City Climate Action Plan Analysis in Latin America and the Caribbean

Argentina | Brazil | Chile | Colombia | Ecuador | Honduras | Jamaica | Mexico | Peru

THE WORLD BANK

About

The following report presents the results of analyzing 30 city-level Climate Action Plans (CAPs) from Latin America and the Caribbean region, the cities analyzed are listed below.

Argentina:	Buenos Aires, La Paz, Rosario, San Carlos de Bariloche, San Carlos Sud, Villa General Belgrano
Brazil:	Recife, Rio de Janeiro, Salvador, Sao Paulo
Chile:	Independencia, Peñalolen, Santiago, Temuco, Vitacura
Colombia:	Bogota, Cali, Cartagena, Medellin
Ecuador:	Quito
Honduras:	Tegucigalpa
Jamaica:	Montego Bay
Mexico:	Bahia de Banderas, Culiacan, Guadalajara, Juarez, Madero, Mexico City, Zapopan
Peru:	Lima

The report is structured into two main sections. This first section presents the city context and summary of CAP evaluation for each city. The second section presents a comparative analysis between climate action plans including information gaps, GHG emissions, and climate actions.

Content

CAP analisis

How do cities compare?

City Climate Action Plan Analysis in Latin America and the Caribbean

Argentinian Cities Climate Action Plans Analysis

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City Context
Buenos Aires, Argentina 2020 CAP

Population

large-size
3.0 M people

0.60%
yearly growth rate
2015-2020

Vulnerable Groups
Elderly
Children
People living in barrios

Location

Urban

Area:
202 km²

Density:
14,851 people/km²

Economy

GDP
$24 B USD

GDP/capita
$8,196

Service Sector 83%
Commercial
Manufacture

Geography

Grassland

Coastal

Geographic scope

1.52% of
Metropolitan Area

Weather

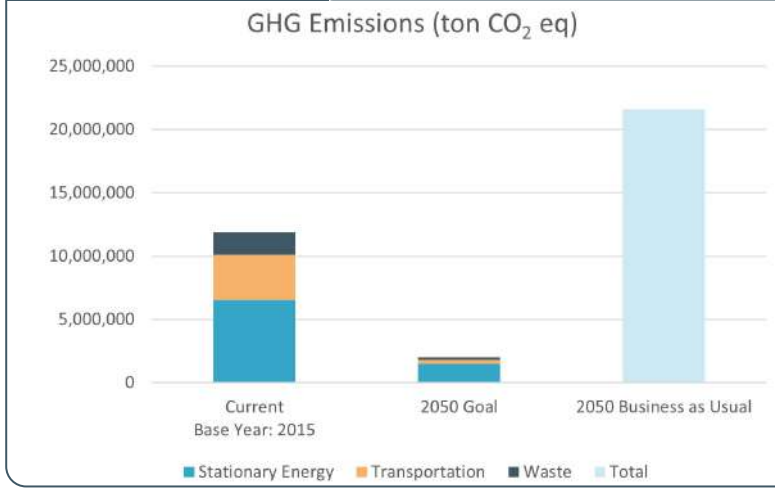
Av Max 22°C
Av Mid 18°C
Av Min 14°C

Temperate

Humid

1,100 mm
rain per year

GHG Emissions Inventory (scopes 1,2,3)



3.97 ton CO_2 eq / person
484 kg CO_2 eq / MUSD

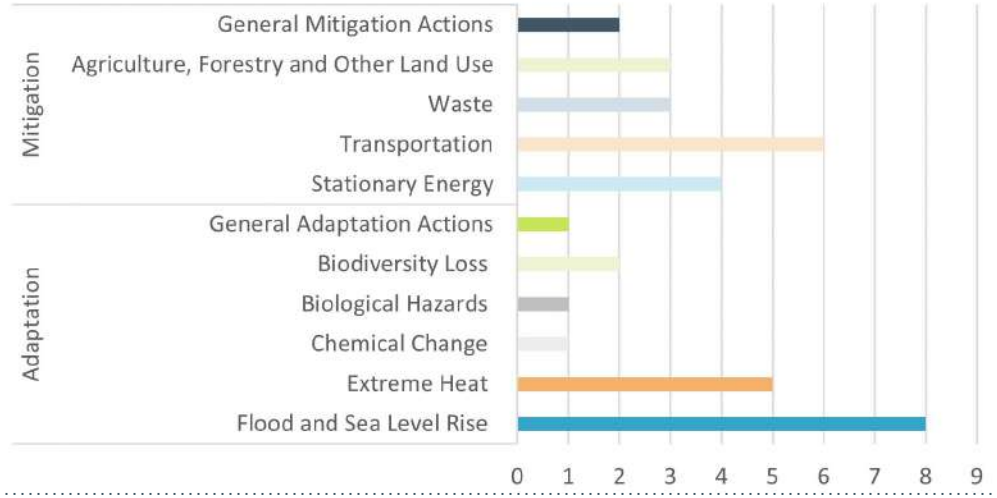
Climate Risks and Vulnerabilities

Rain flooding
Costal flooding
Storms
Landslides
Extreme cold
Heat waves
Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

Climate Action Plan Evaluation
Buenos Aires, Argentina 2020 CAP

Priority Actions

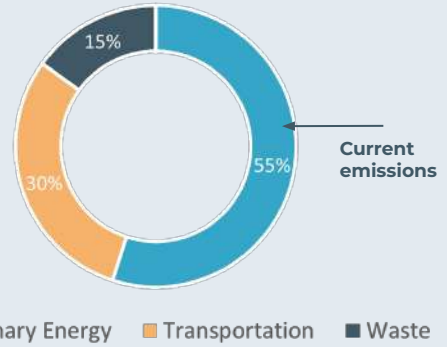
Number of Priority Actions by Sector and Type



Quality of Action Design

Mitigation (current emissions vs reductions by sector)

Current Emissions distribution



The ambitious scenario does not specify what percentage of emission reductions corresponds to each sector

Part of the **residual emissions will be offset through forestry projects** within and outside City limits.

The main mitigation actions for the **stationary energy** sector are the construction of **more efficient new buildings** as well as the **installation of FV systems** in 30% of **residential roofs** by 2050.

Some mitigation actions for the transport sector include: **increasing efficiency in urban logistics by** focusing on delivery services. and **substituting the public transport flee with biodiesel or electric vehicles.**

The main mitigation action for the waste sector is to **reduce waste** through the promotion of **circular economy** principles.

Adaptation Actions

- Expand the hydraulic system in the city's main water basins.
- Increase natural surplus water retention area using nature-based solutions including the opening of some piped stream sections.
- Increase tree cover by planting 100,000 new trees by 2025.
- Increase green spaces and create a 400-meter average maximal proximity to green spaces by 2025.
- Integrate low-income neighborhoods and provide better public services to low-income communities creating climate resilience.

Climate Action Plan Evaluation
Buenos Aires, Argentina 2020 CAP

CAP Construction process

Developed by Buenos Aires' City Hall

Partner Organization

C40 CITIES

Buenos Aires' 3rd CAP

No budget mentioned

- Even though the CAP methodology states that the identification of the source of financing was one of the evaluation criteria of the selected actions, these are not specified.

Best practices

- All adaptation actions identify **co-benefits.**
- CAP is explicit about **the socialization and public consultation** of the Plan.
- Some adaptation actions are targeted towards **vulnerable groups** (low-income communities and the elderly.)

Gaps

- Ambitious Scenario does not specify emission reductions by sector.
- Mitigation actions do not provide an estimate of emission reductions per action
- CAP **does not include a cost estimate** for the implementation.
- Actions do not specify if **financing sources have been identified,** even though the action evaluation and selection process includes the identification of financial sources.
- Actions are **not prioritized.**

Climate Action Plan Recommendations
Buenos Aires, Argentina 2020 CAP

Climate Actions

- Mitigation actions should **include an estimate of the expected mitigation reductions** produced after the action is implemented. This would facilitate action prioritization and provide an additional indicator to measure the actions' success (see La Paz, Rio de Janeiro or Recife's CAP).

- Whenever possible, **actions should be prioritized** based on the benefits obtained per unit cost. This is especially true for adaptation actions that do not have a clear mechanism for comparing the expected impact.

- **Actions should be budgeted,** each action **should have identified sources of funding**, if this is not available potential sources of funding should suffice.

GHG Emission Inventory

- In addition to residual emissions by sector, a table detailing the **expected emission reductions by sector** in the ambitious scenario would allow the reader to get a better sense of the biggest contributions towards emission mitigation.

City Context
La Paz, Argentina 2020 CAP

Population

small-size
25,808 people

0.44%
yearly growth rate
2001-2010

Vulnerable Groups
Low Income Communities
People living in the periphery of the city

Location

Urban

Area:
119 km²

Density:
216 people/km²

Economy

GDP
$221 M USD

GDP/capita
$8,579

Agriculture and Livestock
Fishing
Tourism

Geography

Forest

Inland

Geographic scope

100% of Municipality*

*Not part of a metropolitan area.

Weather

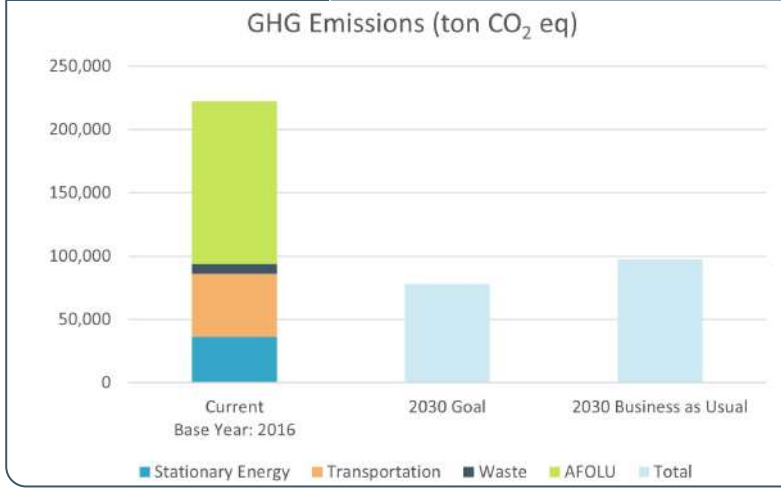
Av Max **25°C**
Av Mid **19.5°C**
Av Min **13°C**

Temperate

Humid

1,075 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



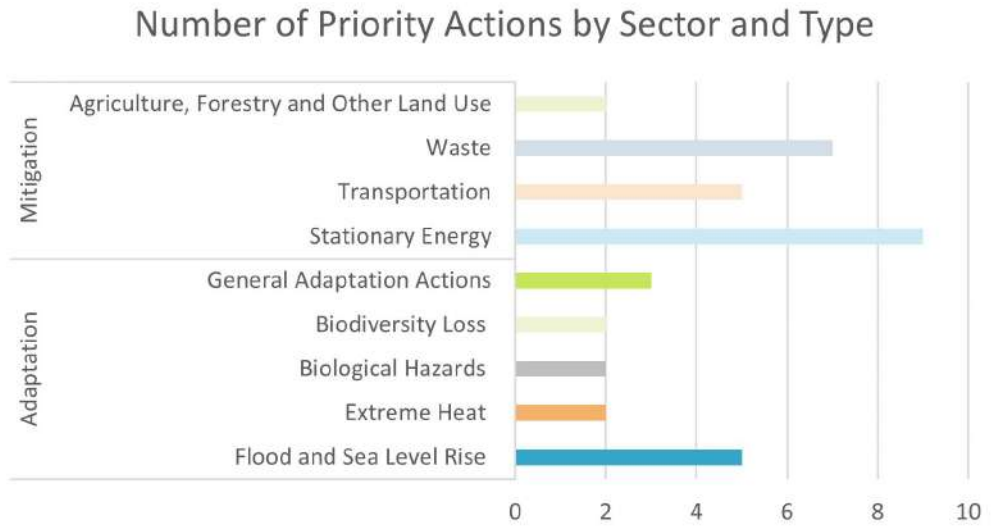
8.61 ton CO_2 eq / person
1,004 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
La Paz, Argentina 2020 CAP

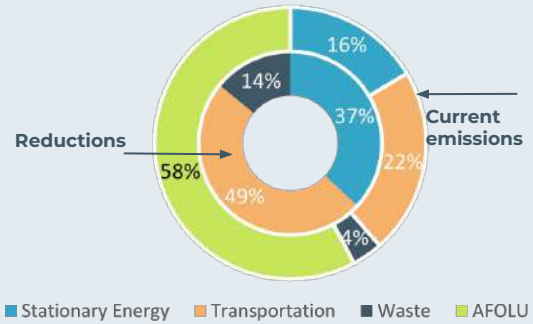
Priority Actions



Quality of Action Design

Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The ambitious scenario only considered the Stationary Energy, Transportation and Waste Sectors.

49 % of emission reductions are expected to come from the transport sector by **reducing mobilization needs,** promoting the renewal of private vehicles for **more efficient models through fiscal benefits,** and replacing the **public transport fleet with biodiesel or electric vehicles.**

The main mitigation action for the stationary energy sector and their contribution to planned emission reductions are the installation of 2020 **thermal heaters (5.5%)**, the reduction of 15% of household energy consumption in 60% of households by 2030 through **domestic appliance retrofit programs (6%)** and the use of **biodigesters in feedlots** for energy generation (**20.3%).**

The main mitigation action for the waste sector is the **increase of liquid effluents treatment.** This is equivalent to **10%** of mitigation emission reductions.

Adaptation Actions

- Increase the placement of rain tubes, decreasing gutter obstruction.
- Implement an early warning system for storms.
- Promote afforestation, reaching 1,800 trees planted by 2023.
- Increase tree cover by 3,500 trees in 2025 in the municipality.
- Implement urban land management and acquisition mechanisms to improve urban planning and reduce the number of informal urban settlements.

Climate Action Plan Evaluation
La Paz, Argentina 2020 CAP

CAP Construction process

Developed by La Paz' City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

La Paz' 1st CAP

No budget mentioned

- All actions have identified sources of financing which can be public, international, or local partnerships with the private sector

Best practices

- All mitigations actions have an emission reductions estimate.
- All actions have identified sources of financing and financing need levels (high, medium, low).

Gaps

- 2030 Business as Usual **(BAU) scenario is lower than the 2016 base year inventory** due to the omission of the AFOLU sector.
- **AFOLU emissions are not addressed** in any of the **mitigation actions** even though the AFOLU sector contributes to **58% of the 2016 emissions.**
- **Transportation actions do not specify emission reductions for each action,** instead the total expected emission reductions for the sector are used.
- CAP **does not include action prioritization** or mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis.
- Only 3 actions have an implementation budget, aside from that, the CAP **does not include a cost estimate** for implementation.

Climate Action Plan Recommendations
La Paz, Argentina 2020 CAP

Climate Actions

- Given that **it is responsible for 58% of emissions**, it is important to include **specific mitigation actions for the sector AFOLU.**
- Include **emission reduction estimates for all transportation actions.**
- Describe the **criteria used for action selection** (cost-benefit, cost-effectiveness, multicriteria analysis, etc).
- Whenever possible, **actions should be prioritized** based on the benefits obtained per unit cost. This is especially true for adaptation actions that do not have a clear mechanism for comparing the expected impact.
- **Include an estimated budget for all actions.**

GHG Emissions inventory

- The Business as Usual (BAU) emission scenario is lower than the inventory base year. While the CAP makes it explicit that this is because both the BAU and the ambitious scenario only considered the basic inventory sectors (stationary energy, transportation, and waste) the AFOLU sector accounts for 58% of the inventory emissions. **The BAU would be more realistic if the AFOLU base year emission were added even if their growth is not modeled**.
- The ambitious scenario does not consider AFOLU emissions. If no AFOLU mitigation actions are planned, **AFOLU emissions should be added as residual emissions** to the Ambitious scenarios.

City Context
Rosario, Argentina 2020 CAP

Population

large-size
992,323 people

0.70%
yearly growth rate
2001-2010

Vulnerable Groups
Elderly
Children

Location

Urban

Area:
178 km²

Density:
5,553 people/km²

Economy

GDP
$8 B USD

GDP/capita
$8,579

Commercial
Private service
Industrial

Geography

Grassland

Inland

Geographic scope

10.11% of Metropolitan Area

Weather

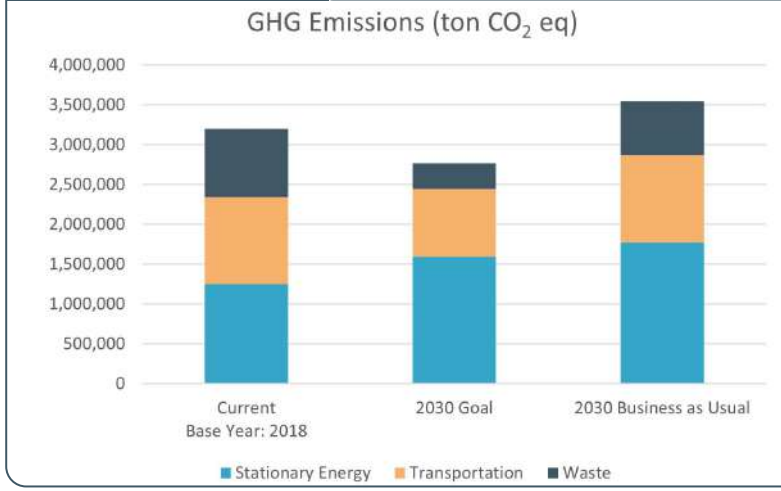
Av Max **24°C**
Av Mid **17.6°C**
Av Min **12.5°C**

Temperate

Humid

1,050 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



3.22 ton CO_2 eq / person
376 kg CO_2 eq / MUSD

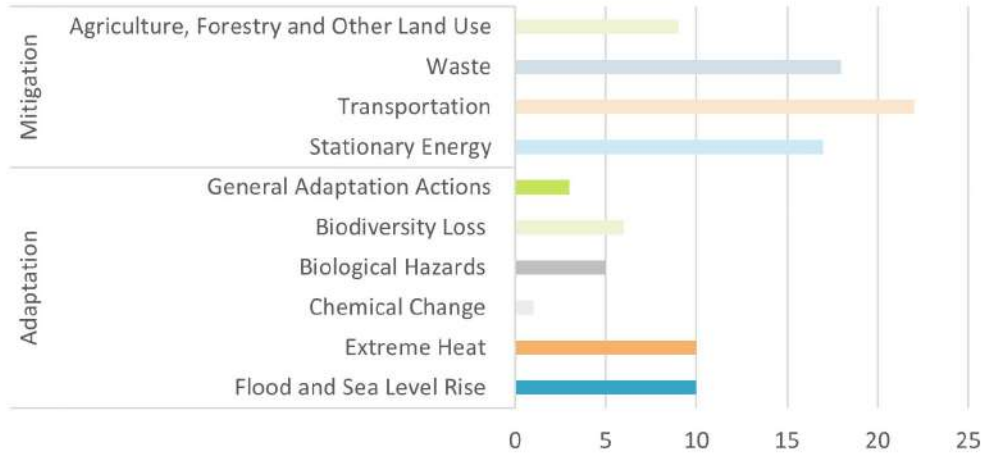
Climate Risks and Vulnerabilities

- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
Rosario, Argentina 2020 CAP

Priority Actions

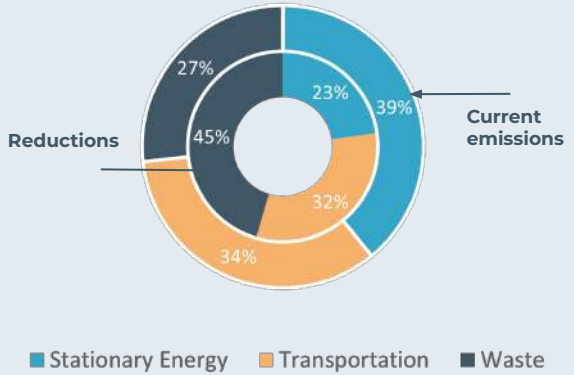
Number of Priority Actions by Sector and Type



Quality of Action Design

Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The main mitigation actions for the stationary energy sector are the replacement of the public lighting system with **LED and smart lightning** and the increase in **municipal buildings' energy efficiency** through the implementation of an **energy management system**.

The main mitigation measures in the transportation sector are the commissioning o**f the Rosario-Cañada regional train** and the incorporation of **cleaner and more efficient technologies and energy sources in public transport units.**

The main mitigation action for the waste sector is the creation of a **dry biodigester plant.**

Adaptation Actions

- Institutional strengthening of comprehensive hydraulic management through planning instruments that enable the construction of new water infrastructure.
- Consolidation of the early warning system and information dissemination to the community.
- Increase the absorbent surface and urban vegetation cover.
- Development of climate change adaptation policies in the health sector.
- Updating of the Rosario Urban Plan, to include riverbank conservation and extension and the identification and analysis of management units within the historical area of the city, forming environmental units.

Climate Action Plan Evaluation
Rosario, Argentina 2020 CAP

CAP Construction process

Developed by Rosario's City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

Rosario's 1st CAP

No budget mentioned

- The CAP states that climate action implementation will be funded through public, private, national, and international funds but does not specify which ones or which actions have identified funding.

Best practices

- Very detailed GHG inventory.

Gaps

- It is **hard to distinguish between** actions that are **currently being implemented and proposed actions.**
- Mitigation actions do not provide an **estimate of emission reductions** per action
- Actions do not specify **who is responsible** for the action **implementation.**
- CAP **does not include action prioritization** or mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis.
- CAP **does not include a cost estimate** for the implementation and **does not specify sources of financing** for mitigation actions.

Climate Action Plan Recommendations
Rosario, Argentina 2020 CAP

Climate Actions

- Mitigation actions should **include an estimate of the expected mitigation reductions** produced after the action is implemented. This would facilitate action prioritization and provide an additional indicator to measure the actions' success (see La Paz, Rio de Janeiro or Recife's CAP).
- Actions that are currently being implemented and proposed actions should be clearly identified.
- **Actions should be budgeted**, and each action **should have identified sources of funding**, if this is not available potential sources of funding should suffice.
- Whenever possible, **actions should be prioritized** based on the benefits obtained per unit cost. This is especially true for adaptation actions that do not have a clear mechanism for comparing the expected impact.
- Include who is the responsible unit assigned to each climate action.
- Describe the **criteria used for action selection** (cost-benefit, cost-effectiveness, multicriteria analysis, etc).

City Context
San Carlos de Bariloche, Argentina 2020 CAP

Population

mid-size
129,927 people

2.08%
yearly growth rate
2001-2010

Location

Urban

Area:
80.5 km²

Density:
1,614 people/km²

Economy

GDP
$1 B USD

GDP/capita
$8,579

Tourism

Geography

Forest

Mountain

Geographic scope

100% of Muncipality*

*Not part of a metropolitan area.

Weather

Av Max **13.6°C**
Av Mid **8°C**
Av Min **<1°C**

Temperate

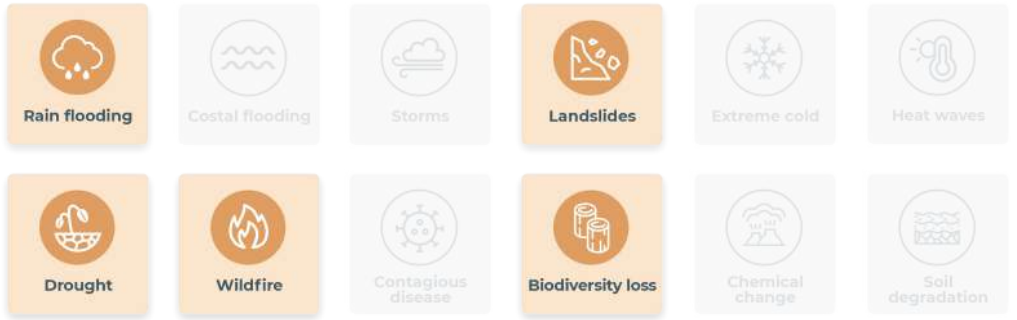
Humid

1,200 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)

7.49 ton CO_2 eq / person
873 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

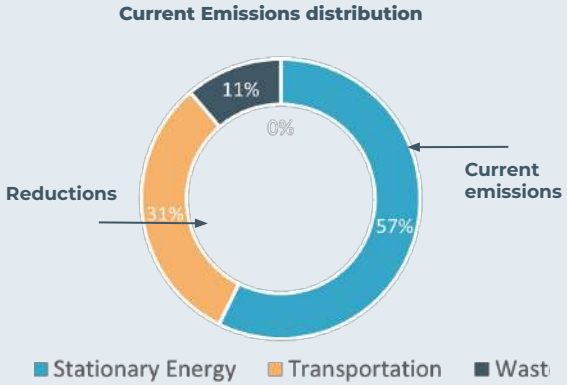


Climate Action Plan Evaluation
San Carlos de Bariloche, Argentina 2020 CAP

Priority Actions

Quality of Action Design

Mitigation (current emissions vs reductions by sector)



The ambitious scenario does not specify what percentage of emission reductions corresponds to each sector

The main mitigation actions for the transportation sector are to **invest in mobility infrastructure and public transport** and to promote **efficient driving.**

The main mitigation actions for the stationary energy sector are to create **legislation to increase energy efficiency i**n residential buildings and to facilitate **distributed energy generation.**

The main mitigation action for the waste sector is to **Install collection points for dry waste, that will later be recycled.**

Adaptation Actions

- Heat Plan
- Hydraulic plan
- Fire prevention plan.
- Wetland protection.
- Land-use plan

Climate Action Plan Evaluation
San Carlos de Bariloche, Argentina 2020 CAP

CAP Construction process

Developed by San Carlos de Bariloche's City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

San Carlos de Bariloche's 1st CAP

No budget mentioned

- No financing identified for the implementation of the mitigation and adaptation strategies.

Best practices

- Very detailed **social Vulnerability analysis.**

Gaps

- CAP **does not explicitly state the BAU emissions,** instead, it uses a bar graph.
- **CAP does not explicitly state the expected emission reductions by sector.**
- It is **hard to distinguish between** actions that are **currently being implemented and proposed actions.**
- Mitigation actions do not provide an **estimate of emission reductions** per action
- Actions do not specify **who is responsible** for the action **implementation.**
- Actions are **not specific or detailed** enough.
- CAP **does not include action prioritization** or mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis.
- CAP **does not include a cost estimate** for the implementation and **does not specify sources of financing** for mitigation actions.

Climate Action Plan Recommendations
San Carlos de Bariloche, Argentina 2020 CAP

Climate Actions

- Mitigation actions should **include an estimate of the expected mitigation reductions** produced after the action is implemented. This would facilitate action prioritization and provide an additional indicator to measure the actions' success (see La Paz, Rio de Janeiro or Recife's CAP).
- Actions that are currently being implemented and proposed actions should be clearly identified.
- Include a more detailed breakdown of mitigation and adaptation actions with **measurable indicators of success, specific timelines,** and for adaptation actions, detailed expected outcomes. A good example of this is can be found in Buenos Aires' and Rio de Janeiro's CAP action cards.
- **Actions should be budgeted**, and each action **should have identified sources of funding**, if this is not available potential sources of funding should suffice.
- Whenever possible, **actions should be prioritized** based on the benefits obtained per unit cost. This is especially true for adaptation actions that do not have a clear mechanism for comparing the expected impact.
- Include who is the responsible unit assigned to each climate action.
- Describe the **criteria used for action selection** (cost-benefit, cost-effectiveness, multicriteria analysis, etc).

GHG Emissions inventory

- Stated the **total estimated emissions** for the **BAU scenario.**
- Include a table d**etailing the expected emission reductions by sector in the ambitious scenario**. This would allow the reader to get a better sense of the biggest contributions towards emission mitigation.

City Context
San Carlos Sud, Argentina 2020 CAP

Population

small-size
2,673 people

1.33%
yearly growth rate
2001-2010

Vulnerable Groups
Elderly

Location

Rural

Area:
95 km²

Density:
28 people/km²

Economy

GDP
$22 M USD

GDP/capita
$8,579

Agriculture and Livestock Industrial

Geography

Grassland

Inland

Geographic scope

100% of Municipality

*Not part of a metropolitan area.

Weather

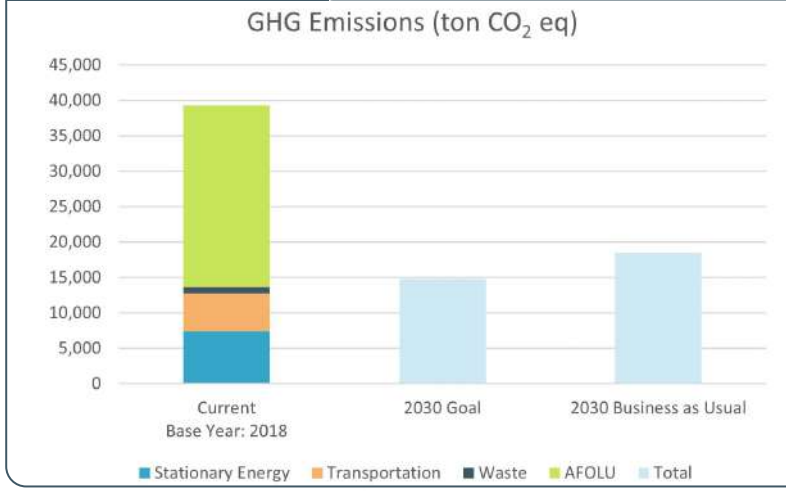
Av Max 26°C
Av Mid 18.5°C
Av Min 12°C

Temperate

Humid

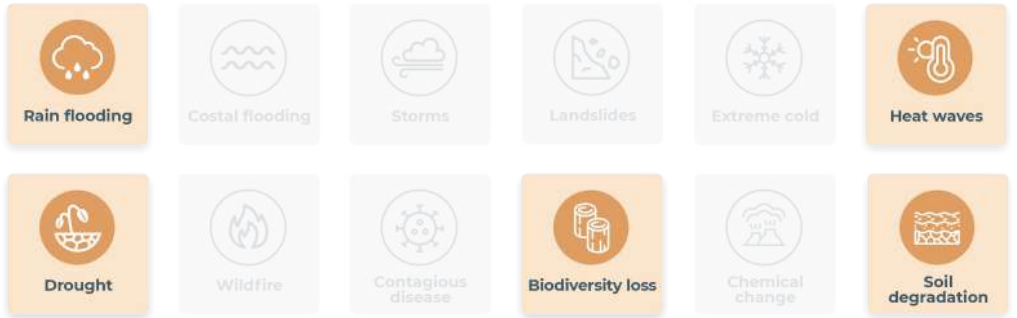
1,100 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



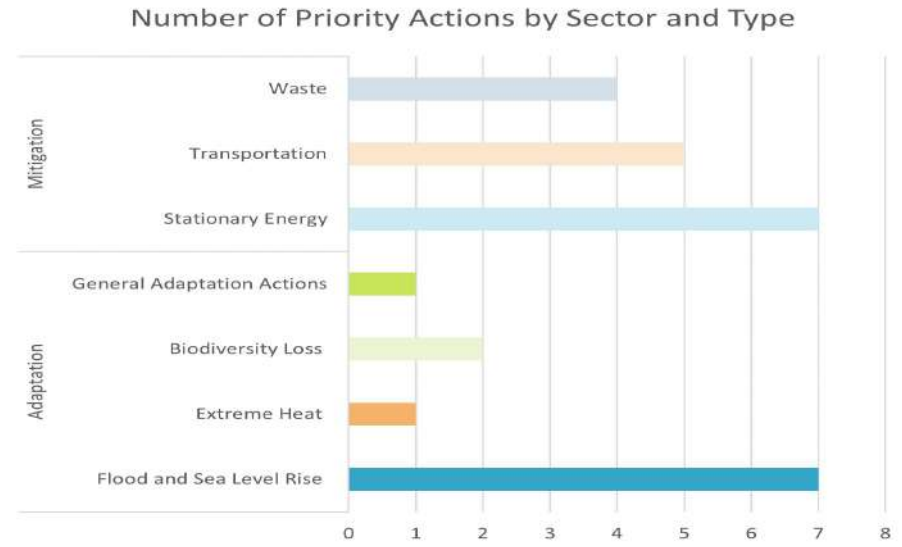
14.69 ton CO_2 eq / person
1,713 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities



Climate Action Plan Evaluation
San Carlos Sud, Argentina 2020 CAP

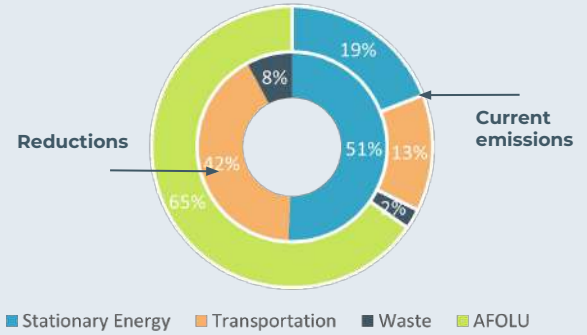
Priority Actions



Quality of Action Design

Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The ambitious scenario only considered the Stationary Energy, Transportation and Waste Sectors.

10 % of emission reductions are expected to come from the creation of the (Ciclovia Sur) bike path and an additional 10% from the **pedestrianization and semi-pedestrianization** of part of the commercial areas**.**

The main mitigation action for the stationary energy sector and their contribution to planned emission reductions are the promotion of **energy audits in the industry sector (17%)** and **the retrofit of public lighting for LED (15%).**

The main mitigation action for the waste sector is the **creation of new works of sewage networks and a new lagoon.** This is equivalent to **5%** of mitigation emission reductions.

Adaptation Actions

- Create piping for 1ero de Mayo street.
- Construction of rural storm drains.
- Include the creation of water reservoirs in new urbanization development.
- Continue to support the municipal tree nursery, and increase the number of trees in public spaces.
- Creation of Natural Pasture Conservation Law.

Climate Action Plan Evaluation
San Carlos Sud, Argentina 2020 CAP

CAP Construction process

Developed by San Carlos Sud's City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

San Carlos Sud's' 1st CAP

No budget mentioned

- No financing identified for the implementation of the mitigation and adaptation strategies although some actions are already under implementation..

Best practices

- All mitigations actions have an emission reductions estimate.

Gaps

- 2030 Business as Usual **(BAU) scenario is lower than the 2016 base year inventory** due to the omission of the AFOLU sector.
- **AFOLU emissions are not addressed** in any of the **mitigation actions** even though the AFOLU sector contributes to **58% of the 2016 emissions.**
- **All transport sector actions have the same amount of emission reductions.**
- CAP **does not include action prioritization** or mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis.
- CAP **does not include a cost estimate** for the implementation and does not specify sources of financing for actions.

City Context
Villa General Belgrano, Argentina 2018 CAP

Population

small-size
9,319 people

1.17%
yearly growth rate
2001-2010

Vulnerable Groups
Elderly
Children
Low Income communities

Location

Rural

Area:
18 km²

Density:
517 people/km²

Economy

GDP
$79 M USD

GDP/capita
$8,579

Agriculture

Geography

Forest

Mountain

Geographic scope

100% of Municipality

*Not part of a metropolitan area.

Weather

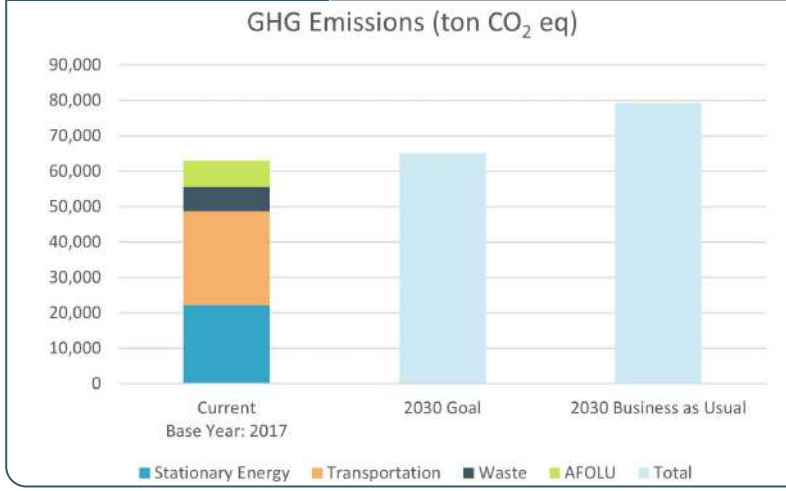
Av Max 26°C
Av Mid 16°C
Av Min <0°C

Temperate

Sub-humid

800 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



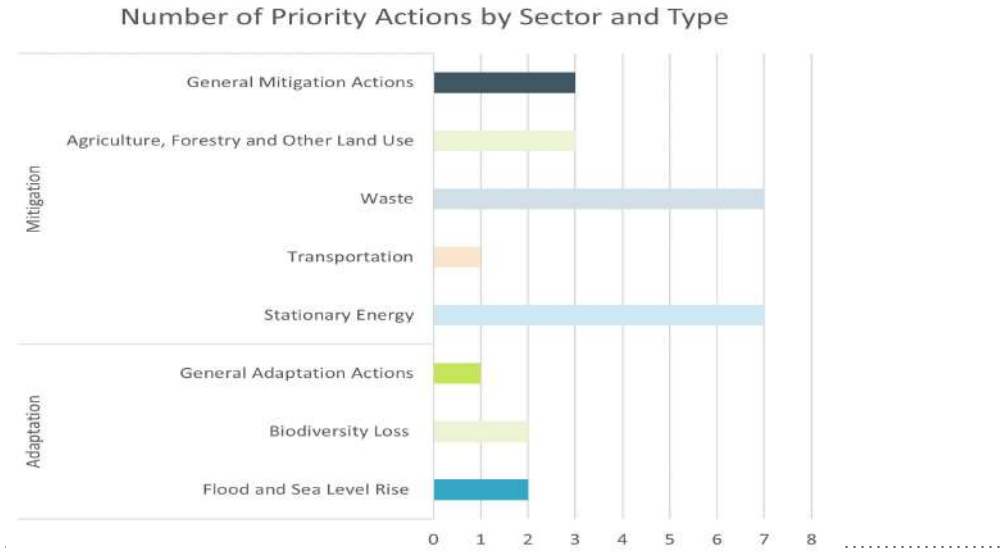
6.75 ton CO_2 eq / person
787 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

Rain flooding
Costal flooding
Storms
Landslides
Extreme cold
Heat waves
Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

Climate Action Plan Evaluation
Villa General Belgrano, Argentina 2018 CAP

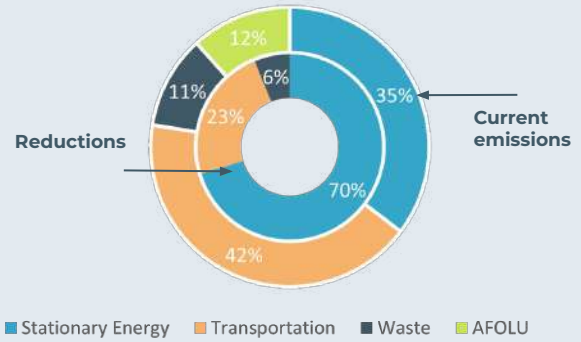
Priority Actions



Quality of Action Design

Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The ambitious scenario only considered the Stationary Energy, Transportation and Waste Sectors.

18 % of emission reductions are expected to come from the transport from a **combination of low-emission vehicles, low-emission fuels (biodiesel), and an increase in non-motor transportation.**

The main mitigation actions for the stationary energy sector and their contribution to planned emission reductions are the **reduction of commercial buildings' energy** consumption **(18%)**, the creation of **energy efficiency norms** for the **construction sector(25%),** and the implementation of **energy efficiency** measures **in public lightning (7.5%).**

The main mitigation action for the waste sector is the **implementation of the Composting Club campaign enrolling 50 new households per year.** This is equivalent to **3%** of mitigation emission reductions.

Adaptation Actions

- Creation of recreational spaces in streambanks and provide retention gaps to reduce flash flood episodes.
- Strengthen the forest-fire early warning system.
- Development of a new Management and Conservation Plan for the Water Basin.
- Increase natural protected areas and promote private natural protected areas.

Climate Action Plan Evaluation
Villa General Belgrano, Argentina 2018 CAP

CAP Construction process

Developed by Villa General Belgrano's' City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

Villa General Belgrano's'
1st
CAP

No budget mentioned

- No financing identified for the implementation of the mitigation and adaptation strategies.

Best practices

- The **GHG inventor**y is well documented.
- Very detailed **social Vulnerability analysis.**
- **The CR&V Analysis is** very thorough and has a clear explanation of the methodology used.
- All mitigations actions have an emission reductions estimate.

Gaps

- CAP **does not explicitly state the BAU emissions,** instead, it uses a bar graph.
- Even though it is identified as climate risk, there **are no specific adaptation actions to reduce the risk of extreme cold.**
- CAP **does not include action prioritization** or mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis.
- CAP **does not include a cost estimate** for the implementation, except for two climate actions, and does not specify sources of financing.

Climate Action Plan Recommendations
Villa General Belgrano, Argentina 2018 CAP

Climate Actions

- **Include adaptation actions aimed at reducing the risk of extreme cold.**
- Describe the **criteria used for action selection** (cost-benefit, cost-effectiveness, multicriteria analysis, etc).
- Whenever possible, **actions should be prioritized** based on the benefits obtained per unit cost. This is especially true for adaptation actions that do not have a clear mechanism for comparing the expected impact.
- **Actions should be budgeted,** each action **should have identified sources of funding**, if this is not available potential sources of funding should suffice.

