



TOP 50 SMART CITY GOVERNMENTS

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# Contents

<b>Introduction</b>	<b>01</b>
Methodology	04
Top 50 Smart City Governments	06
<b>Top 50 City Highlights</b>	<b>08</b>
<b>Regional Showcase</b>	<b>110</b>
Asia-Pacific	113
Africa	119
Europe	125
Middle East	131
North America	137
South America	143
<b>Feature Articles</b>	
<i>Available in premium hardcopy edition</i>	
Smart Strategies to Combat COVID-19	
Achieving Carbon Neutrality at City Scale	
Creative Models in Smart City Financing	
Addressing Privacy and Security Concerns	
Building Inclusive Smart Cities	
<b>Bibliography</b>	<b>150</b>
<b>About Us</b>	<b>160</b>



# Introduction

It is in cities where some of the most critical advances we make as a society will take place.

Understanding the city is now central to understanding our contemporary and future world. Increasingly, the flow of capital, goods, and people takes place across cities in place of national borders. Two-thirds of the global population reside in cities, making it ever more imperative that governments worldwide understand how cities work and leverage their advantages to address the greatest challenges of our time – from managing climate change and overcoming the COVID-19 pandemic, to eradicating poverty, attaining quality education, and protecting habitats.

While much of the focus within existing smart cities literature lies in the efficacy and outcomes of technology solutions introduced thus far, less attention has been placed on smart city development from the city government's perspective. City leaders have the great and highly complex task of governing distinct urban environments that all have unique needs. They would be well-served by a practical and detailed overview of smart city models globally in place of the cornucopia of solutions and poten-

tial investment opportunities which they are often presented with instead. Successful and effective city leadership hinges upon leaders' exposure to innovative solutions to overcome the challenges of financing smart city development, maintaining a strong citizen- and impact orientation, developing effective policy tools, and introducing city-wide initiatives.

Eden Strategy Institute's Top 50 Smart City Government rankings places an explicit focus on the government as a key driver of smart city development, using ten key indicators to systematically and holistically assess city governments globally, with the goal of identifying and celebrating those which have been successful in steering their cities towards success. Beyond being assessment indicators, however, the ten factors also reflect the tools which city leaders have leveraged to achieve positive outcomes in their respective cities: Increasing citizen participation, improving service delivery efficiency and quality, enhancing digital inclusion, and beyond.



Our 2018/2019 rankings were conducted in a very different world. This past year, we have found that the ongoing global pandemic has put smart cities to the ultimate test. To what extent were city governments able to utilise their investments in digital solutions to identify high risk areas or vulnerable population groups, and manage the spread of COVID-19? Did the enabling programmes and policies introduced in smart cities ensure that governments were adequately prepared to address potential challenges with digital literacy and data protection, key success factors in pandemic responses? How did previous initiatives to increase citizen participation impact citizen trust in government-led pandemic responses as well as the ease and quality of communication between the public sector and the public they serve?

Based on an extensive study of 235 cities across the globe, we are delighted to announce the Top 50 Smart City Governments for 2020/21:

RANK	CITY	PREVIOUS RANK	RANK	CITY	PREVIOUS RANK
1	Singapore	+1	26	Dublin	+15
2	Seoul	+1	27	Oslo	NEW
3	London	-2	28	Bandung	NEW
4	Barcelona	+5	29	Hangzhou	NEW
5	Helsinki	=	30	Busan	NEW
6	New York City	-2	31	Adelaide	NEW
7	Montreal	-1	32	Boston	-25
8	Shanghai	+2	33	Wellington	+4
9	Vienna	+3	34	Dubai	+6
10	Amsterdam	+3	35	Copenhagen	-11
11	Columbus	+14	36	Guangzhou	NEW
12	Tallinn	NEW	37	Seattle	-19
13	San Francisco	-2	38	Frankfurt	NEW
14	Moscow	NEW	39	Philadelphia	+4
15	Beijing	+15	40	Los Angeles	-14
16	Chengdu	NEW	41	Hong Kong	-22
17	Tel Aviv	+25	42	Chicago	-25
18	Sydney	+13	43	Christchurch	NEW
19	Taipei	-3	44	Vancouver	-23
20	Melbourne	-12	45	Zurich	NEW
21	Hamilton	NEW	46	The Hague	NEW
22	Tokyo	+6	47	Rotterdam	NEW
23	Berlin	+6	48	Lisbon	NEW
24	Milan	NEW	49	Chongqing	NEW
25	Shenzhen	-11	50	Stockholm	-35



In this latest edition of our Smart City Government rankings, we have found that the most significant changes to the rankings can be attributed to each city's management of COVID-19, as well as their resilience, adaptability, foresight, and proactiveness in anticipating and addressing key urban challenges. Amidst civil unrest, political turmoil, and an increased focus on mitigating climate change that occurred throughout 2020, our smart city government rankings also reflect the extent to which city governments were able to steward and best support citizen needs and aspirations.

As city governments evolve and grow in their capabilities to drive smart city development, the competition for the Top 50 has intensified. It is incredibly exciting for us to welcome 18 new cities to the Top 50 Smart City Government rankings and celebrate their achievements and success in building urban resilience, driving environmental sustainability, and harnessing multi-stakeholder partnerships to fund and support various local initiatives. Across the board, we observed the addition of a number of Chinese cities including Hangzhou, Guangzhou, Chengdu, and Chongqing which have each made notable efforts to drive innovation and support talent development in their respective cities. A number of European cities such as Frankfurt, Zurich, Oslo, and Rotterdam have also made significant headway in reducing their carbon emissions and achieving greater environmental sustainability through interventions in transportation, citizen education, and energy use.

We congratulate the 2020/2021 Top 50 Smart City Governments for their outstanding efforts to serve their respective citizens which have and will continue to inspire city leaders near and far. In this edition of the Top 50 Smart City Governments publication, we have also highlighted the creative and commendable initiatives which we have found across all six regions of the globe, from Africa and the Asia-Pacific, to South America and the Middle East. The spirit of creativity and resilience we have seen across these cities has been deeply encouraging amidst these challenging times.

City leaders today are presented with an unparalleled opportunity to influence the direction of urban development and design cities which are truly smart, loveable, and future-ready. While no single 'theory of change' exists to arrive at a smart city, we believe that the cross-fertilisation of practices and ideas remains paramount in smart city development. We have enjoyed the opportunity to learn from such a broad range of exemplar cities and are hopeful that this collection of practices and initiatives in our 2020/2021 Top 50 Smart City Governments publication may serve as a source of inspiration for other cities beginning, continuing, or searching for the next step in their smart city journey.

# Our Methodology

The Top 50 Smart City Government Rankings requires a robust methodological approach to ensure that as many potential smart cities around the world are considered and holistically evaluated as possible, focusing explicitly on the role of city governments in driving smart city development. In our 2018/2019 rankings, we first developed a broadlist of 140 cities from those mentioned in existing smart city rankings, news articles, websites, and other media sources. For the 2020/2021 edition, we were able to expand our initial broadlist to form a total list of 235 cities. The increase of 95 cities in the most recent rankings account for those which have gained greater recognition or recently developed in the past two years, as well as regional representation across Asia-Pacific, Africa, Europe, Middle East, North America, and South America.

While this broadlisting method allows us to identify as many smart city governments deserving of further study as possible, several additional steps were taken to narrow this list and arrive at the final ranking of 50 cities. First, Eden launched a Call for Proposals inviting city government representatives from the 235 cities in the broad list to submit relevant documents, news articles, and data to supplement our secondary research. The primary data collected from the Call for Proposals helped to complete our understanding of each city and ensure that each city government was represented fairly and comprehensively in this study to the greatest extent possible. Subsequently, the cities were ranked based on ten key factors outlined below:

## FACTORS USED TO DETERMINE CITY GOVERNMENT RANKINGS

### 1 VISION

A clear, well-defined, and updated strategy to develop a "smart city"

### 6 TALENT READINESS

Programmes to equip the city's talent with smart skills

### 2 LEADERSHIP

Dedicated City leadership that steers smart city projects without major discontinuities

### 7 PEOPLE CENTRICITY

A sincere, people-first design of the future city, with no systematic disregard for human life or basic human rights

### 3 BUDGET

Sufficient and sustainable funding for smart city projects

### 8 INNOVATION ECOSYSTEMS

A comprehensive range of engaged stakeholders to sustain innovation and partnerships where the city government was instrumental in sustaining and catalysing them

### 4 FINANCIAL INCENTIVES

Financial incentives to effectively encourage private sector participation (e.g. grants, rebates, subsidies, competitions) specifically in smart city projects and initiatives

### 9 SMART POLICIES

A conducive policy and regulatory environment for smart city development (e.g. data governance, IP protection, urban design)

### 5 SUPPORT PROGRAMMES

In-kind programmes to encourage private actors to participate (e.g. incubators, events, networks, awards) specifically in smart city projects and initiatives

### 10 TRACK RECORD

The government's experience in catalysing successful smart city initiatives, with no systematic or widespread failure

Cities were then scored on a scale of one to four for each of these ten factors, representing low to high for each of the criterion. With each factor, a "high" would indicate a best-in-class effort that could involve originality and resourcefulness, multiple institutionalised initiatives, demonstrated authenticity and commitment, and success attributable to that factor. Conversely, lower scores would reflect that cities were not yet prepared or had not introduced any of the relevant programmes, policies, or initiatives. Sporadic or partial implementation of smart city initiatives earned a "mid" category score of either two or three, depending on the extent of implementation observed.

Our assessments and subsequent scores were informed by the primary and secondary research conducted on that particular element of the city. For example, a city government's vision would be assessed based on available material and sources which explained or referenced its vision. This often includes a combination of Smart City Plans, Action Plans, strategy or roadmap documents typically issued by city governments, information published on the official city website, press releases, well as third-party publications (e.g. UN-Habitat, research institutions). The scores were further validated where possible through additional in-depth virtual interviews conducted with key stakeholders including Mayors, Chief Innovation Officers, Chief Digital Officers, and Smart City Project Managers who shared detailed information about smart city initiatives underway in their respective cities and their unique city development journeys. We compiled some of their insights and stories into a series of videos to share publicly online, which you may find at our official website [www.smartcitygovt.com](http://www.smartcitygovt.com).

Having assigned a score from one to four for each of the ten criteria, we calculated a total score for each city which then determined their positions on the rankings. Cities with a high score, meaning those which were the most exemplary across the ten factors, were positioned at the top of our rankings. The top 50 cities from the broader list of 235 cities then emerged as the 2020/2021 Top 50 Smart City Governments.



## TOP 50 SMART CITY GOVERNMENTS



1 Singapore



2 Seoul



3 London



4 Barcelona



5 Helsinki



6 New York City



7 Montreal



8 Shanghai



9 Vienna



10 Amsterdam



11 Columbus



12 Tallinn



13 San Francisco



14 Moscow



15 Beijing



16 Chengdu



17 Tel Aviv



18 Sydney



19 Taipei



20 Melbourne



21 Hamilton



22 Tokyo



23 Berlin



24 Milan



25 Shenzhen



Dublin



Oslo



Bandung



Hangzhou



Busan



Adelaide



Boston



Wellington



Dubai



Copenhagen



Guangzhou



Seattle



Frankfurt



Philadelphia



Los Angeles



Hong Kong



Chicago



Christchurch



Vancouver



Zurich



The Hague



Rotterdam



Lisbon



Chongqing



Stockholm

# City Highlights

The journey to becoming a true smart city is a complex one, requiring great commitment, innovative problem-solving capabilities, and collaboration, all guided by a citizen-centric vision. We highlight a unique aspect of each city's smart city strategy to learn more about the initiatives, programmes, and impact achieved by the city governments in our Top 50 Smart City Government Rankings.

We acknowledge that the city highlights may not encompass all ten dimensions across our smart city parameters, but aim to feature and detail a specific theme which offers key learning points across one or multiple parameters.

Singapore's efforts in recent years have been characterised by a deliberate shift to deliver government services with more empathy and with the citizen in mind as it continues on its smart city journey.



# Singapore

*Strong national support to onboard SMEs on their digitalisation journey*

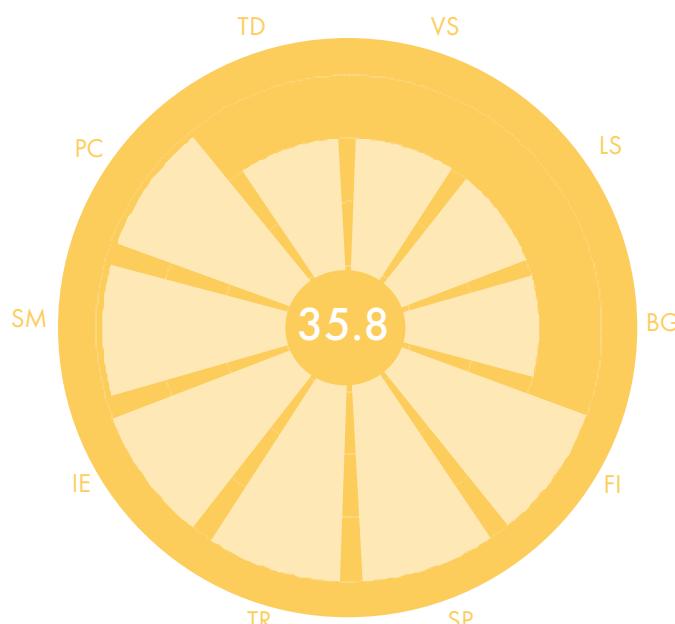
Since the introduction of its Smart Nation Singapore strategy in 2014, the city-state has launched a series of strategic projects across all aspects of urban life, from urban mobility to e-payments and a government portal unified by a single ID. With over USD 1.7 bn invested in improving technology infrastructure and rolling out digitalisation initiatives, the small and medium-sized enterprises (SMEs) are a key stakeholder group that contribute 49 percent of the Singapore's national economy and 65 percent of its total workforce.

Programmes such as SMEs Go Digital aim to help businesses adopt technology and Artificial Intelligence solutions more readily. The Infocomm Media Development Authority (IMDA) spearheads this initiative, working closely with industry stakeholders to develop Industry Digital Plans which guide SMEs at each stage of their digital journey, providing practical advice and directing SMEs to relevant resources including grants and training. A 'Whole-of-Government' effort involving five agencies and the Smart Nation and Digital Government Office (SNDGO) drove e-payment adoption amongst food stallholders, where Digital Ambassadors were deployed to reach out to over 15,000 stallhold-

ers in 2020. This helps to accelerate the roll-out of a unified e-payment solution, which ultimately provides a single, interoperable system with benefits such as merchant discount rates and quicker credit transaction for stallholders.

Singapore has also stepped up its efforts to further enhance its citizen-centric services on top of achieving efficiency. The LifeSG app was launched in 2020, providing over 40 digital government services to cater to a citizen's journey and their key life moments: Parents with young children might easily access information on schools, whereas the elderly might enrol in an Active Ageing module.

While Singapore's efforts in recent years have shifted towards delivering government services with more empathy and with the citizen in mind, there always remains more to be done. For example, its otherwise sterling management of COVID-19 was sullied by the neglecting of the health conditions of its migrant population, as well as growing privacy concerns surrounding the use of its contact tracing technology and collected data.



## Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	4.0
SP	SUPPORT PROGRAMMES	4.0
TR	TALENT-READINESS	4.0
IE	INNOVATION ECOSYSTEM	4.0
SM	SMART POLICIES	3.9
PC	PEOPLE-CENTRICITY	3.9
TD	TRACK RECORD	3.0

# 2 Seoul

## *Collectively harnessing urban data to optimally deliver citizen services*

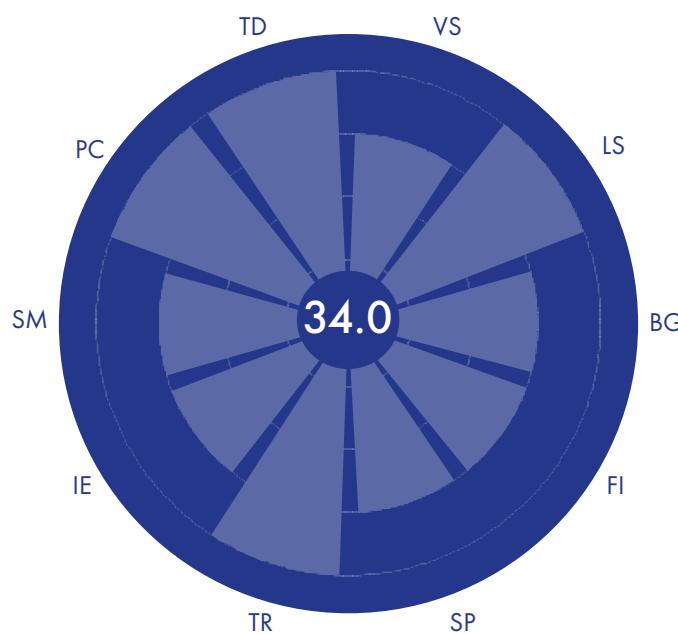
Under former Mayor Park Won-soon's three-term leadership of the Seoul Metropolitan Government (SMG), the South Korean capital has introduced a host of initiatives to develop service offerings which address citizens' needs in the areas of transportation, digital connectivity, and civic participation.

The collection, storage, analysis, and strategic use of data has been at the heart of the city's success. In 2013, SMG launched the *Owl Night Bus* services after analysing three billion cases of mobile call logs and five million cases of taxi ride data to develop optimal bus routes which would cater to late night commuters' needs.

More recently, SMG has committed to installing 50,000 Internet-of-Things (IoT) sensors by 2022 under a broader smart city budget of USD 370 mn, which is also dedicated to supporting startups and training employees. These 'City life' sensors will collect information on a range of city elements such as noise, fine dust, night light intensity, and traffic. Data inputs are channelled into an Integrated Public Big Data Storage system, which leverages artificial intelligence technology to sort and classify multiple

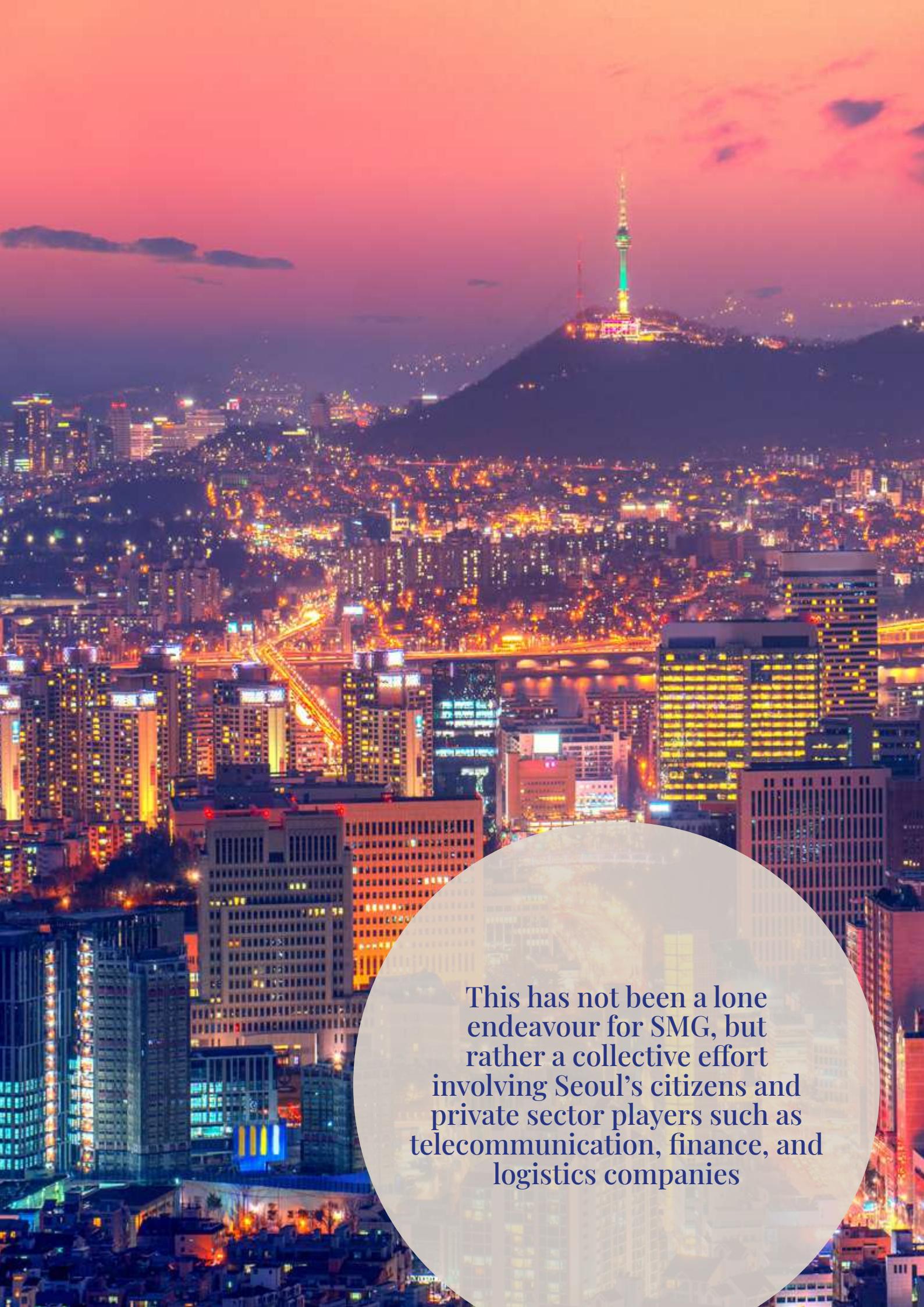
streams of information from the city life sensors. Access to a large pool of data allows SMG to develop appropriate policies and initiatives to address Seoul's key urban challenges such as citizen safety or congestion. As an example, temperature sensors might indicate a particularly warm area where cooling technology installation should be prioritised.

This has not been a lone endeavour for SMG, but rather a collective effort involving Seoul's citizens and private sector players such as telecommunication, finance, and logistics companies through platforms such as the Public-Private Big Data Platform and the Smart Seoul Cooperation System. The private sector's data, analytical, and technical capabilities strengthen the city government's ability to elevate their service quality.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	4.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	4.0
IE	PEOPLE-CENTRICITY	3.0
SM	INNOVATION ECOSYSTEM	3.0
PC	SMART POLICIES	4.0
TD	TRACK RECORD	4.0

The background image shows a panoramic view of the Seoul city skyline at night. The city is densely packed with buildings of various heights, all illuminated with a warm, golden glow from their windows. In the distance, the iconic N Seoul Tower stands prominently on a hill, its lighted spire reaching towards the dark sky. The overall atmosphere is one of a vibrant, modern metropolis.

This has not been a lone endeavour for SMG, but rather a collective effort involving Seoul's citizens and private sector players such as telecommunication, finance, and logistics companies

The background image shows a wide-angle aerial view of the London skyline. In the center, the Elizabeth Tower (Big Ben) and the Palace of Westminster are prominent. To the right, the dome of St. Paul's Cathedral rises above the city. The foreground features a large, semi-transparent white circle containing the text. Beyond the circle, the River Thames and various other buildings are visible.

With the objective of becoming the world's smartest city, London has designed five collaborative missions in its roadmap to address digital inclusion, data innovation, technology adoption, and digital leadership.

# 3 London

## *Building a renowned digital capital through data collaboration*

London's track record as a leading smart city faces a new challenge – that of scaling the adoption and impact of innovative ideas and initiatives across the city's 32 distinct boroughs. Mayor Sadiq Khan's refreshed Smarter London Together roadmap launched in 2018 positions the city as a lead collaborator in initiating partnerships with citizens, public, and private-sector stakeholders alike to realise its smart city vision.

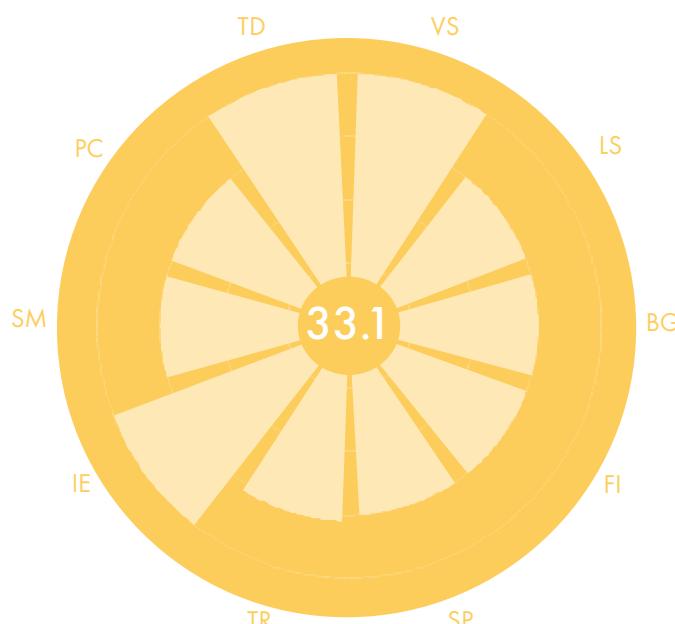
With the objective of becoming the world's smartest city, London has designed five collaborative missions in its roadmap to address digital inclusion, data innovation, technology adoption, and digital leadership, all of which engage London's local authorities, NHS trusts, and multiple major public agencies such as Transport for London.

This intentionally collaborative approach has yielded meaningful results, including the establishment of the London Office for Data Analytics (LODA) which aims to facilitate data collaborations across London's public service offices.

LODA has already secured USD 484,400 of funding from a number of public, private, and regional bodies.

The Mayor's Civic Innovation Challenge, another one of the city's initiatives which bridges innovative technology firms addressing social challenges with local councils, agencies such as Transport for London, as well as large companies such as Shell, has already entered its second iteration.

Leading regional and global collaboration efforts have also been a key component of the city's innovation strategy, and the city had formed partnerships with Bloomberg Associates and the European Union's Sharing Cities programme, as well as Helsinki as part of the 'City to City Digital Declaration' on artificial intelligence, digital innovation, and data sharing practices in the two cities.



### Smart City Government Score

VS	VISION	4.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.1
IE	INNOVATION ECOSYSTEM	4.0
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	4.0

# 4 Barcelona

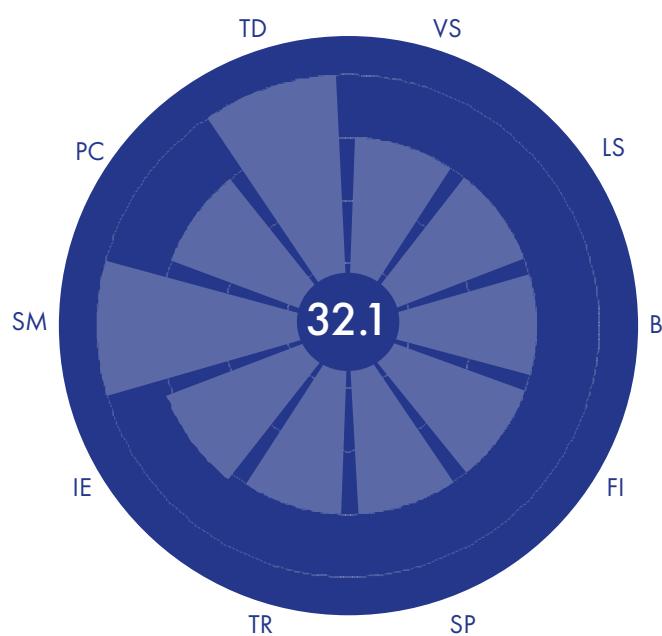
## *'Digital democratisation' to empower citizens*

For the city of Barcelona, smart citizens are an integral part of its smart city transformation. Therefore, it was crucial for all citizens to understand, learn, and explore smart city initiatives, tinker with digital tools and technologies, and gain the skillsets required in the economy.

To support its smart city ambition, Barcelona launched a network of FabLabs: small-scale workshops offering digital fabrication training and tools, as well as skills necessary for innovation using advanced technologies. Approximately 5,000 students and teachers have been trained in digital production and IT literacy through these FabLabs. The City also developed a Cibernarium programme targeting the professional sector, training citizens in technology and digital skills. Cibernarium targets the professional sector, offering over 180 different activities such as website creation, digital image and design, programming, 3D and digital production. More than 50,000 people have taken up courses to upskill since the programme was first launched.

Another part of creating a digital democracy is to provide accessible platforms and opportunities for citizens to take part in decision making. One of the key platforms in Barcelona is Decidim, where citizens are able to co-create future policies and provide ideas for the city. It allows citizens, organisations, and public institutions to self-organise, vote through consultations, and propose ideas. Over 70 percent of the citizen proposals have been incorporated into various government policies and plans.

With the city's own sensor network, the city council is also looking into how Barcelonians can have more control over their data through decentralised technologies such as blockchain or cryptography. The City is currently running pilot programmes under its DECODE – Decentralised Citizen Owned Data Ecosystem project in areas such as Digital Democracy and Data Commons (DDDC) and Citizen Science Data Governance, to reimagine more democratic forms of data governance, and to share environmental data openly but anonymously.

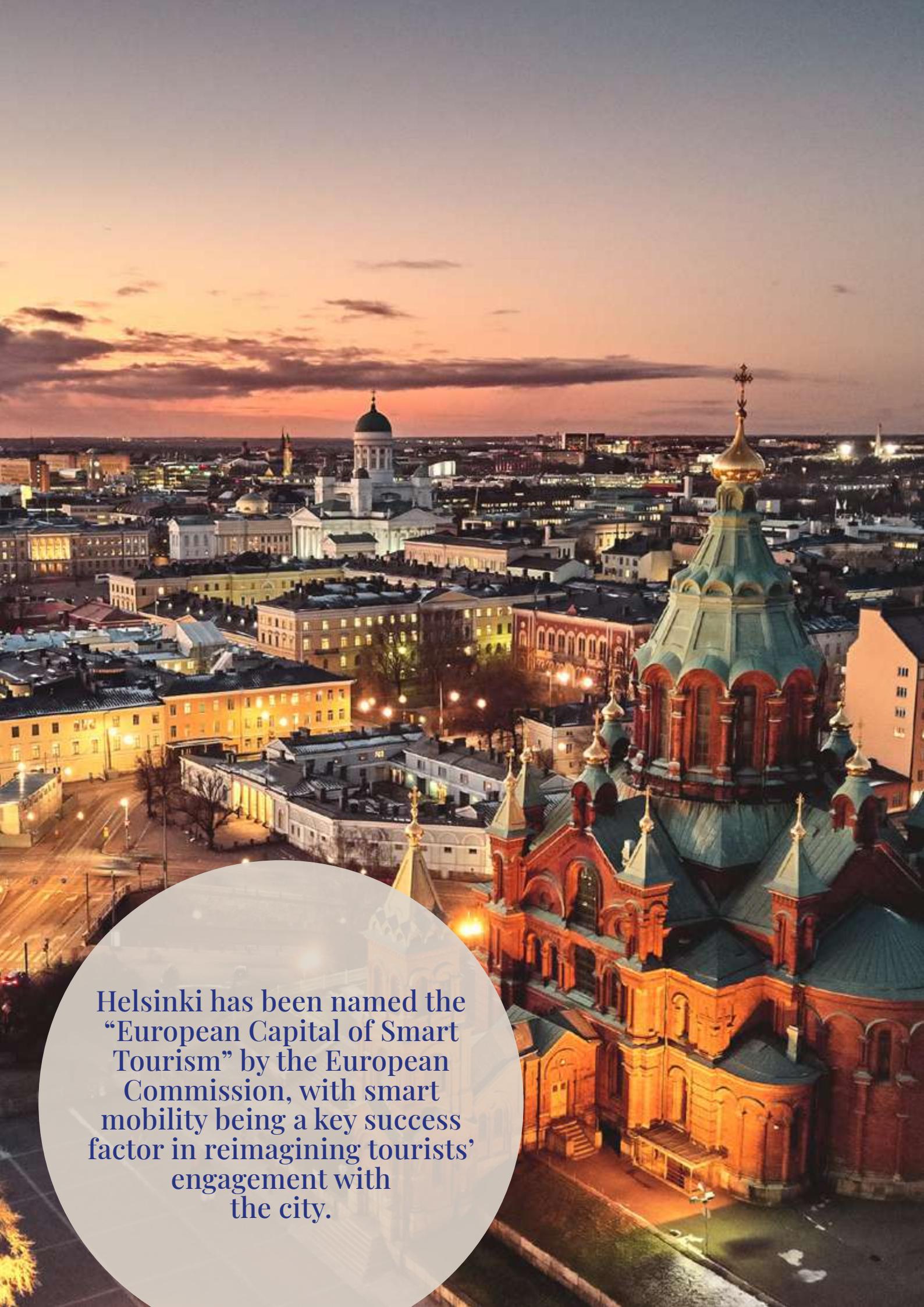


### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	3.1
SM	SMART POLICIES	4.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	4.0



Over 70 percent of citizen proposals have been incorporated into various government policies and plans through its Decidim platform.



Helsinki has been named the “European Capital of Smart Tourism” by the European Commission, with smart mobility being a key success factor in reimagining tourists’ engagement with the city.

# 5 Helsinki

## *Capitalising on existing strengths in transportation and education*

With one of the highest standards of urban living worldwide, a vibrant innovation ecosystem, and citizens in the driving seat of smart city initiatives, it is no surprise that Helsinki has the ambition to become the "most functional city".

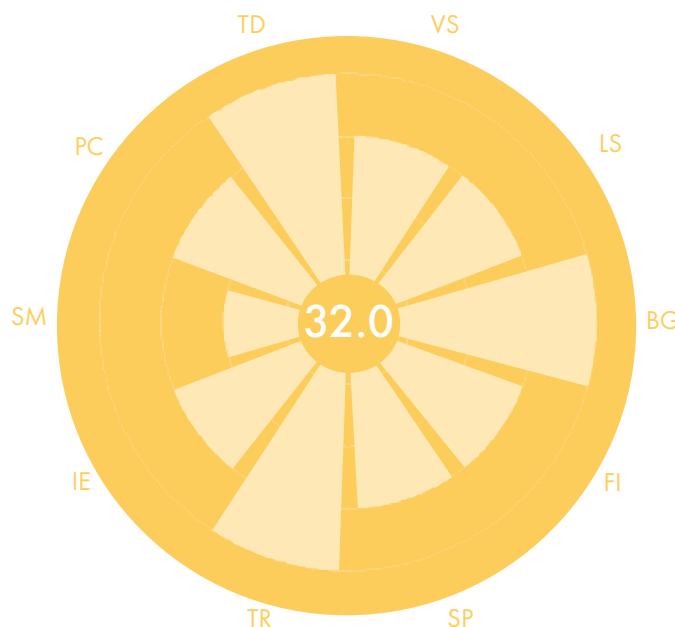
In our 2018/2019 smart city rankings, we emphasised Helsinki's design thinking approach in solving city problems, showcased by co-piloting projects in the Kalasatama innovation district. Since then, Helsinki has been named the "European Capital of Smart Tourism" by the European Commission, with smart mobility being a key success factor in reimagining tourists' engagement with the city.

In the Jätkäsaari Mobility Lab, innovations have emerged to redesign the City's maritime tourism and site spectating experience. Bout, an 'Uber for boats'-like service, makes it easier to access and explore Helsinki's archipelago and coastal locations by connecting those who need boat rides to residents who offer them.

Other initiatives, such as the Norsö Line, offers water transportation on the Jätkäsaari–Hietalahti–Market Square route, while Vapaus Bikes provides electric bicycle tours with audio navigation.

The City has been investing further in its widely-acclaimed education system, in efforts to elevate an already innovative society. Higher learning institutions play a central role in the innovation ecosystem, by fostering more private-public collaborations. Post-doctoral research positions in urban research are financed, for which the research themes are specifically selected from the City's smart strategy programmes. Through the Smart & Clean Foundation, the City along with institutes of higher education, businesses and other cities are advancing the development of smart and clean solutions in energy, wastewater, and climate change.

By finding new ways to improve the city's core industries and educating the leaders of tomorrow, the City of Helsinki has been able to further improve on its smart city goals.



### **Smart City Government Score**

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	4.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	4.0
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	4.0

# 6 New York City

*Smart city strategy instrumental in effective pandemic response*

New York City (NYC) was an early epicentre of the COVID-19 pandemic in the United States, due to the large numbers of international visitors coming through the city, its high density, and relatively large size. NYC's smart city initiatives are guided by its OneNYC 2050 strategy, which proved to be instrumental in helping the city respond to this crisis.

