CERTIFIED EXECUTIVE TRAINING ON GREEN ECONOMY

WGEO EXECUTIVE TRAINING COURSE ON SCALING UP TRANSITION TO A GREEN ECONOMY ON A PATH TOWARDS IMPLEMENTING THE UNITED NATIONS 2030 SUSTAINABLE DEVELOPMENT AGENDA

MODULE DELIVERED BY

GGGI

GREEN + SMART CITIES
PLANNING FOR A SUSTAINABLE URBAN FUTURE

MODULE "GS"

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WGEO WORLD GREEN ECONOMY ORGANIZATION   UNDP Empowered lives. Resilient nations.   ESCAP   GGGI   isa INTERNATIONAL SOLAR ALLIANCE

By the end of this module you will:

Understand

The beneficial nexus of smart **and** green cities

Know

How smart + green synergies work to benefit cities overall & support global sustainable development agendas in the areas of:

i) Sustainable waste management infrastructure & services
ii) Green buildings & infrastructure
iii) Smart green mobility
iv) Climate smart and resilient cities

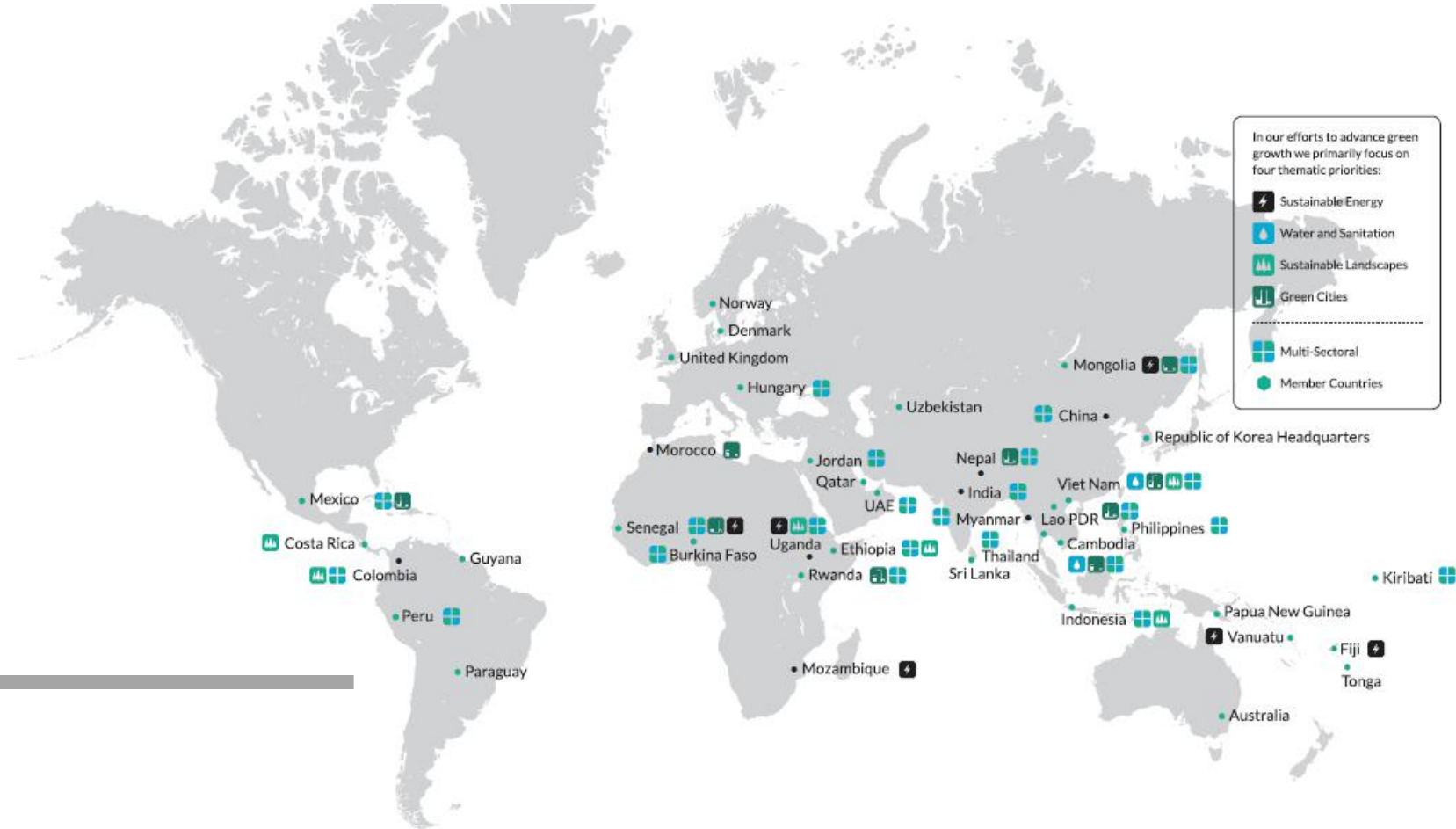**Be able to**

Apply that understanding to specific and pressing urban development challenges

CERTIFIED EXECUTIVE TRAINING ON GREEN ECONOMY

GGGI at a Glance

Headquartered in Seoul, GGGI has 32 Members with operations in 33 countries

GGGI's mission

To help developing country governments transition towards a model of economic growth that is environmentally sustainable and socially inclusive

GGGI Services Value Chain

Sustainable Energy

Water & Sanitation

Sustainable landscapes

Green cities

Diagnosis

Green impact assessment

Sector/Sub-sector strategy & planning

Design, financing & implementation

Development, economic growth and sustainability diagnosis

Sectoral green impact assessment and prioritization

Macro economic impact assessment

Policy and institutions analysis

Analysis of costs and investment requirements

Development of sectoral/sub-sectoral investment plans and selection

Design: Project and policy preparation

Financing: Identification of possible financial structure

Implementation

GGGI Value Chain

Green Cities

How to define green cities?

For GGGI Green Cities are…

Innovative & Smart

Resource-efficient & Low Carbon

Inclusive & Pro-Poor

Climate Smart & Resilient

Healthy & Liveable

Prosperous & Bankable

"A city/town/city-region which pursues resource efficient, low-carbon, climate resilient and socially inclusive urban development, generating green job opportunities"

GGGI's urban sector – Priority areas to transform cities

1. Mainstreaming green growth into urban planning, management and finance.

- Green (secondary) cities strategic planning.
- Strengthened municipal finances.
- Increased green public spaces.
- Climate-resilient urban infrastructure.
- Green buildings, sustainable low-cost housing.