GHG Emissions inventory

- Stated the **total estimated emissions** for the **BAU scenario.**

City Climate Action Plan Analysis in Latin America and the Caribbean

Brazilian Cities Climate Action Plans Analysis

THE WORLD BANK

City Context
Recife, Brazil 2020 CAP

Population

large-size
1.6 M people

0.73%
yearly growth rate
2010-2020

Vulnerable Groups
Low Income Communities (25.3% of population below poverty line)

Location

Urban

Area:
218 km²

Density:
7,555 people/km²

Economy

GDP
$10 B USD

GDP/capita
$6,084

Civil Construction Service Sector

Geography

Tropical forest

Coastal

Geographic scope

6.8% of Metropolitan Area

Weather

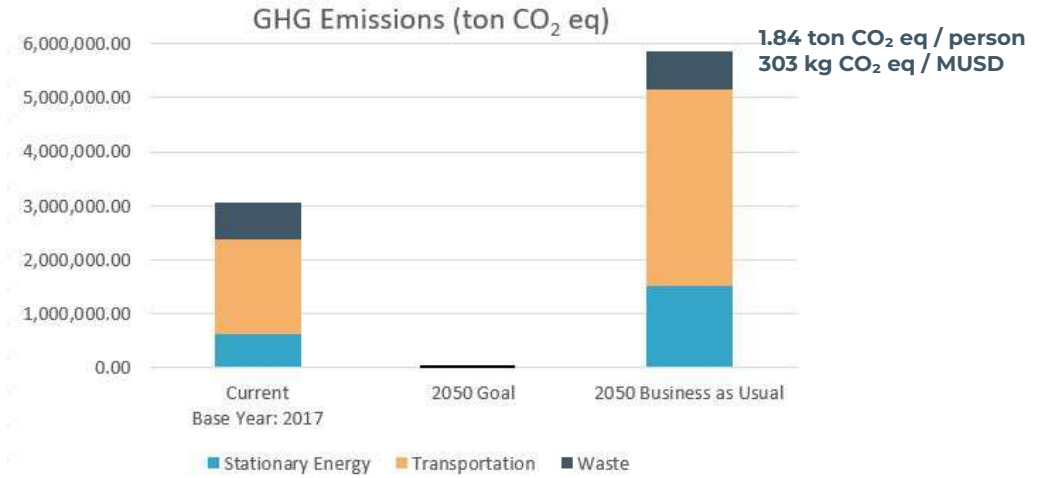
Av Max 30°C
Av Mid 26°C
Av Min 22°C

Tropical

Humid

2,000 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



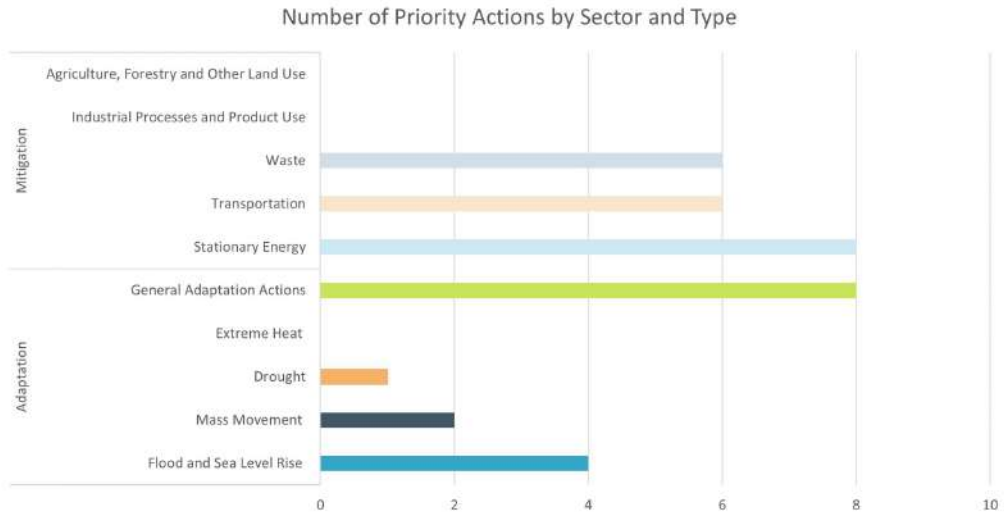
1.84 ton CO_2 eq / person
303 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

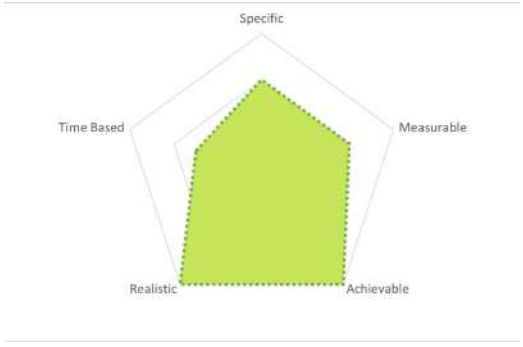
- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
Recife, Brazil 2020 CAP

Priority Actions

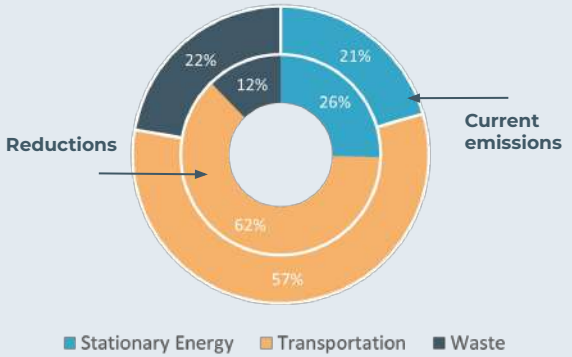


Quality of Action Design



Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The ambitious scenario visualizes a carbon neutral Recife by 2050

40 % of emission reductions are expected to come from the **compensation* of the transport sector's residual GHG emissions.**

The main mitigation action for the stationary energy sector is ensuring that by 2037 **100% of electricity comes from renewable sources**. This is equivalent to **9.7%** of planned emission reductions.

The main mitigation action for the waste sector is to **harness 100% of methane emitted in landfills** or sewage treatment stations for energy use by 2050. This is equivalent to **11.8%** of mitigation emission reductions.

Adaptation Actions

- Upgrade macro and micro-drainage infrastructure.
- Carry out structuring actions for slope containment.
- Implement, by 2025, a system to monitor the city's sea and river level.
- Guarantee the supply of drinking water to the entire population of Recife by 2025.
- Expand and update the Municipal System of Protected Areas. Prepare Sectoral Adaptation Plans by 2022.
- Prepare a diagnosis identifying priority areas for receiving sustainable urban works and improvements.

*CAP does not specify a specific compensation mechanism

Climate Action Plan Evaluation
Recife, Brazil 2020 CAP

CAP Construction process

Developed by Recife's City Hall

Partner Organization

URBAN LEDS

Recife's 1 st CAP

No budget mentioned

- The climate change adaptation strategy will be financed through the CITInova project which is executed by the Ministry of Science, Technology, and Innovation (MCTI) and financed by the Global Environment Facility (GEF).
- No financing identified for the mitigation strategy.

Best practices

- All mitigations actions have an emission reductions estimate.
- Mitigation actions are congruent with the emission inventory.

Gaps

- **Vulnerable groups** are not well identified.
- Even though it is identified as climate risk, there **are no specific adaptation actions to reduce the risk of heatwaves or contagious diseases.**
- Mitigation actions are not specific enough. Given the **reliance on emission compensations,** the 2050 Ambitious scenario is not realistic.
- CAP **does not include action prioritization** or mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis.
- CAP **does not include a cost estimate** for the implementation and does not specify sources of financing for mitigation actions.

Climate Action Plan Recommendations
Recife, Brazil 2020 CAP

Climate Actions

- **Include adaptation actions aimed at reducing the risk of heatwaves,** some good examples are revitalization of public spaces (see Rio de Janeiro's CAP), creation of green spaces such as parks and conservation areas (see Salvador's CAP), increase tree cover with climate-resilient native trees (see Sao Paulo's CAP).
- **Include adaptation actions that directly address the risk of contagious diseases**. For example, strengthen the healthcare sector(see Salvador's CAP).
- Include a more detailed breakdown of mitigation actions with **measurable indicators of success, specific timelines,** and for adaptation actions, **detailed expected outcomes**. A good example of this is can be found in Rio de Janeiro's CAP action scorecards.
- Given the lack of clarity on carbon offset mechanisms, **do not include transport sector compensation in the 2050 ambitious mitigation scenario.** Those emissions could be seen as residual emissions. This would provide a more realistic picture of mitigation potential.
- Describe the **criteria used for action selection** (cost-benefit, cost-effectiveness, multicriteria analysis, etc).
- Selected **actions should be prioritized,** actions do not necessarily have to be ranked but it should be clear which actions provide the biggest benefit. This is especially true for adaptation actions that do not have a clear mechanism for comparing the expected impact.
- **Actions should be budgeted,** each action **should have identified sources of funding**. If this is not available potential sources of funding should suffice.

Climate Risk & Vulnerability Assessment

- Conduct a thorough **analysis of vulnerable groups** to determine their climate risk. This would allow for more target adaptation actions that create a resilient population. A good example can be found in the 2021 Sao Paulo Climate Action Plan pg 89 Social Vulnerability Section.

City Context
Rio de Janeiro, Brazil 2021 CAP

Population

large-size
6.7 M people

0.78%
yearly growth rate
2015-2020

Vulnerable Groups
Low Income Communities
Elderly
Indigenous Population
People of Color
Women
Children

Location

Urban

Area:
1,204 km²

Density:
5,580 people/km²

Economy

GDP
$62 B USD

GDP/capita
$9,268

Service Sector
Industrial Activity
Agribusiness

Geography

Tropical forest

Coastal

Geographic scope

16% of
Metropolitan Area

Weather

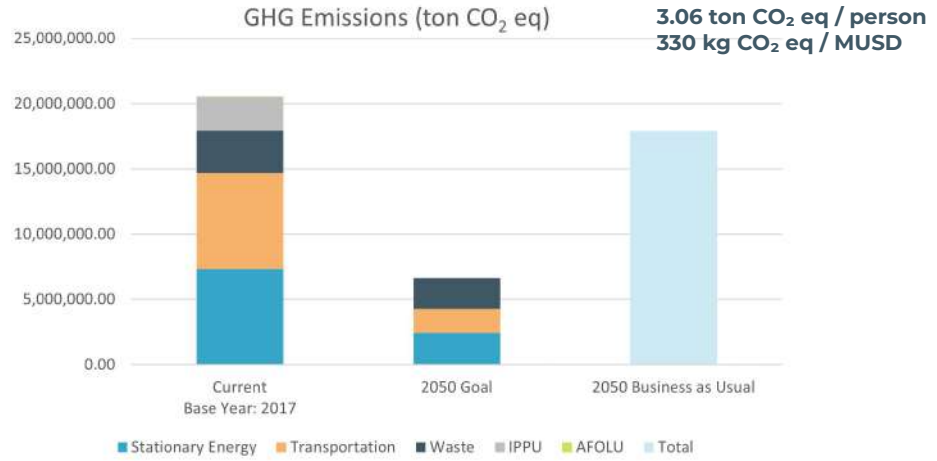
Av Max 30°C
Av Mid 24°C
Av Min 20°C

Tropical

Humid

1,069 mm
rain per year

GHG Emissions Inventory (scopes 1,2,3)

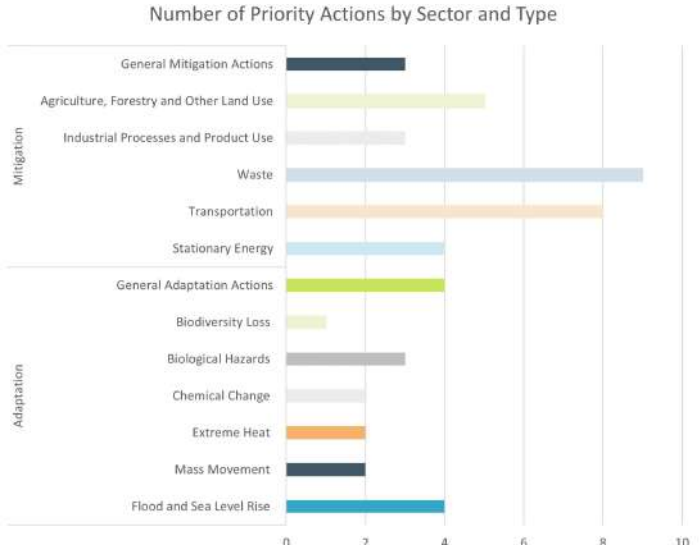


Climate Risks and Vulnerabilities

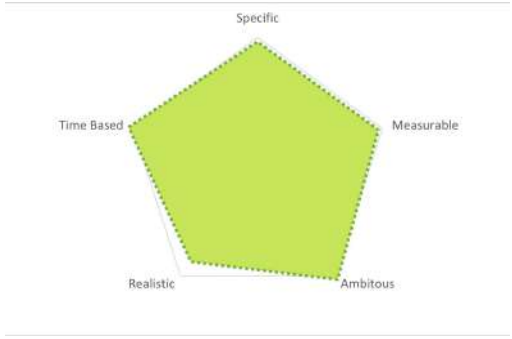
Rain flooding
Costal flooding
Storms
Landslides
Extreme cold
Heat waves
Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

Climate Action Plan Evaluation
Rio de Janeiro, Brazil 2021 CAP

Priority Actions

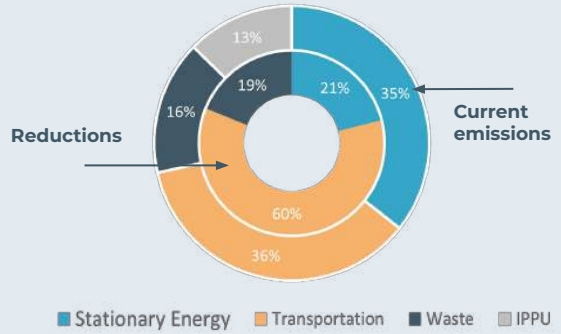


Quality of Action Design



Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



For the emission reductions, the 2017 Pathway scenario, not the 2017 current emissions inventory, was used.

80 % of emission reductions will come from the **MCR3.1 Goal*** which details a timeline of **policy actions to reduce emissions by 20% in 2030 and achieve neutrality by 2050.**

The main mitigation actions for the **transport sector** are to replace **20% of the fleet of the Public Bus Transport System** and **3% of the City's total circulating fleet** with **non-emitter vehicles**. This is equivalent **to 2.16%** and **11.52%** of reductions, respectively.

Creation of at least one city area with zero carbon emissions..

The main mitigation action for the waste sector is to **increase by 35% the recycling of dry waste** such as glass, paper, plastic, and metal. This is equivalent **to 4 %** of reductions.

Adaptation Actions

- Ensure no people living in areas of high risk of flooding and no housing in areas of high risk of landslides in the areas mapped and identified by Rio's City Hall.
- Establish Nature Conservation Units in 100% of areas identified as relevant Environmental Interest (ARIA), by the Municipal Secretary of the Environment.
- Conduct at least 20 simulated responses to emergencies to the impacts of climate extremes.
- Implement the revitalization of 300 km of public spaces, prioritizing pedestrian-scale design with sustainable urban drainage.
- Reduce by 50% the housing deficit and inadequacy in the city.
- Double the number of followers on the Center of Operations and Resilience (COR)'s social media or communication platforms.

*Climate Change and Resilience goal number 3.1 in Rio de Janeiro's CAP

Climate Action Plan Evaluation
Rio de Janeiro, Brazil 2021 CAP

CAP Construction process

Developed by Rio de Janeiro´s City Hall

Partner Organization

C40 CITIES

Rio de Janeiro's 2nd CAP

No budget mentioned

- A key goal is to use **resources collected from the application of urban and environmental instruments** to invest at least **R$350 million per year** in sustainable development projects.

Best practices

- All mitigations actions **estimate emission reductions.**
- Mitigation actions are **congruent** with the emission inventory.
- All adaptation actions identify **co-benefits and vulnerable groups.**
- Most actions have **identified financing sources.**
- CAP used an **action selection tool.**

Gaps

- Due to the use of the Pathways tool, the **Business as Usual (BAU) scenario is lower than the 2017 base year inventory.**
- The MCR3.1 goal does not specify the expected **emission reductions of each sub-action.**
- Actions are **not prioritized.**
- CAP **does not include a cost estimate** for the implementation.

Climate Action Plan Recommendations
Rio de Janeiro, Brazil 2021 CAP

GHG Emissions inventory

- The **Business as Usual (BAU) emission scenario is lower than the inventory base year.** While the CAP makes it explicit that this is due to the use of the Pathways tool and that the inventory for the base year using Pathways is lower than the BAU, it is still confusing for the reader and highlights a significant gap in the emissions considered for the ambitious scenario. This could be clarified by quantifying the emission categories not considered in the Pathways tool and then adding those emissions to the BAU and Ambitious scenarios as residual emissions. Another alternative might be to use a different tool to model the BAU and the Ambitious scenarios.

Climate actions

- **Specify the expected emission reductions** in each sub-action for the MCR3.1 priority action. This would provide more visibility as to the potential for emission reductions by sector and contribute to a prioritization of sub-actions.
- Whenever possible, **actions should be prioritized** based on the benefits obtained per unit cost. This is especially true for adaptation actions that do not have a clear mechanism for comparing the expected impact.
- **Actions should be budgeted** and cost estimates for each action should be included.

City Context
Salvador, Brazil 2020 CAP

Population

large-size
2.8 M people

1.32%
yearly growth rate
2015-2020

Vulnerable Groups
Low Income Communities
The Elderly
Children
Ethnic and Racial minorities

Location

Urban

Area:
693 km²

Density:
4,121 people/km²

Economy

GDP
$11 B USD

GDP/capita
$4,118

Service Sector
Industrial Sector
Agribusiness

Geography

Tropical forest

Coastal

Geographic scope

16% of Metropolitan Area

Weather

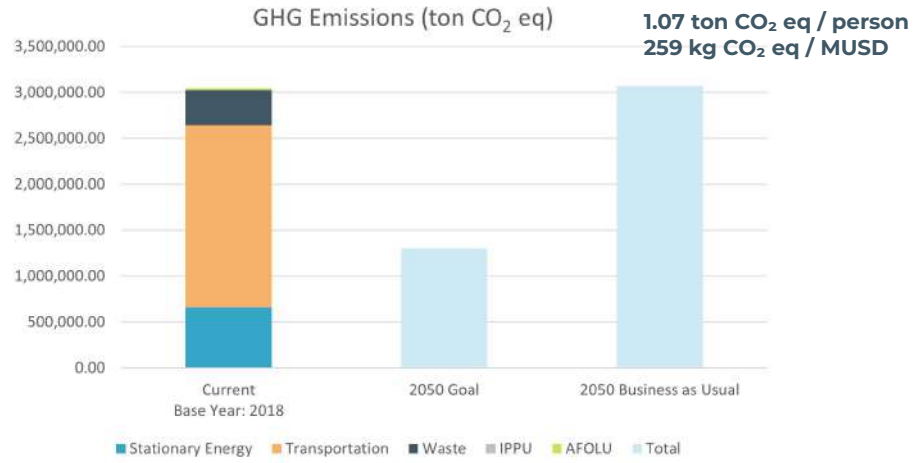
Av Max 30°C
Av Mid 25°C
Av Min 23°C

Tropical

Humid

1,871 mm rain per year

GHG Emissions Inventory (scopes not specified)

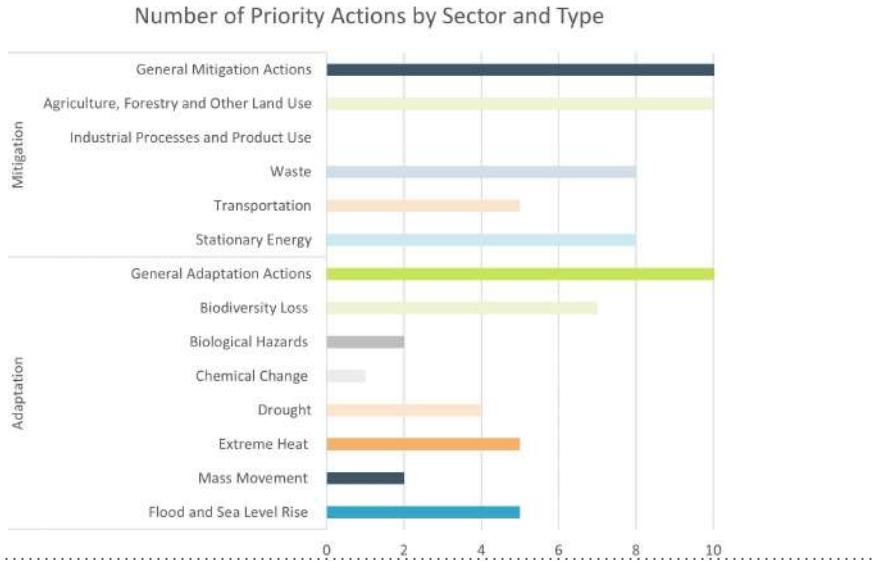


Climate Risks and Vulnerabilities

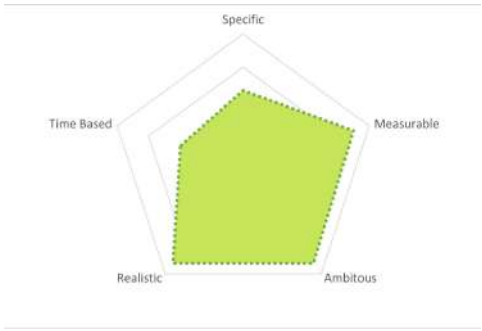
Rain flooding
Costal flooding
Storms
Landslides
Extreme cold
Heat waves
Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

Climate Action Plan Evaluation
Salvador, Brazil 2020 CAP

Priority Actions

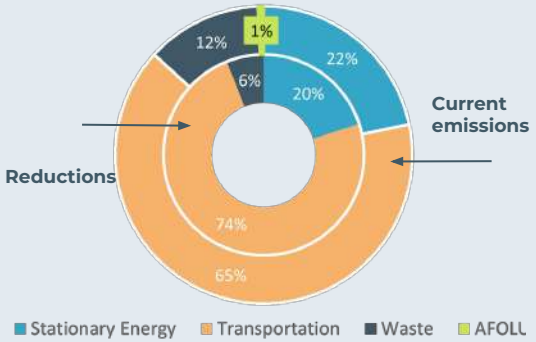


Quality of Action Design



Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



% of reductions by sector are estimated based on graphs found in CAP

The main mitigation actions for the **transport sector** are: to **expand the rapid bus transit** (BRT) and rapid bus (BRS) lines and to **renew public transport fleets with less polluting vehicles.**

The main mitigation actions for **stationary energy** are to encourage the use of Green IPTU and yellow IPTU programs. Both programs **provide fiscal incentives**. The green program is aimed at **businesses** for the implementation of **sustainability actions** while the yellow program is directed at **homeowners** and encourages the installation of **PV systems.**

The main mitigation actions for the **waste sector** are the **strengthening of the reverse logistics system** and the **expansion of Salvador's Waste Sorting Program.**

Adaptation Actions

- Review and update drainage plans.
- Gain the Blue Flag Certification for more beaches in Salvador by 2049
- Create and implement a payment for ecosystem services program.
- Launch an Intelligent Adaptation Platform.
- Create new parks, conservation areas, and green spaces.
- Create a coastal management system.
  Implement ecological corridors.
- Expand the role of the Civil Defence.

Climate Action Plan Evaluation
Salvador, Brazil 2020 CAP

CAP Construction process

Developed by the Municipal City Government of Salvador

Partner Organization

C40 CITIES

Salvador's 1 st CAP

No budget mentioned

- All actions have identified sources of financing which can be public, international, or local partnerships with the private sector
- Some actions are already in execution and their budget has been confirmed

Best practices

- All adaptation actions identify co-benefits.
- Most actions have identified financing sources, and some are under execution.
- CAP used an action selection tool.
- Adaptation actions selection included public consultations with community groups.
- Climate risk includes potential economic loss related to climate change.

Gaps

- Due to the use of the Pathways tool, the **Business as Usual (BAU) scenario is almost the same as the 2018 base year inventory.**
- The emission inventory **does not provide a detailed account of emissions by sector** (the reader has to estimate using very small graphs).
- Mitigation actions do not provide an **estimate of emission reductions per action.**
- Actions are **not specific or detailed** enough.
- Actions are **not prioritized.**
- CAP **does not include a cost estimate** for the implementation.

Climate Action Plan Recommendations
Salvador, Brazil 2020 CAP

Climate Actions

- Mitigation actions should **include an estimate of the expected mitigation reductions** produced after the action is implemented. This would facilitate action prioritization and provide an additional indicator to measure the actions' success (see Rio de Janeiro or Recife's CAP).
- Include a more detailed breakdown of mitigation actions with **measurable indicators of success, specific timelines,** and for adaptation actions, detailed expected outcomes. A good example of this is can be found in Rio de Janeiro's CAP action cards.
- Whenever possible, **actions should be prioritized** based on the benefits obtained per unit cost. This is especially true for adaptation actions that do not have a clear mechanism of comparing the expected impact.
- **Actions should be budgeted**, cost estimates for each action should be included.

GHG Emission Inventory

- **The Business as Usual (BAU) emission scenario is almost the same as the inventory base year.** While the CAP makes it explicit that this is due to the use of the Pathways tool, it is still confusing for the reader and highlights a significant gap in the emissions considered for the ambitious scenario. This could be clarified by quantifying the emission categories not considered in the Pathways tool and then adding those emissions to the BAU and Ambitious scenarios as residual emissions. Another alternative might be to use a different tool to model the BAU and the Ambitious scenarios.
- In addition to the graphs shown in the future emission scenario, a table **detailing the emission reductions by sector,** or ideally by sub-sector would allow the reader to get a better sense of emission distributions and the biggest contributions.

City Context
Sao Paulo, Brazil 2021 CAP

Population

mega city
12.3 M people

1.08%
yearly growth rate
2015-2020

Vulnerable Groups
Low Income Communities
Elderly
Indigenous Population
People of Color
Women
Children

Location

Urban

Area:
1,521 km²

Density:
1,521 people/km²

Economy

GDP
$135.6 B USD

GDP/capita
$11,001

Service Sector 82%
Industrial Sector 9.9%

Geography

Forest

Inland

Geographic scope

19% of Metropolitan Area

Weather

Av Max **27°C**
Av Mid **22°C**
Av Min **12°C**

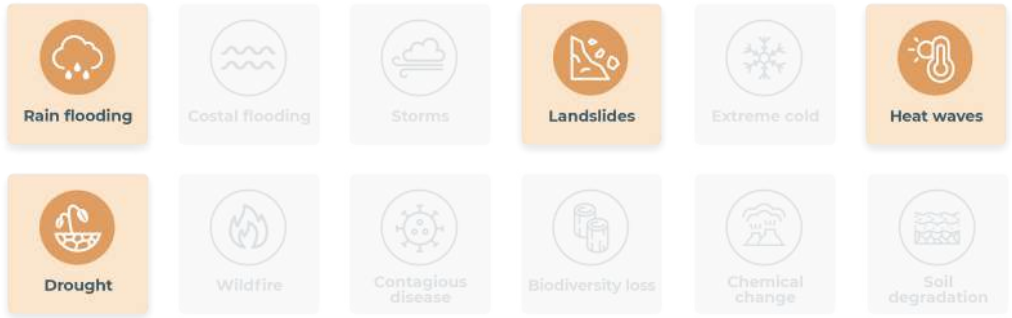
Temperate

Humid

1,616 mm rain per year

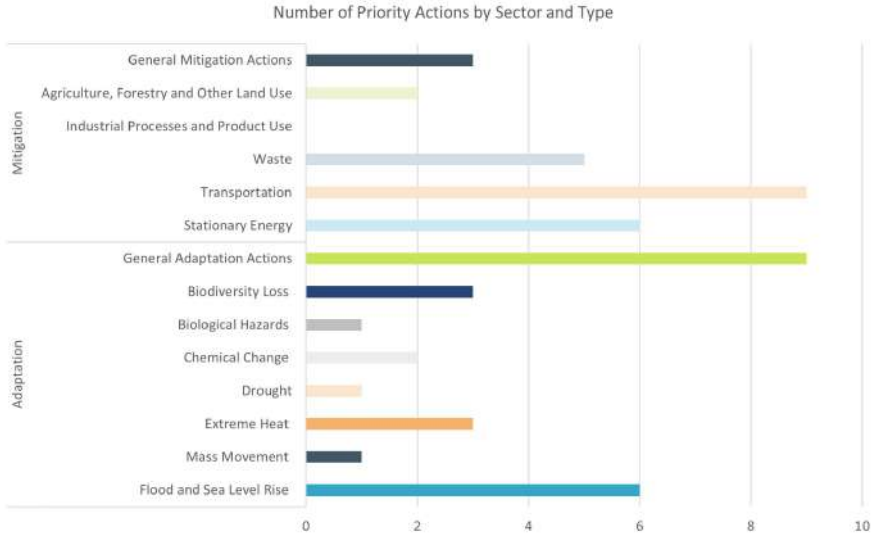
GHG Emissions Inventory (scopes 1,2,3)

Climate Risks and Vulnerabilities



Climate Action Plan Evaluation
Sao Paulo, Brazil 2021 CAP

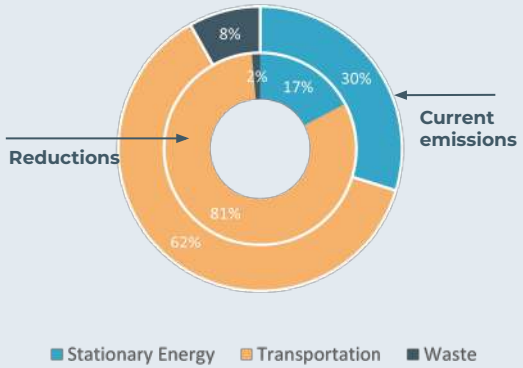
Priority Actions



Quality of Action Design

Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The main mitigation actions for the transport sector are: to increase the attractiveness of **the municipal bus system,** the establishment of a **Zero Emission Zone** in the perimeter of the **Minianel Viário,** the promotion of the gradual replacement of **municipal bus fleets for zero-emission vehicles, reduction of home-work distances** and the implementation of a **network of Logistics mini-terminals in partnership with the private sector.**

The main mitigation actions for the stationary Energy sector are the establishment of standards for **improving ventilation and natural lighting in social interest housing projects** and to encourage the production and distribution of energy from **renewable sources and distributed generation.**

The main mitigation actions for the waste sector are the **maximization of composting processes** and the **implementation of eco-parks.**

Climate Action Plan Evaluation
Sao Paulo, Brazil 2021 CAP

Adaptation Actions

- Increase the use of nature-based solutions (SbN) in drainage infrastructure works
- Map critical floodable areas, aiming to incorporate them into the Land Division, Use and Occupation Law
- Create the Drought Contingency Plan
- Strengthen the governance of the Municipal Civil Defense System for intersectoral and cross-cutting disaster management and risk reduction
- Promote the planting of climate-resilient native trees to improve thermal comfort in the city
- Protect springs and watercourses
- Expand adaptation measures and strengthen preparedness capacity and response of health services in situations of extreme events, with emphasis on the vulnerable population residing in peripheral areas

CAP Construction process

Developed by Sao Paulo's City Hall

Partner Organization

C40 CITIES

Sao Paulo's 2nd CAP

No budget mentioned

- Not specified.
- Action 28 seeks to establish criteria that would allow and guide the allocation of resources from municipal funds to climate change mitigation and adaptation actions.

Best practices

- All adaptation actions identify **co-benefits.**
- Even with the use of the **Pathways tool,** both **the Business as Usual (BAU) and Ambitious scenarios are congruent with the base year inventory.**
- CAP used an **action selection tool.**
- **Very detailed GHG inventory.**
- **Vulnerable groups** are mapped by area.

Gaps

- Actions do not specify if **financing sources have been identified,** even though the action evaluation and selection process includes the identification of financial sources.
- Mitigation actions do not provide an estimate of emission reductions per action.
- Actions are **not prioritized.**
- CAP **does not include a cost estimate** for the implementation.

Climate Action Plan Recommendations
Sao Paulo, Brazil 2021 CAP

Climate Actions

- Mitigation actions should **include an estimate of the expected mitigation reductions** produced after the action is implemented. This would facilitate action prioritization and provide an additional indicator to measure the actions' success (see Rio de Janeiro or Recife's CAP).
- **Actions should be budgeted**, and each action **should have identified sources of funding**, if this is not available potential sources of funding should suffice.
- Whenever possible, **actions should be prioritized** based on the benefits obtained per unit cost. This is especially true for adaptation actions that do not have a clear mechanism for comparing the expected impact.

City Climate Action Plan Analysis in Latin America and the Caribbean

Chilean Cities Climate Action Plans Analysis

THE WORLD BANK

City Context
Independencia, Chile 2020 CAP

Population

mid-size
100,281 people

0.73%
yearly growth rate
2015-2020

Vulnerable Groups
Elderly
Children
Migrants (34% of population)

Location

Urban

Area:
7.4 km²

Density:
13,551 people/km²

Economy

GDP
$1.3 B USD

GDP/capita
$13,307

Commercial
Manufacture
Housing

Geography

Forest

Inland

Geographic scope

0.36% of Santiago Province

Weather

Av Max **30.6°C**
Av Mid **14°C**
Av Min **4.1°C**

Temperate

Arid

362 mm rain per year

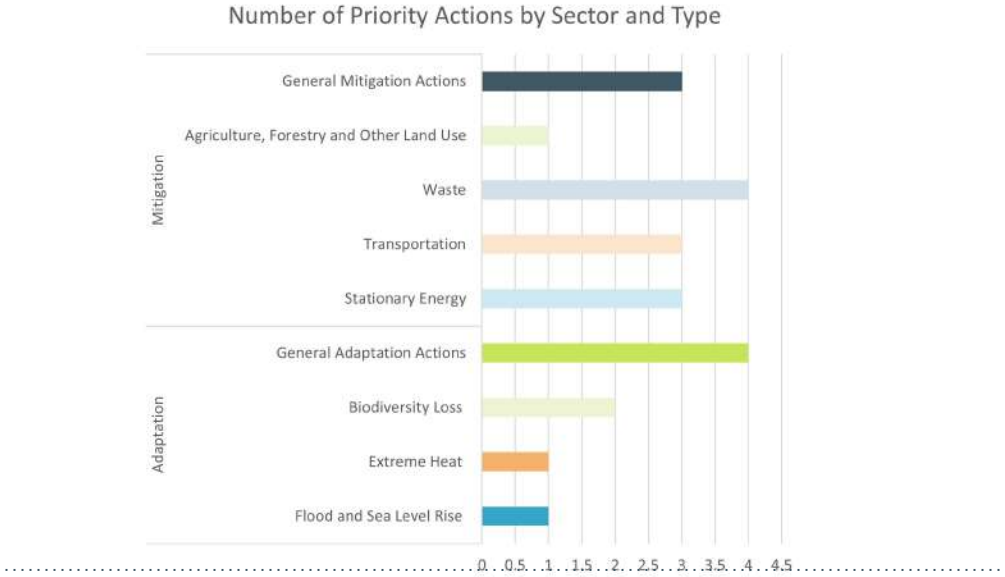
GHG Emissions Inventory (scopes not specified)

Climate Risks and Vulnerabilities

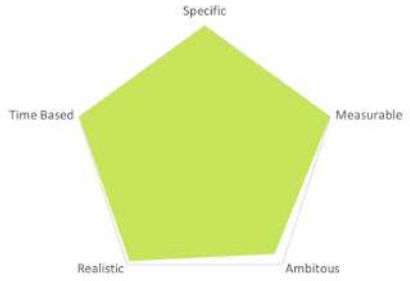
- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
Independencia, Chile 2020 CAP

Priority Actions

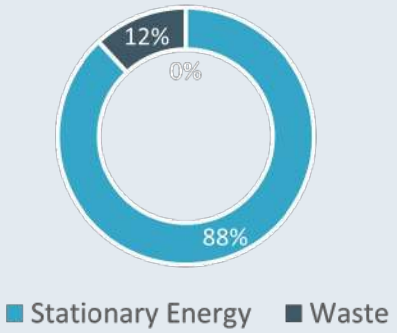


Quality of Action Design



Mitigation (current emissions vs reductions by sector)

Current Emissions distribution



The ambitious scenario does not specify what percentage of emission reductions corresponds to each sector

The main mitigation actions for the **transport sector** are: to create **infrastructure to encourage pedestrianization and bicycle use** and to promote the use of **electric vehicle**s for municipal tasks and passenger transport**.**

The main mitigation actions for **stationary energy** are to promote the incorporation of **non-conventional renewable energy and energy efficiency** and to improve **administrative energy managemen**t to minimize energy consumption and costs

The main mitigation actions for the **waste sector** are to **minimize organic waste**, create a **municipal composting plant** and implement **biodigesters.**

Adaptation Actions

- Increase tree cover in key areas.
- Encourage the development of green roofs and green wall projects in new buildings.
- Create an Early Warning, Attention, and Risk Control System.
- Encourage the development of rainwater recovery projects in homes.
- Establish a historical risk baseline and updated registry.

Climate Action Plan Evaluation
Independencia, Chile 2020 CAP

CAP Construction process

Developed by Independencia's City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

Independencia's 2nd CAP

No budget mentioned

- All actions have identified sources of financing which can be public, international, or local partnerships with the private sector
- Some actions are already in execution.

Best practices

- CAP specifies priority actions.
- Most actions have identified financing sources, and some are under execution
- Adaptation actions selection included public consultations with community groups.
- Climate risk includes potential economic loss related to climate change.

Gaps

- The CAP shows **two different emission inventories** with very different values. The first one estimated a total of 9,931.16 tons while the second inventory estimated 94,299.
  For this report, the inventory with the highest emissions was analyzed.
- The emission inventory **does not provide a detailed account of emissions by sector**.
- Inventory does **not have a BAU scenario**.
- **Mitigation goal** does not specify emission **reductions by sector.**
- Mitigation actions do not provide an **estimate of emission reductions per action.**
- CAP **does not include a cost estimate** for the implementation.

Climate Action Plan Recommendations
Independencia, Chile 2020 CAP

Climate Actions

- Mitigation actions should **include an estimate of the expected mitigation reductions** produced after the action is implemented. This would facilitate action prioritization and provide an additional indicator to measure the actions' success (see Rio de Janeiro or Recife's CAP).

- **Actions should be budgeted**, cost estimates for each action should be included.

GHG Emission Inventory

- CAP should **specify which of the two inventories** presented **will be used** as a metric for emission reductions.

- The emission inventory should include emissions from the Transportation sector.

- CAP should **develop a future emission baseline scenario** which can then be used to evaluate mitigation goals.

- The overall mitigation goal should **include expected emission reductions by sector in the ambitious scenario.** This would allow the reader to get a better sense of the biggest contributions towards emission mitigation.

City Context
Peñalolén, Chile 2020 CAP

Population

mid-size
241,599 people

0.73%
yearly growth rate
2015-2020

Vulnerable Groups
Children
Elderly

Location

Urban

Area:
54.9 km²

Density:
4,400 people/km²

Economy

GDP
$3 B USD

GDP/capita
$13,307

Commercial
Manufacture
Real estate

Geography

Forest

Valley

Geographic scope

2.66% of Santiago Province

Weather

Av Max 21.3°C
Av Mid 14.5°C
Av Min 7.9°C

Temperate

Humid

400-800 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)

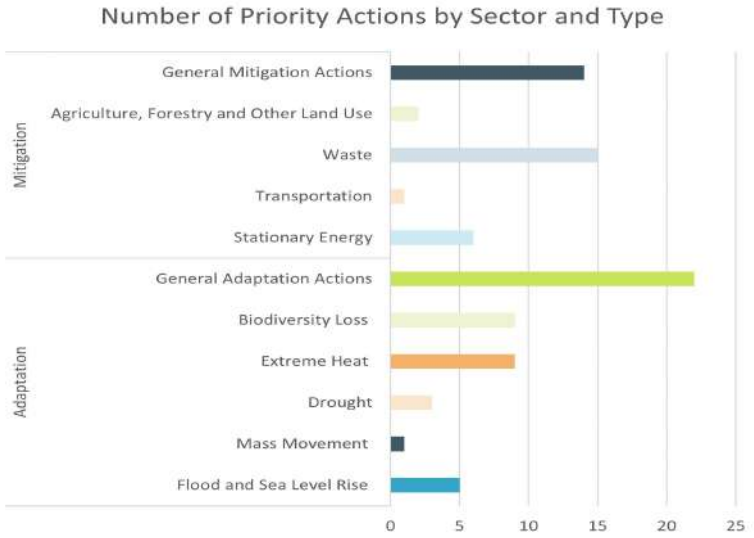
There is no emission inventory in the Climate Action Plan

Climate Risks and Vulnerabilities

- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
Peñalolén, Chile 2020 CAP

Priority Actions



Quality of Action Design

Mitigation

As part of their mitigation efforts, Peñalolen plans to develop instruments and local regulations for sustainable development and climate change.

The main mitigation action for the **transport sector** is to promote the **creation of infrastructure and services** that allow and promote sustainable practices.

The main mitigation action for **stationary energy** is to **promote renewable energy and energy efficiency** through photovoltaic and thermal solar panels and luminaire replacement, among others.

The main mitigation action for the **waste sector** is to improve municipal waste management with the construction of a **recycling center** and a **composting plant** and the strengthening and expansion of the i**nclusive recycling program.**

The main mitigation actions for the **AFOLU sector** is to develop initiatives for the conservation and preservation of high-ecological value areas.

Adaptation Actions

- Development of initiatives for the conservation and preservation of areas with high ecological value in the foothills and mountains of the municipality.
- Strengthen the various initiatives aimed at promoting formal and informal environmental education.
- Adequacy of current territorial planning instruments according to national and regional policies on climate change.
- Promotion of initiatives that increase and improve the state of urban trees.
- Implementation of initiatives related to efficient, conscious, and responsible water management.

Climate Action Plan Evaluation
Peñalolén, Chile 2020 CAP

CAP Construction process

Developed by Peñalolén's City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

Peñalolén's 2nd CAP

Although some actions are budgeted, not all of them are and the total implementation cost of the CAP is unknown.

- All actions have identified sources of financing which can be public, international, or local partnerships with the private sector.

Best practices

- Some actions have cost estimates.
- Most actions have identified financing sources.
- Includes prioritization of key mitigation and adaptation actions.

Gaps

- There is **no GHG Emission Inventor**y, although one of the mitigation actions is to develop the inventory.
- There is no **BAU scenario.**
- There is no specific **mitigation goal.**
- CAP does not mention how priority actions were chosen. There is no mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis.
- Even though it is identified as climate risk, there are no specific adaptation actions to reduce the risk of extreme cold.

Climate Action Plan Recommendations
Peñalolén, Chile 2020 CAP

Climate Actions

- **Include adaptation actions aimed at reducing the risk of extreme cold,** a good example is Santiago's Plan Calor.
- Mitigation actions should **include an estimate of the expected mitigation reductions** produced after the action is implemented. This would facilitate action prioritization and provide an additional indicator to measure the actions' success (see Rio de Janeiro or Recife's CAP).

