City logistics environmental decision support-system: Moving towards decarbonized urban freight transport

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Introduction

Research question

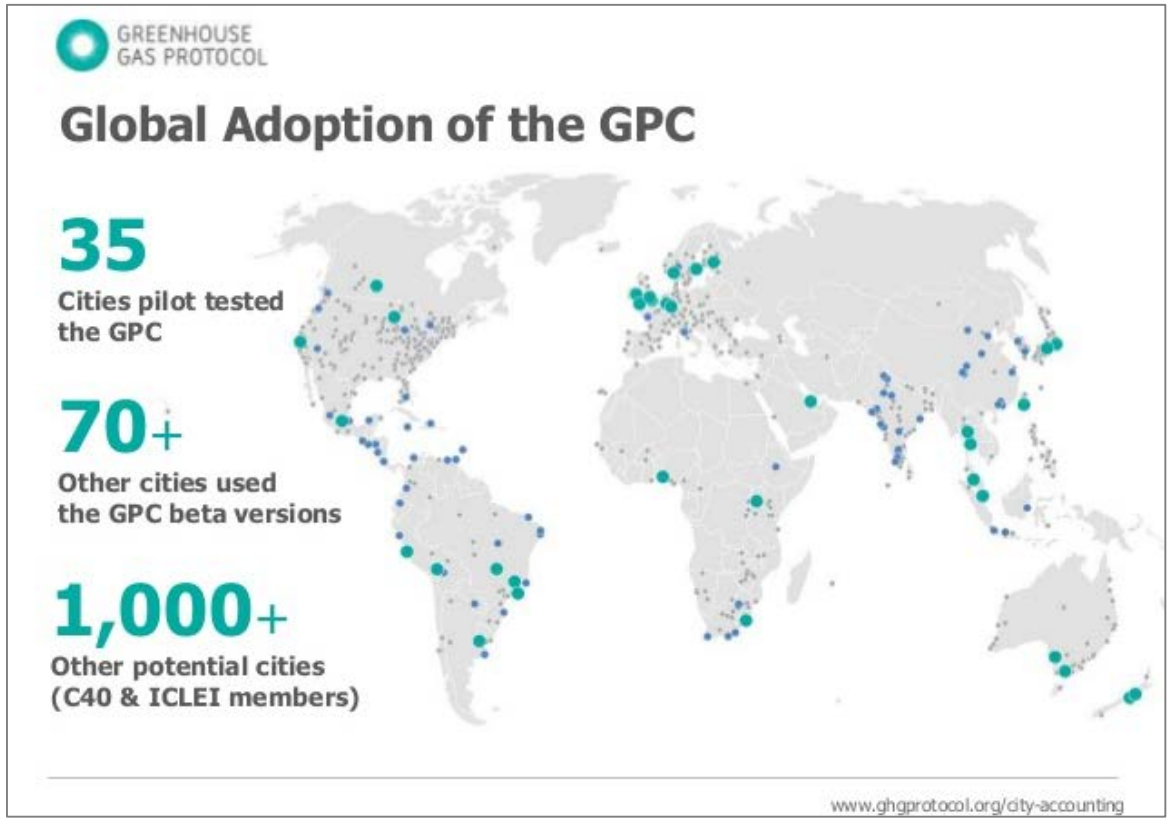
"How to strengthen relationships between the industry and cities to improve ***the ability to use carbon as a meaningful climate-tracking mechanism*** *and define low emission development pathways with collaborative actions? "*

