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Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific

SOM Steering Committee on Economic and Technical Cooperation

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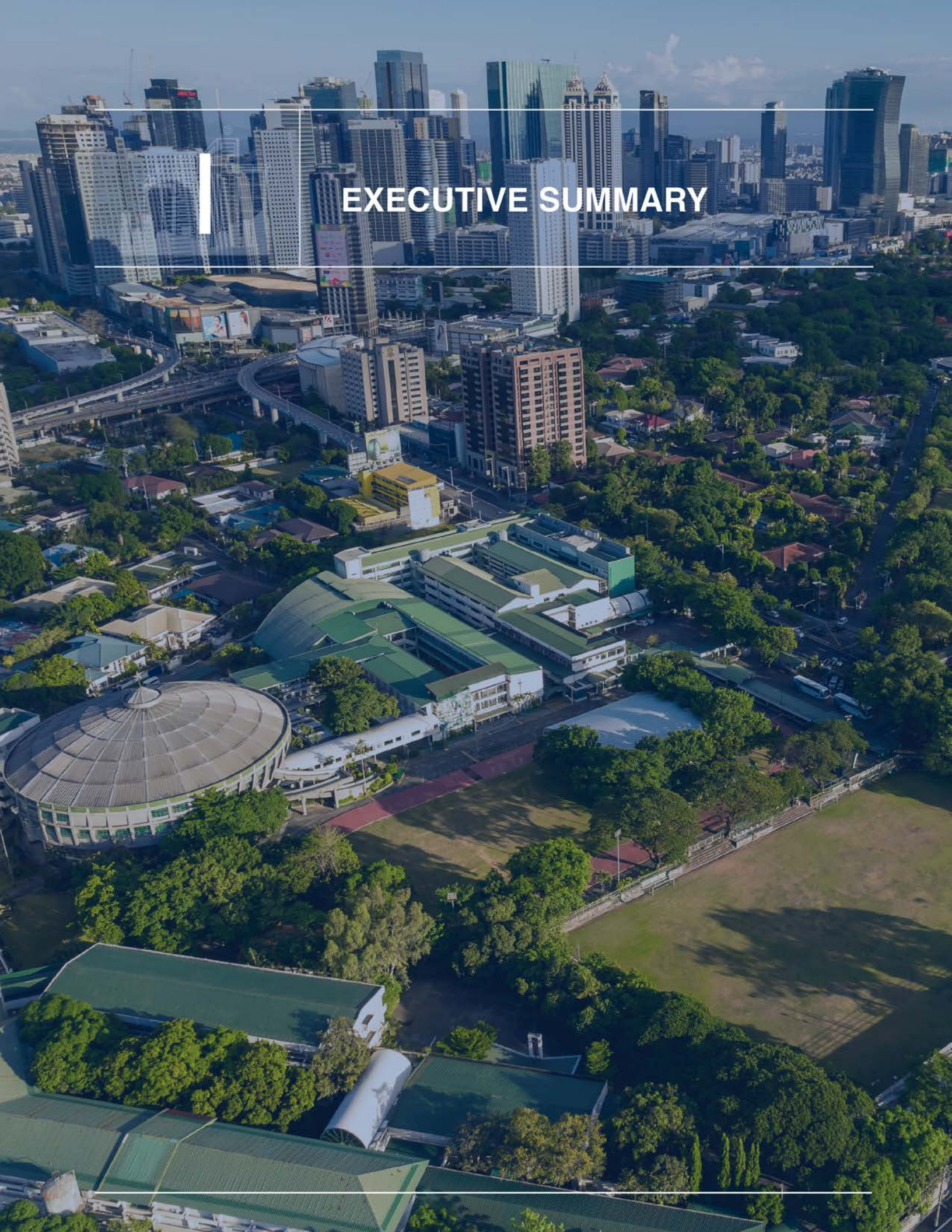
Glossary

AI	Artificial Intelligence
APEC	Asia-Pacific Economic Cooperation
APSEC	APEC Sustainable Energy Center
AWS	Amazon Web Services
BCG	Bio-Circular-Green
CO2	Carbon Dioxide
ENAMOV	Domestic Strategy for Mobility and Road Safety of Mexico
ESCI	Energy Smart Community Initiative
FTAAP	Free Trade Area of Asia Pacific
GDP	Gross Domestic Product
GMT	Greenwich Mean Time
GPS	Global Positioning System
ICT	Information and Communication Technologies
IoT	Internet of Things
LCMT	Low Carbon Model Town
PECC	Pacific Economic Cooperation Council
SDG	Sustainable Development Goal
SME	Small and Medium Enterprises
UN	United Nations



EXECUTIVE SUMMARY

Sustainability has become a fundamental topic in the discussions among Asia-Pacific Economic Cooperation (APEC) economies around the globe. This is due to the fact that the world's population is increasingly facing a range of impacts resulting from climate change and the transformation of natural and urban habitats. APEC member economies are home to 14 (half) of the Earth's mega cities. In addition to this, 74% of APEC region's total population is expected to live in cities by 2040.

This brings several challenges for different sectors, such as: transport, healthcare, infrastructure and security, and for governments to improve urban spaces and circumstances, ensuring livable conditions for inhabitants. At the same time, cities are the engines for economic growth and innovation, which brings important opportunities for the sustainable development of urban areas. Therefore, planning and overall city management will benefit from digital technologies.

Making cities greener, more inclusive and sustainable requires innovative measures, exploring both policies and technologies related to sustainable urban development, especially in the sectors of infrastructure, smart logistics, transportation systems, digital services, renewable energy and among others.

Against this background, **APEC is actively fostering knowledge sharing activities and technical discussions across its member economies.** Among many APEC projects by various economies on this subject, the 2021 published APEC Case Study Report "Best Practices of Smart Cities in the Digital Age" (SCE 022019S) presented twelve exemplary case studies shared by APEC economies in order to spread ideas and knowledge about smart solutions, which focus on better life conditions for their urban citizens.

Aligned with this purpose, the "APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific" (SCE 02 2023S), co-hosted by Chile and China APEC Teams in September 2024, was in part a follow-up activity on smart city solutions and best practices, to update on recent developments, achievements and pending challenges to address.

The symposium was attended by speakers and participants from 15 APEC economies, including Australia; Chile; China; Indonesia; Korea; Malaysia; Mexico; Papua New Guinea; Peru, the Philippines; Russia; Singapore; Thailand; the United States, and observer organizations such as the Pacific Economic Cooperation Council (PECC) and the APEC Sustainable Energy Centre (APSEC). Additionally, representatives from international entities such as the Global Innovation Forum and the Smart City Council were in attendance. The symposium featured a series of presentations of exemplary city initiatives in various related thematic areas, with the objective of fostering knowledge exchange across APEC members. This publication presents a summary of the key findings from that in-depth experience sharing event among speakers and participants, aiming at contributing ideas and wisdom to APEC sustainable cities' development.

During a two-day discussion, the symposium has provided the following findings and recommendations:

Several existing sustainable city initiatives relay on the use of digital technologies like Blockchain, Big Data, Interoperability of different technologies, sensors, Internet of Things (IoT) and Artificial Intelligence (AI). On the one hand, these allow the prioritization of efforts and resources (e.g. open real time data about traffic congestion or air pollution), facilitating decision-making, for example, through intelligent traffic management or clean mobility solutions. They may also allow tracking the impact of measures over time, as well as comparison between development levels between different APEC economies.

- The development of low-carbon cities is a crucial part of sustainable cities development. **Policies and regulations should consider the need to be**

based on nature, ecosystems and biodiversity protection. Sharing data about the specific economic impacts (costs) of climate change may be key to drive investment in mitigation and adaptation measures, as well as setting up green funds covering different economies and sectors.

- In line with the APEC's inclusive development agenda, the creation of sustainable cities entails the development of sustainable management and city planning measures that encompass social aspects and adopt collaborative methodologies. Additionally, **effective communication and co-creation approaches are essential to guarantee access for all demographic groups, including women, youth, the elderly, and other economically marginalized communities.** Capacity building of all affected stakeholders is key to ensure their inclusion in any project or policy creation process.

- The need to build resilient cities was repeatedly mentioned. Member economies are advised to address the challenge of securing all the services cities need to provide a large and growing population.

- It is important to share best practices and examples, but at the same **time it is crucial to think locally, considering that each possible solution needs to be embedded in the specific local context and ecosystem.** Several sustainable city initiatives have the potential to be replicated across APEC economies, but these always need to be adapted to local conditions and needs to be successful.

