

**GREEN
CLIMATE
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Climate Impact and Financing of Green and Smart Cities

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Presentation Content

1. Climate change realities in the context of cities, urban areas and urban development complexities;
2. Taxonomy of Green vs. Smart Cities; and how it defines climate driven interventions for cities / urban areas in developing countries;
3. The global investment potential of climate-smart urban infrastructure (US\$30 trillion);
4. GCF sector-driven interventions, towards de-risking, paradigm shifting and forward thinking on green transformation

Introduction: Cities and GHG emissions - towards placing 80% burden of blame

Average per capita GHG emissions in cities:

Rotterdam 29.8 tCO₂eq.
Sydney 15 tCO₂eq.
Shanghai 12tCO₂eq.
Mexico City 4.25 tCO₂eq.
Amman 3.4 tCO₂eq.
Colombo 1.54 tCO₂eq.
Kathmandu 0.12 tCO₂eq.



Caveat:

Close interaction between urban form, service access and per capita GHG emissions; Low and high neighborhoods in the same city vary by a factor of 10. Density play

The IEA estimates:

While currently 71% of GHG emissions;
76% of energy related GHG by 2030 will come from the cities.



Caveat:

Scope 1: production-based emissions
Scope 2: consumption-based emissions
Scope 3: consumption-based emissions embodied in fuel, food, building materials and water

Importance of urban economies:

Both **Tokyo** and **New York** gave a greater GDP than Canada;
by 2030 **New Delhi** will have a greater GDP than Malaysia.



Caveat:

Focus on urban form and integrated Transportation system;
Greater material, products and activities efficiency; low carbon energy / lower energy intensity

New IPCC Report & previously known data

• 1.5 degrees Scenario

- Available global carbon budget is only about **750 Gt of Co2 equivalent until 2030**;
- **Great risk of disruptive path dependencies**, not only in the urban sector, as most of the world continues to **model economic growth according to past methods**;
- 85% of demand for new housing in emerging economies, 50% of which is in China and the rest mostly across Asia and Africa

• 2 degrees Scenario:

- Available global carbon budget is about 1,050 Gt of CO2 equivalent until 2030;
- Only existing urbanization trend – **CO2 footprint of construction of new infrastructures in developing countries and emerging economies** could lead to **350 Gt of CO2 emissions**;
- Resource intensive and high-carbon urbanization process need to be stopped at all costs

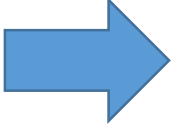
BUT...climate reality continues to unfold – refinement of climate sensitivity towards 3 degrees scenario

• **2.6 to 4.1 degrees pathways**

- If the CO2 concentration in the air doubles from the pre-industrial level, the earth will warm to between 2.6 and 4.1 degrees Celsius.
- **At the current rate at which humans emit CO2, this doubling will be achieved within 50 to 60 years.** A new, comprehensive analysis, recently published in Review of Geophysics, concludes.
- **Source: An Assessment of Earth's Climate Sensitivity Using Multiple Lines of Evidence, Review of Geophysics, Volume 58, issue 4, 2020.**
- The researchers hereby provide **an important refinement of climate sensitivity**, a central concept in climate science.
- That sensitivity is a measure of the response of the Earth's climate when it is unbalanced, as has happened over the last 150 years with human emissions of CO2 and other greenhouse gases.
- According to **Steven Sherwood**, the analysis clearly shows that people must reduce their CO2 emissions, as well as other greenhouse gases, "very drastically".
- Within 50 to 60 years we will already be bound to a warming of about 3 °C, he says, **unless we start using massive techniques to get CO2 out of the air again.**

‘As humanity, we can no longer hope for a low climate sensitivity’ says Steven Sherwood, lead researcher of this new climate study (the University of New South Wales).

Raising to the challenge: addressing market failures & negative externalities - **Green vs Smart Cities;**

- Human settlements are **vulnerable** to the increasing impacts of climate change such as extreme temperatures and sea level rise, especially in the absence of **resilient infrastructure and planning;**
 - These trends are expected to grow unless actions are taken to ensure that cities and urban areas are designed to enhance **productivity, resilience, and innovation,** while reducing the carbon intensity of their economic and social activities.
 - Such efforts will not only generate economic benefits, but also address **market failures** such as urban sprawl, congestion, and **negative externalities** of pollution and carbon emissions.
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- **Green Climate Fund's continuous focus of strategic considerations in the urban sector:**
 - **Green vs Smart Cities;**
 - Pursuing transformative pathways in urban systems
 - **Retrofitting megacities**
 - Supporting carbon neutral / carbon negative planning, orientation and development of **secondary and intermediate cities;**
 - Catalytic and innovative finance for de-risking and upscaling private sector

Important, taxonomy-driven, differentiation (1)

- **Green Cities**

- The concept of **'Green City' or 'Green Development'** is not new. Previously couched within the term 'sustainable development', it seeks to integrate climate, environmental, social and economic considerations within development processes.
- A Green City or Green Development is an extension of this concept but understood within the frame of a city priority actions and how these actions contribute to a city or urban area advancing as **green, climate conscious and sustainable.**
- **Green Urban Development** considers how to
 - improve and manage the overall climate considerations (low emission, climate resilient - LECR) ,
 - quality and health of water, air and land in urban spaces,
 - its correlation to hinterlands and wider ecoservices systems
 - and the resultant benefits derived by both the climate, the environment and residents.