Aligned to National Priorities

2. Supporting circular urban systems & economies

- Improved solid waste management.
- Waste-to-energy, waste-to-resource.
- Enhanced local livelihoods, jobs, investment

3. Sustainable urban infrastructure and transport to support connected & healthy cities

- Climate resilient and adaptive urban infrastructure
- Sustainable ecosystems and ecosystem services in urban & peri-urban areas
- Improved air quality through transport solutions

Reflection: How do we understand smart cities, green cities & smart+green cities?
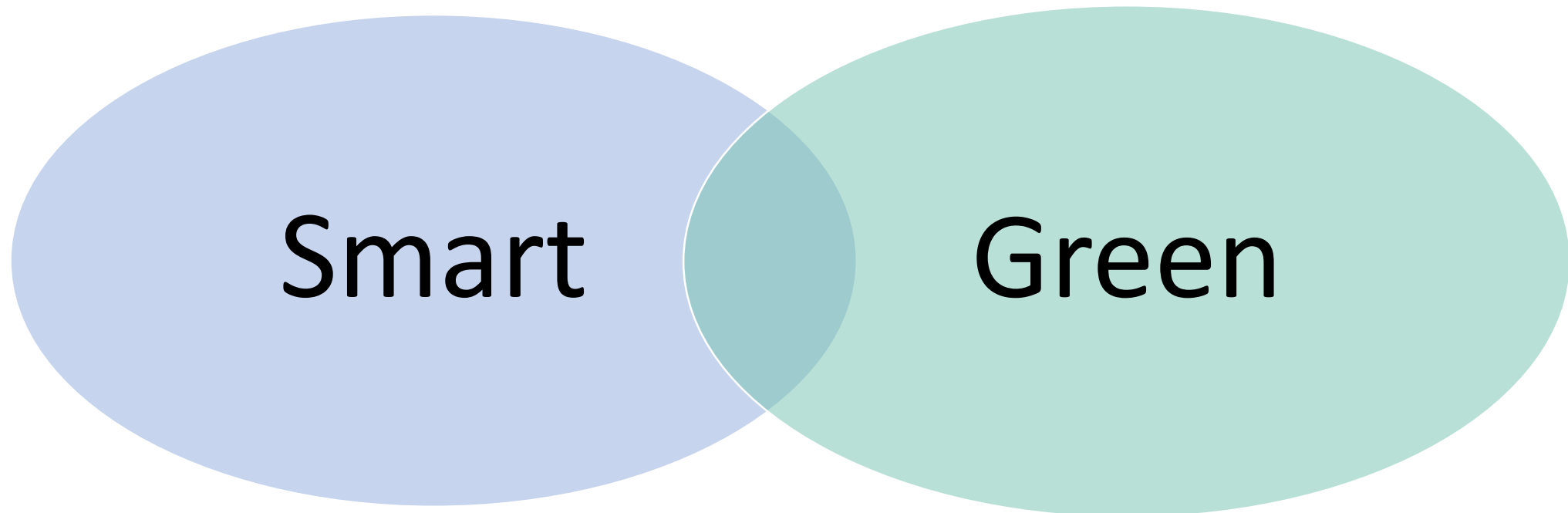
Smart

Green

A Smart City is Green & A Green City is Smart!

A smart green city is *well governed, inclusive, manages its eco-resources sustainably* through ICT.

It is *able to provide resource efficient, affordable and effective services to all* through *'smart approaches and systems'*.

The Limits of Separation

- Integration of Smart & Green is not automatic & benefits are not always clear

- For some a smart city is to foster a green/sustainable city through greater efficiency, cleaner production, decreased GHGs etc

- Digital-Green divides – and gaps: e.g. transport vs urban natural systems & resources

- Smart cities also may have environmental costs: a 'high-tech' city is energy hungry

- Energy consumption & e-Waste: the hidden face of our digital world

- The digital ecological footprint: computer+internet activity now greater than air transport energy emissions; by 2025 the digital energy footprint will be greater than road transport

Towards Green+Smart Cities

- **No 'models' or single strategies: smart+green cities range from centralized to decentralized; technology-printed to collaborative; public-oriented to private/crowd-sourced**

- **What they share: integration & application of smart approaches & technology in supporting sustainability**
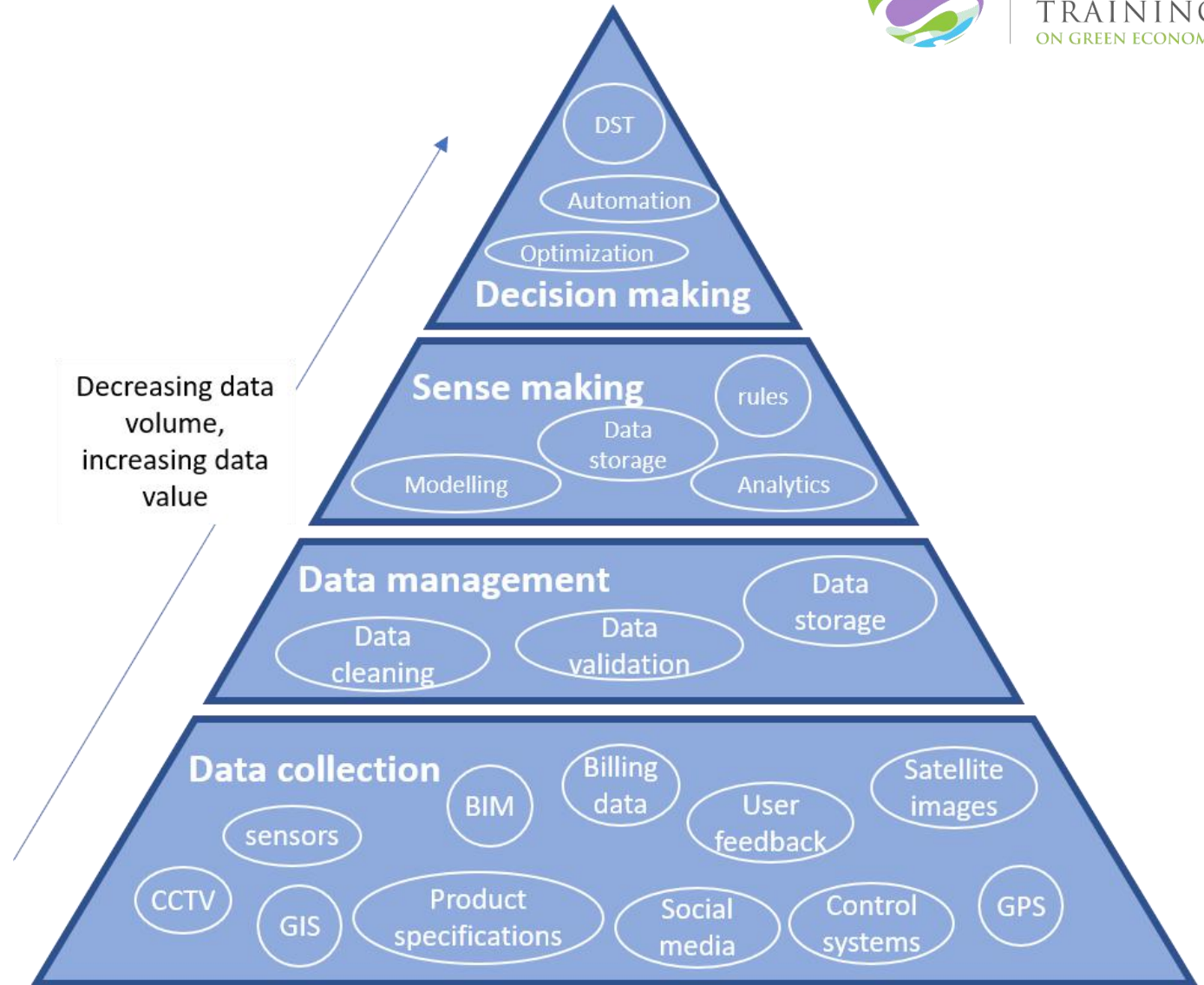