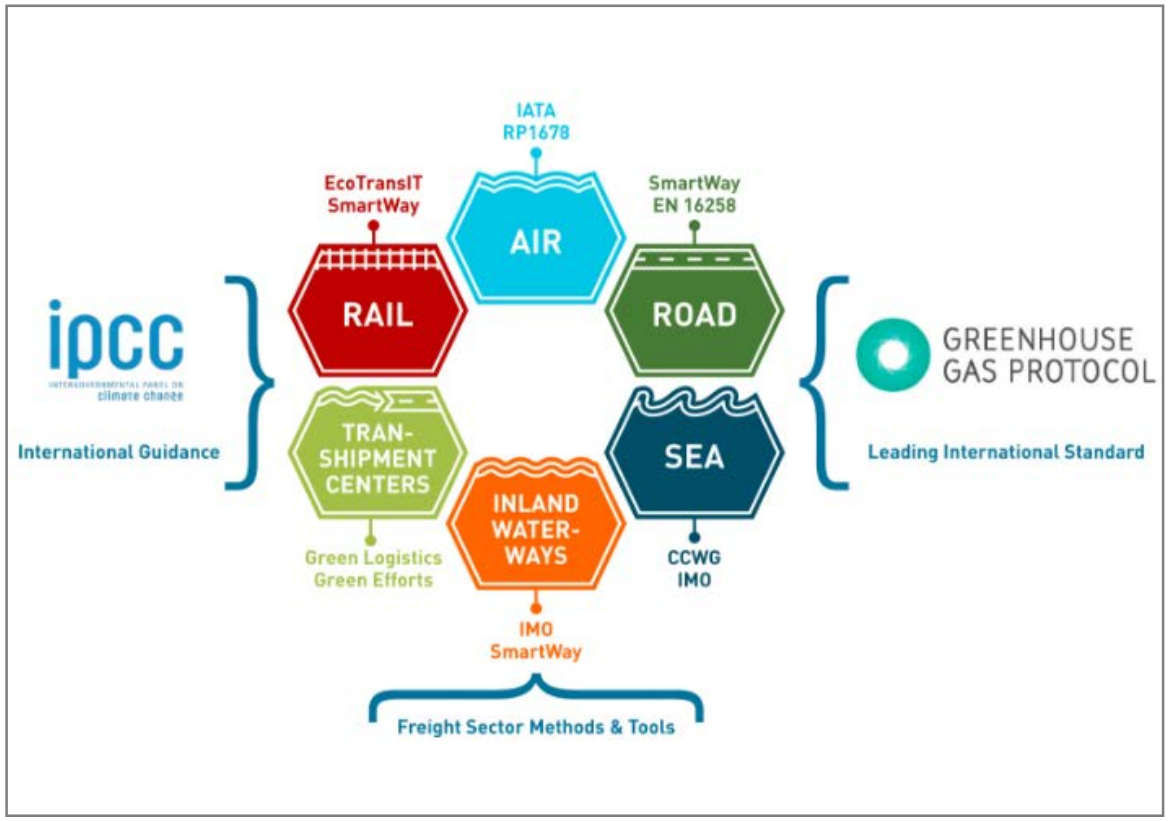
Methodology

Desktop Research

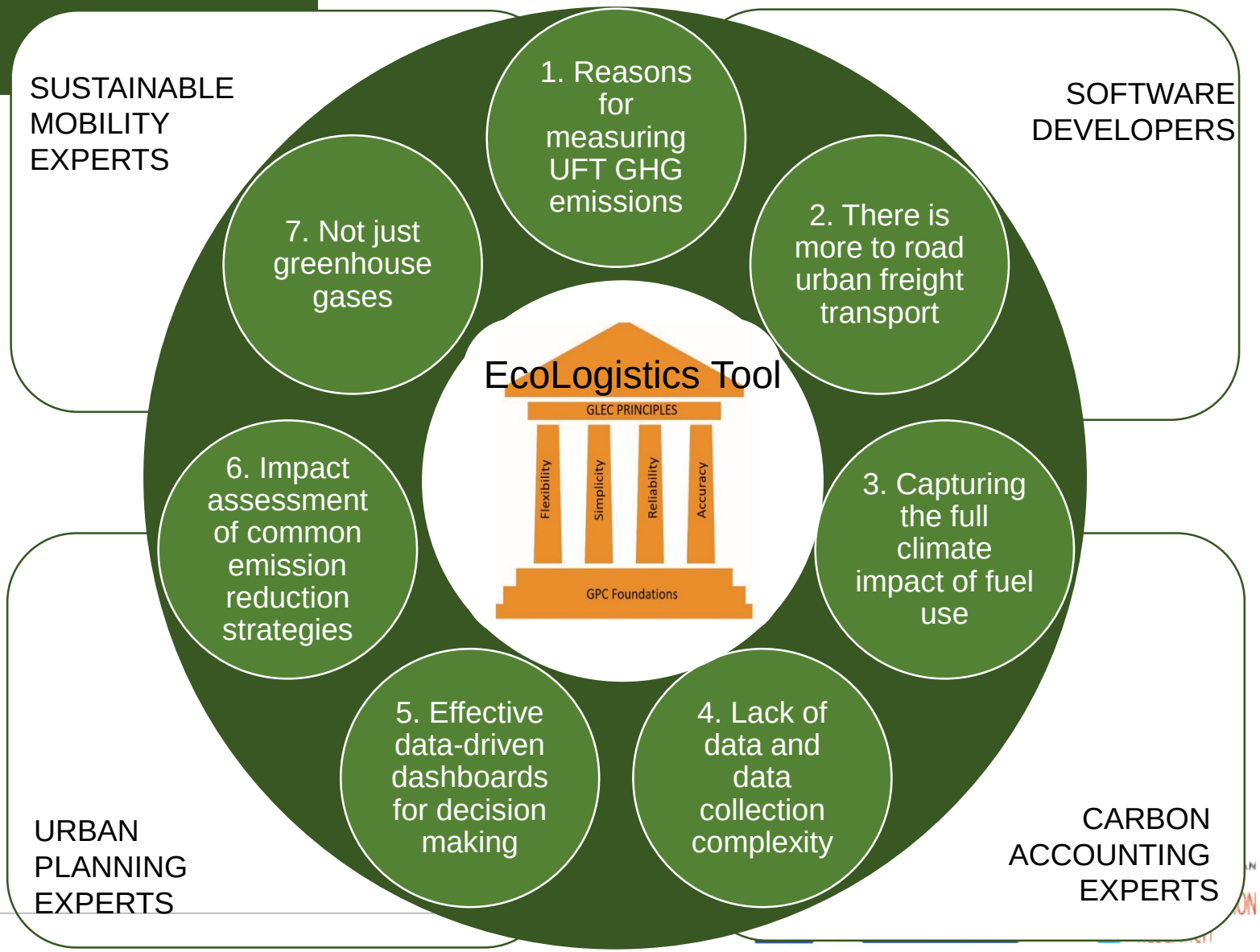