- An aligned policy approach of spatial and urban planning is key. This requires aligning both domestic as well as regional and local planning to ensure the overall success of initiatives.

- The role of the private sector, specifically Small and Medium Enterprises (SME's), is important when developing projects, as those may be able to move quicker than large companies or public entities when developing innovative solutions and implementing pilot projects to test new applications and solutions. **Strategic collaborations between large and small and medium enterprises have shown success.** Moreover, public-private collaboration, including research and development institutes and academia, is the recommended approach to follow.

- Some initiatives are of utmost interest, given their replicability within a singular economy, such as the Carbon Neutral Campus initiative led by APSEC, since universities often have multiple campuses, allowing for greater impact with fewer resources.

- **There is an overall alignment and common understanding between all APEC member economies about the urgency to act in a coordinated way and based on consensus to address climate change related impacts, by fostering innovation based on social, economic and environmental sustainability.**

1 INTRODUCTION

The concept of sustainability has become a fundamental issue for discussion in economies around the globe. This is due to the fact that the world's population is increasingly facing a range of impacts resulting from climate change and the transformation of natural and urban habitats.

As stated by APEC Chile Senior Official, Ms. Marcela Otero "although cities occupy only 3% of Earth's land area, they account for between 60% and 80% of energy consumption and 75% of carbon emissions." Moreover, more than half of the world's growing population - 56% - lives in urban areas, with growth expectations reaching up to 68% by 2040. This global trend is also observed within the Asia-Pacific region: 74% of the region's total population is expected to live in cities by 2040, increasing their density. **APEC member economies are home to 14 or half of Earth's mega cities** (Figure 1).

Already in 2018, Tokyo had the largest population of the world's capital cities with over 37 million people, followed by Delhi with over 28 million and Mexico City with 21 million. Urban spaces thus face challenges in terms of urban infrastructure, public services and environmental protection, with the necessity of being adapted to a higher density of population in a sustainable manner.

At the same time, as highlighted by Ms. Lu Mei, China APEC Senor Official, **cities are the engines for economic growth and innovation**, which brings opportunities for a sustainable development of urban spaces, using digital technologies to improve planning and management of diverse areas.

Making cities greener, more inclusive and more sustainable requires innovative measures, exploring both policies and technologies related to sustainable urban development in infrastructure, smart logistics, innovative transportation systems, digital city management, and renewable energy, among others.

In light of these considerations, **sustainable city development has emerged as a key priority for APEC and its member economies.** To this end, APEC is fostering cooperation within the Asia-Pacific region of a number of initiatives, including knowledge exchange on best practices and roundtable discussions with experts.

This report is part of APEC's ongoing commitment to driving sustainable and smart urban development in the Asia-Pacific region. Our goal is to make cities cleaner, safer and better places to live, with a focus on enhancing the well-being of individuals.

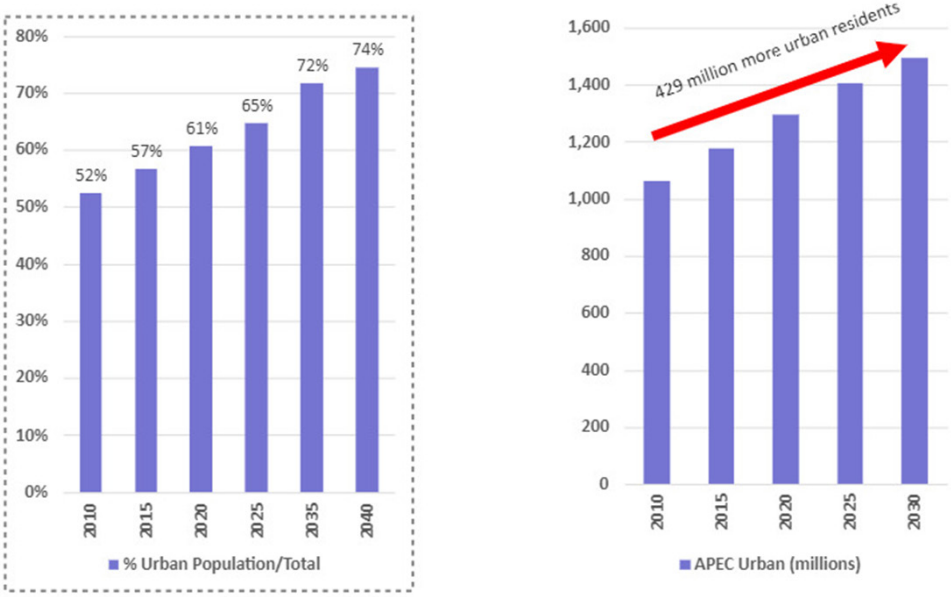


Figure 1. Urbanization in the Asia Pacific. **Source:** Presentation by Mr. Eduardo Pedrosa, PECC (2024).

In 2021, the APEC Case Study: Best Practices of Smart Cities in the Digital Age (SCE 02 2019S) presented different strategies and case studies of smart city solutions using digital technologies among APEC economies. Exemplary initiatives from Canada; Chile; China; Japan; Malaysia; Thailand; The Philippines; and Viet Nam covering topics around energy, infrastructure and transport were explained in that report, outlining their specific outcomes, impacts, benefits, investment and operational costs, stakeholder engagement approaches and implementation challenges. Also the effect of COVID-19 pandemic on smart city initiatives was analyzed in the mentioned publication.

In August 2024, APEC hosted the "Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific," a two-day virtual event that featured a series of presentations on exemplary sustainable city initiatives. These presentations were delivered by leading experts in various related thematic areas and APEC economies, with the objective of fostering an Asia-Pacific community with shared prosperity. **This report presents a summary of the key findings from an in-depth experience sharing event among speakers and participants. It also outlines the current plans and strategies of different APEC economies that are already driving the transformation of their cities towards more livable spaces for future generations. The publication aims to contribute ideas and wisdom to APEC sustainable cities development.**

During the introduction of the Symposium, Mr. Renato Reyes, Peru APEC Senior Official, stated that **low carbon production patterns and the use of emerging technologies are relevant for advancing sustainable economic growth, and consensus and spirit of cooperation are key to achieve economic prosperity among APEC economies.** In this line, innovation and digitalization are among Peru's priorities to promote the transition from its informal economy to the formal and global economy, together with an inclusive and sustainable approach, e.g. by fostering dialogues with the business community and academia. Peru mentioned that the APEC Roadmap to promote **the transition to the formal economy, one of the deliverables they are seeking for this year, also considers a nexus with digital technologies** that are seen as a tool to facilitate that important transition. APEC Peru also highlighted the opportunity of building more inclusive trade and to achieve sustainable development through the Free Trade Area of Asia Pacific (FTAAP); the development of an APEC policy guidance to develop and implement clean hydrogen policy frameworks in Asia Pacific to decarbonize various productive sectors; and the Just Energy Transition Initiative, aiming at sharing Just Energy Transition best practices among APEC member economies.

Thailand's Alternate APEC Senior Official Ms. Salinee Phonprapai highlighted the Bangkok Goals on Bio-Circular-Green (BCG) Economy that focus on climate change mitigation, sustainable trade and investment, Environmental Conservation and waste management, and under which **381 APEC initiatives and projects related to sustainability have been launched across APEC Region since 2022**, showcasing APEC's successful work in adopting and implementing an ambitious sustainability agenda.

