



Towards Smarter and Greener Cities

World Bank's Climate-Smart Cities
Engagement

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World Bank Group

November. 4. 2022



I . World Bank Group: Cities and Climate Change

WBG Urban, Resilience, and Land (URL)

Cities: Opportunities, Challenges & the Urgency for Action

80%

of global economic activity generated in cities
– mostly in industry and services benefiting
from density

2.5 billion

additional residents in cities between now
and 2050

1 billion

live in slums today to be near jobs and
opportunity

1½ billion

exposed to cyclones and earthquakes in large
cities by 2050 (up from 680 million 2000)

1.2 million km²

of new urban built up area by 2030—more
than half is yet to be built.

Land consumption outpaces population
growth by 50%. Rapid spatial expansion
makes it difficult to provide services, houses,
and transport

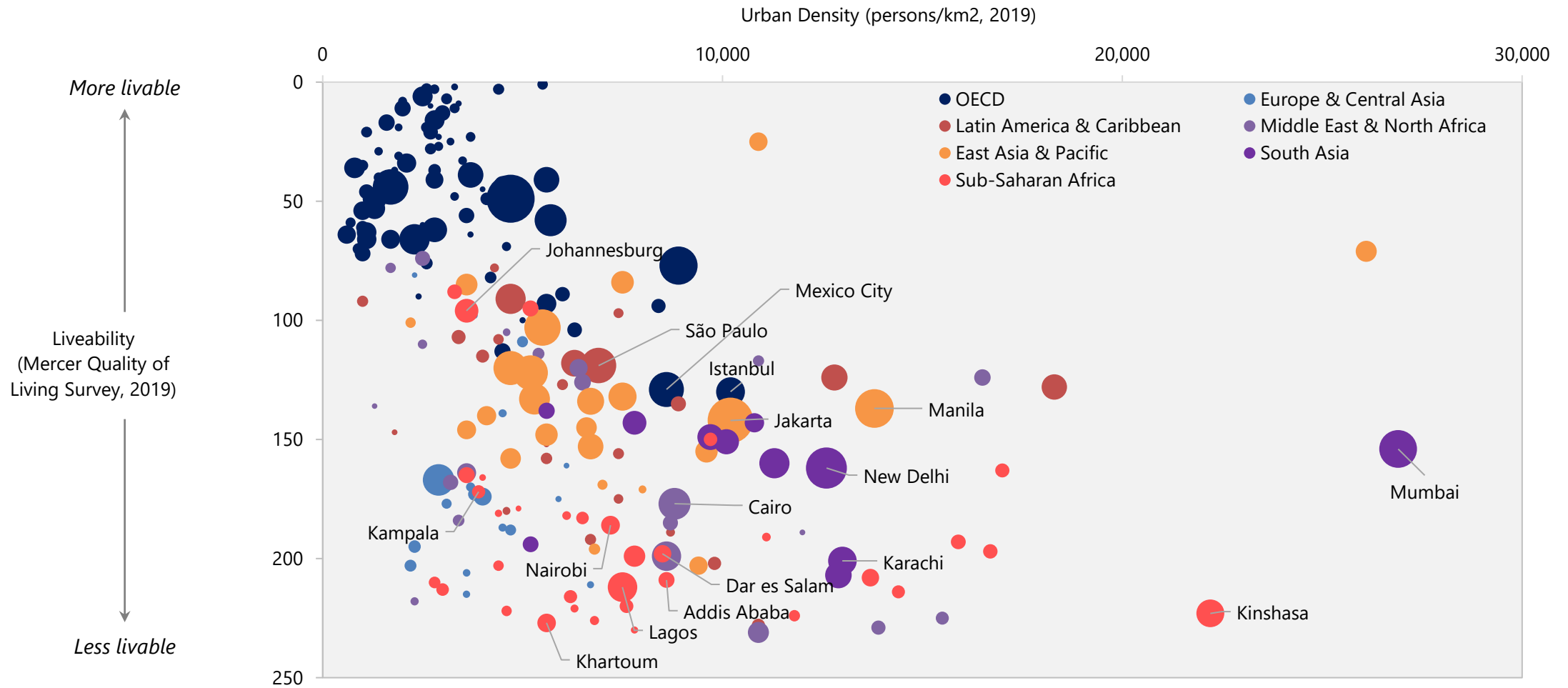
70%

of Greenhouse Gas emissions +

70%

of energy consumption is attributable to
cities.

Many cities in Africa & Asia are dense, lack public space and are unlivable



Source: Mercer- Quality of living survey (2019)

Note: Mercer's Quality of Living survey provides quantitative values for such qualitative perceptions to establish effective, objective assessments of city-specific quality of living measures around the world, by capturing aspects of daily living personal safety and security, health, transport infrastructure, availability of consumer goods, and adequate housing, schooling, and recreation opportunities.