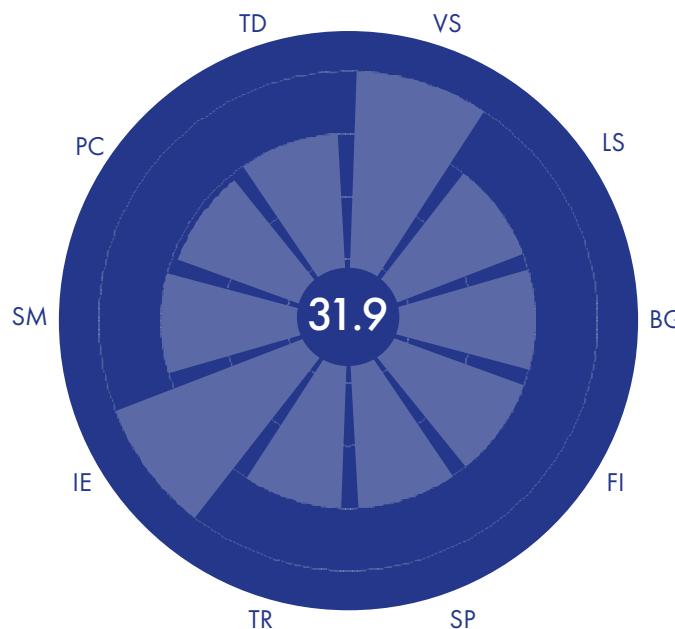
Released in 2019, the Strategy outlines eight goals and 30 initiatives that will prepare the city for the future. For example, its goal to modernise its infrastructure includes initiatives to encourage universal broadband access and digital inclusion. To help elders stay connected during the lockdowns, the city partnered with LG and T-Mobile to freely distribute 10,000 tablets to seniors staying by themselves in public housing.

The city put out a digital appeal for donations of Personal Protective Equipment (PPE) when supplies were running low, and also used digital tools to help residents articulate and volunteer their expertise and resources to combat the pandemic, as well as to monitor PPE. It actively monitored anti-Asian sentiment

and hate crimes in the wake of the pandemic, and introduced real-time language translation to support social distancing and contact tracing.

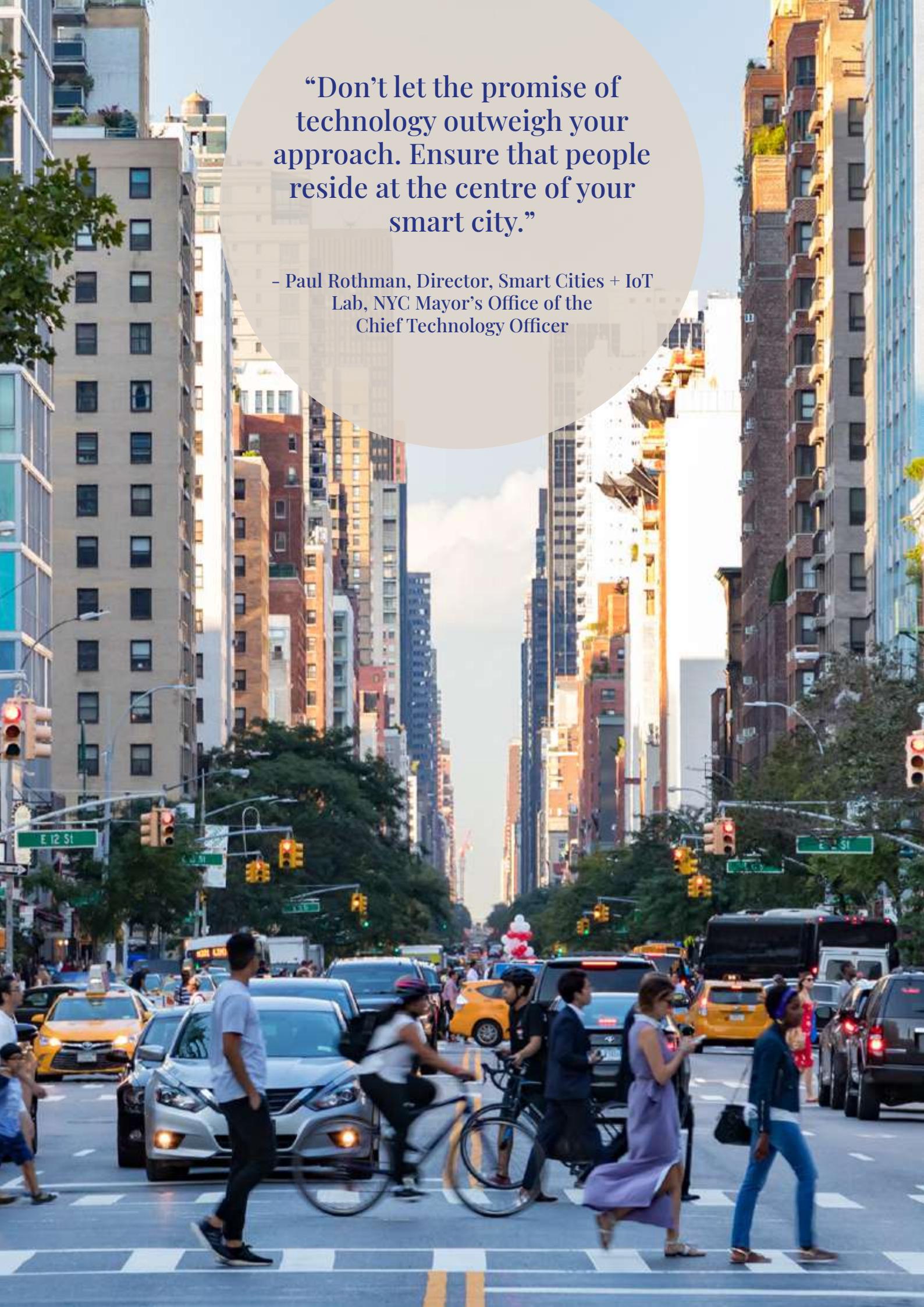
NYC's Economic Development Corporation (EDC) has been building advanced manufacturing capabilities over the years, bringing together technology, engineering, and production capabilities in its urban technology hubs. During the pandemic the EDC co-ordinated local manufacturers to design and produce PPE, hand sanitisers, low-cost ventilators, and laboratory testing.

Incidentally, the city's efforts to reclaim streets with People Priority Zones that restrict vehicular access were accelerated because of COVID-19, where more streets were shut down to encourage kerbside dining as a safe way to help its restaurants stay in business.



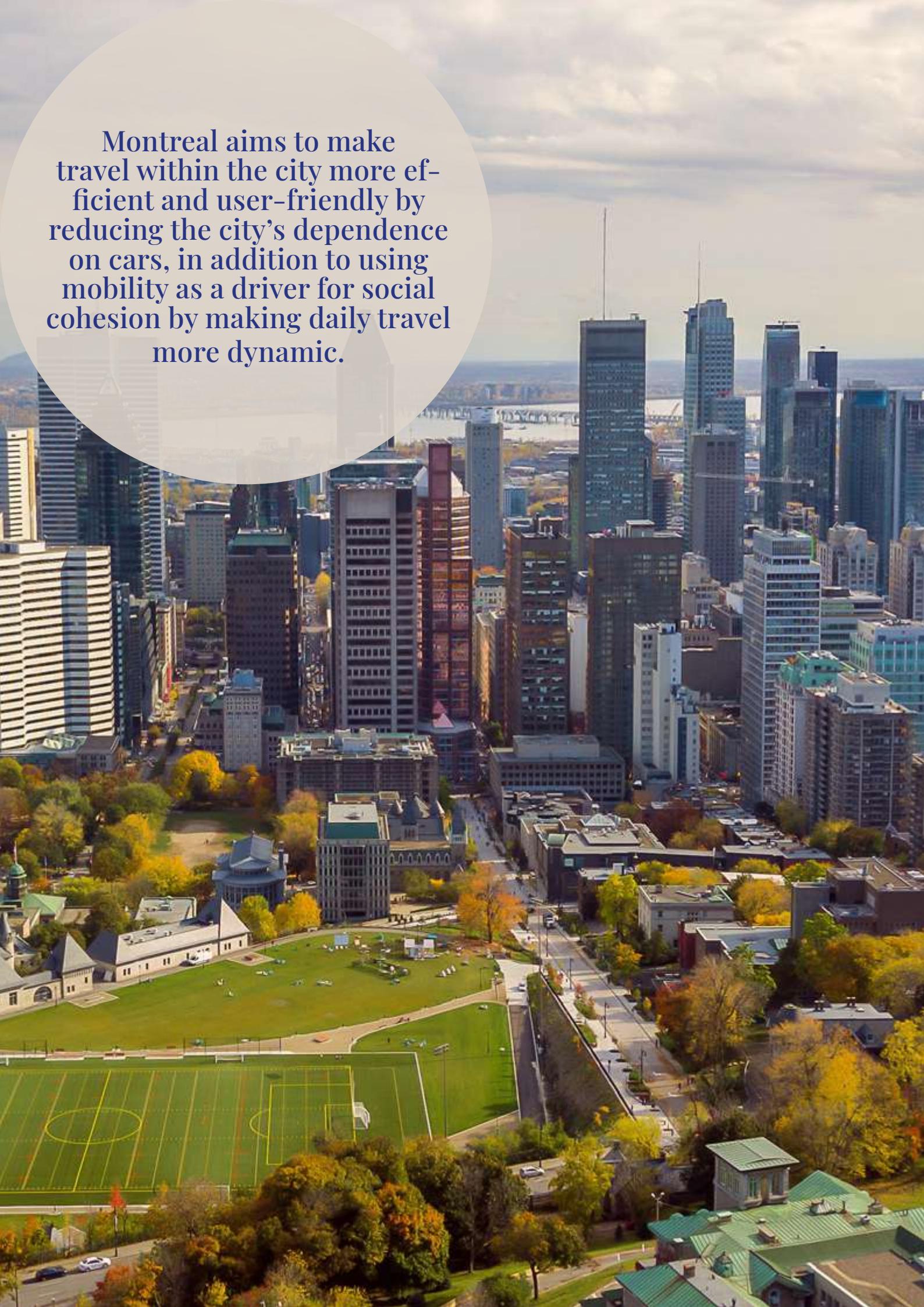
## Smart City Government Score

VS	VISION	4.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	4.0
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	2.9
TD	TRACK RECORD	3.0



“Don’t let the promise of technology outweigh your approach. Ensure that people reside at the centre of your smart city.”

- Paul Rothman, Director, Smart Cities + IoT Lab, NYC Mayor’s Office of the Chief Technology Officer

An aerial photograph of the Montreal city skyline during autumn. The foreground features Mount Royal Park with its green lawns, yellow and orange fall foliage, and various buildings. In the background, the dense urban skyline of downtown Montreal is visible, with numerous skyscrapers of different heights and architectural styles. The sky is overcast with soft, grey clouds.

Montreal aims to make travel within the city more efficient and user-friendly by reducing the city's dependence on cars, in addition to using mobility as a driver for social cohesion by making daily travel more dynamic.



# Montreal

## *Mobility to enhance social cohesion within the city*

Building off of its consultative and multi-stakeholder smart city approach, Montreal has set out an ambitious smart city plan that involves 70 projects revolving around six overarching programmes that include: 1) public Wi-Fi; 2) a smart city economic cluster; 3) ultra-high speed multi-service network; 4) participatory democracy; 5) smart mobility; and 6) digital public services.

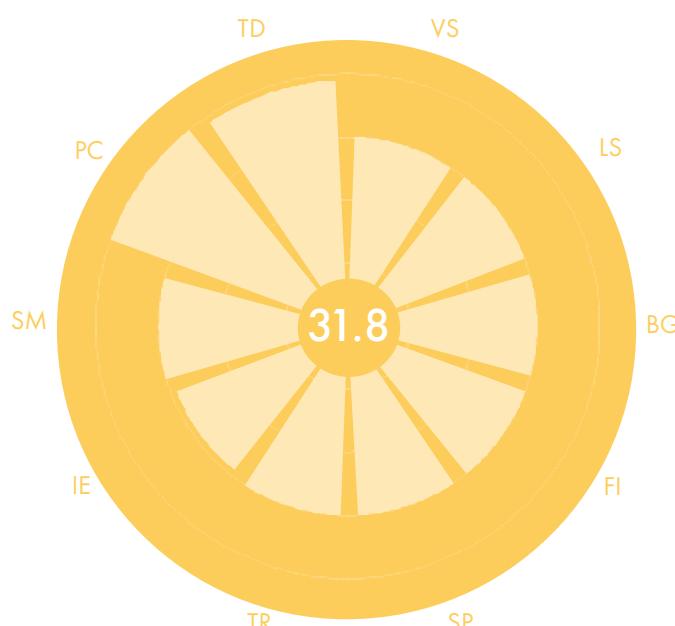
The sphere of smart mobility is aligned with Montreal's reputation of championing sustainable mobility. Recognised as North America's most bike-friendly city, Montreal has outlined several projects to make travel within the city more efficient and user-friendly, with the aim of not only reducing the city's dependence on cars, but also using mobility as a driver for social cohesion by making daily travel more dynamic.

One such project is the creation of a digital platform that will consolidate the availability of multiple transport modes. Through this platform, users will have unified access via a single account with a simplified pricing mechanism. Subscribers will have

access to a multimodal trip-planning tool which will provide them with multiple transport options for any given journey in the city.

This mobility project was applied to the city's food access needs. Montreal outlined a plan to create a local and integrated food system by creating a platform to manage inventory, sales, food donations and delivery. Community food organisations, that otherwise experience the need for high levels of coordination, are able to use this tool to enhance food access for vulnerable Montrealers.

Montreal was awarded USD 39 mn when it presented this multidimensional project proposal in Infrastructure Canada's 'Smart Cities' Challenge. Through this plan, Montreal allows us to envision the various ways in which we think about mobility, demonstrating how smart cities can create social cohesion in different ways.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	2.9
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	4.0
TD	TRACK RECORD	3.9

# 8 Shanghai

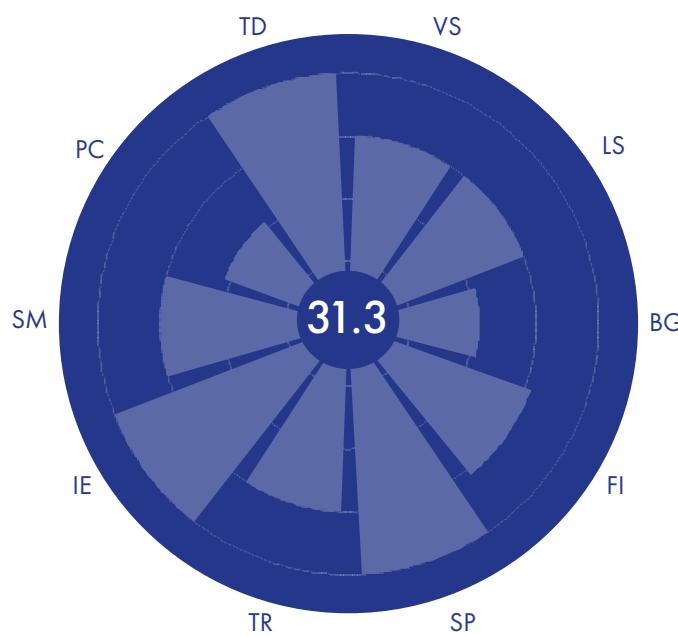
## *Artificial Intelligence to connect citizens, services, and the private sector*

The interconnectivity of Shanghai's digital network is central to its interpretation of a smart city. Large investments in smart infrastructure such as sensors and cameras designed to collect real-time data, free wi-fi hot spots, and an integrated data platform work in tandem around the city. Prior investments in digitising its 100 public service offerings have matured, and the city now services upwards of seven million residents digitally.

Its breadth of users, sensors, and cameras have been generating a wealth of data that Shanghai is well positioned to capitalise on. To do this, the city has invested heavily in Artificial Intelligence (AI) to design an integrated smart city, informed by insights from the data it collected. Based on data insights, Shanghai's ambition to be a global platform for AI applications are reflected in its generous funding mechanisms. For instance, in 2019, Shanghai distributed USD 78.8 mn across 663 smart city projects. Furthermore, the city has further earmarked USD 15 mn as a guiding fund that supports SMEs and corporations to conduct AI-related research and development.

Shanghai hosted the World Artificial Intelligence Conference, the biennial Global City Information Forum, as well as more localised programmes such as its Smart City Experience Week. Elevating its global profile has attracted tech giants such as Alibaba, SenseTime, Microsoft, and Amazon to locate their AI R&D bases in the city and establish joint labs with local universities. These developments signal the growing adoption of AI to tackle city-level problems.

Shanghai's current suite of digital government services offers AI-enabled solutions for public transport and industrial applications, and streamlines a unified database of medical records, consumer payments, and credit conversion.

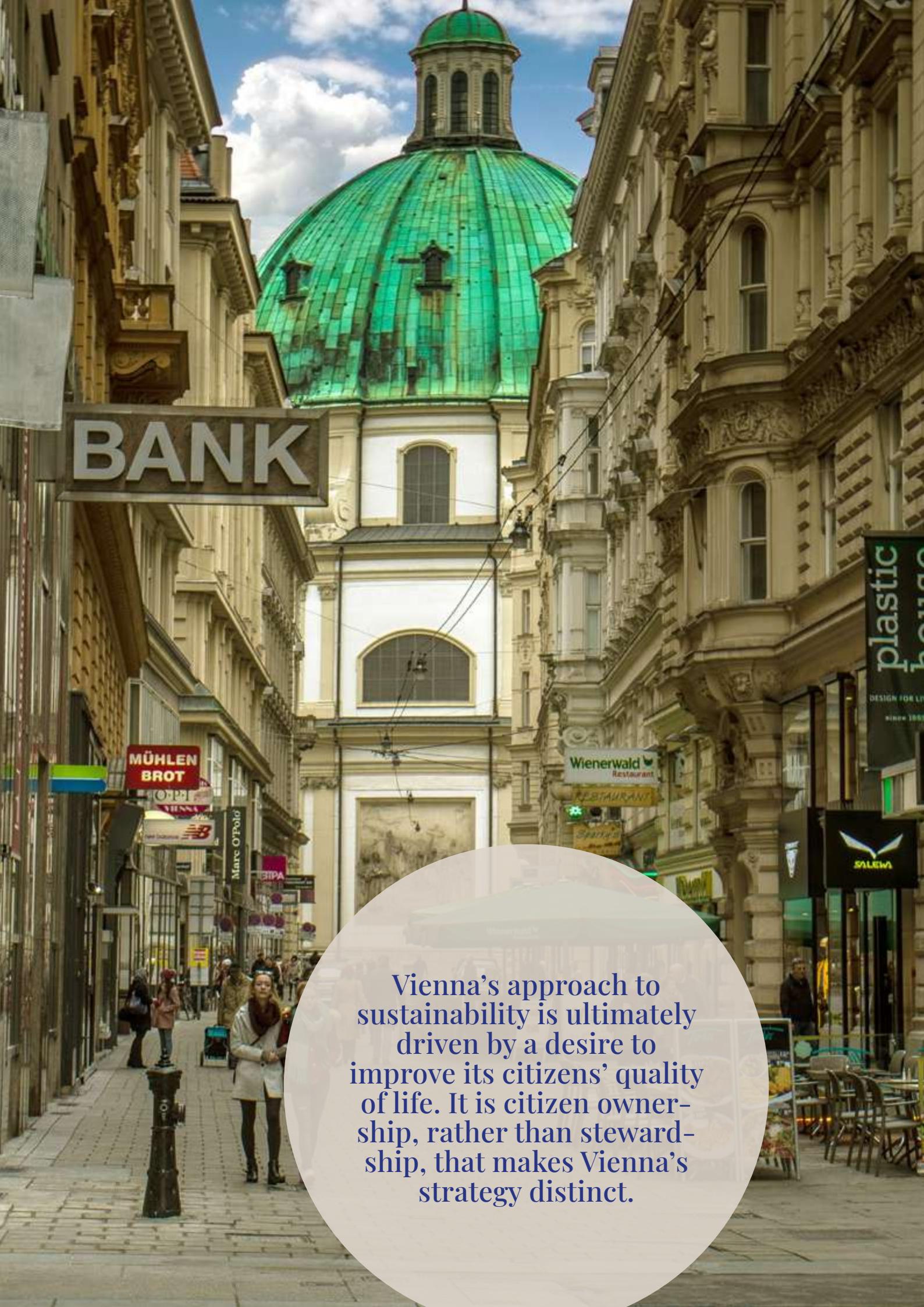


### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	2.1
FI	FINANCIAL INCENTIVES	3.1
SP	SUPPORT PROGRAMMES	4.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	4.0
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	2.1
TD	TRACK RECORD	4.0

Prior investments in digitising its 100 public service offerings have matured, and the city now services upwards of 7 million residents digitally.





Vienna's approach to sustainability is ultimately driven by a desire to improve its citizens' quality of life. It is citizen ownership, rather than stewardship, that makes Vienna's strategy distinct.

# Vienna

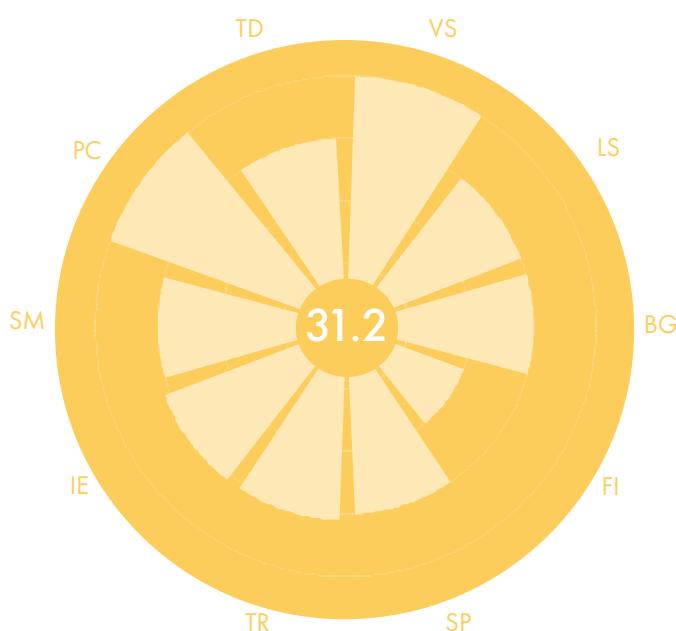
## *Facilitating bottom-up approaches to sustainability*

Vienna has been a champion for bottom-up sustainability solutions that scale effectively at a city level. Initiatives ranging from reusing sludge to heat homes and electric car sharing, to co-owning solar power plants have been successfully piloted and expanded across the city. Vienna adopts a holistic and proactive approach to the sustainable, efficient, and long-term management of its natural resources.

To achieve its ambitious sustainability targets, Vienna has committed to a strategic roadmap that will run from 2019 to 2050. Its headline goal is to reduce CO<sub>2</sub> emissions by 80 percent of 1990 levels by 2050. Achieving this goal requires a coordinated approach to governance, which is where Vienna's holistic approach to sustainability is most pronounced. For instance, its citizen-owned solar power plant was a government-led initiative which partnered with energy providers to redistribute ownership of energy production into the hands of its citizens. By 2017, sufficient solar power had been generated to power approximately 300,000 households.

Other initiatives such as its sludge-based home heating, electric car sharing, and its EcoBusiness Plan, where consulting and funding are made available to 'green' local businesses, similarly demonstrate Vienna's bottom-up approach to sustainability. Taken together, this approach has put Vienna well on track to achieve its CO<sub>2</sub> reduction, waste management, social inclusion, and energy reduction goals outlined in its 2017 review.

Although these initiatives are coordinated by a centralised smart city team, Vienna's approach to sustainability is ultimately driven by a desire to improve its citizens' quality of life. It is citizen ownership, rather than stewardship, that makes Vienna's strategy distinct.



### Smart City Government Score

VS	VISION	4.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.1
IE	INNOVATION ECOSYSTEM	3.1
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	4.0
TD	TRACK RECORD	3.0

10

# Amsterdam

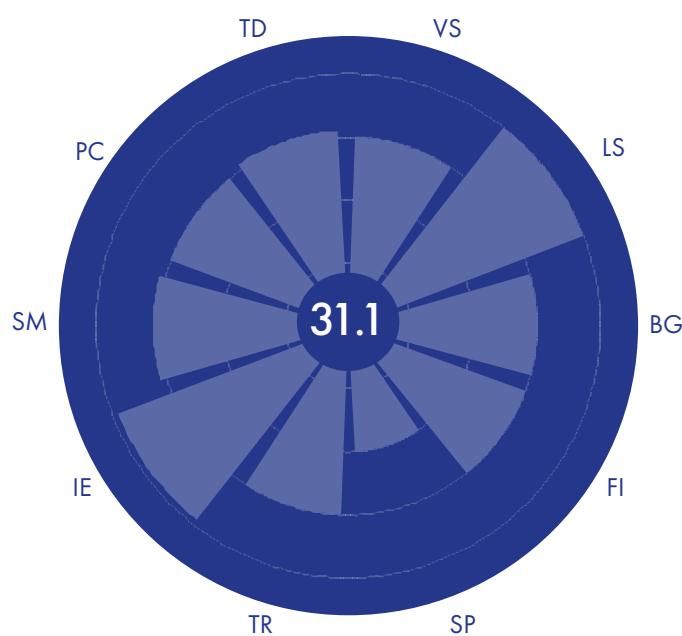
*Leveraging startup culture to deliver innovation*

Amsterdam has taken up a more literal approach to the concept of a smart city. The Amsterdam Smart City Team (ASC) is a conglomerate of city officials, academic institutions, and representatives of large private corporations. Meeting regularly, the ASC hosts open calls for innovation to address the city's pressing issues.

A core component of Amsterdam's smart city strategy lies in the tight fit between technologically-driven startups, its research institutions, and funding from larger corporations. For instance, the Startup in Residence programme offers support in the form of funding, training, and legal counsel to startups that promote innovative solutions to social challenges. Similarly, Amsterdam Capital Week is a five-day program where startups and investors are engaged to pitch, meet and foster new partnerships. A strong research bent supports these initiatives. In Amsterdam Science Park, scientists, corporations, and students across the fields of big data, AI, material sciences, sustainability, and life sciences form a technological ecosystem that drives smart city solutions.

Through collaborative efforts, successful startup offerings have contributed towards enhancing the liveability of the city. A host of initiatives from bio-based street benches, a CO<sub>2</sub> smart grid, and solar panels on metro stations, to dimmable LED streetlights that respond to real-time traffic, and using electric vehicles as backup power during outages, illustrate the tight nexus between Amsterdam's academic and entrepreneurial capital.

The ASC balances well between driving an overall smart city strategy, decentralising aspects of innovation, collaboration, and implementation across its networks of partners to drive an agile, startup approach to deliver smart city innovation.



## Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	4.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	3.9
SM	SMART POLICIES	3.1
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	3.1

A wide-angle photograph of a canal scene in a European city. In the foreground, a dark stone arch bridge spans a calm canal. Several small boats are moored along the banks. The background features a row of traditional multi-story buildings with dark roofs and light-colored facades. Large trees with green leaves frame the scene on both sides. The sky is overcast with soft, grey clouds.

ASC balances well between driving an overall smart city strategy whilst decentralising aspects of innovation, collaboration and implementation.



Columbus' smart city vision is to be the model for connected cities of the future by reinventing mobility. Columbus views smart mobility as an enabler to increase access and equity.

# Columbus

## *A mobility-centric smart city vision*

Columbus' smart city vision is to be the model for connected cities of the future by reinventing mobility. To achieve this vision, the city has three key initiatives.

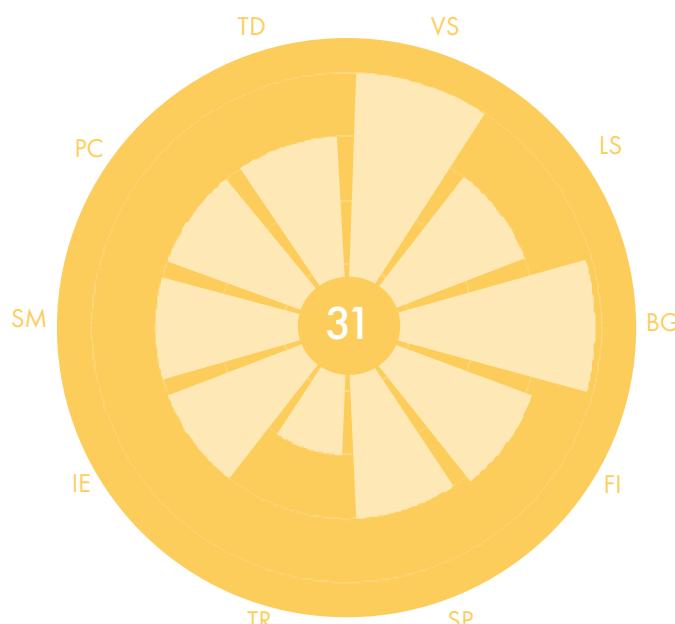
First, laying foundational building blocks through projects such as Smart Columbus Operating System (SCOS), an open data platform which collects, visualises, and makes transportation data publicly available.

Second, conducting technology trials in the community so that it can test, learn, and iterate. One example is Smart Circuit, a self-driving shuttle, which currently gives free rides in downtown Columbus. This is the first step in using autonomous vehicles to close gaps in transportation access.

Third, embracing new travel patterns by improving shared mobility. Columbus Ohio Transit Authority (COTA) is encouraging citizens to adopt multi-modal options by developing a mobile application that will seamlessly integrate trip planning, booking, ticketing, and payment across all forms of public and private transportation.

Columbus views smart mobility as an enabler to increase access and equity. Linden LEAP, the nation's first public self-driving shuttle in a residential area, connects a historically underprivileged neighbourhood to community resources. During the current Covid-19 pandemic, the shuttle has been used to alleviate food insecurity by transporting pre-packaged food boxes between food assistance organisations and community centres.

Columbus also aims to achieve carbon neutrality by 2050. The city is committed to reducing emissions from transportation by improving shared mobility. In the American Cities Climate Challenge (ACCC), Columbus committed to achieving a 30 percent reduction in municipal CO<sub>2</sub> emissions, a 20 percent reduction in city CO<sub>2</sub> emissions, and a 20 percent reduction in per-capita energy consumption by 2020. It was named a Leadership City in the ACCC.



### Smart City Government Score

VS	VISION	4.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.9
FI	FINANCIAL INCENTIVES	3.1
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	2.0
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	3.0

# 12 Tallinn

## *Leapfrogging to become an integrated, digital-first society*

The capital of Estonia underwent a remarkable transformation since the nation gained independence less than 30 years ago. Estonia's newfound status as an independent post-Soviet republic offered a unique opportunity to build a digital-native city, with leaders declaring Internet access as a human right in 2000, and nationwide digital identity requirements and electronic voting instituted as early as 2005.

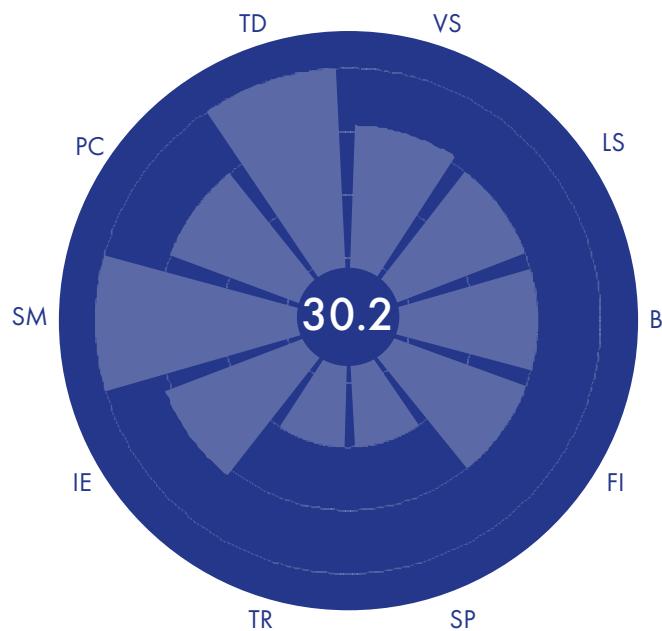
Estonia's digital foundation is reflected in Tallinn, a globally recognised leading technology hub and start-up city. Its 437,619 population accounts for two-thirds of the nation's GDP, and the city has been hailed as a model of effective, digitalised public service delivery.

At the heart of Tallinn's digital society is the unique identification number which is assigned to each citizen from birth. The Estonian electronic identity (e-ID) system allows for seamless and secure digital delivery of 99 percent of state services, such as in healthcare, education, taxes, and voting. This digital infrastructure is trusted and sufficiently secure

to support private sector e-services in banking, telecommunications, and energy services as well. Estonians save approximately five working days per year through e-ID, a testament to the impact of Tallinn's digital service delivery.

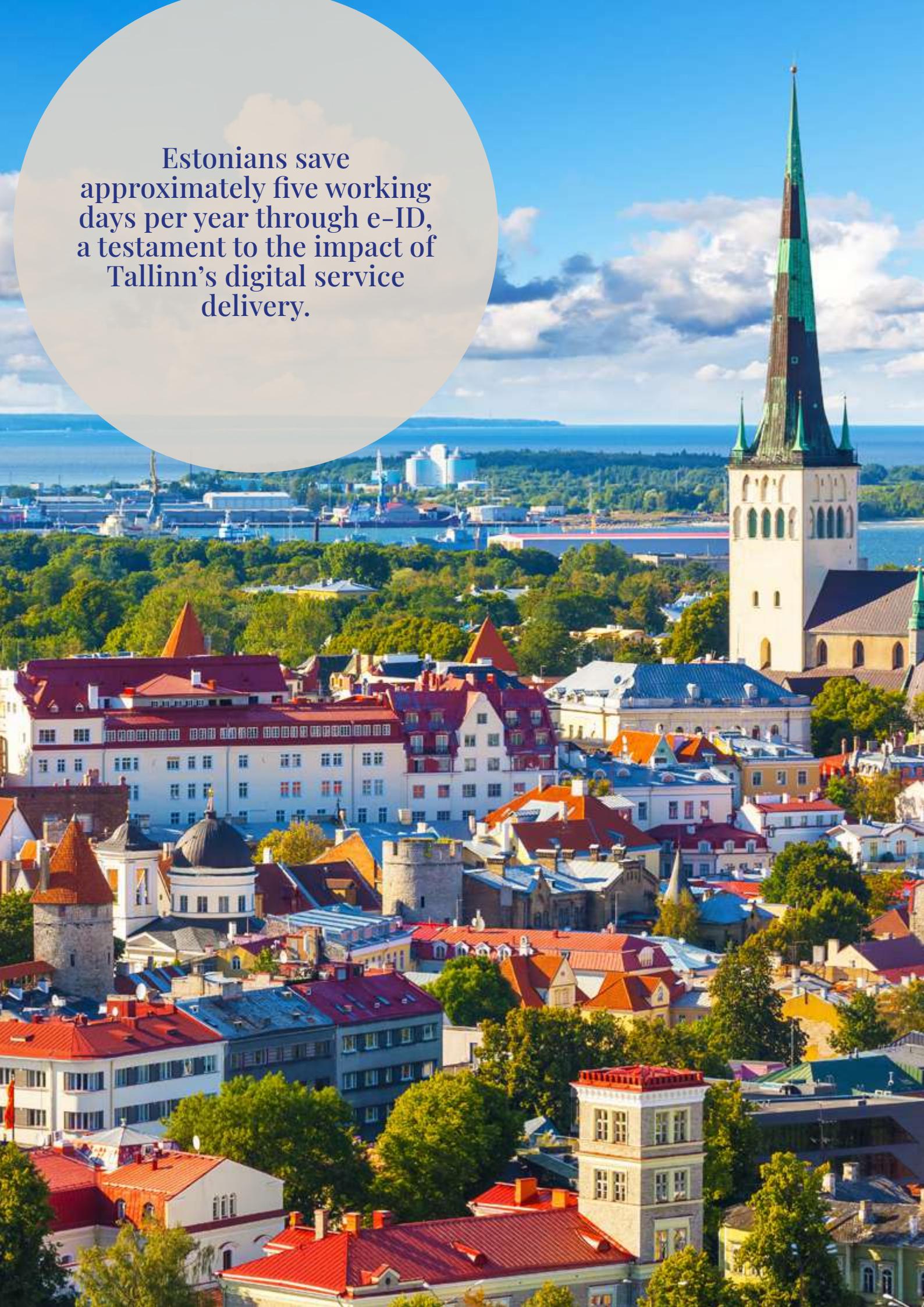
In spite of its strong digital foundation, Tallinn has remained inclusive by providing citizens the flexibility of submitting documents and applications physically. Interestingly, the efficiency and convenience of digital services is often an incentive for citizens to shift towards digital channels. Digital applications can be processed in 24 hours, whereas a paper-based application may take up to one month.

Tallinn's transformation was no accident, but rather the product of strong leadership, intentional technology investments, and stakeholder collaboration, bolstered with a sound regulatory and policy framework.

