



Challenges and way forward in implementing eco-efficiency at the city level

- *How to quantify citywide greenhouse gas emissions based on the consumption approach?*

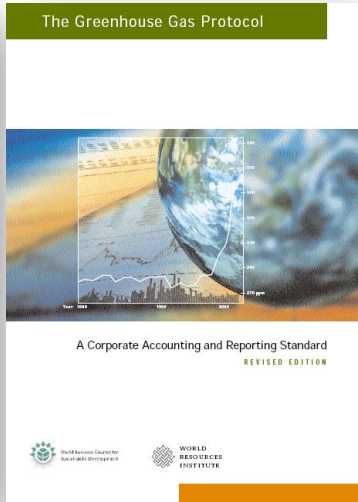
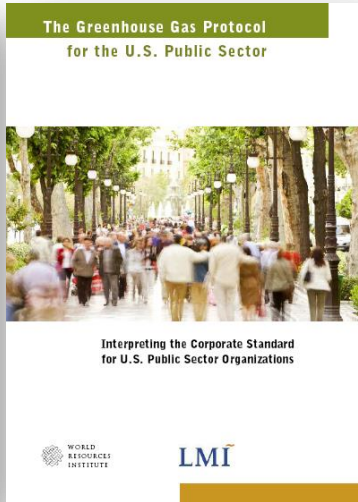
October 17-18, 2011

Suwon, Republic of Korea

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How to quantify?

- Citywide GHG emissions

e.g. BOD, CO₂, energy, water...

Environmental Cost

Eco-efficiency =

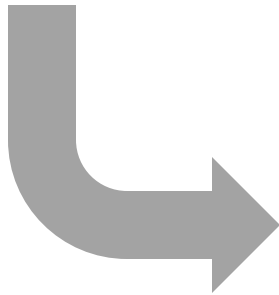
Economic Output

e.g. GDP, km, m²...



Why accounting GHG emissions?