Important, taxonomy-driven, differentiation (2) – absence of sequencing

- **Smart Cities: Big Data and AI**

- A smart city is an urban area that uses different types of electronic Internet of things sensors (and since relatively recently – 1980s - artificial intelligence) to collect and manage big data;
- Insights gained from that data are used to manage assets, optimize resources and services efficiently;
- in return, that data is used improve the operations across the city, which also benefits climate and environment (energy efficient buildings, sustainable transportation, on demand energy management are a few examples of smart cities technology).

- **GCF Perspective - first Green then Smart, for developing countries:**

- In a broad / directional sense, a vast majority of cities in developing countries will not easily or anytime soon reach a smart city focus;
- Hence the necessary step for these cities and urban areas in developing countries is **Green Cities** orientation and strategy;
- what is within their and our grasp is a combination of **developmental and climate impact interventions** that will make these cities prioritize low emissions and climate resilient infrastructure and development;
- **Laying leapfrogging ambitions towards Smart Cities development should never be ignored nor forgotten**

Transformative action fields for cities

Transformative Action Fields	2030 GHG emissions reduction	2050 GHG emissions reduction
Decarbonization of energy sector: renewable energy and storage	50% to 70% renewables, saving 35% - 45% of GHG At cost \$40-\$80 per MW	Up to 90% reduction on the basis of the same trend
Improving energy efficiency in building stock	Buildings: 32% reduction in primary material consumption and associated GHG	Buildings: 53% reduction in primary material consumption and associated GHG
Mobility and transport	20% to 45% emissions reduction	Same trend
Urban form	20% emissions reduction	40% emission reduction combined with transportation strategies
Urban resilience	DRR / Optimizing value for money through resilience enablers	DRR / Optimizing value for money through resilience enablers
Materials and material flow	32% reduction in primary material consumption and associated GHG	53% reduction in primary material consumption and associated GHG
Improving waste management	20 % reduction in related GHG emission	40% reduction in related GHG emissions

Main Urban dimensions for creating a smart city:

- **Smart Living (Quality of life):** housing, education, health, safety and security, lifestyle, culture and tourism, provision of basic services;
- **Smart Economy (Competitiveness):** green technology and jobs, green focused SMEs, local industry and businesses;
- **Smart Energy (Efficiency):** smart grids, smart meters, fuel cells, energy storages, renewable energy, energy efficiency in lighting systems and green buildings;
- **Smart Governance (Participation):** various communication mechanisms between local government and residents, e-government, open data, data centers, transparency, community consultation mechanism
- **Smart Mobility (Connectivity):** green transport – environmentally friendly, green solutions for public transportation, bicycle and walking pathways, hydrogen fuel, electric vehicles and busses;
- **Smart Environment (Sustainability):** major reduction of GHG emissions, green buildings, ecosystem services in urban context (sponge cities with natural flooding resilience, water management, circular economy and waste management);
- **Smart People (Governance):** bottom up engagements, social integration, social cohesion, local human and social resources, schools and universities, green technology research centers, green focused clusters of business communities;

Catalyzing private sector investment in climate smart cities

- Some \$29.4 trillion in opportunities exist in developing countries alone across six urban sectors that reduce emissions: renewable energy, public transportation, climate-smart water, electric vehicles, and green buildings (IFC 2017).
- Climate resilience also presents significant private investment opportunities as climate change becomes an increasingly powerful macroeconomic trend impacting the real economy.
- As the climate change crisis gets bigger, better understood by markets, and better priced, so will the value, importance and return of companies and assets that are intrinsically resilient or provide resilience solutions (Invest4Climate Knowledge Series, 2020).
- According to a recent survey of the world's biggest companies, climate adaptation products and solutions could result in \$236 billion in increased revenue (GCA 2019).