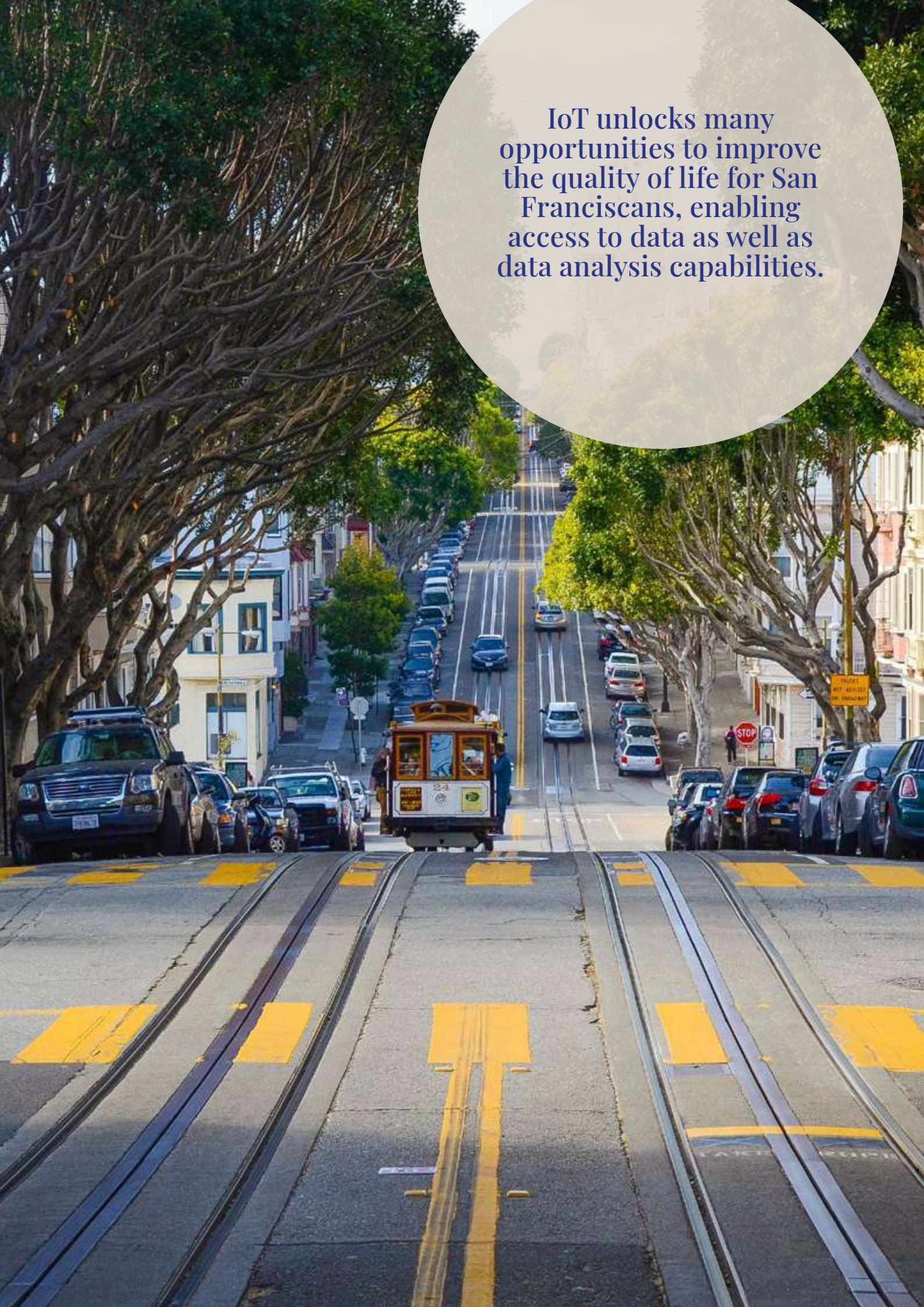


### Smart City Government Score

VS	VISION	3.1
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	2.0
IE	INNOVATION ECOSYSTEM	3.1
SM	SMART POLICIES	4.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	4.0



Estonians save approximately five working days per year through e-ID, a testament to the impact of Tallinn's digital service delivery.

A scenic view of a San Francisco street, likely Russian Hill, featuring cable car tracks in the foreground. A cable car is visible on the tracks, moving away from the viewer. The street is lined with large, leafy trees and parked cars. In the background, there are buildings and more trees under a clear sky.

IoT unlocks many opportunities to improve the quality of life for San Franciscans, enabling access to data as well as data analysis capabilities.

# San Francisco

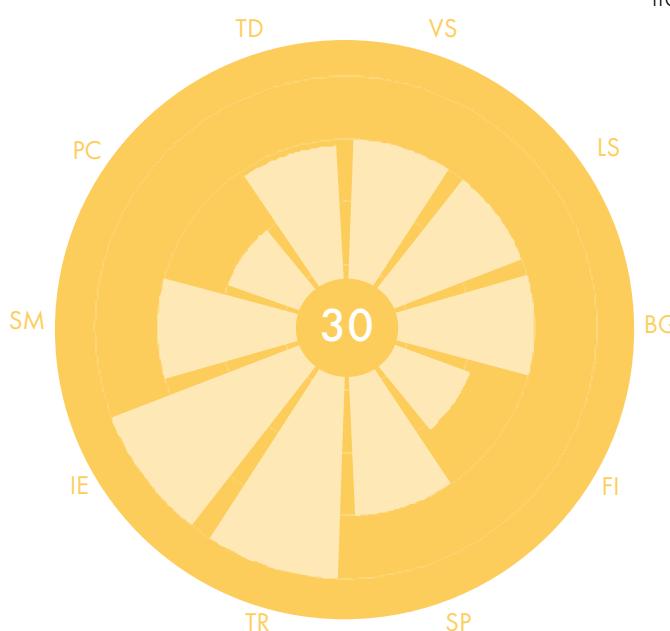
## *Effective governance to prepare citizens for the future*

San Francisco's smart city vision is to become the Internet-of-Things (IoT) capital of the world. IoT unlocks many opportunities to improve the quality of life for San Franciscans, enabling access to data as well as data analytics capabilities. This vision is driven by the desire to create a more equitable, effective, and efficient government and to ensure that citizens are well-equipped to satisfy the demands of next-generation jobs. The city government has developed several detailed plans to achieve this vision, namely the ICT Strategic Plan 2020-2024, which will guide the city's investments and initiatives.

The city government collaborates with private sector partners to improve public services. Government-led programmes such as Civic Bridge and Startup in Residence bring in skilled volunteers from the private sector to collaborate with city staff and design solutions to resolve public policy problems. One example initiative under Civic Bridge is DAHLIA (Database of Affordable Housing Listings, Information, and Applications). The Mayor's Office of Housing & Community Development and Google co-created an online portal (DAHLIA) to transform the fragmented, time

consuming affordable housing application process. DAHLIA reduced application information requirements by 75 percent, enhancing convenience for citizens and improving in-house processing efficiency. Similarly, the Startup in Residence initiative connects government agencies with start-ups to devise custom technology solutions that address civic challenges.

To equip its citizens with smart skills for next generation jobs, the city government supports training at all levels, from grade schools, to universities, and employment programmes. The San Francisco Unified School District aims to extend computer science education from pre-kindergarten to Grade 12 across all schools by 2025. UC Berkeley also has a dedicated Smart Cities Research Center which teaches undergraduate and graduate courses related to smart cities and urban challenges. Additionally, a dedicated ICT Sector Committee in the Office of Economic and Workforce Development oversees technology training programmes including technology apprenticeships, technology skills training, and networking events. These initiatives, in conjunction with San Francisco's IoT strategy, ensure that the city and its inhabitants are prepared for transformation.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	2.1
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	4.0
IE	INNOVATION ECOSYSTEM	4.0
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	2.0
TD	TRACK RECORD	2.9

# MOSCOW

## *City-as-a-Service to improve citizens' lives*

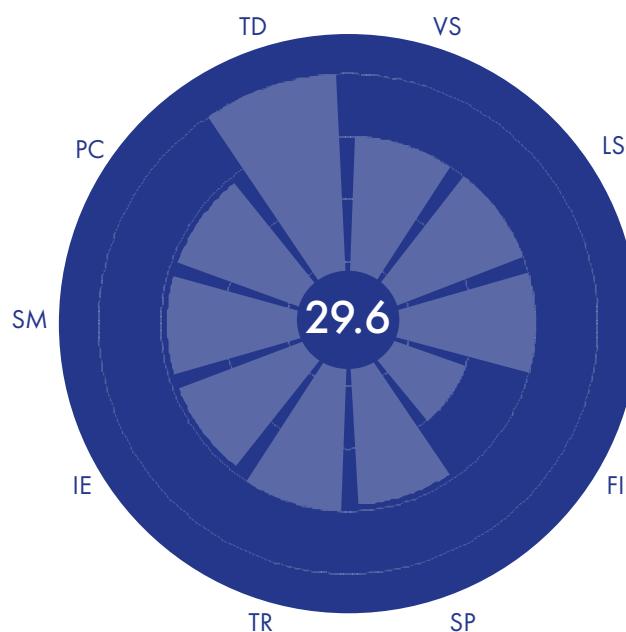
Moscow has achieved many successes on its way to creating a smart and innovative city. Its digital technologies boost living standards, improve government performance, enhance the effectiveness of service provision, increase competitiveness, fulfil the needs of the current and future generations of citizens, and help to meet its city challenges. In this megacity with over 12 million inhabitants, a 300 percent mobile penetration rate, and 4G coverage across 99 percent of the city's areas supports the rapid introduction and active use of online services and digital platforms.

Its government services portal Mos.ru aggregates over 370 public services for the Muscovites in one platform. Over the past decade, these services have been used approximately two billion times. The city government continually strives to improve existing services and to introduce new services for Mos.ru, which receives over 20 million visits from local citizens each month. Some good examples include "Moscow State Services" and "My Moscow" applications that ensured digital services in high-demand were more easily and quickly obtained. Additionally,

a feature allowing citizens to access their electronic medical records was also introduced following numerous requests from platform users.

Since the launch of the Active Citizen platform in 2014, Moscow's citizens have been able to vote online on urban development issues. In six years, almost 4.8 million users have been registered on the platform that offered over 4,800 opportunities for citizens to vote. As a result, 25 local parks as well as ten new bus routes and bicycle lanes have been created. From this experience, the city government launched the City of Ideas crowdsourcing project (Crowd.Mos.ru), a separate platform for citizens to suggest their own ground-up initiatives. Here, almost 240,000 residents proposed more than 109,000 ideas that have been transformed into a number of city projects.

Moscow's strong digital foundation and IT infrastructure has allowed the city government to develop and deploy services at a large scale quickly and seamlessly to meet its citizens' needs.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.9
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	2.9
SM	SMART POLICIES	2.9
PC	PEOPLE-CENTRICITY	2.9
TD	TRACK RECORD	4.0



Moscow's strong digital foundation and IT infrastructure has allowed the city government to develop and deploy services at a large scale quickly and seamlessly to meet its citizens' needs.



Beijing, who has long considered 5G a strategic priority, achieved full 5G coverage in August 2020.

# 15 Beijing

## *5G city rollout accelerates smart innovation across sectors*

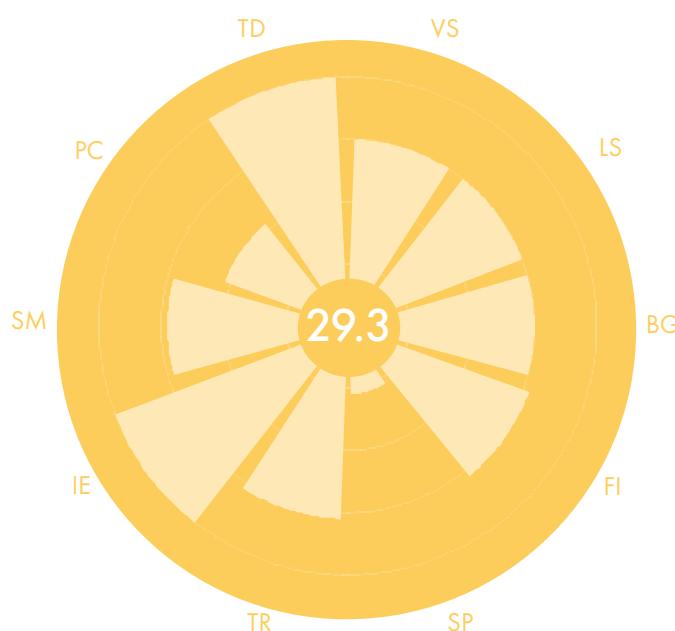
"5G technology will be epoch-making in a new era of the Internet of Everything and of great strategic significance for the digital economy", said Wang Hui, deputy head of Beijing Communications Administration. Beijing, who has long considered 5G a strategic priority, achieved full 5G coverage in August 2020. As of August, there were 44,000 5G base stations and five million 5G users, approximately 25 percent of Beijing's population.

Beijing's 5G rollout enables major advances in the development and deployment of smart technologies. The smart transportation sector is expected to experience significant growth as 5G creates new opportunities for the commercialisation of autonomous driving technology. Beijing, as the first Chinese city to regulate and open autonomous driving road test zones, plays a leading role in terms of the scale of test vehicles and types of test traffic scenarios. It also has comprehensive infrastructure and policies to encourage industry development. For example, Beijing has the most stringent safety requirements in China for manned autonomous driving tests, to ensure safety and reliability. In October 2020, Chinese Internet

Giant Baidu launched its self-driving Apollo Go service in a free public trial to the public. Apollo Go vehicles will still have safety drivers onboard. However, Baidu aims to achieve driverless 5G vehicles which allow human drivers to take over remotely if necessary.

Beijing is also home to China's first 5G smart construction site, which improves efficiency and provides extra safety guarantee for construction workers. For example, 5G AI glasses tracks users' location, allowing engineers to conduct remote site inspection and communication.

Beijing's strategic focus on 5G coverage keeps it at the forefront of research and development of wireless technologies, an essential element in the digital economy.



### Smart City Government Score

VS VISION	3.0
LS LEADERSHIP	3.0
BG BUDGET	3.0
FI FINANCIAL INCENTIVES	3.1
SP SUPPORT PROGRAMMES	1.1
TR TALENT-READINESS	3.1
IE INNOVATION ECOSYSTEM	4.0
SM SMART POLICIES	2.9
PC PEOPLE-CENTRICITY	2.1
TD TRACK RECORD	4.0

# Chengdu

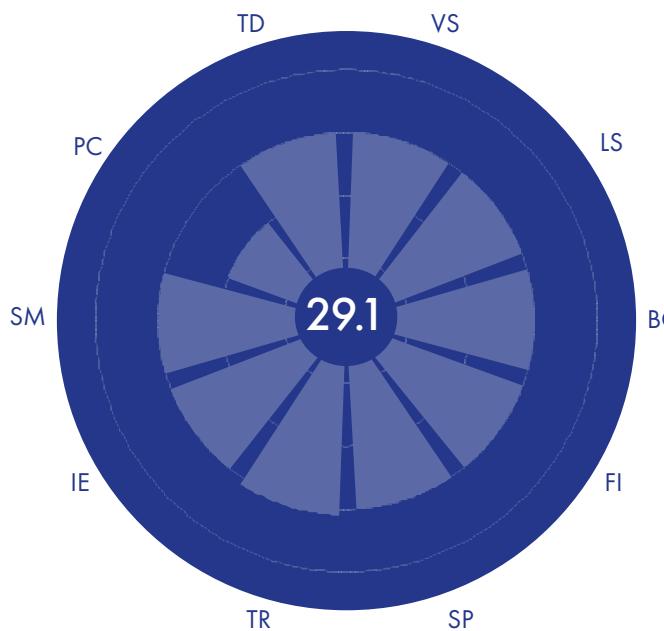
*Investing in continual skills upgrading to develop future workforce*

The municipal government of Chengdu strives to develop its economy into one which is both smart and digital. A key element to support its ambition and drive industrial transformation and upgrading is the presence of a highly-skilled workforce as an engine of growth. Currently, Chengdu ranks as one of the top ten cities in China with the largest pool of undergraduates across the city's 56 universities. Investments are made to attract international talent, such as a USD 15.3 mn grant awarded to winners of the globally renowned Turing award or Fields Medal to engage in innovation or entrepreneurship within the city.

In addition to grants, Chengdu released its Chengdu National Skills Upgrading Implementation Plan in 2019 with the aim of establishing a comprehensive skills improvement training programme by 2023, to cultivate three million skilled workers. In its plan, Chengdu has selected strategic industries aligned with the city's strengths and priorities, where talent is most sought after. These industries include advanced manufacturing (e.g. new materials, equipment manufacturing), modern services

(e.g. creative design, digital publishing), as well as new economy (e.g. artificial intelligence and clean energy), or industries that contribute to the revitalisation of rural industries (e.g. agribusiness, tourism and sports, agritech).

There will also be financial incentives of up to USD 380 to encourage citizens to participate in these training programmes and obtain certifications. Other subsidies support enterprises which are looking to upskill employees, bringing in experts from internationally renowned companies to train employees, or colleges that are developing new programmes. Furthermore, the unemployed, selected residents from rural areas, persons with disabilities, as well as veterans are able to receive free training. Chengdu's emphasis on upskilling its entire workforce to prepare for future industries and disruptions has made it increasingly attractive as a talent hub for both local and international talent.

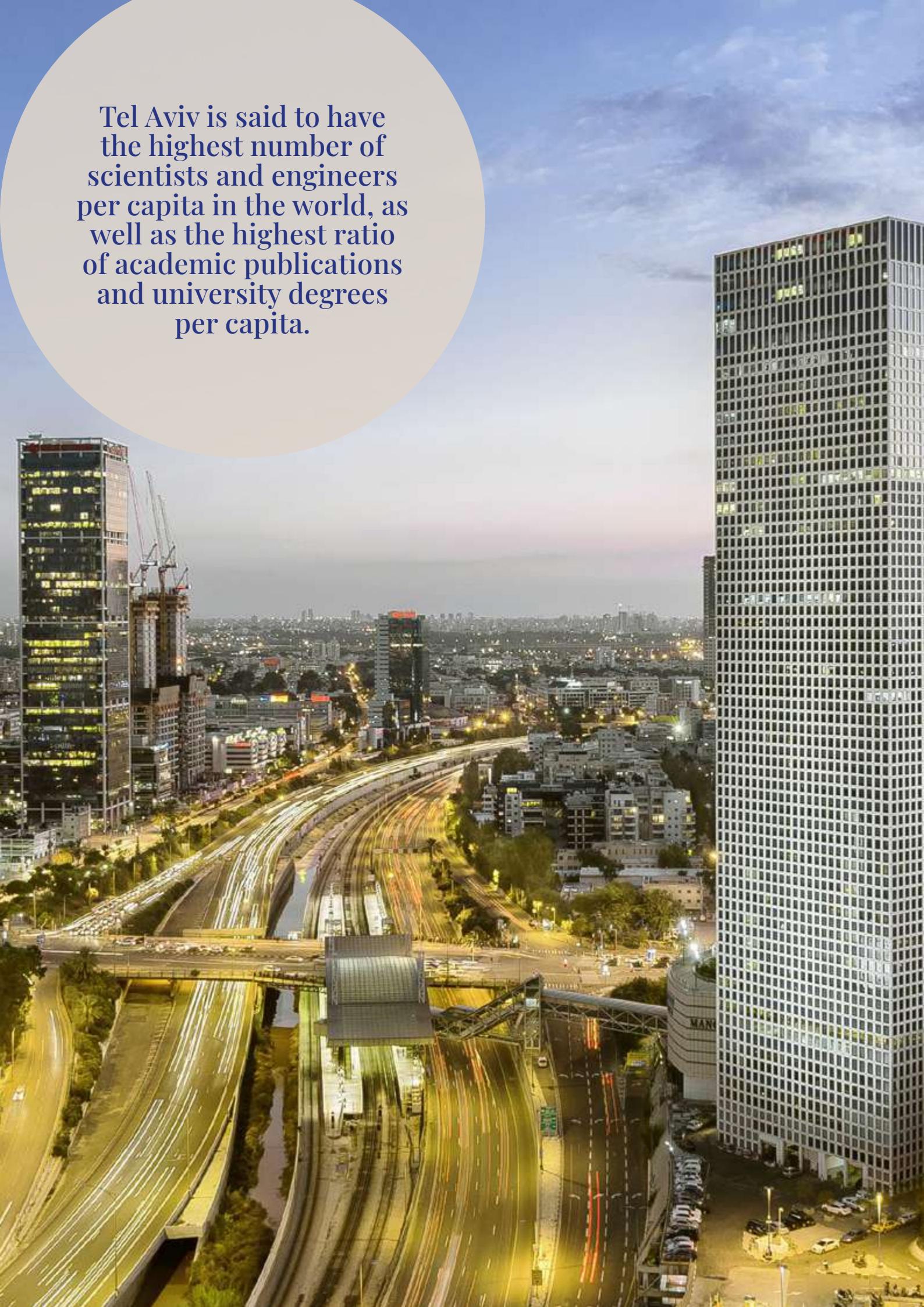


## Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.1
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	2.0
TD	TRACK RECORD	3.0

The background image is a wide-angle aerial photograph of Chengdu, China, taken at dusk or night. It captures a dense urban landscape with a mix of architectural styles. In the foreground, a large, modern building with a curved facade and many lit windows stands prominently. To its left, a traditional Chinese pavilion with a tiled roof and ornate decorations sits on a bridge over a river. The river flows through the city, reflecting the lights from the surrounding buildings. The city extends into the distance, with more modern high-rise buildings visible under a dark sky.

Chengdu's emphasis on upskilling its entire workforce to prepare for future industries and disruptions has made it increasingly attractive as a talent hub for both local and international talent.



Tel Aviv is said to have the highest number of scientists and engineers per capita in the world, as well as the highest ratio of academic publications and university degrees per capita.

# Tel Aviv

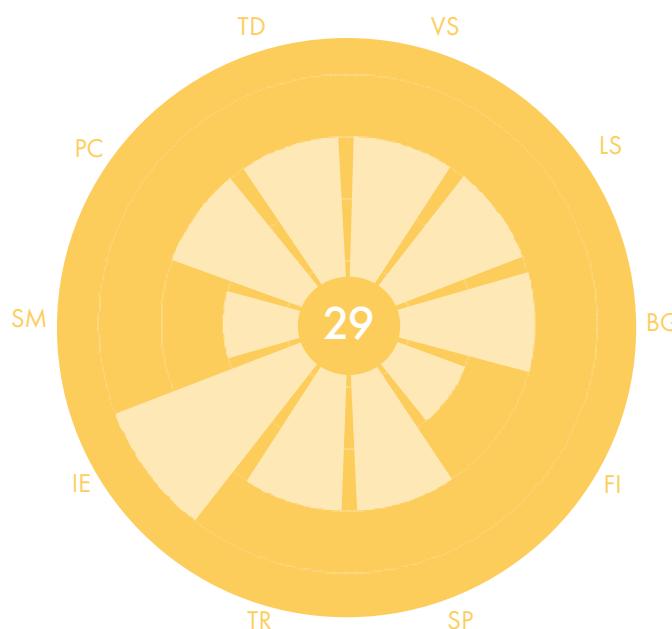
*Creating a knowledge hub to enable a thriving startup ecosystem*

Tel Aviv, the “Nonstop City”, has the highest number of startups per capita in the world, with an ecosystem valued at USD 47 bn in comparison to a global average of USD 10.5 bn. Key to the success of Tel Aviv’s startup ecosystem is the availability of a skilled and educated talent pool, as well as a plethora of multi-national accelerators and entrepreneurship programmes to support entrepreneurs.

Tel Aviv is said to have the highest number of scientists and engineers per capita in the world, as well as the highest ratio of academic publications and university degrees per capita. The presence of institutions of higher learning such as Tel Aviv University, a public institution, and the Zell Entrepreneurship Program, both of which offer comprehensive STEM courses have contributed greatly to the growth of Tel Aviv’s startup ecosystem. Supported by the Tel Aviv-Yafo Municipality, Tel Aviv also has specially dedicated research centres that undertake smart city research such as the City Center at Tel Aviv University, which contribute to knowledge production in the city. All these initiatives have helped create a large pool of highly skilled talent fuelling the startup sector.

There has been an intentional effort to attract and develop entrepreneurs in the City through three key accelerator programmes. The ‘Start Tel Aviv’ is a week-long programme which uses workshops, lectures, and mentorship from industry experts to grow young entrepreneurs. Launchpad Tel Aviv aims to support early stage startups to launch minimally viable products in their respective industries; while Accelerator Academy Tel Aviv offers semester to year-long courses taught in partnership with leading academic institutions in the areas of: 1) smart cities and institutional innovation; 2) technology transfer; and building and promoting entrepreneurial ecosystems. The City is also home to a number of accelerator programmes and R&D centres for leading global firms such as Siemens, PayPal, Google, Coca Cola, Apple, and Samsung, to name a few.

Such a knowledge hub cultivates an enabling environment for the creation of ground-breaking research, new and improved technologies, tangible patents, as well as intentional multi-stakeholder collaborations which form the backbone of the city’s thriving startup ecosystem.



## Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	4.0
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	3.0

18

# Sydney

## *Establishing ‘ethical infrastructure’ to protect citizens’ rights*

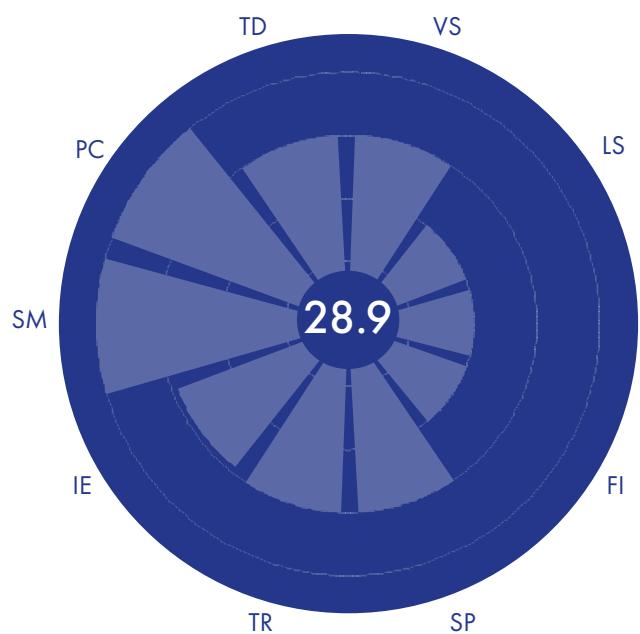
Sydney’s Smart City Strategic Framework emphasises ethical innovation. The City takes the security, privacy, and digital rights of its residents very seriously and sees its role as an ethical custodian to apply effective security and privacy controls and build principles of ethics into new projects and collaborations with all stakeholders. In the City’s Digital Strategy as well as its Information and Technology Strategic Plan, Sydney also clearly outlines its approach to data governance, management, sharing, and use.

For instance, in dealing with data, the City aims to establish foundational system-wide ethical infrastructure to guarantee the City’s integrity, aligning with its Privacy and Personal Information Protection Act enacted in 1998, as well as the NSW Government Privacy Governance Framework. In its open data policy and governance framework, the City adopts a ‘security-by-design’ approach to open data and ensures the ethical publication of data. The ‘security-by-design’ approach ensures that vulnerabilities and risks are minimised by designing systems which incorporate security specifications from the get-go. Sydney’s data policies and guidelines are all based

on a citizen-centric identity management model outlined in ISO 37106, following closely with the six principles of consent, checkability, choice, control, convenience, and content.

The City makes considerable effort to engage with its residents and ensure that their concerns are heard for any city council’s proposal or plan. Multiple platforms exist for residents to provide feedback, including workshops and community meetings, stakeholder meetings and roundtables, consultations through the Sydney Your Say online portal, and advisory panels. A citizen jury was even set up to invite 50 ‘everyday people’ to take part and review ideas, proposals, and concepts for the Sydney 2050 plan.

The City has plans to embed its digital inclusion standards and principles in all its planning, projects, and procurement processes. Sydney was also the first city in Australia to sign the global initiative – Cities Coalition for Digital Rights, which aims to protect, promote, and monitor the digital rights of residents.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	2.0
BG	BUDGET	2.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	2.9
SM	SMART POLICIES	4.0
PC	PEOPLE-CENTRICITY	4.0
TD	TRACK RECORD	3.0

A photograph of the Sydney Opera House and the surrounding city skyline at sunset. In the foreground, a small sailboat with two people on board is visible on the water. The sky is a warm, golden color.

Sydney set up a citizen jury comprising inviting 50 'everyday people' to review ideas, proposals, and concepts for its Sydney 2050 plan.



Taipei's approach has encouraged innovation to take place more frequently, allowing its city departments and its citizens to feel more comfortable with innovation and risk.

19

# Taipei

*Combining top-down government expertise with bottom-up innovation*

Since 2016, Taipei's Smart City Project Management Office (TPMO)’s approach has focused on positioning the city as a living lab to testbed solutions and cultivate a culture of innovation within the city. The TPMO collaborates closely with various government authorities to identify, formulate, and recommend emerging technologies such as Internet-of-Things or Artificial Intelligence that could apply to existing city policies.

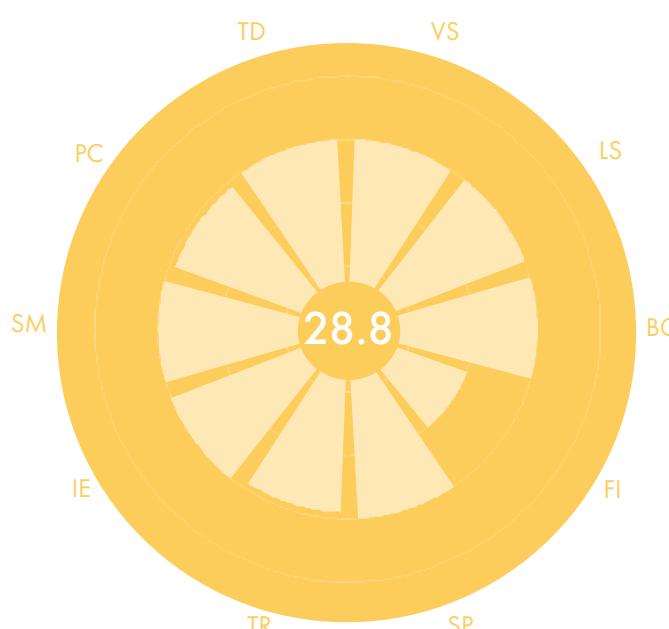
Over 176 pilot programmes have been rolled out since then, and 36 percent of the finished projects are in the midst of scaling up. These include the successful implementation of Air Boxes to collect data on temperature, humidity, and air pollution; its digital learning platform Taipei City CooC Cloud; and smart public housing which allows residents to track their consumption of electricity and water.

The next step for TPMO is therefore to strengthen the effectiveness of its Proof-of-Concept (PoC) projects and institutionalise its collaboration mechanism with the private sector. To achieve this, TPMO introduced its 1+7 field Smart City Programme as an

expansion from its initial *Taipei Smart City Industrial Field Pilot Program*, to invite innovative solutions from the private sector which will solve specific city challenges in fields such as healthcare, security, and environment. Separately, a Smart City steering group is set up to systematically evaluate and refine the solutions into scalable policies.

Beyond subsidising hardware and infrastructure, Taipei City is also supporting the development of emergent services. For example, Taipei will tap into the concept of Mobility-as-a-Service (MaaS) to drive the development and integration of other value-added services including smart parking, shared vehicle rental services, and transportation planning. This contributes to its aim of creating a multi-transport integration system to increase ride sharing, green transportation, and reduce the use of private vehicles.

Taipei’s approach has encouraged innovation to take place more frequently, allowing its city departments and its citizens to feel more comfortable with innovation and risk.



## Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	2.9
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	2.9
TD	TRACK RECORD	3.0

# 20 Melbourne

*Continuing efforts to understand & meet community needs*

The Melbourne city government kick-started its people-centric initiatives five years ago, taking great care to involve citizens extensively in co-creating a vision for Melbourne in 2026. The city used the Participate Melbourne platform and offline engagements to collect ideas from 4,000 citizens in areas such as Future Economies, Digital City, and Climate Change. The resulting 2026 vision was developed in careful deliberation with a 50-person citizens' jury intended to represent the city's demographic mix, dedicated community ambassadors, and the City Council.

Since then, the City has been focusing on enabling access to digital and data-driven solutions to support this vision. The city's government has always initiated their smart city projects by collating insight and feedback from the community to better understand its needs, before investing in smart city technologies.

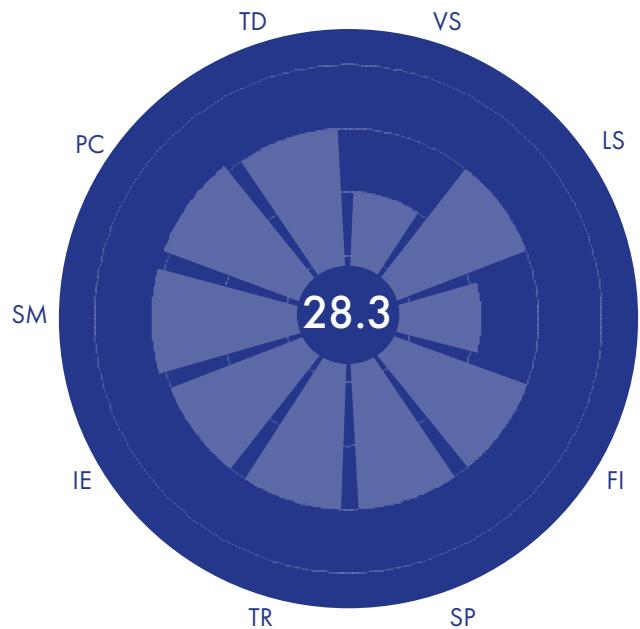
In 2020, the city's main challenges included COVID-19, rapid population growth, and digital disruption. Through the City of Melbourne's 3D Development Activity Model and pedestrian count-

ing system, the public can access and visualise the city's data via open data platforms. Real-time data has been especially useful during the pandemic to help businesses understand the movement of people around the city, so they can better plan and prepare staffing and stock levels.

To attend to its population growth challenge, the City has given key stakeholders such as policymakers, researchers, and academics access to its open data platform with approximately one hundred unique data sets that are used to forecast the city's growth.

One of the city's notable projects has been their 5G and IoT testbed. In collaboration with 26 industry partners, the pilot project was chosen by a resident group which bridges the connection between Melburnians, who benefit from the project, and the implementation and planning partners.

The City's broad-ranging initiatives demonstrate Melbourne's commitment a decision-making process guided most prominently by citizens' needs.

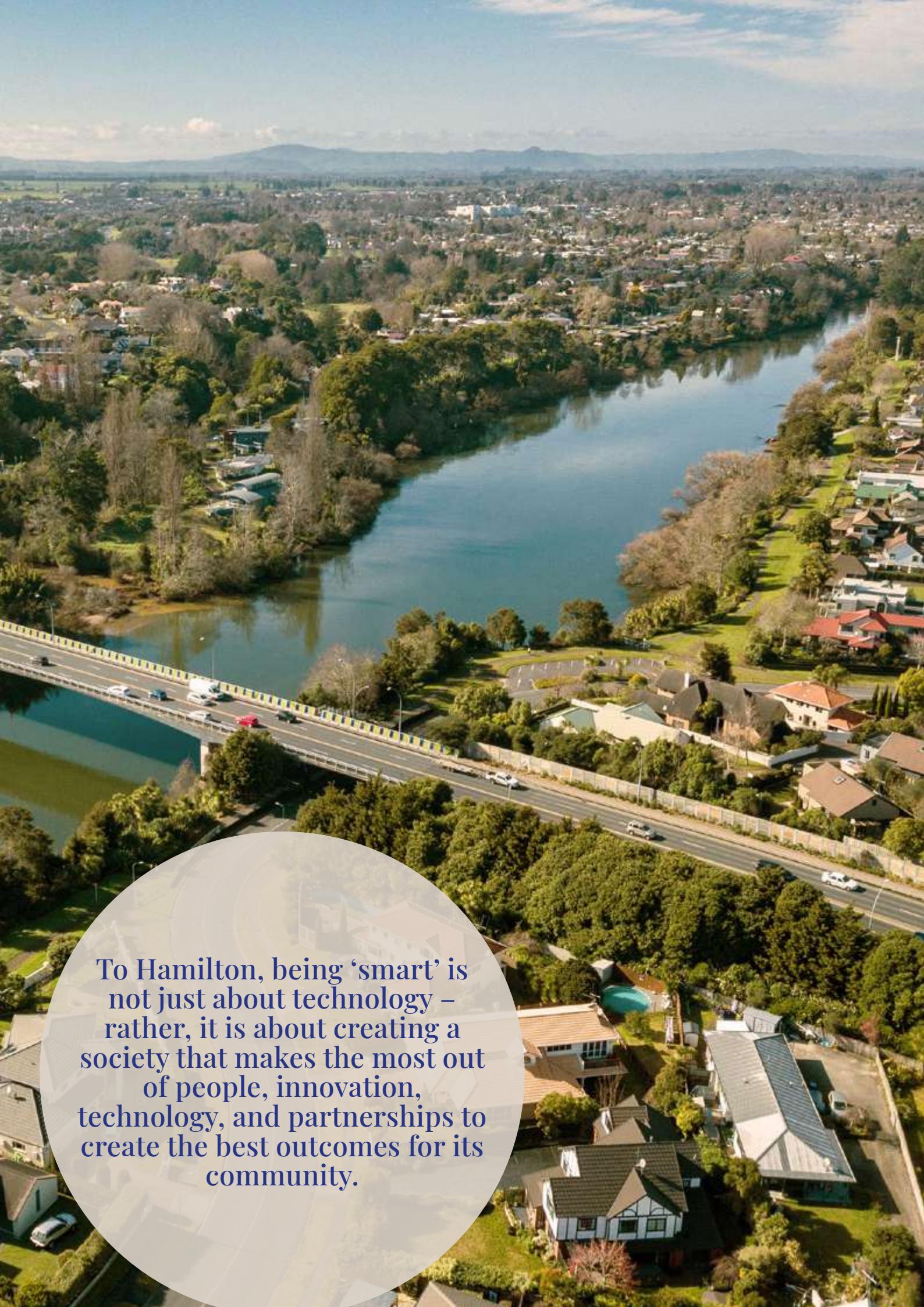


## Smart City Government Score

VS	VISION	2.0
LS	LEADERSHIP	3.0
BG	BUDGET	2.1
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	3.1
PC	PEOPLE-CENTRICITY	3.1
TD	TRACK RECORD	3.0



Melbourne's city government has always initiated their smart city projects by collating insight and feedback from the community to better understand its needs, before investing in smart city technologies

An aerial photograph of a river flowing through a residential area. The river curves from the bottom left towards the top right. On either side of the river are green lawns and clusters of houses. A bridge spans the river in the middle ground, with several cars visible on it. In the background, more houses and trees are scattered across the landscape, leading to a range of mountains under a clear blue sky.

