, basketball courts, baseball diamonds, football pitches, dog runs and birdwatching niches. There is even the world's first official playing field for Jugger – a mixture of rugby,

The Berlin E-Prix at Tempelhof Airport



The E-Prix racetrack sits next to the 1.2-kilometre curved airport terminal

field hockey and quidditch. Former run- and taxiways are filled with sportspeople of many stripes: bikers, walkers, runners, skaters, dancers, BMXers and landsurfers.

Especially on weekends, the open space takes on a festival feel. "Tempelhof has become a playground where you can experience the past and the future in a simultaneous, disorienting, thrilling rush," writes novelist Nathaniel Rich in The Atlantic. "One chilly November afternoon, I found hundreds of Berliners strolling, running, and bicycling on the tarmac. Others flew kites, juggled, and gathered for picnics. A skateboarder holding a windsurfing sail glided by on the strength of the breeze. There is room for everything and everyone here."

All well and good, but surely prime real estate such as this will ultimately be converted into offices, shops and flats, right? Actually, no.

From past to present

If the ground could speak, that of Tempelhof would have a lot to say. References to the sprawling pitch date back to the 1300s, when it was used by crusaders (Knights Templar). When Berlin became the capital of Prussia in 1701, it hosted military manoeuvres and parades as well as a graveyard for fallen soldiers. When aviation emerged in the early 1900s, Tempelhof's huge, flat surface proved ideal for takeoffs and landings.

A proper airport for Germany's then leading city followed in 1923, and when the Nazis came to power a decade later, they upgraded it to a global showplace. Construction of the current airport buildings started in 1937, coming to a halt in 1939 due to the start of World War II. Though never fully completed, Tempelhof became an icon of Nazi architecture: huge austere buildings in totalitarian style, replete with imposing imperial eagles made of stone. More gruesome was the addition soon thereafter of a prison for use by the secret police (Gestapo) and, during World War II, a concentration camp for forced labourers who worked in the hangars and halls to make weapons.

In mid-1945, Tempelhof became part of the American Zone of West Berlin. The US military housed and trained troops there, but most notably used it as the receiving end of the Berlin Airlift. In 1948–9, some 300 000 Allied flights defied a Soviet Union land blockade to deliver food, clothes and life supplies to a besieged city – as the world watched. "Tempelhof is a not just a masterwork of civil engineering," says Irina Dähne, a director of one of the management companies now running Tempelhof. "It's a symbol of freedom."

The airport's prominence faded thereafter. From the 1950s to the 1980s, Tempelhof shifted its focus from military to civil, and even that wound down steadily. By the 1990s, it hosted only short- and mid-distance flights, and was shut down completely in 2008. Since then, it has seen mixed use – mainly as a park.

In 2014, despite the city's affordable housing shortage, Berliners voted to protect the outdoor space in its current mixed use, rejecting a proposal that would have started redevelopment in 2021.

And the history?

At the same time, efforts were made to preserve Tempelhof's past. On the field, a 'history path' of info markers tell its story over the centuries. Then there's the terminal building itself, which bears witness to the history of Berlin – 1.2 kilometres long in the massive, muscular style favoured by its Nazi constructors. The terminal's giant roof will house an interactive history gallery. And soon, the former air traffic control tower will reopen, offering visitors 360° views of the city.

Management of the buildings has been handed to another public-private partnership, which has recruited some 100 tenants. A former military officers' hotel was converted into an incubator for IT firms. The gigantic arrivals and departures hall is used for galas, conferences and trade fairs. The annual Art Berlin show has moved to one of the former airplane hangars. Says one of the organisers, Maike Cruse: "The historic halls of Tempelhof create an international dialogue about Berlin's art market."

The indoor and outdoor spaces have also been repurposed for sporting events. The annual Berlin Marathon, with runners and hangers-on totalling 90 000, is based out of Tempelhof. Formula E electric racing has found a steady home: Tempelhof hosted races in four of the last five years, including the 2019 Berlin E-Prix in May.

Finally, there is a temporary use that fits none of the above categories. In 2016, parts of the terminal and hangars were repurposed to house refugees, mostly from Syria and Iraq, who poured into Europe in the wake of the Syrian civil war. Up to 7000 asylum seekers have taken shelter there in spartan conditions – likened by one journalist to living in a train station. Their tenancy will end this year, reports the newspaper Berliner Morgenpost. All Tempelhof refugees will move to a nearby former convalescence home, with better infrastructure to support daily life.

So redevelopment has not gone in a straight line, but Tempelhof is en route to its next stage in history. "It's still a place of arrival and departure," says Thomas Oberender, director of one of Tempelhof's public-private partnerships. "And so it's a good metaphor for a city experiencing change."

The former air traffic control tower will offer visitors 360° views of Berlin

Tempelhof's expansive arrivals and departures hall

KONG

San Francisco and Tokyo should watch out: a new metropolitan bay area is hot on their heels. Leveraging its status as a global financial, transportation and trade hub, Hong Kong is playing a central role in China's grand plan to develop a Greater Bay Area rivalling its more famous American and Japanese counterparts.

Author Chris Davis

While many cities aspire to be labelled a 'smart city' or 'future city', Hong Kong has always been a metropolis that's kept a close watch on what's in store for the future. During the two decades before mainland China began to raise the bamboo curtain in the late 1970s and subsequently established its reputation as the world's factory, the 'Made in Hong Kong'

Opened in 2018, the new 55-kilometre bridge-tunnel connects Hong Kong to Zhuhai and Macau on the Pearl River Delta

Hong Kong has always played a pivotal role as a strategic East-meets-West gateway.

brand supplied the world with low-cost toys, textiles and electronic products. By the end of the 20th century, however, Hong Kong had closed the toy box lid on producing cheap toys, electrical gadgets and garments, and successfully made the transition to a service-led economy, firmly establishing itself as one of the world's major international financial centres.

