



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



GREEN + SMART CITIES

PLANNING FOR A SUSTAINABLE URBAN FUTURE

MODULE “GS”

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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

GGGI at a Glance



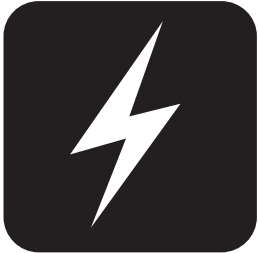
Headquartered in Seoul, GGGI has 32 Members with operations in 33 countries



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



GGGI Value Chain

GGGI's Activities



Global
Green Growth
Institute



GOVERNANCE

- Strengthening policy/regulatory frameworks
- Integrating with existing government processes
- Setting-up institutional structures and coordination mechanisms to implement NDC
- Building capacity of countries' climate diplomacy



IMPLEMENTATION OF TARGETS

- Developing and implementing concrete NDC implementation plans
- Connecting-the-dots and integrating between various strategies, plans and commitments that are already in place
- Developing sectoral policies and incentives



MONITORING, REPORTING AND VERIFICATION

- Developing and strengthening MRV systems in the context of their NDCs
- Developing quality control and quality assurance procedure and building MRV capacity of key stakeholders



SECTORAL INTERVENTIONS

- Addressing sectoral policies, gaps and regulatory risks
- Advising to correct market failures and policy failures where relevant to enhance investment conditions
- Designing policy relevant instruments such as tariffs, subsidies, power purchase agreements, etc.



FINANCING

- Facilitating mobilization of domestic/international resources
- Establishing/strengthening the National Financial Vehicles
- Supporting the development of bankable projects
- Designing risk-reducing instruments
- Accessing clean technologies
- Providing carbon trading partnership



CAPACITY BUILDING AND KNOWLEDGE SHARING

- Strengthening country capacity through training programs with tools and methodologies
- Providing knowledge sharing platforms, including multi-stakeholders and private sector

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 17 Sustainable Development Goals (SDGs)



For GGGI Green Cities are...



"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.



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

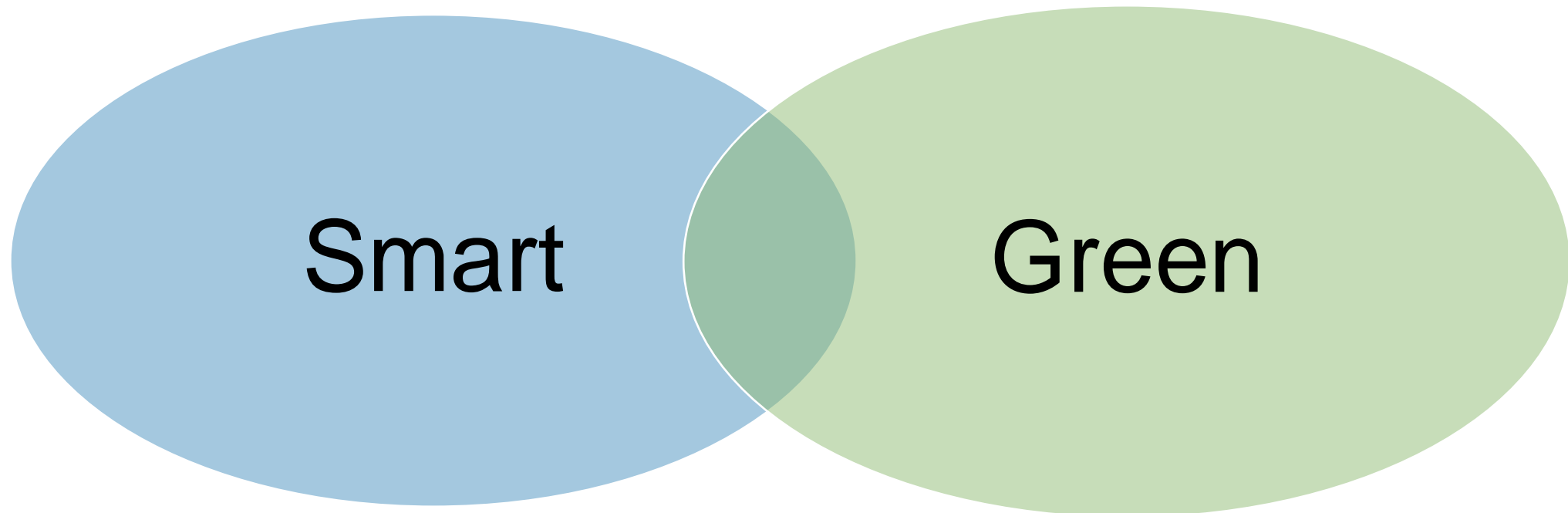
- Climate resilient and adaptive urban infrastructure
- Sustainable ecosystems and ecosystem services in urban & peri-urban areas
- Improved air quality through transport solutions



Aligned to National Priorities
Secondary City Development

Reflection:

How do we understand smart cities, green cities & smart+green cities?