To Hamilton, being ‘smart’ is not just about technology – rather, it is about creating a society that makes the most out of people, innovation, technology, and partnerships to create the best outcomes for its community.

# Hamilton

## *Reaping the rewards of putting people first*

As the first city in New Zealand to connect to the Internet in 1989, Hamilton is no stranger to leading innovation. Today, the city of Hamilton is redefining what it means to be a smart city, by putting its citizens and their needs front and centre to become a 'smart society'.

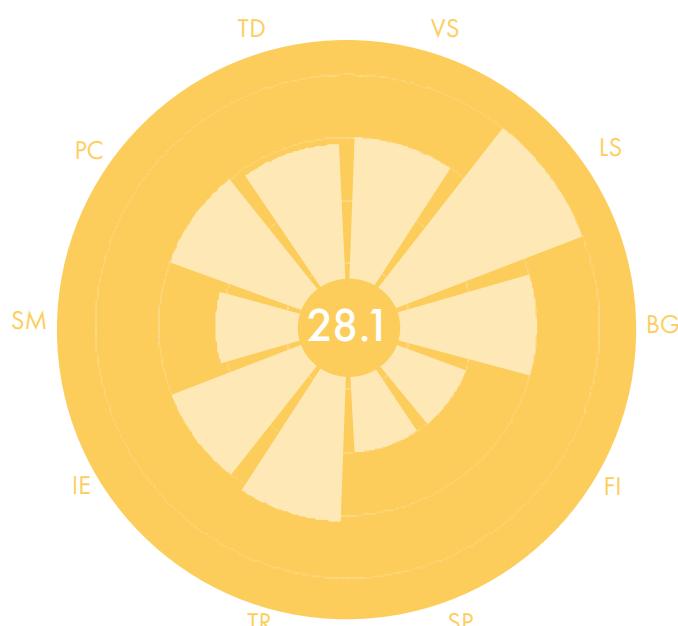
To Hamilton, being 'smart' is not just about technology; it is about creating a society that makes the most out of people, innovation, technology, and partnerships to create the best outcomes for its community.

Part of Hamilton's people-centric approach involves engaging closely with multiple stakeholders when developing smart city initiatives. For example, as part of the city's energy-saving LED light replacement plan, the city council sought the input of a variety of stakeholders to refine its plan before implementation. These stakeholders included the city's astronomical society to test the effects of the new lights on the night-sky; bat ecologists to ensure that the new lights would not harm the city's endangered bat population; and

every household in the city through a letter drop.

Additionally, research was conducted on natural circadian rhythms to ensure that the new lights would improve sleep quality for residents. In the first two years after implementation, this project did result in half a million dollars of energy savings, but more importantly it created positive impact for both its citizens and the environment.

A testament to Hamilton's citizen-first approach is that over 16,000 lights were replaced without one complaint on this project, a finalist in the NZ Local Government Excellence Awards. Hamilton's smart society plan is set to improve the city's liveability and sustainability and is leading Hamilton's development into becoming New Zealand's tech-centre.



### Smart City Government Score

VS VISION	3.0
LS LEADERSHIP	4.0
BG BUDGET	3.0
FI FINANCIAL INCENTIVES	2.0
SP SUPPORT PROGRAMMES	2.0
TR TALENT-READINESS	3.1
IE INNOVATION ECOSYSTEM	3.0
SM SMART POLICIES	2.1
PC PEOPLE-CENTRICITY	3.0
TD TRACK RECORD	2.9

# 22 Tokyo

## *Building city resilience through technology & human-centric design*

The Tokyo Metropolitan Government (TMG) developed an action plan for 2020 titled "New Tokyo, New Tomorrow", to outline its key strategies in creating a safe, diverse, and smart Tokyo. The TMG has allocated the highest amount of funding to its 'safe' pillar, with USD 8.1 bn to enhance the city's resilience against natural disasters.

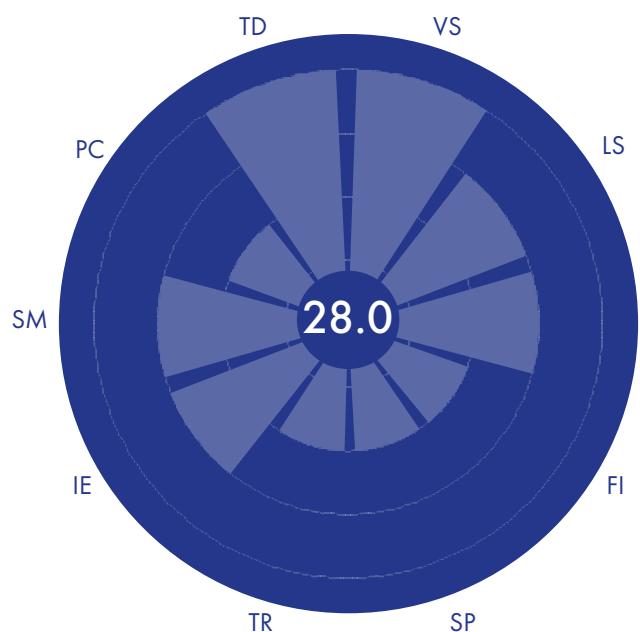
Tokyo's disaster management approach has often been cited as a best practice to follow, as it continually builds on its past experiences, and combines the use of advanced technologies with human-centric design. The TMG emphasises three key pillars to strengthen the city's resilience: Public assistance, self-help, and mutual help.

The TMG has continued to reinforce quake-proof infrastructure such as buildings, water pipes, and sewage systems with a combination of policy instruments and technology solutions. For instance, construction companies need to meet structural strength standards, and include seismic isolation systems such as pendulums that counter earthquake waves, to reduce shaking and

absorb tremors. Today, nearly nine out of ten buildings in Tokyo align with modern anti-seismic standards.

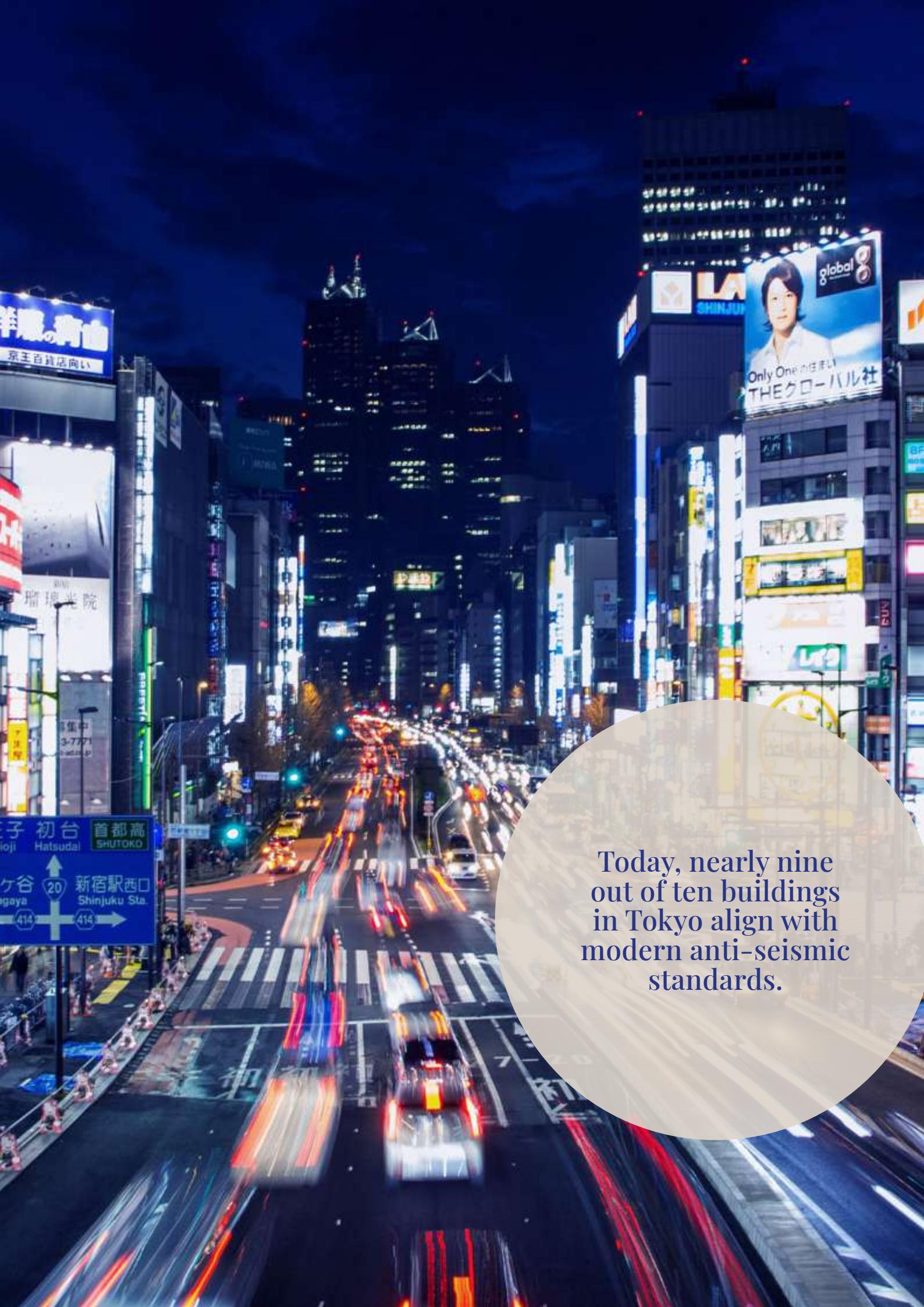
The city has also developed adaptable and multi-functional infrastructure for disaster management. In the event of a natural disaster, the city's Rinkai Disaster Prevention Park can be converted from a park into a survival bunker for citizens. The park has solar-powered charging stations for e-bicycles and electrical appliances, with public benches transforming into cooking stoves and manholes that act as emergency toilets when required. The TMG also developed the Disaster Preparedness Tokyo App to create a more convenient platform for people to access disaster prevention information. Marine robots and airborne drones are also deployed to search for survivors in situations of natural disasters.

Tokyo continues to explore and tap into the potential of emerging technologies to build on its city's resilience, always keeping its citizens in mind.

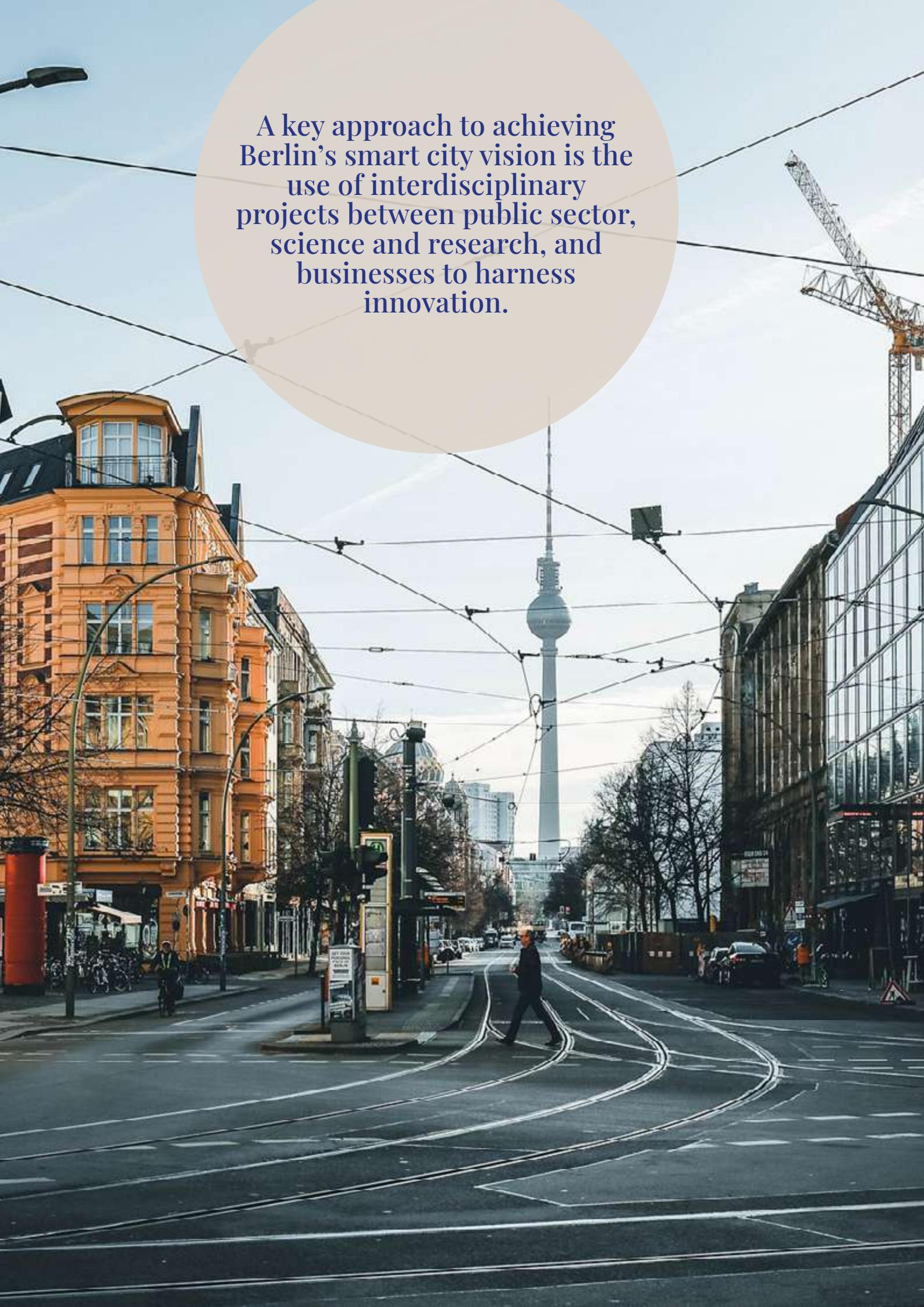


### Smart City Government Score

VS	VISION	4.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	2.0
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	2.0
TD	TRACK RECORD	4.0



Today, nearly nine out of ten buildings in Tokyo align with modern anti-seismic standards.

A wide-angle photograph of a city street, likely in Berlin, showing a complex network of tram tracks on the asphalt. In the background, the iconic Fernsehturm (TV tower) stands tall against a clear sky. To the left, there's a large, multi-story building with a distinctive orange facade and a bay window. On the right, modern glass buildings are visible. Overhead, a complex web of power or cable lines stretches across the scene. A lone figure in a dark coat walks across the tracks in the foreground.

A key approach to achieving Berlin's smart city vision is the use of interdisciplinary projects between public sector, science and research, and businesses to harness innovation.

# 23

# Berlin

## *Interdisciplinary action to build an efficient and sustainable smart city*

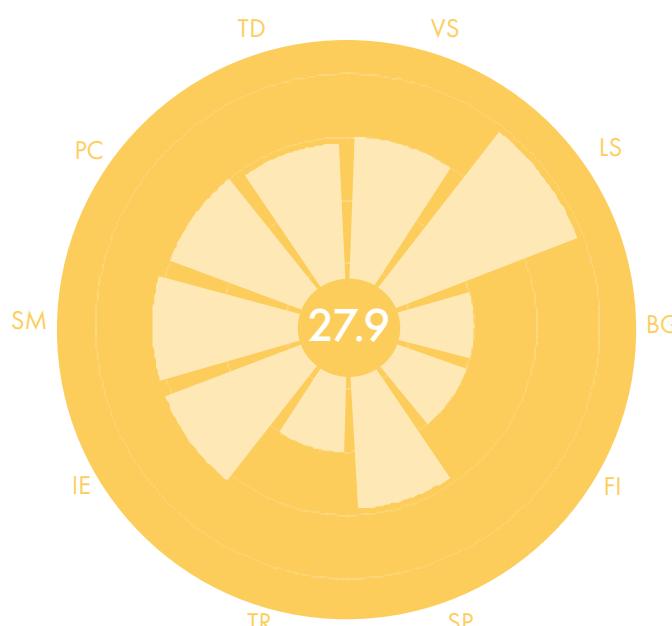
Berlin is known as a creative metropolis, start-up hub, and innovation testbed. In April 2015, the Berlin Senate designed Smart City Strategy Berlin around the six themes of smart administration and urban society; smart housing; smart economy; smart mobility; smart infrastructure; and public safety. It aims to improve the international competitiveness of Berlin, increase resource efficiency, pilot innovative applications, and achieve climate neutrality by 2050.

Berlin's smart city strategy is supported by a robust and inclusive governance structure. The Smart City Unit & Office, the Political Board Smart City, the Smart City Network and the Smart City Lab are entities which comprise of a variety of public and private stakeholders. They communicate directly with policy-makers through bi-weekly meetings with representatives from the Berlin Senate.

A key approach to achieving Berlin's smart city vision is the use of interdisciplinary projects between the public sector, science and research institutions, and businesses to harness innovation. For example, the Einstein Centre for Digital Future (ECDF) is a public-priv-

vate partnership engaging more than 30 companies, organisations, universities and non-academic research institutions. Its purpose is to advance research in digital infrastructure, digital society, digital industry and services, and digital health. ECDF's research and resources can be jointly used with other parties such as the Weizenbaum Institute for the Networked Society, which is funded by the Federal Ministry of Education and Research to investigate the ethical, legal, economic, and political aspects of digital change. An example of one such collaboration is a joint event during Berlin Science Week on "Sustainable Digitalisation in Urban Areas".

While technology is the backbone of a smart city, Berlin prioritises civil liberties. The Berlin Senate views data protection as a fundamental right and the foundation of a free, democratic society. A key tenet of Berlin's new technological deployments is that its usage complies with data protection laws so that citizens retain control over their personal data.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.9
BG	BUDGET	2.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.9
TR	TALENT-READINESS	2.0
IE	INNOVATION ECOSYSTEM	3.1
SM	SMART POLICIES	3.1
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	2.9

# 24 Milan

## *Institutionalising citizen engagement & participation*

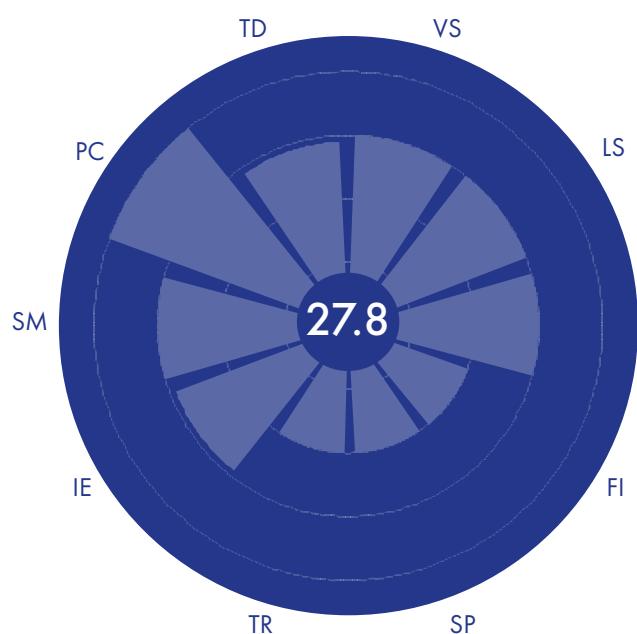
Milan's model of participatory governance is characteristic of its smart city journey. Milan's process of formulating its smart city strategy involved a diverse range of stakeholders including firms, universities, financial institutions, the third sector, government agencies, and citizens through six working groups developed according to six smart city pillars. Public events were held for each pillar to involve more citizens.

Within the city government, Milan has a dedicated Department of Participation, Active Citizenship, and Open Data, which is responsible for providing opportunities to involve citizens actively. For example, the department organises public debates for citizens to discuss issues regarding large infrastructural projects, manages the participatory budgeting process within the city, engages citizens with online surveys to collect feedback and opinions, and plans consultations with diverse groups of stakeholders to review and give inputs on its strategic development plans. For example, the City allocated USD 605,000 to each of its nine districts as part of a participatory budgeting (PB) initiative to involve citizens in decid-

ing on how these funds would be utilised to benefit their respective districts. Milan has adopted an iterative approach to PB, learning from previous PB cycles and improving continuously on transparency, implementation, feasibility, and inclusion.

SharingMi is a mobile application developed by the city government as a pilot to encourage citizens to participate and get involved in sustainability efforts. The application poses challenges for citizens to take part in, and rewards citizens who have completed multiple challenges. Civic Crowdfunding is another initiative which allowed citizens to contribute financially to projects with high social impact, such as those that promote sustainability or inclusivity. Over 16 projects have successfully raised more than USD 728,000 of public funding on this platform.

For Milan, the participatory planning process is underpinned by three principles: a tailor-made model which contextualises the city's characteristics and local culture; a lean approach that values experimental learning and improvement; as well as open governance.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	2.0
IE	INNOVATION ECOSYSTEM	2.9
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	4.0
TD	TRACK RECORD	2.9

A scenic view of Milan, Italy, featuring the Piazza del Duomo and the surrounding city skyline. In the foreground, the ornate spire of the Duomo is visible. The city skyline stretches across the horizon under a clear blue sky.

Within the city government, Milan has a dedicated Department of Participation, Active Citizenship, and Open Data, which is responsible for providing opportunities to involve citizens actively.



The city's unprecedented growth as a smart city is largely driven by tech giants that have large-scale projects to introduce advanced technologies in Shenzhen.

# 25 Shenzhen

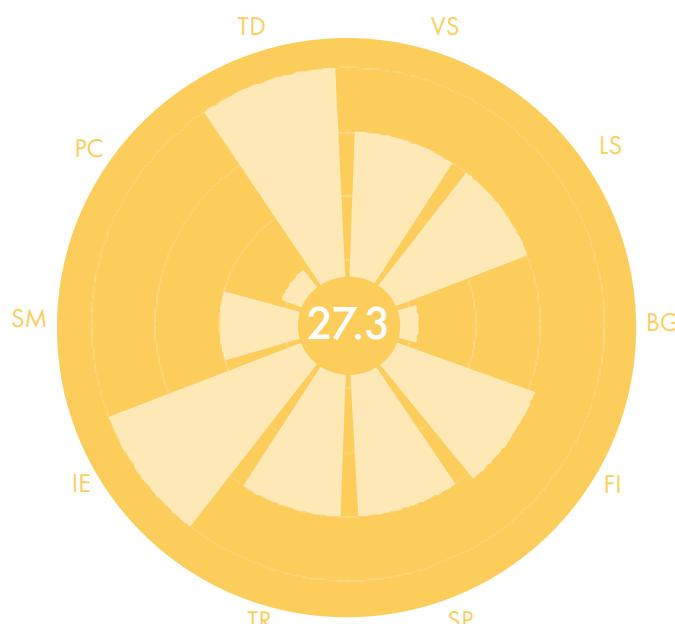
## *Tapping into the potential of partnerships with tech giants*

Shenzhen's vision outlined in its "New-type Smart City" concept plan is to become a modern, international, and innovative city. The city's unprecedented growth as a smart city is largely driven by tech giants that have large-scale projects introducing advanced technologies in Shenzhen. Shenzhen houses some of China's biggest technology firms such as Huawei, Tencent, and Ping An Technologies, all of which played pivotal roles in driving the smart city movement in Shenzhen.

Huawei is part of the government-led consortium helping to improve the operations of the traffic police department. Their solutions have helped reduce the average processing time of administrative procedures by 50 percent in the Longgang district, streamlining more than 700 types of procedures using a customised administrative assessment and approval system. In the city's airport, Huawei also developed a solution using facial image-based access control and big data analytics to replace manual passenger identification, helping to save traveller waiting time by 15 percent.

Tencent, on the other hand, has plans to build a futuristic neighbourhood named Net City, in the city's Dachanwan port area, which will accommodate up to 80,000 residents. It plans to feature eco-friendly buildings with solar panels and sensors to track environmental performance, systems to capture and re-use wastewater, car-free zones, as well as natural storm barriers.

Ping An has also set up a Smart City Operations Command Centre which collects, centralises, and integrates data from multiple channels to enable the municipal government to better manage and plan the city. The platform showcases four core technologies including smart recognition, artificial intelligence, blockchain, and cloud computing. In the field of smart healthcare, Ping An has also developed a smart disease forecasting platform which predicts the likelihood of an outbreak in Shenzhen at a precision rate of 90 percent. These tech giants provide technical expertise that have helped the city break new ground on smart initiatives.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	1.1
FI	FINANCIAL INCENTIVES	3.1
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	4.0
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	1.1
TD	TRACK RECORD	4.0

# 26 Dublin

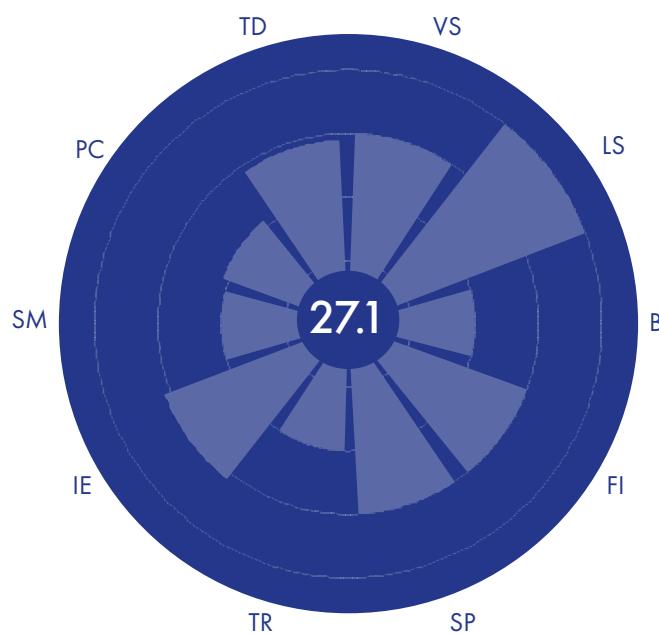
## *Establishing smart districts to testbed innovations & partnerships*

The Smart Dublin initiative was first launched in 2016 by four local authorities, with the aim to bring together multiple stakeholders including smart technology providers, academia, and citizens to collaborate and solve city challenges. To accelerate these partnerships, the Dublin city council carefully selected three areas across the city to turn them into smart districts that could pilot and testbed innovative solutions before they are scaled nation-wide.

The city council collaborated with Trinity College's research centre to establish Smart Docklands as a testbed for technological and other innovative solutions. A Project Management Office was set up as part of the initiative to facilitate collaboration across government, the technology and startup community, small and medium business owners, universities, research centres, as well as city residents. The district now has over 250 participants actively coming up with ideas to solve waste management, flooding, and congestion issues, and attracting new strategic partnerships from companies such as Google, Microsoft, IBM, and Mastercard.

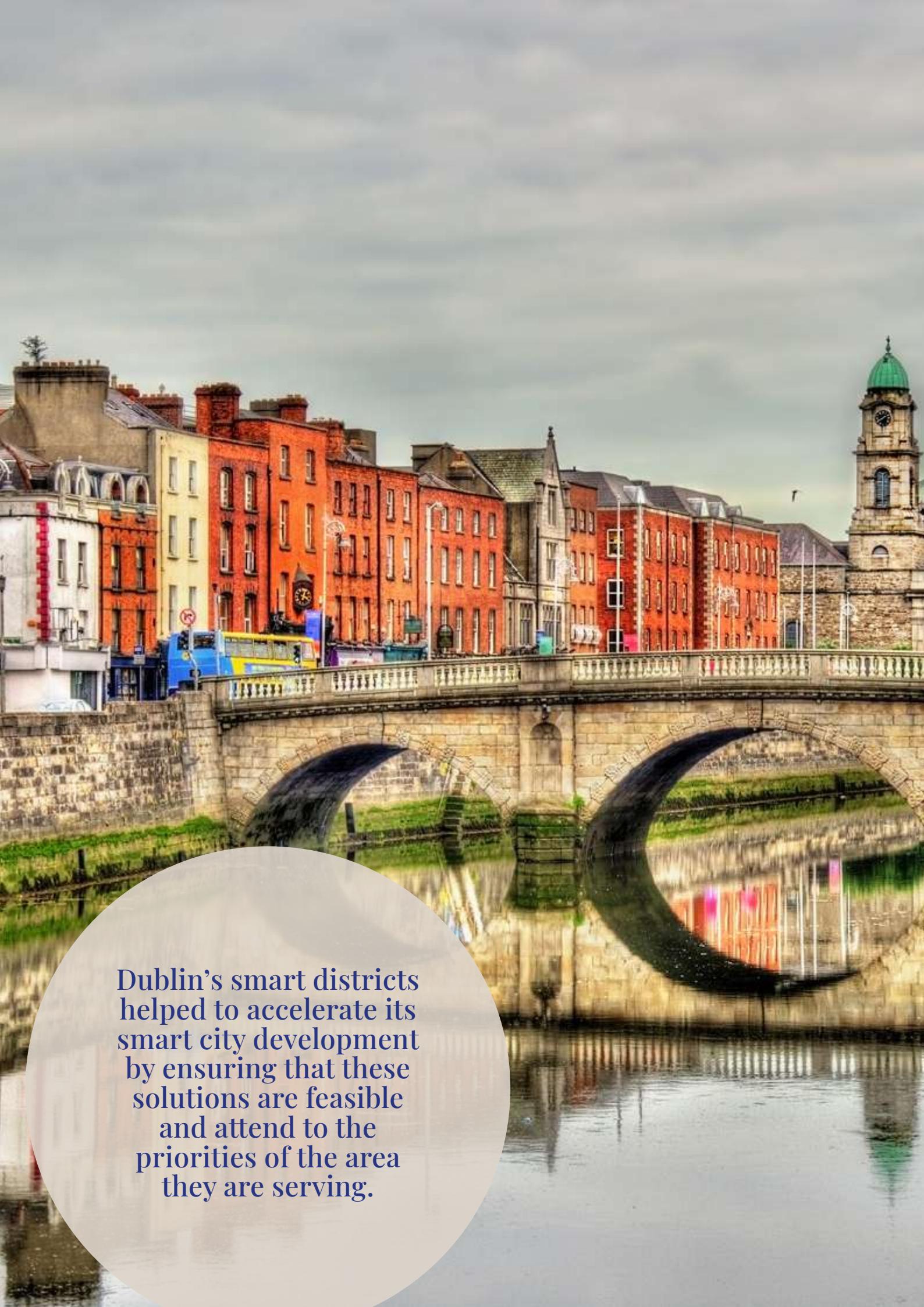
Smart Sandyford is another one of Dublin's smart districts designed to test real-world solutions. The city council conducted workshops with residents and local businesses to identify priority challenges. One of the priorities was sustainable mobility, and projects including climate monitoring, satellite monitoring of accessible parking, as well as electric bikes are being piloted. Data is also collected to measure the impact of these projects before they are replicated at the national level.

The Smart Dublin City University initiative has also played an important role in advancing Smart Dublin's ambitions, particularly to testbed and drive research in IoT technologies and solutions. The university's Insight Data Analytics SFI Research Centre is also applying Artificial Intelligence to the Croke Park sports stadium, to analyse video and other forms of data real-time. This will help to route users safely and more efficiently around the stadium, eventually reducing bottlenecks and queues. Dublin's smart districts are helping to accelerate its smart city development by ensuring that these solutions are feasible and attend to the priorities of the areas they are serving.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	4.0
BG	BUDGET	2.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	2.0
IE	INNOVATION ECOSYSTEM	3.1
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	2.1
TD	TRACK RECORD	2.9



Dublin's smart districts helped to accelerate its smart city development by ensuring that these solutions are feasible and attend to the priorities of the area they are serving.



Oslo now has over 50,000 EVs, making up about 17 percent of the city's total car population.

27

# Oslo

## *Driving smart city development as the world's electric vehicle (EV) capital*

With a vision to reduce carbon emissions by 95 percent in 2030, the city of Oslo had to transform its transportation system, which contributed over 60 percent of the city's total emissions each year. The city now has over 50,000 EVs, making up about 17 percent of the city's total car population.

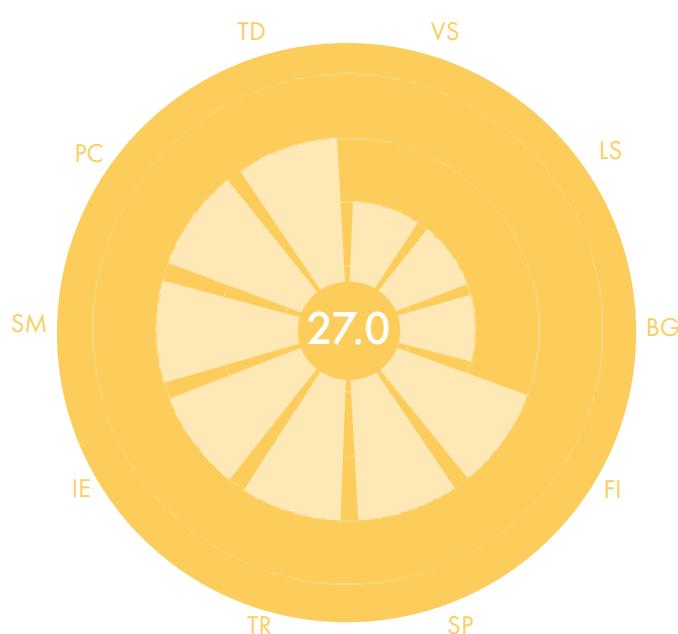
The City first took the lead in switching 1,000 of its city fleet to EVs and modifying its public procurement specifications. Next, the city government focused on developing a set of financial incentives to encourage consumers to purchase EVs, by imposing high taxes on combustion engine cars, including a 25 percent value-added tax and registration fees. EVs on the other hand were able to obtain free access on toll roads, free parking, and free access on ferries. Overall, the city government made it almost 50 percent more expensive to own combustion engine vehicles.

To ensure that there is adequate charging infrastructure for the EVs, the City started with highly visible locations where the need was largest, identified based on high density of EV ownership. The City also rolled

out a Climate and Environment fund to provide subsidies of up to 60 percent for private companies, institutions, and housing associations to build charging stations. Currently, charging is complimentary for all users, with an upcoming plan to introduce semi-fast charging stations as a paid service.

The city government is also installing wireless fast-charging solution for taxis in collaboration with the private sector, to allow taxis to make use of idle time to charge while they are waiting in queues to pick passengers up. This added convenience helps to reduce vehicle downtime and incentivise ownership.

Oslo's claim as the EV capital of the world is a result of its multi-prong approach that made EVs attractive for its residents, and provides an extensive network of accessible infrastructure to support its growth.



### Smart City Government Score

VS	VISION	2.0
LS	LEADERSHIP	2.0
BG	BUDGET	2.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	3.0

# 28 Bandung

*Realising a strategically-developed city vision*

Bandung, Indonesia's third most populous city, home to 2.5 million inhabitants, rose to global prominence under former Mayor Ridwan Kamil. Mayor Ridwan now serves as Governor of West Java – a testament to his successful leadership of Bandung city. As one of the four Southeast Asian cities plugged into the UNESCO Creative Cities Network, Bandung has been recognised for its young population, design prowess, as well as social and cultural capital.