GHG Emission Inventory

- CAP should include a **GHG emission inventor**y as well as a **Business as Usual (BAU) emission scenario.**
- CAP should include a **specific mitigation goal.**

City Context
Santiago, Chile 2020 CAP

Population

mid-size
404,495 people

0.73%
yearly growth rate
2015-2020

Vulnerable Groups
Migrants
(21% of population)

Location

Urban

Area:
22.4 km²

Density:
18,057 people/km²

Economy

GDP
$5 B USD

GDP/capita
$13,307

Commerce Service sector

Geography

Forest

Valley

Geographic scope

1.09% of Santiago Province

Weather

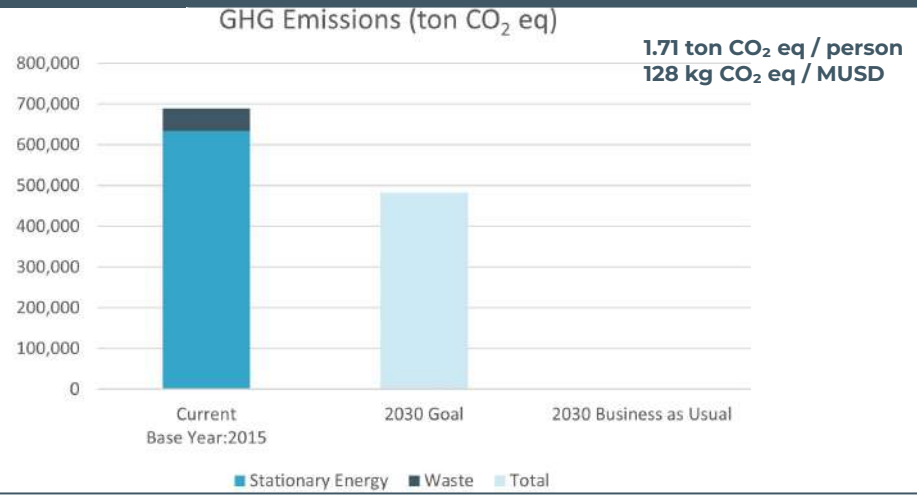
Av Max **30.6°C**
Av Mid **15.4°C**
Av Min **4.2°C**

Temperate

Arid

312.5 mm rain per year

GHG Emissions Inventory (scopes not specified)



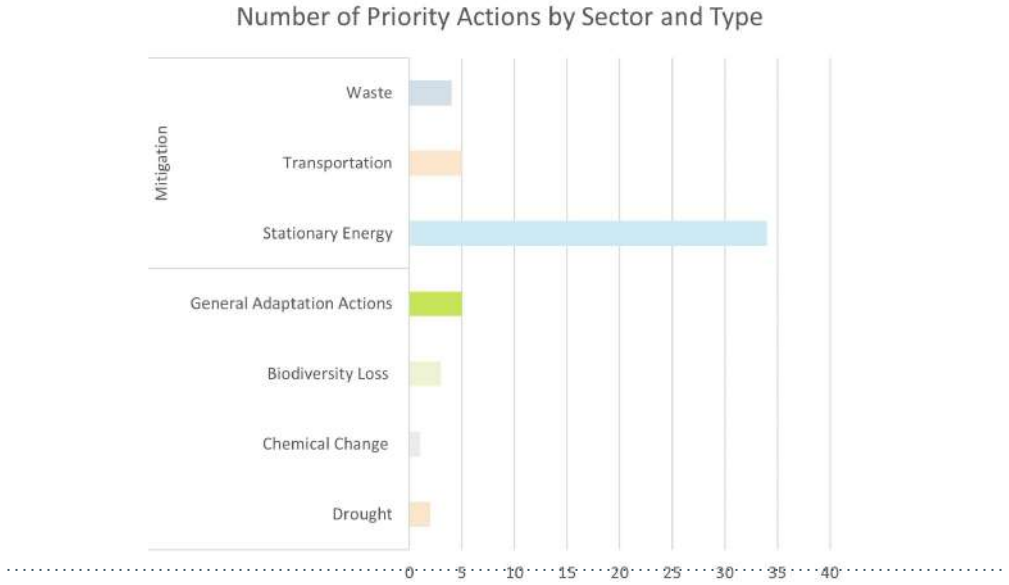
1.71 ton CO_2 eq / person
128 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
Santiago, Chile 2020 CAP

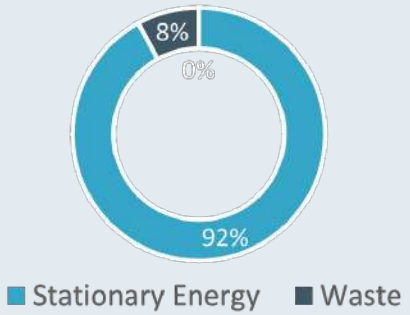
Priority Actions



Quality of Action Design

Mitigation (current emissions vs reductions by sector)

Current Emissions distribution



The ambitious scenario does not specify what percentage of emission reductions corresponds to each sector

The main mitigation actions for the **transport sector** are: to **invest in infrastructure for sustainable mobility** and to promote better mobility through **road-safety education.**

The main mitigation actions for **stationary energy** are to promote the incorporation of **non-conventional renewable energy and energy efficiency** and to increase energy institutionality.

The main mitigation actions for the **waste sector** is to gener**ate energy from waste through** the production of **biodiesel or biogas.**

Adaptation Actions

- Strengthen primary healthcare management and attention to adverse climatic events aimed at vulnerable populations.
- Implement sustainable infrastructure pilot initiatives with a focus on nature-based solutions.
- Create preparation plans for extreme events.
- Prepare and implement a strategy for the efficient use of water resources.
- Promote and strengthen community pilot initiatives focused on sustainable urban drainage and water recovery systems.

Climate Action Plan Evaluation
Santiago, Chile 2020 CAP

CAP Construction process

Developed by Santiago's City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

Santiago's 2nd CAP

No budget mentioned

- All actions have identified sources of financing which can be public, international, or local partnerships with the private sector
- Some actions are already in execution.

Best practices

- CR&V analysis includes an institutional vulnerability analysis.
- Most actions have identified financing sources, and some are under execution.
- Includes prioritization of key mitigation and adaptation actions.
- Identifies adaptation capacities such as Santiago's robust rainwater collection infrastructure.

Gaps

- The CAP shows **two different emission inventories** with very different values. For this report, the inventory with the highest emissions was analyzed.
- The emission inventory **does not provide a detailed account of emissions by sector**.
- Inventory does **not have a BAU scenario**.
- **Mitigation goal** does not specify emission **reductions by sector.**
- Mitigation actions do not provide an **estimate of emission reductions per action.**
- CAP **does not include a cost estimate** for the implementation.

Climate Action Plan Recommendations
Santiago, Chile 2020 CAP

Climate Actions

- Mitigation actions should **include an estimate of the expected mitigation reductions** produced after the action is implemented. This would facilitate action prioritization and provide an additional indicator to measure the actions' success (see Rio de Janeiro or Recife's CAP).
- **Actions should be budgeted**, cost estimates for each action should be included.

GHG Emission Inventory

- CAP should **specify which of the two inventories** presented **will be used** as a metric for emission reductions.
- The emission inventory should include emissions from the Transportation sector.
- CAP should **develop a future emission baseline scenario** which can then be used to evaluate mitigation goals.
- The overall mitigation goal should **include expected emission reductions by sector in the ambitious scenario.** This would allow the reader to get a better sense of the biggest contributions towards emission mitigation.

City Context
Temuco, Chile 2020 CAP

Population

mid-size
282,415 people

1.32%
yearly growth rate
2015-2020

Vulnerable Groups
Elderly
Children

Location

Mixed

Area:
464 km²

Density:
608 people/km²

Economy

GDP
$1.8 B USD

GDP/capita
$6,554

Commercial and service
Transport and communication
Construction

Geography

Forest

Valley

Geographic scope

53.66% of Metropolitan Area

Weather

Av Max 25°C
Av Mid 12.5°C
Av Min 2°C

Temperate

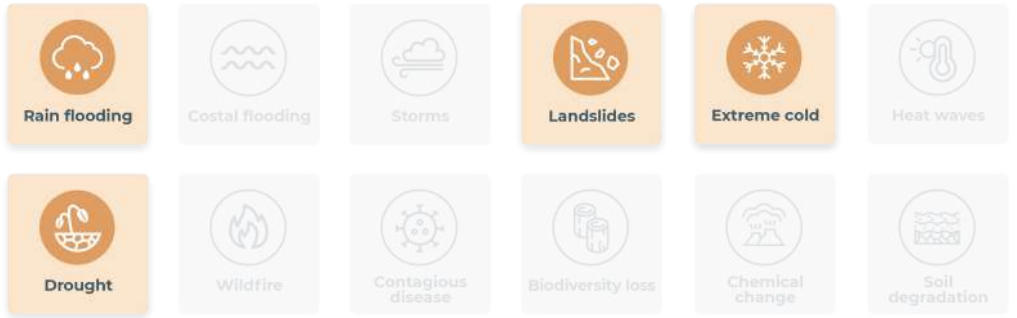
Humid

1,258 mm rain per year

GHG Emissions Inventory (scopes not specified)

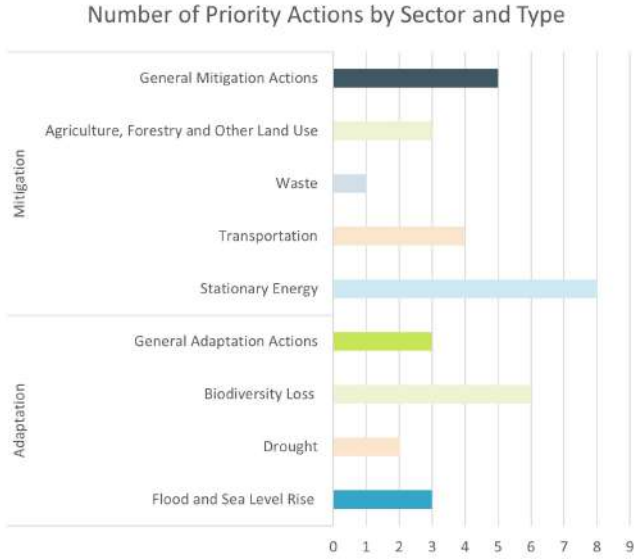
There is no emission inventory in the Climate Action Plan

Climate Risks and Vulnerabilities



Climate Action Plan Evaluation
Temuco, Chile 2020 CAP

Priority Actions



Quality of Action Design

Mitigation

The main mitigation action for the **transport sector** is to develop and implement **Comprehensive Mobility Plan.**

The main mitigation actions for **stationary energy** are to **replace heating equipment for** more efficient models, **replace thermal envelope in buildings** and promote access to **loans for energy efficiency** remodeling in the middle-class **residential sector.**

The main mitigation actions for the **waste sector** is to create a **solid waste management policy** with a **discount rate for tenants who recycle,** as well as **fees if they exceed maximum quota** of disposal by dwelling.

The main mitigation actions for the **AFOLU sector** is to implement **nature-based solutions** for the **generation of communal carbon sinks.**

Adaptation Actions

- Establish a baseline of historical risks and have an updated registry that strengthens local and institutional capacities to reduce vulnerability.
- Establish an action protocol for emergencies, which coordinates the municipality with public services and the community.
- Work with construction companies to develop a sustainable construction proposal for rainwater collection.
- Develop a pilot project for automated irrigation in an urban macrozone.
- Design and implement an ecological monitoring and restoration program for wetlands and other ecosystems.

Climate Action Plan Evaluation
Temuco, Chile 2020 CAP

CAP Construction process

Developed by Temuco's City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

Temuco's 2nd CAP

No budget mentioned

- All actions have identified sources of financing which can be public, international, or local partnerships with the private sector.

Best practices

- Even though there is no emission inventory priority mitigation actions are congruent to Temuco's energy consumption
- . Most actions have identified financing sources.
- Includes prioritization of key mitigation and adaptation actions.

Gaps

- There is no **GHG Emission Inventory,** although one of the mitigation actions is to develop the inventory.
- CAP **does not mention how priority actions were chosen.** There is no mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis.
- CAP **does not include a cost estimate** for the implementation and does not specify sources of financing for mitigation actions.
- Even though it is identified as climate risk, there are no specific **adaptation actions** to reduce the **risk of extreme cold.**

Climate Action Plan Recommendations
Temuco, Chile 2020 CAP

Climate Actions

- **Include adaptation actions aimed at reducing the risk of extreme cold,** a good example is Santiago's Plan Calor.
- Mitigation actions should **include an estimate of the expected mitigation reductions** produced after the action is implemented. This would facilitate action prioritization and provide an additional indicator to measure the actions' success (see Rio de Janeiro or Recife's CAP).
- **Actions should be budgeted**, cost estimates for each action should be included.

GHG Emission Inventory

- CAP should include a **GHG emission inventor**y as well as a **Business as Usual (BAU) emission scenario.**

City Context
Vitacura, Chile 2020 CAP

Population

small-size
85,384 people

0.73%
yearly growth rate
2015-2020

Location

Urban

Area:
28.3 km²

Density:
3,017 people/km²

Economy

GDP
$1.1 B USD

GDP/capita
$13,307

Commerce
Real estate
Hospitality

Geography

Forest

Valley

Geographic scope

1.37% of Santiago Province

Weather

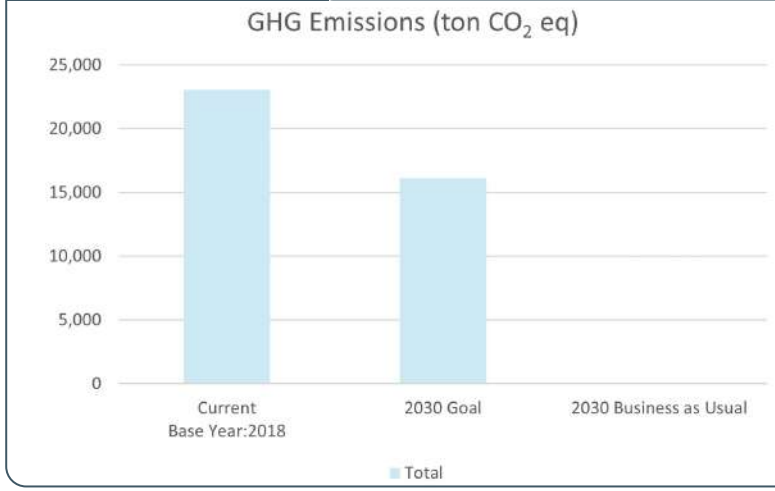
Av Max 30.4°C
Av Mid 18°C
Av Min 4.3°C

Temperate

Semi-arid

412 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



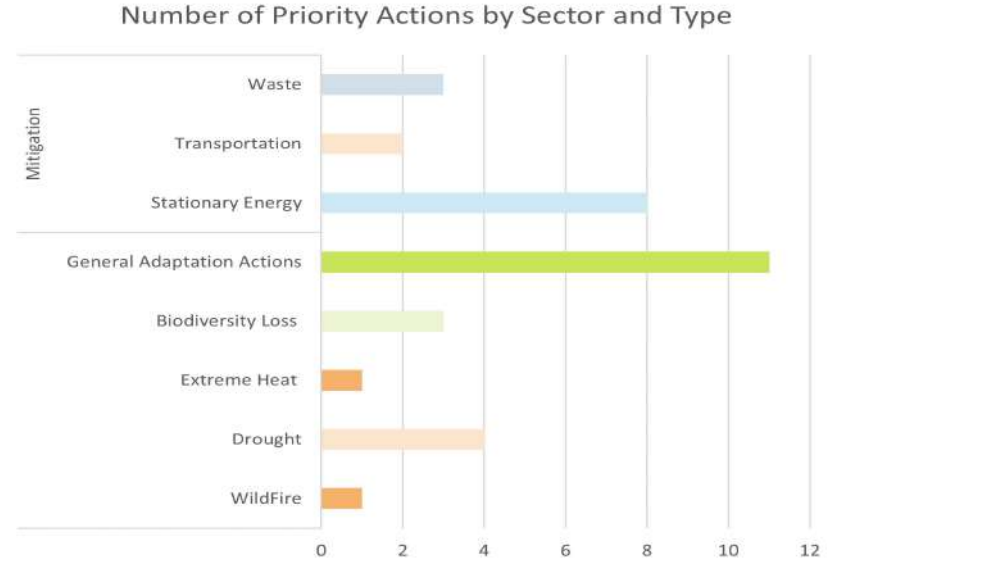
0.27 ton CO_2 eq / person
20 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

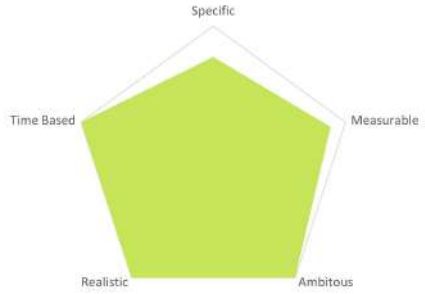
Rain flooding
Costal flooding
Storms
Landslides
Extreme cold
Heat waves
Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

Climate Action Plan Evaluation
Vitacura, Chile 2020 CAP

Priority Actions



Quality of Action Design



Mitigation

he main mitigation action for **the transportation sector** is the **strengthening of mobility programs** within the municipality such as "CicloRecreoVia" to **promote sustainable mobility** and **discourage the use of private cars.**

The main mitigation actions for **stationary energy** are to promote the incorporation of **non-conventional renewable energy and energy efficiency** and to establish **energy audits and baselines** that support currently available information, improve energy management and reduce energy consumption.

The main mitigation action for the **waste sector** is the **reduction, control, and efficient management of organic and inorganic waste**

Adaptation Actions

- Prevention and territorial preparation (citizen education in disaster risk reduction and socialization of the municipal emergency plan).
- Implement a system for monitoring and controlling water consumption in buildings and green areas for municipal maintenance.
- Strengthen the management of the municipal health network with a focus on adverse weather events and vulnerable communities..
- Generate a network of green infrastructure at the metropolitan level through local nature-based initiatives.
- Incorporate the protection of ecosystems and biodiversity in local ordinances and implement management plans or related measures to promote conservation.

Climate Action Plan Evaluation
Vitacura, Chile 2020 CAP

CAP Construction process

Developed by Vitacura's City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

Vitacura's 2nd CAP

No budget mentioned

- All actions have identified sources of financing which can be public, international, or local partnerships with the private sector.

Best practices

- Identifies adaptation capacities such as gabions in the riverbank.
- . Most actions have identified financing sources.
- Includes prioritization of key mitigation and adaptation actions.
- .

Gaps

- The **GHG Emission Inventory** does not classify emissions by sector.
- There is **no BAU** scenario.
- CAP **does not mention how priority actions were chosen.** There is no mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis.
- CAP **does not include a cost estimate** for the implementation and does not specify sources of financing for mitigation actions.
- Even though it is identified as climate risk, there are no specific **adaptation actions** to reduce the **risk of extreme cold.**

Climate Action Plan Recommendations
Vitacura, Chile 2020 CAP

Climate Actions

- Include adaptation actions aimed at **reducing the risk of extreme cold**, a good example is Santiago's Plan Calor.
- Mitigation actions should i**nclude an estimate of the expected mitigation reductions produced after the action is implemented.** This would facilitate action prioritization and provide an additional indicator to measure the actions' success (see Rio de Janeiro or Recife's CAP).
- **Actions should be budgeted**, cost estimates for each action should be included.

GHG Emission Inventory

- The **GHG emission inventory** should include emissions by sector and if possible, by subsector.
- CAP should include a **Business as Usual (BAU) emission scenario.**

City Climate Action Plan Analysis in Latin America and the Caribbean

Colombian Cities Climate Action Plans Analysis

THE WORLD BANK

City Context
Bogotá, Colombia 2020 CAP

Population

large-size
7.4 M people

2.46%
yearly growth rate
2015-2020

Location

Mixed

Area:
1,636 km²

Density:
4,529 people/km²

Economy

GDP
$37 B USD

GDP/capita
$5,045

Service
Commerce
Industrial

Geography

Grassland

Mountain

Geographic scope

100% of
Metropolitan Area

Weather

Av Max 23°C
Av Mid 14°C
Av Min 7.7°C

Temperate

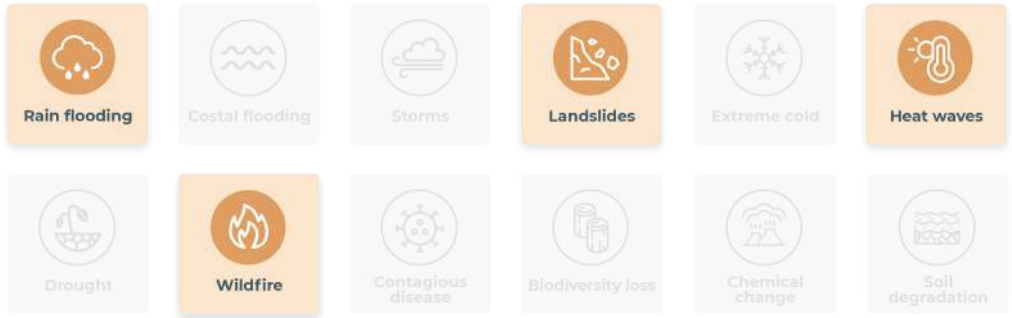
Sub-humid

840 mm
rain per year

GHG Emissions Inventory (scopes 1,2,3)

1.54 ton CO_2 eq / person
305 kg CO_2 eq / MUSD

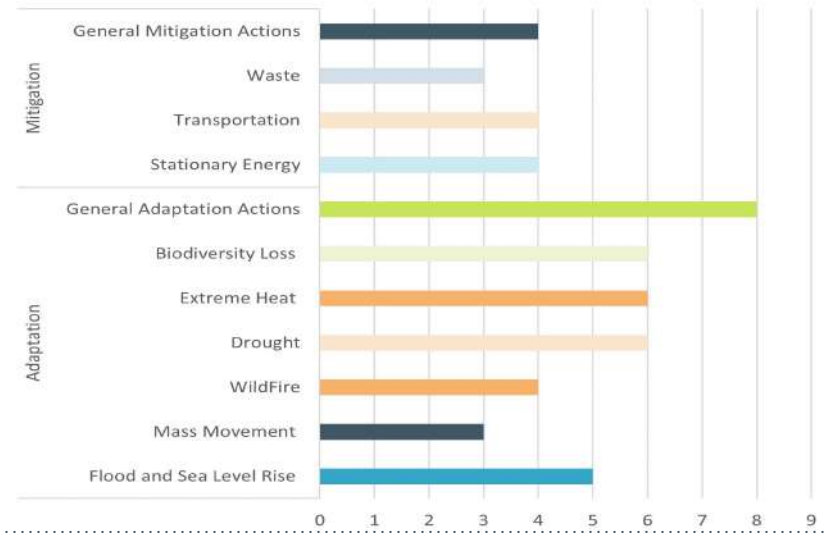
Climate Risks and Vulnerabilities



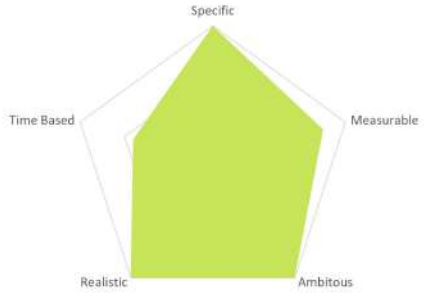
Climate Action Plan Evaluation
Bogotá, Colombia 2020 CAP

Priority Actions

Number of Priority Actions by Sector and Type

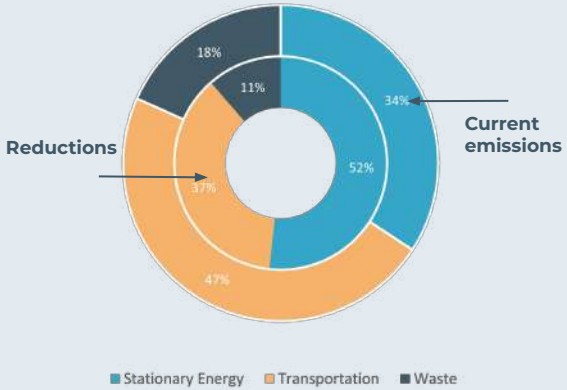


Quality of Action Design



Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The main mitigation actions for the **transportation sector** are to achieve the **maximum use of zero-emission fuels or electrification** possible of motorized transport and **encourage a modal shift towards low emission transportation.** This is equivalent to **31 and 4%** of planned emission reductions, respectively

The main mitigation actions for the **stationary energy sector** are to implement **higher energy standards** to ensure highly **efficient new construction** and to change fuels and **improve energy efficiency in thermal districts and the industrial sector**. This is equivalent to **12 and 27%** of planned emission reductions, respectively.

The main mitigation action for the **waste sector** is to **increase capacity for wastewater treatment** plants that perform secondary treatments. This is equivalent to **1.3%** of emission reductions.

Adaptation Actions

- Implement adaptation programs through nature-based solutions.
- Formulation of climate change management with the District Health System.
- Implementation of conservation, restoration, and management strategies of protected areas and areas of environmental interest.
- Development of affirmative measures to respond to specific expressions of environmental injustice derived from climate change.
- Implement forest fire risk management by communicating, generating information, and updating risk scenarios.

Climate Action Plan Evaluation
Bogotá, Colombia 2020 CAP

CAP Construction process

Developed by Bogotá's City Hall

Partner Organization

C40 CITIES

Bogotá's 2nd CAP

No budget mentioned

- Some actions have identified sources of financing which can be public, international, or local partnerships with the private sector although these are not specified.

Best practices

- All mitigations actions have an emission reductions estimate.
- Mitigation actions are congruent with the emission inventory.
- Includes an adaptation action targeted at climate refugees.

Gaps

- **Vulnerable groups** are not well identified.
- Even though it is identified as climate risk, there **are no specific adaptation actions to reduce the risk of heatwaves or contagious diseases.**
- Mitigation actions are not specific enough. Given the **reliance on emission compensations,** the 2050 Ambitious scenario is not realistic.
- CAP **does not include action prioritization** or mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis.
- CAP **does not include a cost estimate** for the implementation and does not specify sources of financing for mitigation actions.

Climate Action Plan Recommendations
Bogotá, Colombia 2020 CAP

Climate Actions

- **Actions should be budgeted,** cost estimates for each action should be included.

Climate Risk & Vulnerability Assessment

- Contextual information such as average, mid and max temperature and precipitation should be included.

City Context

Santiago de Cali, Colombia 2020 CAP

Population

large-size
2.3 M people

1.56%
yearly growth rate
2015-2020

Location

Mixed

Area:
564 km²

Density:
422 people/km²

Economy

GDP
$12.6 B USD

GDP/capita
$5,334

Commerce and vehicle services 23.5%
Industrial 15.2%

Geography

Forest

Valley

Geographic scope

100% of Municipality

*Not part of a metropolitan area.

Weather

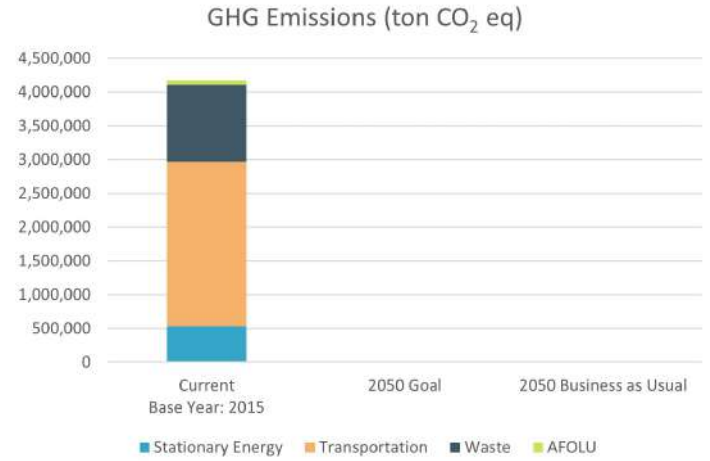
Av Max 28°C
Av Mid 24°C
Av Min 16.5°C

Temperate

Humid

1,200 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



1.60 ton CO_2 eq / person
300 kg CO_2 eq / MUSD

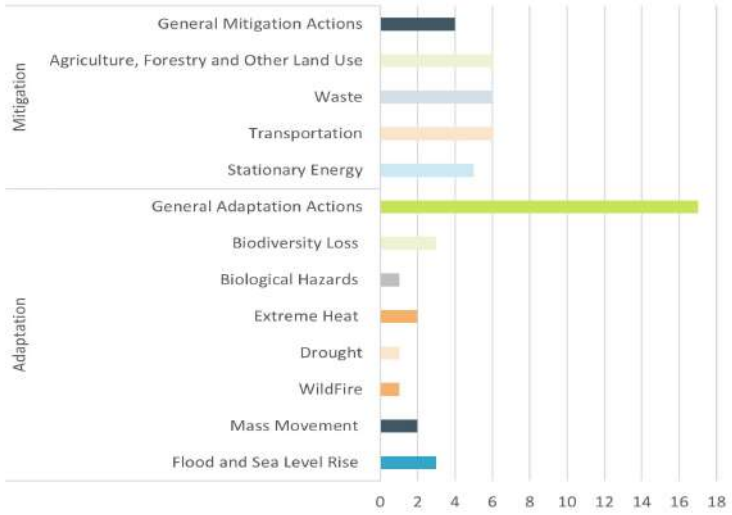
Climate Risks and Vulnerabilities

- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
Santiago de Cali, Colombia 2020 CAP

Priority Actions

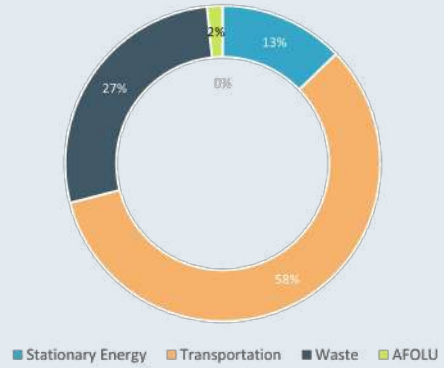
Number of Priority Actions by Sector and Type



Quality of Action Design

Mitigation

Current Emissions distribution



CAP does not include BAU or Emission Reduction Scenarios

The main mitigation actions for the **transportation sector** are to implement an **integrated regional transport system** discouraging the use of private vehicles and to **reduce the average age of the region's public transport fleet,** reducing projected fuel consumption.

The main mitigation actions for the **stationary energy sector** are to implement **clean and renewable energy substitution strategies** to help mitigate climate change. This action will focus on **photovoltaic energy**. Another strategy is the promotion of **energy-efficient eco-neighborhoods.**

The main mitigation actions for the **waste sector** are to implement actions to **adopt a circular economy strategy** and to strengthen the implementation of the **Comprehensive Solid Waste Management Plan,** which includes the promotion of **recycling** and the creation of an organic **fertilizer production plant.**

Adaptation Actions

- Implement a Sustainable Urban Drainage System that dampens water flows and improves water quality.
- Implement forest fire risk management strategies to restore affected areas.
- Increase the vegetation cover through conservation and restoration actions.
- Design and implement nature-based solutions, community participation, and infrastructure works to reduce climate change vulnerability.
- Implement a payment for environmental services scheme to recover, protect, conserve and ensure water regulation to avoid water shortage during dry seasons.

Climate Action Plan Evaluation
Santiago de Cali, Colombia 2020 CAP

CAP Construction process

Developed by Santiago de Cali's City Hall

Partner Organization

Santiago de Cali's
1st
CAP

No budget mentioned

- The CAP lists public sources, multilateral funds, and bilateral funds that could finance climate actions, however, it does not specify which mechanisms will finance which action.

Best practices

- Mitigation actions are congruent with the emission inventory.
- CR&V Assessment identifies areas at risk of biodiversity loss and key ecosystems for climate refuge

Gaps

- The emission inventory **does not provide a detailed account of emissions by subsector for the transportation and waste sectors.**
- Inventory does **not have a BAU or ambitious scenario**.
- Mitigation actions do not provide an **estimate of emission reductions per action.**
- CAP **does not include a cost estimate** for the implementation.

Climate Action Plan Recommendations
Santiago de Cali, Colombia 2020 CAP

Climate Actions

- Mitigation actions should include an estimate of the expected mitigation reductions produced after the action is implemented. This would facilitate action prioritization and provide an additional indicator to measure the actions' success (see Rio de Janeiro or Recife's CAP).
- Actions should be budgeted, cost estimates for each action should be included.

GHG Emission Inventory

- The emission inventory should **include sub-sector emissions** for transportation and waste.
- CAP should **develop a future emission baseline scenario** which can then be used to evaluate mitigation goals.
- The overall mitigation goal should **include expected emission reductions by sector in the ambitious scenario.** This would allow the reader to get a better sense of the biggest contributions towards emission mitigation.

City Context

Cartagena, Colombia 2018 CAP

Population

large-size
1 M people

1.27% yearly growth rate
2015-2020

Vulnerable Groups
People in the periphery of the city

Location

Mixed

Area:
609 km²

Density:
1,663 people/km²

Economy

GDP
$4.8 B USD

GDP/capita
$4,768

Industrial 42.1%
Construction, finance and housing 24.8%
Commerce and tourism 9.6%

Geography

Forest

Coastal

Geographic scope

100% of Municipality*

*Not part of a metropolitan area.

Weather

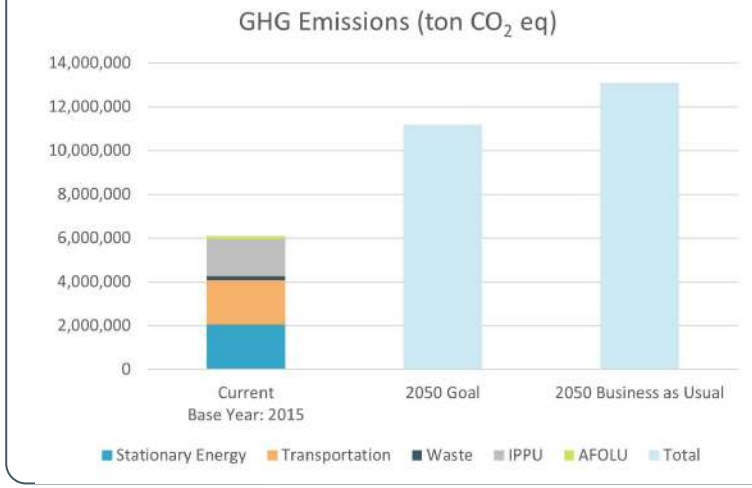
Av Max 34°C
Av Mid 27.5°C
Av Min 22.2°C

Tropical

Humid

1008 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



6.01 ton CO_2 eq / person
1,260 kg CO_2 eq / MUSD

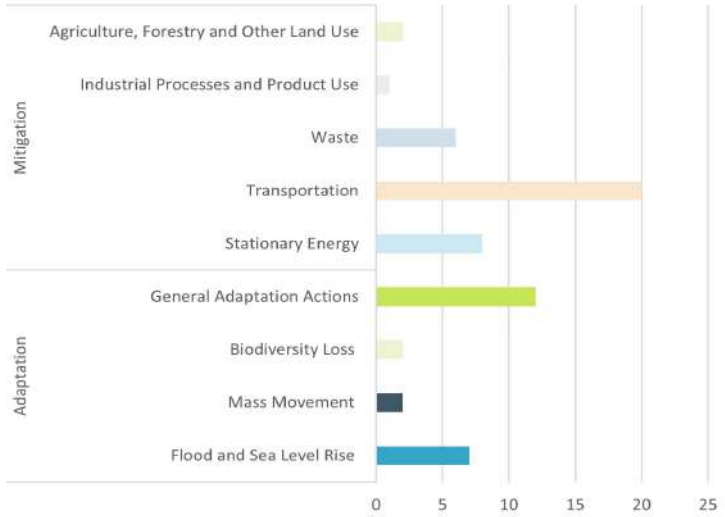
Climate Risks and Vulnerabilities

- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
Cartagena, Colombia 2018 CAP

Priority Actions

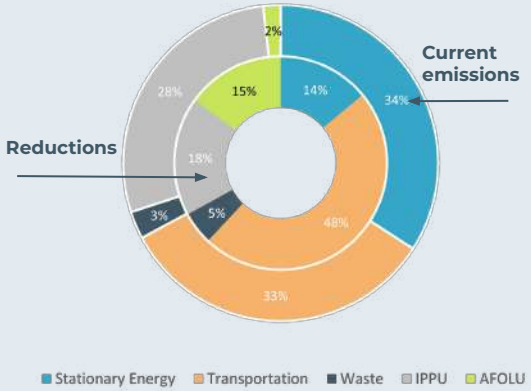
Number of Priority Actions by Sector and Type



Quality of Action Design

Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The main mitigation actions for the **transportation sector** are to reduce mobility needs by **incorporating environmental and mobility criteria into urban planning** and create a program for the **improvement of the bicycle lane network**.

The main mitigation actions for the **stationary energy sector** are to implement an **assistance program for the industrial sector,** including support for project implementation, energy audits and training. Cartagena will also develop **energy efficiency regulations** and **promote** the installation of **solar thermal and photovoltaic energy in new residential buildings**

The main mitigation action for the **waste sector** is to **promote composting of organic waste** on a large local scale, with separation at source of compostable organic matter

Adaptation Actions

- Creation of ecological protective parks in high elevation high mass movement risk areas to achieve soil recovery and optimization.
- Articulation of the different land-use planning instruments in the region.
- Implement a district resettlement program for the population in non-mitigable risk areas.
- Implementation of coastal protection works such as sand, reinforcement of protective rock, and studies of coastal dynamics and floods due to sea-level rise.
- Implementation of the Drainage Master Plan which includes: constructing urban canals, regulation reservoirs, and an interceptor channel to the Caribbean Sea.

Climate Action Plan Evaluation
Cartagena, Colombia 2018 CAP

CAP Construction process

Developed by Cartagena's City Hall

Partner Organization

BID

Cartagena's 1st CAP

$1.98 Billion USD

- Findeter (national development bank) set up a Pre-investment Fund in 2012 and manages cooperation resources with multilateral entities and the National Government.
- Adaptation actions have identified specific financing sources such as multilateral organizations, cooperation agencies private and public sources. Mitigations actions have not identified financing sources.

Best practices

- The CR&V Assessment prioritizes climate risks.
- A cost-benefit analysis was conducted for adaptation actions to specific climate hazards.
- CAP includes an urban growth study and future scenarios.
- All Adaptation Actions have identified costs and sources of funding.

Gaps

- CAP gives a range of emission reduction costs but **does not provide costs for specific mitigation actions.**
- **Mitigation actions are not specific** enough. Only the expected emission reductions of two actions are included in the CAP.

Climate Action Plan Recommendations
Cartagena, Colombia 2018 CAP

Climate Actions

- Include a **more detailed breakdown of mitigation actions** with measurable indicators of success, specific timelines, and for adaptation actions, detailed expected outcomes. A good example of this is can be found in Rio de Janeiro's CAP action cards.
- Include **expected emission reductions for all mitigation actions.**
- **Mitigation actions should be budgeted,** each action **should have identified sources of funding**, if this is not available potential sources of funding should suffice.

City Context
Medellín, Colombia 2021 CAP

Population

large-size
2.5 M people

1.37%
yearly growth rate
2015-2020

Vulnerable Groups
Children, elderly, migrants
Professional recyclers
People with disabilities
Indigenous people

Location

Mixed

Area:
376 km²

Density:
6,730 people/km²

Economy

GDP
$19 B USD

GDP/capita
$7,621

Professional and technical activities 11.7%
Manufacture 11.4%
Commerce and housing 10.8%

Geography

Forest

Valley

Geographic scope

32.3% of Metropolitan Area

Weather

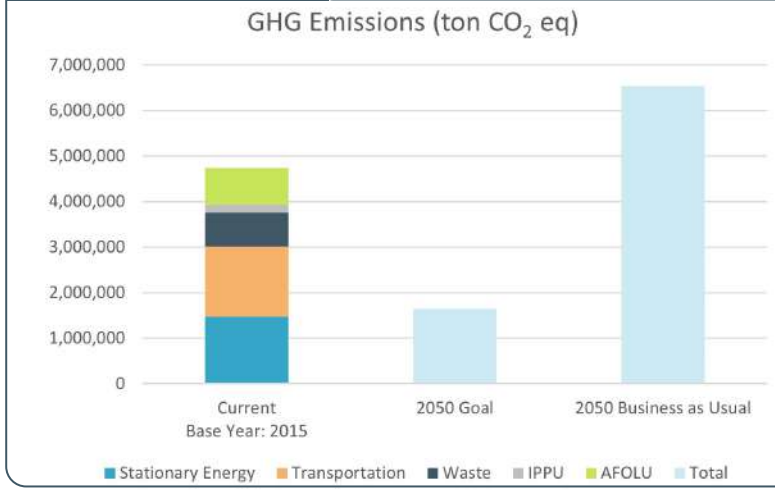
Av Max 27°C
Av Mid 21.5°C
Av Min 17.5°C

Temperate

Humid

1,685mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



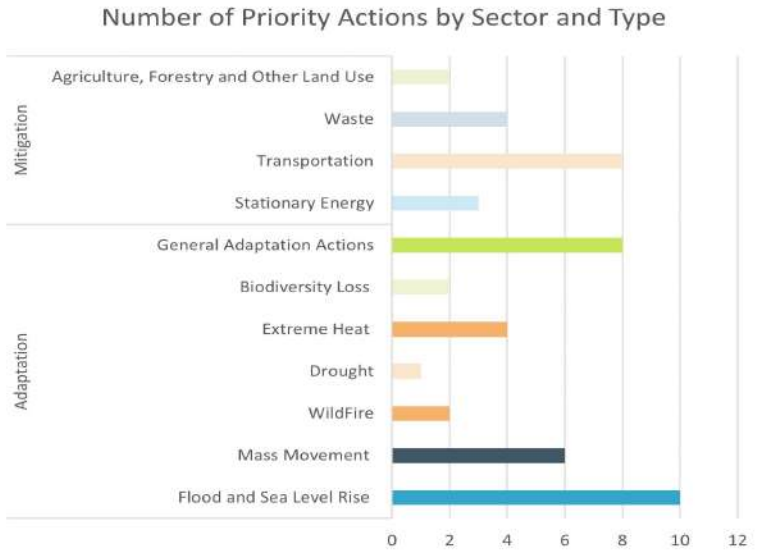
1.87 ton CO_2 eq / person
245 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

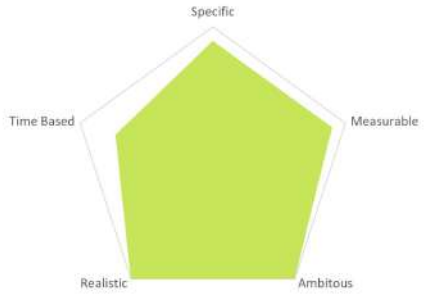
Rain flooding
Costal flooding
Storms
Landslides
Extreme cold
Heat waves
Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

Climate Action Plan Evaluation
Medellín, Colombia 2021 CAP

Priority Actions

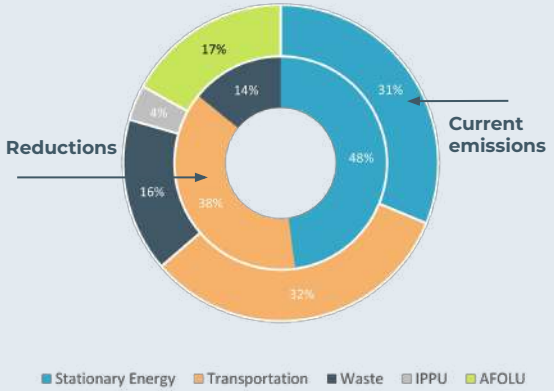


Quality of Action Design



Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The main mitigation actions for the **transportation sector** are to **replace public service vehicles with electric vehicles** and to implement **transportation demand management mechanisms** to reduce the number of private car trips. This is equivalent to **3 and 4%** of planned emission reductions, respectively.