At the crossroads between East and West

Meanwhile, throughout numerous political upheavals and business uncertainties, Hong Kong – from its strategic location perched on China's southern tip – has always played a pivotal role as a strategic East-meets-West gateway. The city constitutes a crucial financial and business intersection between mainland China and the rest of the world. And thanks to its international outlook with strong links to global economic and business markets, Hong Kong's future is being strategically positioned.

9+2 = 15th largest economy in the world

In mid-February 2019, the Chinese government unveiled the Greater Bay Area (GBA) blueprint: an ambitious plan to integrate the flows of people, goods, capital and information between Hong Kong, Macau and nine cities of the Guangdong province to rival the world's better-known bay areas. Often dubbed the '9+2 cities', the GBA comprises Shenzhen, Guangzhou, Foshan, Dongguan, Zhuhai, Zhongshan, Huizhou, Zhaoqing and Jiangmen in Guangdong province – plus Hong Kong and Macau.

Described as the Bay Area – although to be geographically correct, the GBA is a delta rather than a bay – at about 56 000 square kilometres, it is larger than Tokyo Bay and more than twice the size of the New York Metropolitan and San Francisco Bay areas. With a population of close to 70 million and a total GDP of USD 1.53 trillion (similar to that of Russia and slightly larger than Australia), if the GBA were a country, it would have the 15th largest economy in the world.

The GBA's 'grand plan' plays to some of Hong Kong's unique advantages. For example, while the 9+2 cities each have their own strengths,

Hong Kong is by far the most international in its business outlook and global cultural integration. The GBA blueprint outlines the role of each partner city, covering the period from now until 2022 in the immediate term and extending to 2035 in the long term. In this scenario, the future looks bright for Hong Kong. Home to about 70 of the top 100 global banks, the city will leverage its leading edge in international finance, professional services and aviation.

Laying the foundation for Hong Kong's future success

While there are some concerns that Hong Kong, with its population of roughly 7.5 million, might be absorbed into the vast mainland China hinterland and become just another Chinese city, Hong Kong Chief Executive Carrie Lam Cheng Yuet-ngor is pinning high hopes on the Bay Area's contribution to Hong Kong's future success. She cites Hong Kong's economic freedoms, the rule of law and an independent judiciary, its favourable tax environment and the overall ease of conducting business

If the GBA were a country, it would have the 15th largest economy in the world.

High-speed trains allow businesspeople to travel from Hong Kong to mainland China and back in the same day

West Kowloon station is the terminus of the Guangzhou-Shenzhen-Hong Kong Express Rail Link connecting Hong Kong to mainland China

> "Beijing has invited us not only to build closer links with the region, but also to play a role in shaping it."
>
> Carrie Lam Cheng Yuet-ngor

in the city as unique lynchpins and key differentiators. Leveraging on these pillars, Lam says Hong Kong is in a prime position to transition once again, this time into a regional megacity with greater capacity for growth. "Beijing has invited us not only to build closer links with the region, but also to play a role in shaping it," Lam said in response to criticism during a legislative debate. "What kind of foolishness would persuade us not to take maximum advantage of such an invitation?" she added.

Similar to nearly 40 years ago, when Hong Kong entrepreneurs seized the moment when China opened for business, Hongkongers are being urged to do the same again. Steven Lam Hoi-yuen is one example. The co-founder and chief executive of app-based van hire service GOGOVAN, valued at more than USD 1 billion and Hong Kong's first startup to join the global billion dollar 'Unicorn' club, believes the GBA plan has presented a wide opening for Hong Kong's young people. "Young people need to be more open-minded about embracing China's developing economic power and flex their muscles in the Bay Area," Lam said during a panel discussion debating Hong Kong's future. In fact, Hong Kong has always made the most of its proximity to mainland China: during the 1980s and 1990s, when the city was still under British rule, countless small and medium-sized enterprises – the bedrock of Hong Kong's economy – scaled up rapidly by taking advantage of manufacturing capacity on the other side of the border.

Steven Lam Hoi-yuen co-founder of GOGOVAN believes the city's proximity to mainland China offers business opportunities

Connecting businesses, entrepreneurs and academics

With an eye on the future and following decades of investment in modernisation, Hong Kong has developed a world-leading urban transport network that accommodates more than 12 million trips by public transport per day. In preparation for its role as a key GBA city, Hong Kong's transportation systems have been dramatically expanded. The 55-kilometre Hong Kong-Zhuhai-Macau mega bridge and the Guangzhou-Shenzhen-Hong Kong Express Rail Link – connecting Hong Kong with the 25 000-kilometre national high-speed rail network – were completed and opened in 2018 at a combined cost of almost USD 30 billion. The mammoth transportation backbone constitutes the final stages of what is being marketed as one of the most dynamic trading regions in the world.

With convenient new rail and road links in place, it is now possible to wake up in Hong Kong, have breakfast in Shenzhen, lunch in Guangzhou, dinner in Zhuhai and return to Hong Kong – all in the same day. Reduced travel time is expected to lead to more exchanges among business experts, entrepreneurs and academics. Charles Ng, Associate Director-General of Invest Hong Kong, the government department tasked with attracting foreign direct investment into the city, believes that the new physical

The new transportation links make it easier for travellers from mainland China to experience Hong Kong's food, culture and entertainment offerings

Thanks to its privileged geographical position, Hong Kong has always had an international outlook

infrastructure and trade facilitation measures will help drive this next cross-border transformation, which promises larger commercial flows, lower costs, higher efficiencies and greater prosperity for the city and region. "All of these developments are conducive to further developing Hong Kong into an international metropolis with enhanced competitiveness," notes Ng.