*You Can't Manage
What You Can't Measure*



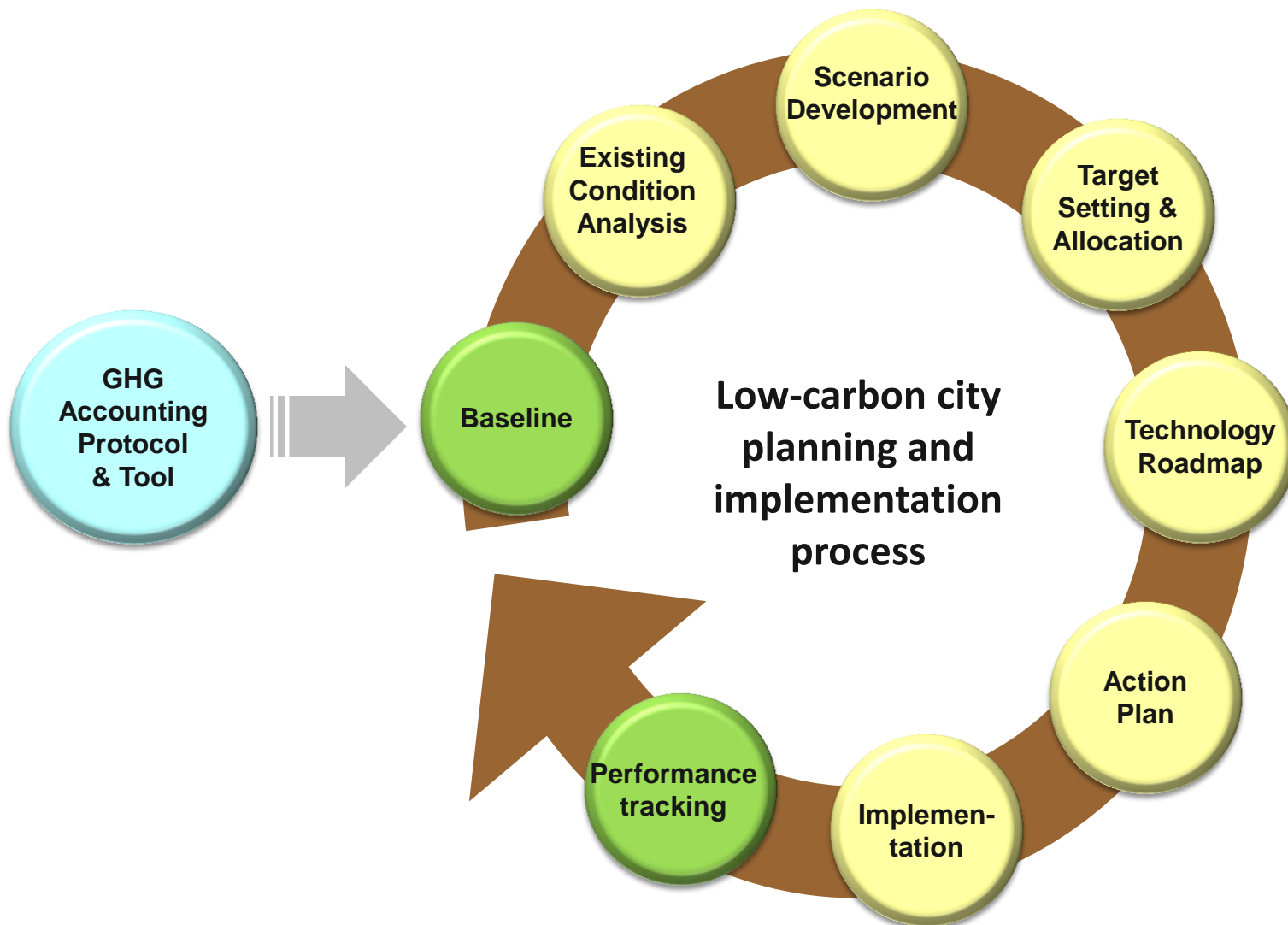
Establishing baseline emissions

Determining current emissions (update)

Setting reduction targets

Identifying sources of emissions

Developing reduction strategies





Existing guidelines/standards

Standard/Protocol

Tools

Int'l Standard for Determining GHG Emissions for Cities, UNEP *et al.*

2010

Int'l Local Gov't GHG Emissions Analysis Protocol, ICLEI

Project 2 Degrees - C40

The CO2 Calculator - Denmark

2005

Bilan Carbone - France

ECO2Region - Switzerland, Germany, Italy

CO2 Grobbilanz & EMSIG - Austria

2000

GRIP - UK



Issues & challenges

Focus only on direct emissions

Mixing up direct and indirect emissions

Indirect emissions/impacts in other cities?

Emission leakages?

Global reductions?

Recognizing the effort changing lifestyle and consumption pattern to reduce emissions?