The main mitigation actions for the **stationary energy sector** are to **improve the energy performance of industrial processes** and production chains and to **increase the participation of renewable energy** in public service provider. This is equivalent to **8 and 7%** of planned emission reductions, respectively.

The main mitigation action for the **waste sector** is to **optimize the collection and final disposal system of ordinary solid waste** through selective collection routes, alternative final disposal models, and the destruction gasses generated at waste processing sites. This is equivalent to **5%** of emission reductions.

Adaptation Actions

- Formulate and implement the urban drainage plan with new infrastructure works and nature-based solutions.
- Consolidate the compact city occupation model provided by proximity urban planning.
- Guarantee water availability through the development of conservation and restoration processes in internal and external supply basins.
- Improve and increase public space areas through the implementation of nature-based solutions, in accordance with the guidelines Medellin Rewilding Plan.
- Increase Medellín's forest coverage through protection, restoration, and sustainable management actions.

Climate Action Plan Evaluation
Medellín, Colombia 2021 CAP

CAP Construction process

Developed by Medellín's City Hall

Partner Organization

C40 CITIES

Medellín's 1st CAP

No budget mentioned

- No financing was identified for the implementation of the mitigation and adaptation strategies.
- Because the municipal budget is assigned for four-year periods it is only possible to secure a budget for short-term actions.

Best practices

- Most mitigations actions have an emission reductions estimate.
- Emission reductions sources are clearly explained and identified.
- Adaptation actions have a metric for risk reduction potential.
- Cap identifies barriers and opportunities for implementation.

Gaps

- The **BAU and ambitious scenarios do not take into account the AFOLU or IPPU sectors** even though they account for 21% of current emissions.
- **Residual emissions do not add up to the 2050 ambitious scenario**
- There are **no specific mitigation actions for the AFOLU sector** even though it is responsible for 17% of current emissions.
- CAP **does not include a cost estimate** for the implementation and does not specify sources of financing for mitigation actions.

Climate Action Plan Recommendations
Medellín, Colombia 2021 CAP

Climate Actions

- **Include mitigation actions aimed at reducing AFOLU emissions.** A more detailed breakdown of emission sources would be useful to target mitigation actions such as reducing urban footprint expansion.

- **Actions should be budgeted,** each action **should have identified sources of funding**, if this is not available potential sources of funding should suffice.

GHG Emission Inventory

- The BAU and ambitious scenarios should include AFOLU and IPPU sectors. If future emission projections for these sub-sectors are not possible then present emissions should be included.

- The total residual emissions mentioned should add up to the ambitious scenario.

City Climate Action Plan Analysis in Latin America and the Caribbean

Ecuadorian Cities Climate Action Plans Analysis

THE WORLD BANK

City Context
Quito, Ecuador 2020 CAP

Population

large-size
2.7 M people

2.20%
yearly growth rate
2001-2010

Vulnerable Groups
Children
People with disabilities
Women
Elderly
Low-income communities

Location

Mixed

Area:
4,231 km²

Density:
657 people/km²

Economy

GDP
$21 B USD

GDP/capita
$7,853

Manufacture
Transport and communications
Construction

Geography

Forest

Valley

Geographic scope

100% of Metropolitan Area

Weather

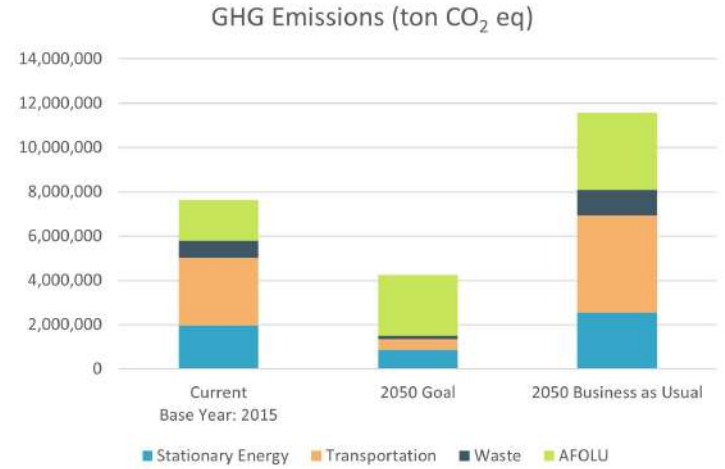
Av Max 28°C
Av Mid 15°C
Av Min 4°C

Temperate

Sub-humid

960 mm rain per year
*Inter-Andean region.

GHG Emissions Inventory (scopes 1,2,3)



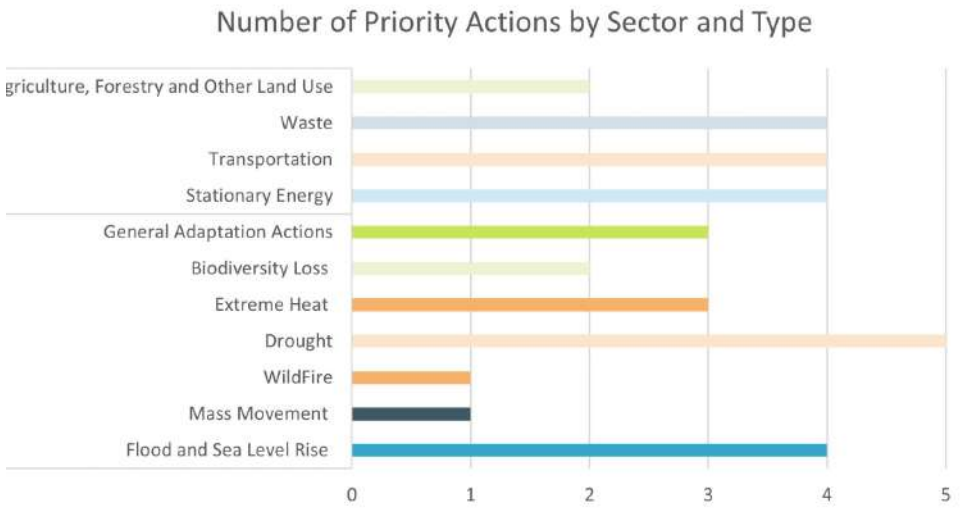
2.74 ton CO_2 eq / person
348 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

Rain flooding
Costal flooding
Storms
Landslides
Extreme cold
Heat waves
Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

Climate Action Plan Evaluation
Quito, Ecuador 2020 CAP

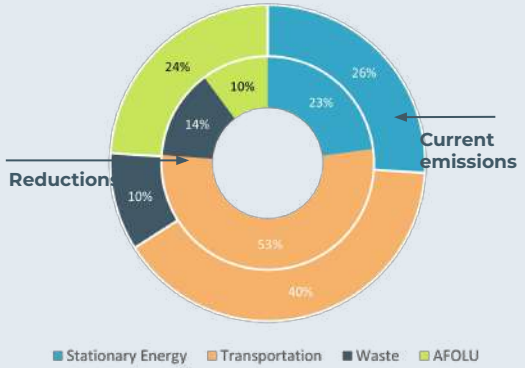
Priority Actions



Quality of Action Design

Mitigation

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



Mitigation goal is net zero emissions by 2050, however the CAP envisions 36% of residual emissions compare to BAU.

The main mitigation action for the **transportation sector** is to **achieve 100% of electrification of public transport,** this is equivalent to 6% of total planned reductions.

The main mitigation action for the **stationary energy** sector is by 2050, achieve that 90% of the national **electricity grid comes from carbon-free sources,** this is equivalent to **7%** of planned reductions.

The main mitigation actions for the **waste sector** are the **treatment of organic waste** through anaerobic digestion and composting, as well as **energy from waste generation.** This is equivalent to **5 and 4%** of planned reductions respectively.

As for the **AFOLU sector, 8%** of total reductions will come from **sustainable land management and the provision of environmental services** such as forest restoration and conservation policies.

Adaptation Actions

- Implementation of blue and gray infrastructure such as sustainable urban drainage systems.
- Technically and institutionally strengthen the Municipality of Quito to regulate the use of fire and the prevention of forest fires.
- Strengthening of governance systems for climate change adaptation resource management.
- Development of regulations to promote eco-efficiency in buildings, promoting the retention and reuse of rainwater, and increasing vegetation cover to reduce the urban heat island effect.
- Implement research programs with a focus on adaptation to climate change to improve monitoring systems for decision-making.

Climate Action Plan Evaluation
Quito, Ecuador 2020 CAP

CAP Construction process

Developed by Quito's City Hall

Partner Organization

C40 CITIES

Quito's 3rd CAP

No budget mentioned

- Even though all actions have identified sources of financing, these are not specified. The CAP later mentions the need for the development of financing sources.

Best practices

- All mitigations actions have an emission reductions estimate.
- Mitigation actions are congruent with the emission inventory.
- Climate risks, vulnerable groups, and potential impacts are well identified in the CR&V assessment.

Gaps

- Even though it is identified as the second-highest source of emissions, **the mitigation action that seeks to regulate land-use change is not well developed and its reduction potential is not quantified.**
- Many **adaptation actions focus on drought prevention even though the CR&V Assessment states that droughts risk** due to climate change **is low.**
- CAP **does not include a cost estimate** for the implementation and does not specify sources of financing for mitigation actions.

Climate Action Plan Recommendations
Quito, Ecuador 2020 CAP

Climate Actions

- **Focused most adaptation efforts in reducing the highest climate risks** such as heatwaves, floods, and mass movements.
- **Include adaptation actions that directly address the risk of contagious diseases**. For example, strengthen the healthcare sector(see Salvador's CAP).
- Include a more detailed breakdown of land-use regulation action with **measurable indicators of success, specific timelines,** and **detailed expected outcomes**.
- **Actions should be budgeted,** and **sources of funding should be specified.**

Climate Risk & Vulnerability Assessment

- Conduct a thorough **analysis of the risk of contagious diseases and wildfires.** This would allow for more target adaptation actions that create a resilient population.

City Climate Action Plan Analysis in Latin America and the Caribbean

Honduran Cities Climate Action Plans Analysis

THE WORLD BANK

City Context
Tegucigalpa, Honduras 2015 CAP

Population

large-size
1.24 M people

2.2%
yearly growth rate
2004-2014

Vulnerable Groups
Marginalized communities
Informal settlements

Location

Mixed

Area:
195.6 km²

Density:
6,337 people/km²

Economy

GDP
$2.5 B USD

GDP/capita
$2,085

Commercial
Services
Industrial

Geography

Forest

Mountain

Geographic scope

12.9% of Municipality

*Not part of a metropolitan area.

Weather

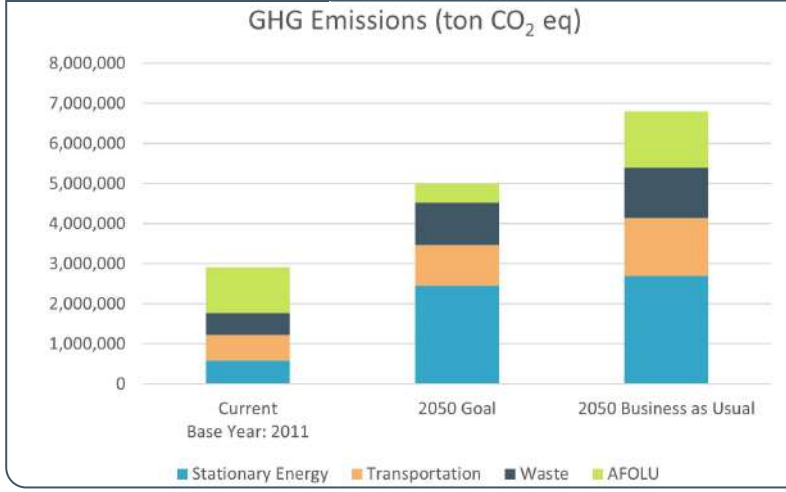
Av Max **27.9°C**
Av Mid **21.8°C**
Av Min **17.3°C**

Tropical

Arid

62.9 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



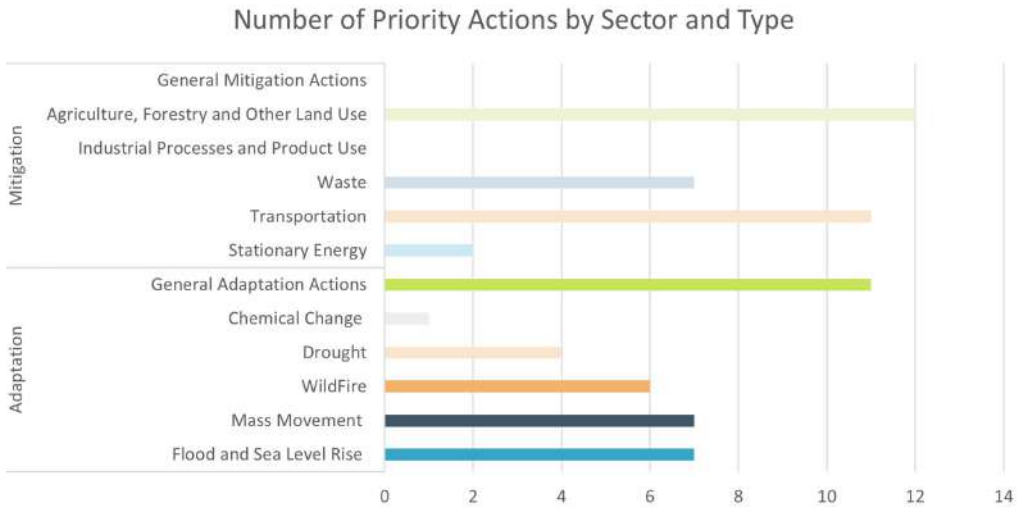
2.36 ton CO_2 eq / person
1,130 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
Tegucigalpa, Honduras 2015 CAP

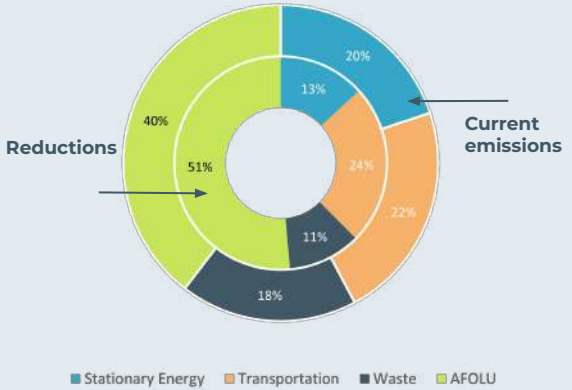
Priority Actions



Quality of Action Design

Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The main mitigation actions for the **transportation sector** are to define and implement the **Bus Rapid Transit** Corridors extension and to apply additional measures such as **bridges and cycle paths**, t**o reduce urban traffic.**

The main mitigation action for the **stationary energy sector** is to encourage the **use of electrical energy during** periods of **lower consumption.**

The main mitigation action for the **waste sector** is to **implement biodigesters for wastewater treatment.**

The main mitigation action for the **AFOLU sector** is to develop and implement an **Early Warning System against forest fires.**

Adaptation Actions

- Rehabilitate the sewage system and build a stormwater drainage network for the urban area..
- Strengthening the application of the existing territorial ordinance.
- Develop the local insurance market to include disaster insurance in real estate loans.
- Conduct pre-design studies for flood control and central streams route recovery. Designs should contemplate the evacuation of flows associated with storms that have a 20 year return period.
- Design an Integrated Information System on natural disaster risks to direct new capital investments to safe areas.

Climate Action Plan Evaluation
Tegucigalpa, Honduras 2015 CAP

CAP Construction process

Developed by Tegucigalpa's City Hall

Partner Organization

BID

Tegucigalpa's 1st CAP

Not all actions are budgeted but the total estimated cost for those that are is: 2,480M USD

- No financing identified.

Best practices

- Some adaptation actions are very detailed.
- Most adaptation actions are budgeted.
- Actions are prioritized and for some actions, a cost-benefit analysis was conducted.

Gaps

- The CR&V Assessment **does not consider extreme heat or vector borne-diseases** as climate risks.
- Mitigation actions are **not specific, time-based, and are not budgeted.**
- CAP **does not** specify sources of financing for actions.
- Detailed level varies significantly for adaptation actions.
- Even though land-use change accounts for 27% of all emissions **there are no specific mitigation actions that address land-use change.**

Climate Action Plan Recommendations
Tegucigalpa, Honduras 2015 CAP

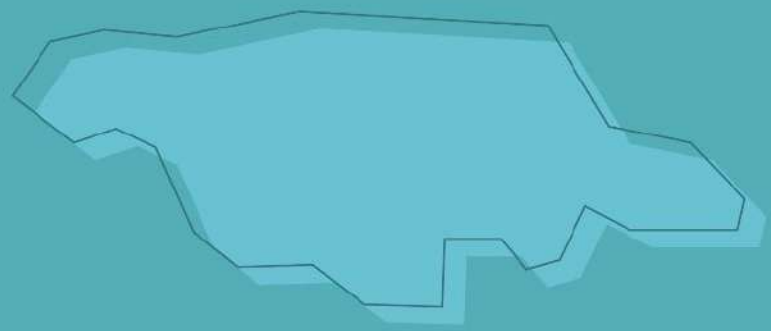
Climate Actions

- **Include mitigation actions aimed at reducing land-use change,**
- Include a more detailed breakdown of mitigation actions with **measurable indicators of success, a budget, and specific timelines.** A good example of this is can be found in Rio de Janeiro's CAP action scorecards.
- **Actions should have identified sources of funding**, if this is not available potential sources of funding should suffice.
- **Action cards should be provided** to ensure that all actions provide the same information.

Climate Risk & Vulnerability Assessment

- Conduct a thorough **analysis of extreme heat and vector-borne diseases climate risk.** The risk might not be significant but it should be analyzed.

City Climate Action Plan Analysis in Latin America and the Caribbean



Jamaican Cities Climate Action Plans Analysis

THE WORLD BANK

City Context
Montego Bay, Jamaica 2015 CAP

Population

mid-size
110,115 people

0.4%
yearly growth rate*
2020

Vulnerable Groups
Marginalized communities
Informal settlements
Children
Elderly

Location

Mixed

Area:
63 km²

Density:
1,740 people/km²

Economy

GDP
$246 M USD**

GDP/capita
$83

Tourism Service sector

Geography

Forest

Coastal

Geographic scope

100% of Municipality***

***Not part of a metropolitan area.

Weather

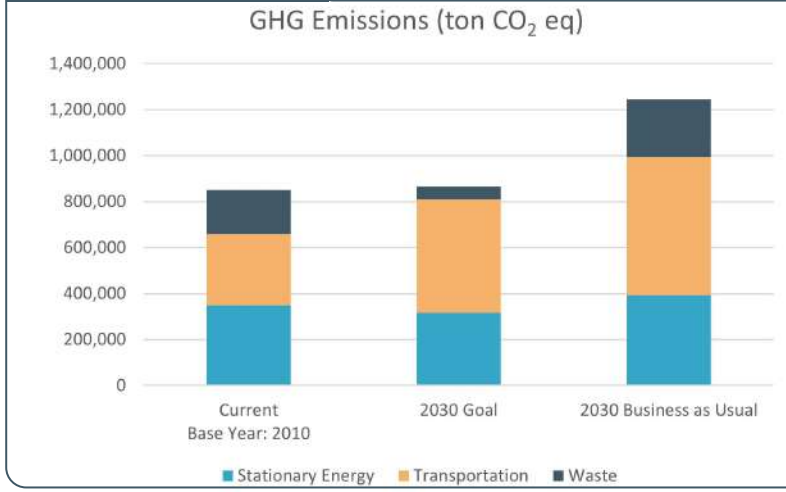
Av Max **31.6°C**
Av Mid **27.6°C**
Av Min **23.6°C**

Tropical

Humid

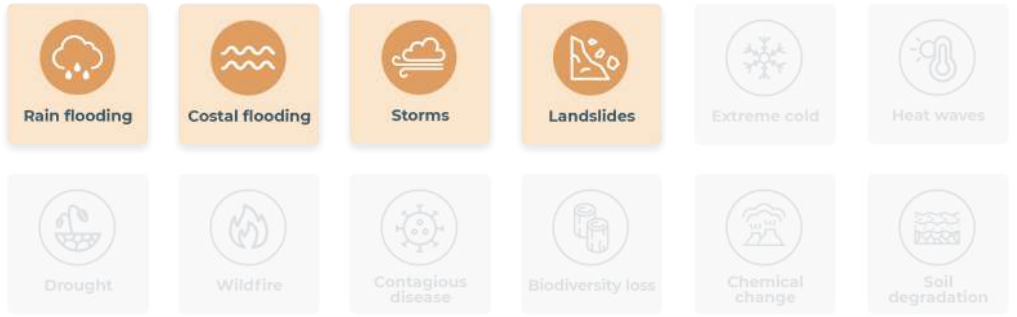
1,684 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



7.73 ton CO_2 eq / person
3,455 kg CO_2 eq / MUSD

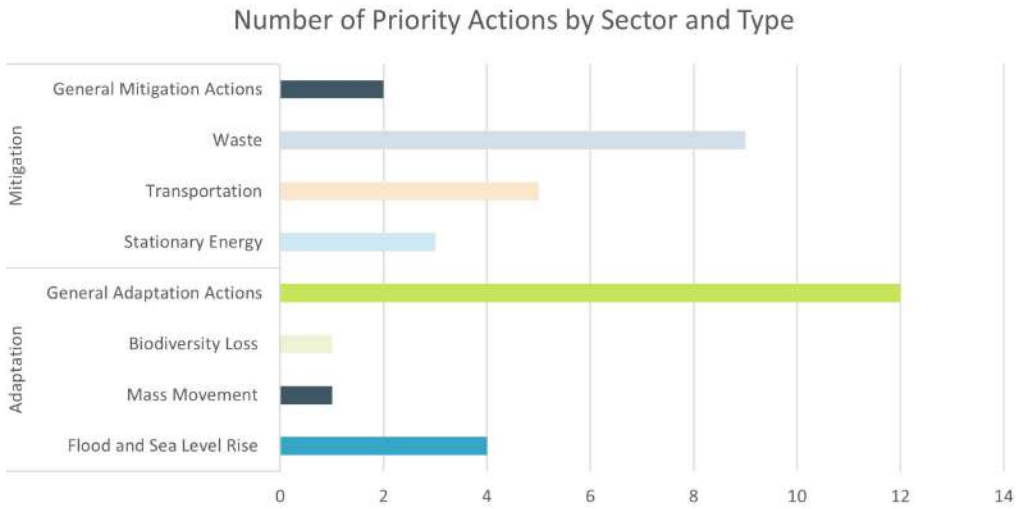
Climate Risks and Vulnerabilities



*No data available for Montego Bay, this data corresponds to Jamaica
**City GDP was scaled from national GDP according to population

Climate Action Plan Evaluation
Montego Bay, Jamaica 2015 CAP

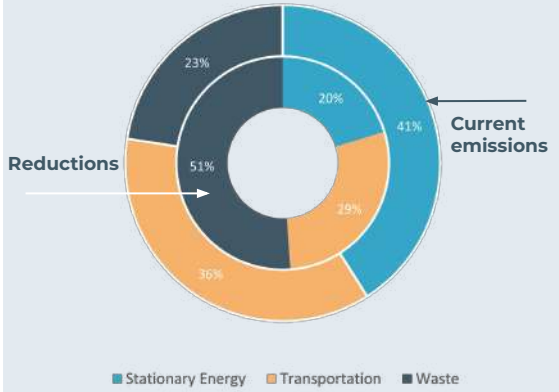
Priority Actions



Quality of Action Design

Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The main mitigation action for the **transportation sector** is to **change** taxis, cars, and **vehicles under three tons from gasoline to natural gas**, this is equivalent to **28%** of planned reductions.

The main mitigation actions for the **stationary energy** sector are to r**eplace household appliances** with energy-saving units and to **implement energy savings in the hotel sector,** this is equivalent to **4 and 16%** of planned reductions respectively.

The main mitigation actions for the **waste sector** are the **recovery and destruction of methane** generated in the Retirement landfill and to generate compost from organic waste. This is equivalent to **9 and 42%** of planned reductions respectively.

Adaptation Actions

- Integrated a Waterfront Park with shoreline stabilization and erosion control and eco-corridors.
- Create hazard risk reduction strategy.
- Implement a public awareness campaign on hazards, vulnerability, climate change, and risk.
- Implementation of a risk-resilient coastal zone management program which will include, risk monitoring, green infrastructure, and ecosystem-based adaptation approaches.
- Stormwater Drainage Plan Implementation

Climate Action Plan Evaluation
Montego Bay, Jamaica 2015 CAP

CAP Construction process

Developed by Montego Bay's City Hall

Partner Organization

BID

Montego Bay's 1st CAP

425.7M USD

- Not all actions have financing sources identified.
- Financing sources identified are mostly **national and local government agencies.**

Best practices

- All adaptation actions have estimated costs.
- Some adaptation actions are very detailed.
- CAP includes an urban footprint analysis
- CR&V includes economic loss per climate hazard.

Gaps

- The CR&V Assessment **does not consider extreme heat or vector borne-diseases** as climate risks.
- Most mitigation actions are **not specific, time-based, and are not budgeted.**
- Detailed level varies significantly for adaptation actions.
- There are **no specific actions** aimed at commercial buildings except for hotels, even though **commercial buildings are the main source of emissions.**

Climate Action Plan Recommendations
Montego Bay, Jamaica 2015 CAP

Climate Actions

- **Include mitigation actions aimed at reducing commercial buildings** emissions such as the promotion of energy efficiency technology.
- Include a more detailed breakdown of mitigation actions with **measurable indicators of success, a budget, and specific timelines.** A good example of this is can be found in Rio de Janeiro's CAP action scorecards.
- **Action cards should be provided** to ensure that all actions provide the same information.

Climate Risk & Vulnerability Assessment

- Conduct a thorough **analysis of extreme heat and vector-borne diseases climate risk.** The risk might not be significant but it should be analyzed.

City Climate Action Plan Analysis in Latin America and the Caribbean

Mexican Cities Climate Action Plans Analysis

THE WORLD BANK

City Context
Bahía de Banderas, Mexico 2020 CAP

Population

mid-size
165,598 people

4.10%
yearly growth rate
2010-2015

Vulnerable Groups
Rural and marginalized communities

Location

Mixed

Area:
773 km²

Density:
214 people/km²

Economy

GDP
$223 M USD

GDP/capita
$1,349

Transport services
Commerce
Mining and manufacture

Geography

Tropical forest

Coastal

Geographic scope

52.5% of Metropolitan Area

Weather

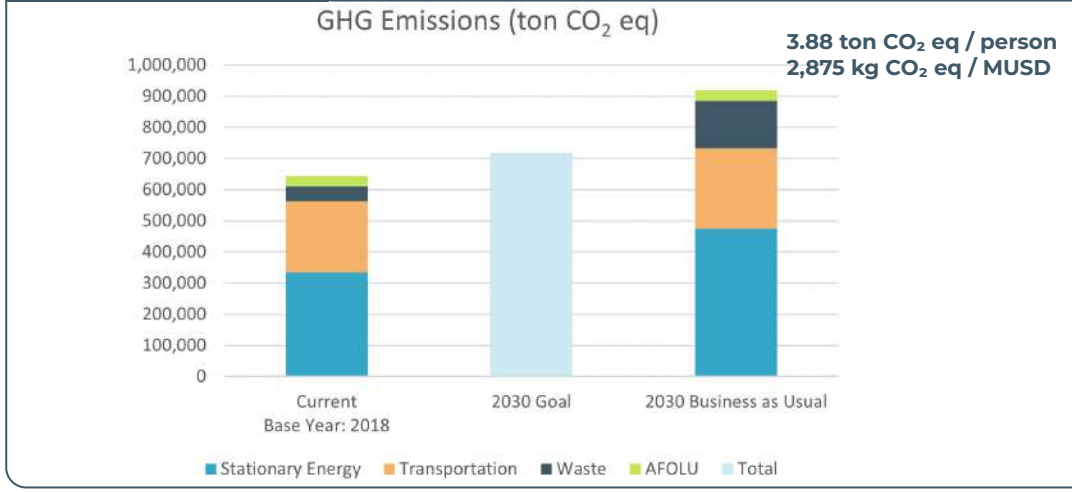
Av Max **30°C**
Av Mid **26°C**
Av Min **17°C**

Tropical

Humid

1,306 mm rain per year

GHG Emissions Inventory (scopes not specified)

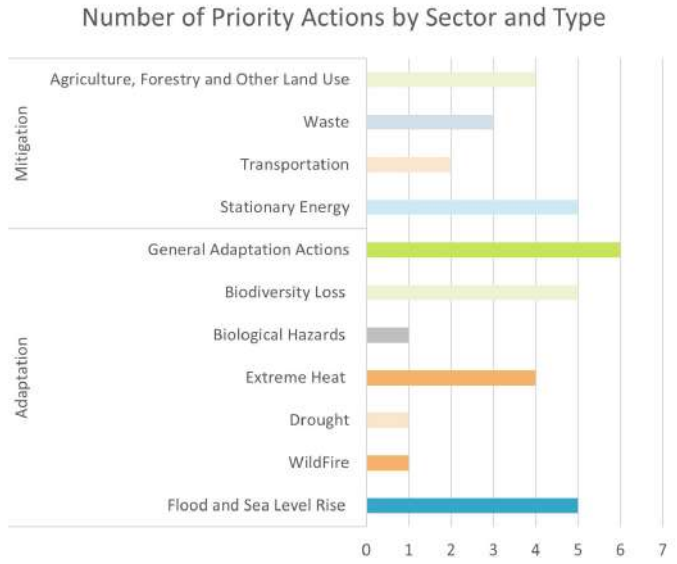


Climate Risks and Vulnerabilities

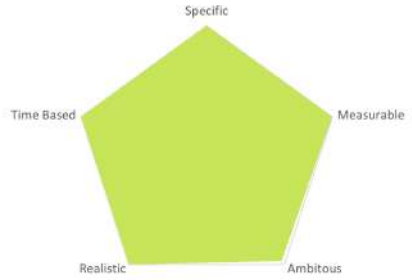
- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
Bahía de Banderas, Mexico 2020 CAP

Priority Actions

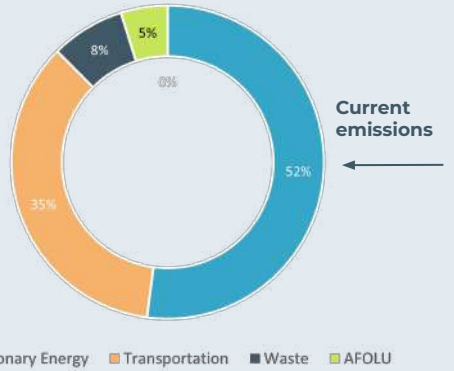


Quality of Action Design



Mitigation (current emissions vs reductions by sector)

Current Emissions distribution



The ambitious scenario does not specify what percentage of emission reductions corresponds to each sector

The main mitigation actions for the **transport sector** are: to design and implement a low-emissions **Rapid Bus Transit (BRT)** system and to create an U**rban Mobility Plan** that **promotes public and non-motorized transport**.

The main mitigation actions for **stationary energy** are to install **solar panels in municipal buildings** to supply 40% of municipal offices' annual electricity. and to promote the acquisition of **PV and thermal solar panels** to small and medium **businesses through fiscal incentives**.

The main mitigation action for the **waste sector** is the Installation of a **biogas plant** to utilize methane generated in the city landfill as an energy source. This action has the potential to **mitigate 80% of solid waste emissions.**

Adaptation Actions

- Provide adequate maintenance to the existing drainage network before and during the rainy season including de-silting activities, as well as mapping and prioritizing flood-prone sites
- Protection of Wetlands and municipal water runways through the construction of linear sustainable parks.
- Install an early warning system for hydrometeorological risks.
- Increase the civil protection workforce and the training and certification of civil protection personnel.
- Intensify fumigation, awareness, and discard campaigns against vector-borne diseases in high-vulnerability areas.s.

Climate Action Plan Evaluation
Bahía de Banderas, Mexico 2020 CAP

CAP Construction process

Developed by Bahía de Bandera city Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

Bahía de Bandera's 1 st CAP

No budget mentioned

- All actions have identified sources of financing. Most sources are public funds.

Best practices

- All adaptation actions identify co-benefits.
- All actions have identified financing sources.
- CAP used an action selection tool.
- Adaptation actions selection included public consultations.
- Climate risks are clearly classified by severity, vulnerability, and adaptation capacity.

Gaps

- Include a detailed breakdown of emission reductions per sector in the ambitious scenario. The more detailed the better.
- CAP **does not include a cost estimate** for the implementation.
- PAC does not include some basic contextual information such as temperature and precipitation data.

Climate Action Plan Recommendations
Bahía de Banderas, Mexico 2020 CAP

Climate Actions

- **Actions should be budgeted**, cost estimates for each action should be included.

GHG Emission Inventory

- An ambitious scenario with expected emission reductions per sector should be included.

City Context
Culiacán, Mexico 2020 CAP

Population

large-size
905,265 people

1.95%
yearly growth rate
1990-2010

Vulnerable Groups
Marginalized communities
Children
Elderly
People with disabilities

Location

Mixed

Area:
6,264 km²

Density:
144 people/km²

Economy

GDP
$6 B USD

GDP/capita
$7,094

Service Sector
Commerce
Industrial

Geography

Tropical forest

Coastal

Geographic scope

71.86% of Metropolitan Area

Weather

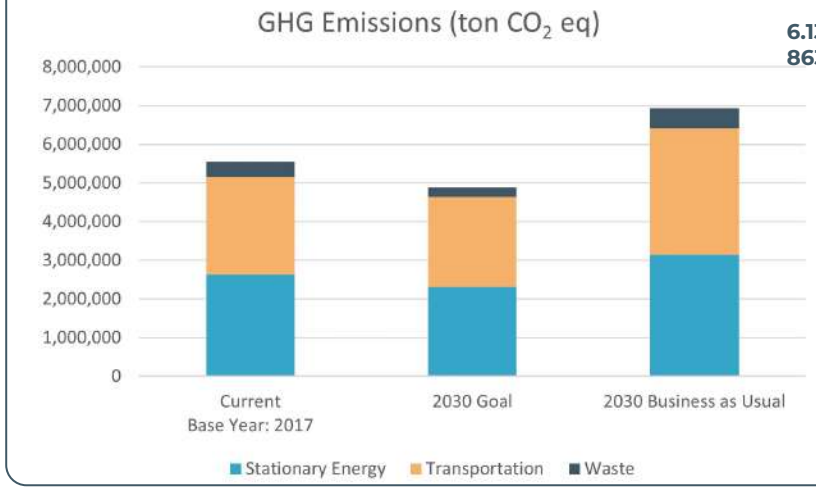
Av Max 40°C
Av Mid 25.4°C
Av Min 12.3°C

Dry

Sub-humid

658.1 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



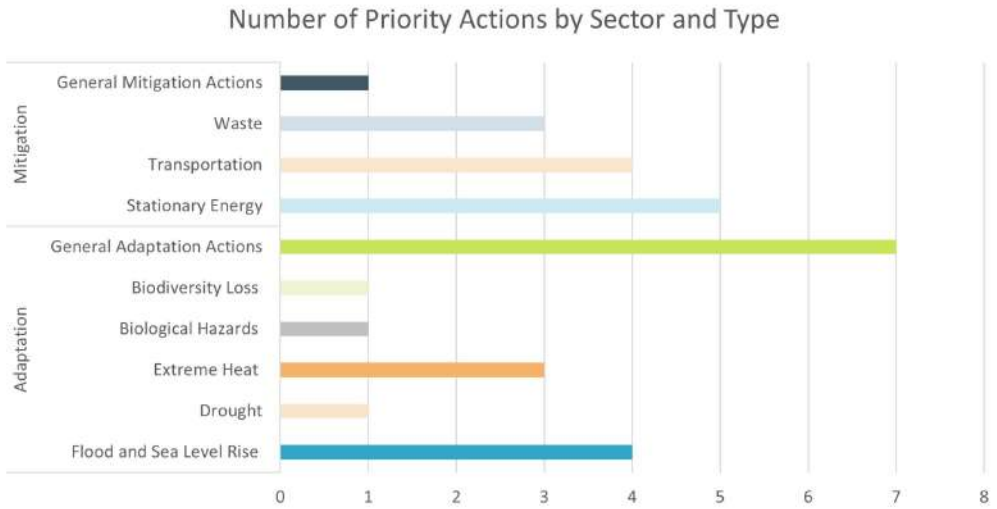
6.13 ton CO_2 eq / person
863 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

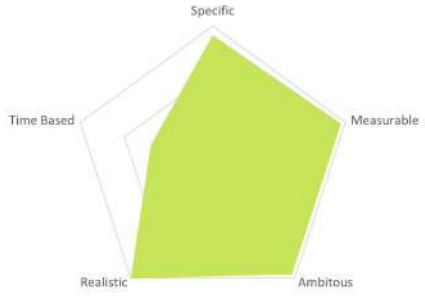
Rain flooding
Costal flooding
Storms
Landslides
Extreme cold
Heat waves
Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

Climate Action Plan Evaluation
Culiacán, Mexico 2020 CAP

Priority Actions

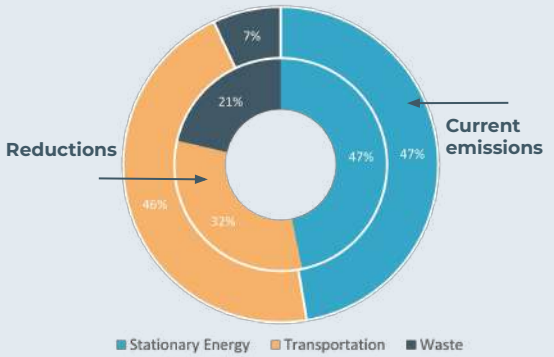


Quality of Action Design



Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



Transportation emission reductions were estimated by subtracting other sectors from the total expected reductions

The mitigation actions for the **transportation sector** are to implement a **public bicycle program** with 350 public bicycles and **expand and improve sidewalks** in the city's downtown area to enhance the pedestrian experience.

The main mitigation actions for the **stationary energy** sector are to **prepare a** comprehensive **energy efficiency plan** where measures are established to optimize energy consumption and to promote electrical **energy efficiency in institutional buildings** through the **replacement of lighting systems**. This is equivalent to **46.% and 0.5%** of planned emission reductions respectively.

The main mitigation action for the waste sector is to **build new landfills with biogas treatment infrastructures** such as waste to energy or burning. This is equivalent to 21% of mitigation emission reductions.

Adaptation Actions

- Develop and/or update school's Civil Protection Programs.
- Establish a permanent protocol for cleaning and maintenance of streams and canals.
- Update of the municipal Risk Atlas..
- Integrate eco-technologies in construction regulations.
- Update the ecology and environmental protection regulation.

Climate Action Plan Evaluation
Culiacán, Mexico 2020 CAP

CAP Construction process

Developed by Culiacán's City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

Culiacán's 2nd* CAP

*1st CAP was not published

No budget mentioned

- All actions have identified public sources of financing which can be federal, state and municipal..

Best practices

- Some mitigations actions have an emission reductions estimate.
- Mitigation and adaptation actions are congruent with the emission inventory and CR&V Assessment.

Gaps

- The CR&V Assessment states that flooding has become a recurrent problem in Culiacan but later classifies flooding risks as low. This must be clarified as it can be confusing for the reader.
- Even though CAP does specify a mitigation goal and expected emission reductions for the stationary energy and waste climate actions it **does not include an ambitious emission scenario.**
- Mitigation actions in the **transportation sector do not state** expected **emission reductions.**
- CAP **does not include a cost estimate** for the implementation.

Climate Action Plan Recommendations
Culiacán, Mexico 2020 CAP

Climate Actions

- **Include expected emission reductions** for the transportation mitigation actions.
- **Actions should be budgeted,** each action **should have identified expected implementation costs.**

GHG Emission Inventory

- An **ambitious scenario** with expected emission reductions per sector should be included.

Climate Risk & Vulnerability Assessment

- CAP should be **explicitly and consistent when evaluating flooding risk** to the municipality. If the risk is high then this should be reflected in the CAPs.