According to APEC Secretariat's Executive Director Ms. Tan Sri Dr. Rebecca Sta. Maria, **cities are living organisms.**

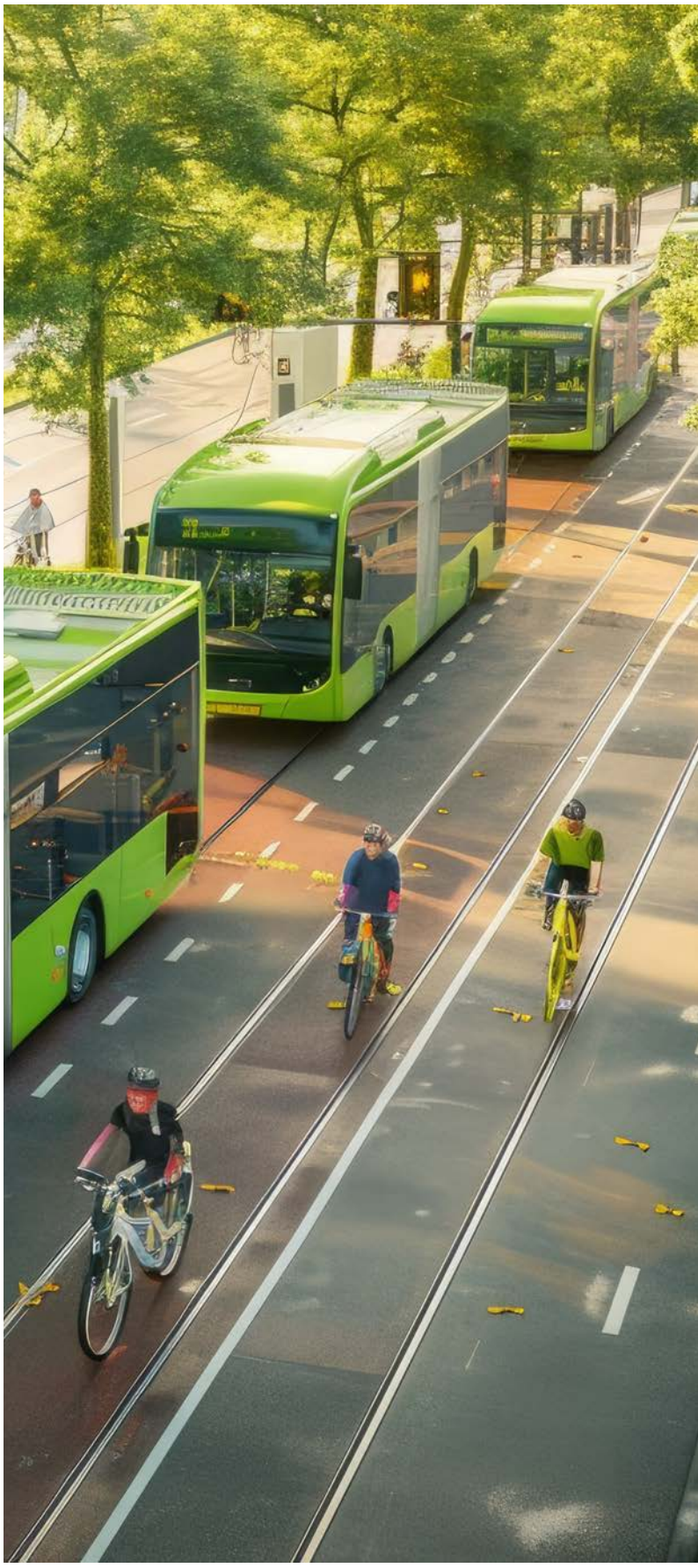
"A city is born, it consumes and recycles, and in its own way. Cities interact with their environments in different ways, some harmful and some in a damaging way, demanding and consuming more resources than available."

Ms. Tan Sri Dr. Rebecca Sta. Maria, APEC Secretariat's Executive Director

She further remembered that APEC's focus must be on advancing policies across all member economies aimed at growing in sustainable and resilient ways, considering sustainability in its three dimensions: socially, economically and environmentally, as "**the fate of cities lies in our hands".**

As Ms. Hera Kevau, Papua New Guinea APEC Senior Official outlined, in the momentum of the need to rethinking growth strategies, **Constructive dialogues between different actors and experts and discussions on digital economy are key** for APEC's inclusion agenda. Those can **avoid duplicating efforts and ensure that value is being added** to already existing ideas, ideally materialized on behalf of public-private-partnerships as an intrinsic part of the equation.

The vision of the United Nations (UN) Sustainable Development Goal 11 to make cities and communities inclusive, safe, resilient and sustainable, has never been more critical than today, as Ambassador Mr. ZHAN Yongxin, the Co-Chair of the Pacific Economic Cooperation Council (PECC) remembered. He further raised attention to the fact of **moving from vision to concrete action and investment is the challenge to be addressed,** taking advantage of the considerable room for cities to cooperate and to share experiences.



PROMOTING THE DEVELOPMENT OF SUSTAINABLE AND LOW-CARBON CITIES THROUGH THE USE OF DIGITAL AND OTHER EMERGING TECHNOLOGIES

Digital technologies are a powerful tool to improve and facilitate decision making, for example when needing to prioritize time and economic investment. Besides this, emerging technologies like blockchain and the use of Big Data in conjunction with geo-spatial and other information provide urban planners with orientation on what is key to address, and allows to solve urban issues efficiently, transparently and safe.

As presented by Ms. Alejandra Labarca, **the basic characteristics** and added values of blockchain are:

01. Decentralization, as it records transactions without central authority.

02. Transparency, as blockchain provides an immutable and transparent record of all transactions, enhancing trust and accountability.

03. Security, as blockchain's cryptographic protocols ensure the security and integrity of data, protecting against fraud and manipulation.

All three aspects are key in a society where more and more processes within different sectors are being digitalized. **Blockchain technology has a wide range of potential applications.** It can be used in the following ways:

- Help to address the challenge of integrating diverse technologies and ensuring interoperability among them
- Democratize access to public services and empower citizens, reducing the risk of exacerbating inequalities.
- Aid in governance and compliance, as it provides transparency.

Besides transparency, blockchain offers the opportunity to make public services more efficient, by using smart contracts based on blockchain that can automate and streamline different processes and thus improve service delivery; and to enable citizens to have a direct say in urban development through decentralized platforms.

The Brooklyn Microgrid initiative, a community-driven project consisting in a platform that since 2016 facilitates direct electricity trading between consumers and prosumers, showed a positive performance of a peer-to-peer energy exchange: by automating and executing agreements between different microgrid participants, renewable energy adoption and grid resilience could be promoted.

Also The Chinese Taipei's Blockchain Governance has shown that electronic voting can be secure and tramper-proof, that using blockchain-based identities can improve public service, medical care and insurance access, and that token-based rewards for community participation have increased civic engagement (Figure2).

Source：Taipei City Government

Figure 2. Chinese Taipei's Blockchain governance.
Source: Wei-Han, Lee (2022): New Value of Digital Asset: Taipei City Governments Introduction of Blockchain Application. Taipeiecon online (09/2024).

Becoming an aging society, Chinese Taipei estimates a 20% elderly population percentage in 2025. An aging population increases the demand for medical resources, and geographical inconvenience for rural areas makes those resources harder to reach, making telemedicine a trend worthy of further cultivation[1]. To solve the problem the medical personnel operating in remote areas face which is the difficulty of making medical records inquiries, Taipei City Hospital in 2020 built **the Care Info Integration Platform powered by blockchain technology.** This platform allows medical institutions to directly access patients' records across various systems that are authorized by the citizens via smart contract. According to Wei-Han, Lee (2022), "the decentralized design of the platform for storing medical records not only reduces the information security risks the centralized way of data storage often is exposed to, but also makes the care services more efficient and the quality of medical care higher."

These examples, but several more, lead to the conclusion and recommendation that **blockchain technology should be considered as a critical tool for sustainable city development;** that it can foster transparency and thus attract investment and build trust in urban governance; and that it can empower communities by promoting civic engagement.

Within the People's Republic of China, Shenzhen has distinguished itself as a pioneer in low-carbon economic development. Its sustainable growth strategy is anchored in the deployment of digital and green technologies, which are being leveraged to enhance urban infrastructure across multiple sectors.

As Dr. JI Xinye, Shenzhen Development and Reform Research Institute China, presented in the Symposium, some main breakthroughs in this context include the reduction of energy consumption and carbon emissions, as well as more efficient and intelligent water use. The city multiplied the use of Electric Vehicles and reached zero-landfill waste based on waste incineration, urban mining and recycling (even of batteries). The city made also efforts in the decarbonization of newly constructed buildings, **applying digital and green technologies transversally,** (Figure 3).

With the progress of digital technologies, enhancements in energy-saving buildings have been achieved. Combining IoT sensing, AI decision-making and a marginal/distributive controlling algorithm, several state-of-art applications have been developed to reduce the energy consumption of buildings' operation, which account to over 40% of the buildings' lifecycle emissions (Figure 4).

Figure 3. Shenzhen's transversal digital technology application.
Source: Presentation by Dr. JI Xinye, Shenzhen Development and Reform Research Institute China (2024).

1 Wei-Han, Lee (2022): New Value of Digital Asset: Taipei City Governments Introduction of Blockchain Application. Taipeiecon online: https://www.taipeiecon.taipei/english_cont.aspx?MSid=116237360002203032 6&MmmID=4002&CatID=744725544402432171, accessed 09/2024. accessed 09/2024.