New infrastructure also makes it easier for travellers to visit Hong Kong to sample its food, cultural charms and purpose-built entertainment attractions. A proposition that Mike Orgill, Airbnb's General Manager for Southeast Asia, Hong Kong and Taiwan, sees as an incentive that will fuel a wave of tourism among the rising tide of travellers visiting China and looking for authentic experiences. "Easier ways to travel means that more people can get a feel for the real experiences that Hong Kong life can offer," says Orgill.

Looking ahead, while it remains to be seen how the development of the GBA will unfold, with Hong Kong playing its part in the birth of a new hub, the future points towards greater prosperity, livability and opportunities.

It is now possible to wake up in Hong Kong, have breakfast in Shenzhen, lunch in Guangzhou, dinner in Zhuhai and return to Hong Kong – all in the same day.

FUTURE-PROOFING OUR CITIES

A city's infrastructure and its prosperity are inextricably linked. But it is a two-way street: good infrastructure is the result of prosperity, and basic infrastructure is required to maintain a certain level of prosperity in urban centres. A city's ability to deliver services through its water, energy, mobility and waste management infrastructure are key contributors to its quality of life and preparedness for the future.

Mobility

Congestion and pollution have a negative impact on quality of life.

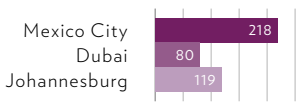
Average increase in travel time for world's 100 most congested cities:

morning rush hour

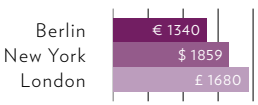
evening rush hour

Source: TomTom

Average number of hours drivers spend in traffic per year:



Annual cost of congestion per driver:



Source: Inrix

Technological advances and growing adoption are making cameras, sensors and software used in autonomous vehicles more affordable; on-demand self-driving taxis could be right around the corner.

Cities can save up to USD 6 billion per year by replacing traditional street lights with LED lights, which are 40–60% more energy-efficient and last 4 times longer.

Digital technology enables the expansion of ride hailing and car, bike and scooter sharing services.

Congestion zone charges and dynamic mobility pricing schemes based on real-time traffic data encourage users to shift to less congested routes or transport modes.

Infrastructure funding

of city officials cite strained city budgets as the main obstacle to making necessary infrastructure investments to future-proof their cities. How to overcome this problem? Here are four financing models that city officials can consider:

- *Social development funds:* specific funds set up to implement and scale up urban development or smart city initiatives.
- *Public-private partnerships (PPP's):* funded and operated through a partnership of government and one or more private sector companies.
- *Self-financing:* sourced from public budgets in collaboration with central governments or state governments.
- *Private investment:* financed through commercial stakeholders, service providers, private investors and venture capitalists.

Energy

Increasing energy consumption driven by urbanisation.

5–10%

Street lighting accounts for 5–10% of large cities' budgets. Source: World Bank

38%

Electric vehicles are expected to reach market penetration rates of up to 38% by 2035, requiring investments in power grids to accommodate for energy demand spikes from simultaneous charging of vehicles. Source: Julius Baer

80%

Demand for street lighting is expected to increase by 80% between 2005 and 2030. Source: IEA

Water

Due to an ageing and insufficient infrastructure, cities lose up to 50% of treated water to leaks:

53% Delhi

40% Mexico City

38% São Paulo

25% London

25% Hong Kong

Sources: various local sources

97%

of leaks are caused by cracked or corroded pipes.

90%

of wastewater in developing countries is discharged untreated into rivers, lakes or oceans.

Source: United Nations

Solar-powered garbage compactors maximise capacity.

Public transportation investments that increase capacity, improve efficiency, repair damaged infrastructure and encourage alternatives such as cycling, help ease congestion.

Developing the waste management industry in emerging markets protects the environment while generating jobs for informal workers who collect and recycle 15–20% of generated waste.

Electronic sensors help detect underground leaks.

Wastewater treatment and water reuse systems help limit water pollution and conserve a city's water resources.

Replacing old pipes with stainless steel or ductile cast iron pipes prevents corrosion and leaks.

Computerised water distribution systems monitor water levels, provide early warning signals for water shortages and ensure stable water supplies.

Smart garbage bins monitor waste levels and help cities optimise waste collection routes.

Solid waste management

Improperly treated waste – especially plastic – leads to soil and water pollution, and decomposing waste in landfills produces methane and CO_2 emissions:

– By 2050, the world is expected to generate 3.4 billion tonnes of waste annually.

30–60% of all urban solid waste in developing countries is uncollected.

97% of all plastic packaging is discarded within the first year.

Source: World Bank

JOHANNES BURG

New artisan development hub Victoria Yards is what its tenants hope all of Johannesburg – and indeed all of South Africa – could one day be like.

Tshepo Mohlala has found creative inspiration for his up-and-coming jeans label at Victoria Yards

Author Tracy Burrows

Pockets of rejuvenation and innovation are now springing up across the once run-down Johannesburg inner city and surrounding suburbs, bringing hope of a new, sustainable and empowering approach to urban regeneration in the city.

Development projects spearheaded both by the city and by private investors have been underway across the city for several years, often focused on arts, entertainment and technology business development. But a recent addition to the east of the city is taking a new approach to urban regeneration, incorporating business space, an urban food farm, and a strong focus on artisanal skills development.

Victoria Yards, once a dilapidated factory precinct occupied by squatters, informal mechanics and chained dogs, has been transformed in only two years into a thriving community of artists, artisans and traders. For up-and-coming jeans manufacturer Tshepo Mohlala, founder of Tshepo the Jean Maker, his Victoria Yards base aligns with the soul he sought for his brand. "I already sell jeans abroad, and I might expand and open shops in places like Soweto and the northern suburbs, but the heart and soul of the brand lives right here at Victoria Yards," he says.