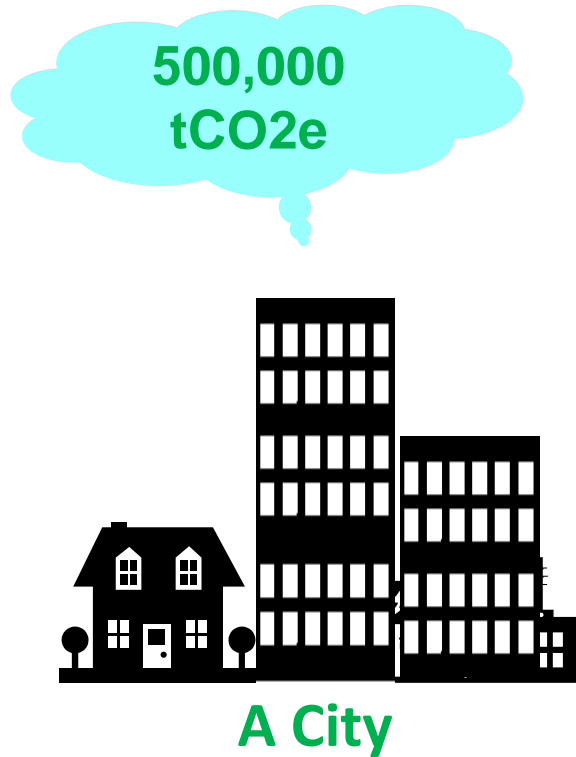
Production-based emissions



Consumption-based emissions

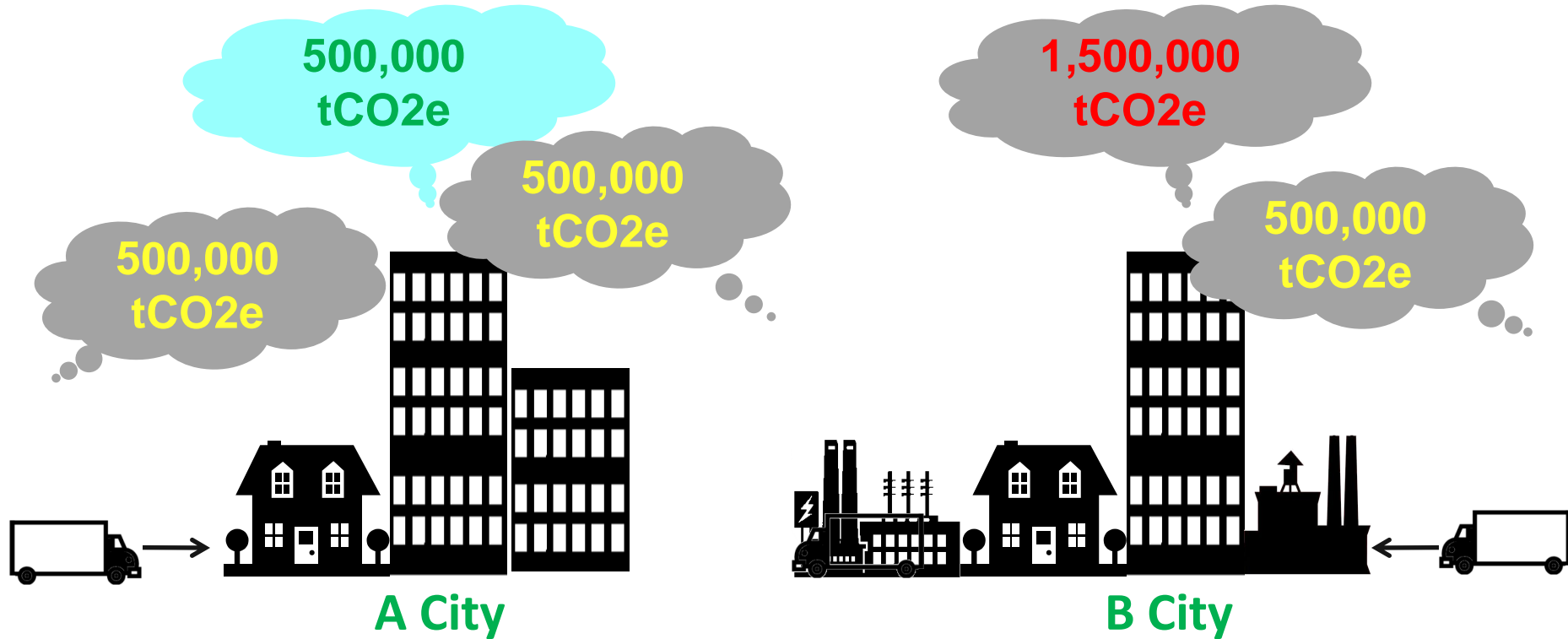