SMART SOLUTIONS FOR SMART CITIES

Applying data smartly

- Increased digitization
- Open source data
- Increased connectivity

Smart cities: Value of data is in its use - interpretation towards decision-making

Functions of digital infrastructure

Reflection: What are the priority sectors in your countries to implement smart green cities?
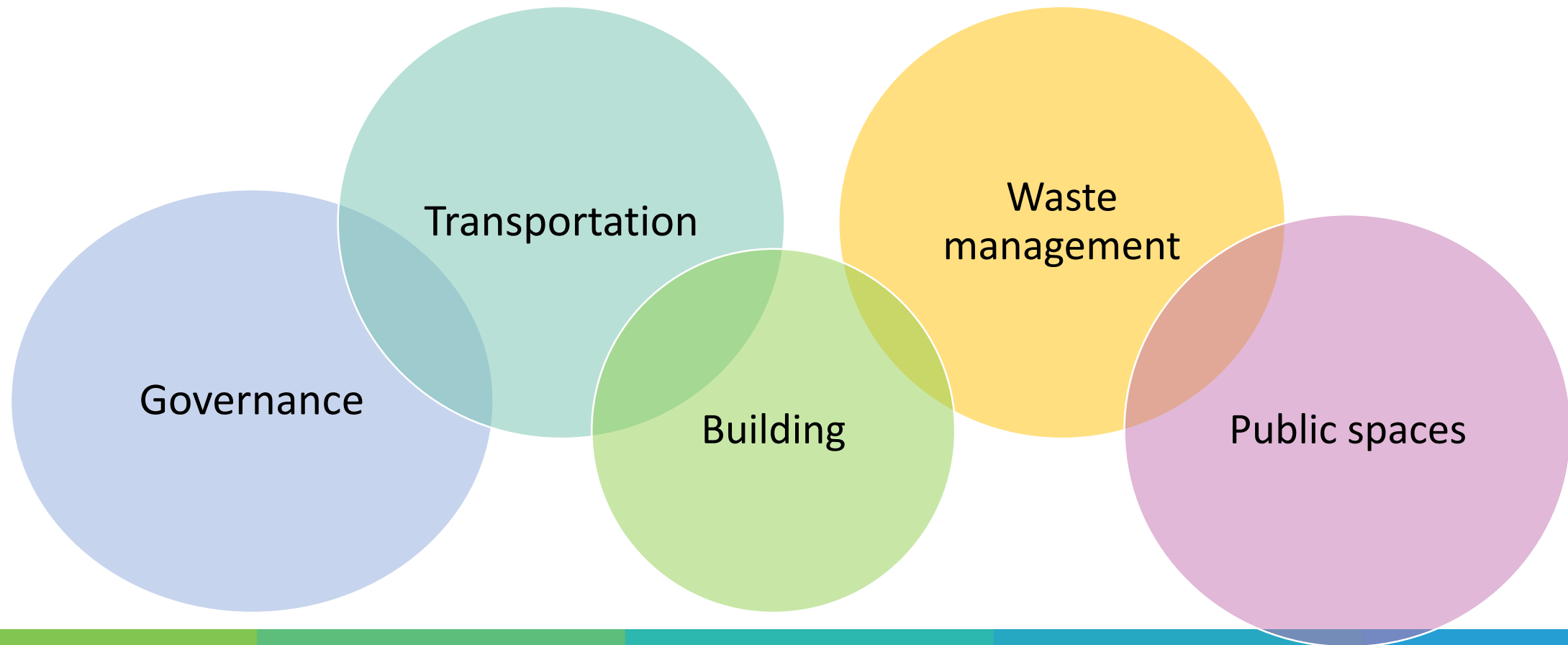
Governance

Transportation

Building

Waste management

Public spaces

- Buildings and grey infrastructure consume **substantial energy** through their production and operations.

- As global population grows in numbers and wealth, **demand for new infrastructure** increases.

- In developed countries, **aging infrastructure** and extreme weather events push infrastructure systems to failure. Limited funds for maintenance.