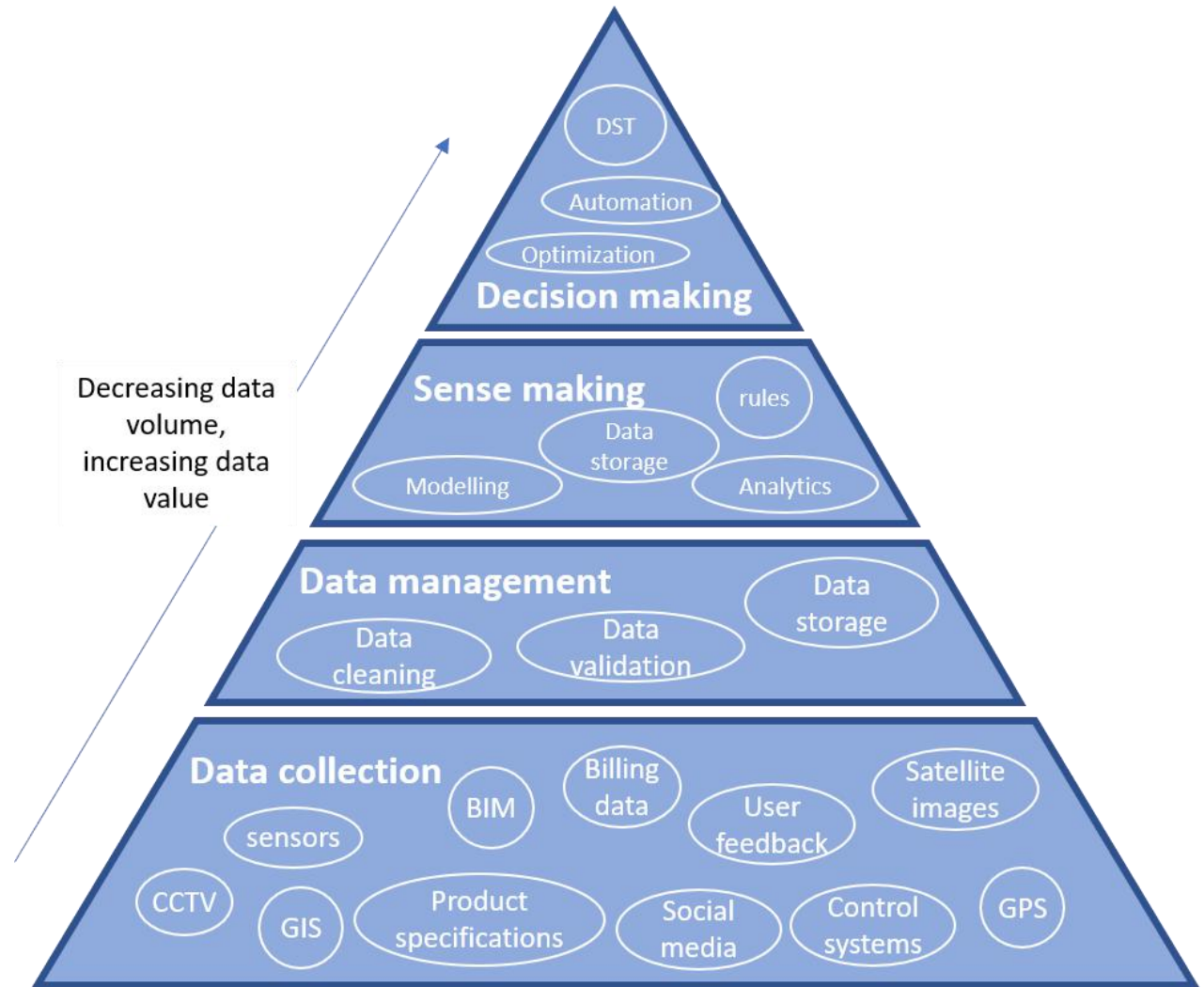
A Smart City is Green & A Green City is Smart!

A smart green city is well governed, inclusive, manages its eco-resources sustainably and through ICT is able to provide efficient, affordable and effective services to all through 'smart approaches and systems'. It is able to efficiently use finances & generate investment to support its plans.

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

Are Smart Cities Green Cities?

- Smart city applications can support innovations in transport; quality of life; economic competitiveness; planning; communication and 'good governance' etc
- Most approaches to smart cities have shifted from ICT-centred to include people and quality of life
- But are the benefits of 'smart city solutions' being realized in addressing major urban sustainability challenges?
- Smart city applications can gather data & create information platforms open to all: but how effectively is this used to shape *sustainability agendas*?