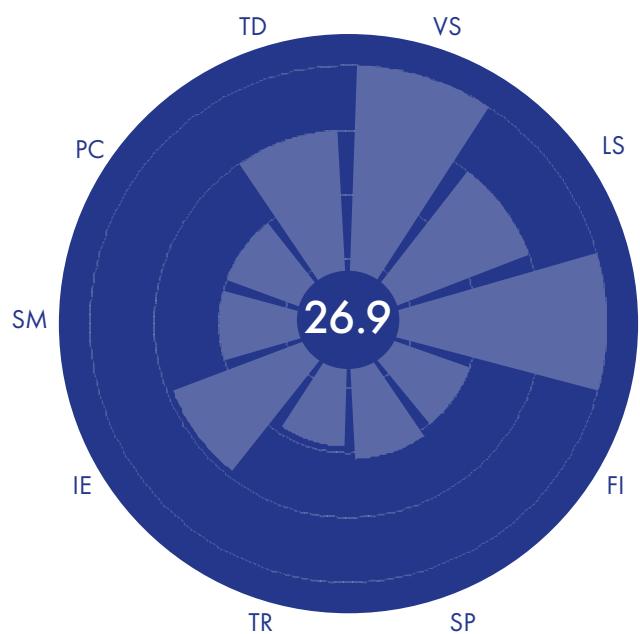
The city of Bandung put forward a bold vision to become a liveable and loveable smart city, rooted in creativity and the city's rich heritage. It embarked on its smart city transformation journey with an exceptionally detailed analysis of the city's existing strengths, baseline capabilities, and areas for improvement. These informed the specific smart city targets which the Bandung city government set surrounding the six key pillars of Smart Branding; Smart Governance; Smart Economy; Smart Living; Smart Environment; and Smart Society.

Bandung's Smart City Roadmap was uniquely designed around contextual factors such as technology and infrastructure readiness levels, allowing for a more targeted

approach towards city improvement.

This strategic approach has extended towards the city's financing of its many Smart City initiatives. Bandung's leadership adopted a creative approach to financing smart city projects and initiatives, utilising policy tools such as Mayoral Regulations to collect mandatory financial CSR contributions from companies operating in Bandung, which are then allocated to smart city projects. Bandung's 180 smart city activities are financed through CSR funds as well partnerships with companies such as national telecommunications company, Telkomsel, which partnered with the city government to operate the Bandung Tour on The Bus (BANDROS) service in alignment with Bandung's Smart Branding pillar. The installation of LED street lights and the Metro Capsule LRT project were both results of public-private partnerships with local firms.

Together, the city's creative financing approach, grounded in a detailed development plan have been central towards Bandung's success both nationally and globally.



## Smart City Government Score

VS	VISION	4.0
LS	LEADERSHIP	3.0
BG	BUDGET	4.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.1
TR	TALENT-READINESS	1.9
IE	INNOVATION ECOSYSTEM	2.9
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	2.0
TD	TRACK RECORD	3.0



Bandung's Smart City roadmap was thus uniquely designed around contextual factors such as technology and infrastructure readiness levels, allowing for a more targeted approach towards city improvement.

The city of Hangzhou has also undergone participatory governance reforms to improve its citizen engagement, enhancing the city's appeal and liveability for younger talents.



# Hangzhou

## *Attracting and engaging talent with a comprehensive support package*

Hangzhou prides itself as an innovation hub which creates high-quality jobs for its talent. It is on par with the first-tier Chinese cities based on average annual income for highly-skilled talent. The city has a wide range of talent-related policies including the 5050 plan for Binjiang District, the 100-person plan for Jiangan District, the Hai Chuang Yuan plan for Yuhang District, 325 for West Lake District, Thousand Talents Plan, and the National Thousand Talents Plan for various areas within the city.

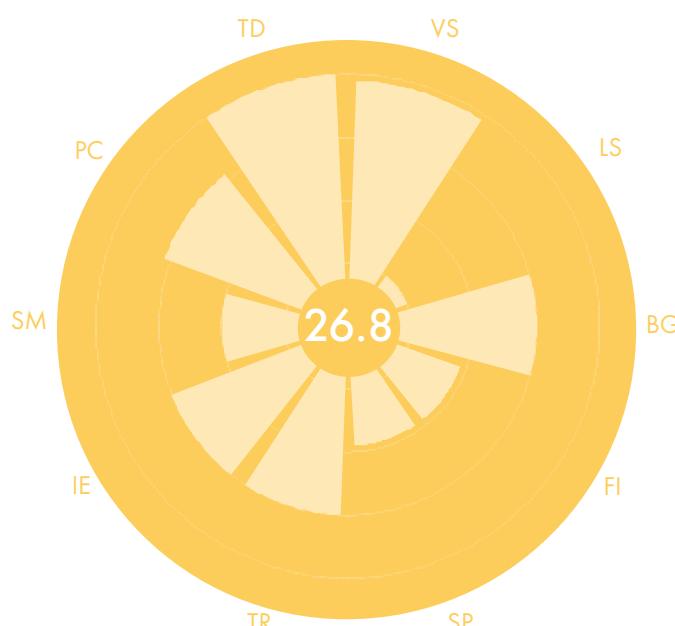
More specifically, Hangzhou's Talent Policy Package provides undergraduates with one-time subsidies of up to 50,000 yuan annually to purchase a home, in addition to offering 50,000 special rental housing units catered to undergraduates identified in the city's talent identification programme. Hangzhou will also launch a 'talent e-card' which integrates services including accessing financial subsidies and grants, children's education, healthcare, sports and leisure, and transportation.

To encourage young talent to innovate, the city government is also piloting a 'start-up' insurance scheme

in collaboration with two local insurance companies, which allows young entrepreneurs to write off their development costs and obtain a living stipend while working on their start-up.

The city has also introduced participatory governance reforms to improve its citizen engagement, enhancing the city's appeal and liveability for younger talents. The Hangzhou government's performance review now includes a social assessment to evaluate and appraise its citizen engagement and interaction efforts as well as their effectiveness.

This is in addition to Hangzhou's existing platforms which allow citizens to write complaints, suggestions, opinions, and provide feedback which are taken into consideration to refine policy priorities. The city government's efforts have also been recognised at the national level with the Innovations and Excellence in Chinese Local Governance award at the national level.



### Smart City Government Score

VS	VISION	3.9
LS	LEADERSHIP	1.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	1.9
SP	SUPPORT PROGRAMMES	1.9
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	3.1
TD	TRACK RECORD	4.0

# 30 Busan

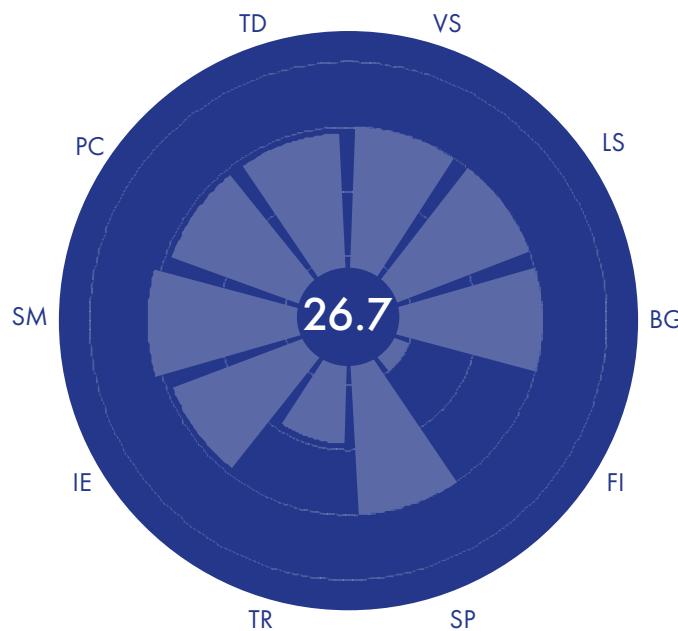
*An IoT (Internet-of-Things) hub to improve quality of life*

Ranked worldwide as the sixth super port city, it is no surprise that Busan has ambitions to establish itself as a smart city leader with applications of IoT to its logistics and port systems, and improve the quality of life for its citizens. This includes building an IoT-based logistics centre and using IoT sensors on shipping containers to allow for real-time monitoring of information such as location and internal temperature levels. The use of IoT aims to reduce distribution costs, as well as improve service quality for its customers.

Besides its port, Busan also set up the Haeundae Smart City Testbed Project in 2015 to provide software development facilities and an operation centre. This allows SMEs and start-ups to develop, test, and market their products and services, while fostering a wide network of relationships with IoT experts. Some notable examples include an IoT-based public service which connects CCTV footage to an open IoT platform monitored by city staff, providing smart-phone alerts to ensure children and senior citizens' safety; smart parking systems linking lot availability information with navigation, monitoring, and parking

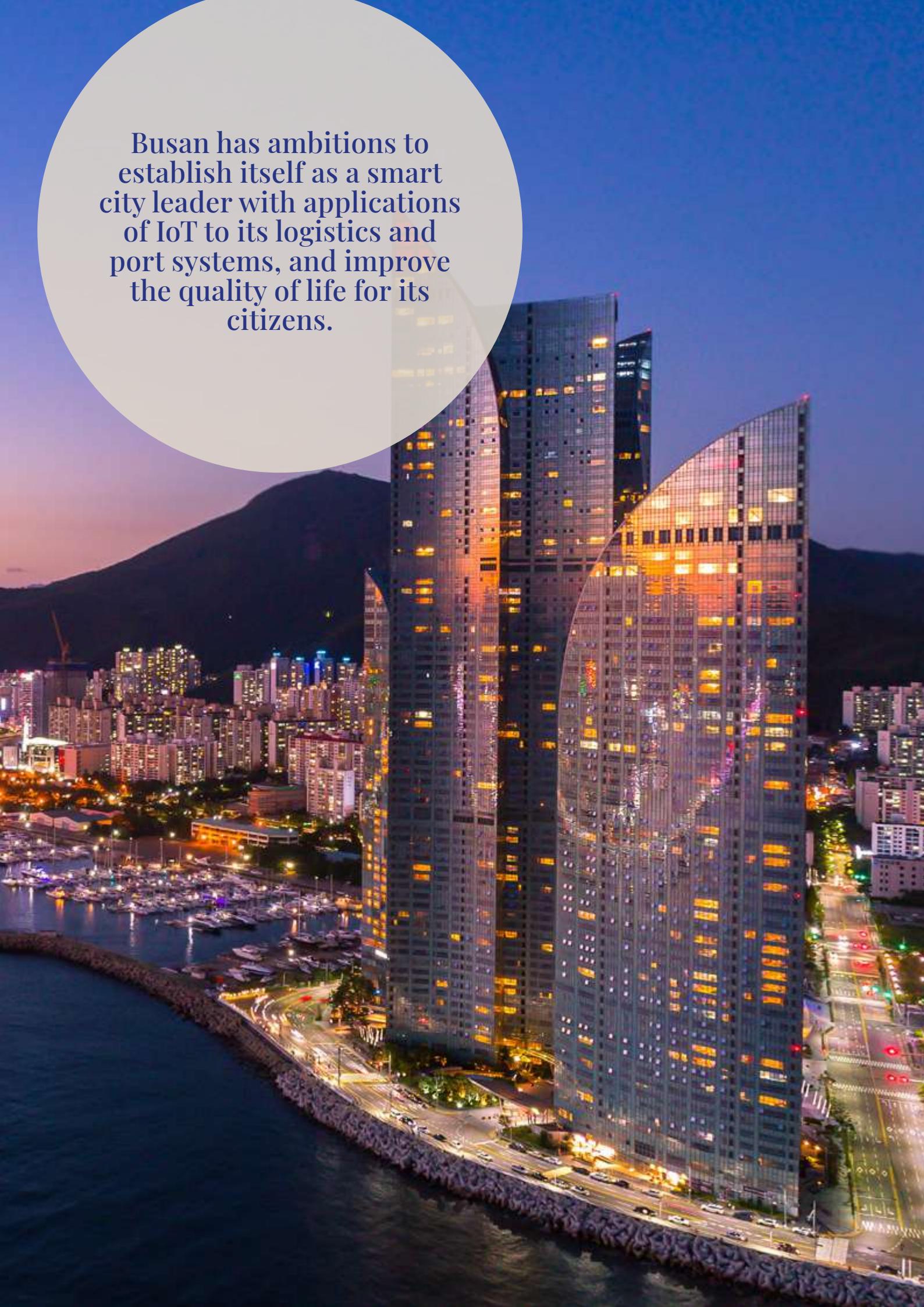
payments; as well as a 3D-based monitoring system of city data.

In addition, the national government has also designated Busan Eco Delta City as a key smart city development for 2024. A combination of big data, IoT, Artificial Intelligence, and robots will be utilised to improve the quality of resident's lives. For example, smart water management systems and zero-energy homes will be introduced, together with a platform that combines artificial intelligence and IoT to increase the performance of connected devices in homes. Residential data will also be linked to external services such as healthcare, home security, and energy saving. It is estimated that these initiatives can help to save Busan residents 124 hours a year by 2022, reduce urban crime rate by 25 percent, and traffic accidents by 50 percent.

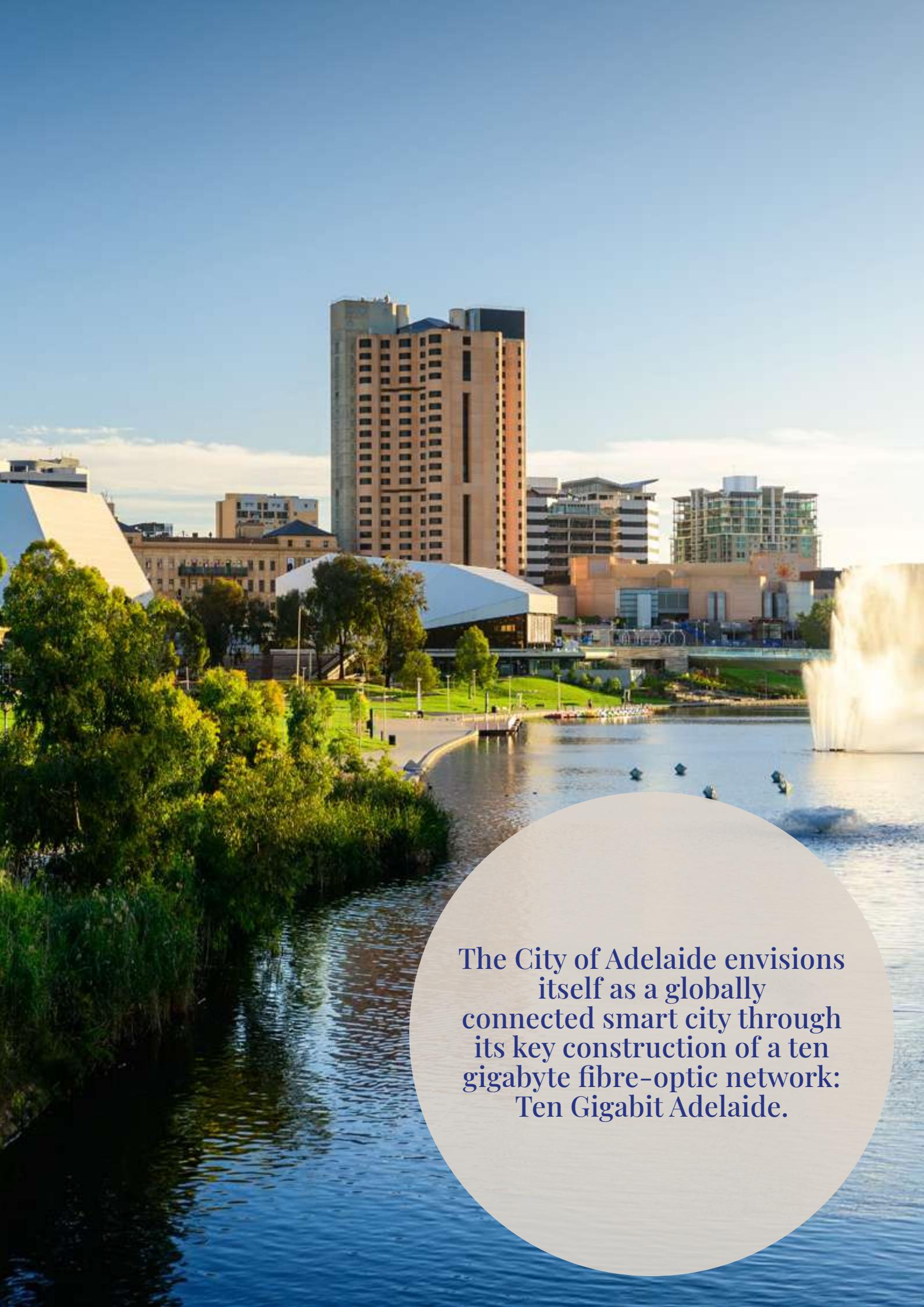


## Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	1.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	1.9
IE	INNOVATION ECOSYSTEM	2.9
SM	SMART POLICIES	3.1
PC	PEOPLE-CENTRICITY	2.9
TD	TRACK RECORD	2.9

The background image shows a panoramic view of the Busan skyline at dusk or night. In the foreground, a large, modern skyscraper with a glass facade and a distinctive triangular top is brightly lit, reflecting the surrounding city lights. To its left, a marina filled with many small boats and yachts is visible. Further back, a dense cluster of buildings, including more skyscrapers and lower residential or office buildings, stretches across the horizon under a darkening sky.

Busan has ambitions to establish itself as a smart city leader with applications of IoT to its logistics and port systems, and improve the quality of life for its citizens.



The City of Adelaide envisions  
itself as a globally  
connected smart city through  
its key construction of a ten  
gigabyte fibre-optic network:  
Ten Gigabit Adelaide.

# 31 Adelaide

## *Digital connectivity with a ten gigabyte fibre-optic network*

The City of Adelaide aspires to become the most liveable city in the world, as articulated in its 2020-2024 strategic plan. One of its key initiatives thus far has been the construction of a USD 1 mn ten gigabyte fibre-optic network called Ten Gigabit Adelaide, to boost digital connectivity and growth for its businesses.

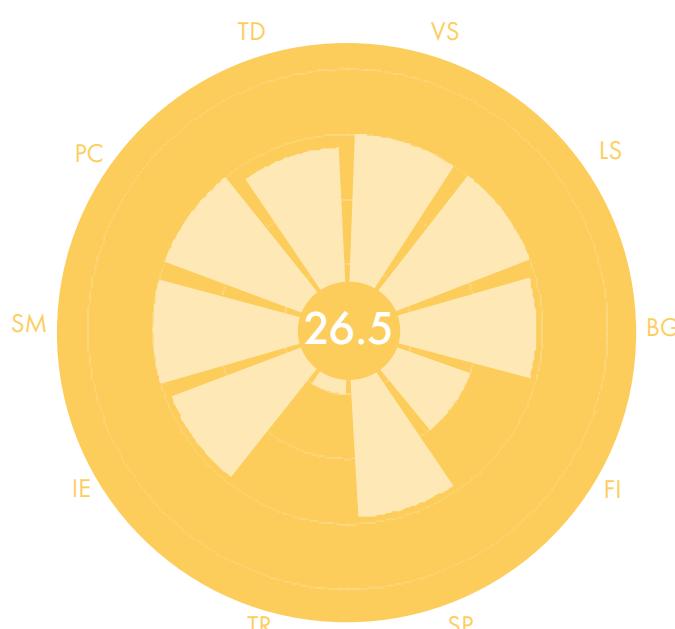
In 2020, the city rolled out the network successfully, and has reached its goal of connecting 1,000 buildings to the network – expanding a whole range of possibilities for organisations in Adelaide. Industries such as healthcare, advanced manufacturing, finance, cybersecurity, defence and film would all benefit and can expand their offerings to export to international markets.

For instance, a philanthropic venture called the Light Cultural Foundation can now tap into this ultra-high speed data transmission to support their live online performances with world-class audio-visual technology. The Australian Institute of Business (AIB) has also benefited as the network can support higher quality interactive online learning experiences for its students

in Australia and globally. Other advanced technologies for 3D and holographic capabilities can also be better supported with the network.

In the project's second phase, the city government will be looking at how it can extract a return-on-investment by bundling additional services with base connectivity access, or offering cloud and software-as-a-service products. The city government will also explore more ways to expand the potential applications of this network for its own city council.

The network provides a strong foundation and generates momentum as the city works towards implementing the Adelaide City Deal released in 2019, a USD 649 mn agreement with the Australian and South Australian Government to transform the city into a leading innovation hub. It includes projects such as the construction of an Aboriginal Entrepreneur Hub, a new state-of-the-art Mission Control Centre, and the opening of the Australian Space Agency Headquarters.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	2.9
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.9
TR	TALENT-READINESS	1.0
IE	INNOVATION ECOSYSTEM	2.9
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	2.8

# 32

# Boston

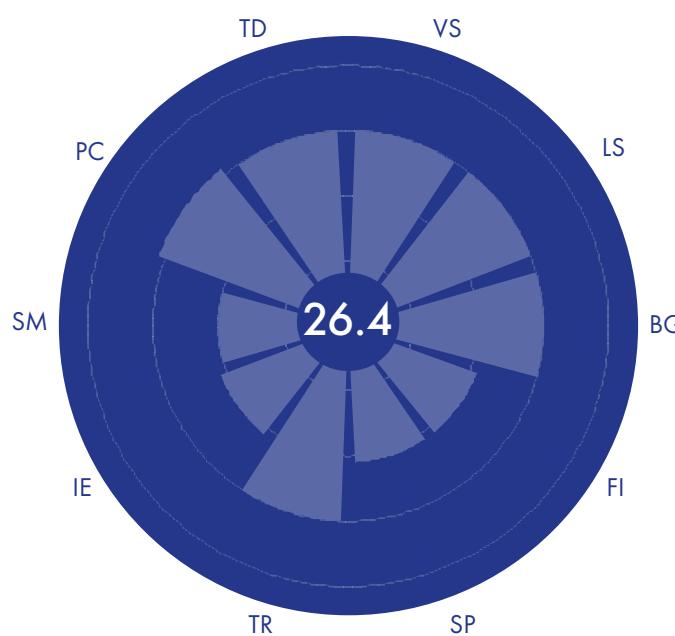
*Making streets safer & smarter*

The city of Boston utilises technology and data to create smart streets, with the aim of improving road safety and design as part of its global Vision Zero initiative. The City's action plan up to 2030 involves redesigning streets that lower vehicle speeds, making streets more accessible to its users, and combating distracted or impaired driving.

The City launched a pilot program using a combination of video cameras, LED lights, sensors under roads, and a web-based platform to analyse, visualise, and report data. This combination of technology allows the City to collect data on the movement of vehicles and cyclists, behaviours at major road intersections, pedestrian crossings at intersections, in addition to interactions among vehicles, cyclists, and pedestrians. Its Vision Zero Boston Safety Concerns Map, an online mapping tool, allows residents to highlight areas where they may have concerns surrounding safety, such as speeding incidents, areas with potential for sidewalks or bicycle facilities, and parking issues.

The City has also begun its program to test autonomous driving technologies on the streets, as autonomous vehicles are estimated to eliminate up to 90 percent of vehicle crashes. More importantly, autonomous vehicles have the potential to enhance physical mobility for the elderly, those with visual impairments, as well as those without access to public transportation.

Besides making streets safer, the City is also looking for smarter ways to allocate resources more efficiently to run its streets. Boston's Transportation Department partnered with New Urban Mechanics to explore and introduce new mobility initiatives such as installing electric-vehicle charging stations in municipal parking lots, and monitoring ongoing pick-up and drop-off zones for ride sharing companies to minimise overcrowding and congestion, in addition to expanding their car-sharing program.

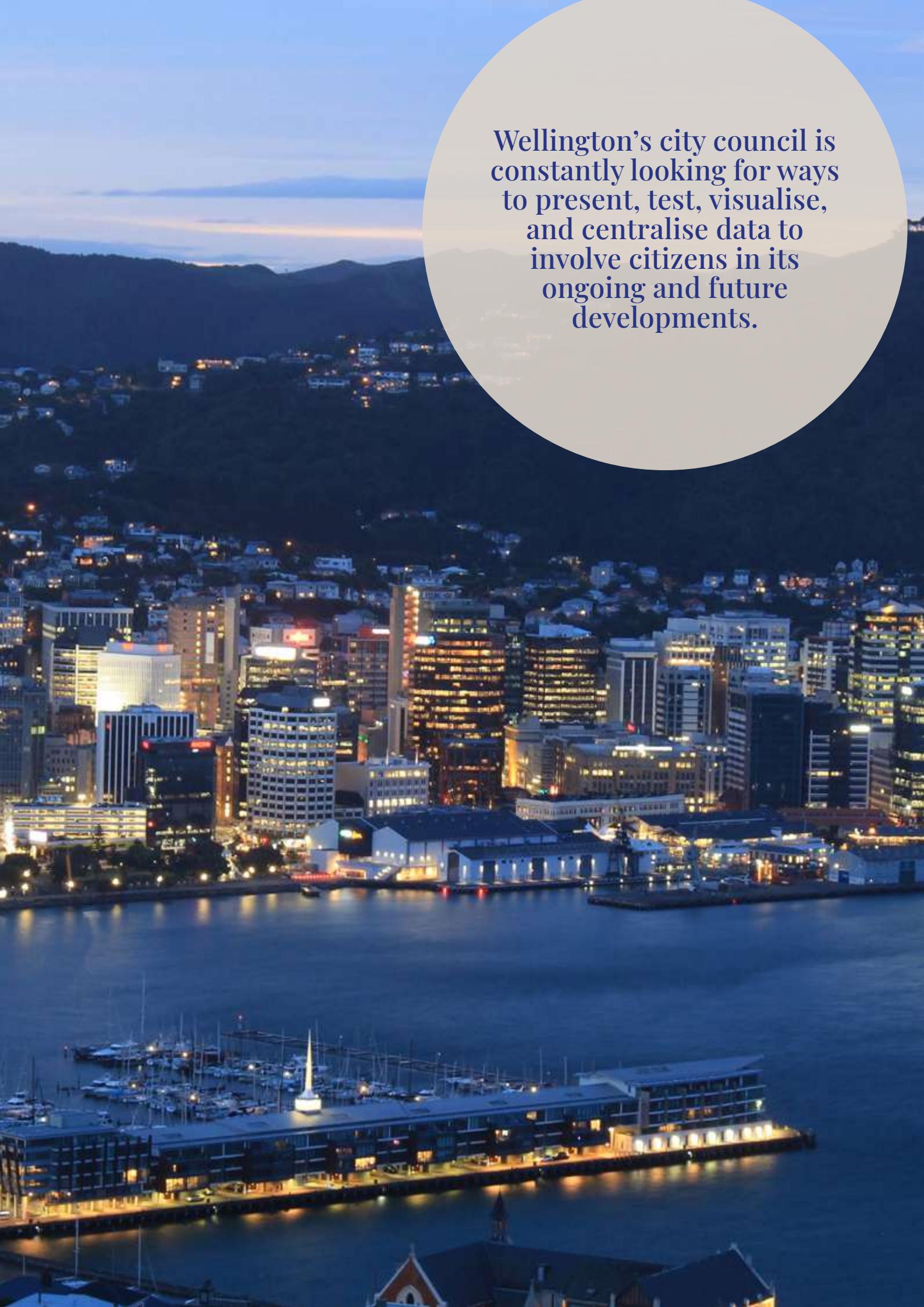


## Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	2.1
SP	SUPPORT PROGRAMMES	2.1
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	2.1
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	3.1
TD	TRACK RECORD	3.0

The background image shows a panoramic aerial view of a city skyline during sunset or sunrise. The sky is filled with warm, pastel-colored clouds. In the foreground, there's a large, semi-transparent white circle containing the text. The city features numerous skyscrapers of various heights and architectural styles, some with illuminated windows. A prominent curved building, possibly a hotel or residential tower, is visible on the right. To the left, a park area with green lawns and trees is partially visible. The overall atmosphere is vibrant and urban.

The City's action plan up to 2030 involves redesigning streets that lower vehicle speeds, making streets more accessible to its users, and combating distracted or impaired driving.

A wide-angle aerial photograph of Wellington, New Zealand, at dusk. The city's central business district is brightly lit with numerous skyscrapers and office buildings. In the foreground, the waterfront features a marina filled with sailboats and a long pier extending into the water. The background shows the city's hilly terrain, with lights from residential areas and streets visible on the slopes. The sky is a soft blue and orange, indicating the transition from day to night.

Wellington's city council is constantly looking for ways to present, test, visualise, and centralise data to involve citizens in its ongoing and future developments.

# Wellington

*Making data accessible, useful, and understandable in civic engagement*

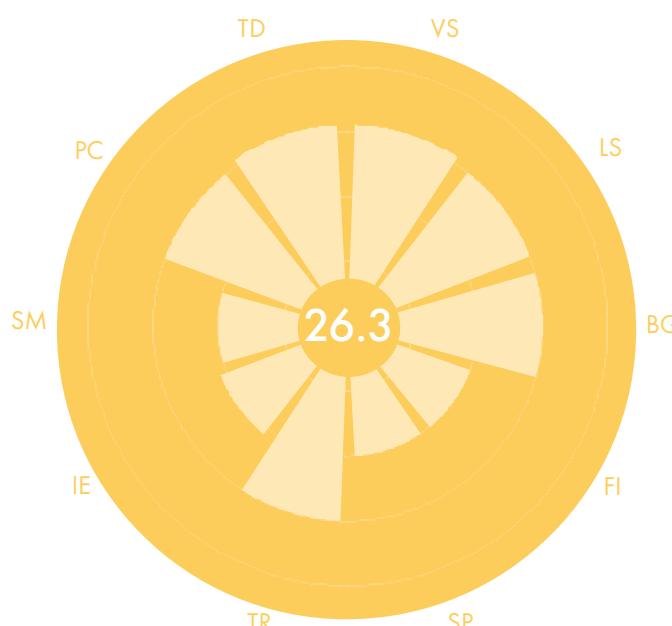
Wellington's goals include becoming people-centred, connected, eco-friendly, and dynamic. These were formed from conversations with its residents to understand their vision and aspirations for the city. In alignment with these stated goals, the City's imperative is to keep its residents informed, engaged, and empowered about what is going on in the city and what lies ahead in the future.

To meet this citywide objective, the City developed a Virtual Reality version of the city, using augmented reality techniques to immerse citizens in a 3D city experience which allows them to interact directly with city data. The model covers the entire Wellington city, including the buildings, trees, roads, and other physical features in the city's environment. Users are also able to access data, city proposals, as well as the city's future scenarios and hazard simulations in an engaging and informative way.

When Wellington released its Resilience Strategy in 2017, it also developed an online information hub to offer citizens a centralised platform where they can access city data about post-earthquake building in-

spections, hazards such as sea level rise, tsunami, tremors, as well as volunteering, social support, funding, and shared community resources. These different types of information are retrieved from open-source data as well as real-time sensors placed throughout the city.

Furthermore, the City has secured funding from the national government to run pilot programmes which aim to develop neighbourhoods and streets that are safer and healthier. Wellington will be using place-making pop-up events and pilots, to co-design and gather continuous feedback from communities in a low-cost and iterative manner. The city council is constantly looking for ways to present, test, visualise, and centralise data to involve citizens in its ongoing and future developments.



## Smart City Government Score

VS	VISION	3.1
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	2.1
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	3.1

# 34 Dubai

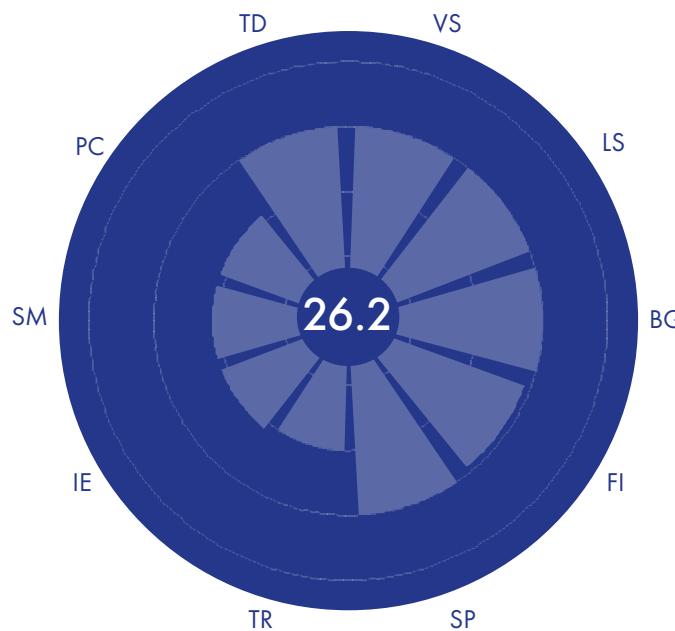
## *Citizen happiness as a key success indicator*

Happiness is a defining characteristic of Dubai's smart city strategy, such that the first Minister of State for Happiness was created, with over 60 Happiness CEOs across various government departments, as champions to educate and align the entire government. This was part of the Happiness Agenda launched in 2015, which was developed with a unique and scientific methodology to measure its residents' happiness and its impact. For its most recent Smart Dubai 2021 strategy, the Smart Dubai Office instituted the Office of Smart City Impact Management to define its transformational key performance indicators and targets, as well as develop the standards and systems required for implementation.

The city government has set up over 4,000 interactive touchpoints called Happiness Meters around Dubai to measure people's happiness. This collected over 22 million responses, allowing citizens to rank their satisfaction with everyday services and eventually feed data into a Happiness Index. The city government aims to reach a Happiness Index level of 95 percent by 2021.

As such, its smart city efforts are all aligned to create a seamless and efficient experience for its citizens, such as a DubaiNow app for citizens to consolidate bill and fine payments, as well as access to 55 other city services. The Smart Nol Card allows citizens to pay across all transportation modes with a unified rechargeable platform. A 'Dubai Pulse' platform was also developed to host and centralise the city's data from both the public and private sectors.

To further these existing efforts, the city government has plans to tap into artificial intelligence to better utilise data, and to run government transactions on blockchain, eliminating third-party transaction costs and ultimately achieving 100 percent digitisation.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	2.9
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	2.0
IE	INNOVATION ECOSYSTEM	2.1
SM	SMART POLICIES	2.1
PC	PEOPLE-CENTRICITY	2.1
TD	TRACK RECORD	3.0



The city government has set up over 4,000 interactive touchpoints called the Happiness Meters around Dubai to measure people's happiness.



Copenhagen has proven that economic growth can be decoupled from environmental impact, achieving a 42 percent reduction in carbon emissions while growing its economy by 25 percent.

# Copenhagen

*Learning from a full-scale smart energy laboratory*

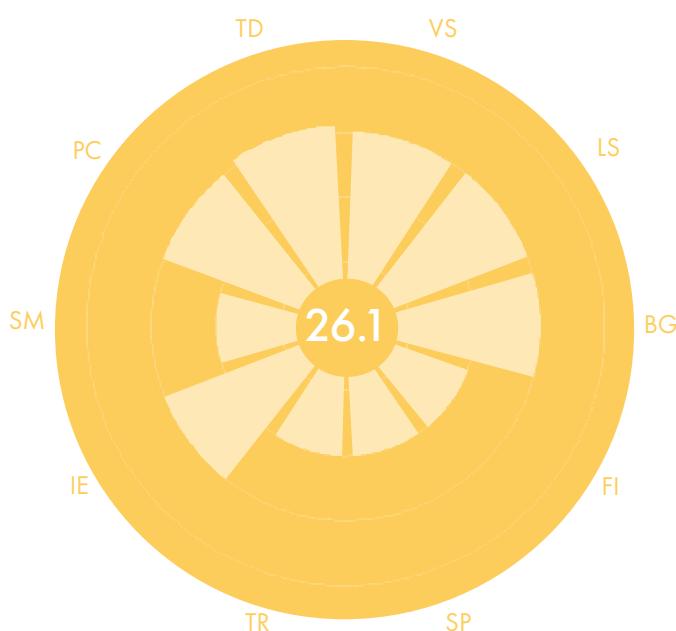
With its 2025 carbon neutral target, Copenhagen has demonstrated to the world that it is indeed possible to cut down carbon emissions and yet continue to enjoy economic prosperity. The city has achieved this with a 42 percent reduction in carbon emissions since 2005, while experiencing a 25 percent growth of its economy. The Danish capital invests heavily in research and development to develop leadership in low-carbon technologies and to power its local green economy.

The city's EnergyLab Nordhavn represents one of its boldest endeavours to look beyond the traditional smart grid, and into the possibility of a fully integrated smart energy system. This five-year project was launched in 2014 and brings together academia, the city government, private companies, and the Danish national government. It is designed as a full-scale smart energy laboratory with district heating and smart-grid integration.

The lab demonstrates how electricity, heat, energy-efficient buildings, and electric vehicles can be integrated into a single energy system. The facility

even boasts a data warehouse that allows real-time sharing of data about energy consumption among residents and businesses, as well as data-driven consumer profiling to improve its operations and planning.

The project has helped the Copenhagen city government to better understand the ways in which it can scale energy-related initiatives to other districts within the city, and to identify the key success factors when rolling out such initiatives. Some of the findings include the need to reform energy taxes to internalise climate impacts, tap into buildings' energy storage potential, and continually collaborate with energy suppliers to access data. There were also new business models discovered such as peer-to-peer energy exchange among energy communities comprising proactive consumers, and other models to strengthen collaboration for technology implementation.



## Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	2.0
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	3.1

# Guangzhou

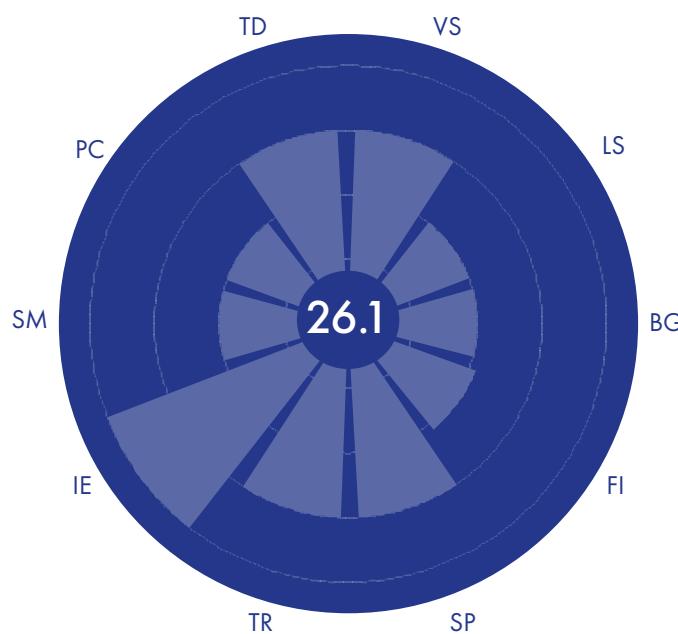
*A strong manufacturing base demonstrating Made in China 2025*

With Guangzhou's strong manufacturing base, the city was designated as one of the demonstration cities for the Made in China 2025 masterplan, a national initiative to upgrade Chinese manufacturing using Industry 4.0 technologies. This drove Guangzhou's municipal government to prioritise eight industries, including intelligent equipment and robotics; next-generation information technology; biomedicine and healthcare; smart and new-energy vehicles; new materials; new energy; urban consumer industries and producer services. The municipal government also committed to launch a Made in China 2025 Industrial Development Fund, which supports research in the Information technology, Artificial intelligence, and Biological medicine (or IAB) industries.

Major investments have poured into the city, such as the Foxconn project and the Cisco Smart City project. The Foxconn project for instance, involved a USD 9 bn production facility that will produce 10.5-generation LCD panels, substrate glass, and other product lines, and will be the most advanced 8k-resolution factory globally. These technologies will be a key component in high-end television displays, medical

treatment, traffic control, as well as smart homes.

The Sino-Singapore Guangzhou Knowledge City based in Guangzhou was another key development which has also strengthened the city's position as a high-tech hub. To date, the Knowledge City has introduced about 165 large-scale investment projects into the area, and houses some of the largest global firms including General Electric, Siemens, P&G, and Alibaba. P&G for example, has plans to invest over USD 100 mn over three years to integrate its digital technology research, Big Data, digital supply chain, and other research projects under the China Digital Innovation Centre set up in the Knowledge City. It is also estimated that more than 600,000 skilled technology workers currently work and live there.



## Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	2.0
BG	BUDGET	2.0
FI	FINANCIAL INCENTIVES	2.1
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	4.0
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	2.0
TD	TRACK RECORD	3.0

Guangzhou was designated as one of the demonstration cities for the Made in China 2025 masterplan, a national initiative to upgrade the Chinese manufacturing using Industry 4.0 technologies.



A photograph of the Seattle skyline at sunset. The Space Needle is the central focus, standing tall against a sky transitioning from blue to orange. In the foreground, there are some green trees and the tops of other buildings. A large, semi-transparent circular graphic is positioned in the upper right corner of the image.

One of Seattle's most pressing challenges is homelessness, with 12,000 homeless people left on the streets.

# Seattle

## *Tackling homelessness through technology and data*

Seattle established its Innovation Advisory Council in 2018, headed by the city mayor. Its aims were to provide a platform to initiate collaborations with the innovation community including big technology players, startups, and non-profits, to build solutions which will improve residents' lives.

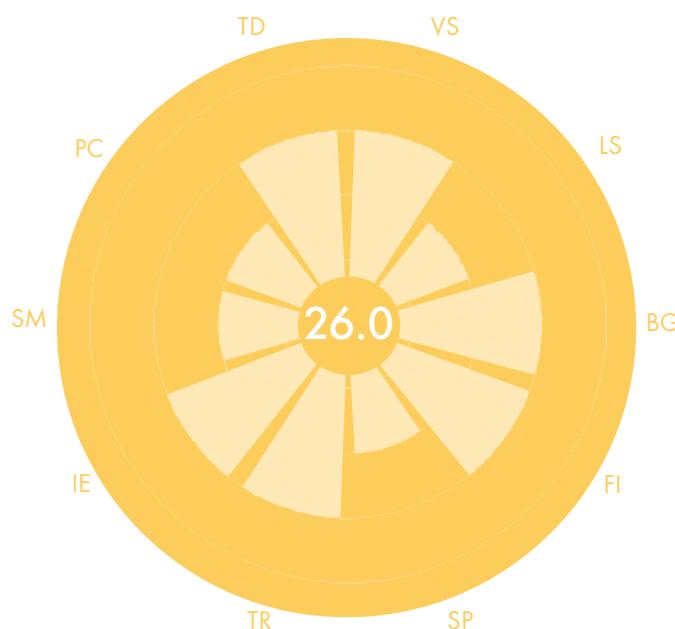
One of the city's most pressing challenges is homelessness, and Seattle has one of the largest homeless populations in the United States. The City spends USD 90 mn annually to address the problem, yet 12,000 homeless people continue to remain on the streets. As such, the City has launched key technology-based initiatives to resolve this complex issue.

With the help of technology partners from the Innovation Advisory Council, the department is now working closely with Amazon, Tableau, and the University of Washington Information School to develop a data modelling solution which will automate the manual process of reporting on investments, budgets, and outcomes related to tackling homelessness, so that the data can be easily analysed thereafter.

The solution will also include a front-end interface for staff to update changes in real-time and be able to connect to other external data sources.

Together with Microsoft and several other city departments, the city's Human Services team also embarked on developing an application which will help its outreach workers to connect the homeless to housing and other essential resources. This requires the integration of data from other systems and departments to allow for more efficient and timely reporting on their efforts.

Moreover, an Affordability Portal will also be set up to centralise information on city programmes such as financial assistance to support living costs for the underprivileged. Deployed together with the other initiatives, residents can expect to see an increase in accessibility and service delivery efficiency in Seattle.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	2.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	2.0
TD	TRACK RECORD	3.0

# 38

# Frankfurt

## *Catalysing citizen behaviour change to accelerate energy transition*

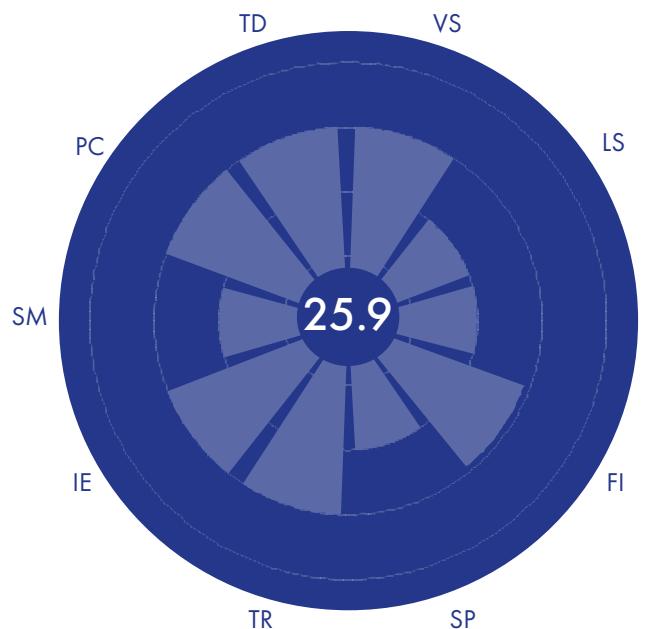
Frankfurt first embarked on its journey to reduce carbon emissions in its city in 2013, with the objective of cutting energy use by half and only using renewable sources of energy by 2050.

Frankfurt first undertook a participatory process to develop its masterplan, where different working groups were set up, each consisting of regional experts specialising in topics including buildings, mobility, education, economy, and supply chain. A total of 100 institutions and 150 experts across the fields of architecture, urban planning, business consultancy, and engineering were involved in the process to set the targets and design a roadmap to achieve them. Moreover, the city also engaged with citizens via a citizen dialogue platform to ensure that their feedback was taken into consideration.

Beyond gaining citizen buy-in from the start, the city has also rolled out incentives and programmes to change citizen behaviour. For instance, Frankfurt rewards electricity savings with a cash bonus. Citizens who are able to reduce their electricity consumption by ten percent annually are eligible

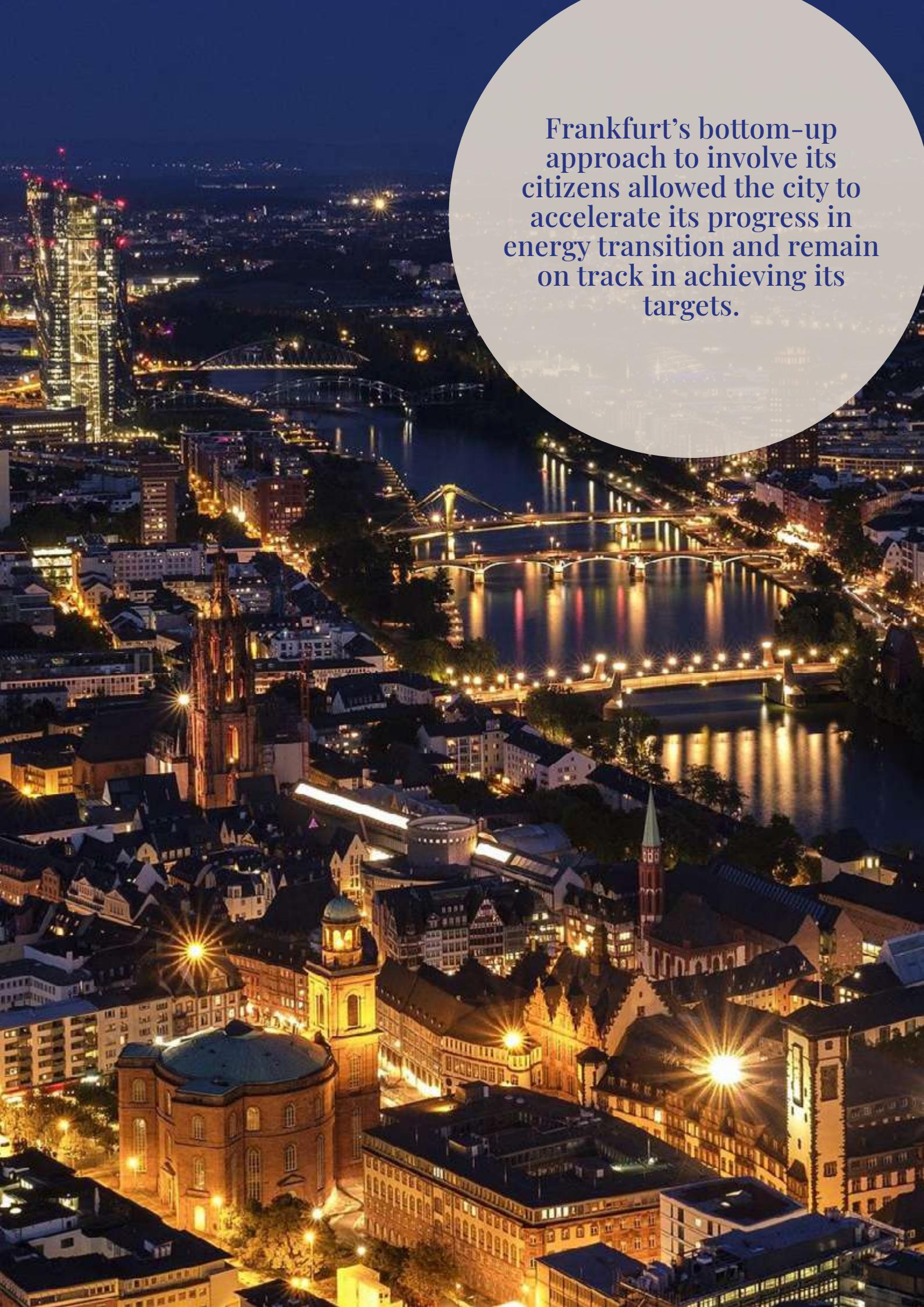
to receive a bonus of USD 24, as well as an additional 10 cents for every kilowatt-hour saved. Aside from incentives, the city government also invests in educating its citizens through its "Learn Sustainability in Frankfurt" network which initiates projects including educational programmes for school children, who are later encouraged to start their own sustainability projects that benefit the city. This works in tandem with Frankfurt's broader aim of integrating climate protection and energy topics into the school curriculum. The city government also developed a Climate Savings Book for the wider public, which provides citizens with energy savings tips for various aspects of life, reducing the use of private transport or supporting local organic produce.

Frankfurt's heavy emphasis on a bottom-up approach to involve its citizens allowed the city to accelerate its energy transition and remain on track in achieving its targets.

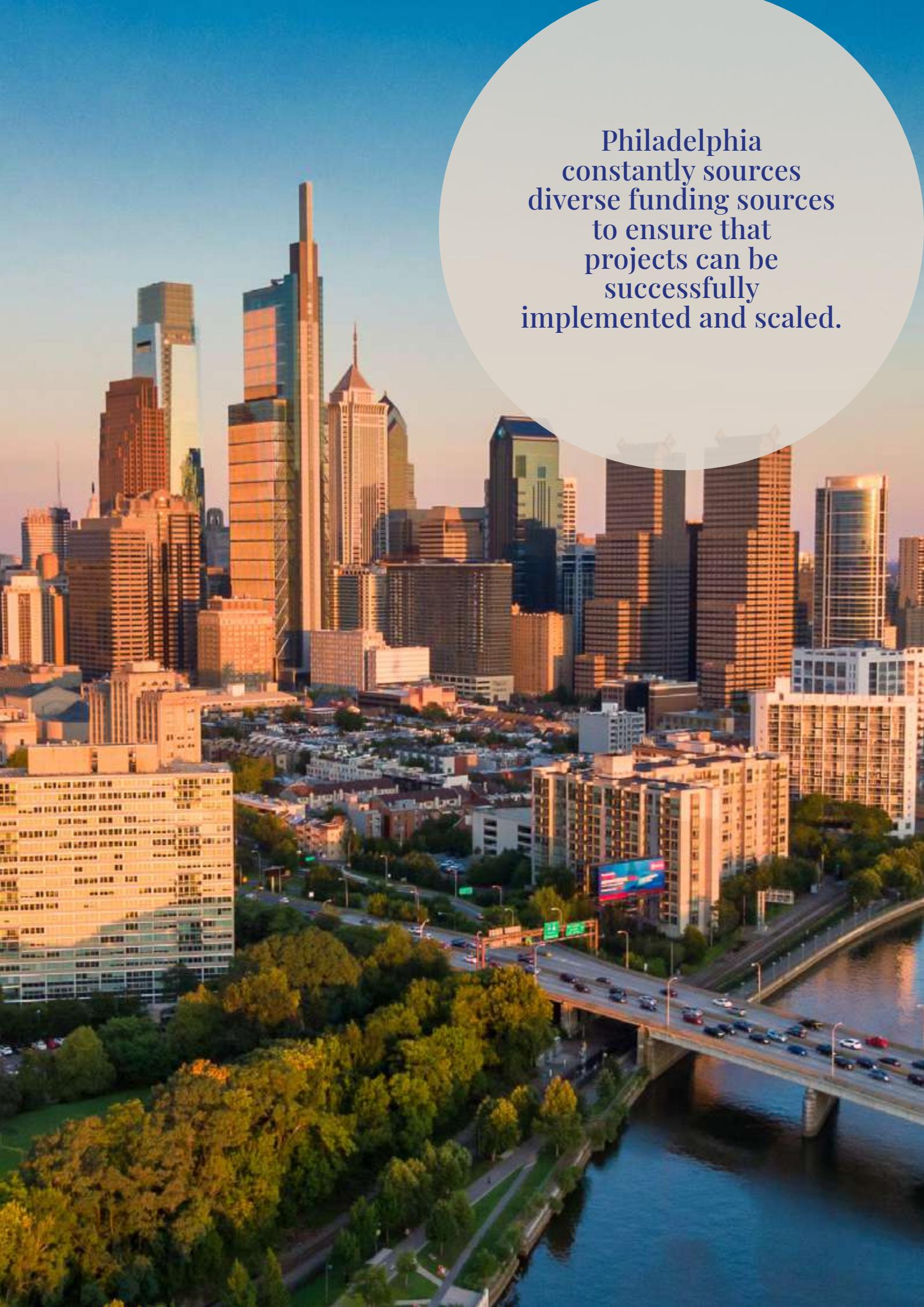


### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	2.0
BG	BUDGET	2.0
FI	FINANCIAL INCENTIVES	2.9
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	3.0

A wide-angle aerial photograph of Frankfurt am Main at night. The city is illuminated by numerous streetlights and building facades, creating a warm glow against the dark sky. The River Main flows through the center of the city, with several bridges of different types spanning it. In the foreground, the dome of the Paulskirche and the towers of the Marienkirche are clearly visible. The background shows the dense urban sprawl of the city stretching into the distance.

Frankfurt's bottom-up approach to involve its citizens allowed the city to accelerate its progress in energy transition and remain on track in achieving its targets.



Philadelphia  
constantly sources  
diverse funding sources  
to ensure that  
projects can be  
successfully  
implemented and scaled.

# Philadelphia

## *Diverse funding sources to support & sustain smart city initiatives*

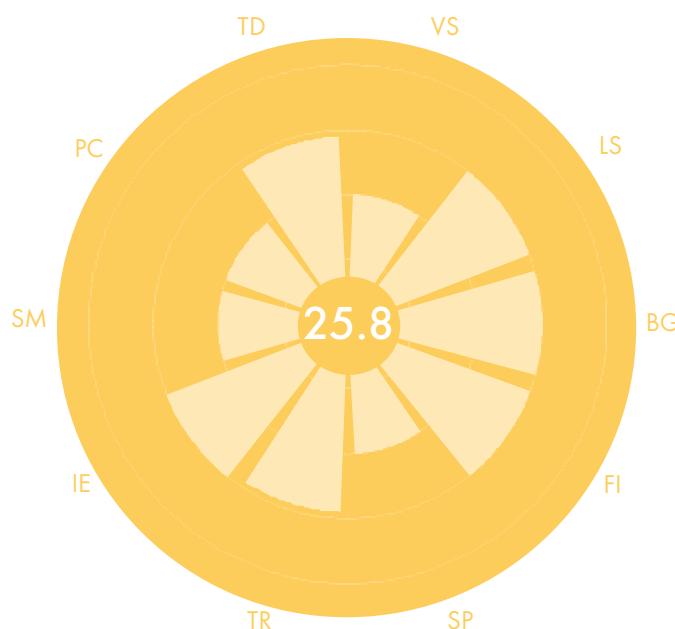
Philadelphia launched its Smart City Roadmap 'SmartCityPHL' in 2017, outlining three key strategies to achieve its vision for the city. These three strategies include 1) Building a strong foundation with policy and infrastructure; 2) Creating a process for engagement and partnership; and 3) Supporting and sustaining implementation of projects and programmes with funding.

The city government does not have a specific budget attached to each smart city project, as smart city projects are often cross-functional and therefore require funding from diverse sources. As such, the city government prioritises the diversification of funding and constantly sources diverse funding sources to ensure that projects can be successfully implemented and scaled.

Aside from traditional sources of public funding from the city government, state, and federal agencies, the Philadelphia city government explores public-private partnerships to finance smart city projects. One such private source of funding is from public-private partnerships. This can take the form of a franchise

agreement, such as the city's high-speed institutional network (I-NET), or revenue generation models for private companies such as advertisements on city infrastructure. The city has also explored the use of vendor financing and credits as financing mechanisms, where private partners provide the city government with credits to access and utilise various services and product offerings.

The city government has also tapped into performance contracts and asset leasing to increase their pool of smart city funding. For instance, the city government entered into performance contracts with energy service companies to reduce energy consumption at various public buildings including the Philadelphia Museum of Art, correctional facilities, as well as police and fire stations, allowing the city government to use annual utility and operations savings to support repayment. The city government has set up a Master Lease Agreement programme to lease spaces for companies to install 5G hardware, to support its upcoming city-wide 5G rollout.



### Smart City Government Score

VS	VISION	2.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	3.0
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	2.9
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	2.0
TD	TRACK RECORD	2.9
VS	VISION	2.0

40

# Los Angeles

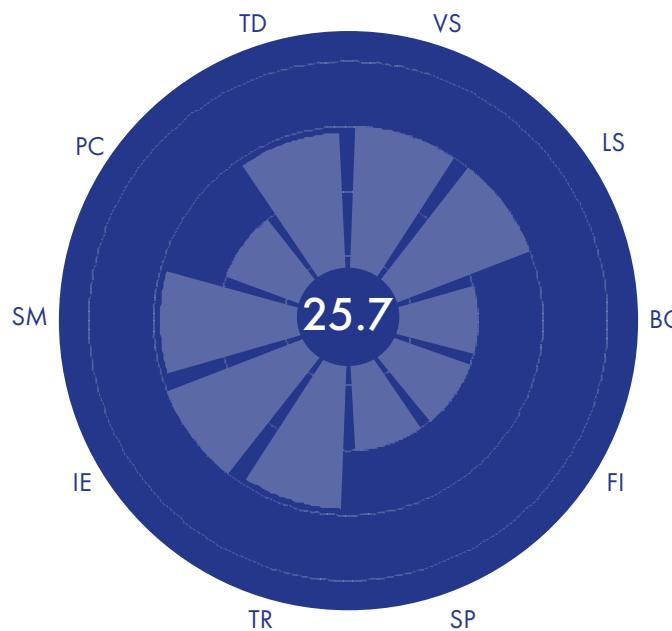
*Public-private partnerships to steer innovation*

The City of Los Angeles establishes public-private partnerships with major private sector players in order to catalyse its smart city initiatives. Its smart street lighting platform, developed in partnership with Royal Philips, forms the foundation of the city's smart city transformation. The Los Angeles Bureau of Street Lighting has converted all 223,000 of its street lights to LEDs, and more than 400 of these lights are now equipped with electric vehicle charging. This has allowed the city to save a total of USD 11 mn in electricity costs. The City has plans to provide Wi-Fi and monitor air quality by leveraging on the street lighting infrastructure. In fact, the funding for the streetlights is generated by leasing out wireless technology in the lighting poles to Internet service providers.

In 2019, the City launched Urban Movement Labs, a public-private partnership platform to drive mobility innovation. Its key founding organisations include the Los Angeles Department of Transportation (LADOT), the Port of Los Angeles, Lyft, Verizon, Waymo, and the Mayor's Office of Economic Development. The Urban Movement Labs will include an Ideas Accelerator to develop solutions, an Economic and Work-

force Development Initiative to support businesses and high quality jobs in the sector, and an Urban Proving Grounds initiative to test solutions.

Other partnerships have also contributed positively to the City's use of technologies to collect and analyse data. The City of Los Angeles, AT&T, the Annenberg Foundation, and the US Geological Survey collaborated on an earthquake warning project which broadcasts alerts through a mobile application, called the ShakeAlertLA. This is based on seismic activity data collected from sensors located along geological faults. As part of its plans to boost environmental awareness, the City also worked together with Google and Caltech in an Internet of Trees project, tapping into machine learning algorithms to identify and count the trees in the city, helping city officials to better understand, manage, plan, and further expand its forest inventory.



## Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	2.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	2.9
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	2.9
PC	PEOPLE-CENTRICITY	2.0
TD	TRACK RECORD	2.9



The City of Los Angeles establishes public-private partnerships with major private sector players in order to catalyse its smart city initiatives.



To work towards building a thriving smart city, the Hong Kong government has committed USD 12.9 bn to I&T policy initiatives, as well as continual investment in innovation infrastructure.



# Hong Kong

*Leveraging innovation & technology to solve its urban challenges*

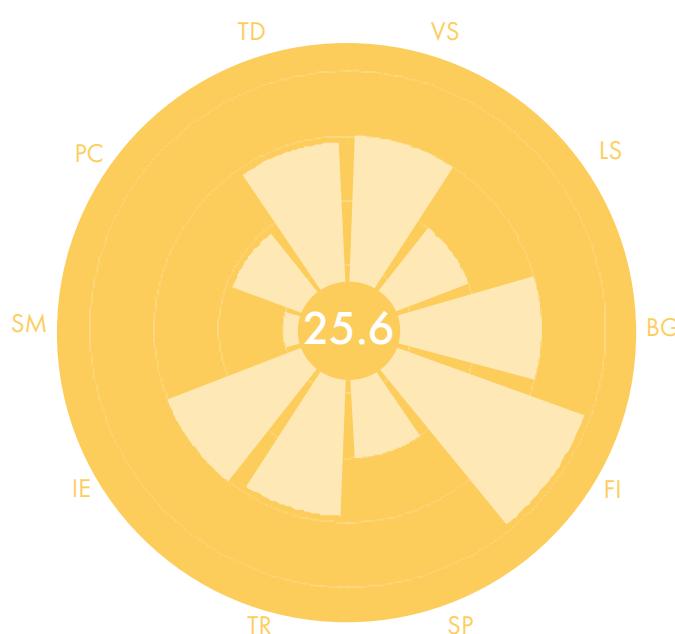
Hong Kong's Smart City Blueprint leverages innovation and technology (I&T) to solve its urban challenges, addressing the broad themes of Smart Mobility, Smart Living, Smart People, Smart Environment, Smart Economy, and Smart Government.

To work towards building a thriving smart city, the Hong Kong government has committed USD 12.9 bn to I&T policy initiatives, as well as continual investment in innovation infrastructure. The government has allocated USD 390,000 to the Hong Kong Science and Technology Parks Corporation (HKSTPC) to expand the Hong Kong Science Park, Hong Kong's largest R&D base, while USD 709 mn is earmarked for the expansion of Cyberport, Hong Kong's digital technology hub consisting of over 1,500 startups and technology companies. The government is also working to develop a Data Technology Hub and Advanced Manufacturing Centre in Tseung Kwan O Industrial Estate, to support smart manufacturing.

Support is also extend to local enterprises and universities, who can apply for funding under the government's Innovation and Technology Fund (ITF) for

activities including research and development, training and re-skilling employees, patent grants, and technological solutions. The government also undertakes strategic collaborations with the private sector through initiatives such as the Innovation and Technology Venture Fund (ITVF), a co-investment fund with venture capitalists firms designed to stimulate private investment in I&T start-ups based in Hong Kong.

Government funding, progressive visa policies for tech talent, and low taxes have contributed to a thriving local start-up ecosystem. Hong Kong has produced several unicorns, such as Klook, Airwallex, and Lalamove, and was deemed the third most innovative location in South East Asia, East Asia, and Oceania in the Global Innovation Index 2019. One key challenge for Hong Kong going forward will be to initiate widespread public engagement to build trust around government-led smart city initiatives, in light of the recent anti-government protests.



## Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	2.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	3.9
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	2.9
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	1.0
PC	PEOPLE-CENTRICITY	1.9
TD	TRACK RECORD	2.9
VISION (repeated)	VISION	3.0

# Chicago

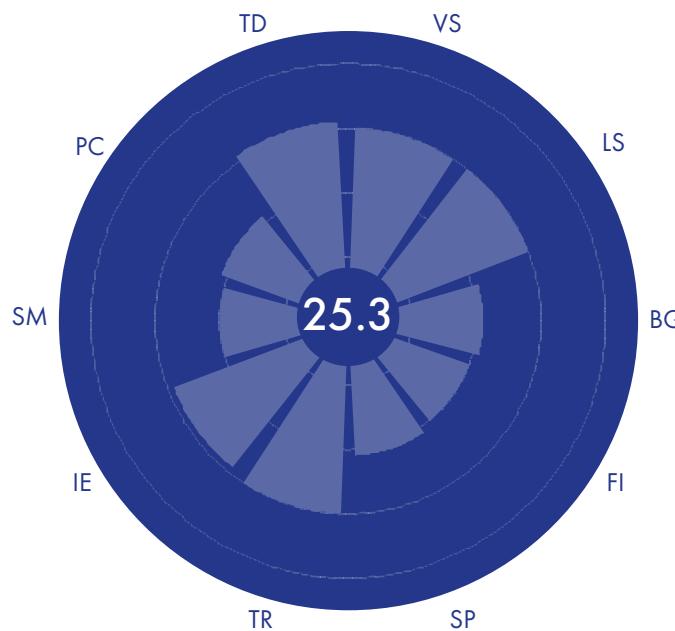
*Assuring citizens about data privacy*

In 2016, the City of Chicago embarked on its Array of Things (AoT) project which saw the installation of up to 500 AoT devices - modular boxes each with around 15 sensor nodes attached - to collect real-time city data that could benefit its residents and improve lives. These data range from urban traffic and vehicle flows, to environmental data such as air quality. Smart Chicago Collaborative, a key partner in the initiative, plays an integral role in managing the initiative's community engagement and public outreach.

The initiative has gone the extra mile to collect feedback from local communities. During one of the public meetings, locals shared that they were most concerned about data privacy and protection. To assuage their concerns, AoT project managers sought advice from privacy policy experts, industry experts, and universities to develop a privacy policy as well as set up an Ethics Oversight Committee (EOC). One key aspect of the policy was that any image or sound captured by the node is processed at the source and then deleted later on. Any new algorithms to be run on the node need to be pre-approved by the EOC,

to ensure consistency in data governance. Collected data is also uploaded onto an open-source API which is open to public scrutiny.

Each sensor in the device also has specific safeguards in place to ensure that data privacy is continuously protected. For instance, sound sensors only collect ambient volume and not raw microphone data; low-resolution infrared cameras collect surface temperatures only, and no images or videos are stored or transmitted from nodes. Moreover, the Smart Chicago Collaborative, AoT project stakeholders and the City of Chicago shared draft privacy and governance policies online to gather public feedback. The project demonstrated the City's efforts and sincerity to ensure that data security and privacy concerns from citizens are taken into consideration and listened to.



## Smart City Government Score

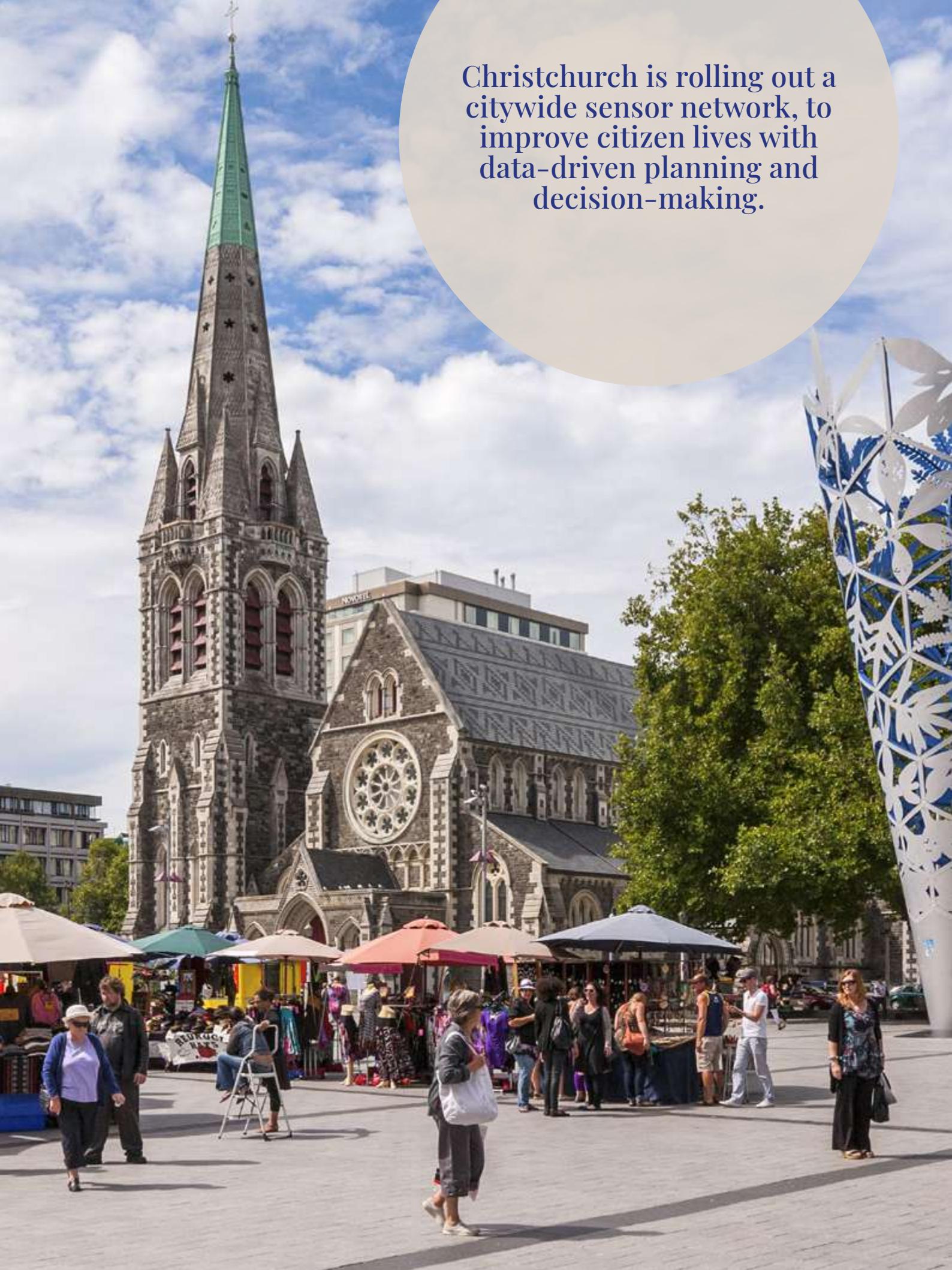
VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	2.1
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.1
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	2.9
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	2.1
TD	TRACK RECORD	3.1



The Array of Things project demonstrated the City's efforts and sincerity to ensure that data security and privacy concerns from citizens are taken into consideration.



Christchurch is rolling out a citywide sensor network, to improve citizen lives with data-driven planning and decision-making.



# Christchurch

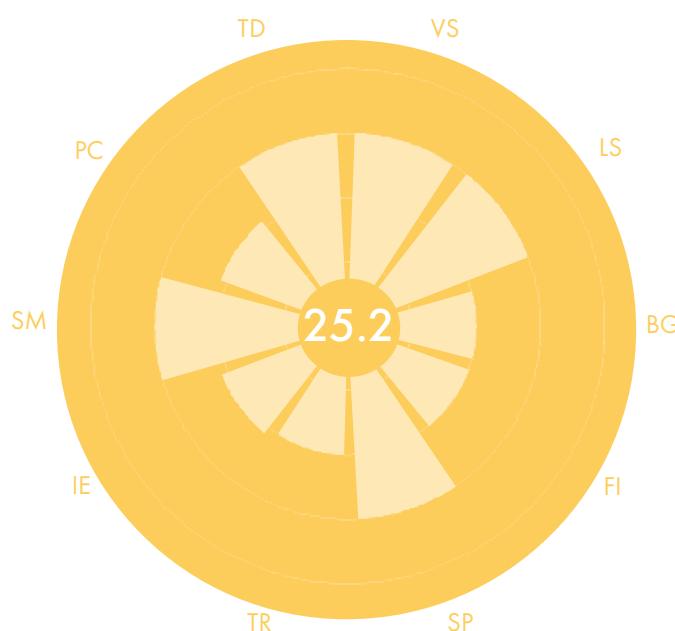
## *Sensor networks as the foundation of a smart city*

Smart Cities Christchurch is an initiative led by the Christchurch City Council, which aims to use technology and data to spur innovation and create equal opportunities for all its residents. After its 'Sensing City' project failed to take flight, the city was keen to revive its previous goal of rolling out a sensor network across Christchurch. The city council pledged a total of USD 6 mn until 2022 to support this entire smart city initiative.

A key use case of the sensor networks in Christchurch is to monitor and make early predictions for earthquakes. The city council embarked on a project to develop and deploy 150 sensors that were positioned at 100 to 200-metre intervals in traffic signal boxes or other council facilities, measuring earthquake tremors across the city. This created a more accurate city-wide map compared to current GeoNet stations, and provided real-time information to engineers, building owners, the city's civil defence, and emergency departments so that they can more rapidly assess and make decisions in the event of an earthquake.

Another use case for sensors is in waste collection. The Christchurch City Council has plans to deploy 100 bin sensors across the city to resolve the issue of overflowing bins. The sensors in the bins will enable contractors to optimise waste collection time and routes, as well as to plan for adequate bins across the city. The City Council is also exploring other ways in which sensor technology can play a significant role to improve Christchurch's liveability, such as for pest eradication, or to run robotic buses in its central district.