(<https://mobilityexchange.mercer.com/insights/article/measuring-expatriate-quality-of-living>)

WBG URL Mission



GREEN cities

- Low carbon city development (CC mitigation)
- Urbanscapes, Urban envt
- Solid Waste Management



INCLUSIVE cities

- Slum upgrading
- Access to basic services
- Participatory planning / Citizen engagement
- Urban poverty



RESILIENT cities

- Multi-dimension resilience
 - Climate risk
 - Disaster risk
 - Economic shocks
 - Social conflict



COMPETITIVE cities

- National urban policies
- Territorial/regional econ development
- Local econ dev (jobs, investments)
- Land & real estate asset management

- PLAN - Integrated spatial/land use & territorial planning, Land & Housing Markets
 - CONNECT - City systems (info, mgmt, governance), Smart Cities
 - FINANCE - Urban infrastructure Finance

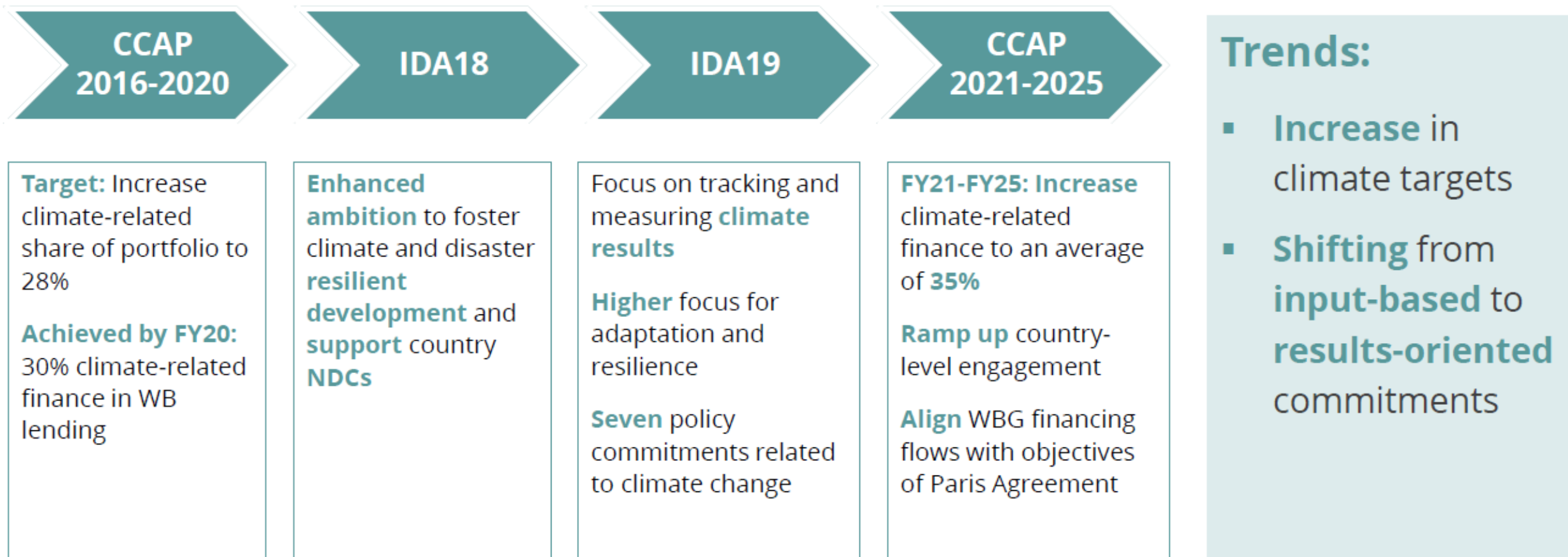
WBG URL Portfolio

GPURL has 215 projects totaling \$30.69B operating in 2,969 locations across 91 countries
In FY22: 42 pipeline projects for \$6.6B
Split is approx. 50% urban, 40% DRM, 10% Land

Results from investment lending in FY21: 14.3M people with improved urban living conditions of which 9.8M people in Africa



WBG Progress in Mainstreaming Climate Change



WBG Climate Change Action Plan 2021-2025

- Supporting **Green, Resilient, and Inclusive Development (GRID)**
- Aiming to **increase climate finance to reduce emissions, strengthen climate change adaptation, and align financial flows with the goals of the Paris Agreement.**

Source: World Bank (2021), Climate Change Action Plan 2021–2025

World Bank Group
CLIMATE CHANGE ACTION PLAN 2021-2025
1. The challenge

GHG reductions are urgently needed  **8x** more natural disasters affected the poorest countries in the last decade than in the 1980s

"Tackling the climate crisis while meeting urgent development needs is the fundamental challenge of our time"
World Bank Group CCAP

 Trillions of US dollars required in developing countries every year through 2030 to build infrastructure

 800 million people worldwide still lack electricity

 Climate change and the degradation of ecosystems together will push the planet closer to irrevocable **tipping points**

 **Adaptation & resilience** are critical for the **POOREST & most vulnerable** countries. 

World Bank Group
CLIMATE CHANGE ACTION PLAN 2021-2025
2. The plan

ALIGN CLIMATE & DEVELOPMENT

NEW DIAGNOSTICS Align with Paris Agreement Goals
 Country Climate & Development Reports supporting clients' NDCs, LTSs and development plans

July 1, 2023 **July 1, 2025**

World Bank: 100% WBG-wide: 100%
 IFC/MIGA: 85%

WBG Climate finance = 35% of overall flows, half for adaptation (WB)

PRIORITIZE KEY SYSTEMS TRANSITIONS

5 KEY SYSTEMS that generate **90%** of GHG emissions and face significant adaptation challenges

- Energy 
- Agriculture, food water, land 
- Cities 
- Transport 
- Manufacturing 

FINANCING TO SUPPORT THE TRANSITION

Help **CLIENT COUNTRIES** boost **public domestic RESOURCES**

INCREASE MOBILIZATION of domestic and private capital

Support global efforts to raise and deploy concessional finance 

WBG Climate Corporate Commitment in Operations



Climate and Disaster Risk Screening

Climate and Disaster Risk Screening represents a proactive approach to considering short- and long-term climate and disaster risks in project ...