The Limits of Separation

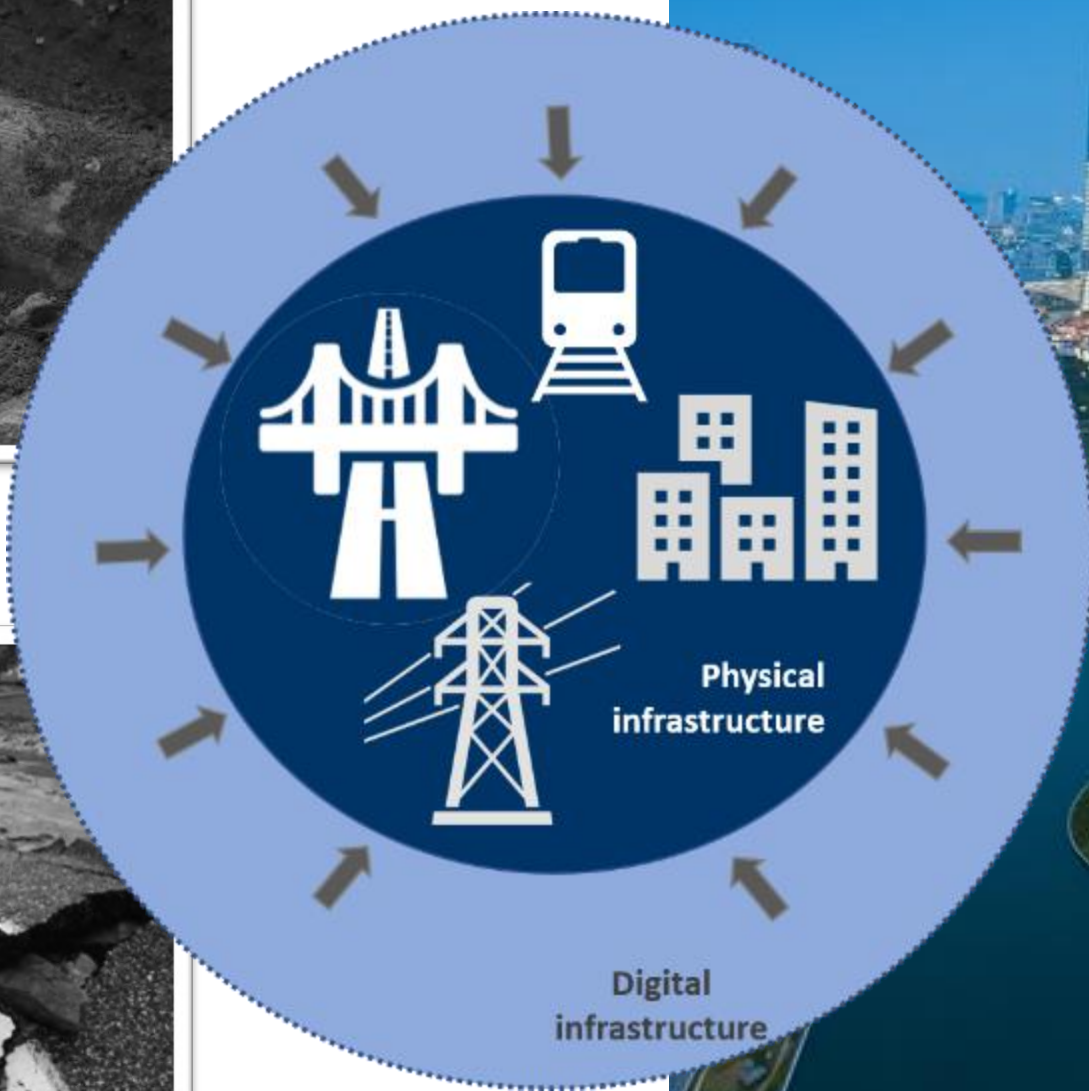


- Integration of Smart & Green is not automatic & benefits are not always clear
- For some a smart city is to foster a green/sustainable city through greater efficiency, cleaner production, decreased GHGs etc
- Digital-Green divides – and gaps: e.g. transport vs urban natural systems & resources
- Smart 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

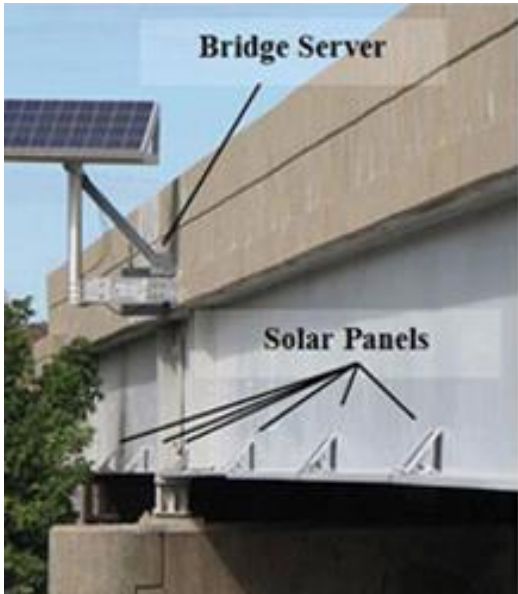
The problem with infrastructure

- 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.