It's the latest addition to the 'Makers Valley' – a 'corridor of solutions' and series of independent urban regeneration and development projects stretching east from the vibrant inner city Maboneng precinct, including the non-profit Spaza Gallery in Troyeville, creative collective Ellis House in New Doornfontein, Victoria Yards in Lorentzville and finally, the Skills Village 2030 community campus precinct in Bez Valley. The Makers Valley Collective driving the progress in Makers Valley is based in sponsored premises at Victoria Yards, working with the various development projects and communities to bring about a clean, safe, productive and inclusive inner city through development nodes and new approaches to low-cost housing.

Building a community

With 30 000 m² of raw industrial space terraced either side of the Jukskei River, Victoria Yards offers large, cost-effective studio and workspace to artists, glassblowers, metalworkers, furniture makers, printers and empowerment projects. Food crops line the walkways between the stark brick buildings, where some of South Africa's leading creatives have found a new space to call home. As one of the earliest tenants of Victoria Yards, Mohlala was sold on developer Brian Green's vision early on. "Brian's crazy – he's a visionary. This place was a mess when I first saw it, but I trusted the vision and moved in," he says.

It's now primarily a workspace only open to the public on the first Sunday of each month, but streams

"The heart and soul of the brand lives right here at Victoria Yards."

Tshepo Mohlala

An employee at Tshepo the Jean Maker's workshop assembles a custom-made pair of jeans

Growing international through small business incubators

From a small loan from a friend four years ago, to a trending exporter of custom-made jeans today, Tshepo Mohlala has come a long way in a short space of time. His Tshepo the Jean Maker range of denims is now sold in Amsterdam, with talks underway on expansion to other international markets this year. Twenty-seven-year-old Mohlala, who initially started his business from home, grew his label through careful brand building and online marketing, and expanded by moving into business development hubs in Johannesburg. He also opened a shop in Johannesburg's Central Business District, but quickly realised a traditional retail outlet was not appropriate for his business at that stage. "The shop was running at a loss," he says. His move to the new Victoria Yards precinct aligned completely with the brand's identity, and Mohlala says the premises is the perfect base for growth. Mohlala believes his customers appreciate the craft, detail and story behind each pair of jeans, and enjoy visiting his Victoria Yards base. "I have customers ranging from young professionals through to a 91-year-old – they appreciate the atmosphere of the Yards, and the personal touch they get from us. It's what customers – especially my generation – want: alternative spaces, a return to real craftsmanship and bespoke products," he says.

Brian Green, the visionary developer behind Victoria Yards

> "With developments like these, you start to slow down the urban sprawl, stop crime, stop people sleeping rough there, and stabilise a part of the city that was degrading."
>
> Brian Green

of visitors spill through the gates all day, every day. Local children have taken to visiting one of the tenants after school, so she can read books to them. Customers wander in to be measured for custom jeans, and are still there three hours later – swapping stories with the tenants. Bees and butterflies drift among the young fruit trees, herbs, vegetables and medicinal plants, which are nourished by waste from the coffee store and carpenters. Tenants meet at the coffee shop to compare notes on the business of the day. For artisans fuelled by creativity, Victoria Yards is proving to be a tranquil refuge from the busy city outside its walls, but it's also a hub of inspiration for like-minded people and a generator of employment and skills development for the surrounding community.

Victoria Yards' owners note that they are property developers rather than social integrators. However, they embrace the concept of inclusive and empowering inner-city communities, so they collaborate with tenants Simon Mayson and Tumi Moroeng of the Makers Valley Collective, and support the overall community development ethos of the collective.

Brian Green, co-founder and the creative inspiration behind Group 44 Properties, which also developed trendy retail precinct 44 Stanley on the western side of Johannesburg, says the Makers Valley Collective association is proving to be a 'plug in' to Victoria Yards that has supercharged the project's community development impact.

Mutually beneficial regeneration

"In the true sense of the word, I was an urban regenerator. If you look at 44 Stanley – and I didn't even know what I was doing back then – I just wanted to make bricks and mortar beautiful again and give the place a chance," he says. "With developments like these, you start to slow down the urban sprawl, stop crime, stop people sleeping rough there, and stabilise a part of the city that was degrading. But we are finding that the Makers Valley Collective next door is fast-tracking our impact by looking at the greater area and the social needs of the area. Together, we address progress, skills development, jobs and low cost housing, and I think that's a very scalable business proposition when you look at the low initial value of the land that you're starting to upgrade."

Green is hesitant to call it gentrification, since many gentrification projects have edged the original communities out of their homes as areas become more valuable. He hopes to find a balance, whereby the original communities are upgraded and given more dignity, without driving them out of the area. He says: "Gentrification is ultimately unavoidable in cities that work because of the proximity of these lower cost/lower income neighbourhoods to where the money is being made. Property developers can become greedy, but we are very aware of the potential evils of gentrification, although ultimately it is unstoppable. This area is pretty gritty, but once this area is safe and clean, you will see more money flowing into it eventually."

He hopes to see the area become a vibrant, safe, clean neighbourhood fully representative of South Africa's population, where a range of income groups live side by side – with dignity.

Fostering skills development

Victoria Yards' first stage saw building repairs and the development of scalable urban food gardens throughout the precinct. Green then sought out tenants such as artists and artisans who were likely to offer jobs and skills development programmes. "I said we have to fill it with artisans – photographers, metalworkers and woodworkers who will fill that gap where this country so desperately needs skills training, and hope there would be some skills osmosis," he says. This is proving successful, and one tenant, award-winning furniture maker David Krynauw, is already upskilling around 50 people – most of them from the surrounding neighbourhood. More formal skills development programmes are in the pipeline, across urban food gardening and artisanal skills.