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Investment potential in cities by region and sector to 2030

|	East Asia Pacific	South Asia	Europe & Central Asia	Middle East & North Africa	Sub-Saharan Africa	Latin America & Caribbean	Total
Waste	$82 billion	$22 billion	$17 billion	$28 billion	$13 billion	$37 billion	$200 billion
Renewable energy	$266 billion	$141 billion	$88 billion	$31 billion	$89 billion	$226 billion	$842 billion
Public transportation	$135 billion	$217 billion	$116 billion	$281 billion	$159 billion	$109 billion	$1 trillion
Climate-smart water	$461 billion	$110 billion	$64 billion	$79 billion	$101 billion	$228 billion	$1 trillion
Electric vehicles	$569 billion	$214 billion	$46 billion	$133 billion	$344 billion	$285 billion	$1.6 trillion
Green buildings	$16 trillion	$1.8 trillion	$881 billion	$1.1 trillion	$768 billion	$4.1 trillion	$24.7 trillion
TOTAL	$17.5 trillion	$2.5 trillion	$1.2 trillion	$1.7 trillion	$1.5 trillion	$5 trillion	$29.4 trillion

INCREASING INVESTMENT
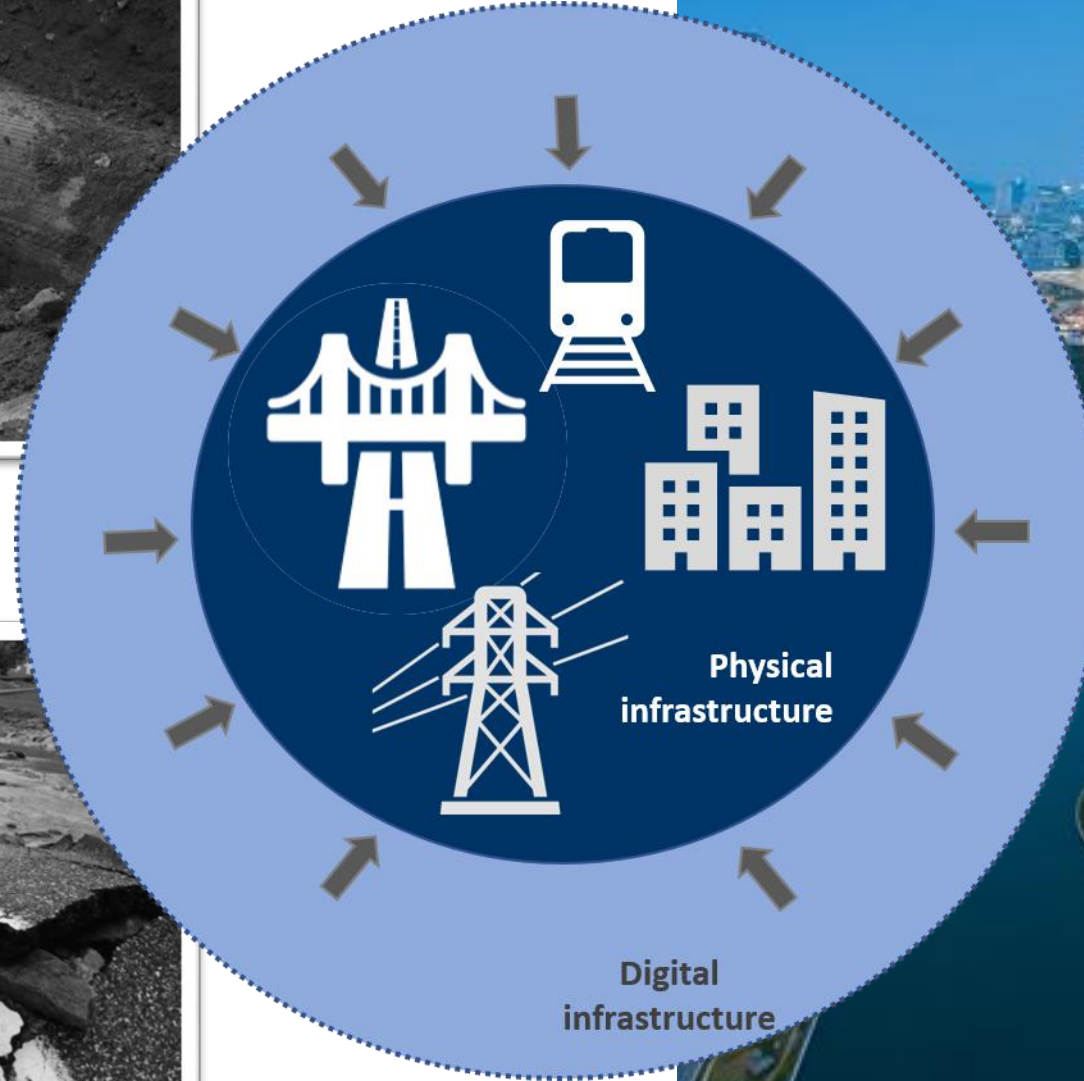
Physical infrastructure enhanced in **capacity**, **efficiency**, **reliability** and **resilience**.
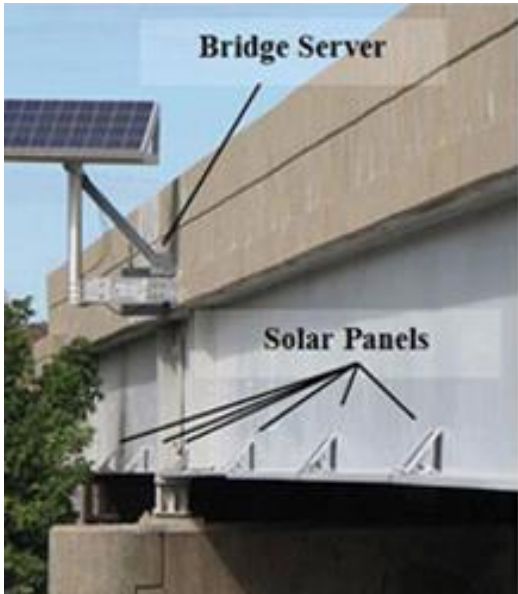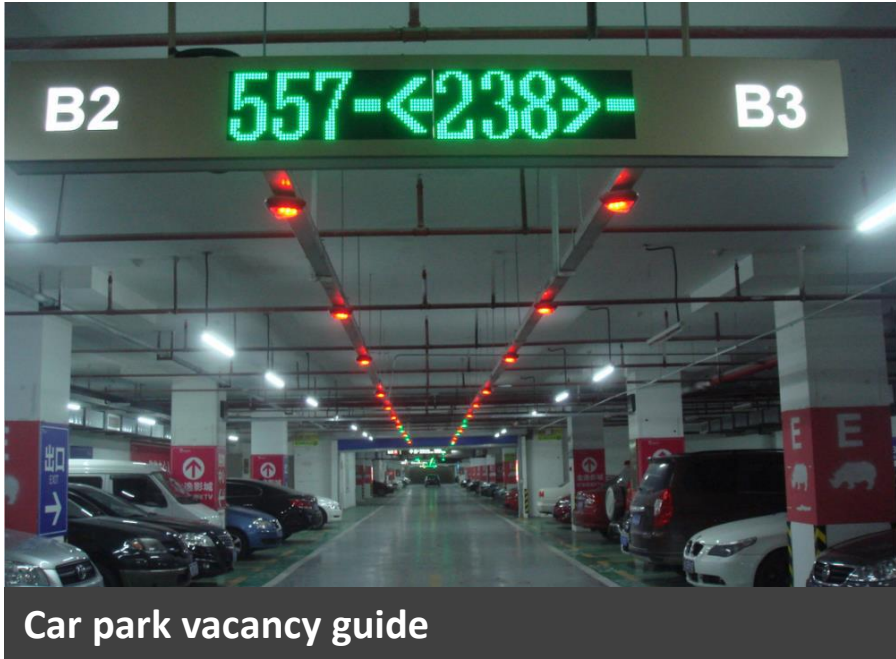
Sensors monitoring health of structures