Climate Co-Benefits

Climate Co-Benefits refer to the share of WBG lending at commitment that contributes to climate change mitigation and/or ...



GHG Accounting

GHG Accounting determines ex-ante gross and net GHG emissions, and, later, value these emissions in the economic analysis.



Shadow Price of Carbon

A Shadow Price of Carbon accounts for the carbon externalities in a project's economic analysis.

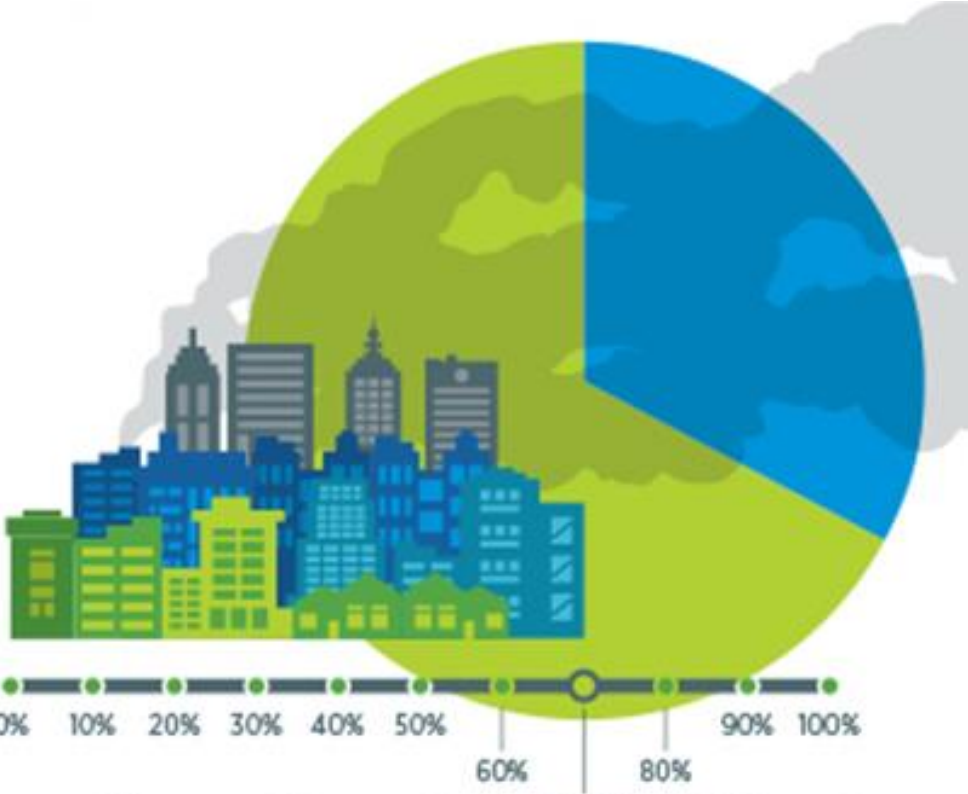


Climate Indicators

Climate Indicators monitor and track the progress of climate results; measuring outputs or outcomes of mitigation and/or ...

How our cities can inspire change

Investing in low-carbon and resilient urban development will be key to cutting city emissions and dealing with climate change



Cities account for over **70%** of global CO₂ emissions



Rising populations

More than half of the world's population lives in cities and that number is expected to jump by 1.5 times to six billion by 2045.



Economic powerhouses

Cities generate over 80 percent of the world's gross domestic product (GDP)



Energy

Cities consume almost two-thirds of the world's energy



Support

Developing green and sustainable cities requires designing more efficient and well-connected urban areas with enhanced access to services.



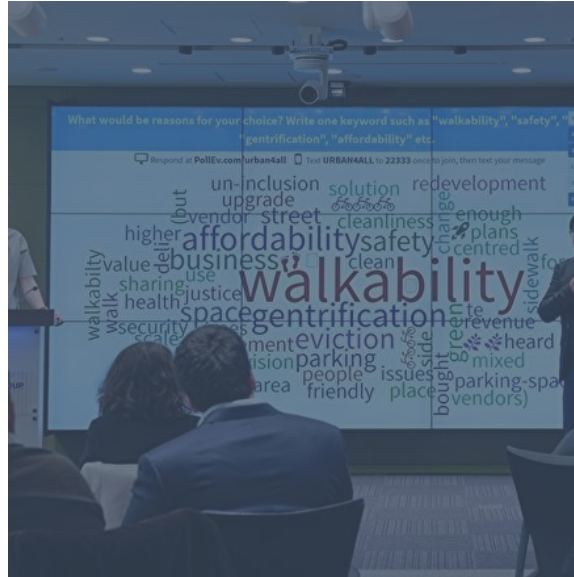


II. World Bank Group: Smart and Green Cities Tools and Resources

WBG Smart and Green Cities Tools and Resources

Advice and Analytics

non-lending activities that help external clients or audiences advance a development objective