"We are starting to attract formal educators, some tenants now have funding to launch training, and hopefully, one day people will say they were trained at Victoria Yards and this will have credibility and a stamp of excellence," says Green.

A green oasis allows community members to hone their urban farming skills

A model for the future

"Projects like this are representative of what the whole of Johannesburg, or all of South Africa, could become," says new tenant Tony Esslinger, who, along with partner Irvin Smith, is currently installing distilling equipment for their new vodka and gin distillery. The distillery, Primal Spirits, will soon open its doors and has longer term plans to extend the distilling co-product, 'supergrain', into a local baking business. Esslinger, now back in South Africa after years of living in Europe, says the appeal of Victoria Yards is that it instils a feeling of well-being in its tenants, without it feeling like an 'elite enclave'.

A logo fit for a king

Shortly after moving in, Mohlala met fellow tenant and renowned artist Ayanda Mabulu, who one day flamboyantly spray-painted a crown on the wall of his studio, saying Mohlala was a king and deserved a crown. The crown is now Tshepo the Jean Maker's logo, inked into his arm and emblazoned in red on the pockets of his jeans. "I was waiting for inspiration for my pocket signature, and only found it because I was here – in such a creative community," he says.

Victoria Yards is just one of several business and skills development hubs now re-energising Johannesburg's inner city and surrounds. But its unique focus on inner-city food gardening and active skills development is inspiring tenants, customers and surrounding communities alike.

Multi-pronged reimagining underway

Johannesburg mayor Herman Mashaba is actively championing inner-city regeneration, business development, job creation and low-cost housing development. He notes the city created 110 000 jobs net year-on-year last year, representing growing confidence in the city among entrepreneurs and small businesses. The city has released at least 84 properties for mixed-use development and clamped down on illegal tenants and slum lords as part of its revitalisation efforts.

Johannesburg Development Agency (JDA) has invested nearly ZAR 10 billion over 15 years on projects initially focused on economic, social and environmental outcomes and which now also include an emphasis on resilient, sustainable and liveable urban areas in identified transit nodes and corridors.

In the 2017/18 financial year, the JDA introduced a new approach to partnering with Johannesburg's inner-city communities by introducing the Our City, Our Block call for partnerships.

Among multiple other projects, JDA is building a Social Cluster in Brixton, nearing completion on the Westbury Transformation Development Centre, and is seeking to revitalise the Hillbrow Tower Precinct, Fordsburg, Park Station and Ghandi Square East precincts.

STOP CALLING THEM ACCIDENTS!

Traffic collisions aren't random: they have known causes that can be avoided. Still, car crashes are all too common and on the rise, claiming huge human and financial costs. So Julius Baer and others are joining forces to fight back.

Author Eric Johnson

1.35
million road fatalities per year
Source: WHO

#1
cause of death among 5 to 29-year-olds
Source: WHO

$500 bn
per year: global economic cost of traffic collisions
Source: FIA Action for Road Safety

Leading causes of death make a grim roll call, populated by the usual suspects: heart disease, stroke, cancer, diabetes, road traffic … yes, you read that right, road traffic! Annually, says the World Health Organization, crashes kill 1.35 million people and injure another 50 million. That's almost one per cent of the entire global population, year after year.

The global toll is heaviest in developing countries of Africa, Asia and Latin America, where growth in motor vehicles has grossly outpaced infrastructure and safety capacity. Heading the gruesome list of 'most fatalities per capita' is Zimbabwe, where each year, nearly eight of every ten thousand people die on the road.

Death rates in the developed world are far lower at 0.2–1 per ten thousand, reports the International Transport Forum (ITF), which is organised by the developed world's think-tank, the OECD. And mortality has declined some 15 per cent in the past decade, the ITF adds, but that decrease has not been smooth. While car passenger safety has steadily improved, motorcyclist, bicyclist and pedestrian fatalities are often higher today than they were in the year 2000.

An uneven match

Ironically, this has happened as many cities have tried to become more bike-and walk-friendly. The problems are that pro-bike/walk policies have been implemented haphazardly and that drivers blithely ignore them, says University of Maryland Public Policy Professor John Short. As he writes in TheConversation.com, many bike lanes and pedestrian zones are too short and/or disconnected. Moreover, "even in the best of times, cars and trucks are not good at sharing the road." It doesn't help that the actors are unequally armed. "Drivers are operating fast-moving lethal weapons," Short notes, "and they are encased in a protective shield."

A positive note, however, is that experts at least agree on the causes of crashes. Excessive speed is nemesis number one: according to the ITF, it causes 20–30 per cent of road deaths. By the way, the modifier 'excessive' should never be omitted: the danger is not absolute speed as such, but speed that is inappropriate to the conditions. In fact, the fastest roads are the safest. As the ITF reports, "The risk of dying on motorways is between two to six times smaller than on the whole [road] network." The other root cause of wrecks is human error, usually lack of attention. The prime culprit in this regard is alcohol, followed by drugs, smartphones, rubbernecks and other distractions.

Experts also agree on three tried-and-true prevention strategies: helmets, seatbelts and child restraints. Here, Argentina serves as a poster child. Between 2008 and 2013, the South American country boosted motorcycle helmet and seatbelt use by 20 per cent and 40 per cent respectively, while cutting drunk driving by 50 per cent. The result: a 10 per cent reduction in road deaths – saving 700 lives per year.