Field Research

Desktop research





Communities of practice



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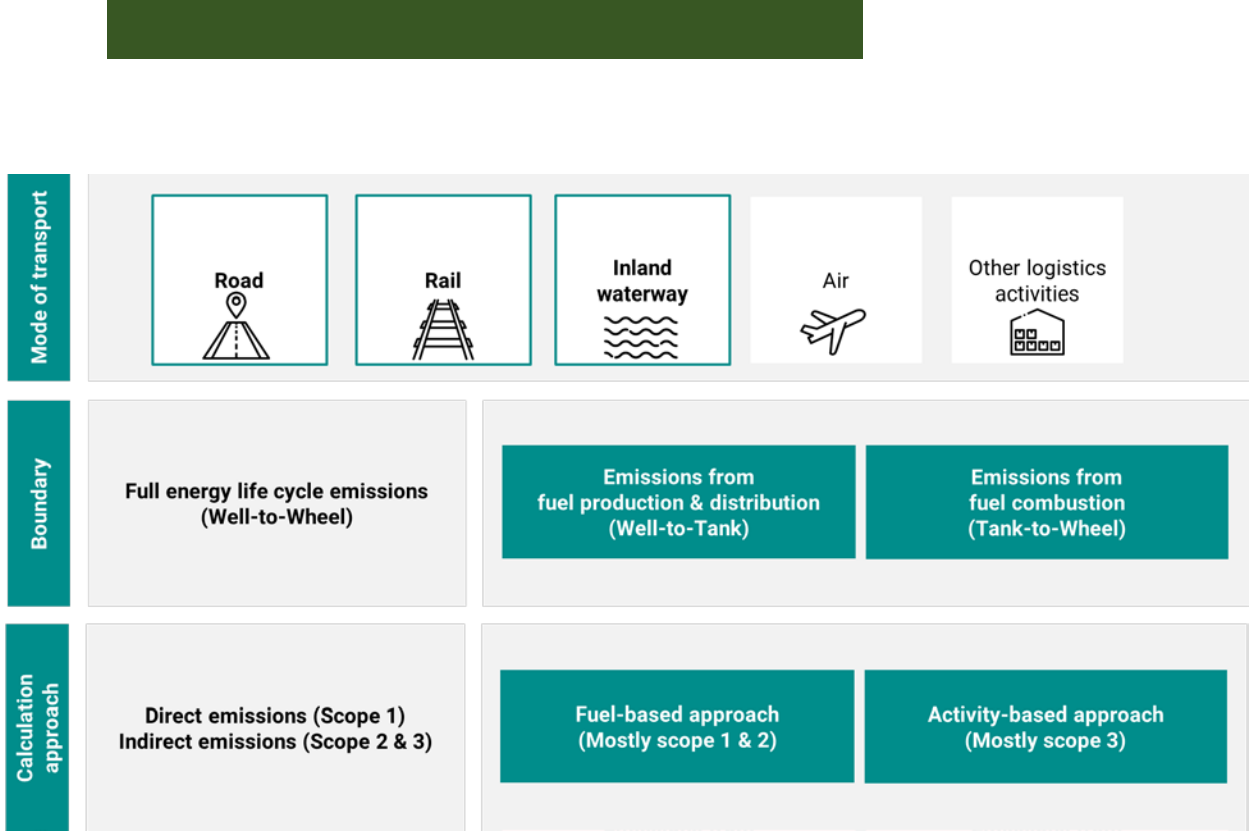
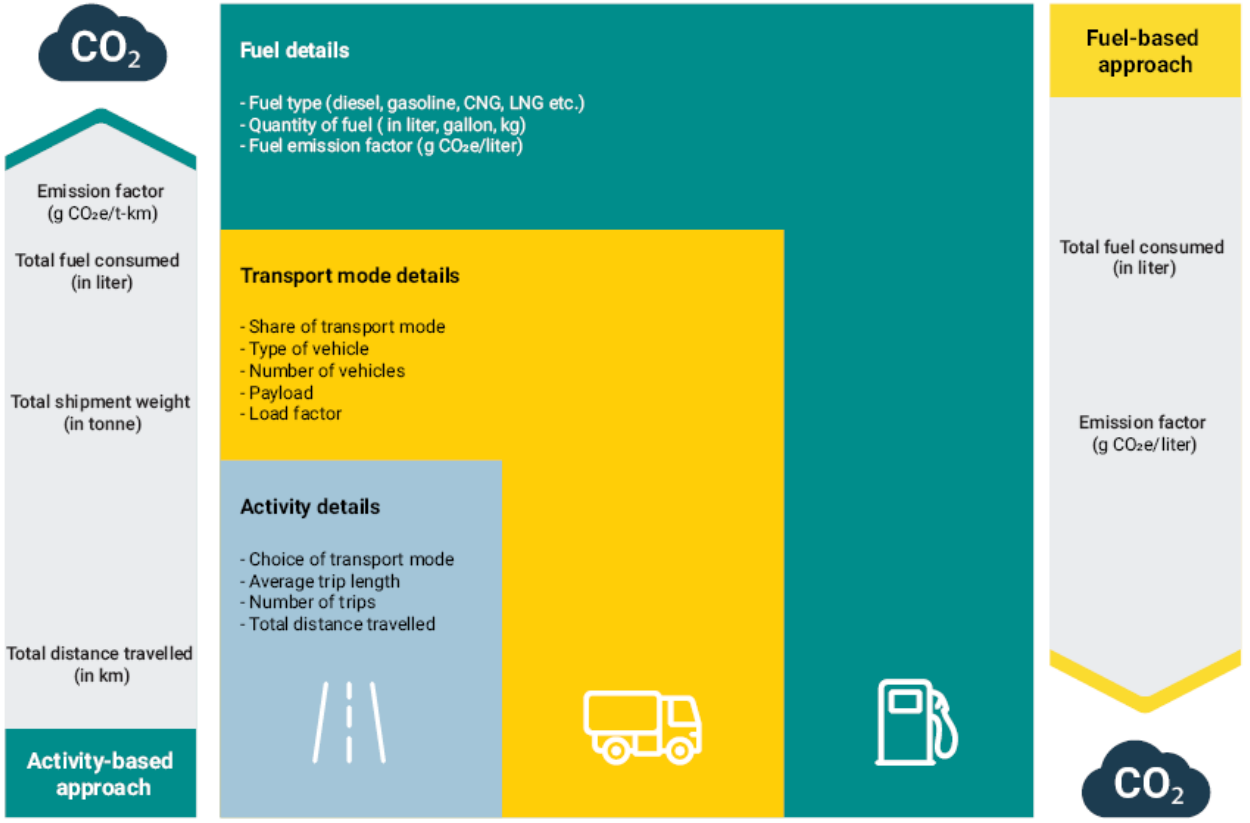
Result