City Context
Guadalajara, Mexico 2020 CAP

Population

large-size
5.2 M people

1.54%
yearly growth rate
2015-2020

Vulnerable Groups
Indigenous people
Women, children, elderly
Migrants
People with disabilities

Location

Mixed

Area:
3265 km²

Density:
1,592 people/km²

Economy

GDP
$54 B USD

GDP/capita
$10,538

Service Sector
Industrial

Geography

Grassland

Valley

Geographic scope

100% of
Metropolitan Area

Weather

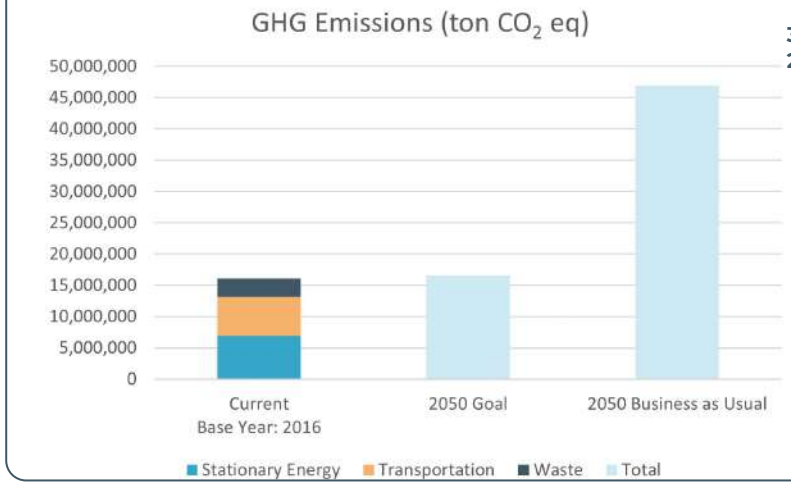
Av Max 31.3°C
Av Mid 20.3°C
Av Min 8.5°C

Temperate

Sub-humid

952 mm
rain per year

GHG Emissions Inventory (scopes 1,2,3)



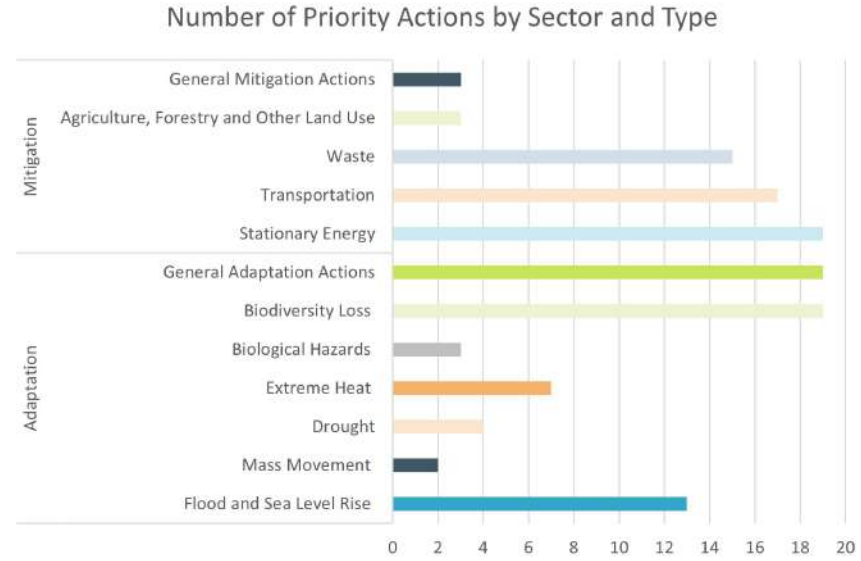
3.10 ton CO_2 eq / person
294 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

Rain flooding
Costal flooding
Storms
Landslides
Extreme cold
Heat waves
Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

Climate Action Plan Evaluation
Guadalajara, Mexico 2020 CAP

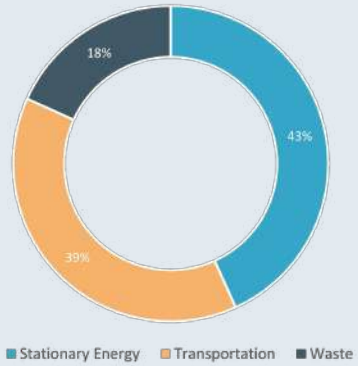
Priority Actions



Quality of Action Design

Mitigation

Current Emissions distribution



The ambitious scenario does not specify what percentage of emission reductions corresponds to each sector

The main mitigation actions for the **transport sector are** the **renewal of 1,000 vehicles** of the public transport fleet as part of the **"My transport"** and the start-up of **line 3 of the electric light rail system** these actions would contribute to **4.7%** and **3.4%** of emission reductions.

The main mitigation actions for the **stationary energy sector** are to promote the use of cutting-edge technology in **smart grids** to reduce electricity supply costs and to **promote the construction of renewable energy plants** considered in Jalisco. This is equivalent to **9.7%** of planned emission reductions.

The main mitigation action for the waste sector is the "Jalisco Reduces" program aimed at r**educing waste generation,** mainly with the **opening of two circular economy centers.** This is equivalent to **5.8%** of mitigation emission reductions.

Adaptation Actions

- Reduce water vulnerability through the "revive the Santiago river" plan which includes NPA conservation, territorial, and waste management..
- Create a continuous inter-municipal reforestation plan in highly-fragility areas for biodiversity conservation and reduction of heatwaves..
- Relocate the population living in areas at risk from mass movements or floods.
- Implement a climate risk health care system.
- Update to the stormwater management program to include a flood control plan with gray and green infrastructure.

Climate Action Plan Evaluation
Guadalajara, Mexico 2020 CAP

CAP Construction process

Developed by Guadalajara's City Hall

Partner Organization

C40 CITIES

Guadalajara's 1 st CAP

No budget mentioned

- 50% of all climate actions have identified total or partial funding.

Best practices

- Some mitigations actions have an emission reductions estimate.
- Mitigation and adaptation actions are congruent with the emission inventory and the CR&V Assessment.

Gaps

- BAU and Ambitious scenarios **do not specify emissions per sector.**
- Not all mitigation actions have identified **expected emission reductions.**
- CAP **does not include a cost estimate** for the implementation.

Climate Action Plan Recommendations
Guadalajara, Mexico 2020 CAP

Climate Actions

- **Include expected emission reductions** for all mitigation actions.
- **Actions should be budgeted,** each action **should have identified expected implementation costs.**

GHG Emission Inventory

- **BAU and ambitious scenarios** should contain expected emissions per sector as well as residual emissions.

City Context
Juarez, Mexico 2020 CAP

Population

large-size
1.3 M people

0.92%
yearly growth rate
2010-2015

Vulnerable Groups
Marginalized communities
Children
Elderly
People with disabilities

Location

Mixed

Area:
4,858 km²

Density:
286 people/km²

Economy

GDP
$11 B USD

GDP/capita
$8,072

Industrial
Service and commerce
Agriculture

Geography

Desert

Valley

Geographic scope

100% of Metropolitan Area

Weather

Av Max **38°C**
Av Mid **25°C**
Av Min **<0°C**

Dry

Arid

262 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)

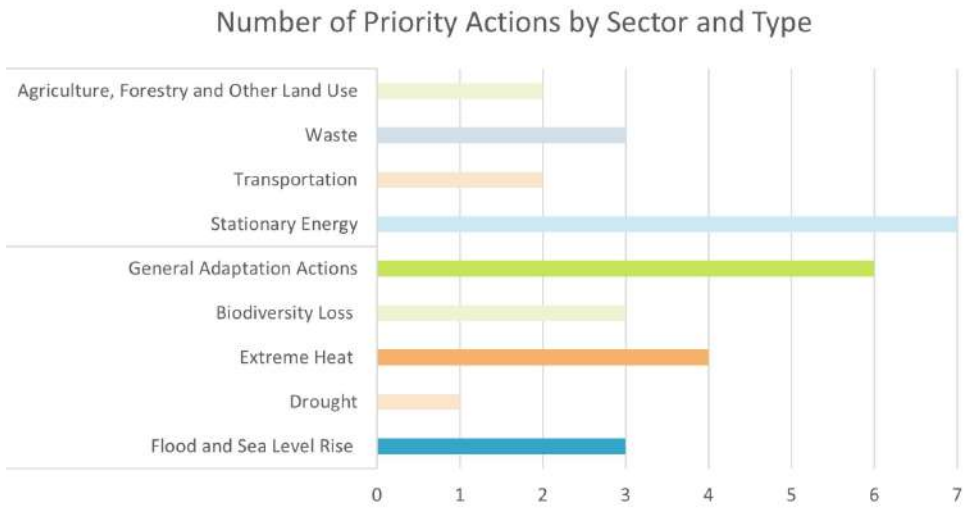
5.59 ton CO_2 eq / person
692 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

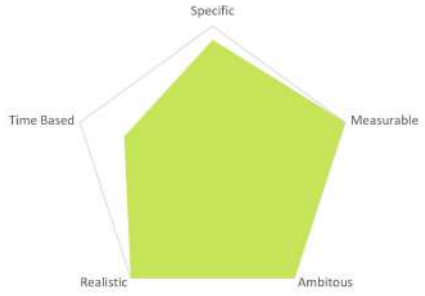
- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
Juarez, Mexico 2020 CAP

Priority Actions

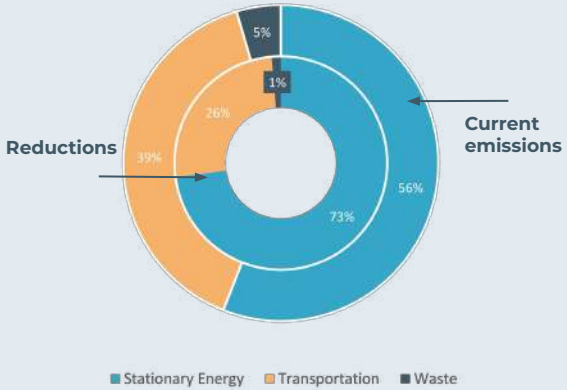


Quality of Action Design



Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The mitigation actions for the **transportation sector** are to promote the installation of **multimodal transport systems** through a **municipal mobility plan**. and to implement the transportation-oriented development model in selected areas, promoting comprehensive planning and mobility models.

The main mitigation actions for the **stationary energy** sector are to create **tax incentives for the adoption of cleaner and more efficient energy generation systems** in the industrial sector and to prepare an **Electricity Consumption Plan** for large establishments.

The main mitigation action for the waste sector is to install **methane recovery systems in sewage water treatment plants.**

Adaptation Actions

- Design and implement low-cost, high-benefit projects in public areas and spaces with flood problems.
- Install Risk Prevention and Resilience Centers.
- Have an annual budget for climate change related issues for the Municipality.
- Create heat absorption zones in public spaces through increases in vegetation, use of cold pavements and cold roofs.
- Promote the creation of resilient parks.

Climate Action Plan Evaluation
Juarez, Mexico 2020 CAP

CAP Construction process

Developed by Juárez City's City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

Juárez City's 1st CAP

No budget mentioned

No financing identified for climate actions.

Best practices

- Mitigation actions are congruent with the emission inventory.
- The GHG Emissions inventory is very detailed.
- CR&V Assessment includes an adaptive capacity assessment.

Gaps

- Even though it is identified as climate risk, there **are no specific adaptation actions to reduce the risk of mass movements or contagious diseases.**
- Mitigation actions do not state **expected emission reductions.**
- CAP **does not include action prioritization** or mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis.
- CAP **does not include a cost estimate** for the implementation and does not specify sources of financing for mitigation actions.

Climate Action Plan Recommendations
Juarez, Mexico 2020 CAP

Climate Actions

- Mitigation actions should **include expected emission reductions.**
- **Include adaptation actions aimed at reducing the risk of mass movements,** an example is the creation of ecological protective parks in high mass movement risk areas (see Cartagena's CAP).
- **Include adaptation actions that directly address the risk of contagious diseases**. For example, strengthen the healthcare sector(see Salvador's CAP).
- Describe the **criteria used for action selection** (cost-benefit, cost-effectiveness, multicriteria analysis, etc).
- Whenever possible, **actions should be prioritized** based on the benefits obtained per unit cost. This is especially true for adaptation actions that do not have a clear mechanism for comparing the expected impact.
- **Actions should be budgeted,** each action **should have identified sources of funding**. If this is not available potential sources of funding should suffice.

City Context
Madero City, Mexico 2020 CAP

Population

mid-size
209,175 people

1.19%
yearly growth rate
2010-2015

Vulnerable Groups
Children
Elderly
Women
Low Income Communities

Location

Urban

Area:
47.9 km²

Density:
4,366 people/km²

Economy

GDP
$5 B USD

GDP/capita
$26,897

Service Sector
Commerce
Manufacture

Geography

Grassland

Coastal

Geographic scope

3.21% of Metropolitan Area

Weather

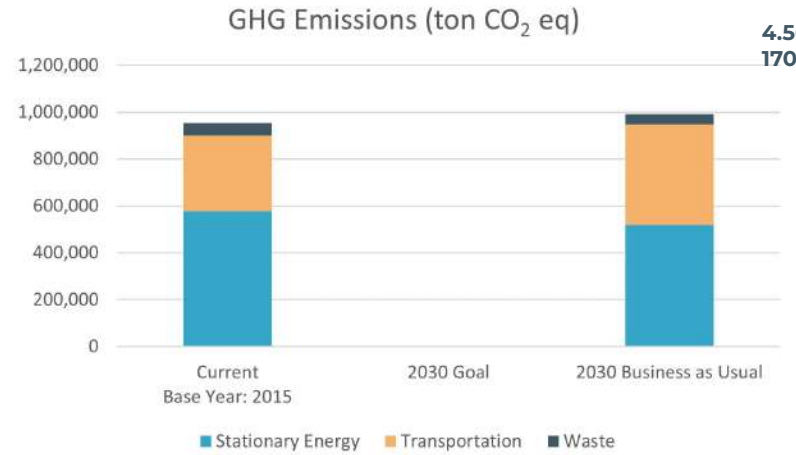
Av Max 34°C
Av Mid 24°C
Av Min 10°C

Tropical

Sub-humid

927.8 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



4.56 ton CO_2 eq / person
170 kg CO_2 eq / MUSD

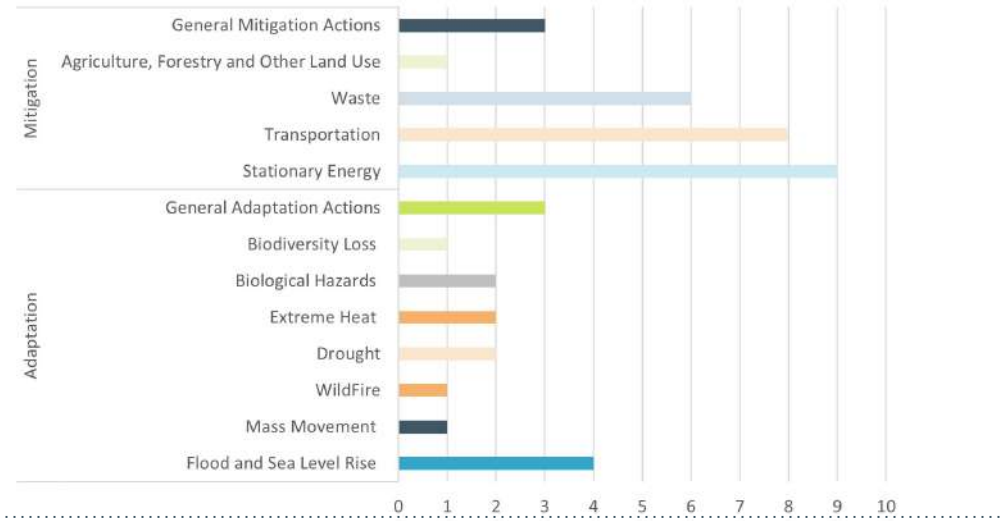
Climate Risks and Vulnerabilities

Rain flooding
Costal flooding
Storms
Landslides
Extreme cold
Heat waves
Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

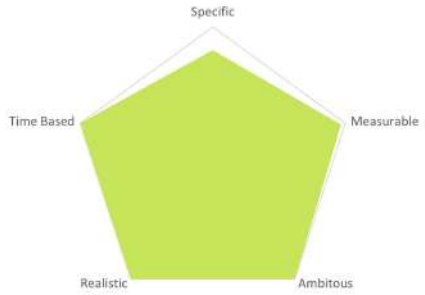
Climate Action Plan Evaluation
Madero City, Mexico 2020 CAP

Priority Actions

Number of Priority Actions by Sector and Type

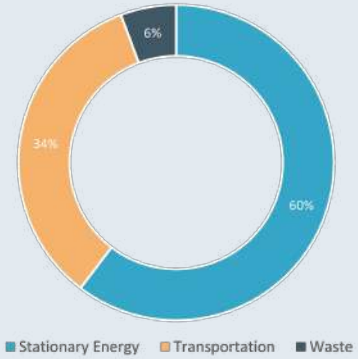


Quality of Action Design



Mitigation

Current Emissions distribution



CAP does not include an ambitious emission reduction scenario.

The main mitigation actions for the **transportation sector** are the creation of the Comprehensive **Urban Mobility Plan** and the implementation of programs to i**mprove public transport units.**

The main mitigation actions for the **stationary energy** sector are to carry out **pollution reduction measures by the Francisco I. Madero Refinery** through adequate regulation and to **update municipal environmental regulations,** to manage the use of fuels and raw materials by businesses.

The main mitigation action for the **waste** sector is to implement the **burning of household waste prevention and regulation program.**

Adaptation Actions

- Build wave breakers on the coast to mitigate the erosion of the southern beach of the Port of Altamira.
- Protect and rehabilitate the coastal zone to avoid possible risks of natural disasters.
- Map and relocate the most vulnerable population to lower-risk areas.
- Promote water use programs to keep water levels stable, thus avoiding shortages, especially in dry seasons.
- Establish a reforestation program through the use of native species.

Climate Action Plan Evaluation
Madero City, Mexico 2020 CAP

CAP Construction process

Developed by Madero City's City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

Madero City's 1st CAP

The total climate action costs estimated in the CAP is **$50M USD**.

Not all mitigation actions were budgeted. **The total adaptation and transversal actions cost is $11M USD**

- Mitigation actions will be funded through federal, state, and municipal funds.

Best practices

- Most mitigations actions have cost estimates and financing sources.
- All adaptation and transversal actions have cost estimates and financing sources.
- Adaptation actions are congruent with the CR&V Assessment.

Gaps

- CAP does **not include an ambitious emission reduction scenario.**
- The low **BAU emissions scenario** can be explained by the expected decline in refinery production. In the past 10 years, barrel production has had a -7.3% growth rate. However, the data shows that from 2018 to 2019 production increased by 176%. While the 2019 increase could be an outlier, **a more detailed analysis is needed.**
- **BAU estimated a decline in the waste sector's emissions** due to an expected reduction in the generation of biogas from waste. **The CAP does not explain why the 2030 value is lower than the base year despite a positive population growth rate**.
- Mitigation **actions do not estimate expected emission reductions.**

Climate Action Plan Recommendations
Madero City, Mexico 2020 CAP

Climate Actions

- Whenever possible, **actions should be prioritized** based on the benefits obtained per unit cost. This is especially true for adaptation actions that do not have a clear mechanism for comparing the expected impact.
- Mitigation actions **should include an estimate of expected emission reductions** per action.

GHG Emission Inventory

- CAP should **include an ambitious emissions reduction scenario** or at the very least an overall emission reduction goal.
- CAP should **explain why they are estimating a decline in emissions for some sectors in the BAU scenario.** All assumptions should be stated.

City Context
Mexico City, Mexico 2020 CAP

Population

large-size
9.2 M people

0.41%
yearly growth rate
2015-2020

Vulnerable Groups
Elderly
Children
Women
Low Income Communities

Location

Urban

Area:
1,485 km²

Density:
6,201 people/km²

Economy

GDP
$167 B USD

GDP/capita
$18,139

Service Sector
Commerce
Industrial

Geography

Forest

Valley

Geographic scope

19.0% of Metropolitan Area

Weather

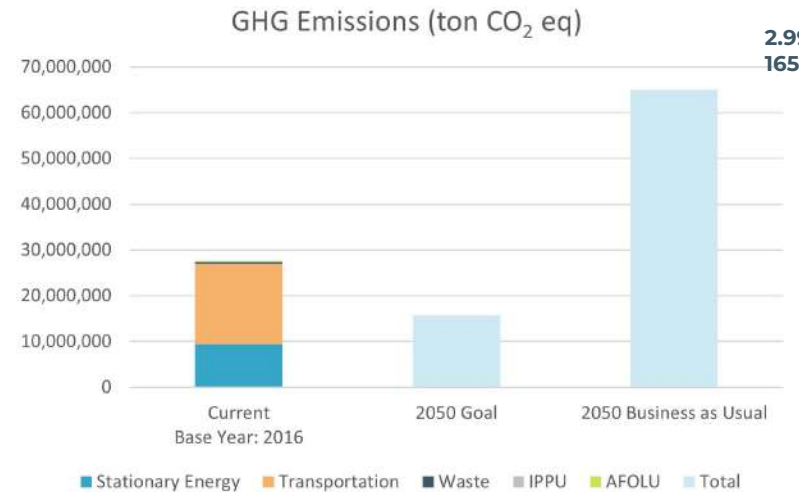
Av Max 34°C
Av Mid 17°C
Av Min -3°C

Temperate

Humid

700-1,200 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



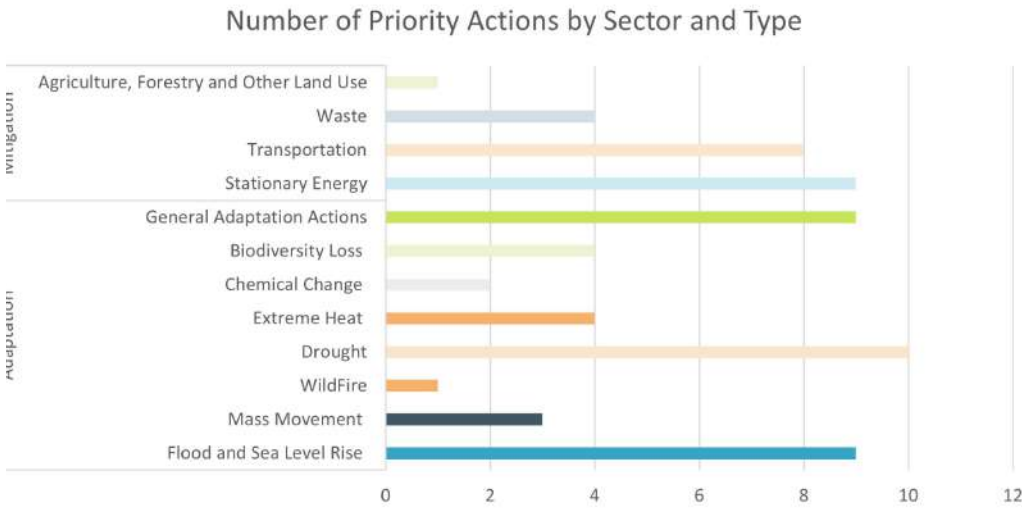
2.99 ton CO_2 eq / person
165 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

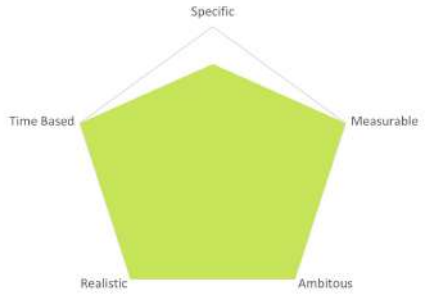
- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
Mexico City, Mexico 2020 CAP

Priority Actions

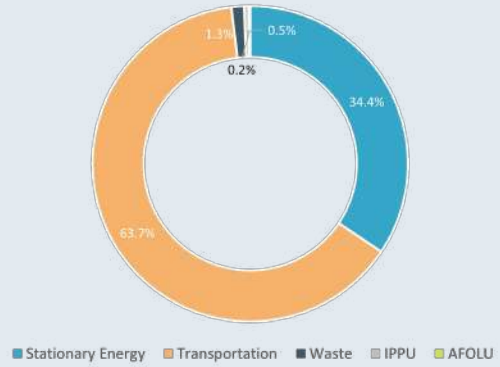


Quality of Action Design



Mitigation

Current Emissions distribution



The ambitious scenario does not specify what percentage of emission reductions corresponds to each sector

The main mitigation actions for the **transport sector** are to boost electromobility through **electrical conversion of the taxi fleet**. and to **discourage the use of private vehicles** through economic and regulatory instruments.

The main mitigation actions for the **stationary energy sector** are to implement actions for the **decarbonization of homes** as well as the promotion of investment in **renewable energy in small and medium-sized companies**

The main mitigation action for the waste sector is to use **bio digestion, co-processing, and thermo-valorization technologies to convert solid waste into energy.**

Adaptation Actions

- Progressively reduce the overexploitation of the aquifer through green and blue infrastructure for infiltration.
- Reduction of water risk by promoting the proper functioning of the drainage network and the construction of water parks, infiltration gardens, and artificial wetlands in natural recharge areas.
- Conserve and restore conservation land, protect natural areas and areas of environmental value.
- Promote resilient land-use planning through the construction of green barriers to help contain urban growth on conservation land, strengthen control mechanisms for irregular settlements, and update land use planning policies.
- Implement early warning systems and action protocols against epidemiological, hydrometeorological, and climatic hazards.

Climate Action Plan Evaluation
Mexico City, Mexico 2020 CAP

CAP Construction process

Developed by Mexico City's City Hall

Partner Organization

C40 CITIES

Mexico City's 2nd CAP

Economic analysis of mitigation actions states that **the total cost for mitigation actions is $334.4 million MXN.**

Adaptation actions are not budgeted.

- No financing identified for climate actions.

Best practices

- Mitigation and adaptation actions are congruent with the emission inventory.
- There is a cost-benefit analysis for mitigation actions.
- Mitigation actions are budgeted.
- CR&V Assessment identifies social vulnerability by region and adaptation capacity.

Gaps

- The **ambitious scenario does not specify** expected **emission** reductions **by sector**.
- Although the transportation and stationary energy action lines do specify **emission reduction** potential for certain changes, those **are not specified in mitigation actions.**
- CAP **does not include action prioritization** or mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis for adaptation actions.
- CAP **does not include a cost estimate** for the implementation of adaptation actions and does not specify sources of financing for any of the climate actions.

Climate Action Plan Recommendations
Mexico City, Mexico 2020 CAP

Climate Actions

- Mitigation actions **should include an estimate of expected emission reductions** per action.
- Describe the **criteria used for action selection** (cost-benefit, cost-effectiveness, multicriteria analysis, etc).
- Selected **actions should be prioritized,** actions do not necessarily have to be ranked but it should be clear which actions provide the biggest benefit. This is especially true for adaptation actions that do not have a clear mechanism for comparing the expected impact.
- **Actions should be budgeted,** each action **should have identified sources of funding**, if this is not available potential sources of funding should suffice.

GHG Emission Inventory

- Include a detailed breakdown of emission reductions per sector in the ambitious scenario. The more detailed the better.

City Context
Zapopan, Mexico 2020 CAP

Population

large-size
1.3 M people

1.03%
yearly average growth rate

Vulnerable Groups
Elderly
People with disabilities
Women
Children
Indigenous people

Location

Mixed

Area:
1,017 km²

Density:
1,333 people/km²

Economy

GDP
$14 B USD

GDP/capita
$10,855

Service sector
Commercial
Industrial

Geography

Forest

Inland

Geographic scope

31.15% of Metropolitan Area

Weather

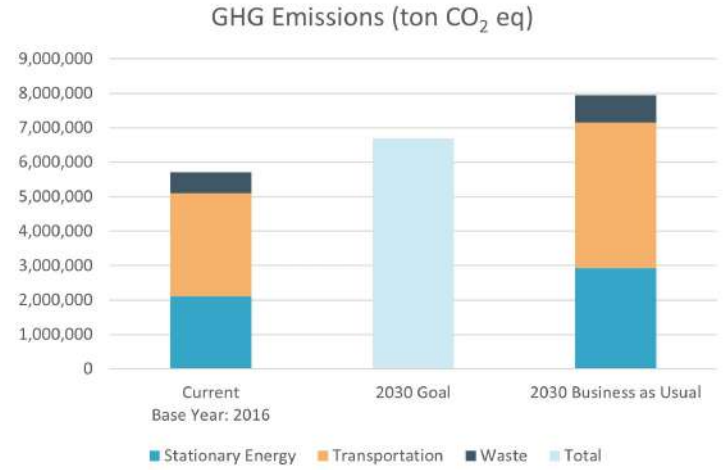
Av Max 32.1°C
Av Mid 20.5°C
Av Min 8.4°C

Temperate

Sub-humid

943 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)



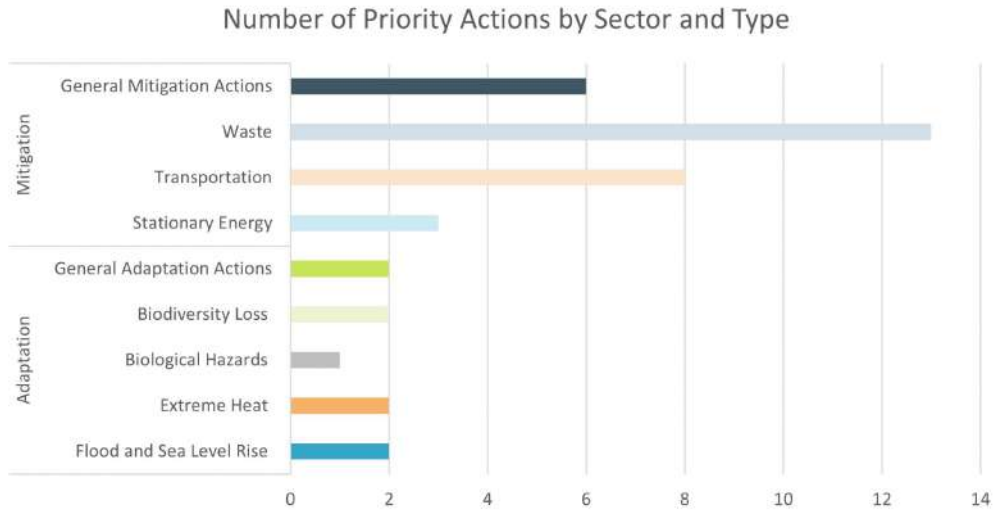
4.21 ton CO_2 eq / person
388 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

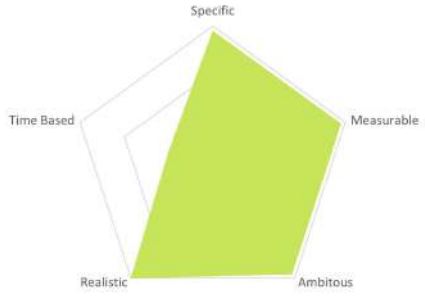
- Rain flooding
- Costal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Evaluation
Zapopan, Mexico 2020 CAP

Priority Actions

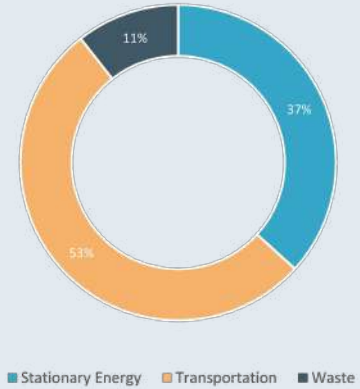


Quality of Action Design



Mitigation

Current Emissions distribution



The ambitious scenario does not specify what percentage of emission reductions corresponds to each sector

The main mitigation actions for the **transportation sector** are to **reduce the use** and emissions **of official vehicles** and to systematically i**ncrease public parking fees** and licenses for private parking.

The main mitigation action for the stationary energy sector is to **encourage the service sector to have good environmental practices,** ensure energy and fuel savings, and proper waste management.

The main mitigation actions for the **waste sector** are to create a community-based **organic waste composting program** and an **organic waste treatment program** through composting or other alternatives **in markets and other larger waste generators.**

Adaptation Actions

- Update the municipal Climate Risk Atlas.
- Strengthen the vector monitoring system by sampling throughout the year and incorporating climate data into epidemiological surveillance systems.
- Develop and implement management programs for natural protected areas.
- Implement a hydrometeorological risk prevention program that includes stream cleaning, rehabilitation and expansion of the drainage system, and maintenance and construction of regulating vessels in flood-prone areas.
- Reforest green areas and municipal parks and increase tree cover.

Climate Action Plan Evaluation
Zapopan, Mexico 2020 CAP

CAP Construction process

Developed by Zapopan's City Hall

Partner Organization

GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY

Zapopan's 2nd CAP

The total **adaptation actions** cost is **$11M USD** Mitigation actions were not budgeted.

- A Municipal Climate Change And Resilience Fund will be financed through municipal, state, and federal funds as well as public, private, national, and international sources.

Best practices

- CAP identifies current adaptation capacity and potential barriers.
- All adaptation actions are budgeted.
- All actions are prioritized.

Gaps

- Even though they are identified as climate risk in the CR&V assessment, there **are no specific adaptation actions that address drought, mass movements, and wildfire risks.**
- The **ambitious scenario does not** specify expected **emission reductions by sector.**
- CAP **does not include a cost estimate for** the implementation of **mitigation actions.**
- CAP does **not specify sources of financing** for mitigation or adaptation actions.

Climate Action Plan Recommendations
Zapopan, Mexico 2020 CAP

Climate Actions

- Include adaptation actions aimed at reducing the risk of **drought, mass movements and wildfires. heatwaves.**
- **Mitigation actions should be budgeted.**
- Each climate action **should have identified sources of funding**, if this is not available potential sources of funding should suffice.

GHG Emission Inventory

- Include a **detailed breakdown of emission per sector** in the **ambitious scenario**. The more detailed the better. .

City Climate Action Plan Analysis in Latin America and the Caribbean

Peruvian Cities Climate Action Plans Analysis

THE WORLD BANK

City Context
Lima, Perú 2021 CAP

Population

large-size
8.5 M people

1.77%
yearly growth rate
2015-2020

Vulnerable Groups
Women, children, elderly
Indigenous populations
Persons with disabilities
Informal settlements
Low-income communities

Location

Mixed

Area:
2,641 km²

Density:
3,245 people/km²

Economy

GDP
$90 B USD

GDP/capita
$10,606

Industrial
Tourism
Agriculture

Geography

Desert

Coastal

Geographic scope

93.7% of
Metropolitan Area

Weather

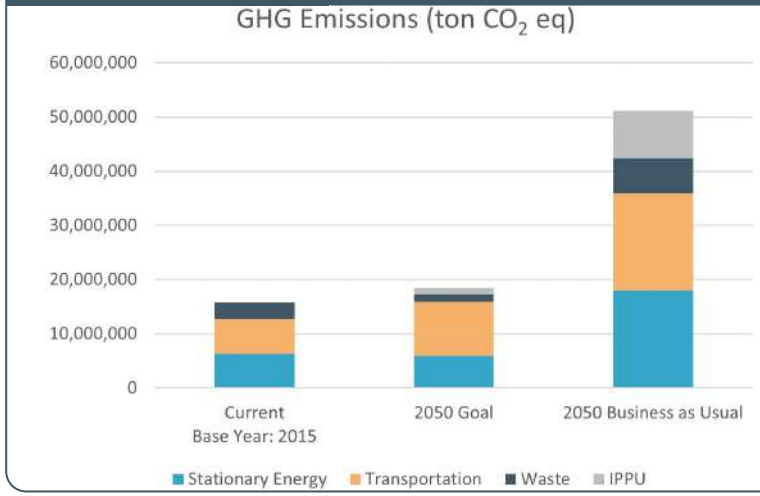
Av Max 22°C
Av Mid 18°C
Av Min 12.5°C

Dry

Arid

<50 mm
rain per year

GHG Emissions Inventory (scopes 1,2,3)



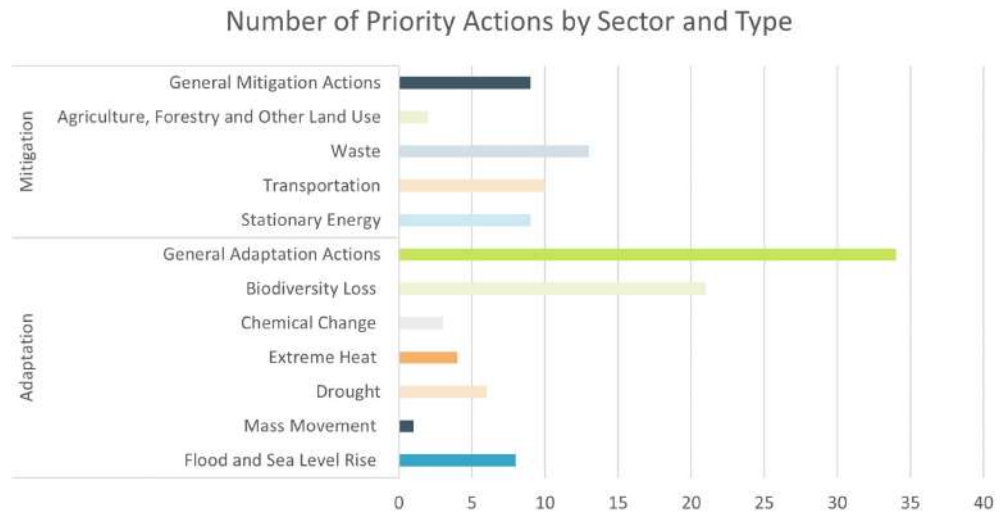
2.08 ton CO_2 eq / person
196 kg CO_2 eq / MUSD

Climate Risks and Vulnerabilities

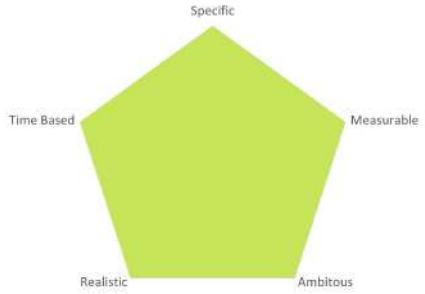
Rain flooding
Costal flooding
Storms
Landslides
Extreme cold
Heat waves
Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

Climate Action Plan Evaluation
Lima, Peru 2021 CAP

Priority Actions

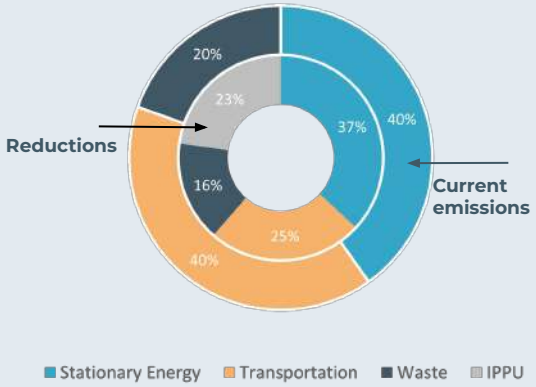


Quality of Action Design



Mitigation (current emissions vs reductions by sector)

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)



The main mitigation actions for the **transportation sector** are the **expansion of** the Metropolitano **(BRT-bus rapid transit system)** and by 2030 implement **640 km of bicycle lanes** and 32 bicycle parking stations. This is equivalent to **3 and 2%** of planned reductions.

The main mitigation actions for the **stationary energy** sector are to implement an **institutional municipal eco-efficiency plan** that includes **retrofitting to LED technology in municipal buildings** and to generate a **sustainable building code** that includes an incentive system to promote sustainable construction.

The main mitigation action for the **waste sector** is the **construction of a municipal solid waste treatment and recovery plant** and the progressive **implementation of methane capture infrastructure**. This is equivalent to **0.5%** of planned reductions.

Adaptation Actions

- Implement Early Warning Systems for heavy rains and associated dangers in the Rímac, Chillón, and Lurín river basins.
- Interconnect all green spaces through the design and implementation of green connecting areas.
- Conserve 13,475.74 hectares of hill ecosystems..
- Implementation of the Disaster Prevention and Risk Reduction Plan which will have a territorial approach.
- Implement the climate-smart neighborhood pilot project which includes green corridors, the creation of shady areas, and a wastewater recycling system.

Climate Action Plan Evaluation
Lima, Peru 2021 CAP

CAP Construction process

Developed by Lima's City Hall

Partner Organization

C40 CITIES

Lima's 1st CAP

The actions are budgeted in the Institutional Operational Plan and the Institutional Strategic Plan 2020-2023.

- Climate actions will be executed with the budget of the governmental institutions responsible for each action.

Best practices

- Climate actions are detailed and well designed.
- Actions are prioritized.
- All actions have identified financing.
- C&V Assessment includes vulnerable group analysis.

Gaps

- The emission **inventory does not include subcategories.**
- Emissions **inventory does not include IPPU emissions** even though the BAU and Ambitious scenarios do.
- Mitigation **priority actions contribute very little to the planned emission reductions** in the ambitious scenario.
- The ambitious scenario includes the decarbonization of the energy matrix, however, the **CAP also states that the city has little competence over the energy matrix.**
- Even though there are **cost estimates for climate actions, these are not included in the CAP.**

Climate Action Plan Recommendations
Lima, Peru 2021 CAP

Climate Actions

- Describe the **criteria used for action selection** (cost-benefit, cost-effectiveness, multicriteria analysis, etc).
- **Prioritize mitigation actions that contribute the most to emission reductions.**
- **Include expected emission reductions** for all mitigation actions.
- **Include estimated cost for all climate actions.**
- Given that the decarbonization of the energy matrix is a big contributor to expected emission reductions, **include mitigation actions that contribute to the decarbonization of the energy matrix.** If this is not possible, then do not include it in the ambitious scenario.

GHG Emissions inventory

- Provide more detail of how subcategories contribute to current emissions.
- Include IPPU emissions in the inventory, not just in the BAU and ambitious scenarios.

How do cities compare?

How do cities compare?
CAP Analysis

For all 30 CAPs, the following information was analyzed:

- **Mitigation diagnostic information**

GHG Emissions inventories,

Business As Usual Scenarios

Ambitious Emissions Reductions Scenarios

- **Adaptation diagnostics**

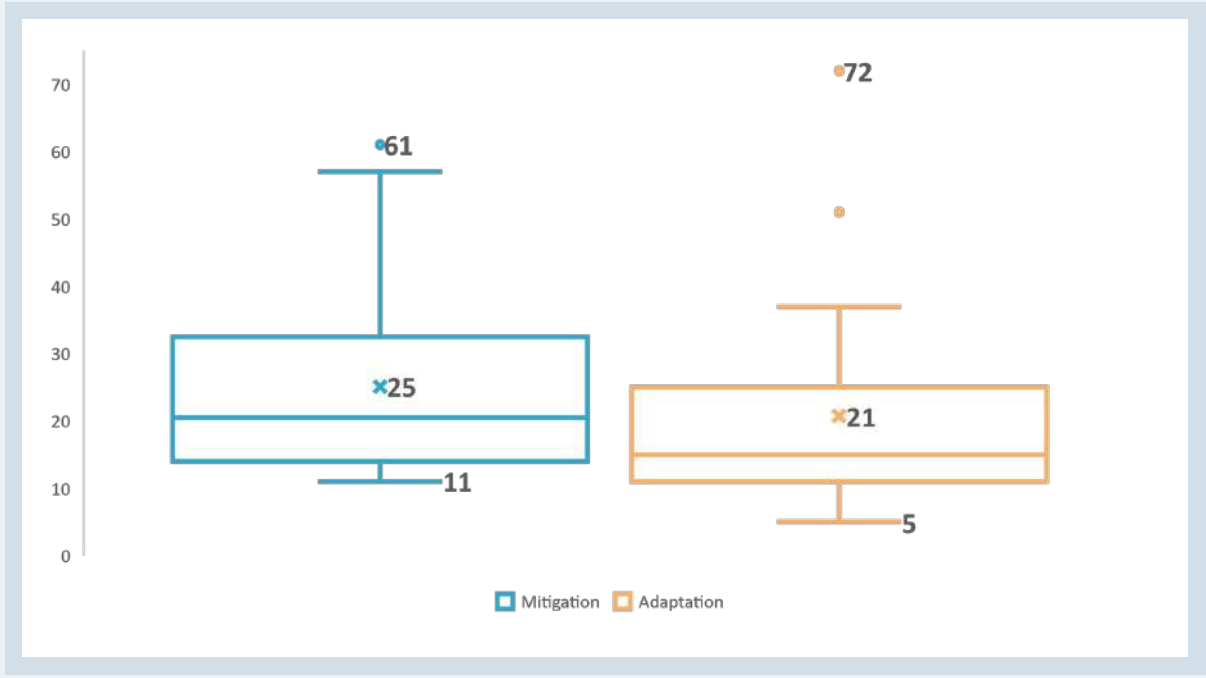
Climate Risk and Vulnerability Assessment

For more information on the technical information used for the CAPs, the **Climate Action Plan Stocktaking report** assessed if a CAP is evidence-based. Part of the criteria analyzed is the quality of both the GHG Inventories and the CR&V Assessments for each CAP analyzed.