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

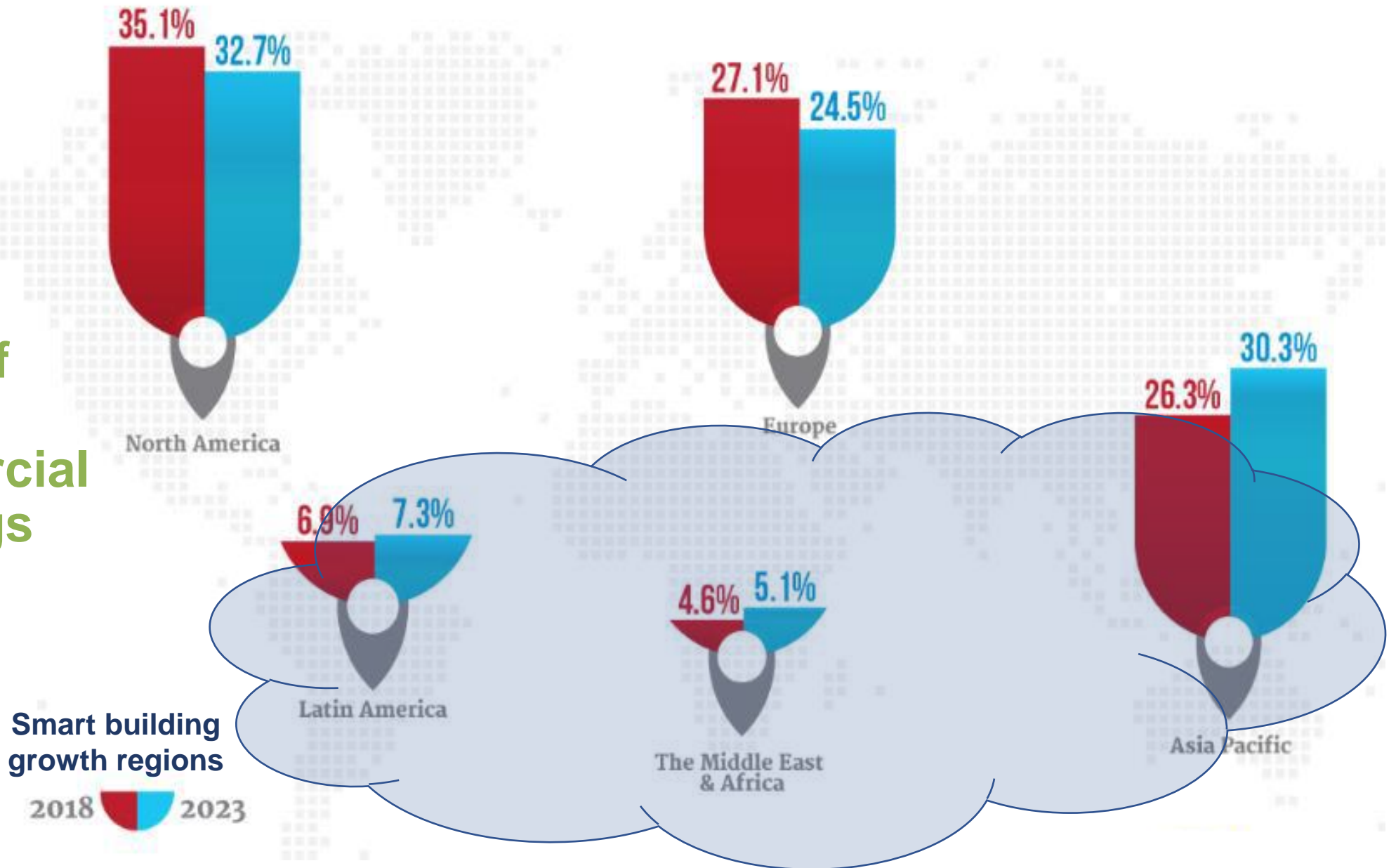


Car park vacancy guide



Automated lighting in parks

Share of smart commercial buildings by region



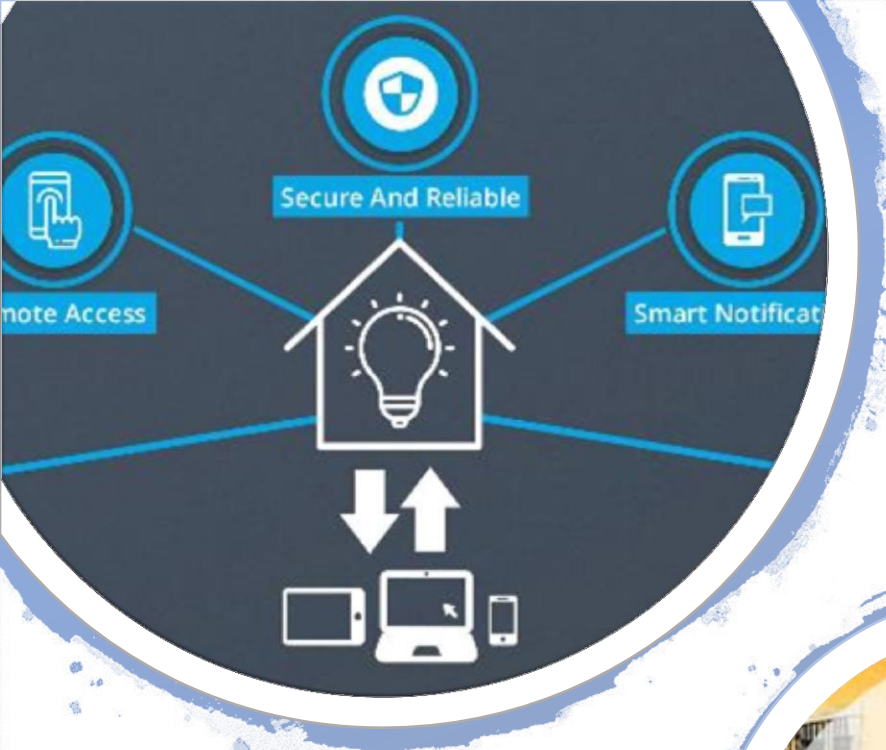


Fully automated building façade:

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

University of Southern Denmark Kolding Campus

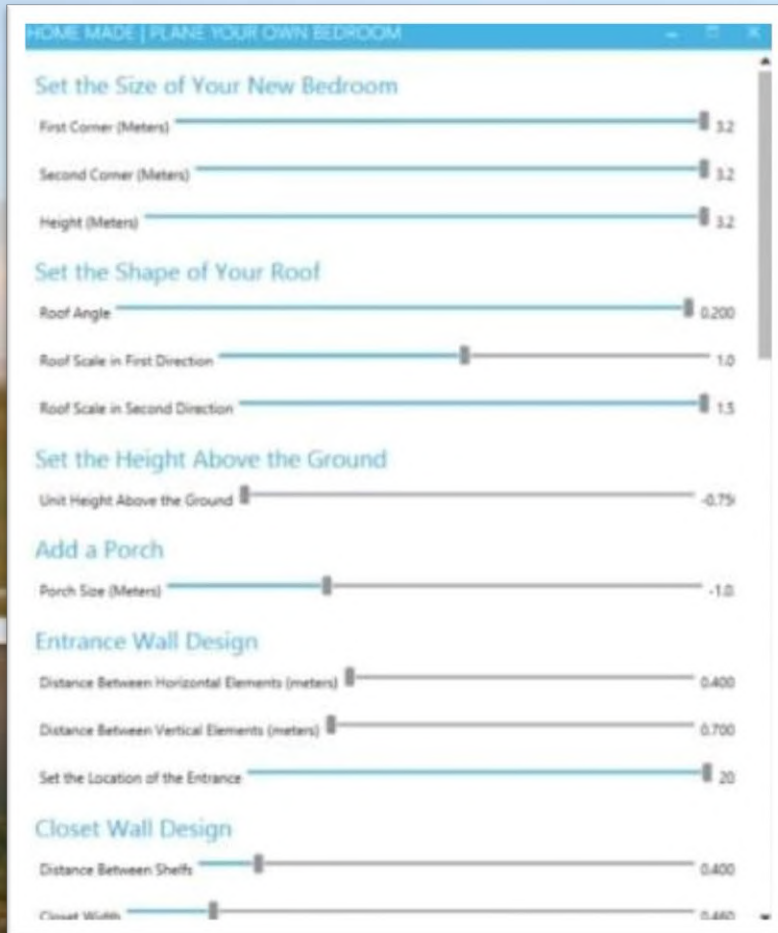
Smart Affordable Homes



- **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

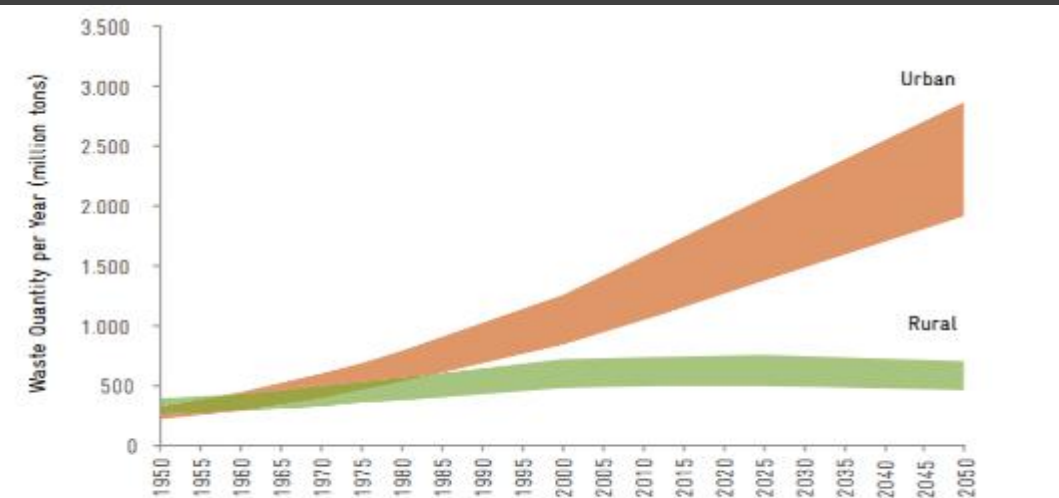
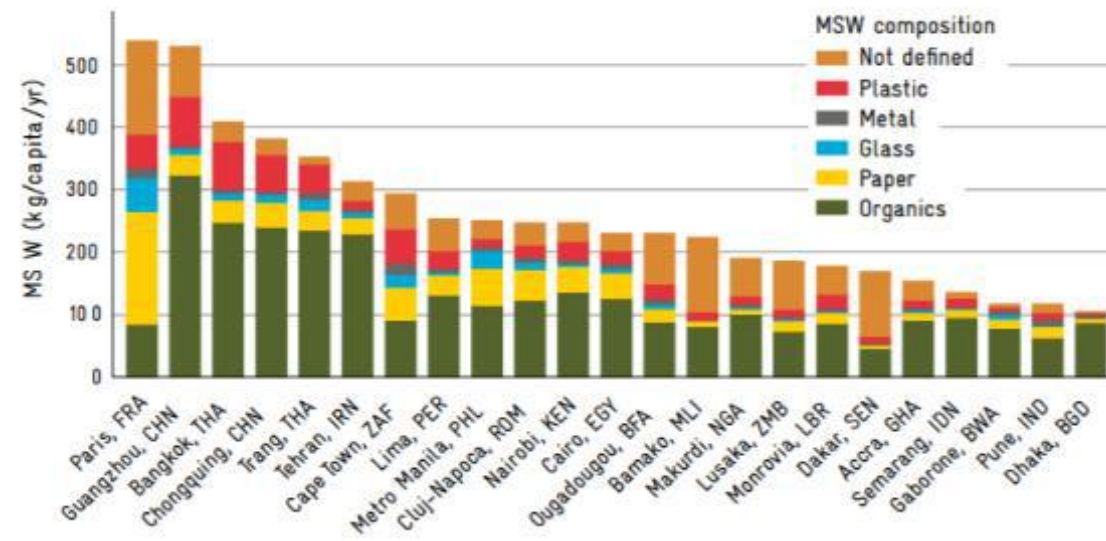


Figure 1: Projection of the development of urban and rural waste quantities of the world, 1950–2050. Based on UN-data [3] [4] [5] [6] and a daily waste production per person between 0.8 and 1.2kg in urban areas and between 0.4 and 0.6kg in rural areas.