Production-based GHG accounting





Consumption-based GHG accounting

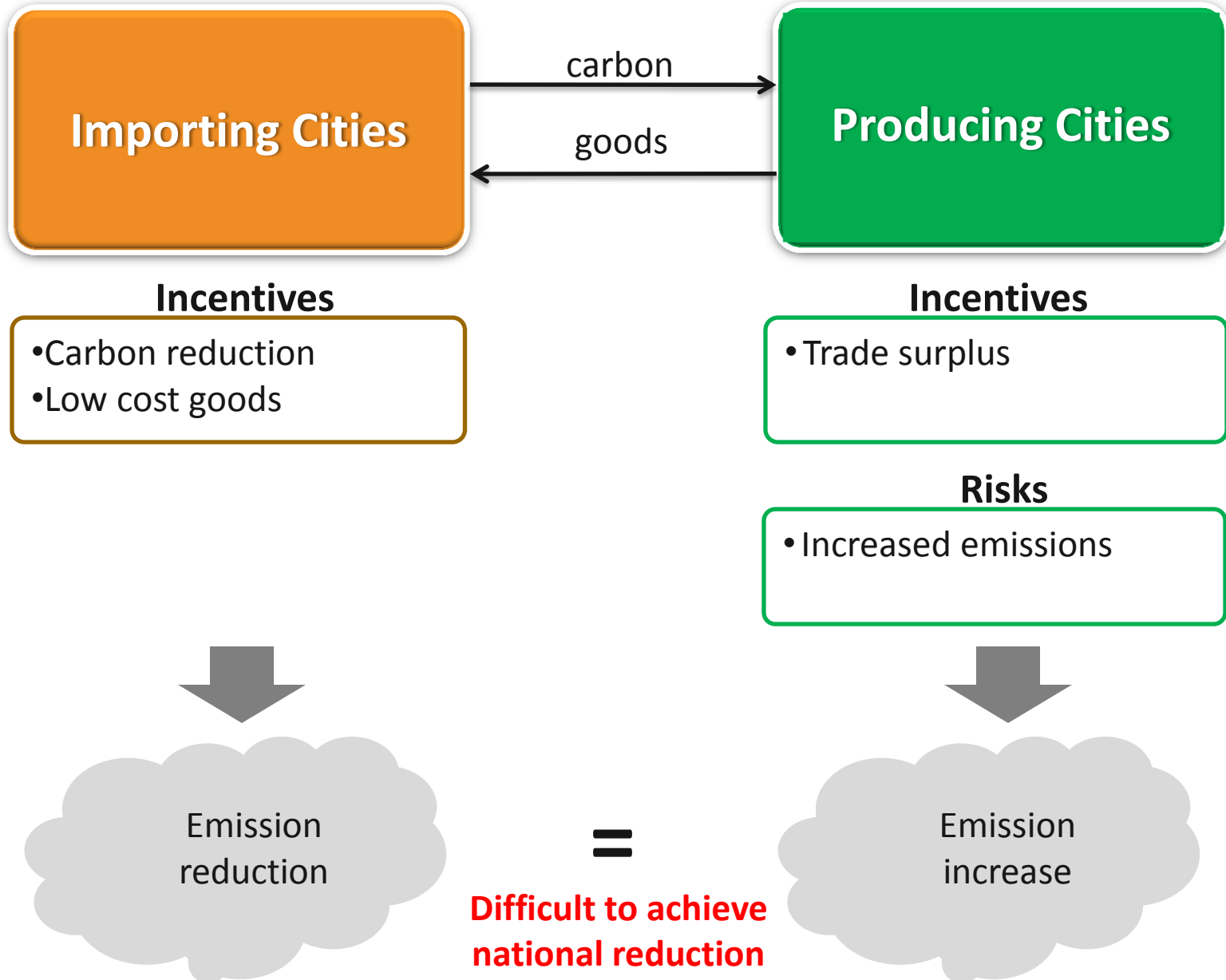


Direct emissions = 500,000 tCO₂e