Area	Selected Methodology	EcoLogistics Criteria	Cities' needs
Kyoto Protocol	GLEC	CO2 and CO2e	**7th**
IPCC, GHG Protocol	GPC, GLEC	Foundations	**1st**
Scopes	GPC	Operators within, to, from, through	**2nd, 4th**
Emissions Life-Cycle	GLEC	WTW	**3rd**
Logistics coverage	Cities' needs	Rail, road, IWW and refrigerated	**2nd**
Accounting methods	Cities' needs	Top-Down & Bottom-up	**4th**
Reporting	Cities' needs	Total Emissions, shared by mode and fuel and intensity indicators	**5th, 6th**

Resulting methodology





Decision Support Tool

EcoLogistics

Low carbon freight for sustainable

Globally, urban freight represents up t
percent of motorized road space and
transport-related greenhouse gas (GH

The "**EcoLogistics Self-Monitoring Toc**
freight for sustainable cities" project
the existing GHG emission performan
values. The tool can also be used to e
business-as-usual (BAU) and target sc
to help decision makers analyze the p

Click on the respective icon to start ca
please refer to the user guide **here.**

City profile

Road freight transport

Results

Supported by:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

based on a decision of the German Bundestag

Nature Conservation and Nuclear Safety (BMU) through the International Climate Initiative (IKI).

Road Transport Input Data

BASELINE RESULTS

City Name: Bogota
Country: Colombia
Area (km2): 413.00
Population (k): 11120
GDP (Million US$): 82730

CO2e (million tonnes)
Road 0.16150757

Emissions v/s freight transport activity as per mode

Impact assessment

Select base year: 2018

Growth rate (%): 3.4 * Calculate

Road transport

0.5
0.45

2018 2025 2030 2050

Road transport

City Properties

City name:			
Country:		Region:	
Area (km2):		Longitude:	
Boundaries:	Administrative	Latitude:	
Climate**:	e.g. Af		

City Parameters

Year:	2019	2020	2021	2022
Population (k):				
GDP (million US$):				
Estimated population growth rate (%):				
Heavy Goods Vehicle (HGV, with a gross vehicle weight of 3.5 tonnes or more)				
er of registered vehicles (k):				
Annual growth rate of registered vehicles (%):				
Total urban freight (million tonnes) - Within:				
Total urban freight (million tonnes) - From:				
Total urban freight (million tonnes) -To:				
Total urban freight (million tonnes) -Through:				
Light Goods Vehicle (LGV, with a GVW up to and including 3.5 tonnes)				
er of registered vehicles (k):				
Annual growth rate of registered vehicles (%):				
Total urban freight (million tonnes) - Within:				
Total urban freight (million tonnes) -From:				
Total urban freight (million tonnes) -To:				
Total urban freight (million tonnes) -Through:				
Total emission reduction target				
Air transport (%):				

Home City Profile

0% 0% 28% 72%

Diesel CNG LPG LNG Gasoline Electricity

Air Quality

Air Quality Index (AQI)

Index level:	100
Risk:	Moderate
Cautionary statement:	Unusually sensitive people should consider reducing prolonged or heavy extension outdoors.

	2019	2020	2021	2022
PM2.5 concentration range [ug/m3]:				
PM10 concentration range [ug/m3]:				
NO2 concentration range [ug/m3]:				
Ozone concentration Range [ug/m3]:				
Number of days exceeding AQI standards (days/year):				
Fine particulate matter (PM2.5)				
Minimum daily average concentration [ug/m3]:				
Maximum daily average concentration [ug/m3]:				
Annual average concentration [ug/m3]:				
Particulate matter (PM10)				
Minimum daily average concentration [ug/m3]:				
Maximum daily average concentration [ug/m3]:				
Annual average concentration [ug/m3]:				
Carbon monoxide (CO)				
Minimum daily average concentration [ug/m3]:				
Maximum daily average concentration [ug/m3]:				

Home City Profile

0% 100%

Diesel Electricity

100%

Diesel Others

rce for neration	EF (gCO2e/kWh)[3]
s	160
EU	320

2030 and 2050 respectively (ITF Transport

ZLC MIT GLOBAL SCALE NETWORK

Smart Freight Centre

despacio

Transporte y Logística

THE PAN AMERICAN SOCIETY OF TRANSPORTATION RESEARCH

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Experimental setting

- Multi-layer, multi-actor approach capture freight patterns:
  - Statistical sources,
  - existing policy documents and plans,
  - previous technical studies,
  - surveys carried out among.