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 at designated places by local governments, while sales and distribution of bags for business purposes are commissioned to private companies; Households use 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 | Amazónico: 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 send 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



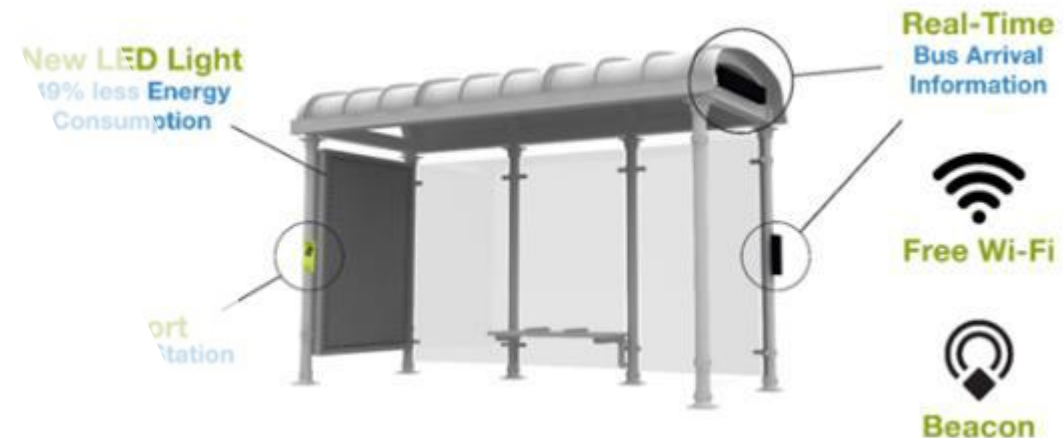
Smart & Green Mobility

- **Planned cities** – Need to plan for public & private transport –including NMT. Smart & Green includes accessible & connected cities
- **Technology** – incl. citywide infrastructure (Wi-Fi & adequate energy) to meet demand