Public advisory signage, traffic updates

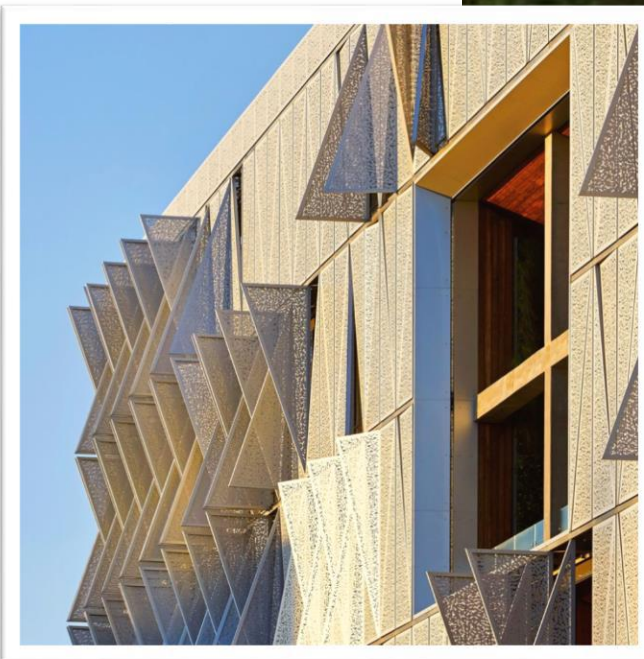**Some applications of smart technology in urban infrastructure**
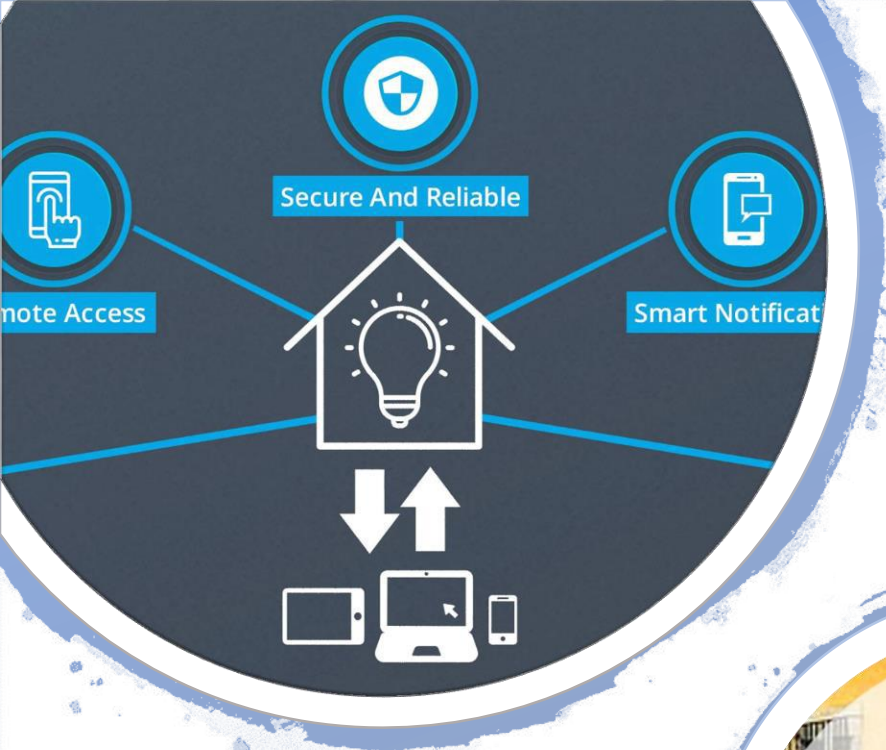

Car park vacancy guide

Automated lighting in parks

Fully automated building façade:

- Maximize **natural lighting** and **thermal comfort**.
- **Reduce electricity use** for ventilation, lighting, cooling & heating.