Indirect emissions = 1,000,000 tCO₂e

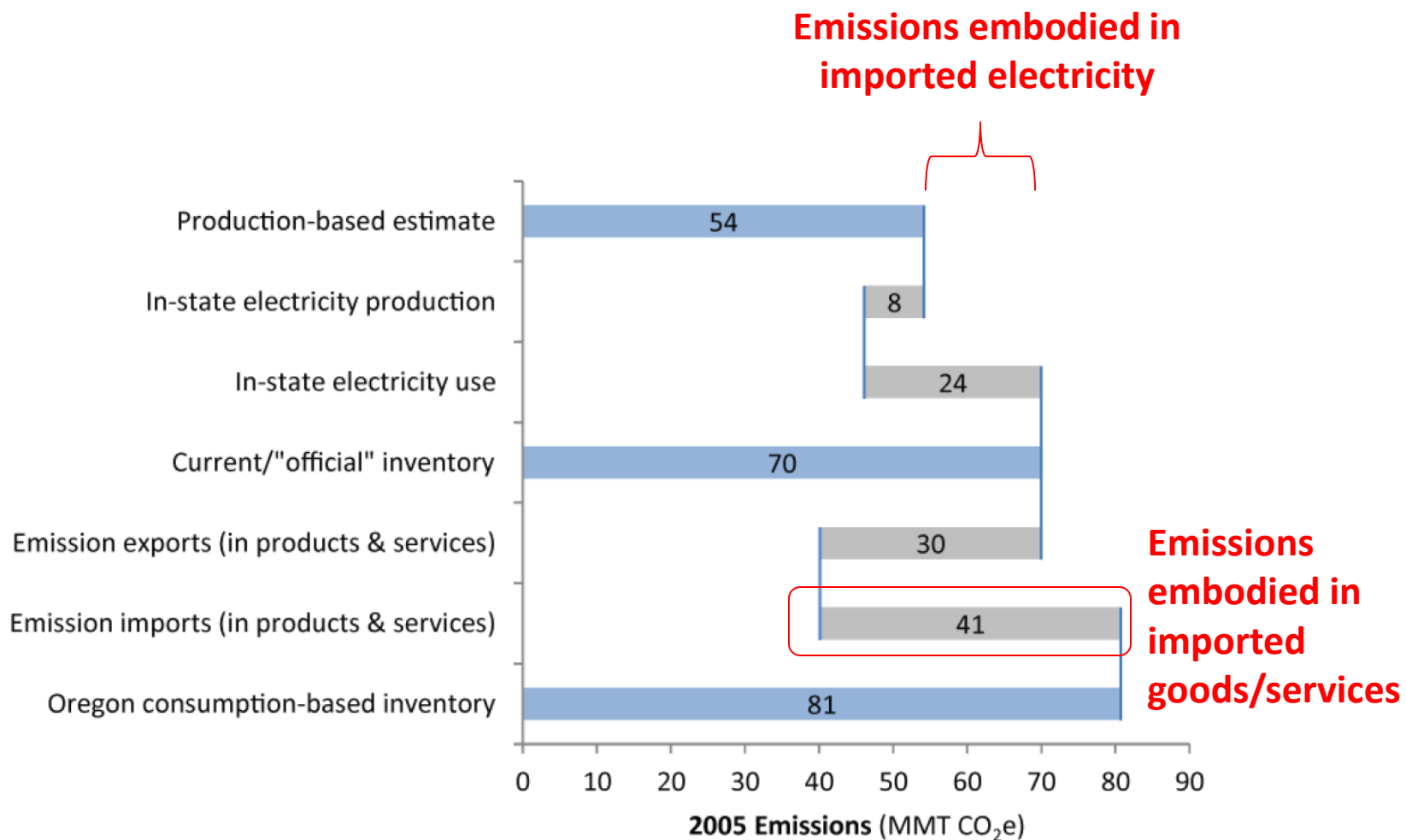
Direct emissions = 1,500,000 tCO₂e
Indirect emissions = 500,000 tCO₂e