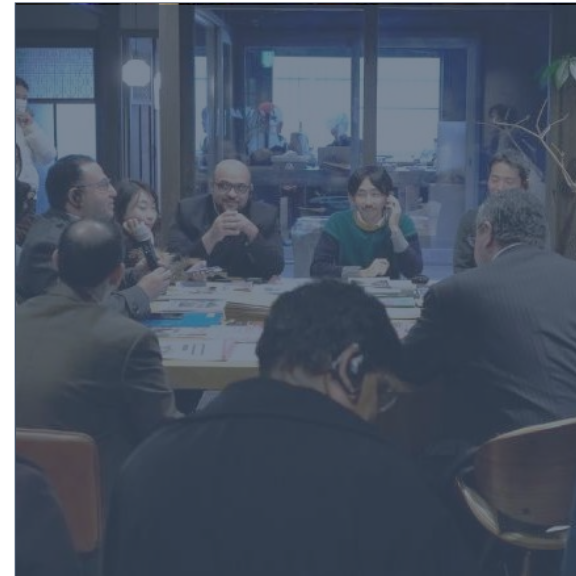
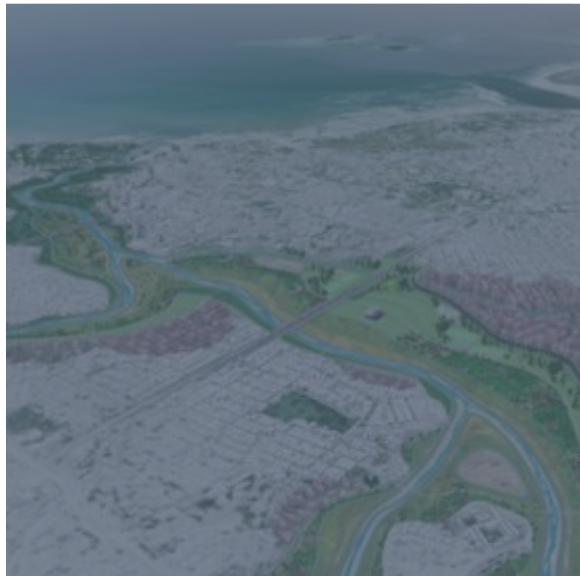
Private sector investment

Financing, direct investment and guarantees are provided by MIGA and IFC.



Financing

- Investment Project Financing
- Development Policy Financing
- Program-for-Results



Capacity building & Knowledge sharing

- E-learning course
- Workshop & seminar
- Stakeholder engagement
- Capacity building tools
- Publications

WBG Smart and Green Cities Initiatives and Programs



Global Smart City
Partnership Program



SMART CITIES KSB



City Climate
Finance Gap Fund



CPL
City
Planning
Labs



Global
Platform for
Sustainable
Cities



GFDRR

Global Facility for Disaster Reduction and Recovery

WBG Smart and Green Cities Thematic Areas

Building on a strong foundation to enable data-driven decision making across government

Urban Analytics for
Decision Making



Geospatial Reference
and Data Infrastructure



Emergency Management
Information System



Risk-Sensitive Zoning and
Land Use Planning



Construction Permitting
and Monitoring



Citizen Engagement



Public Property Asset
Management System



Infrastructure Asset
Management System
(O&M)



Utility Management
(Transportation, Water,
Energy, etc.)



Land Registry, Cadastre
Cadastral Map



Flood Management
Information System



Open Data, Crowdsourcing
Start Up Ecosystem

Location-based Information for Smart and Green Cities



WBG Smart and Green Cities Tools:

Apex Advanced Practices for Environmental Excellence in Cities | IFC International Finance Corporation WORLD BANK GROUP

Durban, South Africa [DASHBOARD] FILE SAVE

GHG Emissions 5.6 MtCO ₂ e	GHG Emissions 1.6 tCO ₂ e/person	Energy Use 5.7 TWh	Private Fossil Fuel VKT 446.5 Million km	Waste to Landfill/Unmanaged 1.0 Mt	Water Use 2219.3 MLD
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City Info Built Env 48% Transport 93% Waste 24% Water 21% Emissions 46% [HIDE RESULTS]

Combined GHG Reduction Measures
Choose measures to achieve GHG emissions savings

Built Environment

- A.1 Mandate Energy Performance Labels - 40% of Buildings
- A.2 Mandate Higher EPL, Impose a Fine on Lower EPL
- A.3 Mandate Roof-top Solar Hot Water - Collectors on 25% of Habita...
- A.4 Implement City-wide Emissions Trading System (ETS) - 25% of No...
- A.5 Improve Building Code - New non-residential only - Zero carbon
- A.6 [x] Require All I
- A.7 Promote Cool I
- A.8 Increase Exten

45.7% GHG Emissions Savings

Line chart showing MTCO₂e from 2021 to 2025. Legend: Built Environment, Transportation, Solid Waste, Water and Wastewater, BAU Forecast, Target Trajectory.

Transportation
93.4% Private Fossil Fuel Vkt Reduction

Bar chart showing Private Fossil Fuel Vehicle Travel (M) for 2021 and 2025. Legend: Automobile, Two-Wheeler, Motorcycle.