This sensor network will form the basis for the city council to adopt a more data-driven way of planning and decision-making to improve residents' lives.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	2.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	2.0
IE	INNOVATION ECOSYSTEM	2.1
SM	SMART POLICIES	3.0
PC	PEOPLE-CENTRICITY	2.1
TD	TRACK RECORD	3.0

# Vancouver

*Data transparency to track city's progress*

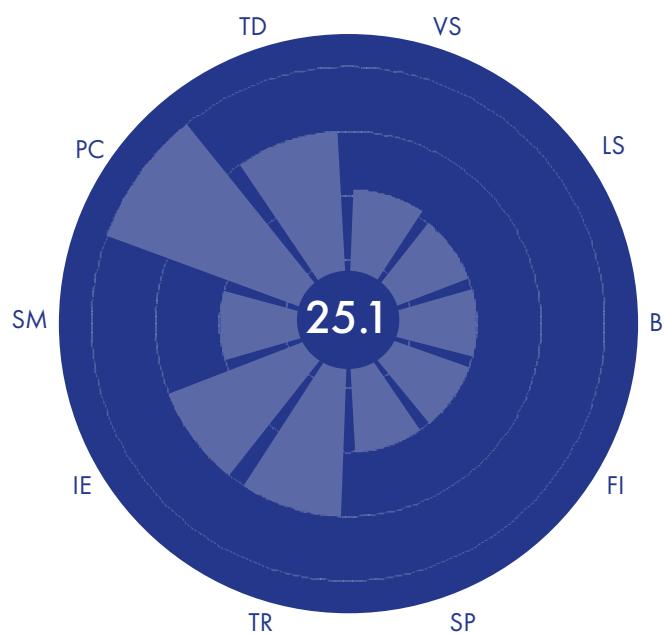
The City of Vancouver took part in the 2019 Smart Cities Challenge in partnership with the city of Surrey. Although they did not win the award, both city governments have agreed to commit to their initial plans and proposals. While the exact details are still pending, Vancouver's city government has been making strides towards its goals, such as its Greenest City Action Plan 2020 and its most recent Climate Emergency Action Plan.

What sets Vancouver apart is the city's transparency in setting specific targets and goals in its plans – whether it is its Digital Strategy or Greenest City Action Plan – and the measurement, collection, and display of this data on dashboards and reports to hold itself accountable. As an example, the city introduced an online dashboard called the VanDashboard to inform its residents on city services available, in addition to updating the city's overall progress on its goals and strategies. In total, the dashboard measures performance data across 65 indicators falling under the six categories of core service delivery; affordability and housing; climate change; economy and finances; equity and social issues; as

well as vibrant culture. The dashboard displays the current state and progress, overall trends, as well as historical data for residents to review.

Under its Climate Emergency Action Plan, the city government has also created a framework to track the impact of its programmes and initiatives on the reduction of carbon pollution in the city, benefits to its economy, as well as level of support provided for those most vulnerable to the impact of climate change. The framework includes three levels of measurement including milestones, outcomes, and headlines. For example, a milestone would be to improve the city's walking and cycling network, which would lead to an outcome where more residents walk instead of drive, eventually contributing to an overall objective of reducing city's carbon emissions.

The city government's efforts to ensure transparency demonstrate its commitment to achieving greater outcomes which are truly beneficial for its citizens.



## Smart City Government Score

VS	VISION	2.1
LS	LEADERSHIP	2.0
BG	BUDGET	2.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	4.0
TD	TRACK RECORD	3.0



What sets Vancouver apart is the city's transparency in setting specific targets and goals in its plans and the measurement, collection, and display of this data to hold itself accountable.





Zurich's vision for the city  
is to reduce its energy  
consumption to 2,000 watts  
per person by 2050.

# Zurich

## *Shifting behaviours to move towards a 2,000 Watt society*

Since 2008, the city of Zurich set a vision for the city, to reduce its energy consumption to 2,000 watts per person by 2050. In doing so, the City made several commitments in improving energy efficiency and renewable energy usage, sustainable buildings, promoting efficient modes of transportation, increasing public awareness, and promoting sustainable consumption.

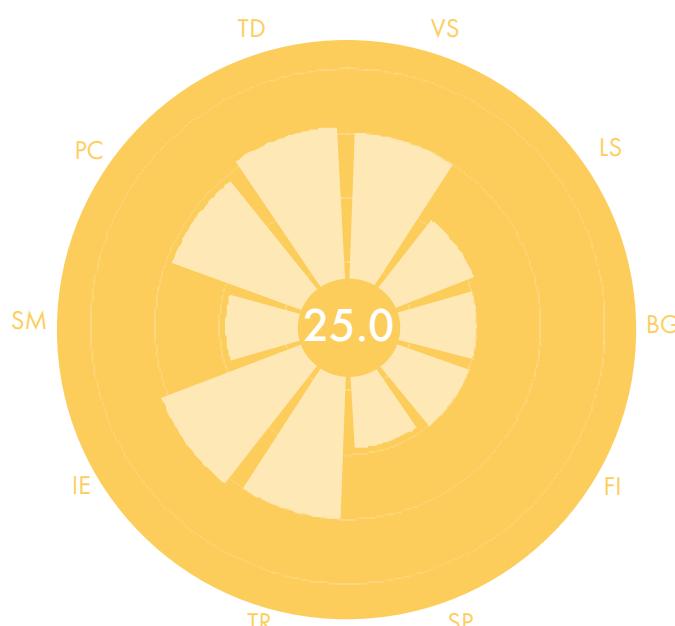
To bring companies and residents onboard, the City first needed to educate the population on its vision, and provided consulting free of charge to businesses in the construction, architectural, urban design and planning sectors, offering independent specialists who could advise on how to optimise energy usage in buildings.

The City also funds the Eco-Compass environmental consultation programme for its small and medium-sized businesses, which offers a free telephone consultancy service to help them identify internal measures to improve environment sustainability. Incentives were also provided for large companies which could prove that they have improved their

energy efficiency. These companies were given a ten percent reduction of their electricity bill called the efficiency bonus. As a result of the bonus, about 9.6 million kilowatt hours of electricity and 12.7 million kilowatt hours of heat was saved collectively.

In addition, the City regularly organises events, activities, and poster campaigns to promote the vision, and has celebrated Zurich Environment Day since 2004, an event that brings together multiple stakeholders including city agencies, environmental organisations, companies, and researchers to showcase their work and findings to the public.

Within the city government, there has also been a transition towards sustainable procurement, to lead behavioural change in the government's standing as one of the largest buyers in the market. The City's procurement policy promotes the purchase of goods and services which are sustainable, produced fairly, and have the lowest carbon footprint across the product lifecycle.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	2.1
BG	BUDGET	2.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	1.9
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	3.1
SM	SMART POLICIES	1.9
PC	PEOPLE-CENTRICITY	2.9
TD	TRACK RECORD	3.1

# The Hague

*Collaboration & design thinking to efficiently solve urban challenges*

The Hague, a renowned international law and arbitration capital, is a busy city populated by approximately 500,000 citizens, all living in a relatively compact space. This poses urban challenges such as traffic congestion, air and sound pollution, as well as changes in mobility needs due to the growing elderly population.

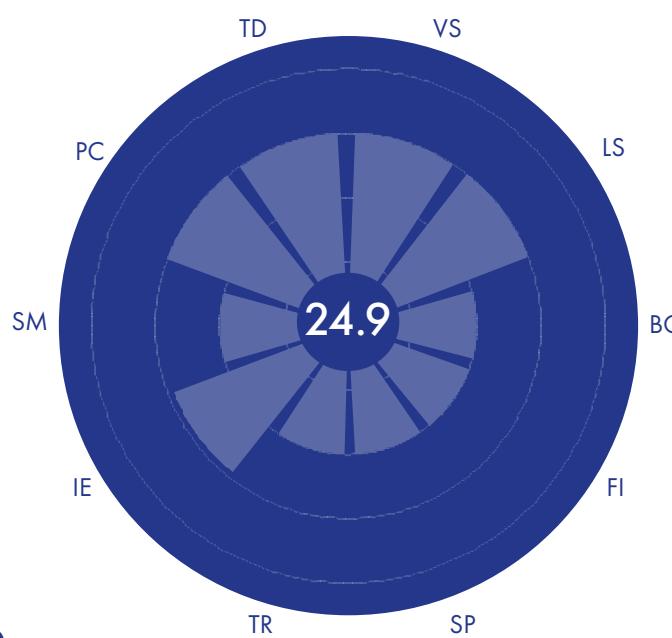
To solve some of these problems, the Municipality created the Living Lab Scheveningen, a large dedicated area open to citizens, start-ups and large companies, inviting them to develop, co-create, and test innovative ideas that could solve the city's problems. The Lab allows the Municipality to experiment in a safe environment before financially committing to scaling them up throughout the city.

Recent innovations developed in the Living Lab include a beach robot that clears cigarette butts, an autonomous waste bin that approaches upon waving, and sensor monitors that can measure the air quality and noise pollution. Cameras have been placed on the sensor monitors to enable movement monitoring, providing the Municipality with ample data to create

crowd management solutions, something that is becoming essential due to the COVID-19 pandemic.

The key ingredient that has attracted third parties to the Living Lab is the Municipality's installation of critical innovation infrastructure, which includes 5G networking and data collection frameworks. For these initiatives, the City collaborated with multinational corporations, sharing resources, capabilities, and associated costs. Its Odyssey Challenge Programme invites the general public to co-create the necessary digital layer for the Living Lab, once again, leveraging external capabilities to create a better overall solution.

By being open to collaborating with stakeholders and creating solutions in an experimental way, the City of Hague is on the path to solving city problems in a smart, entrepreneurial manner.



## Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	2.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	2.0
IE	INNOVATION ECOSYSTEM	2.9
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	3.0



**“The most important thing is to make internal teams able to act as matchmakers, teaching them to collaborate as much as possible with each other and expert third parties in solving complex city problems.”**

**- Marijn Fraanje, Chief Information Officer, Municipality of the Hague**



Rotterdam's development approach utilises innovation to design not only a smart city, but also a resilient and sustainable city.

# Rotterdam

## *Achieving resilience through innovation & co-creation*

With 90 percent of the city below sea level, Rotterdam faces major ecological challenges. Accordingly, its development approach utilises innovation to design not only a smart city, but also a resilient and sustainable city.

Under its "Resilient Rotterdam" strategy, it sets out seven resilience goals. These include creating an inclusive society which equips citizens to benefit from the digital revolution; clean energy transition at its port and industrial complex; cyber security resilience; and climate adaptation measures into all spatial developments.

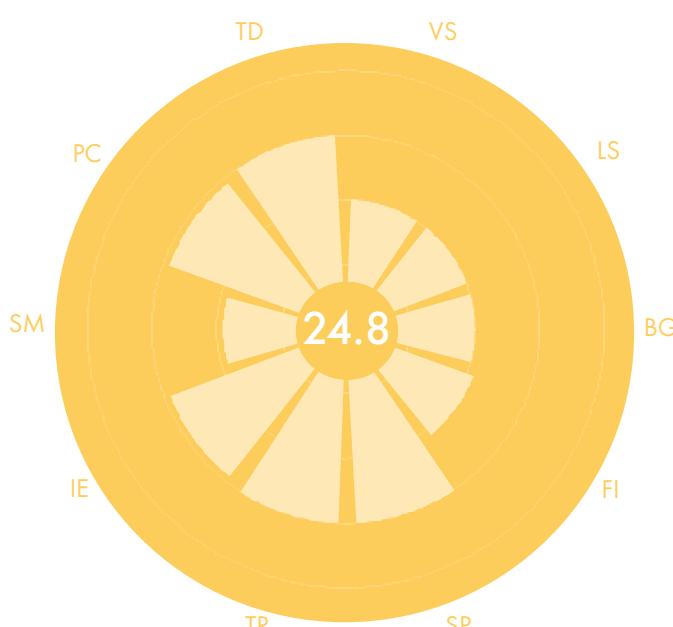
An example initiative is Resilient BoTu 2028. The city council allocated USD 5.6 mn to regenerate one of Rotterdam's poorest and most diverse neighbourhoods with a combination of projects which weave together sustainable energy transition, improved housing stock, climate change adaptation, as well as social inclusion and integration. Rotterdam also aims to achieve circularity and zero waste.

For example, the city is working on a 'materials pass-

port' to make it easy to re-use building materials in the future.

Rotterdam emphasises co-creation with its stakeholders. Under CityLab010, citizens and organisations can jointly create solutions for social issues in Rotterdam. A pool of USD 3.7 mn has been set aside to help project initiators with a starting budget. Initiators also receive project planning support to help with their applications for starting budgets. Another initiative is the Open4Citizens project which empowers citizens to make meaningful use of open data, where citizens participate in hackathons alongside IT experts, public administration, and interest groups to generate innovative applications for urban living.

Rotterdam stands out for its inclusive, whole-of-society approach. In 2019, Rotterdam was a runner-up in the European Capital of Innovation (iCapital) competition which recognises cities demonstrating the ability to improve the lives of its citizens through innovation.



### Smart City Government Score

VS	VISION	2.0
LS	LEADERSHIP	2.0
BG	BUDGET	2.0
FI	FINANCIAL INCENTIVES	2.1
SP	SUPPORT PROGRAMMES	3.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	2.9
SM	SMART POLICIES	1.9
PC	PEOPLE-CENTRICITY	2.9
TD	TRACK RECORD	3.0

# 48 Lisbon

## *Centralised data platform to improve public services*

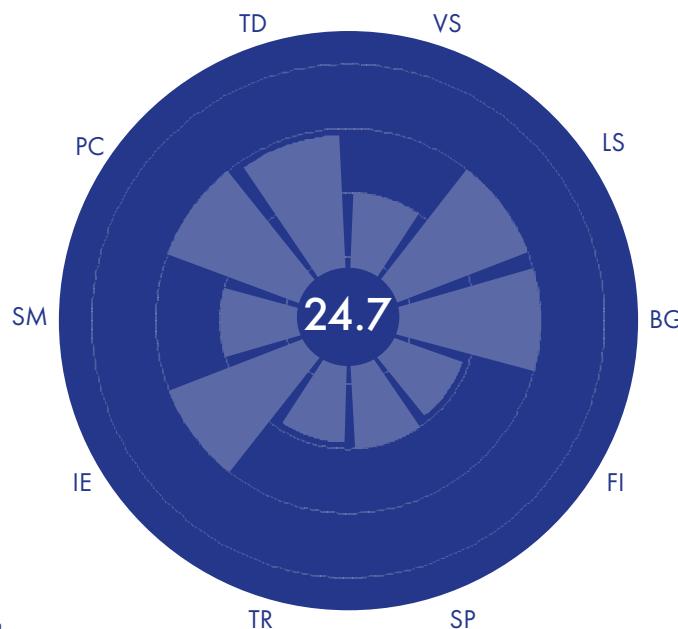
The Urban Intelligence and Management Centre is the key department under the Lisbon City Council in charge of developing and co-ordinating the city's Smart City strategy, as well as promoting data integration, analytics, and sharing. Its strong focus on a data-based management culture aims to provide more efficient, transparent, and innovative services for Lisbon's residents.

The City Council supports the Smart Open Lisboa startup programme, which allows startups to validate their solutions using real data from the city's open data portal, while working with large corporations. Additionally, the LxDataLab is a cooperative urban data laboratory which engages the city council and academic institutions to co-develop analytical and data visualisation solutions, accelerate decision-making, as well as improve city planning, resilience, security, mobility, operations, and emergency management.

In order to address the challenge of disparate information and data across complex, inflexible, and siloed private and public sources, the city council en-

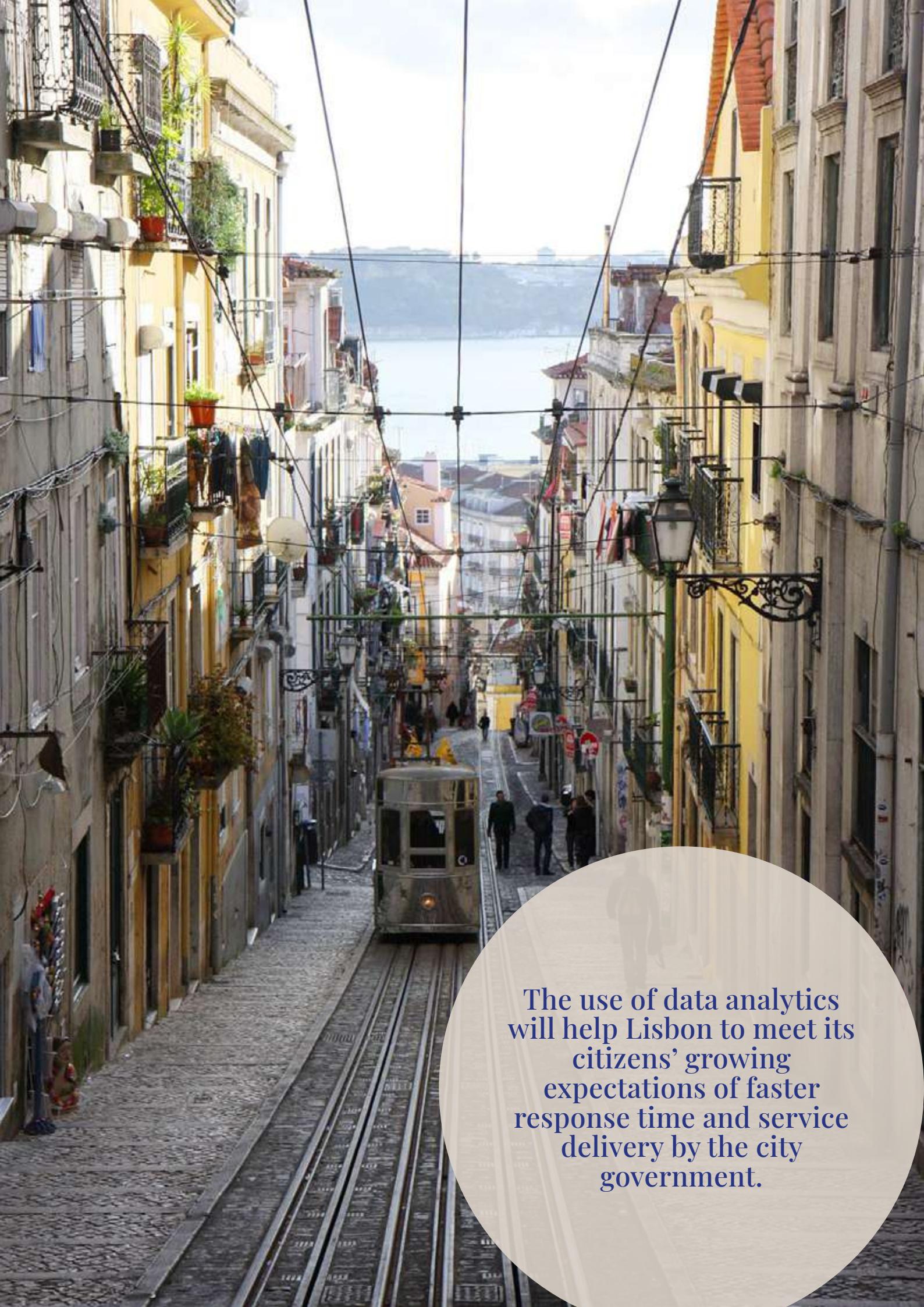
gaged NEC Corporation to build an intelligent management platform coupled with sensors, which was able to integrate, aggregate, manage, and display a range of relevant data sources. With the platform, the city council is now able to monitor and manage 10 internal systems and 30 external systems which were previously separate. The Municipal Service Operation Center provides oversight on matters such as traffic and transportation systems, waste management systems, and public safety providers, providing useful insights users. For instance, the sensors in the city's police vehicles can be used to pinpoint their precise locations to allow the police department to dispatch their resources more efficiently.

The use of data analytics will help Lisbon to meet its citizens' growing expectations of faster response time and service delivery by the city government.



### Smart City Government Score

VS	VISION	2.0
LS	LEADERSHIP	3.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	1.9
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	1.9
IE	INNOVATION ECOSYSTEM	3.0
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	3.0
TD	TRACK RECORD	2.9



The use of data analytics will help Lisbon to meet its citizens' growing expectations of faster response time and service delivery by the city government.



重庆你好  
世界你好

By the end of 2020, 50 percent of Chongqing's sub-districts and areas in its downtown will implement garbage sorting, and achieve 35 percent recycling rate across 270,000 families.

# Chongqing

## *A systems-level smart waste management approach*

Chongqing's smart city plan focuses on constructing strong infrastructure for network information, information sharing, and security; transforming government services and functions; improving public services with innovation and technologies; as well as developing emerging industries. It is a comprehensive plan to target multiple aspects of the city, ensuring that the city resolves its urban challenges using a systems-level approach.

A key example lies in Chongqing's waste management approach. As many citizens are often concerned about where their sorted garbage eventually ends up, Chongqing's Environment and Sanitation Group developed a Garbage Full Life-Cycle Management System that allows citizens to trace the location of their garbage.

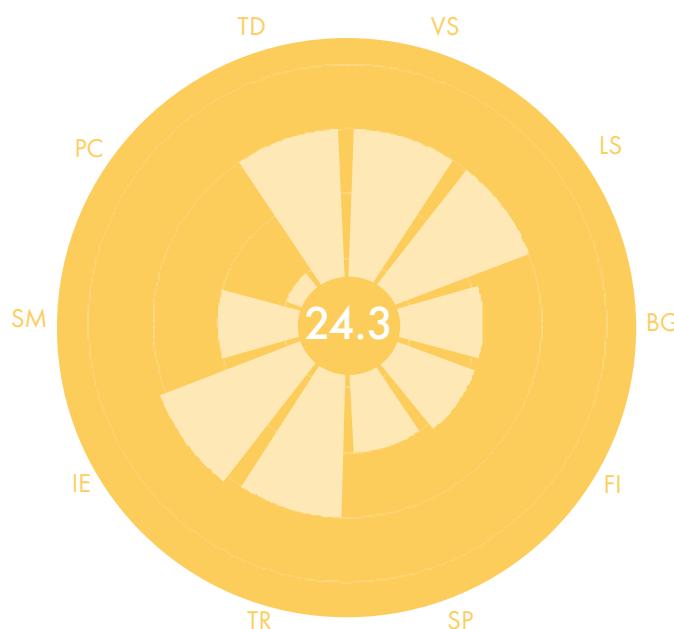
This was done by installing GPS systems and monitoring facilities in the garbage vehicles, bins, transfer stations, and disposal plants. At each stage of the waste management process, the city government has made efforts to utilise advanced technologies to improve efficiency. For instance, garbage transfer sta-

tions have intelligent multi-level garbage sorting systems to identify different types of garbage, followed by an advanced garbage re-utilisation technology to produce biogas, used to generate electricity.

Citizens can now sort garbage more easily with smart dustbins that feature QR codes linked to a mobile application. They can also receive cash incentives based on the market prices of different recycled items.

Within eight months, the programme has managed to collect two million plastic bottles and over 3,000 tons of garbage. By the end of 2020, 50 percent of Chongqing's sub-districts and areas in its downtown will implement garbage sorting, and achieve a 35 percent recycling rate across 270,000 families.

The city government will continue to evaluate its effectiveness based in the reduction of solid waste at the source, utilisation and recycling rates, final disposal, support capacity, and overall public benefits.



### Smart City Government Score

VS	VISION	3.0
LS	LEADERSHIP	3.0
BG	BUDGET	2.1
FI	FINANCIAL INCENTIVES	2.1
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	3.0
IE	INNOVATION ECOSYSTEM	3.1
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	1.0
TD	TRACK RECORD	3.0

# 50 Stockholm

## *Going beyond siloed projects to system integration*

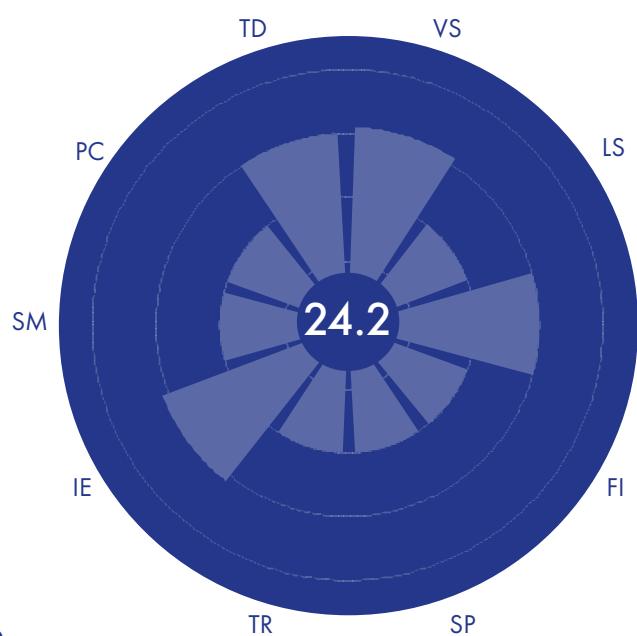
Stockholm was selected as one of the three cities to lead the GrowSmarter project, partially funded by the European Commission from 2015 to 2019. GrowSmarter projects seek to demonstrate city solutions in energy, infrastructure, and transport, bringing together more than 20 partners onboard to support city-wide initiatives. One of the key action areas under the GrowSmarter project is to avoid unnecessary duplication, by integrating new and existing infrastructure as well as active and passive infrastructure networks.

For Stockholm, integration is a major aspect of its smart city character. For instance, the City developed and owns one of the world's most extensive fibre networks with 100 percent fixed and mobile broadband coverage. Situated in one of the most connected countries in the world, Stockholm's fibre network is capable of helping to meet the City's future needs in communication demands and rise in economic activity. Its fibre network has also built a strong foundation for subsequent smart city projects including smart public lighting; electricity management; waste heat recovery; traffic management; mo-

bility solutions; eco-conscious building logistics; as well as elderly home care services.

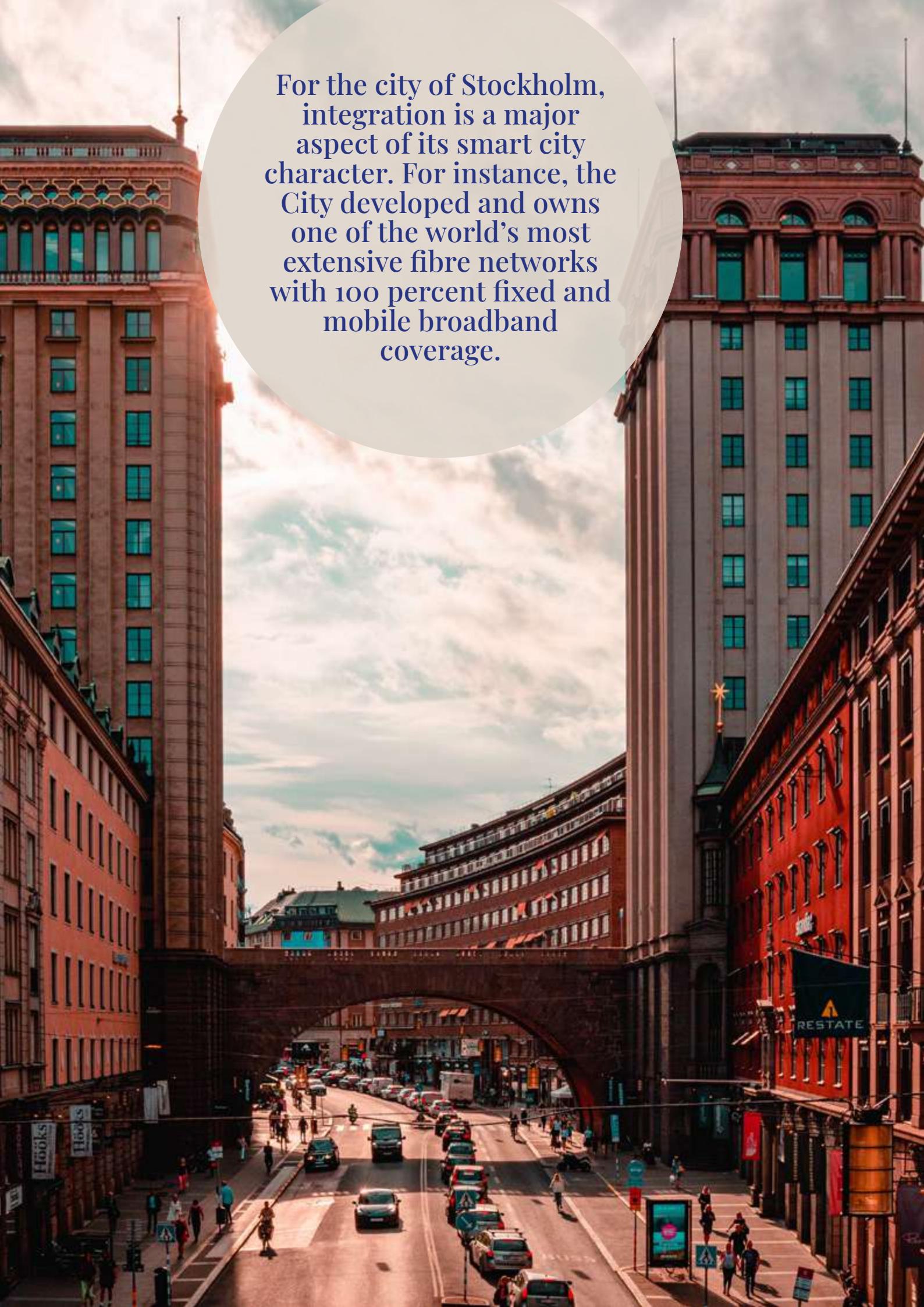
Furthermore, the City developed an Open District Heating approach, where surplus heat recovered from data centres can be injected into an area's existing district heating network. The recovery process is estimated to be able to heat more than 1,000 apartments in the City, simultaneously helping to reduce carbon emissions from avoided electricity usage.

The City also undertook a refurbishment project for a public housing area to enhance energy efficiency, which involved a combination of both active and passive technologies including district heating, geo-thermal heat pumps, exhaust air heat pumps, solar power, and heat recovery from waste water. Smart building management systems and indoor temperature sensors were installed to provide data for residents and building owners. Overall, this approach was able to provide up to 60 percent of energy savings, significantly reducing building maintenance costs.



### Smart City Government Score

VS	VISION	3.1
LS	LEADERSHIP	2.0
BG	BUDGET	3.0
FI	FINANCIAL INCENTIVES	2.0
SP	SUPPORT PROGRAMMES	2.0
TR	TALENT-READINESS	2.0
IE	INNOVATION ECOSYSTEM	3.1
SM	SMART POLICIES	2.0
PC	PEOPLE-CENTRICITY	2.0
TD	TRACK RECORD	3.0



For the city of Stockholm, integration is a major aspect of its smart city character. For instance, the City developed and owns one of the world's most extensive fibre networks with 100 percent fixed and mobile broadband coverage.

# Regional Showcase

As we celebrate the successes of 50 exemplary city governments worldwide, we also draw attention to the unique and creative efforts made by city governments in specific regions including Asia-Pacific, Africa, Europe, Middle East, North America, and South America.





**REGIONAL SHOWCASE**

# Asia-Pacific



ASIA-PACIFIC

## Driving innovation and technology adoption in Smart Villages

📍 BANYUWANGI, INDONESIA

Despite being a city with almost half of its population residing in rural areas, Banyuwangi still sees the importance of encouraging innovation and technology adoption in villages – recognising its potential to improve citizens' lives. The city of Banyuwangi therefore organises the Smart Kampung (or Village) Festival and Digital Village Festival as platforms to showcase and share their innovations across public sector services, health services, and the creative economy. These platforms aim to inspire other villages who have yet to embark on this digitalisation journey to do the same.

The annual two-day festival now exhibits innovations from 16 smart villages who were shortlisted from the annual Smart Village competition since 2017 and received smart village funding support. Some of the villages include Kaligung Village, which developed a self-service kiosk that consolidates data and information on population, health, and education, allowing residents to access multiple functions. A health application called Siap Cantik was also developed in Genteng Wetan Village, where users, especially pregnant or young mothers, are able to receive information on their health developments and other tips or information about their foetal and toddler

development, nutrition checks, and immunisation appointments.

The city has been recognised multiple times by the national government through the Ministry of Internal Affairs and the Indonesia Smart Nation awards in 2018, 2019, and 2020, claiming the Innovation Government Award for the Most Innovative Regency in Indonesia. Governor Abdullah Azwar Anas has wholly embraced innovation as a means to overcome the oft-cited public sector challenges of limited funding, human capital, and time.

As a result, over 350 unique programmes and initiatives were introduced in Banyuwangi, including a 'Public Service Mall' which integrates over 200 government services in one platform, Banyuwangi Teaches, which provides funds to students from low-income families, and One Student One Client, which pairs undergraduates pursuing health-related degrees with mothers with high-risk pregnancies to monitor their health and nutritional intake. It is estimated that Banyuwangi's Smart Village innovations have doubled the city's annual income per capita from USD 1,462 to USD 3,430.

# City-wide transformation through urban revitalisation and local entrepreneurship

📍 SEMARANG, INDONESIA

In recent years, one of Indonesia's leading cultural capitals, the city of Semarang, has made valiant efforts to develop a holistic and inclusive smart city.

One of the city government's notable initiatives is the Thematic Villages programme, which aims to improve the living conditions in impoverished or underdeveloped areas in the city. The programme aims to revitalise the villages' physical appearance, increase the urban villages' greenery, and increase the social and economic potential of each village in a manner which engages citizens and involves them extensively in the process. By adopting a thematic approach, the village residents are able to leverage on the existing strengths of each village community, whether this may be an existing industry or any key characteristics of the local communities related to culture, tradition, or local customs. Districts in Semarang are each given USD 14,000 to conduct these small-scale community upgrading projects.

The project has yielded creative villages throughout

the city, ranging from a Hydroponic Village, Batik Village, Organic Village, and even a Home Industry and Traditional Snack Village. Visitors to the Batik Village, home to talented local artisans specialised in Batik-making, for instance, are able to witness traditional Batik-making processes and purchase Batik fabric in the village. These themes have given each of Semarang's small communities a unique and personable identity which the government hopes will boost the city's branding and local residents' income.

The Semarang city government has also introduced initiatives to support local entrepreneurship and ensure all its citizens enjoy economic growth. The Kredit Wirausaha Bangkit Jawara (Wibawa) programme, launched by the city government's Agency for Cooperatives and Micro Enterprises, offers each eligible citizen a capital loan of up to USD 3,600 to develop innovative ventures and enterprises in the city. This credit scheme charges a competitive three percent interest rate per annum and does not require collateral for loans of USD 360 and under.





ASIA-PACIFIC

## Improving transportation experiences with smart mobility initiatives

📍 PENANG, MALAYSIA

The state government outlined the vision for Penang to become a family-focused green and smart state that inspires the nation by 2030. The state government is the key driver of the city's smart initiatives, with priorities in solving mobility challenges, reducing flash floods, as well as increasing the number of green buildings present. The Digital Penang Corporation was set up in 2019 to coordinate the various projects currently implemented by different agencies to achieve the state's smart city objectives.

The Penang Intelligent Operation Command Centre uses artificial intelligence and intelligent video analytics to recognise faces captured by over 700 CCTVs in places with high crime rates, road intersections, and busy roads for traffic control and enforcement. Traffic violations including illegal parking and vehicles using emergency lanes, as well as flood water levels can all be captured for relevant authorities to take immediate action.

The City has also kickstarted a collaboration with a local telecommunication infrastructure services company in 2019 to run a pilot Smart Bus Stop, which includes charging pods, CCTVs, panic buttons, free

Wi-Fi, a digital directory, and advertising panels to improve safety and increase convenience for users.

A Smart Parking app was also developed by the city council to allow users to locate available spaces across 36,000 state-owned parking lots, access real-time data integrated with the Road Transport Department of Malaysia, and pay securely through its e-Wallet and secure payment platform.

# Tapping into Big Data and IoT to drive smart health

📍 KHON KAEN, THAILAND

Khon Kaen has been selected by the national government to be one of the leading pilot smart cities for others to follow. Its smart city development programme aims to double its annual GDP per capita from USD 6,000 to USD 12,000 by 2029. One of the key initiatives is the Smart Health Project, led by DEPA, Thailand's Digital Economy Promotion Agency, together with local healthcare service providers and universities.

The City developed a smart ambulance which utilises teleconference, IoT, and robotics technology to improve the operational efficiency of the emergency dispatch services, and allows the frontline healthcare professionals to conduct initial diagnostic work and critical emergency treatment on ambulances. Accompanying the smart ambulance is the smart ICU which integrates and analyses data from respirators and other monitors using cloud artificial intelligence to send alerts to healthcare professionals.

The project also consists of a preventive healthcare tool which uses smart wristbands as well as smart home solutions to collect and monitor citizens' health data, especially the elderly. This allows for healthcare professionals to provide more targeted health guidance.

The last component of the city's smart health strategy is the development of a data-sharing platform which taps into blockchain and Big Data analytics to centralise key health data for both public and private healthcare service providers to streamline their processes. The project components have all undergone preliminary studies and was projected to complete in 2019.





ASIA-PACIFIC

## Enhancing e-governance and strengthening IT infrastructure

DA NANG, VIETNAM

As the first city in Vietnam to launch an e-Government system in 2014, Da Nang's smart city journey first focused on building strong IT infrastructure to improve public service efficiency in the city. This effort involved a total of 121 public agencies, and is guided by five key pillars: its policies; infrastructure; human resources; communications; and government applications.