University of Southern Denmark Kolding Campus
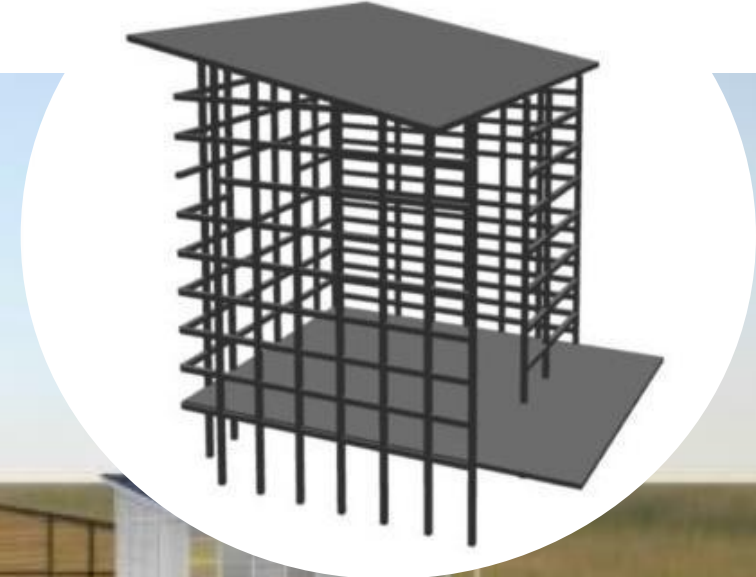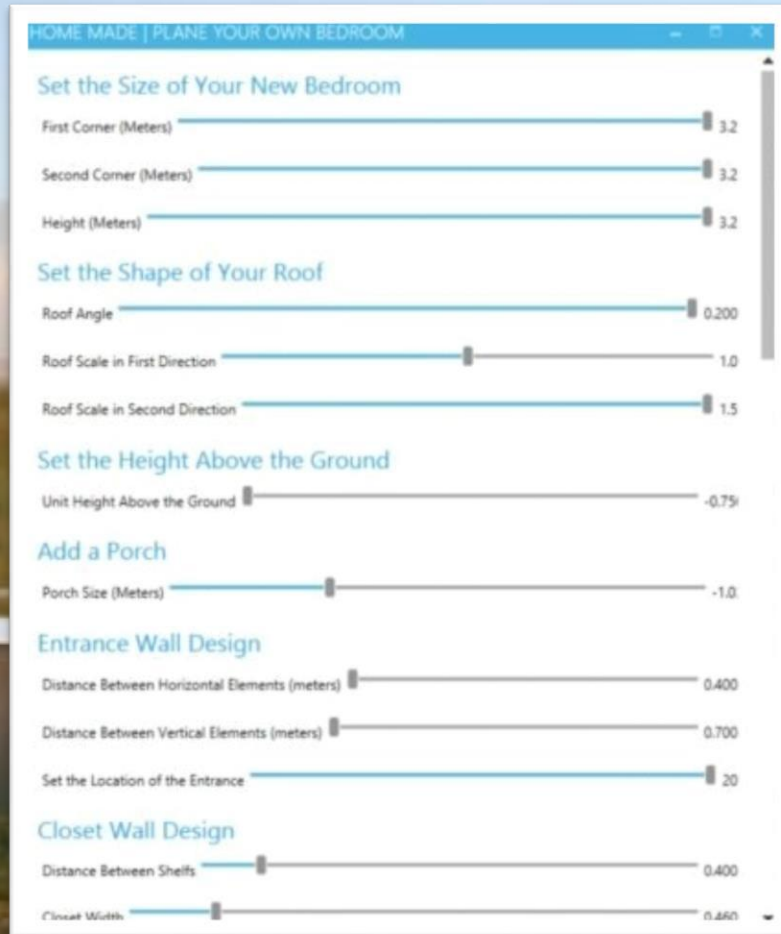
Smart Affordable Homes

- **Smart lighting** – sensor control, remote control.

- **Security systems** – locks, alarms, CCTV.

- **Heating systems** – thermostat-controlled house heating.

- **Water pipe sensors** – monitoring pipe leakages.

- **Climate smart & adaptive** homes & materials

Affordable Housing Design - User-friendly computer application

Waste: From Crisis to Opportunity

- BAU: Serious resource impacts for local/municipal government
- Estimated 20-50% of municipal budgets
- Relying on conventional way of "Collect & Dump" approaches
- Geographical limits of landfill systems

- But – greater understanding of value, development of business models & investment windows

- High proportion of organic waste provides opportunities for economy
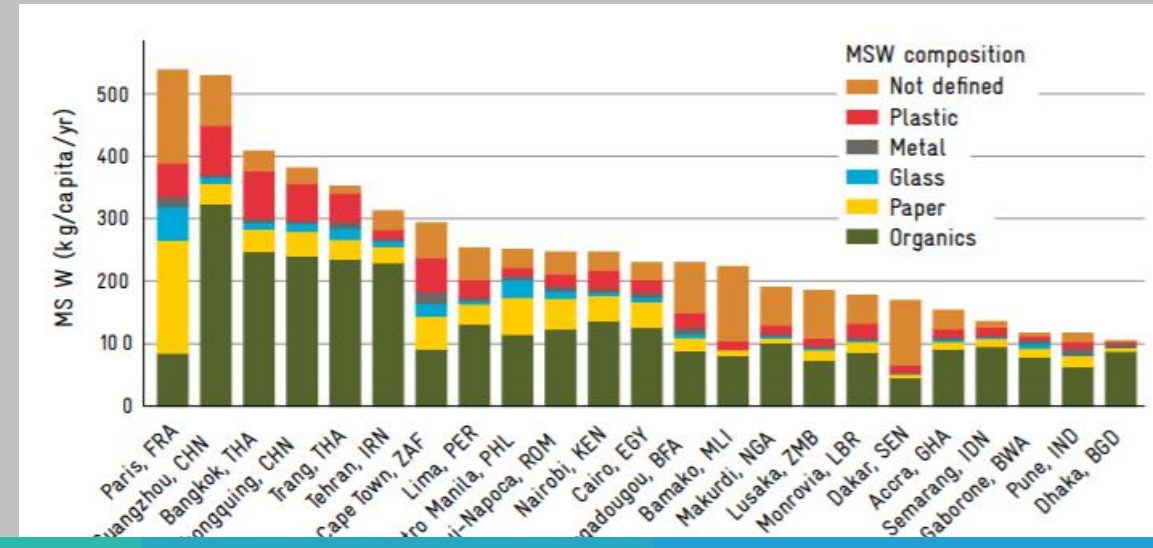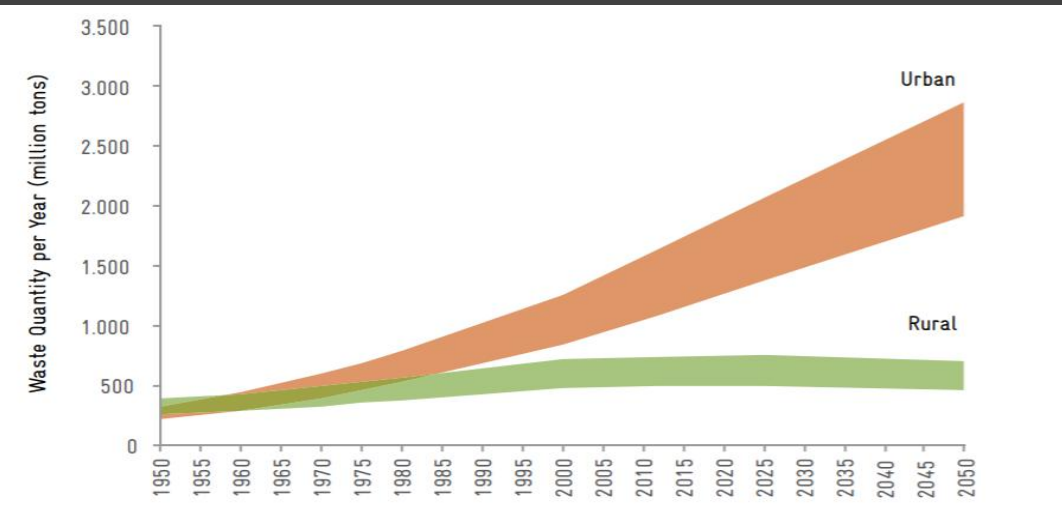
- Appetite for change

Figure 1: Projection of the development of urban and rural waste quantities of the world, 1950-2050. Based on UN-data [3] [4]

If the landfill (dumpsite) is closed tomorrow, what measures will you take?