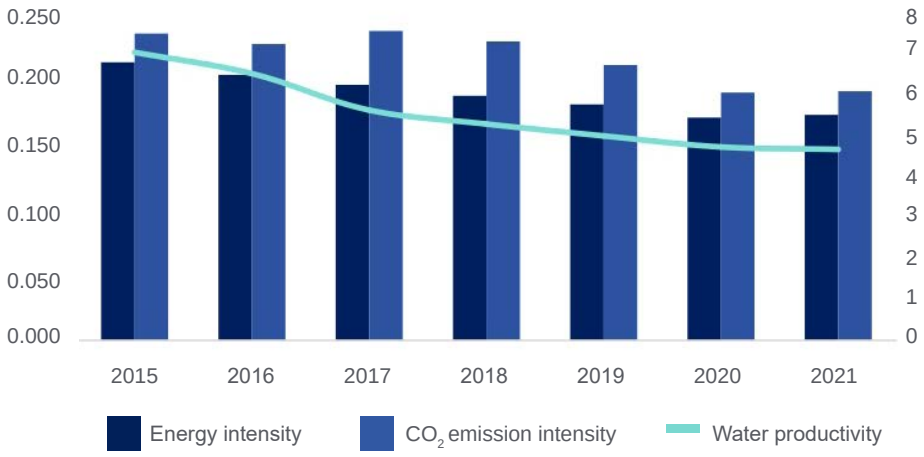


Figure 4. Shenzhen's energy and CO_2 emmision reductions achieved by using digital and green technologies in different urban sectors
Source: Presentation by Mr. Dr. JI Xinye , Shenzhen Development and Reform Research Institute (2024).

The importance of the use of digital information and data was further highlighted by Mr. Eduardo Pedrosa, Secretary General of PECC, who raised awareness on two key issues:

A

The increase of economic costs of damages resulting from the impacts of climate change (e.g. flood results: damaged roads, buildings, effects of droughts on agricultural products, etc.), that are mainly concentrated in urban areas and that are an important reason to adopt sustainability transversally in economic sectors and urban processes; and

B

the increased need and demand for (more) efficient urban transport in line with population growth, which could increase emissions further on.

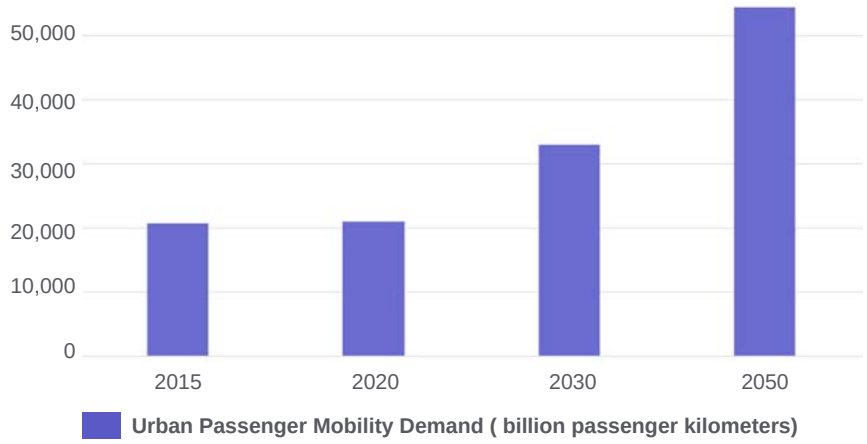


Figure 5. Demand for urban passenger transport among APEC economies
Source: Presentation by Mr. Eduardo Pedrosa, PECC (2024).

Not only will the use of simple, independent technologies and data facilitate smarter urban processes, but also the **interoperability of different technologies** and the integration of data from different sources.

According to Mr. Mark Verheyen, interoperability is understood as "the ability of two devices or applications to perform a given task using a single set of rules, e.g. two components are interoperable if they can both operate in a system as intended, typically facilitated by an ability to share a common defined set of information. This is needed for devices that communicate within a system but have different functions such as a controller and a router." Further, advantages of interoperability lie in the **ability to use the best components from different vendors, modify and expand a system when required, to manage component obsolescence, and to adopt future communication technologies**' (Mark Verheyen (2024)).

As Mr. Mark Verheyen stated, **interoperability can result in a reduction of the total cost of ownership and avoid vendor lock-in**. In terms of Smart City Lighting, interoperability may help different, nearby municipalities to **connect and share data.** It is key that municipalities and cities start to collaborate and to communicate, and to integrate smart solutions like efficient and intelligent city lightning, improving security for people.

The city lightning example was selected for its significance as a foundational step in cross-local digital communication and interoperability. Frequently, lightning controls are the initial technologies deployed in cities, as they often result in significant energy savings, which can offset equipment and installation costs.

Additionally, lightning installations serve as an optimal foundation for other technologies and applications, as they are distributed across the territory and are "ready-connected" with electrical power.

An open, interoperational and standardized protocol for communications can ensure adding new, improved applications in the future, while these devices can ensure data sharing in the future, following the example of the two municipalities of Aurora and Naperville in Illinois, United States.

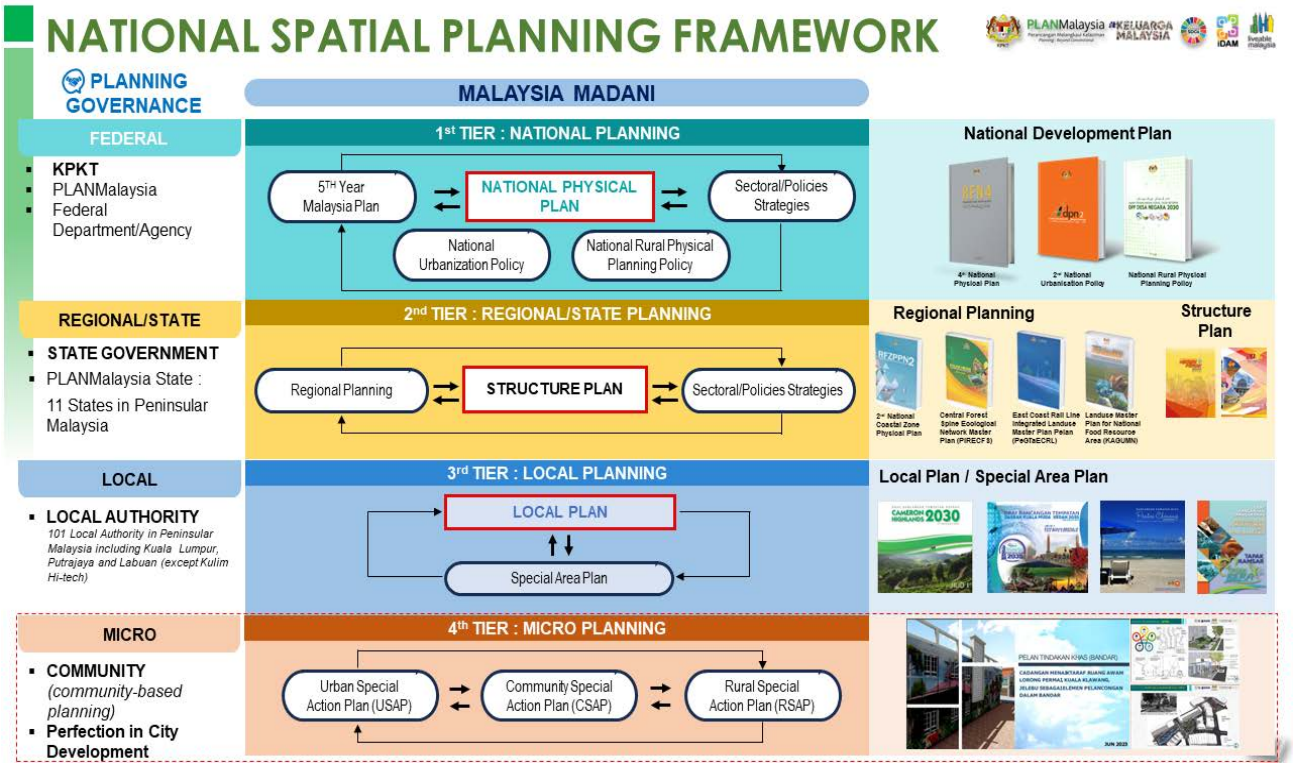


Figure 6. National spatial planning framework by PLANmalaysia.
Source: Presentation by Mr. Dr. Hj. Dzul Khaimi bin Khailani, Deputy Director of the research & Development Division, PLANMalaysia (2024).