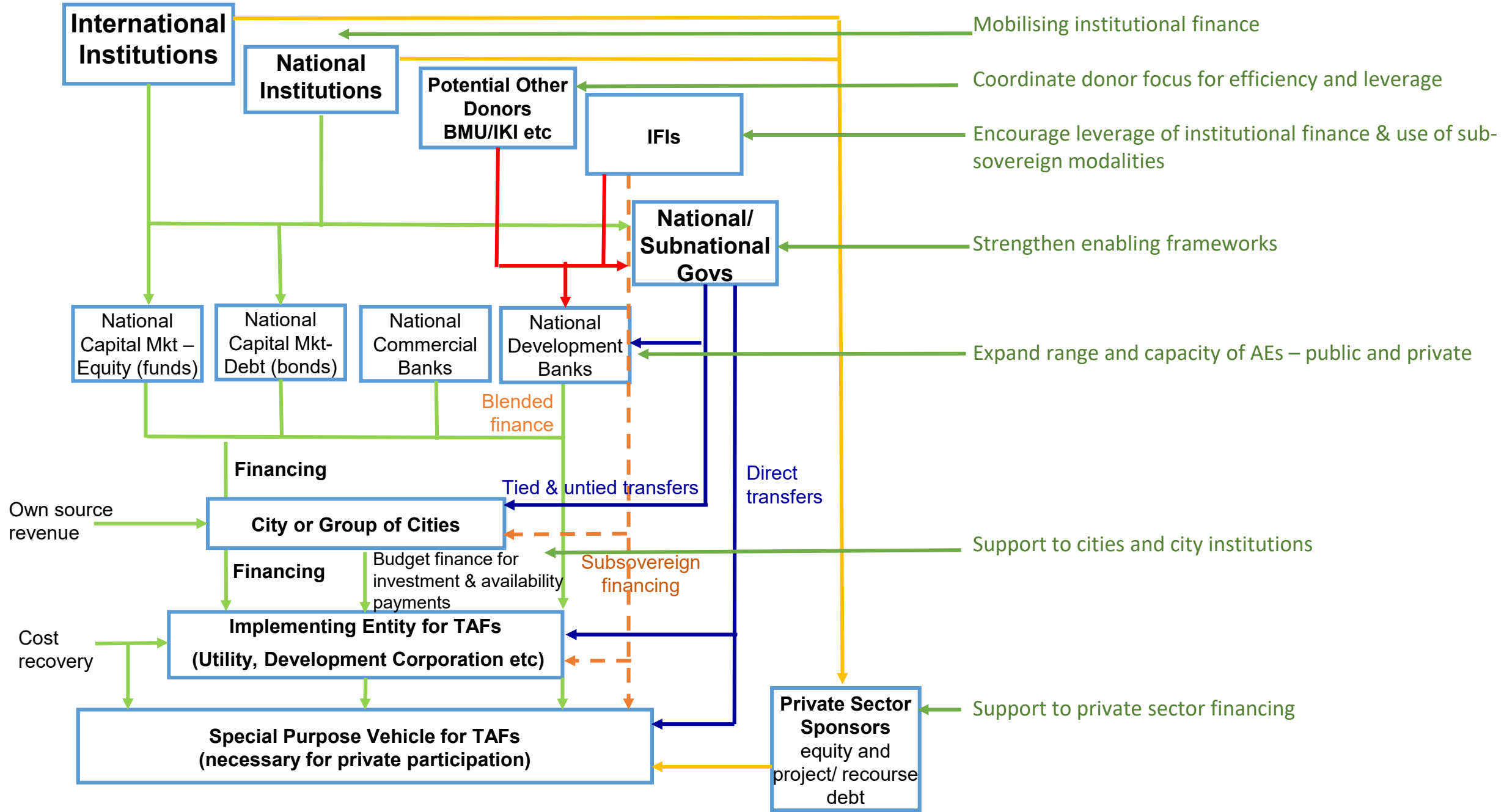
Drivers of change across the GCF results area

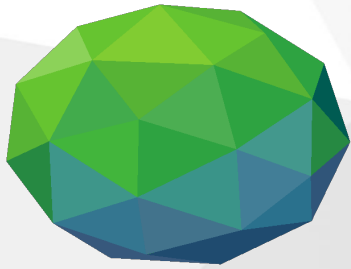
Four drivers of paradigm-shift

		Transformational planning & programming	Catalyzing climate Innovation	Mobilization of finance at scale	Expansion and replication of knowledge
Paradigm - shift pathways (Transformative Action Fields)	Decarbonized & distributed Energy	<ul style="list-style-type: none"> Strengthen mechanisms to implement NDCs and urban climate targets through planning and programming process Foster integrated urban, transport, energy and infrastructure development Institutional strengthening for pipelining and project development Develop and apply new technical standards (MES etc) and performance standards in support of the above 	<ul style="list-style-type: none"> New business models that reduce upfront capital cost requirements and tap new revenue sources (ex: pay-as-you-go schemes; land value capture, etc.) Support to integrated implementation of new technologies New institutions (ESCOs, etc.) New urban development models (TOD, etc.) New legislation (producer responsibility) 	<ul style="list-style-type: none"> Increased access to of cities and city institutions to domestic and international capital markets through Support to pipeline development at scale Catalyse and participate in private sector funding vehicles eg SPVs for PPPs Targeted investments in catalytic funds, city raisings and PPP structures Support to direct access AEs (especially NDBs) in subnational climate financing Mechanisms to enhance the use of blended finance, sub-sovereign finance and mechanisms to leverage the private sector to work for cities – especially in SIDS and LDCs Mobilization of national and global PIC funds through capital markets Incentivize IFIs to leverage resources and to incentivize efficiency and innovation 	<ul style="list-style-type: none"> Developing knowledge products on business models through the Community of Practice for each TAF Utilise partnerships within CCFLA to upscale action on project development, PIC financing and NDBs Partner with other agencies & networks to maximize knowledge feedback / learning loops in each TAF sector Effectively disseminate knowledge through GCF knowledge repository and networking events
	Energy efficient buildings				
	Green & mobility-enhanced cities				
	Circular urban economy				
	Compact & resilient urban form				

GCF & CITY FINANCE

GCF Urban Action Areas





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