Choose measures to reduce private vehicle for travel

- B.1 Mandate Retirement of Inefficient Ca (0)
- B.2 Mandate Retirement of Inefficient Mo (0)
- B.3 Mandate Min. Efficiency For New Cars (0)
- B.4 Mandate Min. Efficiency For New Mot (0)
- B.5 Introduce Congestion Charging Zone (0)



IDENTIFY INVESTMENTS
suitable for green financing



DEVELOP STRATEGIES
for the long-term (e.g., climate action plans)



ASSESS AND TRACK
the performance of your city

Use cases



Developing a Green City Action Plan to Achieve Sustainability Targets



Identifying Low-Cost, Impactful Policies, Planning Measures and Investments



Helping the City Solve Pressing Issues While Managing Climate Impact

WBG Smart and Green Cities Tools:

UP **Urban Performance** Web
Assessing investment projects and policy options for evidence-based decision-making

The **Urban Performance** tool assesses the city's present and future performance by creating multiple growth scenarios that include investment projects, public policies and land regulations. The results are evaluated in a set of indicators related to the Sustainable Development Goals.

The Urban Performance tool allows:



Scenarios development: Urban Performance is a powerful web application that easily creates dozens of urban growth scenarios allowing decision-makers to evaluate policy actions and land regulations in seconds.



City plan evaluation: The tool supports the preparation and further evaluation of city plans in a massive way, evaluating the validity and correct follow-up of the regulations expressed in the plans.



Evidence-based decision - making: Urban Performance advances consensus between different actors and supports decision-making based on quantitative evidence.




We acknowledge the invaluable support of the World Bank's Trust Fund for Statistical Capacity Building (TFSCB) in the making this project. The latest version of Urban Performance was developed at City Planning Labs and is maintained by CAPSUS, UPtech and a community of developers. Urban Performance is open source and its source code can be found at GitHub. Visit our webpage to learn more about the project <https://www.urbanperformance.in>


ST **Suitability** Web
Finding strategic locations for informed urban planning

Suitability is a powerful web application that identifies optimal locations for a specific activity within a city, displaying heat maps of access to urban services and infrastructure. Suitability supports national urban planning agencies and city governments to perform land suitability assessment to plan for infrastructure deficits at the city and local levels, enabling inter-departmental coordination and a strategic planning approach.


The Suitability tool performs in the following features:



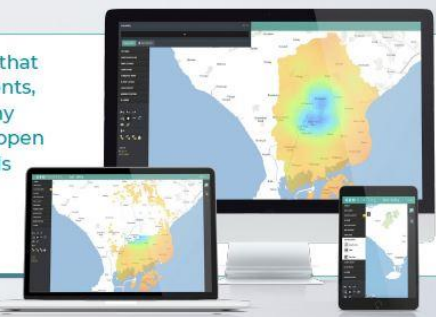
Land suitability: Find strategic locations for schools, hospitals, parks or other urban services. The tool also identifies areas with lack of infrastructure and urban services.



Social housing projects: Identify the optimal location for social housing projects with transparent methods.



Create consensus: Use the tool in a workshop and use interactive maps to create consensus.




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CollabData iOS Android Web
Bringing communities and governments closer

CollabData is a robust digital platform that captures needs, challenges and ground realities of the communities, strengthens public consultations and simplifies the analysis of collected data with powerful visualizations.


In short, it brings people and governments closer. CollabData performs in three main functions:




Data Capture: Participants can directly register their inputs in a digital map, using the CollabData web application, Android App or iOS App. Participants can also use social networks, such as Twitter, Facebook and Instagram. CollabData will integrate these inputs in a single database.



Data Processing: CollabData uses neural networks to recognize emotions from text inputs, uses text mining to identify the most frequent ideas and identifies spatial clusters with the most frequently repeated ideas.

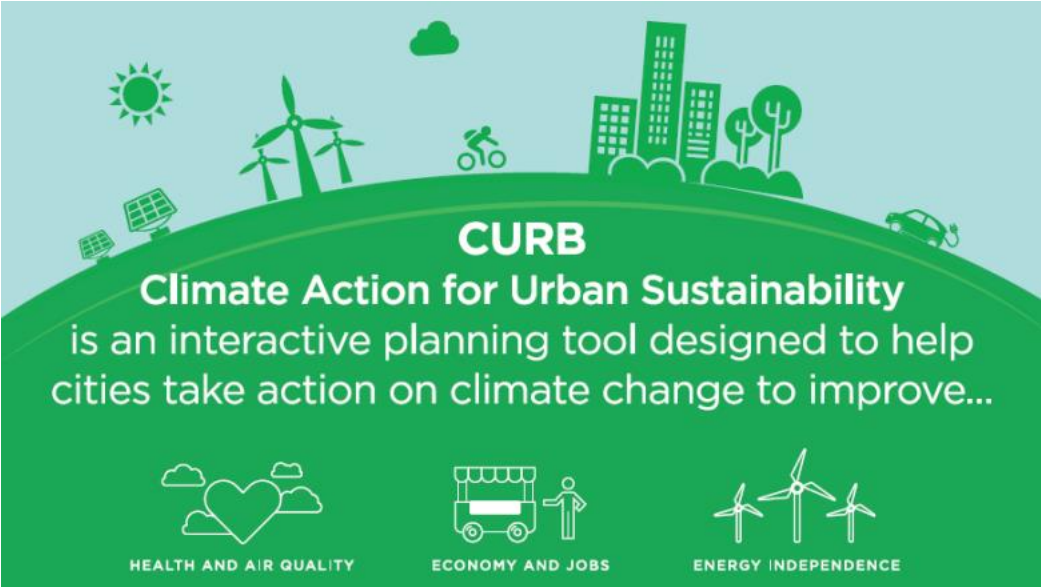


Powerful Analytics: The analysis can be presented in the form of heatmaps, spatial word clouds, emotion maps and gender statistics to transform data into information that can be easily utilized for decision making.