An important example of sustainable urban development was also shared by PLANMalaysia, the Department of Town and Country Planning under the APEC economy's Ministry of Housing and Local Government: after having recognized the importance of climate change mitigation and adaptation through the **Malaysian Disaster Resilient City Planning Guideline released in 2019**, addressed to local authorities to foster climate resilient building designs, urban services, waste management, transportation systems and governance; the economy is currently in the process of promoting **Low Carbon City Planning Guidelines.**

Mr. Dr. Hj. Dzul Khaimi emphasized the relevance of an **integrated spatial planning** framework, where **both governance and strategic planning shall be aligned on federal, regional/state, local and even micro level,** (Figure 6).

This example is key not only for infrastructure planning but also all other urban sectors of relevance.

Considering the diverse stages of digital transformation across APEC economies, the following potential strategies may ensure that the benefits of smart city technologies such as interoperability and innovative solutions are accessible to both developed and developing economies in the region:

- Setting up an APEC-wide **database** sharing successful standards, best practices and regulations, etc. may be a useful tool
- In financial terms, **green funding is needed, e.g. for building renovation that needs large capital investments and long paybacks.** Green funds may serve to support SMEs, for example, that have the benefits of being able to move quicker than large entities and may be able to collaborate with SMEs in other economies or to replicate initiatives from one APEC economy in another.

IV

SUSTAINABLE AND LOW-CARBON CITIES WITHIN APEC ECONOMIES: INNOVATIVE DEVELOPMENT IN SECTORS SUCH AS TRANSPORTATION, ENERGY, INFRASTRUCTURE AND WASTE MANAGEMENT

Technological development is a key factor in both the mitigation of and adaptation to climate change. The use of data is essential for making informed decisions and tracking progress.

Mr. Eduardo Pedrosa also referred to sustainable transportation in the context of **growing population and resilient cities.**

People are more and more concerned about climate change and its economic effects since an increasingly number of disasters are hitting urban areas, mainly affecting infrastructure, which is normally not insured, posing an important fiscal burden.

The main issues of urbanization in the next 20 years lie in the fact that 74% of the APEC economies' population will be living in cities, which amounts to 429 million people doubling the current number. The resulting **traffic congestion and pressure on key urban services will have a significant impact on the efficiency of people's daily journey** from home to work and back. In some cities, the costs of this congestion can reach an estimated 64 million dollars per day in terms of lost productivity. Mr. Pedrosa highlighted the need to look at this challenge in the context of sustainable cities and to find solutions to reduce people's travel times.

Next to this, the demand for public transport is also expected to rise significantly by approximately 20 thousand billion passengers by 2050. Given the increase in the demand for urban services, transport and cars, among others, this will also bring a rise in Carbon Dioxide (CO_2) emissions, hence electrifying mobility is an important solution to mitigate those impacts.

In this effort, **Mr. Ethan MA, Group Deputy General Manager, Shenzhen Bus Group, China,** presented the strategy implemented by the Shenzhen Bus Group Ltd., a leading e-bus and e-taxi operator, with more than 5000 buses and over 7000 taxis, (Figure 7).

Their digital evolution includes safety management solutions, intelligent operations, passenger data-driven optimization, smart dispatching systems as well as fast charging operations. Through their view of carbon reduction driven by new technologies, energy efficiency and circularity, they are investing in research and development of the recycling of retired power batteries, vehicle-to-grid solutions, route flexibility and smaller vehicles to reduce energy consumption.

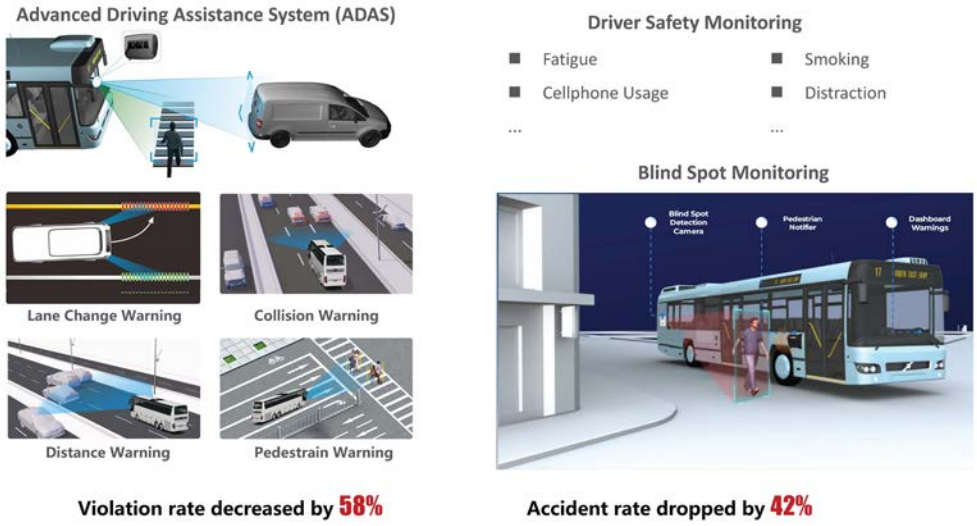


Figure 7. Safety management solutions implemented by Shenzhen bus group LTD.
Source: Presentation by Mr. Ethan MA, Shenzhen Bus Group (2024).

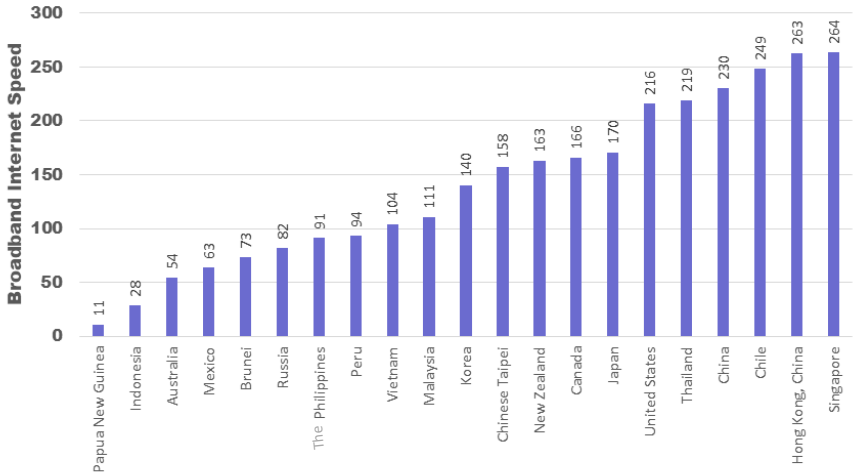


Figure 8. APEC Economies' access to broadband (2023). **Source:** Presentation by Mr. Eduardo Pedrosa, PECC (2024).

Not only will adopting greener technologies improve urban transport related challenges like longer travel times during peak hours, but also improvements in its management and efficiency. The latter requires using Big Data in conjunction with Geo-Spatial data to provide urban planners with information about e.g. population movements and their proximity to risk zones that otherwise, are difficult to collect (e,g. versus household surveys) but that are elemental to take the right decisions, to measure performance and to be able to track improvements over time.

Mr. Eduardo Pedrosa referred to the Data-Driven Planning in Toronto, Canada, where adaptive traffic signals operate using real-time data, and where a big data platform that integrates information from various sources, including Global Positioning System (GPS) data from vehicles, data from public transit systems, and information from traffic sensors and cameras, optimizes traffic management and thus time of movements. The city also has enhanced public access to real-time traffic data through collaboration with Navigation Apps, following a very complete, integrated approach using different technologies to improve urban mobility for its inhabitants.

This is an objective of APEC's Internet and digital economy roadmap, since as can be seen from the table presented by Mr. Pedrosa, there is still huge differences among economies (Figure 8).

Around 20% of the population spends some time working remotely. Remote work can bring down congestion during peak hours. But this means cities will need to offer more broadband access at affordable prices.

Another example of sustainable transportation was presented by Wendy Casanova, the Chief of Transport Safety in the Transport Institute of Mexico.

The perspective is to base Mexico's mobility policies on people's rights: The Domestic Strategy for Mobility and Road Safety (ENAMOV) Published on June 22, 2023, follows the same guiding principles, prioritizing the rights of communities in vulnerable situations and ensure effective implementation. With the publication of this law, a local mobility and road safety system was created, and the Mexican states are harmonizing with the legislation; by the end of 2023, 47% of the states had harmonized their local policies with the general law (Figure 9).