- **Climate actions.**

All climate actions 753 mitigation and 622 adaptation actions were classified into sectors and subsectors.

For each city, between 10 and 20 actions were selected for a more detailed analysis which included quality of action design, costs, and emission reductions.



Climate Actions

CAPs varied significantly in the number of climate actions. On average CAPs had 25 mitigation and 21 adaptation actions. Although those numbers ranged from 11-61 mitigation actions and 5 to 72 adaptation actions.

Information Gaps in CAPs

Of the 30 CAPs analyzed:

Only 23 (77%) had complete mitigation diagnostics information. 2 (6.7%) had no mitigation diagnostics information at all.

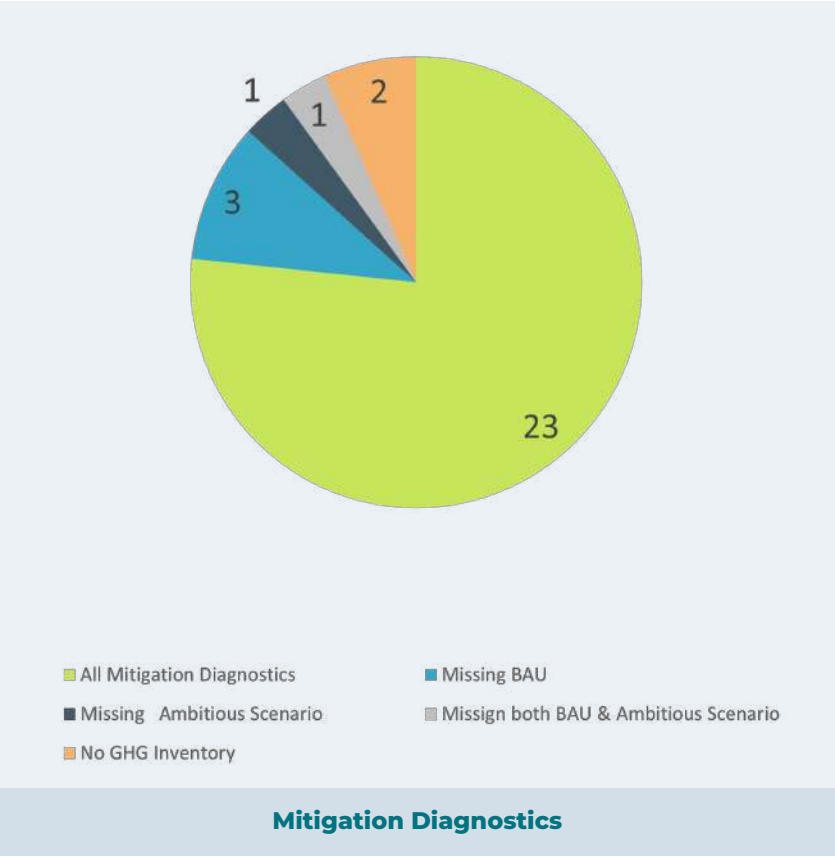
For the detailed climate action analysis

10 (33%) cities had no information on action costs or emission reductions per mitigation action

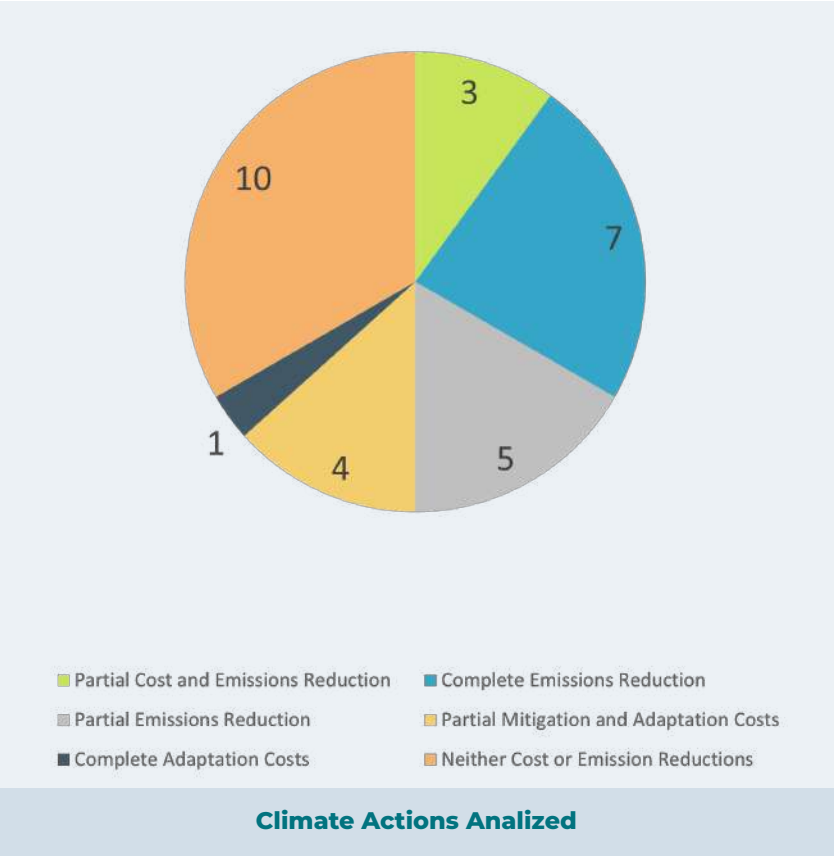
Only 3 (10%) CAPs had information on both emissions reduction per action and costs for at least one climate action.

7 (23%) CAPs have emissions reductions information for all mitigation actions analyzed but no cost information.

In general**, there is more information on adaptation action cost compared to mitigation actions.**



Mitigation Diagnostics



Climate Actions Analized

How do cities compare?
GHG Emissions
Population growth rate vs Emissions per capita

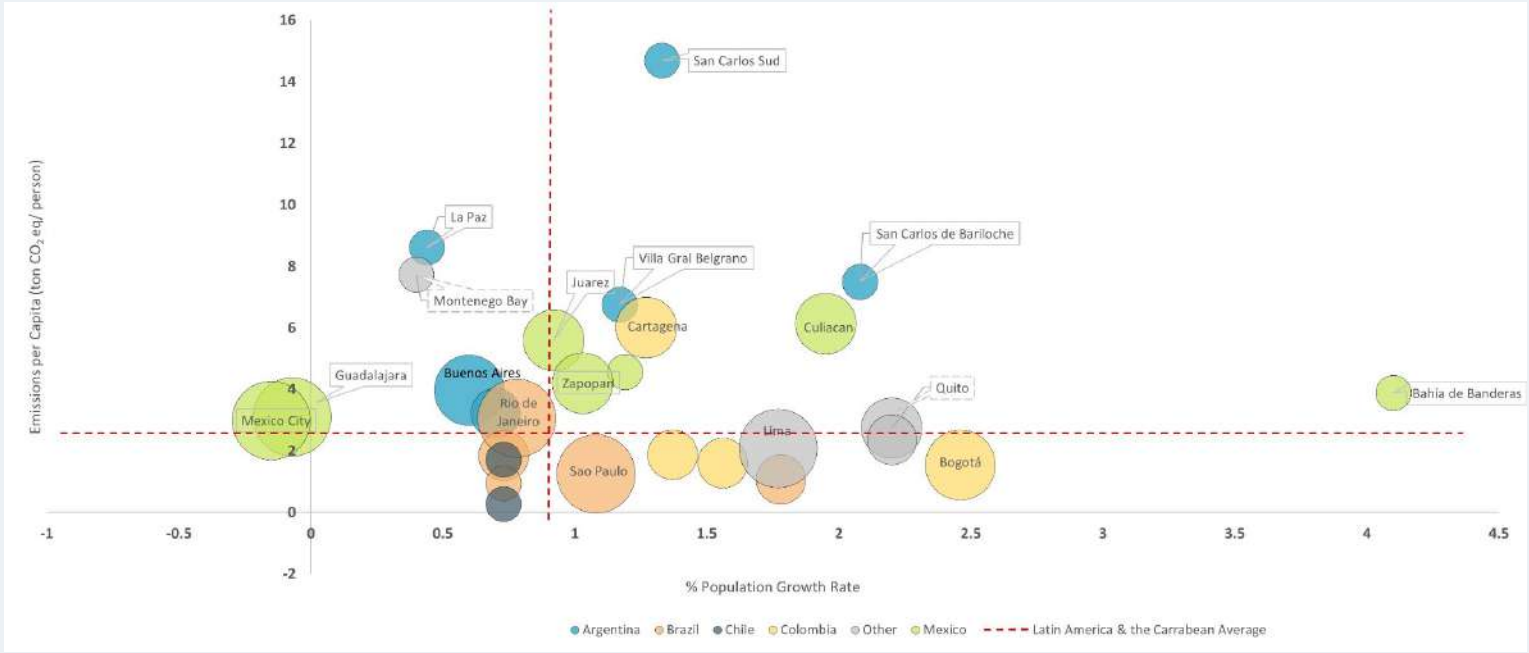
Most cities are above the yearly growth rate and/or emissions per capita for the Latin America & the Caribbean average.

3 Mexican cities are notable outliers. **Bahia de Banderas has the highest population growth rate (of 4.1%). Mexico City and Guadalajara are the only cities with negative population growth rates,** -0.15% and -0.07% respectively.

The 4 cities with the highest emissions are Mexico City (27.5M ton CO2 eq), Rio de Janeiro (20.5M ton CO2 eq), Guadalajara(16.1 M ton CO2 eq), and Sao Paulo (15.4M ton CO2 eq). However, their emissions per capita are relatively low compared to other cities, with Rio having the largest at 3.06 ton CO2 eq/person. **Only Sao Paulo is below the Latin America average with 1.25 ton CO2 eq/person. Out of the four, it is also the only one with a slightly higher than average population growth rate (1.25%).**

In contrast, **San Carlos Sud is both the city with the lowest emissions (0.04 M ton CO2 eq) and the highest emissions per capita (14.6 ton CO2 eq/person).**

3 of the 4 cities with the highest emissions per capita are Argentinian.

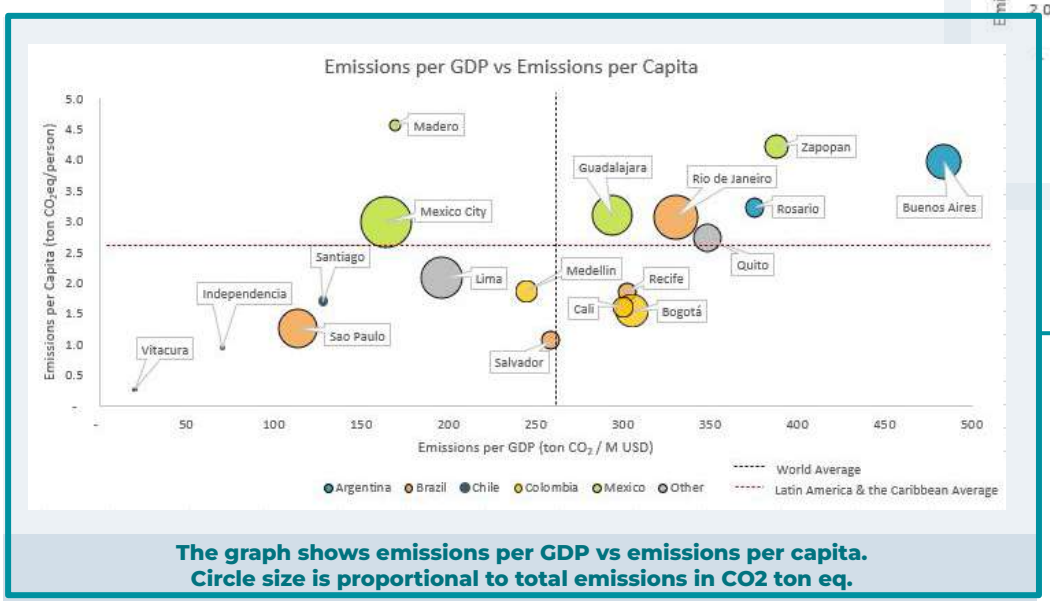


The graph shows % population growth rate vs emissions per capita. Circle size is proportional to total emissions.

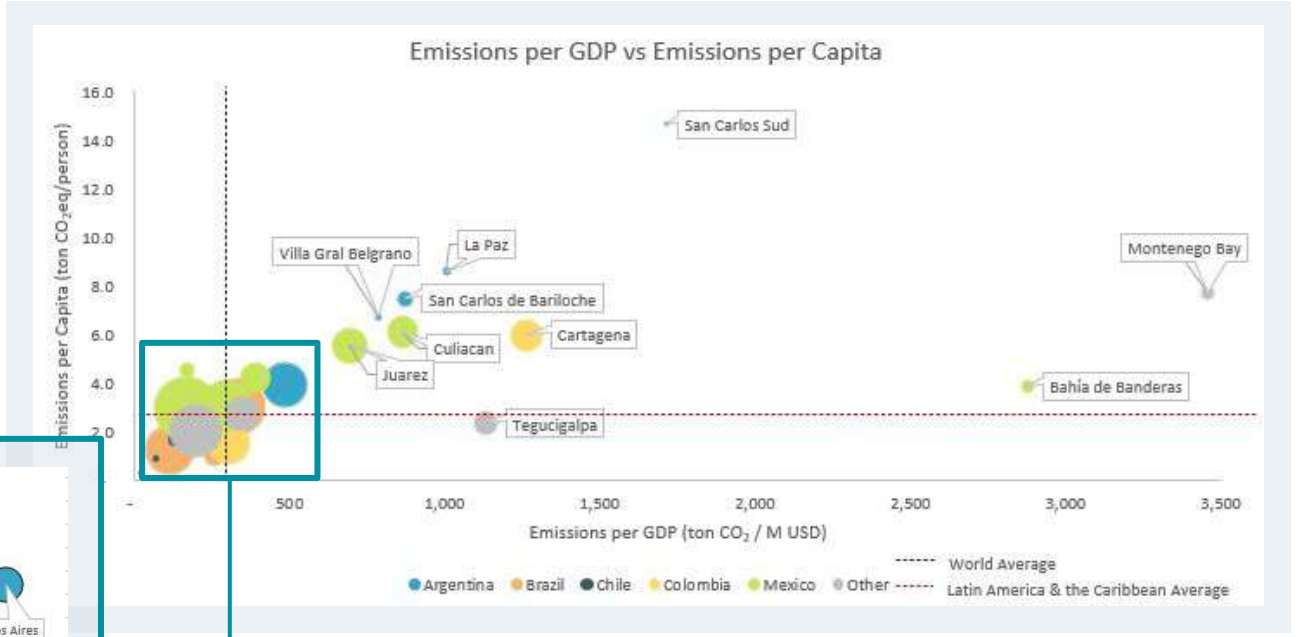
GHG Emissions Emissions per GDP vs Emissions per capita

When it comes to emissions per GDP, **Montego Bay, Bahia de Banderas, and San Carlos Sud stand out with the highest emissions per GDP**, although their total emissions are low compared to other cities.

Mexico City and Sao Paulo despite being the 1st and 3rd highest total emissions also have the 5th and 3rd lowest emissions per capita. The 1st, 2nd and 4th cities with the lowest emissions per capita are all Chilean.



The graph shows emissions per GDP vs emissions per capita. Circle size is proportional to total emissions in CO2 ton eq.



In general, cities with the highest overall emissions also have lower emissions per capita and emissions per GDP.

This could suggest that cities with high concentrations of population and economic wealth tend can be more carbon-efficient than other cities.

Notable exceptions are Santiago, Vitacura, and Independencia although **neither Independencia nor Santiago accounted for the transportation sector in their emissions inventories, while Vitacura only considered transportation emissions.**

GHG Emissions

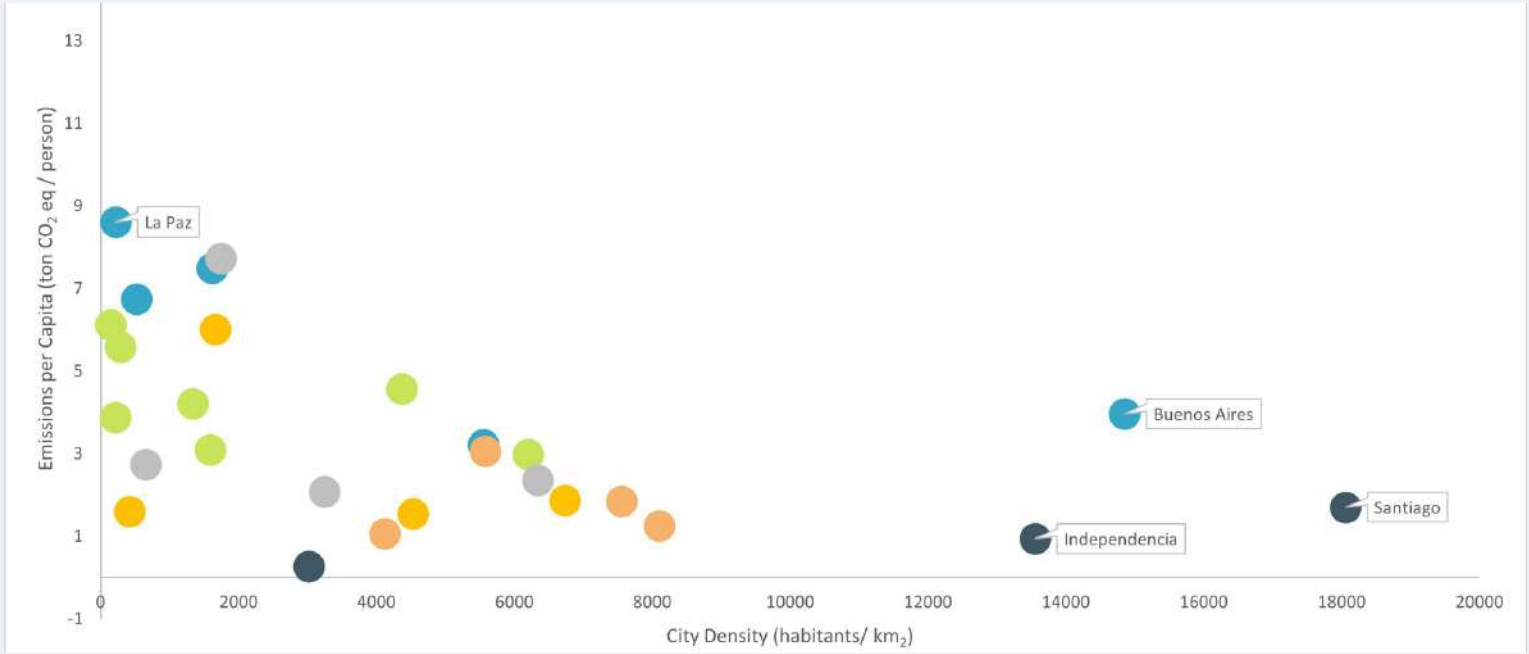
Population growth rate vs Emissions per capita

In general, cities with higher density tend to have lower emissions per capita.

All cities with 5 tons per person or higher emissions per capita had densities below 2,000 habitants per km2.

All Chiles cities have low emissions per capita regardless of density. However, their GHG emissions inventories were missing one or more sectors.

On average, Argentinian cities are the least densely populated and have the highest emissions per capita.



The graph shows city density vs emissions per capita

Future GHG Emissions Scenarios BAU vs Ambitious Scenario

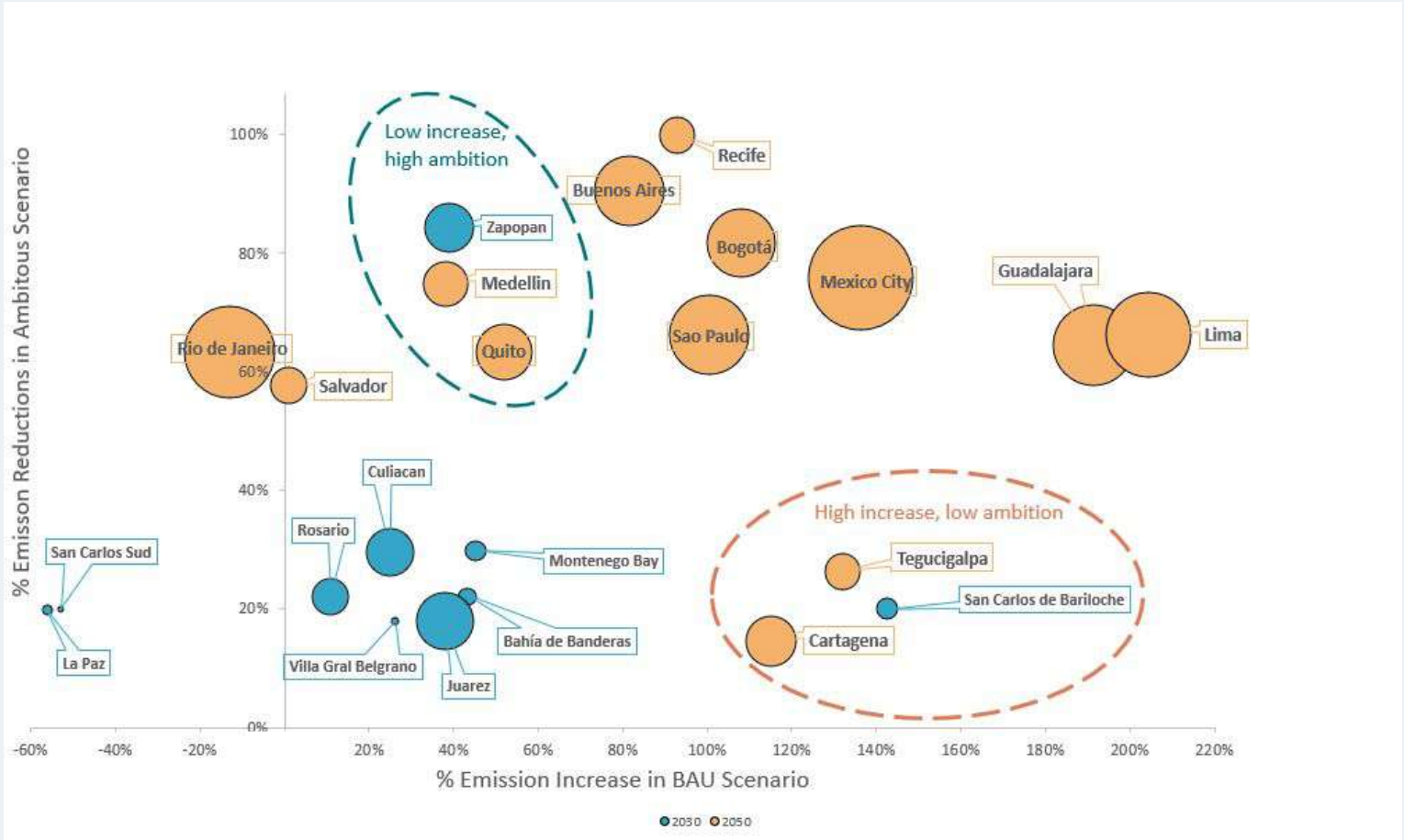
Of the 23 CAPs that had both a BAU and an ambitious Scenario, 43% model emissions up to 2030 and 57% model up to 2050.

The cities with the highest total GHG emissions all had 2050 future emission scenarios.

Salvador and Rio de Janeiro had difficulties using the Pathways tool in their future emission projections. As a result, Salvador had almost no change between the BAU scenario and current emissions, while Rio de Janeiro's BAU scenario was lower than current emissions.

San Carlos Sud and La Paz quantified AFOLU emissions in their GHG emission inventory but not in their future emission scenarios which is why their BAU emissions decreased.

Tegucigalpa, San Carlos de Bariloche, and Cartagena were the least ambitious in their mitigation goals relative to their expected BAU emission increase.



The graph shows % emission increase in BAU Scenario vs % emission decrease in the Ambitious Scenario. Circle size is proportional to total current emissions.

Future GHG Emissions Scenarios Distribution by Sector

Stationary Energy:
On average, stationary energy actions have a 36% share of total current emissions and a 35% share of expected emission reductions.

Transportation:
The transport sector has both the highest share of emission reductions and the highest share of current emissions.

Waste:
Share of emission reductions and current emissions had roughly the same distribution in the waste sector.

IPPU:
Despite being quantified in 16 CAPs, only Cartagena quantified emission reductions in the IPPU sector.

AFOLU:
Only 3 CAPs included AFOLU in their emission reductions. Of those three, only Tegucigalpa with 51%, expects more than 15% of its emission reductions to come from AFOLU.

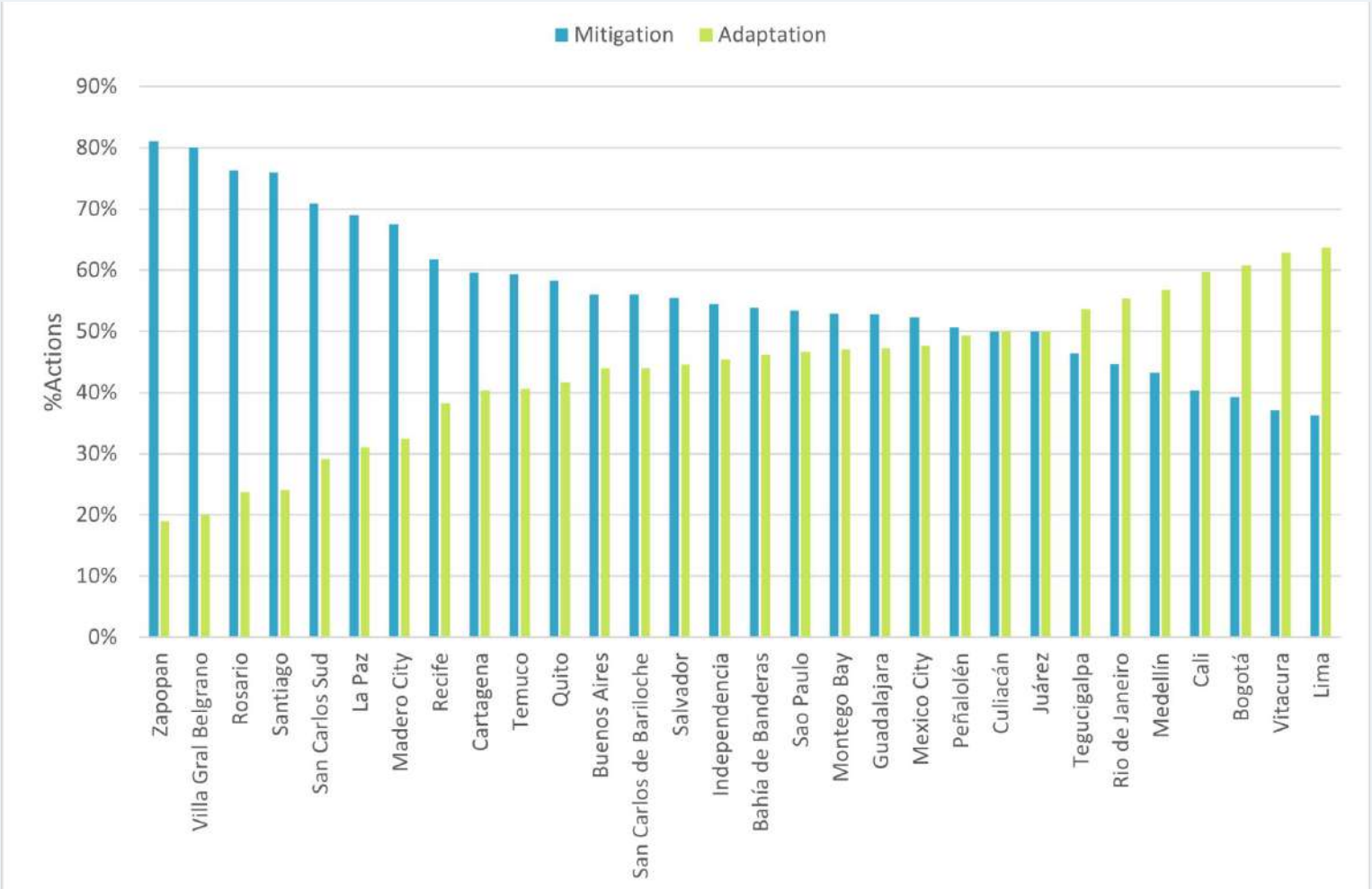
On average there is higher variability in current emissions % and share of emission reductions for the transportation and stationary energy sectors.

The distribution of expected emissions reductions is congruent with the current emission distribution.

Climate actions

Mitigations vs Adaptation

- 70% of the cities have more mitigation than adaptation actions.
- 19 cities have between a 60-40 to a 50-50 distribution.
- All Argentinian cities have a much higher proportion of mitigation actions, while all Colombian cities (excluding Cartagena), have a higher proportion of adaptation actions.
  .
- Rosario and Santiago overwhelmingly focus on mitigation with adaptation actions accounting for only 24% of all climate actions. However, when looking at the total number of actions Rosario had 19 adaptation actions and Santiago had 13. We can then conclude that for both cities the problem stems from a lack of prioritization of mitigation actions and not from insufficient adaptation efforts.
- In contrast, both Zapopan and Villa General Belgrano included only 7 and 5 adaptation actions, and both fail to address all climate risks identified in their CR&V Assessments.



How do cities compare?

Climate Actions: Mitigation

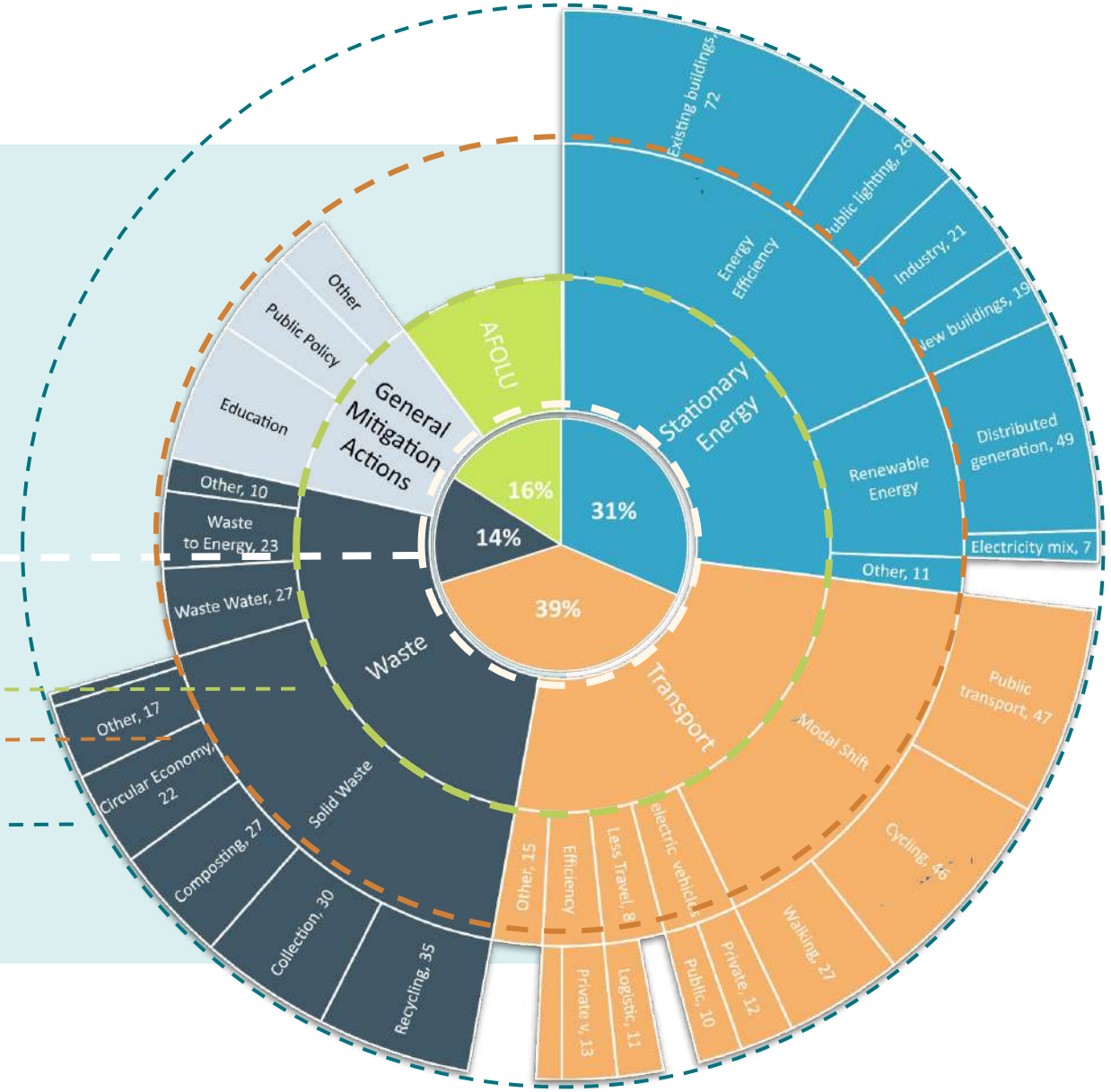
The central circle shows the **average distribution of expected emission reductions** by sector.

All CAP mitigation actions were **classified into five sectors:** general mitigation, stationary energy, transport, waste, and AFOLU.

Each sector was divided according to **action type.**

In some cases, **subsectors were further divided** to give a more detailed description.

Stationary energy, transport, and waste had an even distribution of mitigation actions with 27%, 26%, and 26% respectively.



The Sunburst chart shows the sum of all mitigation actions found in the 30 CAPs analyzed that fall into a specific category. In total 753 actions were classified.

How do cities compare?

Climate Actions: Mitigation

Subsectors with the most actions

Energy:

- Energy efficiency in existing buildings, 71.5 actions (9.5%).
- Distributed renewable energy, 48.5 actions (6.44%).
- Energy efficiency in public lighting, 25.8 actions (3.43%).

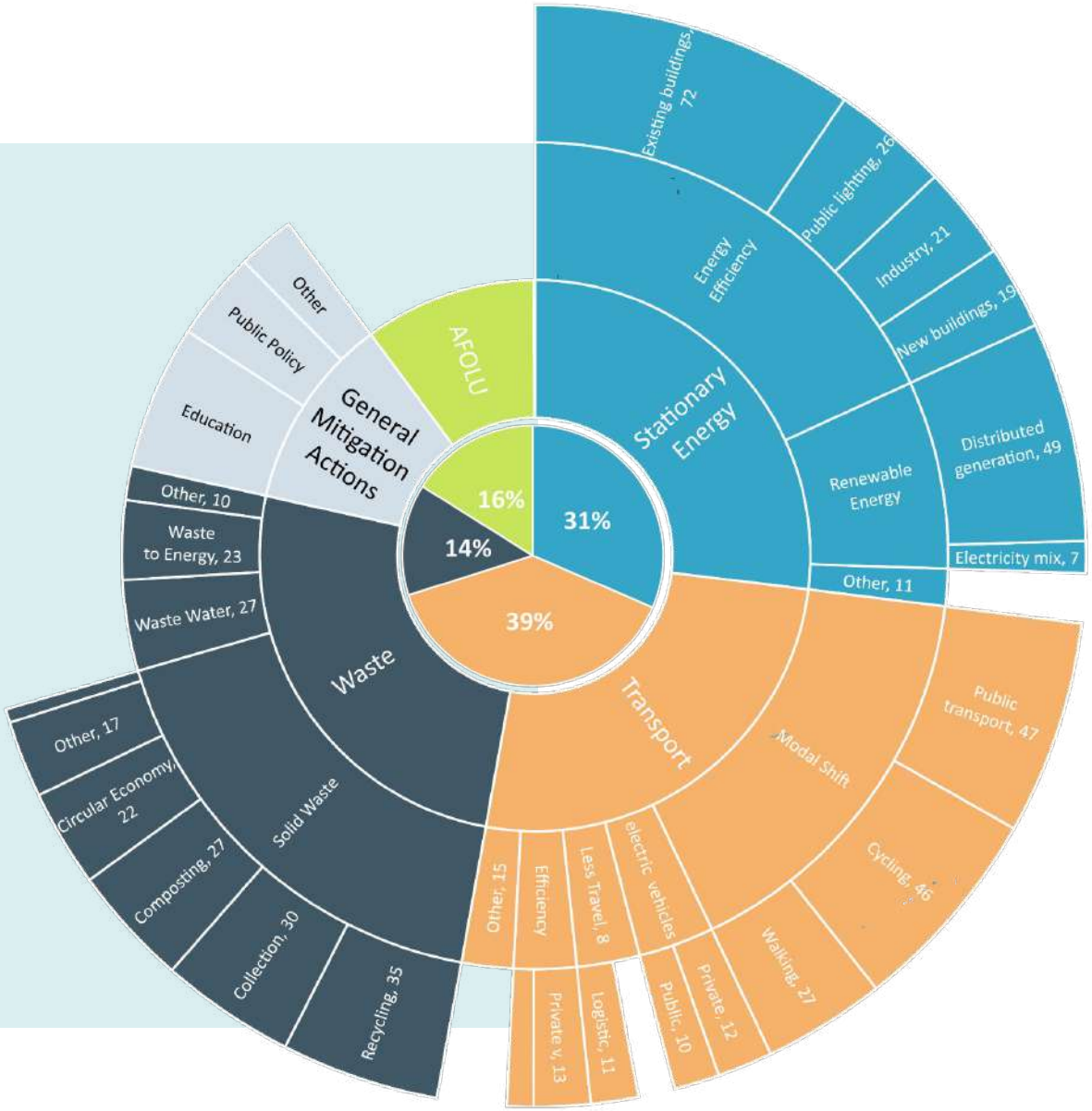
Transport

Promoting a modal shift to:

- public transport, 47.3 actions (6.3%).
- cycling, 46.2 actions (6.1%).
- walking, 27 actions (3.6%).

Waste

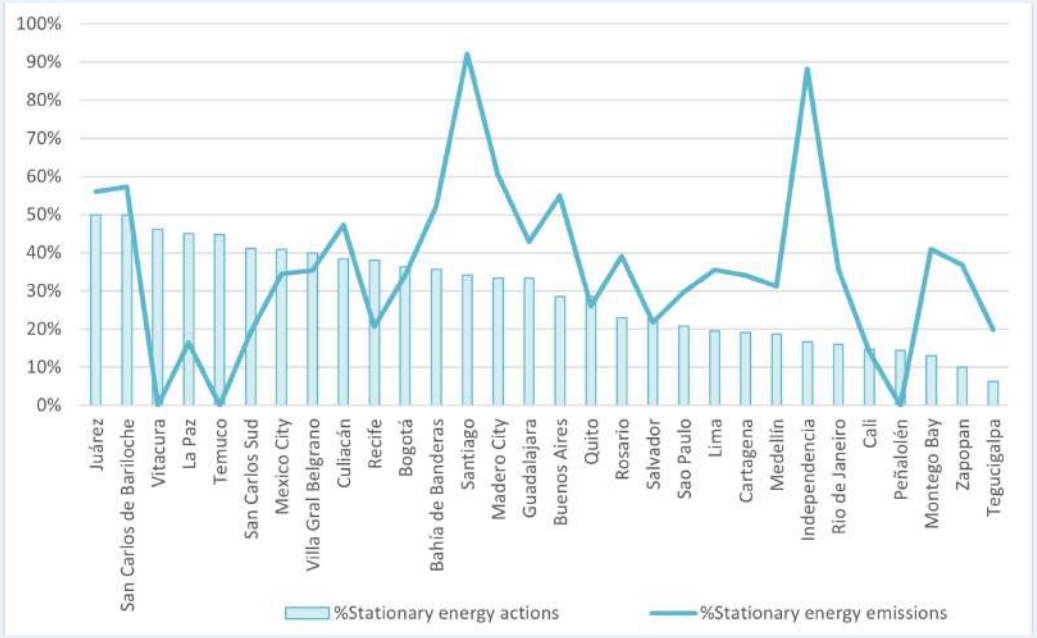
- Promoting solid waste recycling, 34.9 actions (4.6%).
- Improving solid waste collection, 29.8 actions (4.0%).
- Increasing wastewater treatment, 26.75 actions (3.5%).



The Sunburst chart shows the sum of all mitigation actions found in the 30 CAPs analyzed that fall into a specific category. In total 753 actions were classified.

How do cities compare?
Mitigation Actions

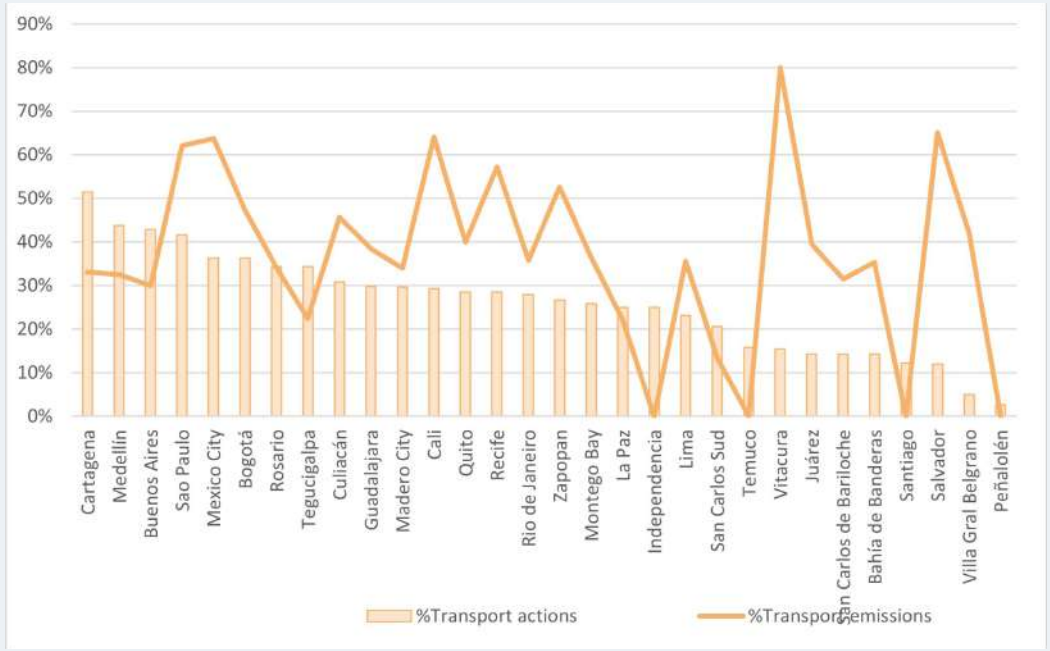
Even though % of mitigation actions is not equivalent to emission reductions, not all CAPs calculated emission reductions per mitigation actions.