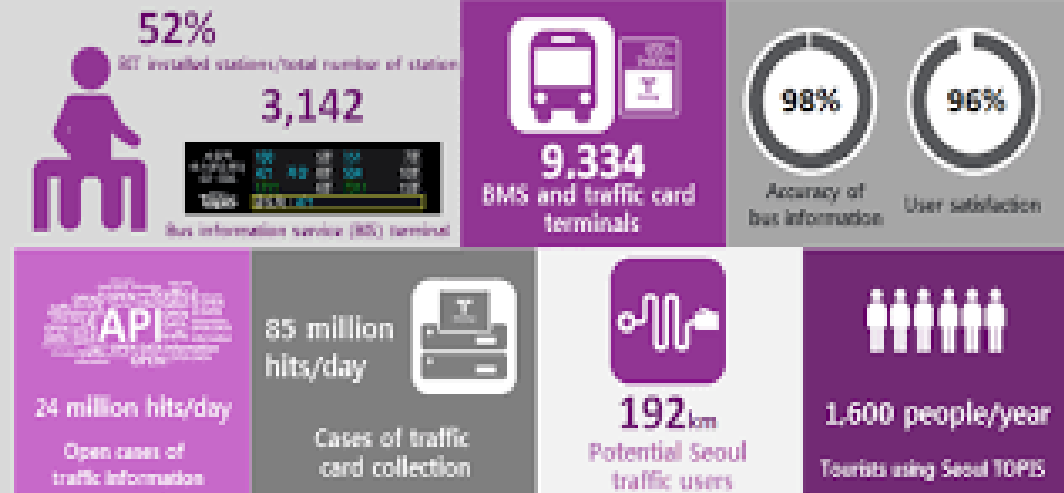
Public & Private Smart and Green Transport

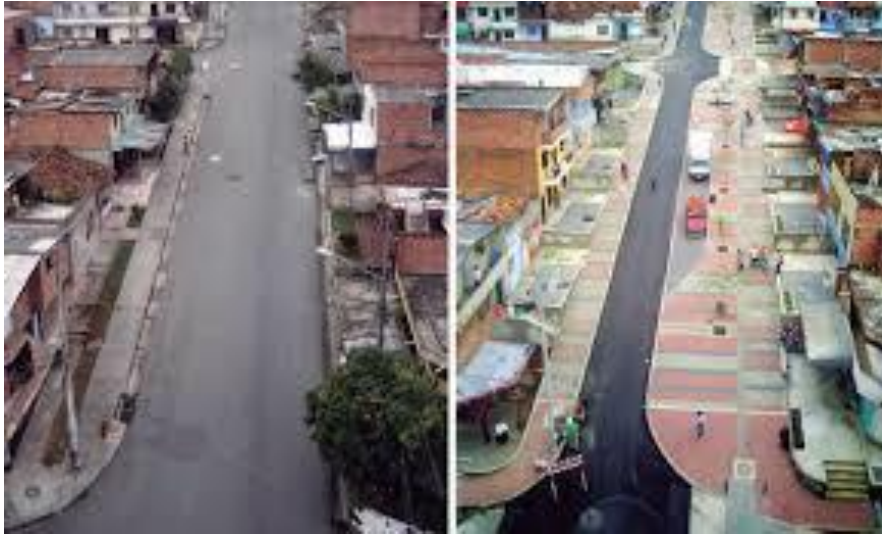
- **Private vehicles:** Use of Wi-fi to connect cars with GPS, manage traffic real time. Users connect via smartphones to access public transport data and connect own vehicles to real time GPS
- **Electric Cars:** running on battery, Wi-fi-enabled, is the grid clean?
- **Future of smart vehicles:** Could be autonomous vehicles, are cities ready for this technology?
- **Challenges:** High infrastructure cost; data privacy; inadequate coordination between departments