Figure 9. Issues addressed by ENAMOV Mexico.
Source: Presentation by Ms. Wendy Casanova, Transport Institute of Mexico (2024).

The People's Republic of China, has the mission to build an inclusive, shared, and sustainable urban transportation system. This led to the establishment of the Law of the People's Republic of China on Building Accessible Environments, which officially came into effect on 1 September 2023. The law contains provisions regarding the construction of accessible facilities, accessible information exchanges and social services, guarantee measures, supervision and management, and liability.

Ms. Xiaofei Liu, Associate Researcher, China Academy of Transportation Sciences of China, addressed the main initiatives being carried out to address the needs of accessible environments.

The aging population trend in China is severe. By the end of 2023, the population aged 60 and above reached **297 million**, accounting for **21.1%** of the total population. The number of persons with disabilities is large has exceeded **85 million.** The demand for age-friendly and accessible transportation is growing rapidly (Figure 10).

In the light of China's ageing population and disability rates, the need to have age-friendly transportation is crucial. The goal is therefore to provide safe, affordable, accessible, and sustainable transportation systems for all, improve road safety, particularly by expanding public transportation, and pay special attention to the needs of those in vulnerable situations, including women, children, persons with disabilities, and the elderly.

Figure 10. Accessible design driven by inclusive principles.
Source: Presentation by Ms. Xiaofei Liu, China Academy of Transportation Sciences of China (2024).

Some measures in China's transportation systems include access designed for wheelchairs, mother and baby rooms, guides for the visually impaired, and technology-based guides, maps and information tools.

However, governments cannot do all the work without the collaboration from the private sector. Ms. Hua Wang, Executive Director of the Global Innovation Forum, United States, presented valuable examples of public-private collaboration and inclusion of SME's.

Microsoft. Through its CityNext initiative, it is helping cities across the world to use cloud computing to manage resources, analyze data, and improve services. Google Cloud and Apple are playing their part by enabling cities to gather real-time data and engage with citizens securely and efficiently.

SMEs are like the hidden gems of the urban innovation world, according to Ms Hua Wang. They are agile, quick to adapt, and highly innovative. But they often need support to scale-up their solutions.

In Japan, the SME Whill is revolutionizing personal mobility with electric wheelchairs. They have partnered with Microsoft Azure and Google AI to make cities more inclusive for people with disabilities. Cities are about individuals—and that includes everyone, no matter their mobility needs.

SolarCity in New Zealand is changing the game by deploying IoT-powered solar energy systems. By working with Amazon Web Services (AWS), they are helping cities reduce their carbon footprint, a move that is critical for a sustainable energy future.

In terms of waste management, companies like Microsoft and Apple have committed to zero waste by 2030. With data-driven waste management, they are leading the way toward a cleaner, greener future.

The challenges of public-private transportation lie in the totally different nature and motivations of each sector.

Thus, governments may present problems that need to be solved through innovative solutions, and developers can present their ideas. A small pilot can lead to big solutions.

V

SUSTAINABLE CITY PLANNING AND INFRASTRUCTURE UPGRADING TO ENHANCE RESILIENCE OF CITIES AND PUT PEOPLE FIRST

Enhancing energy efficiency in housing can bring numerous social co-benefits. It has a large potential to improve living conditions, people's health, address the issues of energy affordability and, as a result, to mitigate social inequality and foster social cohesion.

Russian case study, presented by Ms. Tatiana Zheltonozhko, (Deputy Director of Center for Economy of Innovation of Institute of Macroeconomic Research Russian Foreign Trade Academy under the Ministry of Economic Development of the Russian Federation), proves the benefits of transitioning from the current housing model to energy-efficient design, based on a comprehensive approach including utilities and interrelated organizations.

There are economic benefits, since housing upgrading allows for redistribution of financial resources and balancing budgets. Yet there are challenges in tougher climate zones, lack of investors, costly renewable energy storage systems, among others.

However, energy efficiency retrofitting requires approximately from 8% to 10% of extra capital investments. The payback time in some climate zones in Russia is too long for investors. Therefore, the suggestion would be to have a comprehensive development territorial plan with the participation of all stakeholders including financial scheme and shared experiences and data.

Prof. ZHU, L. President of the APEC Sustainable Energy Center (APSEC), presented interesting insights from the Energy Smart Community initiative (ESCI) and Low Carbon Model Town (LCMT) projects. The APSEC was established at the 11th APEC Energy Ministers' Meeting in 2014. Its establishment is an important result of China's active response to the initiatives of APEC leaders and participation in energy cooperation in the Asia-Pacific region and was included in the 11th APEC Energy Ministers' Statement and the 22nd APEC Leaders' Declaration.

Following providing the following context, Professor ZHU, L. presented the Carbon Neutral Campus initiative, which seeks to collaborate among universities from different economies to share experiences through low-carbon initiatives.

The APSEC initiative consists of three task areas as follows:

01.

Establishing an APEC regional urban energy data system. Support and monitor the achievement of carbon neutrality in cities through local energy and climate data.

02.

Establishing an APEC regional carbon neutral city exemplary practices project database. Select and award exemplary results at the city scale through the establishment of different types of rewards and develop a database of exemplary carbon neutral city projects to promote technology exchange and experience sharing.

03.

Compile and release an annual report on urban energy in APEC. Based on the proposed urban energy data, compile a development report on APEC urban energy, and release it to APEC economies.

It is worth noting that these kinds of initiatives are of great importance, given their replicability within a singular economy. The project's scalability is a key advantage, as universities often have multiple campuses, allowing for greater impact with fewer resources. This includes areas such as information management, project management, traceability, and more.

Tianjin University has carried out a series of work in the field of Carbon Neutral Campus:

- Completed energy consumption research on nearly 7000 public buildings in 5 districts of Tianjin, covering over 1000 educational buildings.
- Conducted data audits on nearly 30000 public buildings and approximately 5000 educational buildings in the city.

- Completed the campus energy audit of Nankai University.
- Conducted research on improving energy efficiency in primary and secondary school buildings in Tianjin and have analyzed no less than 300 primary and secondary schools.
- Advocated the implementation of the "Carbon Neutral Campus" construction action in Haihe, China (Tianjin).
- Applied for and undertaken the major project "Key Technology Research and Application Demonstration of Carbon Neutral Transformation of Existing Campus New Energy System" by China Yangtze Power Corporation.
- Develop and release the group standard "General Requirements and Evaluation Guidelines for Carbon Neutral Campus Construction Management" (T/TJKZS0001-2024).

Ms. Norliza Hashim, Chief Executive Officer of Urbanice Malaysia, presented the results of this notable initiative. As many other economies, in Malaysia 26M people live in urban areas and is expected to reach 41M. 65% of their Gross Domestic Product (GDP) is contributed by urban economy, which means they need a lot of energy for transportation and industries. In parallel, they are losing a lot of tree cover, by 29%. This has caused temperature too to rise, they have faced severe flooding heat waves (during three consecutive days, temperatures exceed 37C°), **cities are getting warmer, storms and heavy rains are causing all sorts of disasters.** Therefore, Malaysia commits to climate change agenda.

One of the main actions is the Spatial Management Plan, which seeks to manage and drive the expansion of the urban areas; to ensure that every development optimizes existing resources and infrastructure and have a strategy to tackle risk areas disaster management plans.

Malaysia uses a lot of data shared by different areas to map the physical, biodiversity and socio-economic vulnerabilities. The next step is to translate domestic plans to local governments and communities. This also involves tools to trace and assess progress.

Andrea Palma, Founder of Extraordinary Cities initiative, spoke about "Architecture as a communication process".

Promoting climate change, requires also a change in our behavior and new ideas. Hence, walking from the idea to the action, requires understanding the particularities of territories, and have many conversations at all levels, authorities, community, domestic and international, to come up with a project and put everything into action.

But project formulation requires building capacities or standardize information among people. So capacity building is the start. Then, methodology is important to plan and design effectively. We need then to take some international experiences and translate them into domestic or local contexts.

At Extraordinary Cities, they are also developing a sustainable development software called Simple-DESO, intended to make social sustainable planning more accessible and easier to develop for people from different backgrounds and with different skills and expertise.[2]

Dr. Hector Jorquera, Professor at the Universidad Católica of Chile, presented the initiative "Montoring, Mapping and Modelling Air Quality for Sustainable Environments in Cities and Communities (MASSEV) developed jointly by a team of experts from Switzerland, Norway, Chile, and China.