Stationary energy

Independencia and Santiago have a small % of stationary energy actions, despite a large % of emissions attributed to this sector, 92% in Santiago and 88% in Independencia. In both cases, this can be explained by a large number of general mitigation actions, 33% in Independencia and 44% in Santiago.

It should be noted that even though Peñalolén, Temuco do not have an emissions inventory and Vitacura did not quantify stationary energy emissions, their CAPs included actions for the sector.



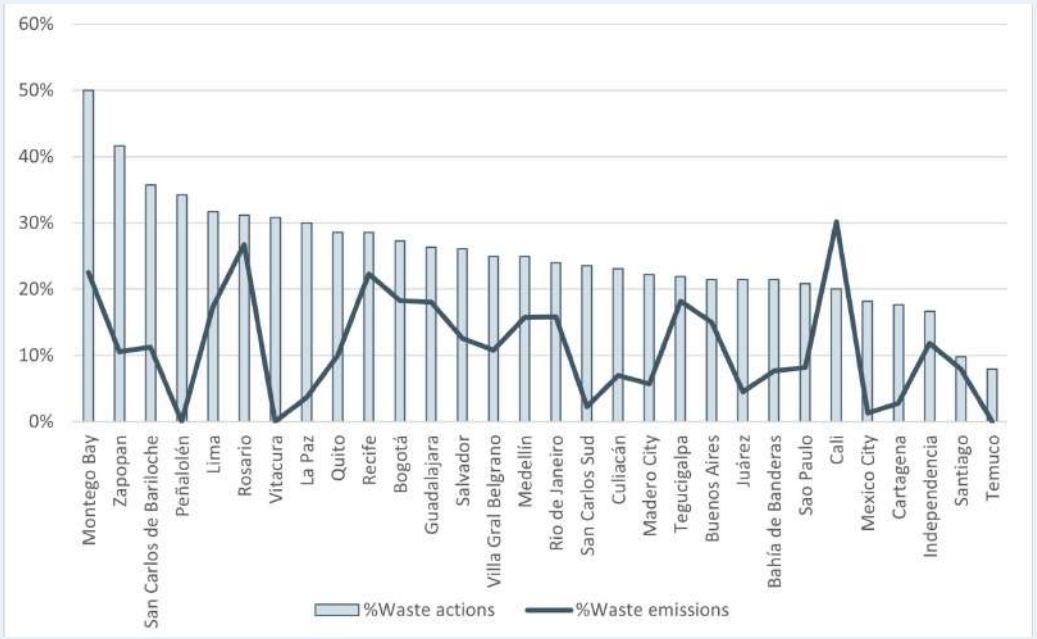
Transportation

Transportation emissions account for more the 40% of total emissions in 42% of cities that include transportation in their emission inventory. This is not reflected in the number of transportation actions. On average, transportation actions are 26% of total mitigation actions.

All Chilean cities include transportation actions, although only Vitacura had included transportation emissions in the GHG emissions inventory.

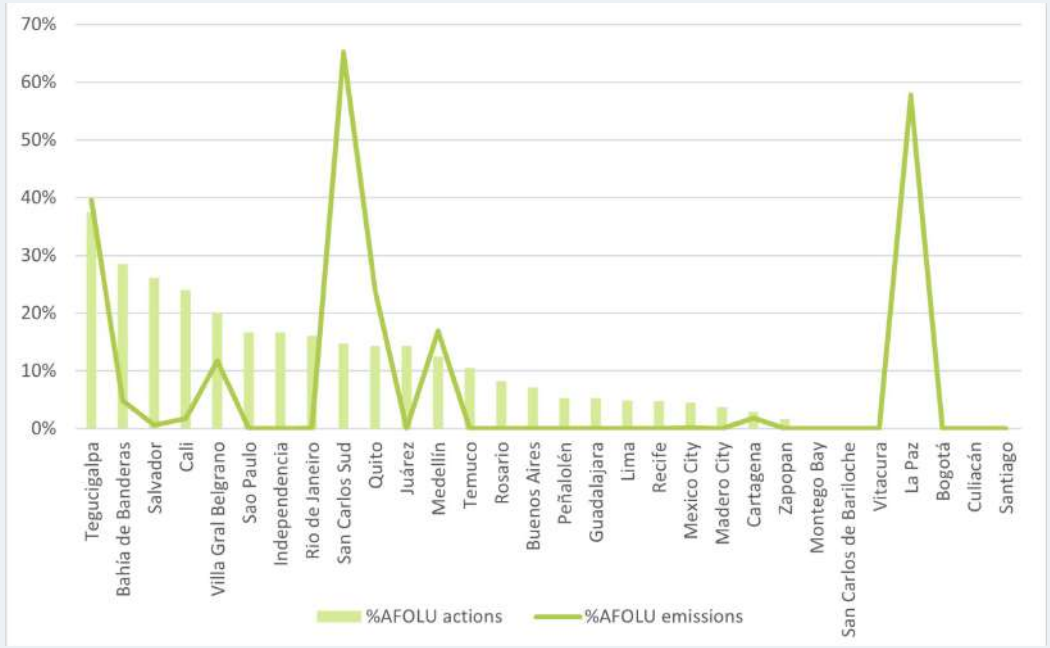
How do cities compare?
Mitigation Actions

Even though % of mitigation actions is not equivalent to emission reductions, not all CAPs calculated emission reductions per mitigation actions.



Waste

Waste is the only sector (excluding Cali) where the % of sector actions is consistently larger than emission %. An explanation could be that waste management usually falls directly under the municipalities' administration and is, therefore easier for most cities to implement mitigation actions. Also, improving waste management has a series of health co-benefits that could be attractive when evaluating climate actions.



AFOLU

Even though less than half of the cities had their AFOLU emissions quantified, around 70% included mitigation measures for that sector.

In general, % of AFOLU emissions were low. San Carlos Sud destined only 15% of mitigation actions to AFOLU even though it accounts for 65% of total emissions, while La Paz whose % of AFOLU emissions is 58% did not include any AFOLU actions.

How do cities compare?
Mitigation Actions

Stationary Energy Actions

On average, **the largest % of stationary energy mitigation actions can be found in Argentinian and Mexican CAPs**, while "other"[1] CAPs have the lowest % of mitigation actions.

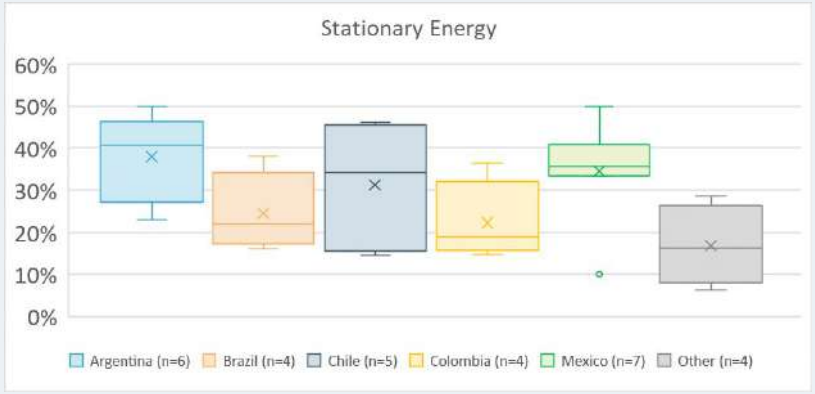
GCoM CAPs appear to have higher % actions than other cities, although this could be largely driven by country given that 83% of Argentinian cities and 71% of Mexican cities developed their CAPs with GCoM.

Cities that did not develop their CAPs with either C40 or GCoM have a lower % of stationary energy actions. Those cities include: Recife, Cali, Cartagena, Tegucigalpa, and Montego Bay.

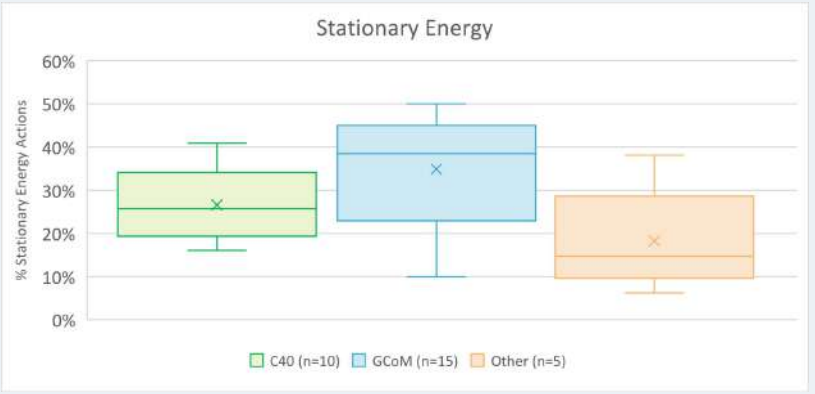
Cities with agriculture as their primary economic activity have a higher % of stationary energy actions. However, the sample size is small (only 3 cities), and all cities are Argentinian. **Cities with other primary economic activities are similarly distributed.**

There is little difference in % of stationary energy actions in urban and mixed cities. Although the two rural cities have a higher % of actions both cities are Argentinian.

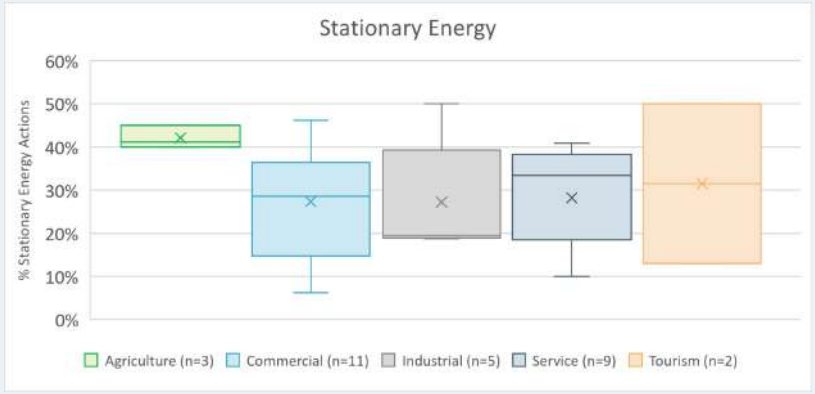
By Country



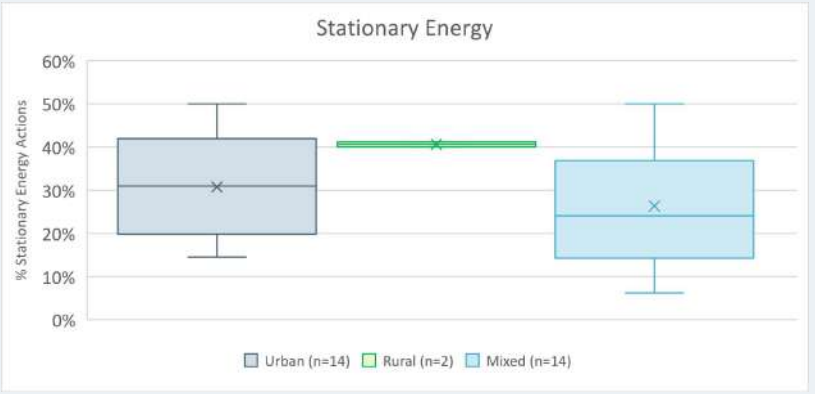
By Partner Organization



By Main Economic Activity



By Rural, Urban or Mixed



1 Quito, Tegucigalpa, Montego Bay, and Lima

How do cities compare?
Mitigation Actions

Stationary Energy Actions

On average **cities with populations larger than 1 million people had fewer stationary energy mitigation actions compared with smaller cities.** However, cities with populations between 1 and 5 million had a lower number of stationary energy actions that cities with a population above 5 million.

Regarding GDP, on average **cities with lower GDPs had larger amounts of stationary energy actions** than cities with higher GDPs. This makes sense given that we can expect more populous cities to have larger GDPs. However, for both population and GDP groups, there is a wide range of % of actions.

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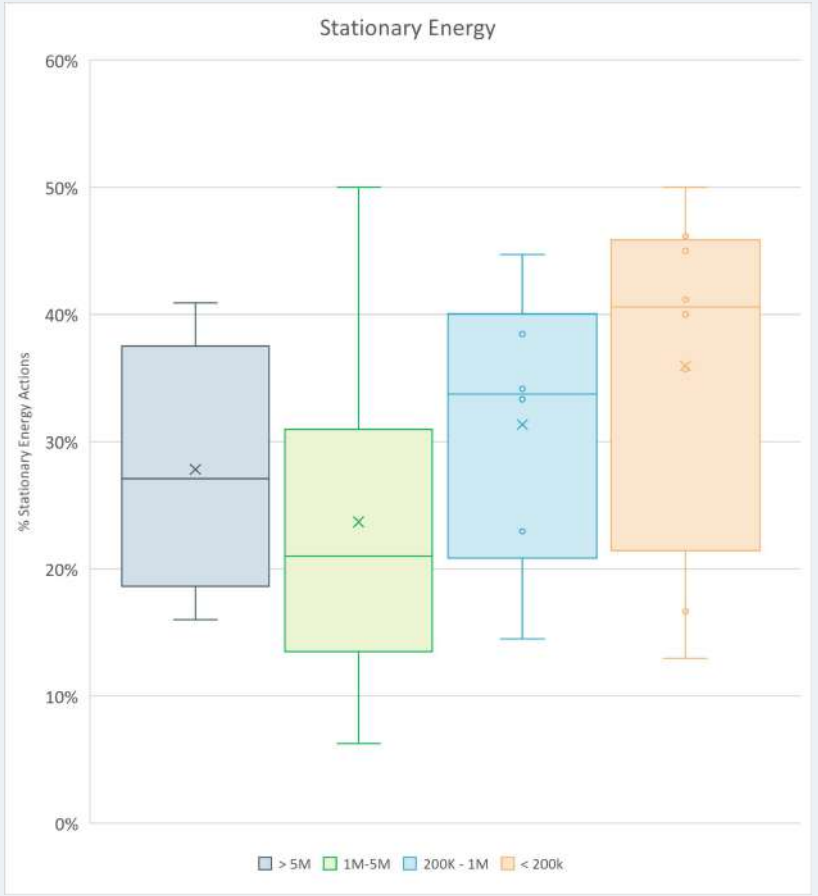
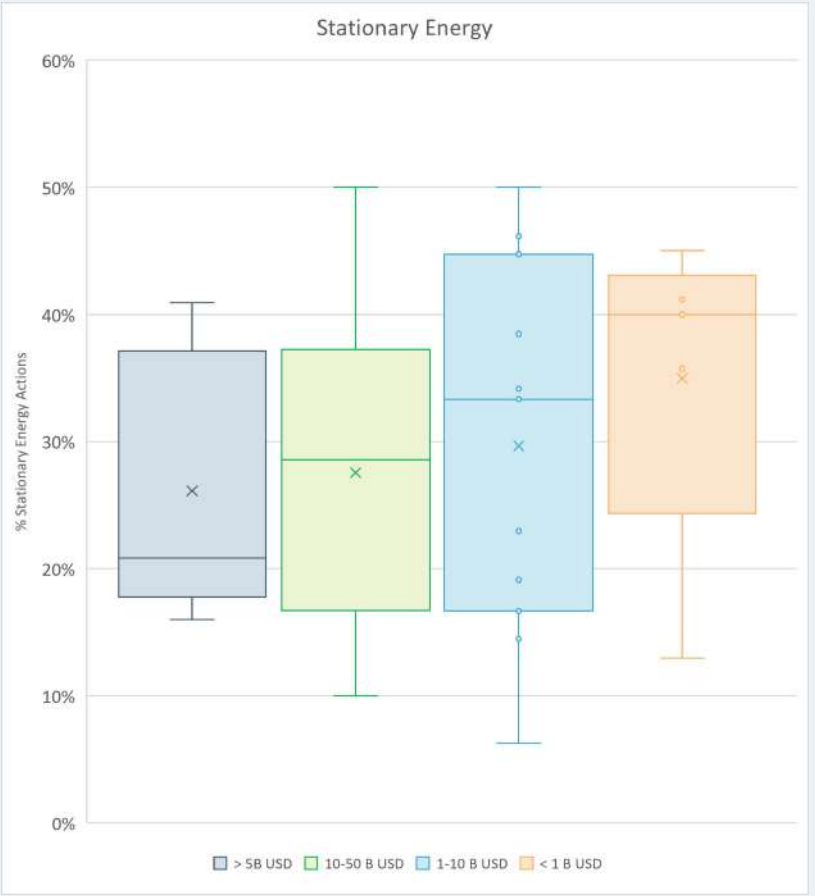
By Population



By GDP



1 Quito, Tegucigalpa, Montego Bay, and Lima

Mitigation Actions

Transport Actions

On average, **the largest % of transportation mitigation actions can be found in Colombian CAPs, while Chilean CAPs have the lowest % of actions.** This makes sense given that only 1 Chilean city quantified their transportation GHG emissions.

GCoM CAPs appear to have a lower % of transportation actions than other cities, although this could be largely driven by country given that all Chilean cities developed their CAPs with GCoM.

Cities with the industrial sector as their primary economic activity have a higher % of transport actions. However, 40% of highly industrial cities are Colombian.

Mixed cities have a slightly higher % of transport actions than urban cities.

Rural cities have a lower % of transport actions. There is also greater variability between the two rural cities than with stationary energy actions.

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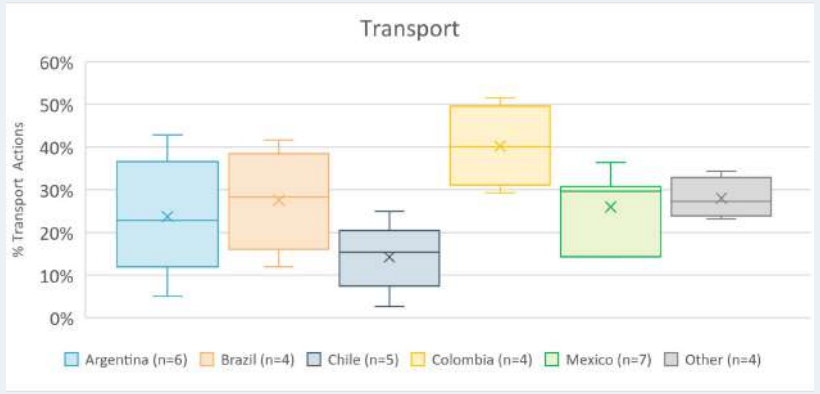
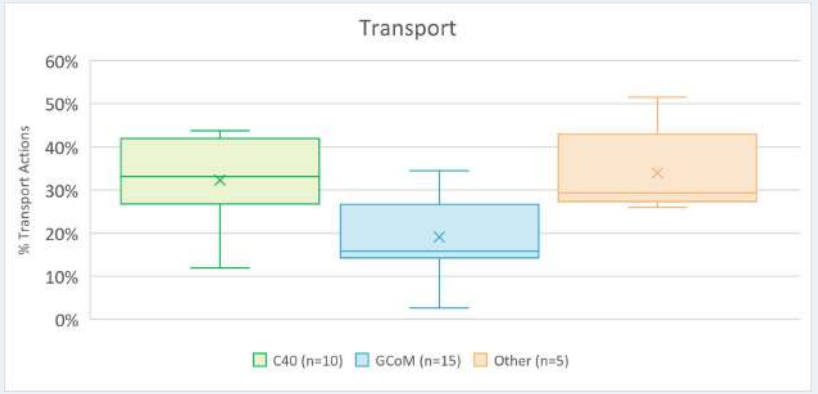
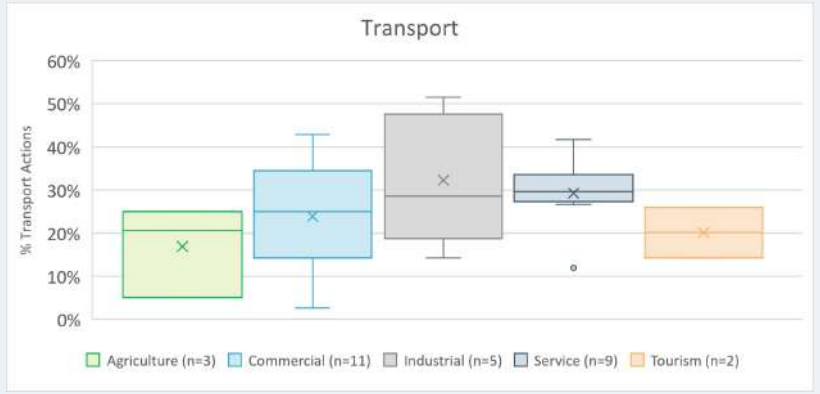
By Country



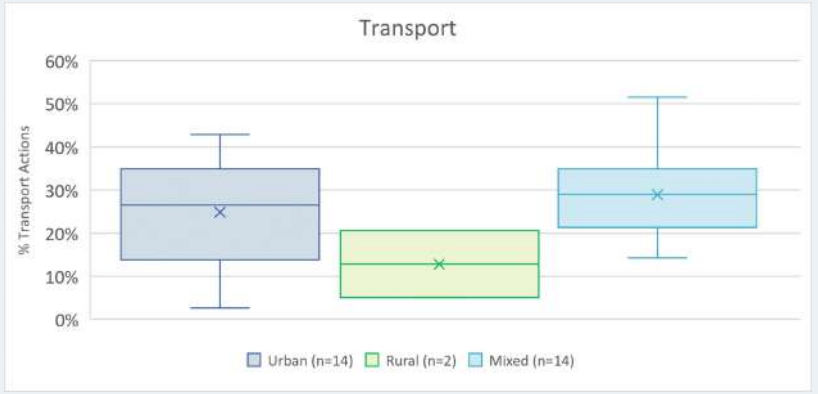
By Partner Organization



By Main Economic Activity



By Rural, Urban or Mixed



How do cities compare?
Mitigation Actions

Transport Actions

The % of transport actions follows an inverse pattern from the % of stationary energy actions. **The large the population the higher the average % of transport actions**.

The same is true for GDP, **the higher the GDP the higher average % of transport actions.**

We can expect that cities with larger populations and GDPs probably have a more developed road transport system and more traffic which might account for the larger share of transportation actions.

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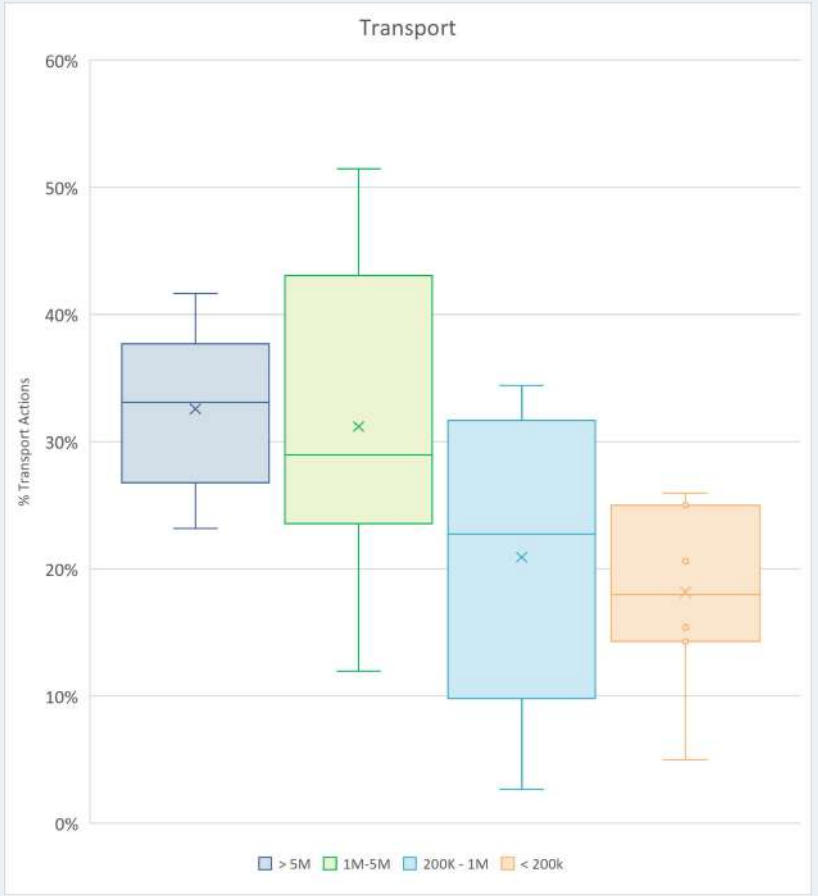
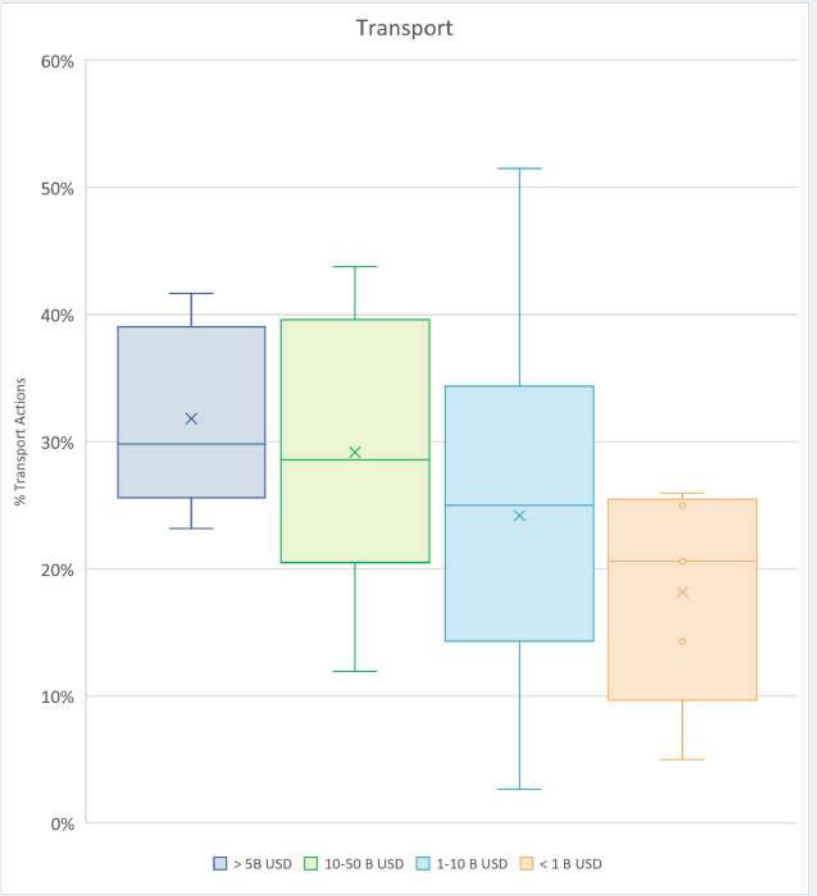
By Population



By GDP



Mitigation Actions

Waste Actions

On average, **there is less variability per country** in % of waste actions compared to the stationary energy and transportation sectors.

The largest % of waste mitigation actions can be found in "other"[1] CAPs.

Cities that did not develop their CAPs with either C40 or GCoM have higher variability of % of waste actions. Those cities include: Recife, Cali, Cartagena, Tegucigalpa, and Montego Bay.

Cities with tourism as their primary economic activity have a higher % of waste actions. However, the sample size is too small (only 2 cities) to make inferences.

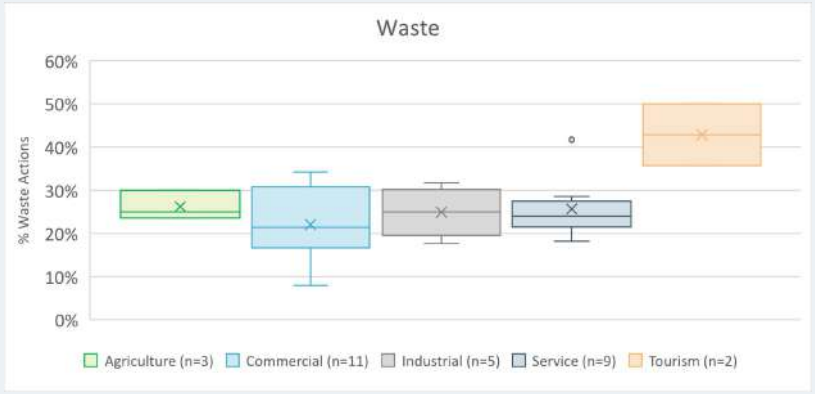
Cities with other primary economic activities are similarly distributed and **have less variability** compared to stationary energy and transport sectors.

There is little difference in % of waste mitigation actions in urban, rural, and mixed cities.

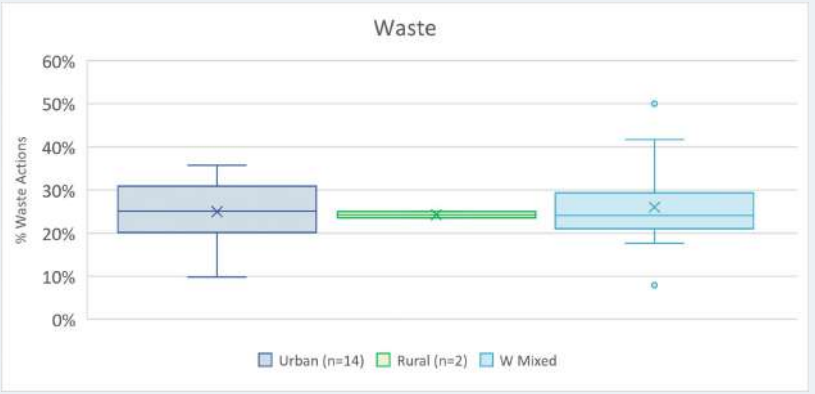
By Country

By Partner Organization

By Main Economic Activity



By Rural, Urban or Mixed



1 Quito, Tegucigalpa, Montego Bay, and Lima

Waste Actions

On average, i**t appears that cities with populations below 200,000 and GDPs below 1 billion USD have a larger % of waste actions compared to other cities.**

What is particularly interesting is that in both cases, the second smallest groups have on average the smallest % of waste actions. However, these groups also have a wide range of % of waste actions and they have the second-highest maximum % of waste actions.

The high $ of waste actions in cities with smaller populations and GDPs could be attributed to the fact that smaller cities have insufficient waste management.

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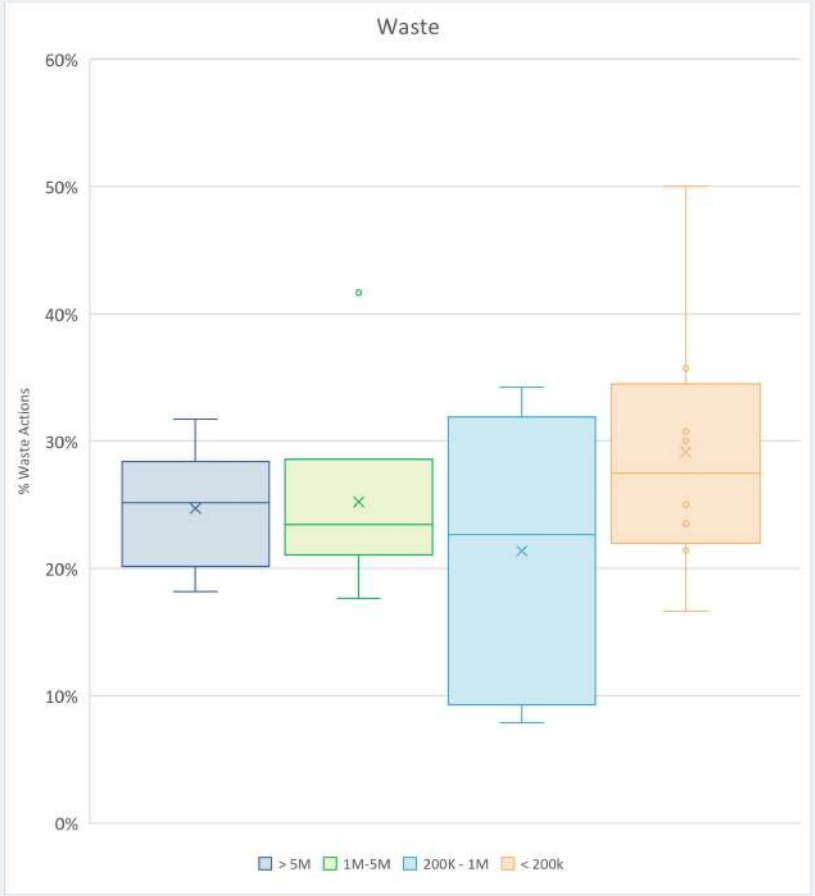
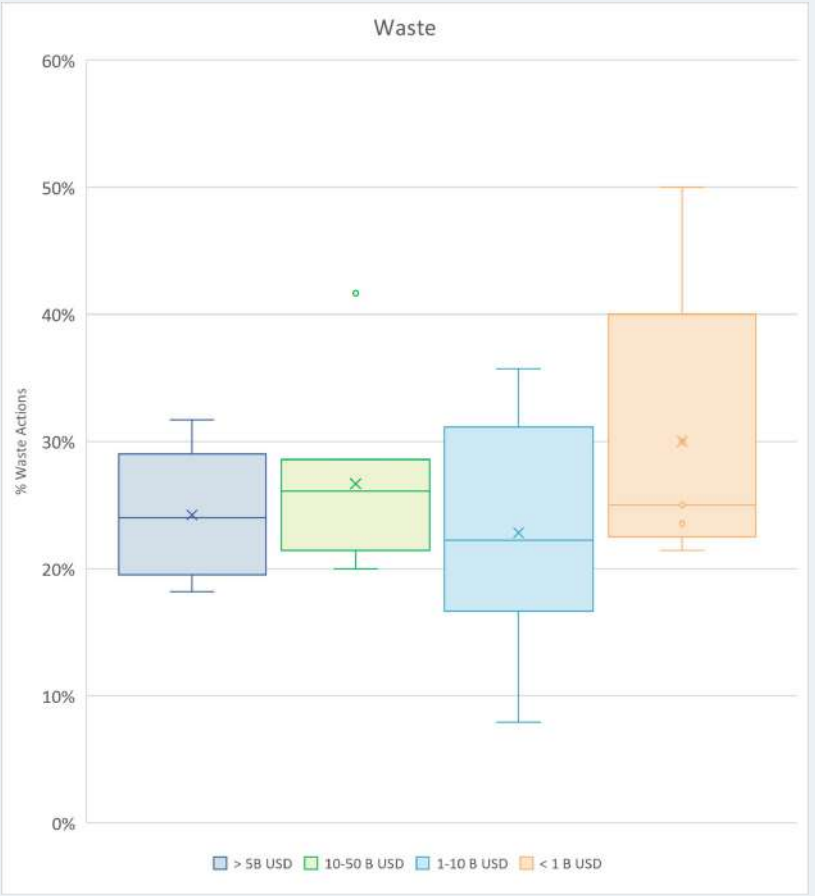
By Population



By GDP



Mitigation Actions

AFOLU Actions

On average, % of AFOLU actions are lower than other sectors. Like waste actions, they also have less variability per country, partner organization, and rural-urban categorization.

The largest % of AFOLU mitigation actions can be found in "other"$_1$ CAPs.

Cities that did not develop their CAPs with either C40 or GCoM have more variability of % of AFOLU actions. Those cities include: Recife, Cali, Cartagena, Tegucigalpa, and Montego Bay.

Cities with agriculture as their primary economic activity have the same average % of AFOLU actions as those with the commercial sector as their main economic activity.

Rural cities have the same average % of AFOLU actions as mixed cities. **Both have a slightly higher % of AFOLU actions than Urban cities.**

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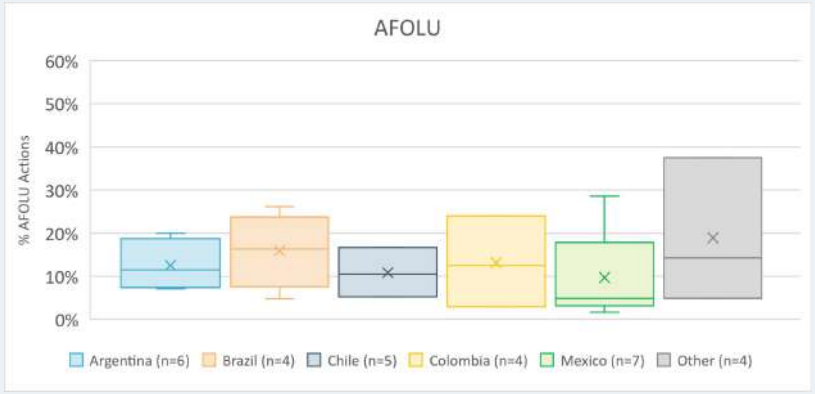
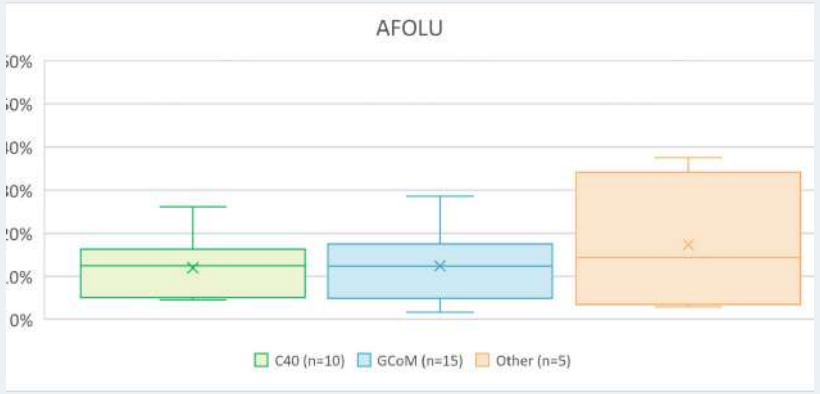
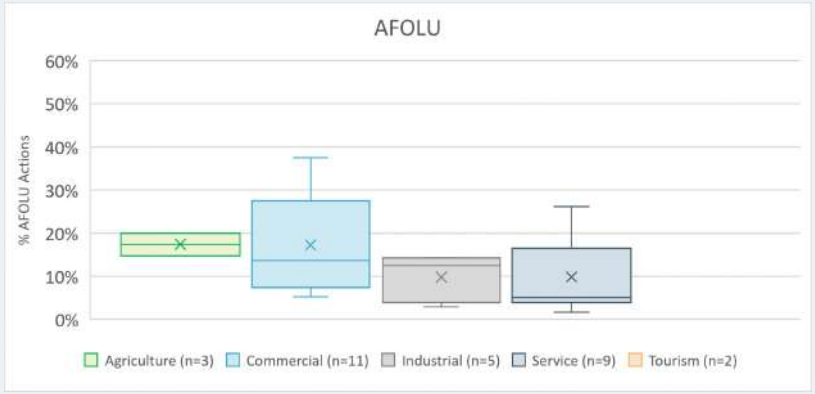
By Country



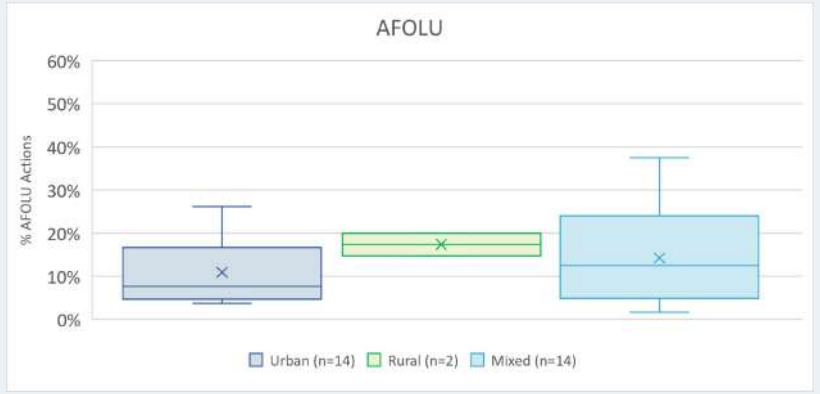
By Partner Organization



By Main Economic Activity



By Rural, Urban or Mixed



How do cities compare?
Mitigation Actions

AFOLU Actions

Overall there does not appear to be a correlation between population and GDP and % of AFOLU actions.