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





Case Study: Inclusive & Connected Green Mobility in Medellín

- 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

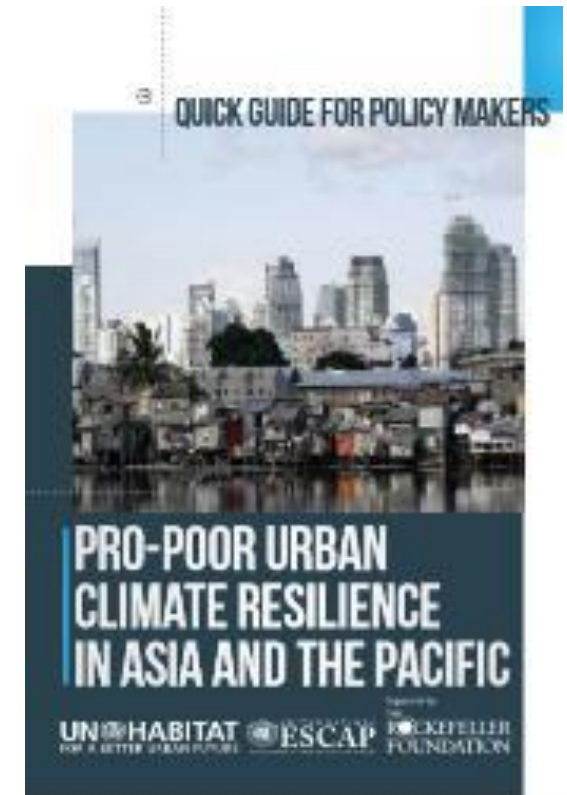


Case Study: Rwanda Bus Smart Card System

- Rwanda's cashless Tap & Go system developed by a start up in Kigali & launched in 2015.
- Commuters can charge smart cards through their mobile money account or Tap & Go agents
- Improved revenue collection rates for bus operators & reduced operational costs
- Demand to export model to other countries and cities
- Similar systems established in Kenya

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, adaptation
- ‘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.



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?

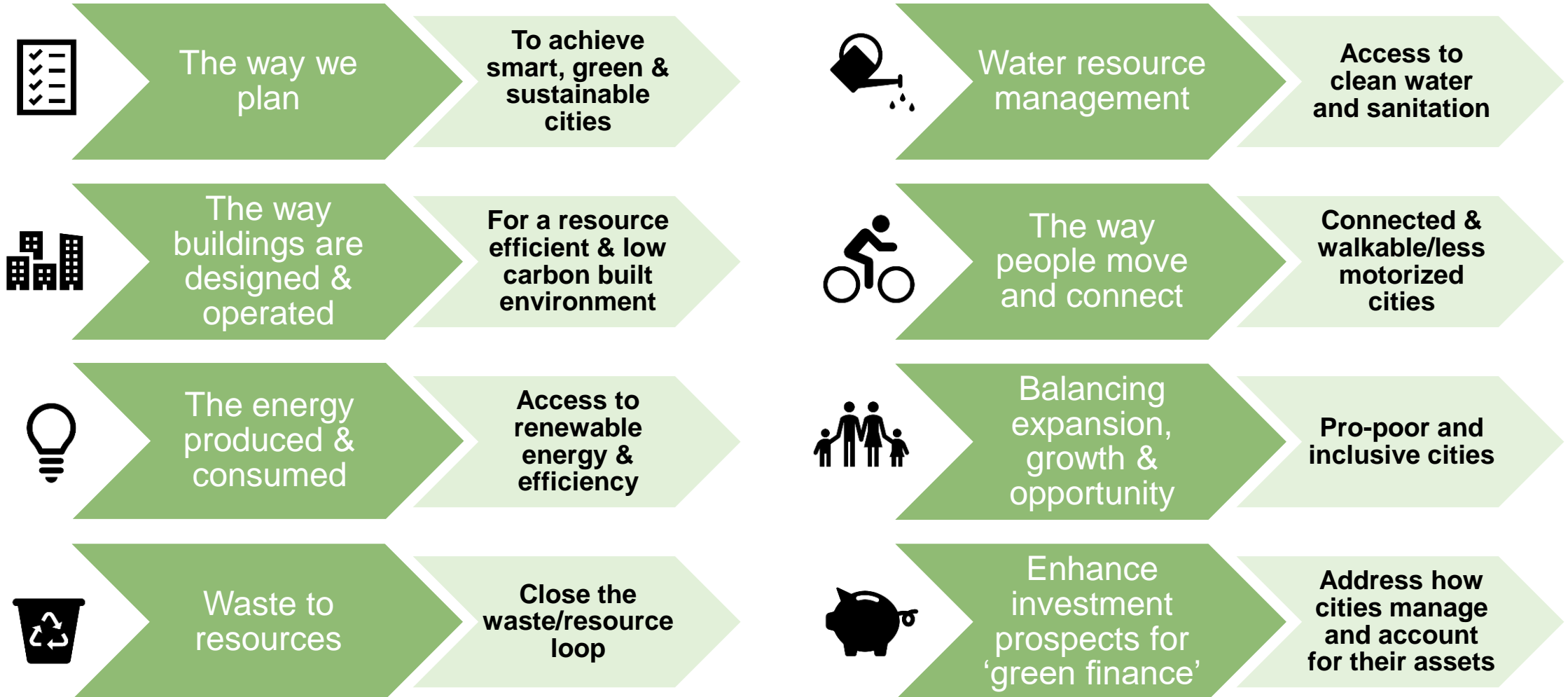


Green building & built environment – What are the opportunities in promoting green building and green public spaces with smart technology? What policy options would you suggest to tackle the impediments?



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

Towards Green + Smart Cities: Key Transformations



Thank You



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