Emission Leakages

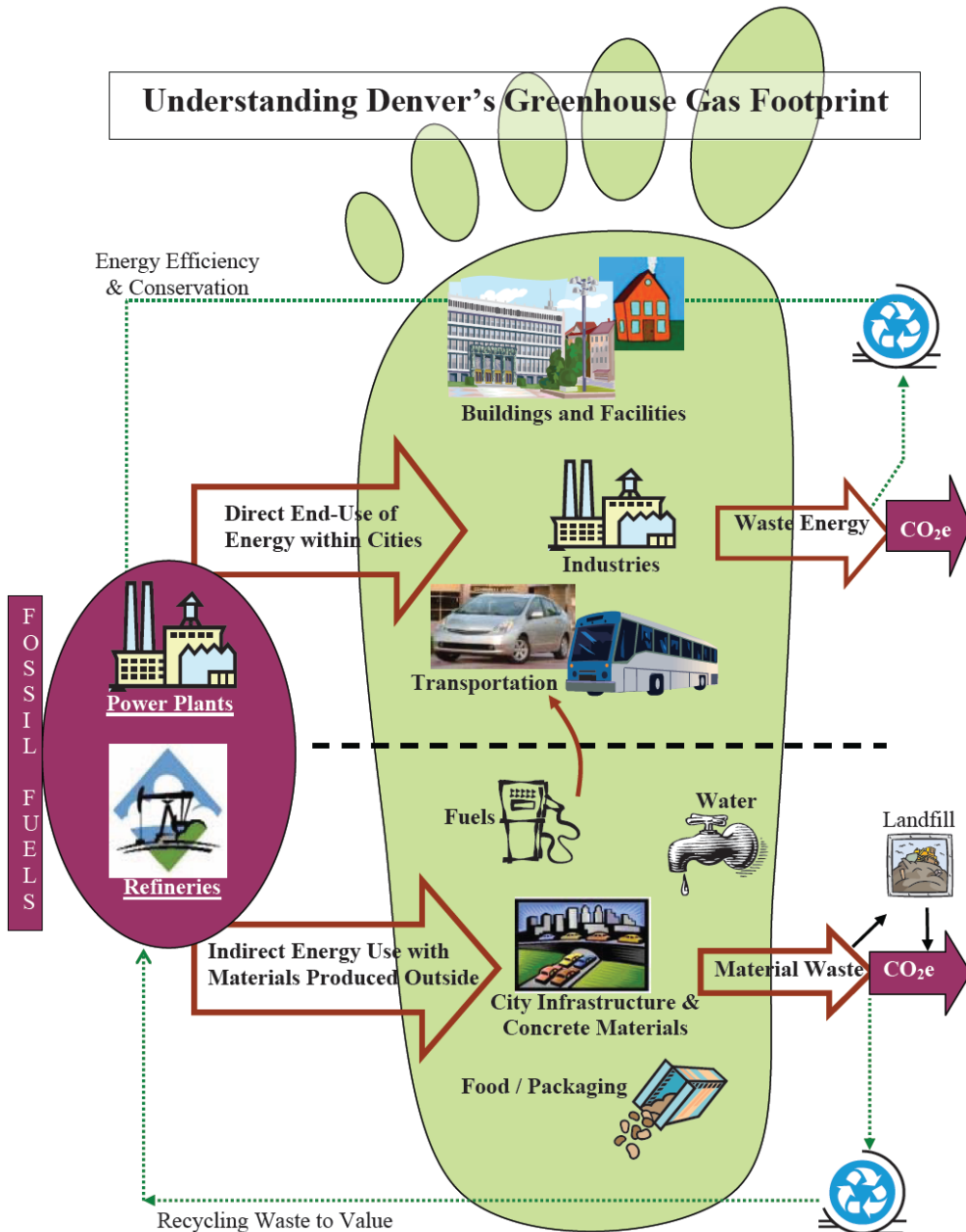


Example 1: Oregon State, USA



Example 2: Denver, CO, USA

Understanding Denver's Greenhouse Gas Footprint



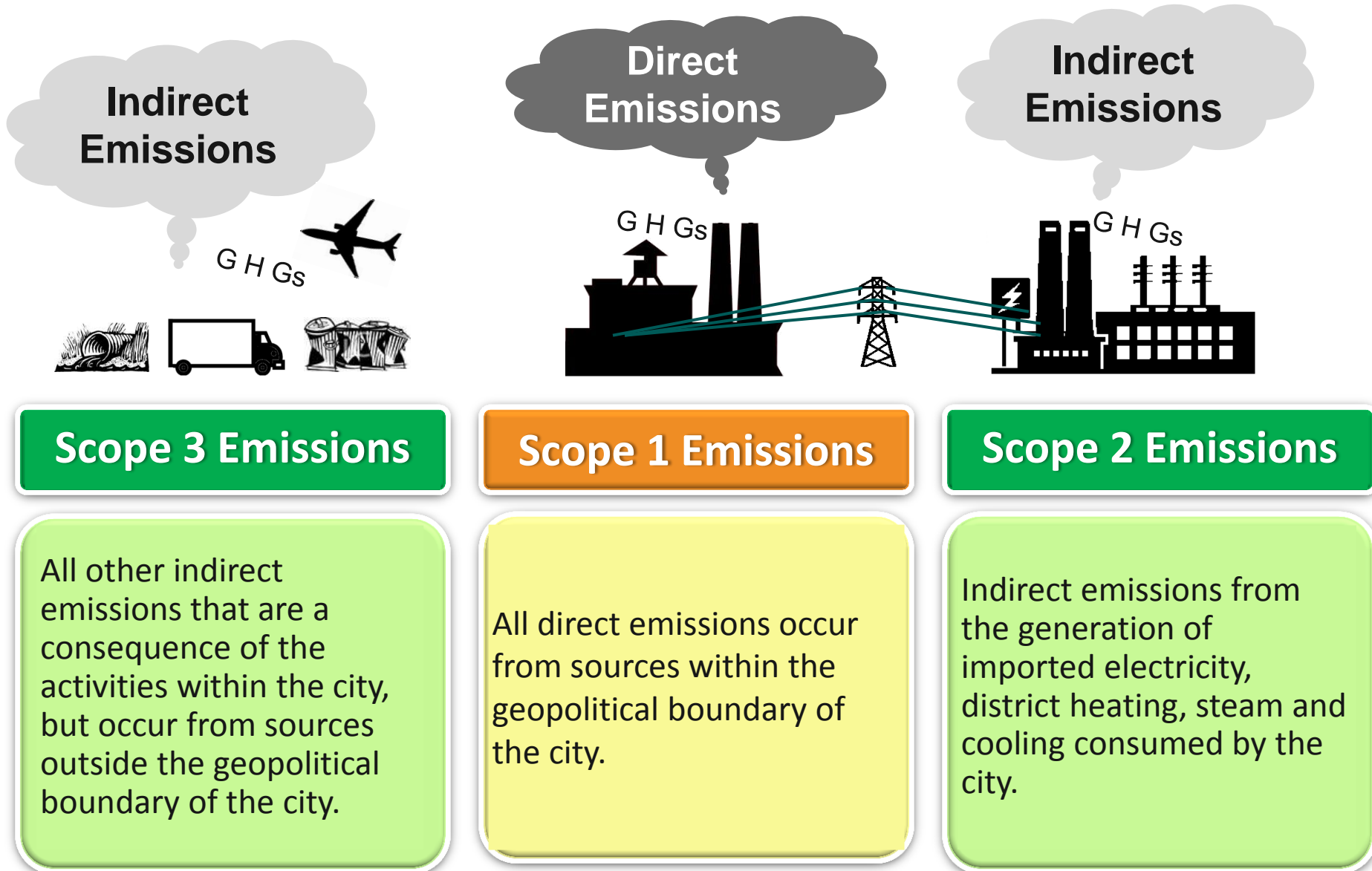
Indirect emissions:

- Cross boundary transportation
- Air travels
- Embodied emissions in materials (concrete & food)
- Wastes

Per capita emissions

	mmtCO ₂ e
Direct energy use	19.1
Direct energy use	25.3
+ air travels	
+ embodied emissions	

Direct and indirect emissions



Indirect Emissions



Scope 3 Emissions

All other indirect emissions that are a consequence of the activities within the city, but occur from sources outside the geopolitical boundary of the city.

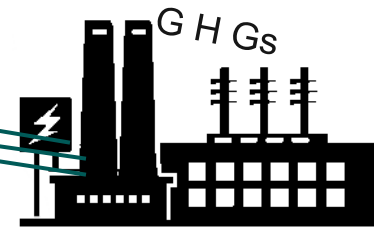
Direct Emissions



Scope 1 Emissions

All direct emissions occur from sources within the geopolitical boundary of the city.