2 Available at:

https://www.giz.de/de/downloads/giz2019-0113en-cfcc-chile-integrated-urban-planning-toolkit.pdf

The project aims to address three Sustainable Development Goals (SDGs): SDG 3 Good Health and well-being; SDG 11 Sustainable Cities and Communities; and SDG 17 Partnership for the goals based on: i) developing and deploying widely accessible air quality sensors; ii) monitoring urban air quality at street and building levels; iii) modelling and evaluating citizen exposure and assessing and mitigating heal risks.

The project's results will support evidence-based urban planning and contribute to the development of sustainable cities and communities.

The first objective is to monitor air quality in different cities, to assess and mitigate health risks; using multi-source and (local sensors, satellite data, agencies, etc.). This information shall be then integrated into real-time air quality maps accessible to individuals through their mobile phones. Using real-time data people and decision-makers can for example, identify highly polluted hot spots and this way, make decisions addressing a prioritized action plan.

Finally, the discussion triggered by the audience's questions, raised the issues of participation and the need to have tools that fit all ages, genders, and social, economic, physical and cultural backgrounds. For example, young people may be more predisposed to use and learn about new technologies than elderly people.

Chile's APEC Senior Official, Ms. Marcela Otero, provided closing remarks, highlighting the importance of the symposium in addressing key challenges related to inclusivity and sustainable economic growth, in line with APEC's Putrajaya Vision 2040. She emphasized the relevance of the perspectives and good practices shared, which help tackle issues in critical areas such as low-carbon cities, urban resilience, transportation, and energy, with a focus on innovative solutions, as well as sustainable city planning and management.

Chile reaffirmed its commitment to sustainable development, mentioning progress in areas such as renewable hydrogen development, electromobility, and urban resilience through climate change policies. Key examples of Chile's work in advancing sustainability in the region include its Climate Change Framework Law, the promotion of sustainable trade agreements, and implementing APEC projects on disaster resilience against climate change, and offshore wind farms for renewable energy and green hydrogen production, among others.

The role of APEC as an incubator of ideas was emphasized as well, **which contributes to fostering collaboration and innovation to explore and find innovative approaches**. The relevance of international cooperation was also underscored in implementing solutions that benefit all member economies.

Ms. Otero concluded by thanking APEC Senior Officials, authorities, speakers, and participants, while reinforcing the call for continued technical cooperation and knowledge-sharing within APEC to address long-term challenges and further development of greener, more sustainable cities for the benefit of all people in the Asia-Pacific region.

VI

CONCLUSION AND POLICY RECOMMENDATIONS

This symposium represents a key deliverable of APEC project SCE 02 2023S. The two-day symposium saw participants from governments, industries, cities and academia from 15 APEC economies and relevant international organizations come together to discuss a range of topics related to sustainable and low-carbon city development. These included the use of digital and other emerging technologies, innovative developments in sectors such as transportation, energy, infrastructure, logistics and waste management, sustainable city planning and infrastructure upgrading to enhance resilience.

There is clear consensus among APEC economies and sustainable cities experts from around the globe, that in the light of the increasing impacts of climate change, sustainability must be implemented transversally and locally, in a comprehensive and systemic way, including social, economic and environmental aspects and including both the private and the public sector.

As a guiding principle, making people the top priority in the promotion of sustainable cities will further enrich APEC's inclusive development agenda, bringing benefits to SMEs, women, youth, the elderly, persons with disabilities, and other groups with untapped economic potential, and accelerating the transition to the formal economy.

This perspective was addressed in the cases and examples presented by the speakers at the event. For example, the approaches taken by Mexico and China regarding inclusive, diverse, and equal mobility may be worthy of examination. In such spirit, efforts conducive to facilitating accessible and age-friendly facilities, as well as policies supporting mobility should be encouraged, and inclusion should be considered as a priority in sustainable cities. Ensuring people's participation in sustainable development projects is crucial. Open-source tools for sustainable planning could be developed for turning complicated methodologies into user-friendly guides for all the people.

Capacity building at both political and technical level in city administrations and for citizens is key in this context, always considering the previous technical skills and equipment of the target groups.

A first pillar was the need to promote a city-wide digital transition. As mentioned above, digitalization is key to build sustainable cities and communities. The previous APEC Case Study on Best Practices of Smart Cities in the Digital Age highlighted the role of digital technologies in decision-making processes and emphasized that (1) the implementation of (new) technologies requires capacity building and training of all beneficiaries. (2) Digital literacy is a fundamental requirement for a successful application of new/ modern technologies. And (3) the transformation into a smart city not only brings more convenience for urban governance, but also stimulates and promotes the development of various smart industries, including the transport sector, and digital economy, which brings great opportunities for its transformation and upgrading.

To build digitalized sustainable cities, APEC economies should build and utilize affordable Information and Communication Technologies (ICT) infrastructure, bridging the gap between cities and economies. For example, remote work can reduce peak hour congestion, yet individuals need to have stable and up-to-speed connections. APEC's digitalization agenda is already addressing this issue, which is crucial to reach equal and inclusive low-carbon economies. In terms of the top-to-bottom approach, digital tools and innovations including AI, IoT, Blockchain, and Big data etc., can enable efficient and effective decision-making, since these solutions have the ability of processing multi-source information at even real-time speed, thus allowing resource allocation, prioritization, monitoring, tracking, and assessment of the different initiatives.

One example, among the many notable ones reviewed during the symposium, is Chinese Taipei's Blockchain Governance which has proven that electronic voting can be secure and tramper-proof; that using blockchain-based identification can improve public service, medical care and insurance access; and that token-based rewards for community participation have increased civic engagement.

Technologies serve not only as instruments to expedite procedures or reduce expenditures, but they may also facilitate the dissemination of transparent and accessible information, thereby fostering greater involvement in the mitigation and adaptation to climate change, which is a global concern and requires collective action.

In terms of mitigation, digital tools can help reduce greenhouse gas emissions (as is the case of Shenzhen's low-carbon buildings pilot); and improve people's safety (as per the interoperable lighting pilot between the municipalities of Aurora and Naperville, Illinois).

In terms of the **environmental pillar, there is the need to develop low-carbon cities and green urban environment.** Build sustainable cities that prioritize ecological protection, the efficient utilization of resources, and green and low-carbon development. Suggestions are given to promote zero-carbon smart parks and green smart buildings, advocate low-carbon lifestyles of green travel and digital consumption, and encourage the integrated transition to green and digital cities.

Examples showcased by the City of Shenzhen explains how the mass application of Electric Vehicle and zero land fill actions can help the city to reach net-zero emissions, which further contributes to the national goals on carbon peaking and carbon neutrality.
Electrifying mobility is required to lower carbon emissions in the sector. Yet technologies are expensive, pilot projects need to be implemented and more investment in clean energy sources is needed. In this sense, hydrogen-based technologies are emerging as solutions not only for sustainable transportation, but also for heating and industrial processes decarbonization.

Similarly, **there is a need for more projects around energy-efficient housing and building retrofit**. In order for local and central governments to allocate funding to these initiatives, it is essential to gain a deeper understanding of the cost-efficiency aspects involved. The sharing of information and the development of innovative funding schemes could prove beneficial in this regard, as well as in the creation of business models that will attract more investors.

On the other hand, **public-private collaboration enables cross-benefits of bringing together each sector's strengths and empowers local governments to address the challenges;** SMEs and big companies can develop and escalate solutions, while central governments and funding agencies can help pilot innovations and digitalization.

International experience is vital to leverage knowledge, but policymaking and technology adoption need to be localized. Cities need to create knowledge to choose the best suited tool for each location, understanding local capacities, gaps and needs, all aligned with domestic goals. An important aspect to consider in case of all type of sustainable city initiatives is the consideration of the investment but also operational costs of different potential solutions, as the APEC case Study "Best Practices of Smart Cities in the Digital Age" (SCE 02 2019S, 2021) outlined: the long-term success of any initiative depends on secured budgets and on a sustainable financial model. Besides public-private investment mechanisms, outcome-based investment is a possible, innovative approach according to which the release of public funding is decided depending on a project's performance.