Demographic and economic characteristics

- The size, density and GDP of project cities

GHG emissions from the transport sector

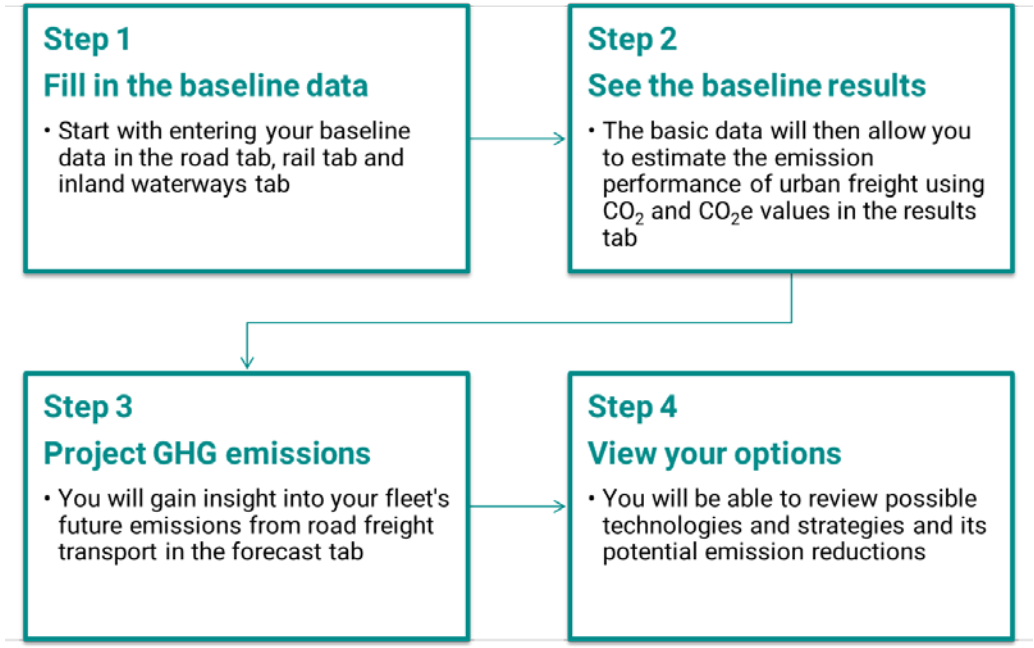
- Emission reduction targets and strategies
- Existing freight-related regulations and measures

Urban freight transport fleet

- The share of freight vehicles in the registered vehicle fleet
- The share of freight vehicles by vehicle type
- The share of freight vehicles by vehicle age
- The share of freight vehicles by fuel type
- Urban freight traffic flows
- Vehicle kilometers travelled
- Road freight activity in terms of tonne-kilometer
- Utilization of vehicle capacity

Environment and energy aspects

- Fuel consumption in terms of liters per 100 kilometers
- Baseline CO_2e emissions from urban freight transport
- Projections for CO_2e emissions from urban freight transport in the BAU scenario
- Projections for CO_2eemissions from urban freight transport in the target scenario