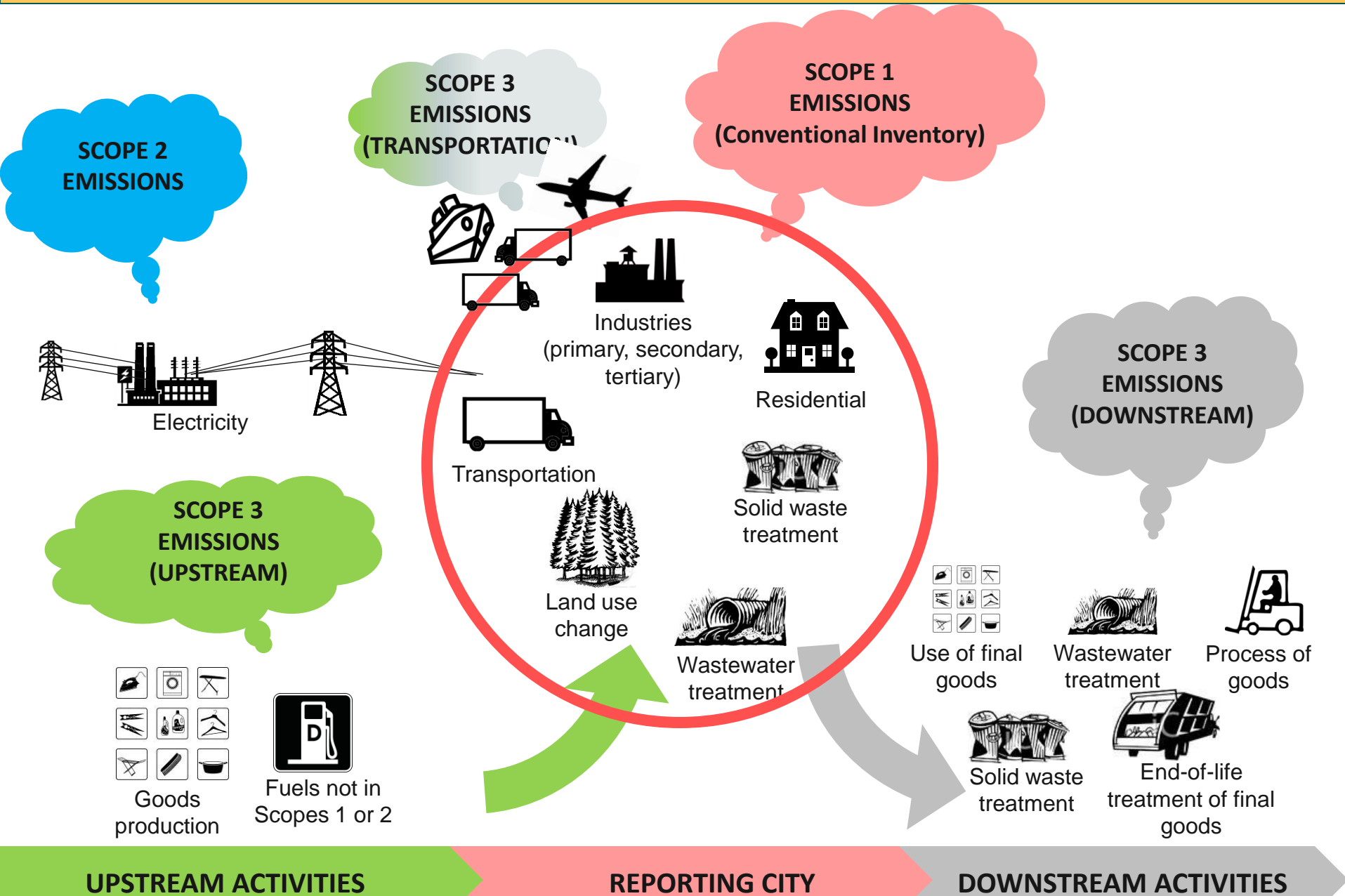
Indirect Emissions



Scope 2 Emissions

Indirect emissions from the generation of imported electricity, district heating, steam and cooling consumed by the city.

Example of direct and indirect emission sources





Global GHG reduction

Allow local government, businesses, and residents to assess both **direct** and **indirect** GHG emissions of their activities

Avoid emission leakages

Help government to draw **policies** and **strategies** to cut emission within and outside the city

It **recognizes** not only the control of direct emission sources within the city, but also reduction of indirect emissions due to change of lifestyle and consumption pattern



GHG Protocol for Cities



Piloting the new GHG Protocol





Corporate Value Chain (Scope 3) Accounting and Reporting Standard

*Supplement to the GHG Protocol Corporate
Accounting and Reporting Standard*



[Video](#)