Transforming waste systems by integrating smart solutions and technology.

1. Urgently address **separation at source** while minimizing waste generation; apply digitalized volume-based waste collection systems.

2. Support existing and new economies around recycling and **valorization of recyclables** by creating online platforms to connect waste generators and local recyclable collectors

3. Establish **economic opportunities around organic waste** by collecting separated organic waste at source through sensor-based organic waste bins.

4. Converting local informal dumpsites into material recovery centres with **integrated resource management solutions** (e.g. smart sorting, processing, and information system).

CASE | Volume-based Waste Fee

Seoul, Republic of Korea

👉 Users pay according to the amount of garbage they generate by having to purchase bags required to dispose of household waste

👉 The standard bags also vary in colour and size according to their intended purpose;

👉 The bags are purchased as designated places by local governments, while sales and distribution of bags for business purposes are commissioned to private companies; Households uses special cards to pay for disposing of food waste at the food waste machine.

👉 The VBWF system reduced the amount of waste generation by 16.6% & increased the recycling rate from 15.7% to 43% (1994-2001)

💡 District information on waste generation and disposal is automatically collected through sales of waste bags. Weight scale food waste machine encourages households to reduce food waste generation.

CASE | Amazóniko: smart waste recycling WebApp

Bogota, Colombia

👉 A multifunctional recycling WebApp with a comprehensive toolkit on waste recycling and collection, as well as the point management system rewarding points from the collected recycles and redeemable for products produced from the collected materials and discounts in associated brands.

👉 **Social impact:** Provides 200 jobs and Improved their health and safety conditions; Supports sustainable consumption and choices

👉 **Environmental aspect:** Reduced the landfill by 900kg of plastic, 600kg of metals, and 550kg of paper products during its pilot programe alone.

👉 **Economic aspect**: Markets green products through a rewards scheme; Provides reliable incomes to waste management sector workers.

💡 Using Webapp as a platform to connect the service providers and waste generators more effectively

CASE | Sensor-based organic waste boxes

Turin, Italy

☞ Organic waste box distributed by the municipal government has an information chip to sends an information to the collection companies when it is placed outside for collection.

☞ The information chip also monitors waste separation at source by analyzing the waste composition in the boxes.

☞ This prevents the stealing of organic waste boxes.

☞ Digitalized organic waste boxes cost only 5 Euro.

Using a simple information technology to increase adequate separation/collection of organic waste

Smart & Green Mobility

Case Study: Seoul Transport Hub

- Seoul had poor transport infrastructure in 1950s and 1960s

- Increasing number of cars led to congestion & calls for public transportation

- Smart systems introduced over time: bus lanes, smart traffic cards, public transportation information system, control center

- Real time data collection - Bus information accuracy up to 98%, public satisfaction rate 96%

- Result: greater use & reliability. reduced congestion, improved air quality, reduced GHG emissions and overall integration
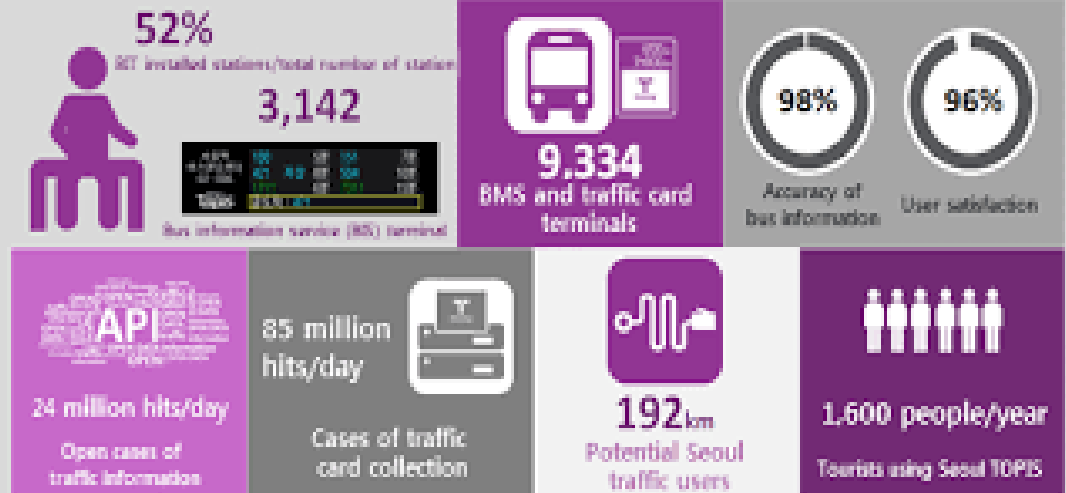
Bus-equipped unmanned enforcement

Fixed unmanned enforcement system (308)
1) Automatic enforcement of illegally parked or stopped vehicles within 200m of the device
2) Enforcement of vehicles in bus or bicycle lanes