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WBG Smart and Green Cities Tools:



	D	E	F	G	H	I	J	K	L
		Percent							
	0.0%	Percent							
Solid Waste Collection and Transportation	Value	Units	Explanation				Comment/specify alternate units	Source	
Type of Fuel Used in Trucks	Please Select	Please Select	Please select the fuel most commonly used in the waste trucks						
Number of Trucks		# of Trucks	Enter the number of trucks used for waste collection and transportation						
Waste Truck Travel		Km/Year	Please estimate the average annual distance traveled by one waste truck						
Average Fuel Efficiency of Trucks		Km/Liter	Please provide the average fuel efficiency of waste trucks.						
Transfer Station Energy Consumption	Value	Units	Explanation				Comment/specify alternate units	Source	
Type of Fossil Fuel Used at Transfer Stations	Please Select	Please Select	Please select the fuel most commonly used in the waste trucks						
Fuel Consumed Monthly		Liter equivalents/Month	Please enter the fuel quantity consumed monthly at the transfer stations						
Amount of Electricity Used Monthly		kWh/month	Please estimate the average electricity used in transfer stations in one month						

WBG Smart and Green Cities Tools:

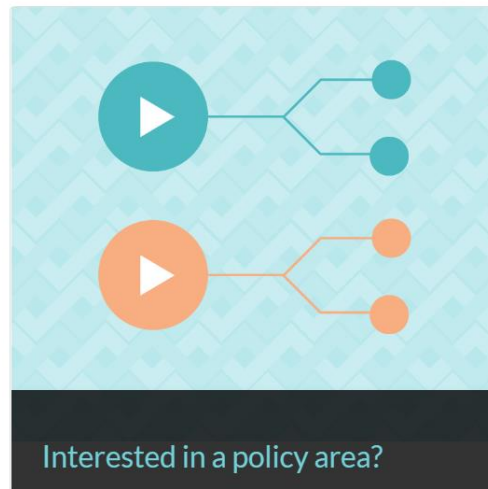
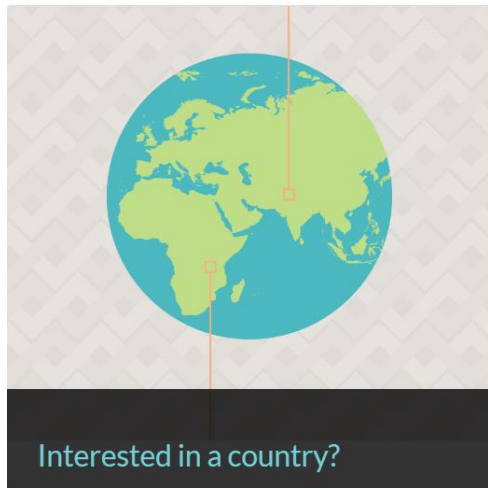
UNBREAKABLE
RESILIENCE INDICATOR

COUNTRY POLICY ADVANCED TOOL REPORT ABOUT



Welcome to Unbreakable THE RESILIENCE INDICATOR TOOLBOX

Is your country vulnerable to floods or windstorms, earthquakes or tsunamis? Find the optimal resilience-building solution in your country that also protects the most vulnerable. Use our three tools to estimate the benefits of investing in resilience. Click [here](#) to view tutorial.



WBG Smart and Green Cities Tools:

Think**Hazard!**

Identify natural hazards in your project area
and understand how to reduce their impact