The third pillar is the need to build resilient cities. Recalling the APEC Disaster Risk Reduction Framework and its Action Plan, APEC economies

should consider the need to build resilient cities and keep urban safety. In this sense, it is vital to strengthen comprehensive monitoring and early warning of urban disaster risks and promote high quality urban infrastructure.

For example,PLANMalaysia presented many initiatives that address the challenge of securing all the services cities need to provide a large and growing population, while involving the environmental services nature and biodiversity can offer to build resilient areas. It was discussed that policies and regulations need to be based on nature, ecosystems and biodiversity protection, controlling not only urban planning and industrial activities, but also agricultural activities. This is key when thinking, for example, in climate change impacts and food security.

Also, in terms of the policy response to climate change and the challenges of growing population -at a greater rate in APEC economies than in the rest of the world- energy efficiency and electrification with renewables, are considered effective solutions for pressing issues, such as traffic congestion and their negative impact on GDPs; greenhouse gas emissions reductions; equality, inclusion, diversity, climate risks, and democratization, among other challenges.

Also, questions arose around the issue of mobilizing funding **from the most developed to the least developed APEC economies**. In this aspect, more research and innovative solutions shall be developed to build funding schemes and sustainable business models to deploy pilot projects and promote sustainable development in those economies. Sharing specific insights on an initiative's methodological and financial complexity is important to define whether it is replicable in one local context or another.

Most sustainable city initiatives presented both in the APEC Case Study (2021) as well as in the Symposium (2024), have been driven by both the public and the private sector. In this line, private companies may replicate sustainable solutions in different economies, and Governments can facilitate those replications by

- Setting the required conditions and frameworks, including data protection to ensure trust of citizens, but ensuring benefits from the use of protected data; and by
- Identifying and monitoring the satisfaction of their citizens with newly applied measures,

As the initiatives across APEC economies have shown, technological, social and economic measures and disciplines are planned as data-based and integrated approaches to ensure their success.

In sum, the Symposium highlighted a common will to cooperate between economies and continue to share experiences, despite the local differences among them. In this sense, all APEC members understand that sustainable communities, resilient cities and tackling climate change is a collective action.

VII ANNEX I. SYMPOSIUM AGENDA

APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific

Day 1: 5th September, 2024

- **20.00 - 23.00 hours** (Santiago Time Zone, GMT-4)

20.00 - 20.40	Opening Session I. Moderator introduces the Symposium **Ms. Nuria Hartmann, Manager, Hinicio - Chile** II. Opening remarks a. **Ms. Lu Mei**, China APEC Senior Official b. **Ms. Hera Kevau,** Papua New Guinea APEC Senior Official c. **Mr. Renato Reyes**, Peru APEC Senior Official (pre-recorded) d. **Mrs. Salinee Phonprapai**, Thailand Alternate APEC Senior Official (pre-recorded) e. **Tan Sri Dr. Rebecca Sta. Maria**, Executive Director of the APEC Secretariat (pre-recorded) f. **Amb. ZHAN Yongxin**, Co-Chair of PECC

20.40 - 21.40	Session I: Promoting the development of sustainable and low-carbon cities through the use of digital and other emerging technologies Moderator: **Ms. Nuria Hartmann**, Manager, Hinicio 1. "Blockchain for Smart Cities" **Ms. Alejandra Labarca, Business Development Manager at ZeroCo2, Chile** 2. "Shenzhen: innovation-driven low carbon city example " **Dr. JI Xinye, Shenzhen Development and Reform Research Institute, China**

	3. "Climate Change, Sustainability and the Use of Digital Technology" **Mr. Eduardo Pedrosa, Secretary General of PECC** 4. "The importance of interoperability based on the example of streetlighting controls" **Mr. Mark Verheyen, Smart Cities Council** 5. "Low carbon cities and MURNInets" **Dr. Hj. Dzul Khaimi bin Khailani, Deputy Director of the Research & Development Division at PLANMalaysia** (pre-recorded)

21.40 - 21.55	Discussion Round Moderator: Ms. Nuria Hartmann, Manager, Hinicio

21.55 - 22.45	Session II: Innovative development in sectors such as transportation, energy, infrastructure and waste management Moderator: Mr. Juan Pablo Zúñiga, Manager, Hinicio. 1. "Sustainable Mobility in Mexico" **Ms. Wendy Casanova, Chief of Transport Safety, Transport Institute of Mexico** 2. "Highlighting SMEs and large companies' public-private collaboration" **Ms. Hua Wang, Executive Director, Global Innovation Forum, United States** 3. "Carbon Neutral Campus Program to Nurture Sustainable Cities Development" **Prof. Zhu Li, President, APSEC** 4. "Shenzhen Practices in Driving Public Transportation Towards Digitalization and Green Transformation" **Mr. Ethan MA, Group Deputy General Manager, Shenzhen Bus Group, China**

22.45 - 23.00	Discussion Round and closure Moderator: Mr. Juan Pablo Zúñiga, Manager, Hinicio

Day 2: 6th September 2024

- **08.00 - 11.00 hours (Santiago Time Zone, GMT -4)**

08.00 – 08.30	Greetings Summary of Day 1: summary of presentations and discussion main topics. Ms. María José Riquelme, Senior Consultant, Hinicio

08.30 -09.30	Session III: Sustainable city planning, and infrastructure upgrading to enhance resilience of cities and put people first Moderator: Ms. María José Riquelme, Senior Consultant, Hinicio 1. "Mass construction of energy efficiency buildings in Russia: projected macroeconomic effect and problems of implementation" **Ms. Tatiana Zheltonozhko, Deputy Director of Center for Economy of Innovation, Institute of Macroeconomic Research, Ministry of Economic Development, Russia** 2. "The Practice of Age-Friendly and Accessible Urban Transportation in China" **Ms. Xiaofei Liu, Associate Researcher, China Academy of Transportation Sciences, China.** 3. "Low Carbon cities in Malaysia" **Ms. Norliza Hashim, Chief Executive Officer, Urbanice Malaysia.** 4. "Architecture as a communication process" **Ms. Andrea Palma Pérez, Founder, Extraordinary Cities.** 5. "MASSEV: Monitoring, Mapping and Modelling Air Quality for Sustainable Environments in Cities and Communities". **Mr. Héctor Jorquera, Professor, School of Engineering, Pontificia Universidad Católica de Chile**

09.30 - 09.45	Discussion Round Moderator: **Ms. María José Riquelme**, Senior Consultant, Hinicio
09.45 – 10.30	Wrap-up session: Summary and key findings **Ms. Nuria Hartmann**, Manager, Hinicio
10.30 – 11.00	Closing remarks **Ms. Marcela Otero**, Chile APEC Senior Official

REFERENCES

Casanova, W. (2024, September 5-6). ***Sustainable mobility in Mexico*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Hashim, N. (2024, September 5-6). ***Low carbon cities in Malaysia*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Jorquera, H. (2024, September 5-6). ***MASSEV: Monitoring, mapping and modelling air quality for sustainable environments in cities and communities*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Khaimi bin Khailani, D. (2024, September 5-6). ***Low carbon cities and MURNInets*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Labarca, A. (2024, September 5-6). ***Blockchain for smart cities*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Liu, X. (2024, September 5-6). ***The practice of age-friendly and accessible urban transportation in China*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Ma, E. (2024, September 5-6). ***Shenzhen practices in driving public transportation towards digitalization and green transformation*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Palma, A. (2024, September 5-6). ***Architecture as a communication process*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Pedrosa, E. (2024, September 5-6). ***Climate change, sustainability and the use of digital technology*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Verheyen, M. (2024, September 5-6). ***Importance of interoperability using the example of street lighting controls*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Wang, H. (2024, September 5-6). ***Highlighting SMEs and large companies' public-private collaboration*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Wei-Han, L. (2022). ***New value of digital asset: Taipei City Government's introduction of blockchain application.*** *Taipeiecon online.* https://www.taipeiecon.taipei/english_cont.aspx?MSid=116237360002203032 6&MmmID=4002&CatID=744725544402432171

Xinye, J. (2024, September 5-6). ***Shenzhen: Innovation-driven low-carbon city example*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Zheltonozhko, T. (2024, September 5-6). ***Mass construction of energy efficiency buildings in Russia: Projected macroeconomic effect and problems of implementation*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

Zhu, L. (2024, September 5-6). ***Carbon neutral campus program to nurture sustainable cities development*** [Conference presentation]. APEC Symposium on Sustainable Cities Development to Promote Inclusive and Sustainable Growth in Asia-Pacific.

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