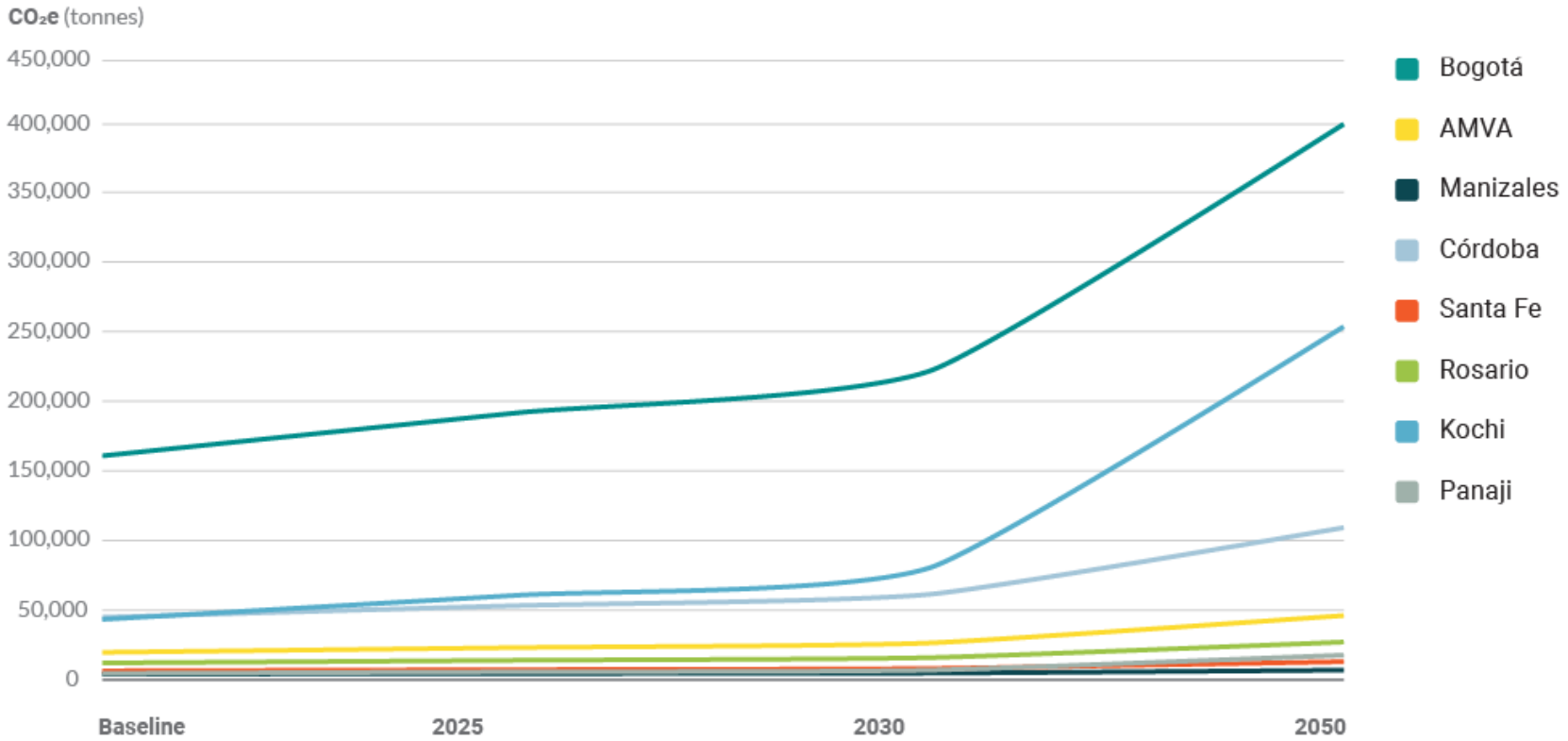


Results and discussion

2019 vehicle activity and the fuel used data collected from the surveys

Baseline essential:

- Cities to define the LCAPs
- Cities to understand the potential reductions
- Pilots within the city to estimate and track the GHG emissions



Conclusions and future research

- ❑Decarbonizing city logistics a top priority
- ❑Sustainable economic growth: governments and industry collaboration
  - ✓ To plan a credible and high-impact greenhouse gas emissions reduction strategy
  - ✓ Improve the ability to use carbon as a meaningful climate-tracking mechanism and decision making tool
- ❑Existing city GHG logistics emissions methodologies are overly complex and do not involve the industry
- ❑First methodology for harmonizing GPC and GLEC
- ❑**First DSS for policymakers** to track and assess carbon projections and identify reduction strategies
- ❑Flexibility vs paucity
  - ✓ Initiate actions
  - ✓ Improve level of specificity and decission making accuracy

References

Methodologies:

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- SFC. (2018). *Accounting for logistics emissions in cities using industry best practices*. https://sustainablemobility.iclei.org/wpdm-package/accounting-for-logistics-emissions-in-cities-using-industry-best-practices/?wpdmdl=70743

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- ICLEI. (2020b). ICLEI Ecologistics Self-Monitoring Tool User Guide. https://sustainablemobility.iclei.org/wpdm-package/iclei-ecologistics-self-monitoring-tool-user-guide/