River flood



Urban flood



Coastal flood



Earthquake



Landslide



Tsunami



Volcano



Cyclone



Water scarcity

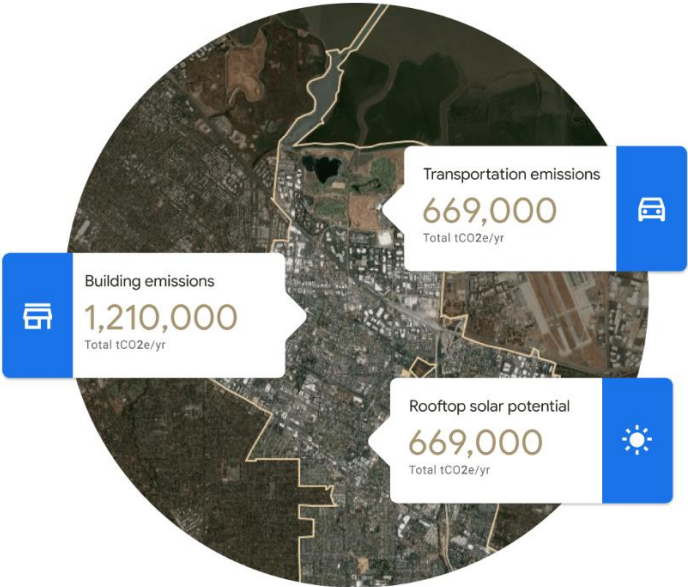


Extreme heat

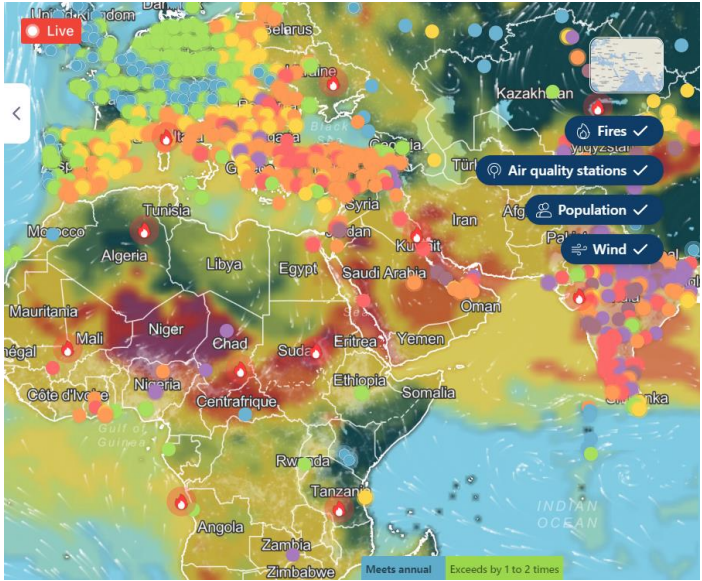


Wildfire

Other Smart and Green Cities Tools



Google/ Evt Insight Explorer



UNEP/ Urban Air Action



C40/ CRISIS



EPA

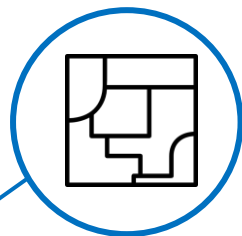
WBG Smart and Green Cities Engagement Cases:

Smart Land and Infrastructure Management in Indonesia using 3-dimensional cadastre



WBG Smart and Green Cities Engagement Cases

Smart and Green Cities PASA – Thematic Anchors



Delivering foundational land and geospatial infrastructure for smart urban land management

- **Land administration and geospatial information** system links to e-governance and e-services
- Foundational readiness for **urban land use planning** and management



Promoting green and resilient smart cities

- Smart city tools for **low-carbon urban development**, notably greening buildings and managing selected urban systems and services
- Functional smart applications for **disaster risk management and resilience planning**



Fostering inclusive smart cities

- Integration and analytics on the use of digital technologies for **citizen engagement and consultation**
- Promotion of **inclusive regularization and urban planning** including the promotion of gender-smart city elements

Smart and Green Cities Engagement Cases

Smart and Green Cities PASA – Areas of Support

Objective Build knowledge and support the operationalization of smart urban systems in EAP

Pillars

1. Country Program Analytical Support
2. Regional Knowledge Services



Gap assessment

Support baseline analysis of existing environment - Data/ Hardware/ Software/ Policy, including:

- Data and ICT Assessment & Gap Analysis
- Open Data Readiness/ Supply Chain Assessment
- Data sharing policies & processes, and data management guidelines



Cost-benefit Analysis

Build economic rationale for smart & green cities investment by estimating potential city losses from inaction in digitizing, interconnecting, and geo-informing land & urban planning & management functions



Urban planning, infrastructure & management tools for WB financing

Investment plans for digitization of legal records, data collection, storage solutions & ICT infrastructure upgrades

Investment plans of data-informed infrastructure planning, Integrating climate, spatial planning platform

Design review for green, resilient and inclusive infrastructure and public space

Smart and Green Cities Engagement Cases

Smart and Green Cities PASA – Regional Knowledge Services

Knowledge generation

- Technical notes
- Case studies
- ❖ Korea smart city note
- ❖ Korea Urban regeneration case study

Cross-GP Collaboration

- ❖ DD, ENB, FCI, KPOK
- ❖ GSCP

Knowledge exchange

- Peer-learning
- Webinars
- Study visits
- ❖ HCMC digital transformation knowledge visit

K-Partnership

- ❖ Land & geospatial
- ❖ Territorial, urban & spatial planning
- DRM, resilience
- Municipal governments
- Utility management
- Digital development
-



III. World Bank Group: Smart and Green Cities Knowledge Sharing

Knowledge Sharing and Dissemination



Capacity building program

Investment in people, institutions, and practices that will, together, enable countries in the region to achieve their development objective.

- Virtual Knowledge Exchanges
- Study Tours



Photo: <https://www.worldbank.org/en/data/statistical-capacity-building>



E-learning course and Webinars

Learning programs offered at the Bank are supported by the Open Learning Campus (OLC) for WBG learning for both staff and clients. Webinars on the development topics hosted by the World Bank teams are also archived.

- Virtually facilitated and self-paced courses
- Podcasts, videos, webinars, infographics, mobile apps



Research

A host of publications and research papers to inform discussions and dialogue with its partners, most notably governments, with a view to modifying or improving practices and action strategies on the ground.

- Policy research working paper, technical notes
- Case studies
- Research digest

Knowledge Sharing and Dissemination E-Learning courses and webinars



Bite+

Machine Learning for Smart Cities 1.0

How are smart cities solving everyday urban problems with machine learning algorithms and big data?



Bite+

Korea Innovation 2020: Smart City Financing and PPP

How can we bring specific tools of private-public partnerships and financing to solve big challenges related to urban cities?



MOOC

Smart Cities for Sustainable Development

Throughout history, cities have been the center of economic development, technological innovation, social progression and the enhancement of human capability. While growing in numbers and sizes –...



Bite+

Korea Innovation 2020: Smart City Land Administration and Geospatial Technologies

Digital Twin example of Korea and the importance of technology to address the issue of land administration and policy



Virtual Face-To-Face

GPURL Learning Days 2022: Cities and Climate 101: Master Class on Low-Carbon City Development

The objective of this master class is to build the foundational knowledge and skills necessary to help operational teams and their client cities to both better understand the impacts of climate change and transition to low-carbon development pathway.