70%

reduction of risk of death among infants through use of child safety seats

Source: FIA Action for Road Safety

5%

reduction in average speed can reduce the number of fatal crashes by 30%

Source: FIA Action for Road Safety

90%

of road fatalities occur in low- and middle-income countries

Source: WHO Global Status Report on Road Safety

> "Even in the best of times, cars and trucks are not good at sharing the road."
>
> Professor John Short

In large, congested cities like Jakarta, cars and their more vulnerable counterparts must share the road

A busy crosswalk in Hong Kong

"Boosting road safety is not rocket science," says Norbert Ruecker, an Economics and Next Generation analyst at Julius Baer. "It's following simple principles that prevent collisions and minimise damage."

Taking it to the streets

Making roads safer is, of course, easier said than done. The right laws need to be in place. Those laws must be properly enforced. And all that costs money (although experts uniformly say that the return well outstrips the investment). A good place to start being safer is in people's minds. Crashes are not accidents, fatalities are not fate. They are preventable losses.

Global initiatives are underway. In 2015, the United Nations targeted a 50 per cent cut in road deaths as one of its 'Sustainable Development Goals'. Also that year, the Federation Internationale de l'Automobile (FIA), the international association of motoring and motor racing, convened a High Level Panel for Road Safety. Along with heavyweights from industry and politics as well as safety experts, the FIA Panel has 25 ambassadors – high-profile sportspeople and entertainers – to spread the safety message worldwide. In 2017, the ITF published a Marrakech Declaration, whereby 40 countries pledged to improve the collection and analysis of road safety data.

Julius Baer has joined one of the FIA's initiatives: the Child Safety Global Programme, which aims to bridge one of safety's poverty gaps. Countries such as Belarus and Moldova mandate child restraints, but less than half of children use them. The reason: child seats are too expensive for lower-income families. This initiative will collect some of the thousands on thousands of usable seats in Western Europe that are sitting in storage because children they protected have outgrown them, and deliver them to Eastern Europe. Pilot testing has shown high participation and enthusiasm.

Cities are also taking action. With programmes such as Vision Zero and EuroRAP, they are pushing the same agenda as their global counterparts and additionally focusing on 'system design': how roads are laid out and traffic is regulated. Ultimately, this will bring the most benefits, but the bar is high. "It will require not only re-engineering urban traffic, but also reimagining our cities," says Professor Short. "We need to think of them as shared spaces with slower traffic, and see neighbourhood streets as places to live in and share, not just to drive through at high speed."

> "We need to think of cities as shared spaces with slower traffic, and see neighbourhood streets as places to live and share, not just to drive through at high speed."
>
> Professor John Short

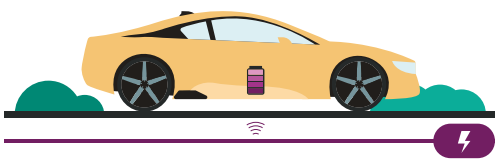
FROM THE RACETRACK TO THE ROAD

As the world's first all-electric street racing series, Formula E was originally conceived as a test bed for innovation in electric mobility. The extreme conditions of a street race help accelerate the development of new ideas, contributing to mobility improvements and making our cities more liveable. We highlight six of the most promising solutions.

Changing perceptions

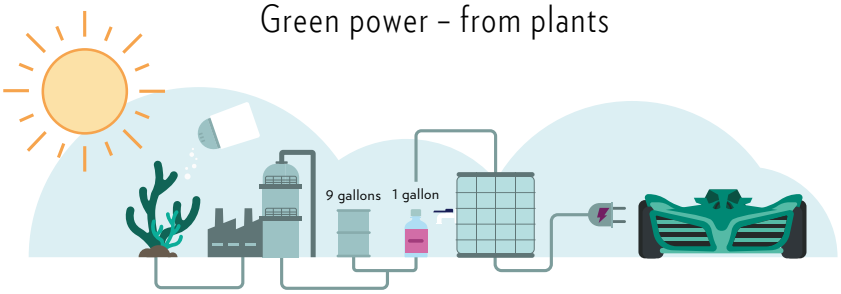
Not only will Formula E continue to develop the technology that we see in our road cars, but it's starting to change perceptions of electric vehicles too. The sport is showing people that electric cars aren't boring or slow. A lot of people will look at these slick race cars and start to think that if they can enjoy electric racing, perhaps they can enjoy driving an electric car.

Wireless charging



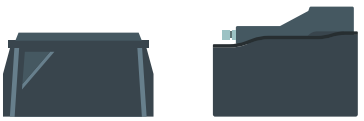
Imagine charging your car like charging your electric toothbrush. This has already become a reality. During the first four seasons of the series, the Formula E safety car, a BMW i8 Coupe, used a special wireless pad to charge its battery. The charging process was initiated by simply driving over the wireless pad, saving time and effort, which are vitally important during a Formula E race – but are also highly convenient for electric road vehicles. Qualcomm, the company behind this technology, is already developing a solution in which wireless charging pads embedded in the road can charge the cars while driving, extending the range of electric vehicles.