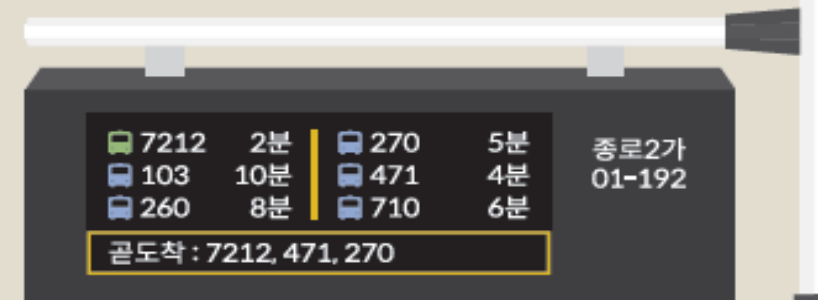**Bus-equipped unmanned enforcement system (7 routes, 28 buses)**
1) Automatic enforcement of vehicles in violation through unmanned enforcement cameras on buses
2) Enforcement on all roads where buses operate
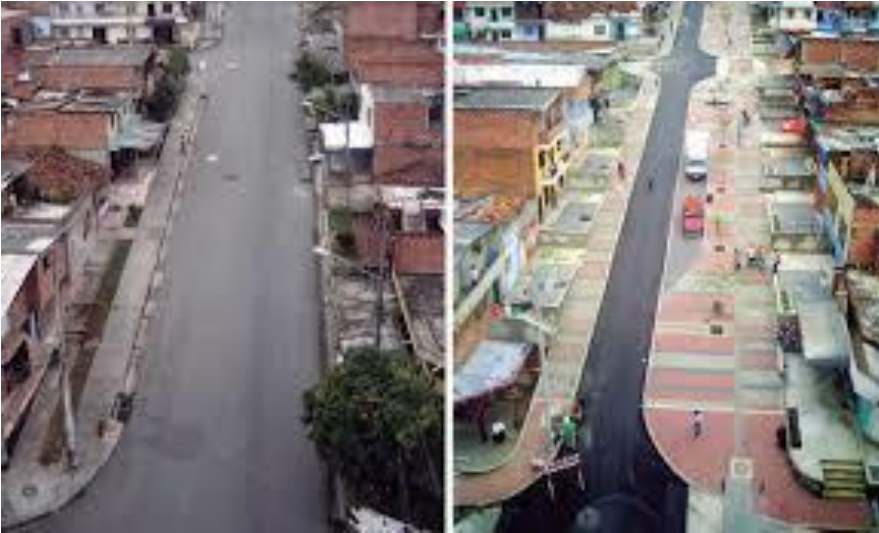
Late Night Bus (Owl Bus) – Utilizing Big Data

- Seoul Metropolitan Government used the big data in collaboration with the mobile carriers to determine the most popular routes between midnight to 5 am.

- This is to ensure citizens' convenience and safe return to their destinations when public transportation is not typically available.

✓ People can check the information about late night bus stops, intervals, arrival time, locations and bus numbers with Bus Information Terminal (BIT) at bus stops and Transportation Information Center Mobile (http://m.bus.go.kr) and homepage (http://bus.go.kr/nBusMain.jsp).

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Case Study: Inclusive & Connected Green Mobility in Medellin

- Integrated mobility network designed for the city, transit-oriented development

- Network consists of metro, cable car, BRT, public bicycle sharing, and tram

- For successful delivery, have masterplans for each mode

- Innovation & implementation key to keep up with climate change

- Results: decreased crime rates, reduced congestion. Increased walking and cycling = green

Climate Smart & Resilient Cities

- On the frontline: Cities represent concentrated vulnerabilities (of assets, infrastructure and people)

- What does it take to be a climate smart green city?

- Co-advancement of resilience, mitigation, adaption

- 'Climate Smart' cities: integrated systems which avoid cascading failure

- Smart city applications: support adaptation/shift away from sector approaches & fragmented planning & investment responses (role of AI)

- Co-benefits: low-carbon infrastructure, adaptive 'smart' systems & data + empowered communities

- Smart climate resilient cities also invest in resilience of their communities – especially the most vulnerable
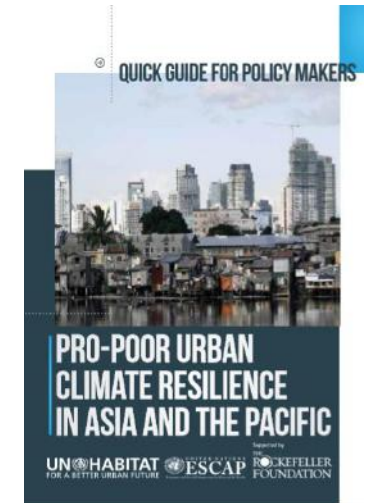
Singapore Marina Barrage

- Tidal and flood control barrier.

- Inland freshwater reservoir.

- Urban recreational space.

- Sensors continually monitoring pressure on structure.

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Climate resilient smart infrastructure

GROUP EXERCISE/DISCUSSION

Please choose the category of the topics that are most relevant to the area your expertise and discuss the following questions with your group (20 mins)

City Planning – Identify a priority sector that your city is driving for application of smart technology? How could you use the smart technology to promote "green and inclusive urban growth"?

Waste Management – Design a simple web-based innovative solution to promote waste separation at source in your city. How will you apply market & service driven approaches?

Green building & built environment – What are the opportunities in promoting green building and green public spaces with smart technology? What policy options would you suggest to tackle the impediments?

Sustainable transportation & mobility – How could you use big data to improve mobility and connectivity in your city?

THREE KEY TAKEAWAYS

Co-dependency

Green and Smart Cities are **co-dependent** on each other in sustainable city planning and implementation

Observation through evidence based data

Smart cities are not always high-technology based but it is more about using the **evidence-based data and information** to design cities more climate resilient, inclusive, low-carbon, and resource efficient.

Transformation

Transform the way we **plan**, **manage** resources, **design** urban infrastructure, **communicate** with unban dwellers, **invest** urban finance to make our cities greener and smarter.

Supporting Partner Governments to achieve the SDGs and NDCs

33 — Work with 33 developing country partner governments to achieve their Nationally Determined Contributions (NDCs)

17 — GGGI's 70 projects currently contribute to all of the 14 Sustainable Development Goals (SDGs)

Share of smart commercial buildings by region

Smart building growth regions

2018 / 2023

35.1% 32.7% North America

27.1% 24.5% Europe

6.9% 7.3% Latin America

4.6% 5.1% The Middle East & Africa

26.3% 30.3% Asia Pacific

Infographic from the report: Towards Data-Driven Buildings: Big Data for Smart Buildings 2018 to 2023 by Memoori. https://memoori.com/portfolio/towards-data-driven-buildings/

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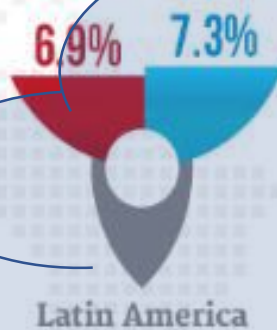
Towards Green + Smart Cities: Key Transformations

Transformation	Goal		Transformation	Goal
The way we plan	To achieve smart, green & sustainable cities		Water resource management	Access to clean water and sanitation
The way buildings are designed & operated	For a resource efficient & low carbon built environment		The way people move and connect	Connected & walkable/less motorized cities
The energy produced & consumed	Access to renewable energy & efficiency		Balancing expansion, growth & opportunity	Pro-poor and inclusive cities
Waste to resources	Close the waste/resource loop		Enhance investment prospects for 'green finance'	Address how cities manage and account for their assets