Bite+

GPSC Global Online Series: Catalyzing Private Sector Investment in Climate-Smart Cities (Report)

Despite the investment potential, cities face unique challenges in accessing finance to fill the climate-smart investment gap.



Archived Webinar

GPURL #OnlineLearningSeries: Smart City Innovations to Overcome COVID-19 in Swiss Cities

An interactive discussion to understand how public and private players are collaborating and using Smart Technologies to address the challenges of COVID-19 in Switzerland and beyond.



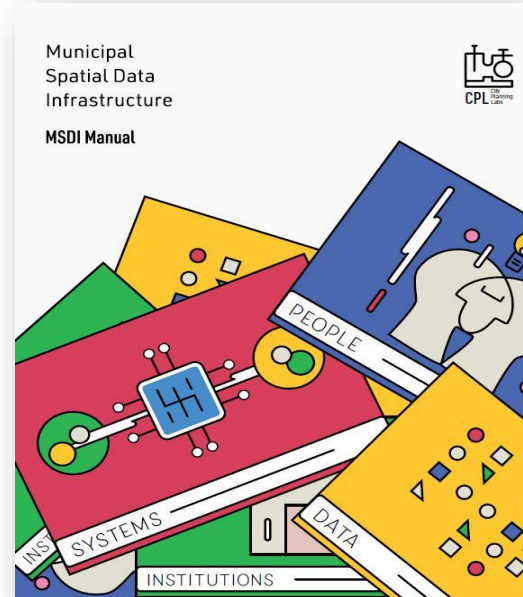
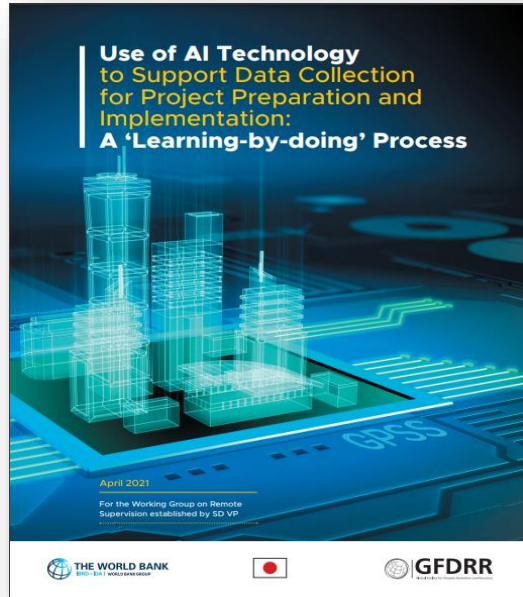
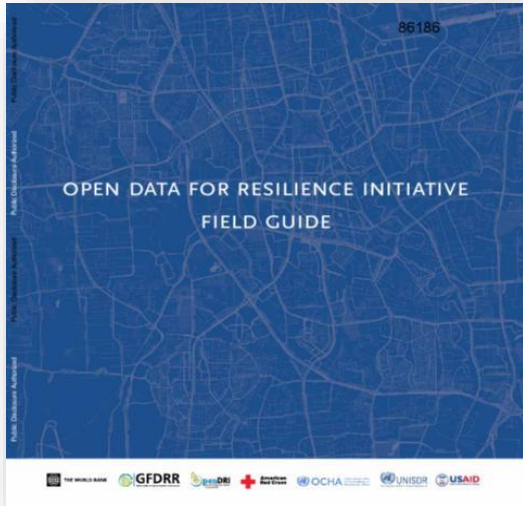
Archived Webinar

GPSC Global Online Series: Catalyzing Private Investment in Climate Smart Cities

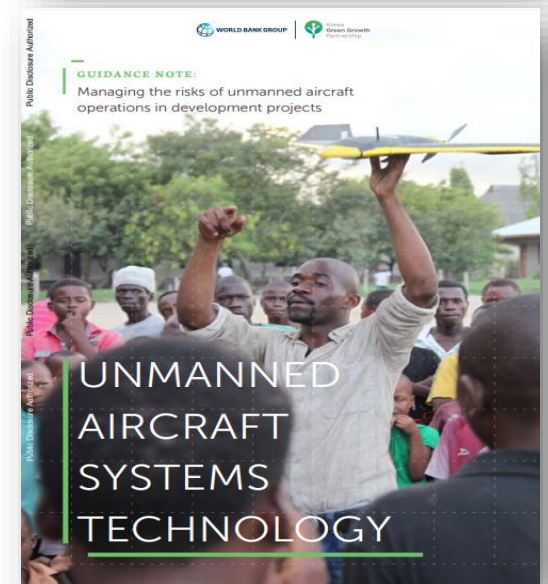
Understanding urban climate investment opportunities and barriers, and featuring case studies of innovative financing approaches to overcome these barriers



Knowledge Sharing and Dissemination Research and guidance notes



Knowledge is central to the World Bank's ability to influence the **global development agenda**. Combining global and country knowledge, our research programs **generate wide-ranging insights for solving development challenges** in client countries.



The background features a dark blue cityscape at night with various icons overlaid. These icons include a Wi-Fi signal, a group of people, a padlock, gears, a globe, and a heart with a pulse line. Dotted lines connect these icons, suggesting a network or data flow. A white vertical line is positioned to the right of the text on the left.

**Smart Cities
for
Sustainable
Development**

Thank You



WORLD BANK GROUP