Green power – from plants



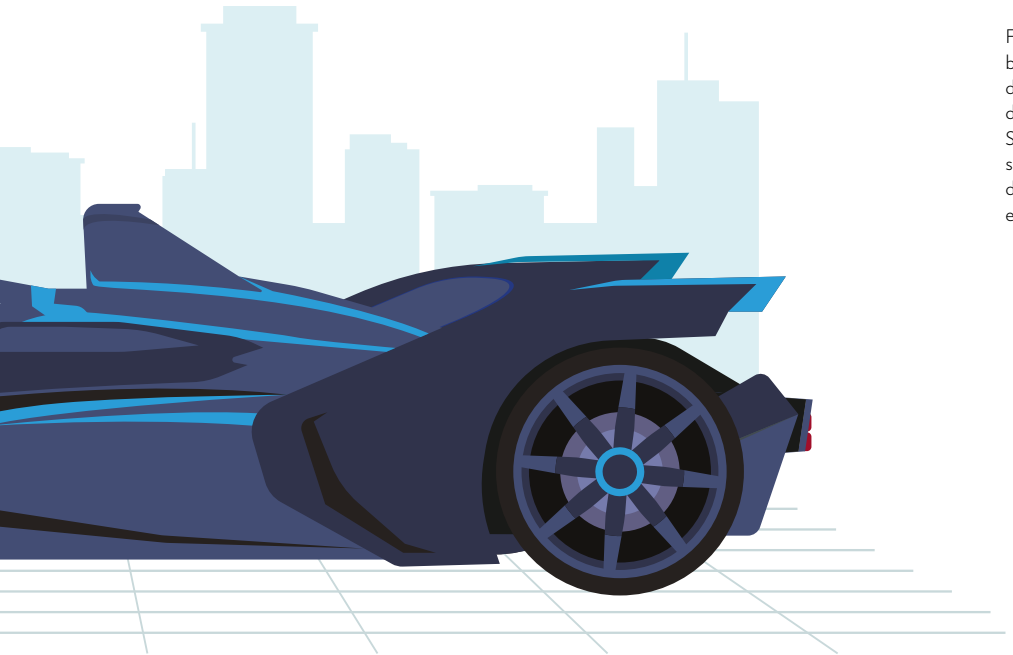
Formula E provides power for its cars from portable glycerine generators, which are as powerful as diesel generators. Glycerine is a by-product of biodiesel production: for every nine gallons of biodiesel, one gallon of crude glycerine is produced. Just two of the generators, developed by the company Aquafuel, provide enough electricity to power 2000 UK homes for one hour. The sugar solution is actually edible, and is made from plant algae farmed in saltwater, conserving freshwater resources. This allows Formula E cars to be charged in a clean, safe and reliable manner – in less than one hour.

Efficiency goes the distance

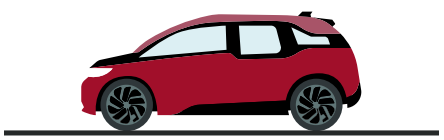


Gen1		Gen2
28 kWh	**Capacity**	54 kWh
60 min	**Charging time**	45 min
200 kW (272 hp)	**Power**	250 kW (340 hp)
225 km/h	**Top speed (of the car)**	280 km/h

Formula E teams drove the first generation battery over 240 000 miles – more than the distance from the earth to the moon. Race distances increased more than 25 per cent from Season 1 to 4 using the same battery. In Season 5 (2018–2019), the Gen2 battery almost doubled in capacity, from 28 kWh to 54 kWh, eliminating the need for the mid-race car swap.

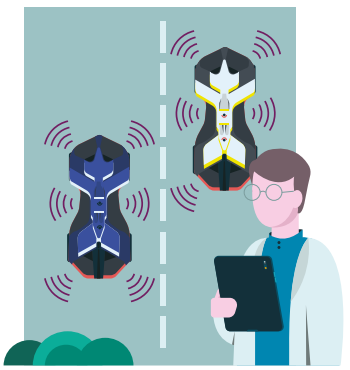


Straight to consumers



Eight commercial manufacturers have fielded Formula E cars so far – with Mercedes and Porsche set to join in the 2019–2020 season. Though each team uses the exact same battery and chassis, manufacturers are free to develop all other components such as the engine, transmission, suspension, springs, shock absorbers, stabiliser, brake-by-wire system and cooling. Many of these parts designed for the race cars have gone directly into road vehicles.

Robots learn how to race



As a support event at Formula E races, Roborace also uses racing as a platform to drive technological progress. The difference is that Roborace uses driverless electric vehicles. Using inputs from the cars' multiple sensors, radars and cameras, the teams' software engineers develop real-time computing algorithms and artificial intelligence to guide the cars around the track. Ultimately, Roborace aims to advance all aspects of autonomous driving, ranging from driver assistance to collision avoidance and security technologies, all of which will be hitting our streets in five to ten years' time.

HOW TO BUILD A RACETRACK

A lifelong motorsport fan, Valencia native Agustín Delicado never imagined that his civil engineering degree would lead him to a dream job designing Formula E racetracks in the world's most iconic cities. He tells us about the challenges of building temporary tracks in city centres – and the thrill of working through the night to make sure the FIA-approved track is ready on race day.

Interview Adriana Wattengel

Agustín, how did you become a track designer?

Well, I've been a huge fan of motorsports since I was a kid, but I never thought about designing motorsport tracks until I joined Formula E. I studied civil engineering in Spain, and then I was recruited for a job to work on some track layouts for Formula E in their London office. And about nine months later, during Season 1 of Formula E, we started to actually build the tracks and then my life changed.

What makes Formula E racetracks unique?

The main difference between Formula E and other motorsport championships is that the tracks are temporary and are built right in the middle of the city. Therefore, the track layouts need to fit the specific circumstances of a city's centre.

What are the main parameters you have to bear in mind when designing a racetrack?

We start with the feasibility study. When we define an initial layout of the track, it needs to be sufficiently wide. Then there's the length of the track itself – we are now targeting tracks of 2.5 kilometres, especially because we will have an additional racing team next year. We also need to make sure there is enough space for the safety run-off areas. The biggest challenge at this feasibility stage is to consider what roadworks and surfacing work need to be carried out in the city. This might involve the removal of a traffic island and other street furniture. But we also need to find the space for our pit lane, which with 12 teams is becoming more challenging in city centres. So we have to be very creative.

How important is the involvement of the neighbourhood?

Well, that's quite critical and is a key factor in being able to return to the same city in the next season. Let's say you have a neighbourhood with a road full of businesses – they might not be too excited about us putting concrete blocks and fences in front of their establishments. So we've developed a system of modular blocks homologated by the FIA [Federation Internationale de l'Automobile – motorsport's governing body] that helps us build a race circuit quickly without affecting residents and businesses. Thanks to this modular system, we can wait until Thursday night or Friday morning to install the blocks and fences and other infrastructure to allow for vehicle access, ensuring the businesses remain completely operational until then. As for pedestrian access, we ensure it is maintained during the entire event, of course.