The City worked closely with other governments in the region, such as the Korea National Information Society Agency, to develop its Open eGovPlatform that now centralises over 21 core public services online. For instance, the City's agencies in charge of air control, water, waste management, meteorology, food safety, and sewage management are now connected and plugged into the same system.

The eGovPlatform is also linked to the Da Nang Contact Centre, which was established as a single contact point for citizens to acquire more information about public services, check the status of their applications, as well as request for socio-economic information about the city. This enables citizens to evaluate the performance of government officers

whom they have been served by, creating a feedback loop to improve service quality.

The City has plans to use digital signatures for at least 30 percent of its administrative procedures, and have all of its public services online by 2030.



# REGIONAL SHOWCASE

# Africa



AFRICA

## Building an inclusive city by creating a channel for citizen voices

📍 SEKONDI-TAKORADI, GHANA

The city government of Ghana's third largest city, Sekondi-Takoradi, has made great efforts to address urban poverty and increase their capacity to empower the urban poor in the twin-cities through the IncluCity programme. Launched in 2011 with the support of Global Communities, a non-profit humanitarian organisation, and funded by the Bill & Melinda Gates Foundation, IncluCity supported the Sekondi-Takoradi Metropolitan Assembly (STMA)'s quest to enhance the participation of its most impoverished communities in its governance, planning, and budgeting processes. The IncluCity programme also introduced a host of intervention to strengthen the STMA's capacity to serve its constituents, by increasing internally-generated funds.

STMA seeks to improve its municipal revenue collection capacity and efficiency using geographic information systems to geo-code the tax dues and payment status for the city's land parcels. More specifically, a Land Use Planning Management Information System as well as property and business permits were able to help minimise STMA's loss of uncollected tax revenues, which are now channelled towards funding city government services for the

poor. A Citizens Report Card (CRC) was also developed in 2012 to directly obtain citizens' feedback on the current condition of ten public services. Through a survey of 834 households, the CRC results are helping the STMA to prioritise three areas of key concern to citizens: water, basic education, and public health services. The CRC is conducted every three years and allows STMA to assess the impact of their efforts to improve municipal service delivery.

# Unleashing local digital innovation potential

📍 JOHANNESBURG, SOUTH AFRICA

The City of Johannesburg's Smart Cities Office uses strategic partnerships with key ecosystem stakeholders to realise Johannesburg's vision for an innovative and smart city. The Smart Cities Office demonstrated great support for initiatives such as the Fak'ugesi African Digital Innovation Festival, a celebration of Africa's most creative and technologically-savvy individuals. The five most innovative ideas identified through the festival which address local challenges relevant to Johannesburg received support from the Smart Cities Office and the Tshimologong Digital Innovation Precinct to further develop their ideas and prototypes.

The Festival has even expanded to include three new initiatives: 1) a Blockchain Hack-a-thon for Creative Industries by the Fak'ugesi Festival, the nation's official animation industry body Animation South Africa, and the Johannesburg city government; 2) Cross-Sector Game Jam, an initiative focused on the digital creative sector (e.g. gaming, gamification, music, user experience design, and screenwriting); and 3) SUPER-POWER! Johannesburg, a collaboration with Ling

Tan, a UK-based Singaporean architect and technologist leading a workshop equipping participants with an understanding of how citizen data collection and wearable technology can improve the urban environment.

Across these programmes, there is an explicit focus on localising innovations to meet the unique needs of the South African context, with stakeholders recognising the value of local perspectives in driving creative problem-solving smart city transformation. For example, winners of the 2019 Blockchain hackathon developed a solution which automated royalty distribution to artists using a smart contracting system, addressing a local challenge amongst African composers, authors, and publishers regarding intellectual property.





AFRICA

## Catalysing Niger's innovation and digital transformation journey

📍 NIAMEY, NIGER

Niger is embarking on an exciting period of transformation through a centralised Niger 2.0 programme which it is rolling out across its major cities, including its national capital Niamey. As the result of a collaboration between Niger's Agency for Information Society (ANSI) and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Niamey is envisaged to become an innovation and technology city. This collaboration is particularly ambitious in Niger's context, where agriculture contributes 40 percent to GDP.

The innovation and technology city aims to drive improvements in key sectors including agribusiness, health, and education through incubation and accelerator programmes to support startups as well as small and medium enterprises. Additionally, the city will establish a training and certification centre, coding academy, business centre, national data centre, as well as production facilities for digital equipment such as computers, tablets, and solar panels. The city, to be based out of ICRISAT's Sadore facility, aims to enhance the nation's core economy of agriculture and invite the nation's youth, who comprise two-thirds of the entire population, to engage with digital

technologies, recognising their potential to address Niger's most pressing societal challenges. Agritech offers an exciting opportunity to transform Niger, through crop health monitoring systems comprising drones and machine vision technology.

# Investing in digital infrastructure for accelerated growth

 KIGALI, RWANDA

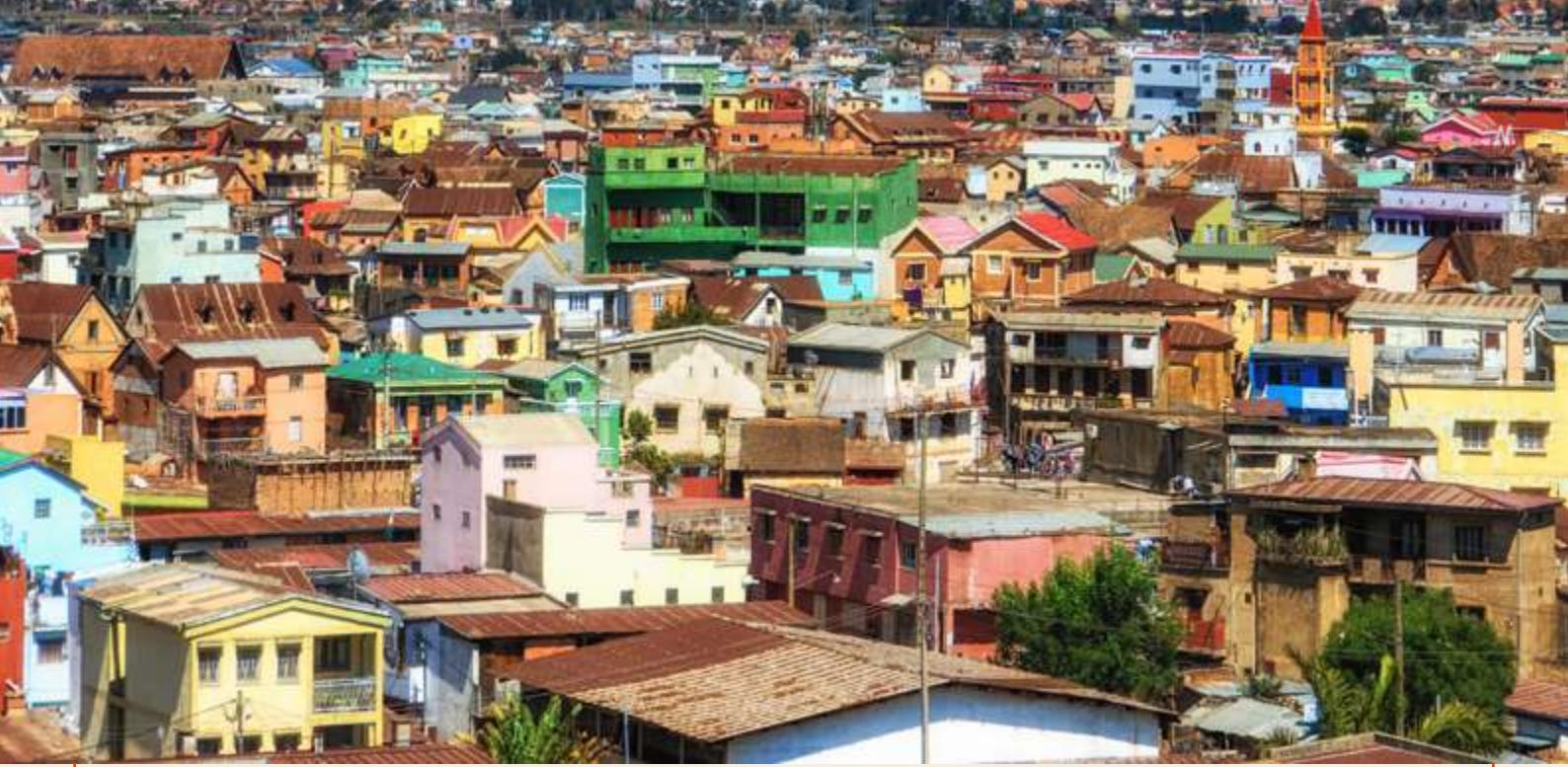
Often dubbed the digital capital of the African continent, Rwandan capital Kigali has made a remarkable departure from its troubled history to become a budding hub for innovation and global business. At the national level, Rwanda's rapid transformation from an agriculture to knowledge-based economy has also propelled a host of initiatives to prepare Rwandans for the future.

Kigali, in particular, has placed an explicit focus on digital infrastructure as a foundation for innovation and has effectively utilised public-private partnerships to realise this goal. For instance, telecommunications company Inmarsat has been a key private stakeholder involved in the development of IoT infrastructure across Kigali, which has created the basis to innovate for a smarter urban environment through the creation of IoT-based applications for parking, air quality, water resource management, as well as to improve agricultural yield.

The shift towards a knowledge-based economy has

also driven the government to invest heavily in talent development, a strategic decision given the nation's lack of natural resources. Global technology companies such as Andela have partnered with the Government of Rwanda to establish a pan-African hub to train Rwandan and African technology talent. Likewise, Carnegie Mellon University has also constructed a Kigali campus (CMU-Africa) to address the shortage of high-quality engineering talent in Africa. Over 300 students are now graduates of CMU-Africa. CMU-Africa is an anchor institution in Kigali Innovation City, a technology cluster developed by the Rwandan government in partnership with other private and public stakeholders to spur entrepreneurship and innovation and further accelerate Rwanda's economic growth.





AFRICA

## Community enterprise investment to unlock inclusive economic growth

 EKURHULENI, SOUTH AFRICA

Ekurhuleni, meaning 'place of peace' in Xitsonga, is located in South Africa's Gauteng province. Home to approximately 3.9 million residents, the city is one of the most densely populated areas in South Africa. Often dubbed 'Africa's Workshop', Ekurhuleni has a long-standing history of being a production capital, with the manufacturing sector alone making up 23 percent of the city's economy. Channelling the city's production prowess, existing infrastructure, and young population into a new trajectory for economic growth through smart city development is next on the city government's agenda.

To achieve inclusive economic growth as part of the broader development plan to become a smart city, the city government launched a USD 20 mn Ekurhuleni Community Enterprise Development Fund in 2019, in partnership with the National Empowerment Fund (NEF). The Fund aims to support community enterprise development, recognising that small, medium, and micro-enterprises would be key to creating sufficient jobs for Ekurhuleni and driving the city's economic growth.

The fund is structured into three categories to support a wide range of stakeholders and ensure that growth in the city is inclusive. The Phanda (South African slang for 'hustling') Fund supports local entrepreneurs, enterprises and cooperatives in developing business plans and with mentorship. The Ximilani ('germinating seed') Fund supports business incubators; soft, technical and business skills development providers; women, youth, and persons with disability development organisations; industry associations and chambers of commerce; and agriculture development organisations. Lastly, the Fetola ('transform') Fund is structured into two sub-segments: Fetola A targets development finance institutions, state-owned enterprises, corporate social investment partners, enterprise development, and private financing; whereas Fetola B specifically supports black-owned and managed businesses.

This sizable amount of funding to support a diverse base of local entrepreneurs and enterprises is a commendable initiative to achieve more inclusive economic growth in the city.



**REGIONAL SHOWCASE**

# Europe



EUROPE

## Leading the national e-mobility movement

📍 MUNICH, GERMANY

The City of Munich's smart city strategy builds on a national pilot area called 'Neuauing-Westkreuz' as an arena to test emerging technologies and concepts. The district was also selected by the European Commission under the 'Smarter Together' consortium, to launch e-mobility initiatives that explore how smart mobility options could become part of citizens' daily lives and transform the way they commute.

Led by Münchner Verkehrsgesellschaft (MVG), the Munich Transport Corporation, e-mobility stations were installed in the district, offering various modular e-mobility services including e-car sharing, e-bikes, and e-trikes. MVG was in charge of funding the stations, subsidising the entire program and purchasing the e-bikes. With these one-stop stations, users do not need to own vehicles. The stations are also equipped with electricity charging ports as well as digital information panels. Another feature is that the stations act as pick-up and drop-off points for businesses or individuals to deliver and store food items or packages, even boasting cooling compartments for items which require refrigeration.

Ensuring access to adequate charging infrastructure is another key factor to accelerate and enable the e-mobility movement. To this end, the City of Munich has funded the installation of over 1,100 public charging points across residential and commercial buildings, carparks, and some private developments. The locations of these charging stations, along with the e-mobility stations, are listed on the Munich Smart City App for users to access easily.

With an increase in user acceptance through the pilot programme, the City will expand more of these e-mobility services to the rest of Munich, paving the way for a new era of smart mobility.

# Creative ways to encourage co-creation

📍 GOTHENBURG, SWITZERLAND

Instead of consolidating a single smart city vision, the city of Gothenburg has outlined five key areas which it will focus on addressing in the upcoming years, including transportation and waste management; social inclusion; data privacy; citizen engagement; and decentralised leadership; by using technology and digital innovation. The City has also been recognised for encouraging co-creation with its citizens through creative, interactive, and engaging means.

One of its most innovative platforms is called 'Gothenburg in blocks', led by its planning department. All of the city's districts, constituting almost 400 square kilometres of land, were recreated in Minecraft. A competition was held during a holiday where presents were hidden across the city's landmarks. This was meant to spark interest in urban development and collect feedback on how its residents wanted to utilise the city's land.

The City has also developed 'Min Stad', an online interactive city map to crowdsource stories, interesting landmarks, as well as suggestions for the city across categories such as culture and recreation, to cultivate a greater sense of ownership of the city. By using digital platforms to increase engagement and enjoyment, the City has made it easier and more accessible for citizens to step up and provide meaningful feedback to further improve Gothenburg.





EUROPE

## A customised approach to promoting energy efficiency

📍 GENEVA, SWITZERLAND

In line with the national Confederation's 2050 Energy Strategy, the reduction of carbon emissions through promoting energy efficiency has become a goal of Geneva's transformation. SIG, the national provider of local utility services including water, gas, electricity, and thermal energy owned by the municipality of Geneva and the city authority, has been key in driving this change. The SIG-eco21 programme is one of its most successful initiatives. Running for a decade now, this programme offers customised solutions and services to help individuals, business owners, and corporates reduce their energy consumption.

When signing up for the programme, a client manager is attached to the user to diagnose and understand their current levels and forms of energy consumption, and later outlines an action plan for the business or individual. Support is provided in multiple forms, including financial solutions, organisational support such as training and coaching of 'green teams', as well as technical solutions and advice, including tools for monitoring energy savings, training, behavioural programmes, and even access to networks. For example, individuals can access financial and technical assistance to move towards renewable heating

solutions in their homes; SMEs can request for an action plan to reduce energy usage which is specific to their industry; and large businesses can request for their energy managers to be trained or supported to attain energy management certifications.

# Raising the digital readiness level of the workforce

📍 MANCHESTER, UNITED KINGDOM

In 2015, the City released its 'Our Manchester' strategy which sets the city's growth trajectory until 2025, with a vision to build a world-class city supporting a sustainable, dynamic, and skilled workforce alongside a thriving, fair, and liveable future. In its plan, the City outlined 64 priorities that were grouped into five themes, with one of them being a 'highly-skilled city'. In alignment with this objective, a series of extensive programmes, investments, as well as initiatives were introduced to support residents across all ages and ensure their digital readiness.

The city council runs an annual Digital Skills Audit of over 250 digital and technology businesses, to understand the skills requirements, limitations, and challenges faced in the industry. With the insights gathered from this annual survey, the City then collaborates with various departments and private sector players to develop industry programmes that plug identified gaps. For instance, Northcoders, one of the programmes operated by the city, is a three to six-month long coding bootcamp and employment

support programme which trains individuals who are interested to become software developers. The programme has now trained over 280 people across four years, with 96 percent of its graduates placed in digital or technology-related firms.

Beyond technical skills development, the City has also launched a 'Skills for Life' programme in 2019 which focuses on developing five 'soft' skills which are Communication; Teamwork; Self-management; Self-belief; and Problem-solving amongst children up till the age of 16.





EUROPE

## Smart skills programmes for different ages

📍 STAVANGER, NORWAY

Stavanger is one of the most forward-looking smart cities in Norway, being the first municipality to develop a roadmap which details its vision and principles in developing a smart city. Education and knowledge are listed as key priority areas for the municipality, and various programmes have been launched to invest in skills development and innovation across all ages and educational levels.

Top-performing lower secondary school students are selected for a Smart City Talents programme, where they learn more about Stavanger as a smart city, and cover concepts such as service design, concept development, and citizen co-creation in eight sessions across a year. The Smart City Talents programme culminates into a final project where the students will develop and present their prototypes to their peers. The municipality has also launched a pilot programme for sixth-graders called TechnologySMART which aims to expose students to challenges faced by local communities and to develop technology-based solutions for them. The programme has since expanded to five more primary schools.

Aside from younger students, the municipality also

collaborated with the design industry to establish a new design course at the University of Stavanger, focusing on service design and innovation. This course will help to plug the skill gaps faced by the design industry and also allow government employees to undergo training to advance their work in enhancing public services.



**REGIONAL SHOWCASE**

# Middle East



MIDDLE EAST

## Developing citywide technology use cases and pilots

📍 ABU DHABI, UNITED ARAB EMIRATES

The Abu Dhabi Municipality, the key driver of smart city initiatives, launched a five-year project called the Zayed Smart City project from 2018 to 2022 to validate key use cases and assess the viability of smart cities and Artificial Intelligence. The project aims to explore ways in which the environmental, social, and financial aspects of its citizens' lives can be enhanced with the use of digital technologies.

In the project's pilot phase, the City selected ten use-cases to test, including the use of sensors, actuators, and IoT for air quality monitoring, asset tracking, water metering, street lighting, smart parking, and waste management. Low power wide-area network (LPWAN) technologies were used to transport sensor data across different parts of the city to a centralised office, where a third-party software and IoT platform used code-free integration capabilities to monitor, manage, and analyse the collected data.

Part of the Zayed Smart City project was also to transform the way the municipality works in serving the needs of its residents. For instance, the municipality has shifted its service delivery model towards a 'journey-focused approach' which is more customer-centric and personalised. Its e-government portal is now re-designed based on journeys, from accessing social or healthcare services, to buying cars, starting a business, and finding houses.

# Strategic partnerships to solve traffic challenges

 IZMIR, TURKEY

Izmir is one of Turkey's most densely-populated cities, reaching three million inhabitants, and is also known for being the country's second biggest port. Even though it is still in its infant phase in driving smart city development, the municipality has already embarked on several projects to introduce technological solutions that could help to solve some of its greatest urban challenges, such as transportation. These projects are often supported with strategic partnerships developed by the municipality to bring in funding and technical expertise.

In 2011, the International Finance Corporation and the municipality of Izmir started a strategic partnership which has helped the city to raise over USD 500 mn through different financing sources, to support Izmir in implementing nine large-scale infrastructural projects. The municipality tapped into this pool of funding to adopt a comprehensive traffic management system in 2015 in collaboration with two private sector providers of intelligent transport systems (ITS) and sensor technology.

As a result, a wireless parking sensor system combining magnetic and infrared detection technologies is now tracking over 2,000 parking spaces across the city, to detect parking space occupancy and duration. With real-time parking data collected from the sensors and then transmitted to a traffic management platform, information can be sent through variable message signs to motorists to help them find parking spaces easily. The municipality can also use this system to detect and track traffic-related violations, and also inform their decisions when planning parking spots and placements of road intersections.

Moving forward, the City is expanding the use of its ITS to introduce more solutions, including solar-powered bus stops with digital signage and boards, as well as smart traffic light systems to reduce its overall traffic congestion and electricity costs.





MIDDLE EAST

## Building a smart city from scratch

### 📍 LUSAIL CITY, QATAR

Lusail City is also known as 'Qatar's Future City', with a vision to create a modern, smart, and sustainable city in the Gulf Region. It is expected to reach a population of 450,000 people, and is a city planned from scratch, underpinned by eight Smart City pillars including smart people; operation; economy; environment; governance; living; mobility; and construction.

The City will construct the Lusail Command and Control Centre which centralises the monitoring and management of all smart services in the city. There will be two key aspects to the control centre – the operation centre which is the central monitoring and management facility, as well as a data centre which handles the processing, networking, and storage requirements for its smart services.

In addition, the City will also pilot an eHome concept, which consists of an automated system that allows residents to control their sprinklers for their gardens; lighting; shutters; appliances; car garages; heating, ventilation and air-conditioning (HVAC); as well as security systems.

Other elements such as district cooling, pneumatic waste collection, and an underground Synthetic Natural Gas distribution network are also in place to ensure that the city minimises its carbon footprint.

# Envisioning the future with a mega-city

📍 NEOM CITY, SAUDI ARABIA

The birth of Neom City was a result of the Vision 2030 programme under the leadership of Crown Prince Mohammed bin Salman to chart the nation's future – a diversified economy characterised by strong inflows of foreign investment and leading in sustainable urbanisation. Neom City is a 26,500 square kilometre mega-city development expected to be completed by 2025. In 2017, it was announced that over USD 500 bn has been invested from both public and private sources of funding.

The newly-planned city aims to become the largest innovation and technology hub in Saudi Arabia, championing the future growth for industry sectors including renewable energy, water, mobility, and biotechnology. This is driven by the need to encourage local production to replace the high levels of commodity imports in the nation. In addition, the city is also designed as an attractive environment to spur foreign investment, with an independent judicial system that has more autonomy to adjust

taxes and labour laws. By 2030, Neom is projected to contribute USD 100 bn to the nation's GDP.

In terms of sustainability, the city is planned to be powered largely by solar and wind energy. Other innovative technologies are being explored, such as the use of concentrated solar power technology to desalinate seawater, generating a carbon neutral source of fresh water for its population.

While the nation is currently undergoing a challenging time due to COVID-19, with a bleak future for oil prices, as well as reputation fallout from human rights issues, the nation remains hopeful for the completion of Neom to realise its objectives of being a truly sustainable, modern, and technology-driven city of the future.





MIDDLE EAST

## Maximising the potential of data technologies to manage urban issues

📍 YANBU, SAUDI ARABIA

Yanbu is one of the major industrial cities in Saudi Arabia, which has begun its transformation towards a smart city in line with the nation's Vision 2030 programme. One of its challenges was to manage and control its traffic to reduce road accidents and improve its road safety.

As such, the City collaborated with a global information and communications technology provider to set up an e-Police system in 2019. This replaced the older devices at major road intersections with 256 new high-definition cameras, which now provide quality images and videos that allow city officials to trace vehicles as well as impose controlling measures. The system can also run video searches with pattern recognition technology and automatically detect traffic violations, which drastically increases government efficiency. Moreover, the system allows traffic lights to be controlled and therefore adapt dynamically to differing traffic flows at various intersections.

Since the system was deployed, the City saw a reduction in traffic violations by almost 60 percent monthly, and was able to collect penalty fees to re-invest back into the city. Due to the pilot's success, the Royal Commission of Yanbu has now expanded the first phase to add ten e-Police sites beyond the initial 16 intersections.



**REGIONAL SHOWCASE**

# North America



NORTH AMERICA

## A leading mobility innovation hub

📍 CHULA VISTA, USA

Chula Vista, San Diego Metropolitan Area's second largest city in the state of California, has successfully positioned itself as a smart city innovation launchpad for research related to solutions for the future of mobility – autonomous vehicles (AVs) and unmanned aerial systems (UAS). Chula Vista is the only city in the United States with federal recognition for both AV and UAS real-world testing. The city is home to a host of facilities which have been made available to private sector stakeholders through project proposals, partnerships, and pilot programmes to advance the development of these emerging mobility technologies.

Chula Vista is one of ten designated Autonomous Vehicle Proving Grounds in the United States. The city and broader San Diego area function as testing grounds to advance autonomous vehicle technology, bringing together stakeholders from the public, private, and academic sectors to validate existing solutions and trial new ones. The establishment of the San Diego Regional Proving Ground (RPG), in partnership with the Chula Vista city government, the San Diego Association of Governments (SANDAG), and the California Department of Transportation

(Caltrans) has been central to this effort. San Diego RPG industry and academic affiliates receive benefits such as streamlined access to agency officials, as well as expedited permit application processes for road closures and other installations related to vehicle testing.

Chula Vista was also designated a UAS Integration Pilot Program (IPP) site by the Federal Aviation Administration (FAA). This will support the FAA's key objectives in achieving UAS integration in urban environments as well as developing regulations to facilitate the use of UAS. The city is also home to UAS testing facilities, including a portion of a 150-hectare site located within the city's innovation district. The site will be used for the creative conversion of an upcoming university campus, which will provide drone researchers from the private sector and academia the opportunity to validate UAS solutions.

# Creating a compassionate city for everyone

📍 ORLANDO, USA

The City of Orlando prides itself in being 'A City for Everyone' with a host of initiatives to foster inclusivity and encourage citizen participation. The city's programmes cut across a wide range of age and interest groups, from pre-schoolers, the elderly, new home buyers, and young men of colour, to army veterans, gardeners, and the LGBTQ+ community. The City offers support for different citizen needs such as early childhood literacy, a committee for liveability and healthy aging to make recommendations for programmes to support older adults, as well as financial incentives to support the construction of affordable housing units.

A notable initiative underway is Orlando Speaks, or Our Community Speaks, a programme designed by the City of Orlando in partnership with the Valencia College Peace and Justice Institute, which aims to bridge the divide between the citizens and police. This programme was designed in response to the rising concerns among residents regarding policing practices which have had a disproportionately nega-

tive effect on disadvantaged communities and people of colour. Orlando Speaks establishes a safe space for community dialogues and interactive workshops to share perspectives, stories, and concerns, so as to find common ground between police and citizens.

The Mayor of Orlando further fosters inclusion and engagement by providing avenues for citizen participation through public budget workshops. These allow citizens to voice their opinions on the structure and use of the city budget. Additionally, citizens can apply to join a City of Orlando Advisory Board or Commission, which allows residents to contribute to policymaking in their community.

This broad range of initiatives speak to one of Orlando's key characteristics as a Compassionate City, a title designated by the International Compassion Action Network dedicated to integrating compassion within local communities.





NORTH AMERICA

## Bringing all citizens on board for an inclusive digital society

📍 AUSTIN, USA

Austin is the capital of Texas state and a well-known technology hub. The city has chosen to focus explicitly on digital inclusion, responding to the growing number of technology and innovation-related jobs driving Austin's economy, whose benefits may not be enjoyed by all citizens. Some may still lack access to technology or the Internet, or are digitally-illiterate.

The city has demonstrated its commitment to digital inclusion by setting up a designated Digital Inclusion programme under the city's Office of Telecommunications & Regulatory Affairs (TARA). This programme develops, implements, and manages the city's Digital Inclusion Strategic Plan approved in 2014. The Plan was developed to ensure that all residents have access to and are well-equipped to adopt digital technology solutions in the city. Having gained an intimate understanding of Austin's digital landscape in terms of residential technology use and potential barriers to technology adoption through a 2014 Austin Digital Assessment, TARA designed digital inclusion recommendations and initiatives tailored to Austin's unique context. The Strategic Plan presented 25 action items across five action categories, including:

1) Connect; 2) Engage; 3) Include; 4) Integrate; and

5) Coordinate. The city's investment in digital inclusion efforts are underpinned by a vision for Austin for every resident to have the opportunity to be fully engaged in Austin's digital society.

To this end, TARA is tasked with providing information and communication technology (ICT) resources which are freely-accessible to the community. The Office also provides free training to enhance digital knowledge and skills, and promotes the relevance and adoption of ICT solutions within the broader community. TARA also works in tandem with local non-profit organisation, Austin Free-Net, to manage the city's public access computer labs and provide digital literacy training services.

# Bringing citizen participation into the smart city development process

 PITTSBURGH, USA

Citizen participation is at the heart of Pittsburgh's smart city strategy, with the city government developing clear platforms and initiatives to engage citizens. Pittsburgh's approach is guided by a unique Citizen Participation Plan (CPP), which combines civic and community engagement methods to involve Pittsburgh citizens in conversations and processes pertaining to the city's planning and development processes. The CPP adopts a proactive approach to involve a host of city stakeholders, including citizens, non-profit organisations, community development agencies, developers, and foundations in Pittsburgh. It also contains specific guidelines regarding the format and mode of citizen engagement, such as a minimum number of public hearings and the information which local agencies are expected to disclose to the public regarding government programmes.

Additionally, the city has developed a Public Engagement Guide, Toolkit, and Supporting Plan which provides a structured framework for how Pittsburgh should conduct engagements to bring citizens into

the city planning process. Together, city officials have a clear understanding of the concept of public engagement, including how to integrate public engagement into decision-making, and select appropriate public engagement planning processes. They are also well-equipped with the engagement tools and resources to involve stakeholders. This structured and intentional approach towards involving and collaborating with citizens, as well as a proactive attitude towards improving citizen engagement, ensures that citizens have a say in Pittsburgh's development.

To further bolster citizen participation efforts, Pittsburgh has expanded social media services by enabling residents to tweet requests, stream leadership meetings on virtual platforms such as Youtube, and access key financial reports online.





NORTH AMERICA

## Scaling urban innovation through public-private collaboration

📍 SAN DIEGO, USA

The City of San Diego partnered with the Smart Cities Accelerator Labs + Environment (SCALE) and US Ignite to bring private industry, public organisations, and academics together to resolve San Diego's most pressing urban challenges. The IGNITE | SCALE | SAN DIEGO Innovation Program supports San Diego's smart city journey by jointly identifying key community challenges with city government officials which can be addressed through collective problem solving. In their 2020 iteration of the program, the challenge statements for the city included 1) Arts and Culture Engagement; 2) Mobility and Mode Sharing in Low to Moderate Income (LMI) Communities; and 3) New Interfaces for Communities to interact with the City of San Diego.

The Innovation Program utilises a combination of research and discovery, talent engagement, mentorship, and innovation challenges to arrive at feasible solutions and prototypes for real-world implementation through actionable programmes for the city or new business ventures. Innovation Challenge winners have the opportunity to present their findings and solutions to the City of San Diego as well as other stakeholders and sponsors. City officials are

also engaged as mentors and subject matter experts throughout the programme in areas such as city planning, arts, and culture, providing valuable insight to innovation teams. Collaborating closely with the San Diego City Government ensures that the technology solutions which are developed through the programme can be easily adopted in the city and that the solutions are well-tailored to address San Diego's unique context and needs.

IGNITE | SCALE | SAN DIEGO has seen meaningful innovations surface from past and current iterations of the Innovation Programme. This includes a computer vision and crowdsourced data-based solution enhancing road safety, a food rescue platform, a centralised cultural platform offering immersive cultural experiences, as well as a city permit optimisation solution. These innovations reflect the power of joint problem-solving among a wide range of stakeholders including data scientists, planners, design consultants, and nanotechnology engineers, to meet the complex needs of the city.



# **REGIONAL SHOWCASE**

# **South America**



SOUTH AMERICA

## Improving public services with technology

📍 BOGOTA, COLOMBIA

The city of Bogota has ambitions to become one of the most sustainable and inclusive cities in Latin America. It aims to ensure that the city is well-adapted to the realities of climate change, becomes a compact city, and advances towards being a more inclusive and integrated city as outlined in its 2013 revision of the Land Use Plan.

The City is known for its Bogota Abierta digital platform launched in 2016, which engages with its citizens and allows them to contribute ideas, proposals, and content to solve various problems in the city. It has been used to garner citizen feedback and support to design and formulate policies, projects, and initiatives, such as its Land Use and Regulation Plan as well as the City Development Plan. Since its inception, Bogota Abierta has received more than 950,000 visits and 35,000 contributions to offer ideas and solutions to improve the city.

The City also has plans to design, install, and operate more than 6,000 street displays across the city which include smart digital city information panels on bus shelters and bus stops. It is part of the City's efforts to deliver new services, communicate better with citizens through the panels, as well as enhance the city's cultural appeal. Some of these bus shelters will be powered by solar energy and LED technology, which helps to reduce their electricity consumption by about 60 percent.

# Smart mobility system for a safer city

 MEDELLIN, COLOMBIA

Medellin has embarked on its smart city journey since the mid-1990s and has achieved tremendous success. Almost the entire city population now enjoys free access to basic education, healthcare, transportation, and other services. Today, Medellin has also become a city that has embraced smart and sustainable mobility management.

The City adopted an intelligent mobility platform with the aim of empowering its mobility managers with tools to manage the city's traffic and transport. The platform integrates the monitoring and management of various systems including traffic lights; CCTV and automated incident detection; photodetection; logistics planning; incident management; information and broadcasting; as well as public transportation. The city enjoyed positive outcomes arising from this platform, such as a decrease in incident detection time from 35 minutes to 17 minutes, resource optimisation, less crowding, and an 18 percent reduction in traffic accidents.

A Collective Transport System was also implemented, where 383 Intelligent Bus Stops that included information panels, estimated arrival times, and braille displays for people with visual disabilities were set up across the city. An official transport app called the TPMED allows residents to access clear, precise, and verified data for them to map their journeys and plan their trips, including transport costs and estimated travel time.

The City has further ambitions to introduce 1,500 publicly-serviced electric vehicles in the next three years, and to make all its traffic lights energy efficient and low maintenance.





SOUTH AMERICA

## Developing an ethos of eco-citizenship

 CURITIBA, BRAZIL

The city of Curitiba launched a city-wide initiative in 1991 which allowed residents to trade recyclable materials for fresh produce, bus tickets, and even schoolbooks. Named the Green Exchange Program, it aimed to guarantee the sale of surplus crops and to promote recycling.

As a result of this initiative, the city has reduced about 70 percent of its landfill waste as of 2007, created employment with 600 workers employed in the program to sort recyclables, and even provided opportunities for low-income communities to travel to the city to work in better paying jobs. The success of the program has also led to the creation of the Special Green Exchange Program in 2016 for schools and organisations to exchange biodegradable waste for school supplies and other essentials.

The City focuses on building eco-citizenship through innovative ways, encouraging residents to take ownership of their responsibilities in contributing to sustainability efforts. For example, the City transformed old buses into mobile schools called the 'lighthouses of knowledge', to provide education on sustainability, along with a library and free Internet access for its residents. Electronic displays are also put up in public spaces to represent the number of trees that were saved as a result of the city's recycling efforts.

# Empowering citizens through digitalisation

📍 BUENOS AIRES, ARGENTINA

To provide wider access and ease for its residents to participate in budgeting processes, the city of Buenos Aires saw its first digital participatory budgeting platform called 'Elige' launch in 2017. With the platform, the City received more than 25,000 resident proposals monthly, which can be voted on by other citizens to show their support. Proposals can be made across 11 categories including innovation; culture; education; quality of life; urban art; fairs and markets; and safety. The selected proposals are allocated a total of USD 30 mn from the city's budget and put up on the city government's procurement site, which will then be tracked and monitored for progress updates.

In 2019, the City also expanded the platform to include additional features, allowing residents to collaborate and build on ideas together. Interested residents can also take part in proposal co-creation ideation sessions with the city government.

Aside from the platform, the City has made commitments to ensure that all students above five years

old receive digital education, by distributing laptops throughout its schools, and providing digital education training for its teachers. The City also developed the '+simple' app which allows the elderly to access news easily, and has distributed 20,000 tablets with the app pre-loaded. Its aim is to reach out to 100,000 elderly to ensure that they are digitally-engaged.





SOUTH AMERICA

## Rejuvenating the city's historic centre to attract innovation

📍 GUADALAJARA, MEXICO

Guadalajara is Mexico's second largest city and is also known as the country's very own Silicon Valley. To drive long-term economic development and strategic growth in the state, and tap into the city's potential as a future economic cluster for the digital and creative industries, the City embarked on a journey to develop a digital creative hub within the historic centre of Guadalajara.

The project was named 'Ciudad Creativa Digital (CCD)', an innovation hub with the objective of spurring growth, investment, and employment for the digital media industry within Mexico. This includes creative industries across TV, film and cinema, advertising and video games, 3D and digital animation, interactive multimedia, and e-learning. It is located at the historic centre of the city where crime, poverty, and sales of drugs has historically been common. As such, the City strategically selected the area to be transformed and rejuvenated as the home of innovation and tech companies.

The concept master plan outlines high standards for innovation and efficiency across a series of design principles, infrastructure elements, and sustainability targets. For example, the district will develop local and decentralised sources of renewable energy to reduce energy usage, and will also recycle wastewater and rainwater to minimise water consumption. The plan also includes the design and implementation of a digital platform which aims to use real-time data along with cloud services, sensory networks, and the built environment. These initiatives aim to provide an attractive environment for companies to live, work, and play.



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