In terms of planning, we need to work very closely with the city's engineering department, traffic management and police to ensure that everything we do is in the right place for every stakeholder on and around the track.

"The track layouts need to fit the specific circumstances of a city's centre."

Agustín Delicado, Senior Track & Overlay Manager at Formula E

"The biggest challenge is to consider what roadworks and asphalt work need to be carried out in the city."

Even with the concrete barriers installed, city streets must remain open to road traffic until race day

Who approves the final layout of the track?

That would be the FIA. The Federation has 'circuit safety commissions', which carry out speed simulations and then give feedback to the respective national sporting authorities in the city. These commissions are the ones dealing directly with Formula E or with the track designer. They tell us which modifications we need to make to the planned track to ensure it is safe. This process is ongoing and is reviewed over time because the circuit safety commissioners need to see that what we are building is indeed what they have simulated and approved on paper. The final homologation by the FIA usually takes place on the Friday morning before the race, once they've had a chance to see the completed track.

Do you ever have to make last-minute changes to the track before a race?

Yes, but changing the layout in terms of the safety devices, the blocks and the fences and so on is not such a big challenge, because it might involve just a couple of curves, a couple of blocks, or simply repainting something. What is most challenging is having to make last-minute asphalt repairs. Because the roads are open to traffic as long as possible, there might be an issue and then you need to act on that on Friday night. The asphalt repairs are the more critical ones.

How do you balance the safety requirements with building a track that will deliver an exciting race?

Temporary overpasses ensure pedestrian access for local residents is maintained during the race

Zurich's 2018 E-Prix featured the first ever cobblestone pit lane in Formula E history

The key thing for overtaking in general is the track width, which is very limited in a city. In Paris, for instance, there are not many options for changing the design of the track itself. But what makes our championship interesting is the drivers' battery management, the FANBOOST and now the ATTACK MODE, which is new this year. This gives drivers various strategy options during the race. So that really helps in races where we don't have the option to widen the track. But if we go to places like the site of Berlin's historic Tempelhof Airport, where we are not limited by the city streets, we can pretty much do whatever we want to make the track itself more challenging.

What are some of the physical obstacles that you typically encounter when designing a city circuit?

We've had several instances in which we had to work around some tramlines. Sometimes we need to find a solution to cover the tramlines, which, of course, has to be done at the last minute so that trams remain operational until Friday. But the real challenge lies in ensuring we don't adversely affect any grassy areas or any trees in the city. So when we see a signpost or a traffic island, it's not an issue for us because that's easily repairable and we can even find a semi-permanent solution. But when we see anything green, we try to redesign the layout to make sure we don't affect any of the city's green areas.

What did you like most about the track in Zurich, the location of the first E-Prix on Swiss soil, which took place in 2018?

Well, although some people didn't like it, I really enjoyed the fact that we needed to install almost 400 concrete barriers and debris fences on the last night – which is 1.6 kilometres of material. This requires coordinating with a lot of teams, suppliers and contractors working onsite through the night, and it's quite a challenge to monitor that.

This was all done to make sure that we could keep all roads open and the traffic flowing for the residents as long as possible. But this means having a very long and busy Thursday night into Friday – which is not something everybody else enjoys as much as I do!

Let's stay with the track in Zurich. What were the biggest design and implementation challenges?

In addition to the last-minute track building, we had a pit lane made of cobblestones for the very first time in our series. So it was a challenge to get the teams comfortable with it, build the temporary garage structure there, and then get the homologation from the FIA.

What is the most striking feature of the Berne track, the site of the second E-Prix hosted in Switzerland?

The nicest thing in Berne, apart from the backdrop that the city itself offers, is the slopes: half of the track slopes downwards and half of it slopes upwards. We have a little bit of that in Rome, but that's not something that we have on many tracks in our series.

Berne's Old Town offers a stunning backdrop for the 2019 Swiss E-Prix

The Berne racetrack is one of the few Formula E tracks that features upward and downward slopes

How does it feel to watch a race once the track is complete?

Well, when you come from the site and go to a screen to watch a race on a track that you've just finished building, you can feel quite proud.

I'm always quite relaxed on race day because that means my work is done [laughs]. But I like to follow the race and see if there are any crashes so that I can think of how to improve the track for next year. Let's say we have recurrent incidents in Turn 2. The following year, we will be ready to make changes to that turn.

And at the same time, I know that I need to come back and help take it all down after the race to help reopen the roads. So the adrenaline is still palpable on race day.

How quickly do you take everything down?

We usually take down the tracks in five, six days, but we've even removed some in four days. We always race on a Saturday, and if the venue really needs the roads reopened on Sunday, we remove every turn, every junction, everything we've installed in the middle of the roads and will leave only blocks and fences that are out of the way of normal traffic. And we work every night during that next week to make sure we are gone by, let's say, Friday.

Are there any cities that are not already on the Formula E calendar that you would like to see host a race?

Ah, yes. There are big names out there that we haven't tackled yet. Japan springs to mind. We could go to more cities in the United States.

But I would also love to see a race in my hometown. When I go home to Valencia, I can see the Formula One racetrack from the plane, half of which is built. So, on my second visit back after I moved to London, as I was landing, I redesigned the Valencia street circuit to have a Formula E track. Maybe that will become a reality someday.

> "When you come from the site and go to watch a race on a track that you've just finished building, you can feel quite proud."

THE FUTURE OF MOBILITY:

WHAT WILL MOVE US TOMORROW?

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