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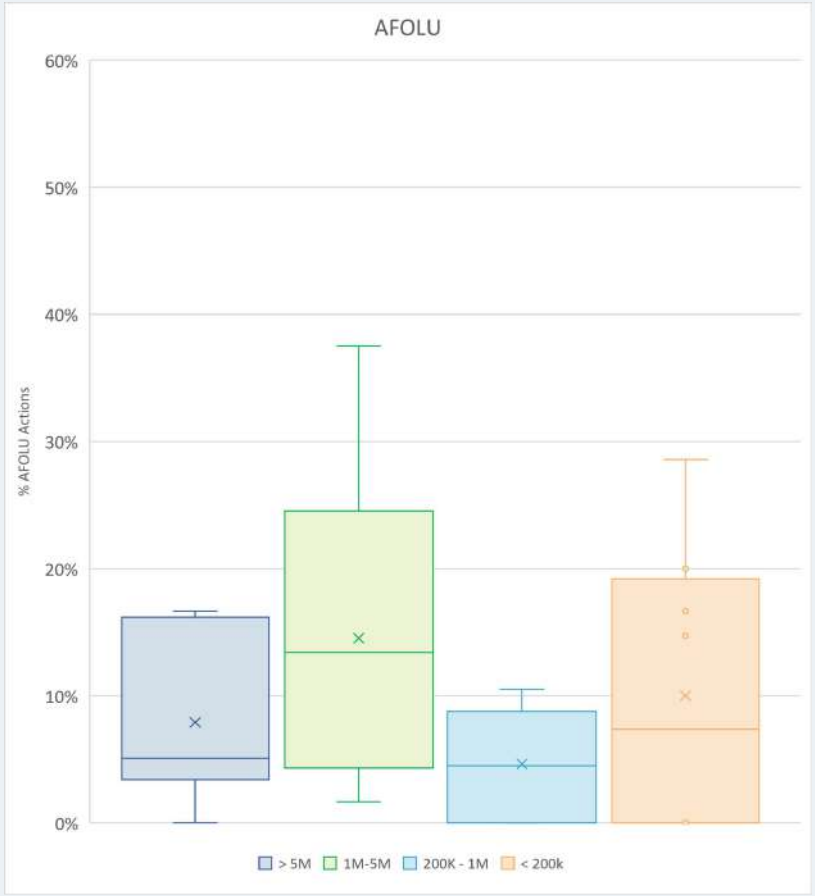
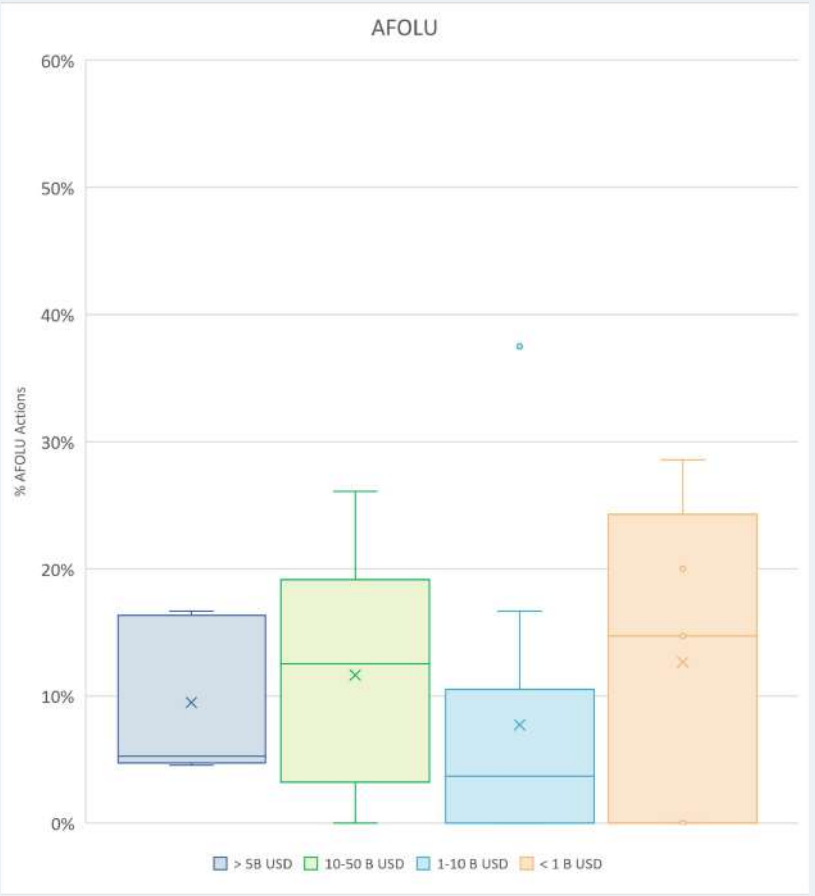
By Population



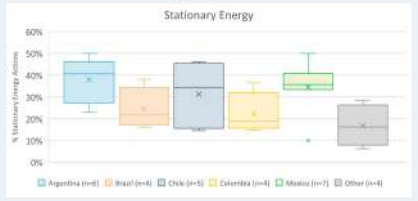
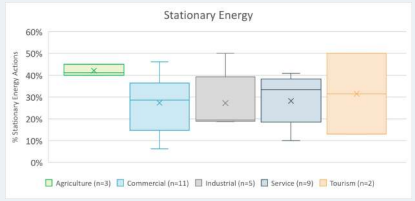
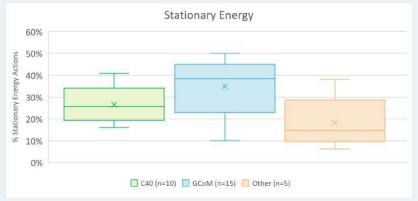
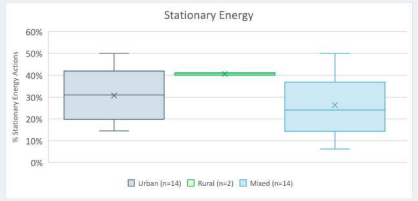
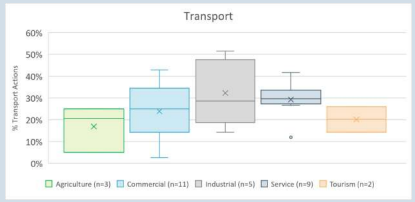
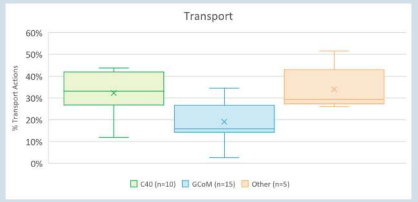
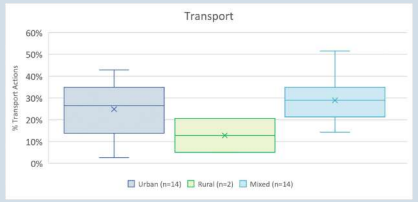
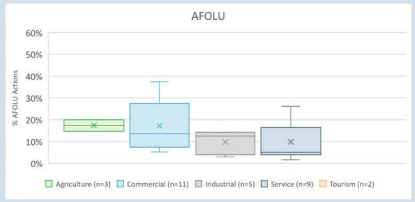
By GDP



1 Quito, Tegucigalpa, Montego Bay, and Lima

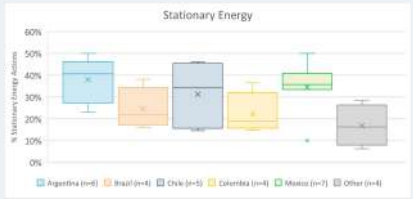
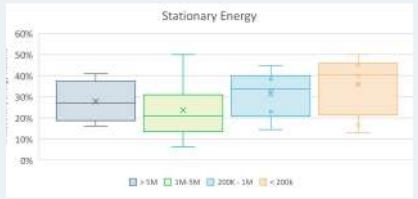
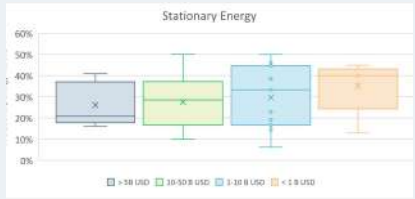
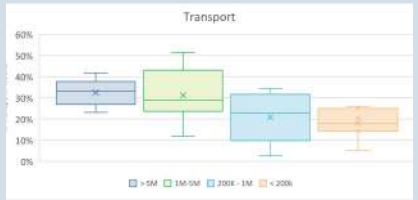
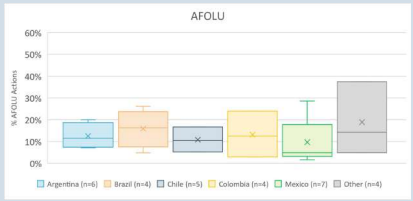
How do cities compare?
Climate actions

On average, the country to which the city belongs appears to have a larger effect on mitigation action distribution by sector than the partner organization, main economic activity, and rural-urban categorization.

By Country	By Main Economic Activity	By Partner Organization	By Rural, Urban or Mixed	
				**Stationary Energy**
				**Transport**
				**Waste**
				**AFOLU**

How do cities compare?
Climate actions

On average, the country to which the city belongs appears to have a larger effect on mitigation action distribution by sector than population and GDP size.

By Country	By Population	By GDP	
			**Stationary Energy**
			**Transport**
			**Waste**
			**AFOLU**

How do cities compare?

Climate Actions: Adaptation

Adaptation actions were **classified by threat**: rain floodings / sea level rise, biodiversity loss, drought, extreme heat, mass movement, wildfire, chemical change, vector-borne diseases, and general adaptation.

Each sector was divided according to **action type.**

In some cases, **subsectors were further divided** to give a more detailed description. Chemical change and vector-borne diseases were not subdivided.

The Sunburst chart shows the sum of all adaptation actions found in the 30 CAPs analyzed.

General adaptation, rain flooding / sea level rise, and biodiversity loss had the most adaptation actions with 39.4%, 15.8%, and 14.7% respectively.

The Sunburst chart shows the sum of all adaptation actions found in the 30 CAPs analyzed that fall into a specific category. In total 622 actions were classified.

How do cities compare?

Climate Actions: Adaptation

Subsectors with the most actions

General Adaptation
- Education & Communication, 111.6 actions (17.9%).
- Update Policy Instruments, 56.7 actions (9.1%).
- Increase Civil Defense Capabilities, 22 actions (3.5%).

Rain flooding/sea level rise
- Drainage Infrastructure, 22.6 actions(3.6 %).
- New Green Spaces as part of Nature-Based Solutions, 19.7 actions (3.2%).

Biodiversity Loss
- Urban Afforestation, 27.1 actions (4.4%).
- Conservation of Natural Protected Areas, 23.3 actions (3.7%).
- Monitoring & restoration, 20 actions (3.2%).

Drought
- Water Efficiency 19.1 actions (3.1%).

Extreme Heat
- Increase tree cover 19.3 actions (3.1%).

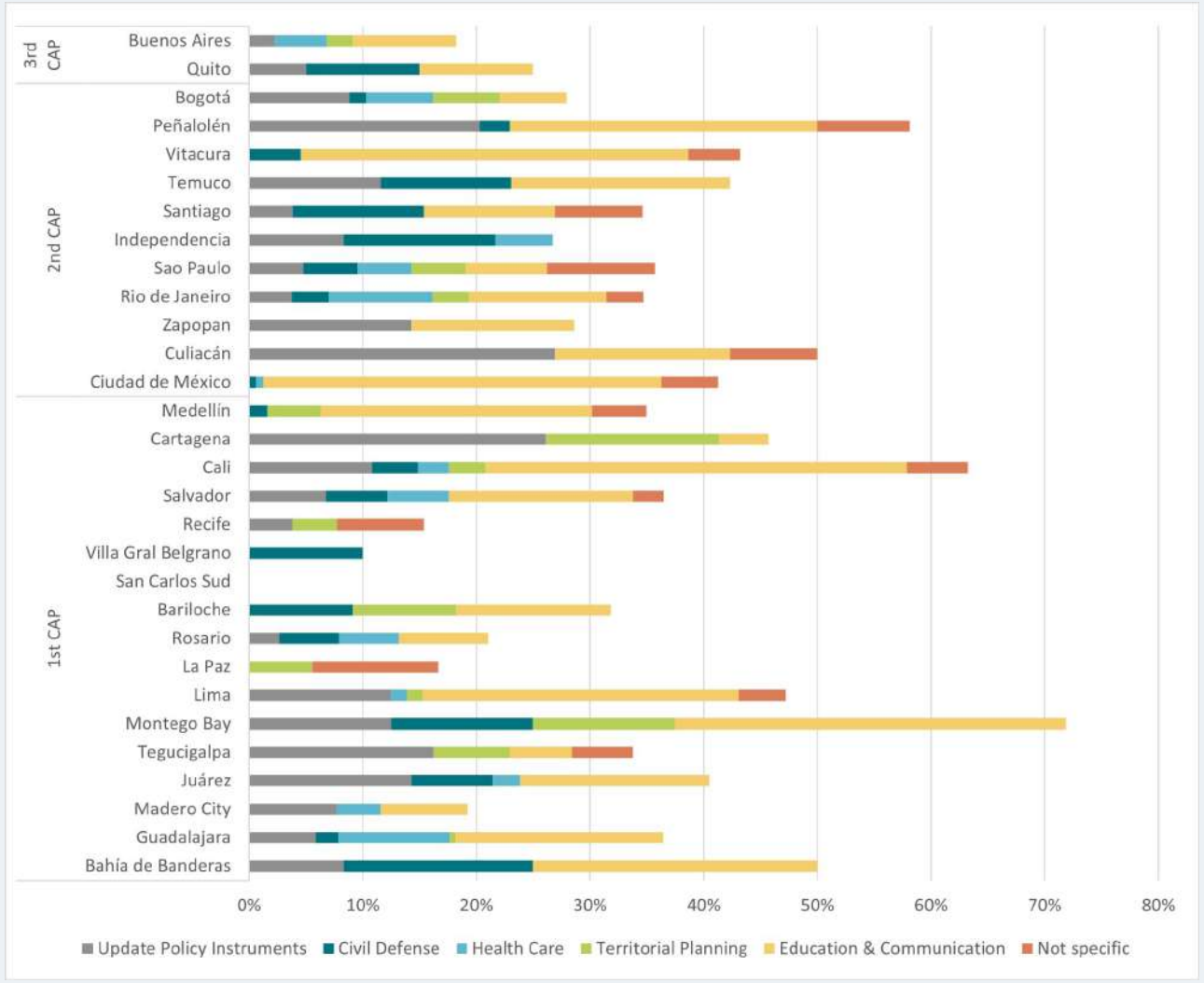
The Sunburst chart shows the sum of all adaptation actions found in the 30 CAPs analyzed that fall into a specific category. In total 622 actions were classified.

How do cities compare?
Adaptation Actions

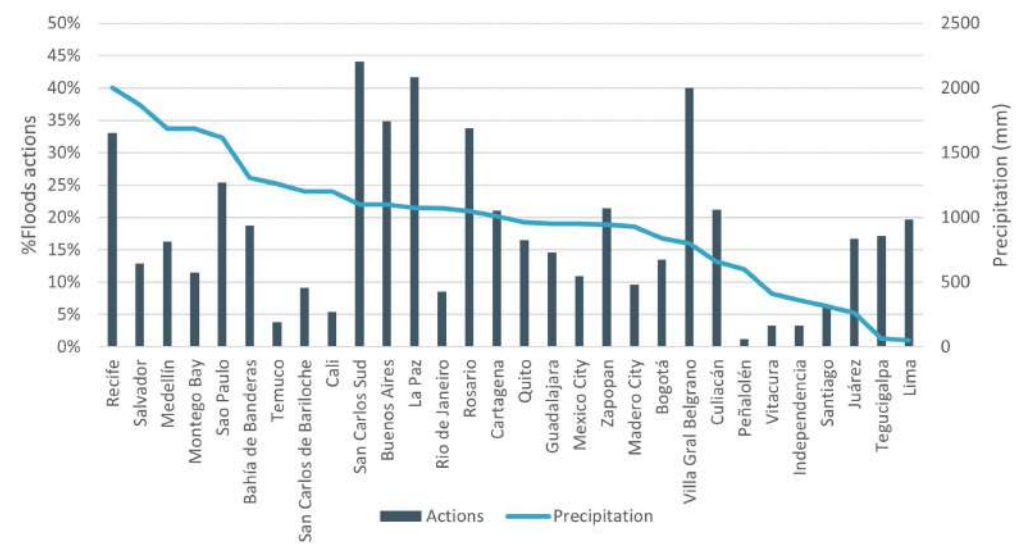
In cities developing their 1st or 2nd CAP, general actions were between 30-40% of total adaptation actions. In contrast, cities with more experience in CAPs had a lower % of general adaptation actions.

It is noteworthy that **general adaptation actions**, such as creating or strengthening public policy instruments, strengthening civil defense capabilities, educating the population on climate risk, and issuing appropriate communication awareness campaigns are **important first steps for a city to develop the conditions that might enable further climate adaptation actions.**

We can expect that as cities gain more experience and create enabling conditions for climate action, their climate actions become more specific



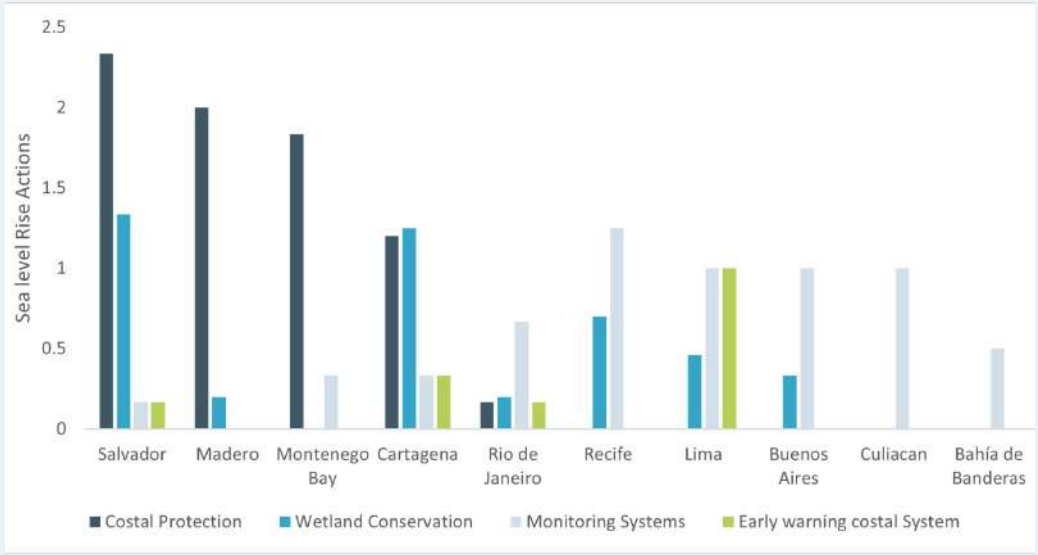
How do cities compare?
Adaptation Actions Floods and Sea-level rise



Floods and precipitation

% of flood actions are not correlated to average precipitation.

Temuco has high precipitation but only one flooding action (wetland conservation). In Salvador, Medellin, Montego Bay, and Rio de Janeiro average precipitation values are high but % of flooding actions is low because their CAPs have many general adaptation actions, which reduces flooding actions %, **in reality, they have all addressed flooding risks in their CAPs.** Because of the different methodologies and reporting formats used across CAPs, it is difficult to compare flooding risk per city. **However, all cities have identified flooding as a climate hazard.**

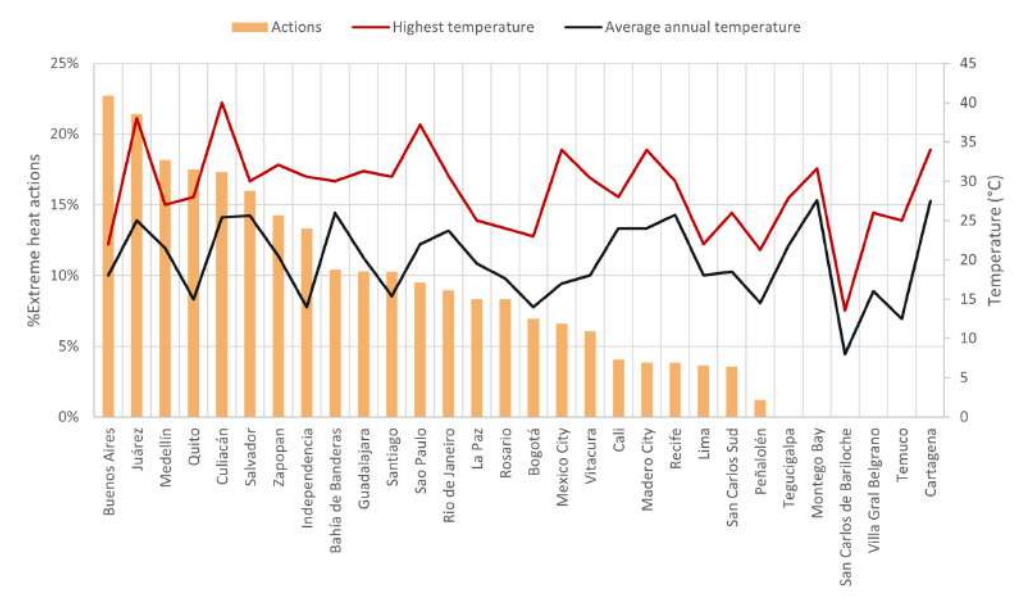


Coastal Cities

All coastal cities had at least one type of sea-level rise mitigation action.

Madero was the only coastal city not to include a monitoring or early warning action, although it did include coastal protection actions such as the construction of wave breakers. **Only 4 cities included coastal protection actions which tend to be more expensive.**

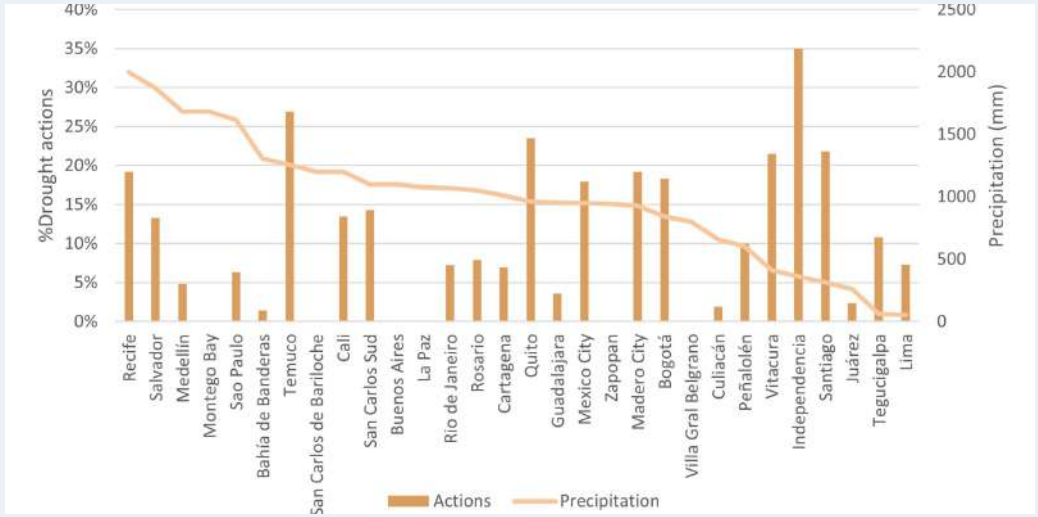
Adaptation Actions Extreme heat & Droughts



Extreme heat

% Extreme-heat actions are not correlated with maximum or average temperature.

The cities with an average maximum temperature higher than 30°C and that have more than 10% of actions intended for extreme heat are Juarez, Culiacan, Zapopan, Bahia de Banderas, Guadalajara, Santiago, and Sao Paulo.
Despite their high temperatures Montego Bay and Cartagena do not have extreme heat actions. Nevertheless, both have actions aimed at reducing biodiversity loss which could mitigate heatwaves.



Droughts

Not all cities with low precipitation address drought-related risks in their adaptation actions.

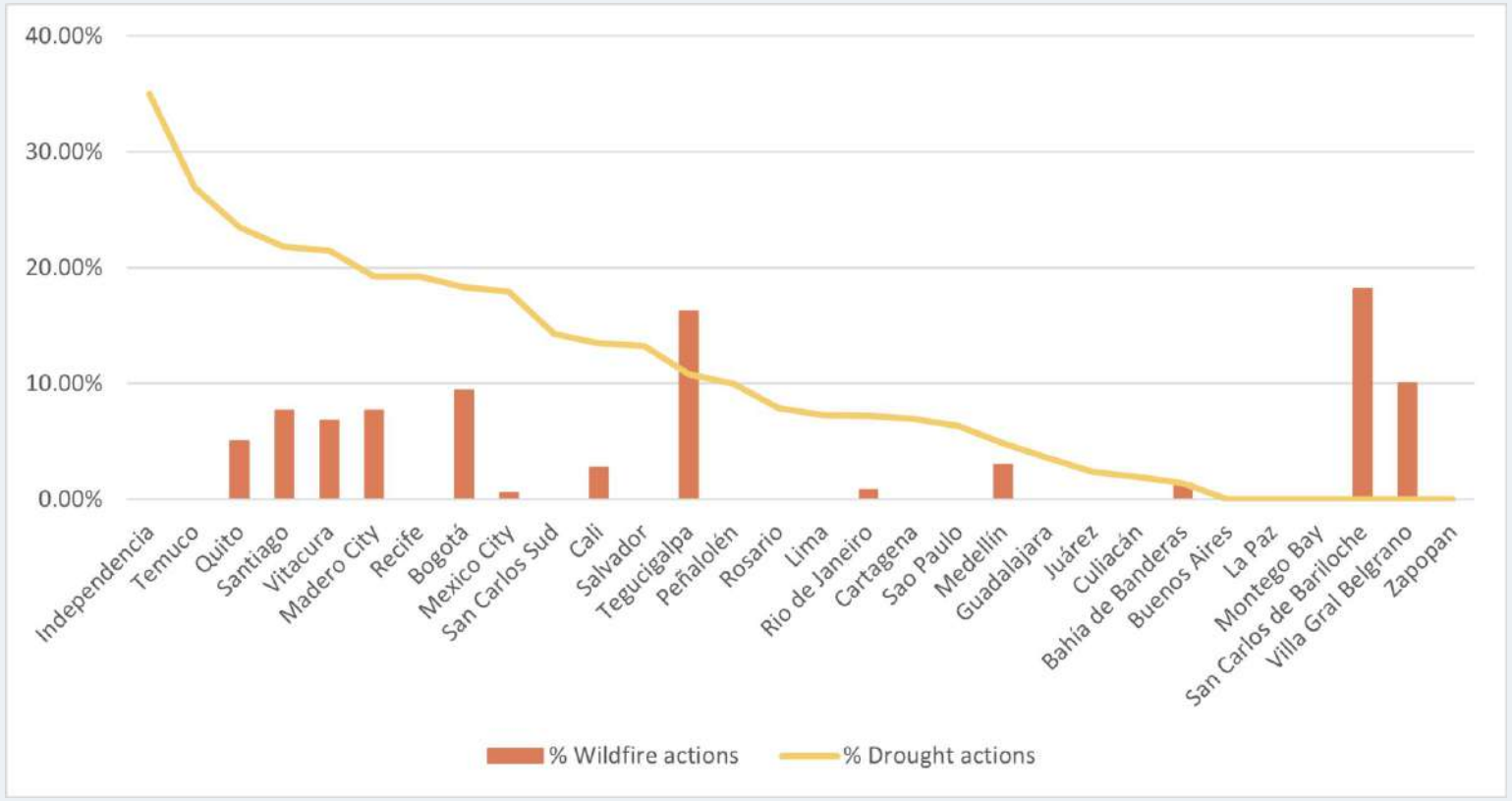
Of cities with less than 1000 mm of average yearly precipitation, only Villa General Belgrano, Culiacan, and Juarez have less than 5% of adaptation actions designed for drought, and neither include water efficiency. Villa General Belgrano has no drought-related actions.

Adaptation Actions Wildfire

Although droughts can produce changes in fire regimes, there is no correlation between cities implementing drought adaptation actions and those that include wildfire adaptation actions.

It should also be noted that only 13 cities included wildfire actions in their CAPs compared to 24 that implemented drought actions.

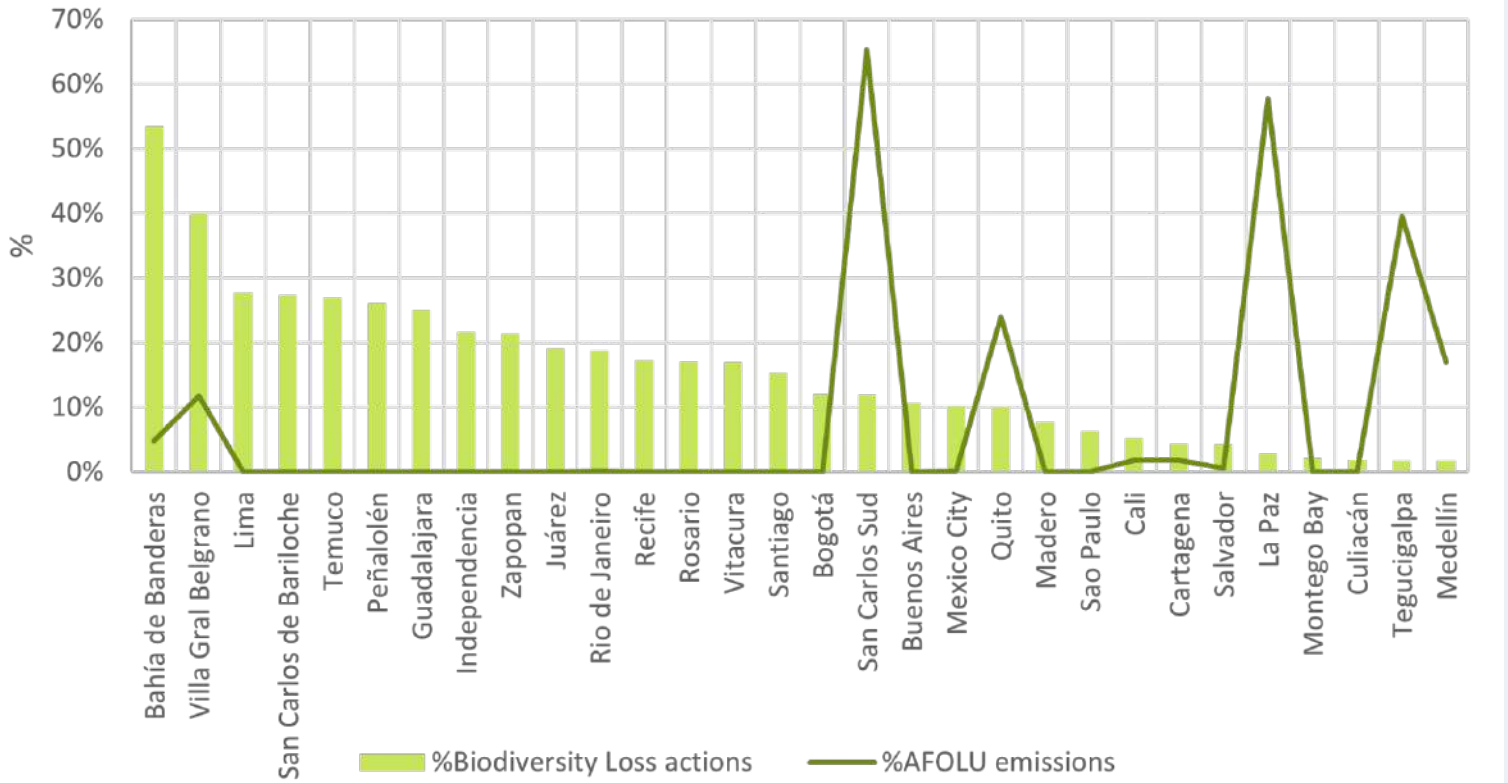
Anthropogenic factors disproportionately increase forest fire risk conditions, which might be why some cities include wildfire actions even if they do not include drought adaptation actions.



Adaptation Actions Biodiversity loss

Even though most of the cities did not quantify their AFOLU emissions, **all cities include biodiversity loss actions.** San Carlos Sud, La Paz, Tegucigalpa, and Quito had the highest % of AFOLU emissions and a lower % of biodiversity loss actions than cities that did not measure their AFOLU emissions.

We can infer that most cities consider biodiversity loss as a climate threat even if they do not quantify the impact that this has on their carbon footprint.



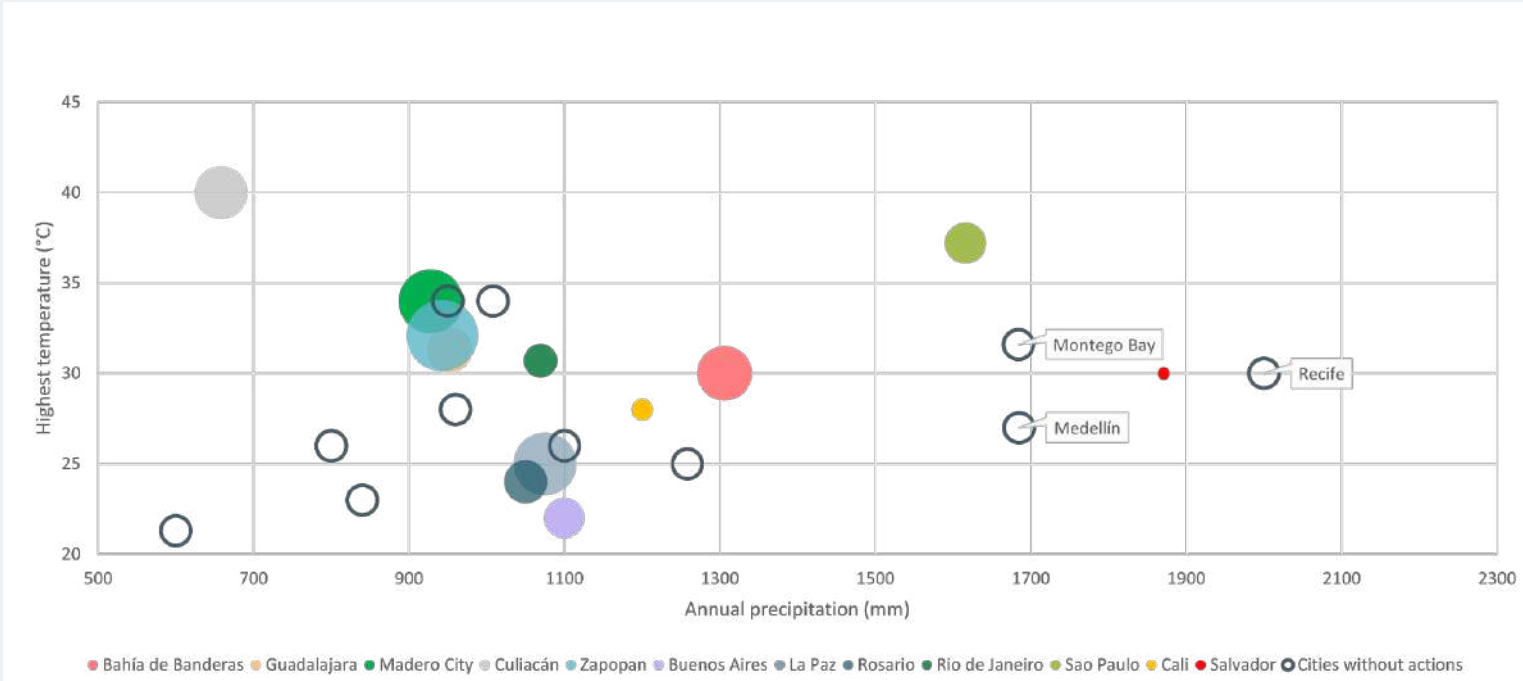
How do cities compare?
Adaptation Actions Vector-borne diseases

25% of the cities that identified biological hazards as a climate risk in their CR&V assessment do not have any vector-borne diseases related climate actions.
On the other hand, some cities that do not identify biological hazards as climate risks do include climate actions for this risk.

The cities with the highest percentage of vector-borne diseases actions are concentrated between 900-1300 mm average yearly precipitation and 20-35 °C maximum temperature.

Despite their high average precipitation and maximum temperature, Recife, Montego Bay, and Medellin did not include vector-borne diseases actions or identify them as climate hazards.

% vector-borne diseases actions are not correlated with temperature or precipitation.



Circle size is proportional to %vector borne disease actions

Climate Actions: Detailed Analysis

To generate a more detailed analysis of climate actions a total of **170 mitigation and 160 adaptation actions were analyzed.** Actions were selected based on priority level. If the priority level was not specified in the CAP actions were selected based on relevance.

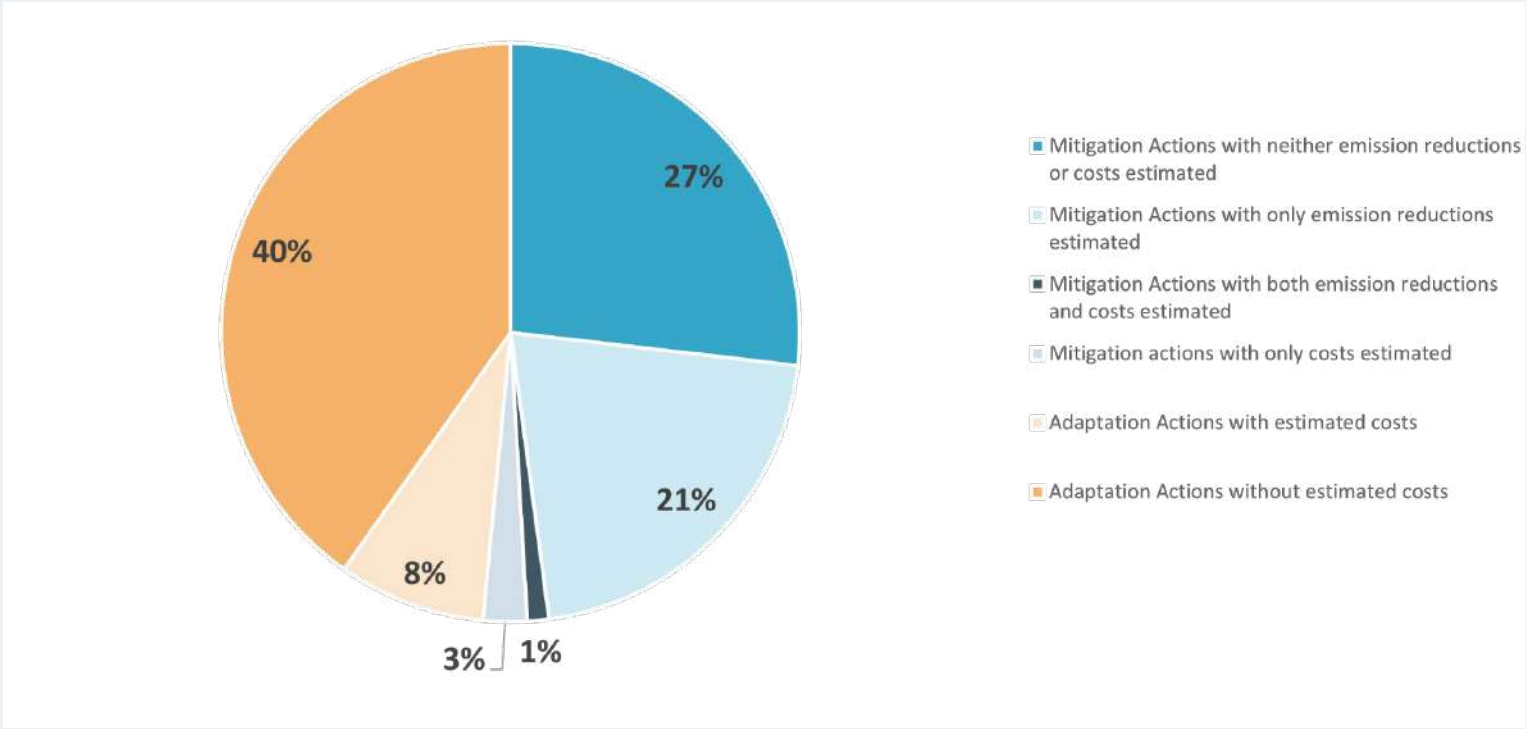
Although most cities state that they have identified financing sources for their climate actions (usually through federal, state, and municipal funds) most CAPs do not estimate costs per action. **There is an urgent need to identify financing sources both for adaptation and mitigation actions.** The lack of costing information is problematic because **without an estimated budget, funding sources might not be realistic.**

Mitigation Actions

12 estimated action costs
73 estimated emission reductions
4 estimated both emission reductions and cost.

Adaptation Actions

27 estimated action costs



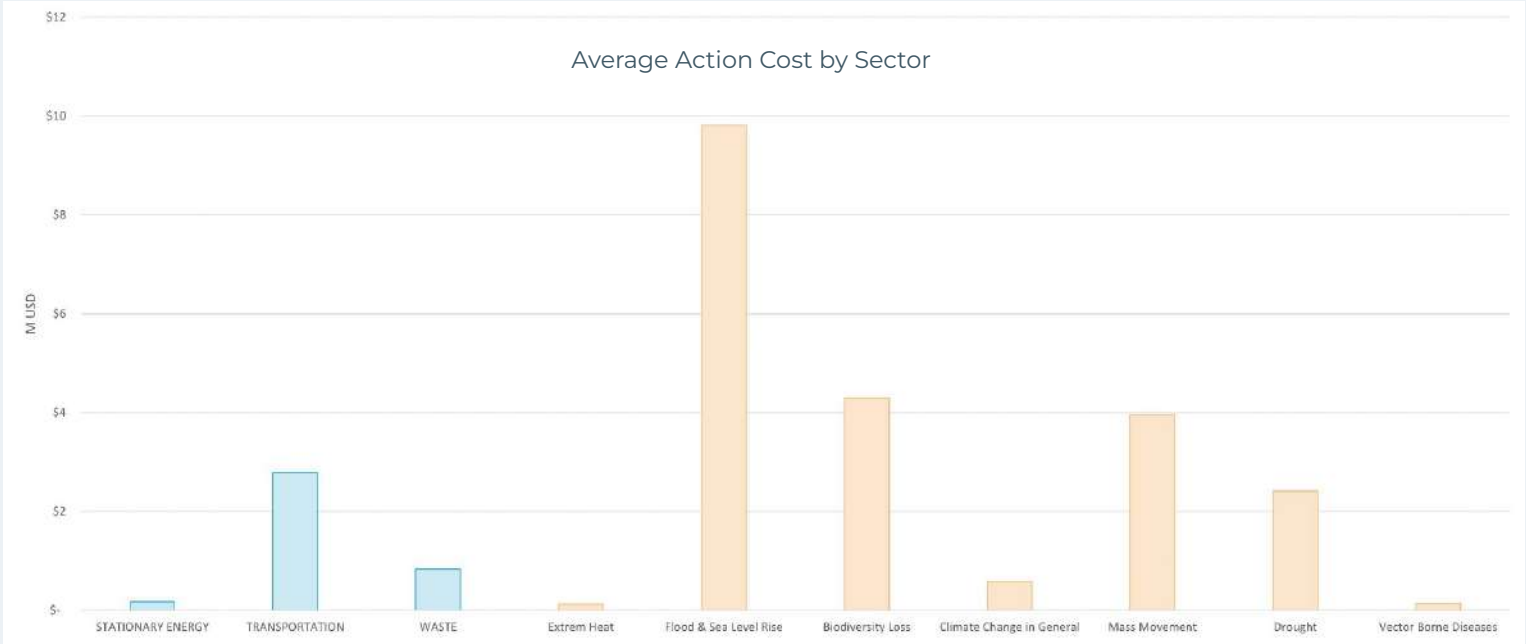
Climate Actions: Detailed Analysis

Action Costs by Sector

Climate Actions costs per mitigation action range from **847M USD** in Cartagena to **8.6 thousand USD** in Villa Gral Belgrano.

The highest average action costs are $93M from Flood and Sea-level rise adaptation actions, although those are largely driven by three outliers the implementation of Cartagena's Drainage Master Plan ($847M) and coastal protection works ($66M), and the rehabilitation of Tegucigalpa's sewage system ($116M).

On average, adaptation actions have higher costs than mitigation actions. However, due to the small sample size, this might not be representative.



Average Action Costs by Sector

Mitigation Adaptation

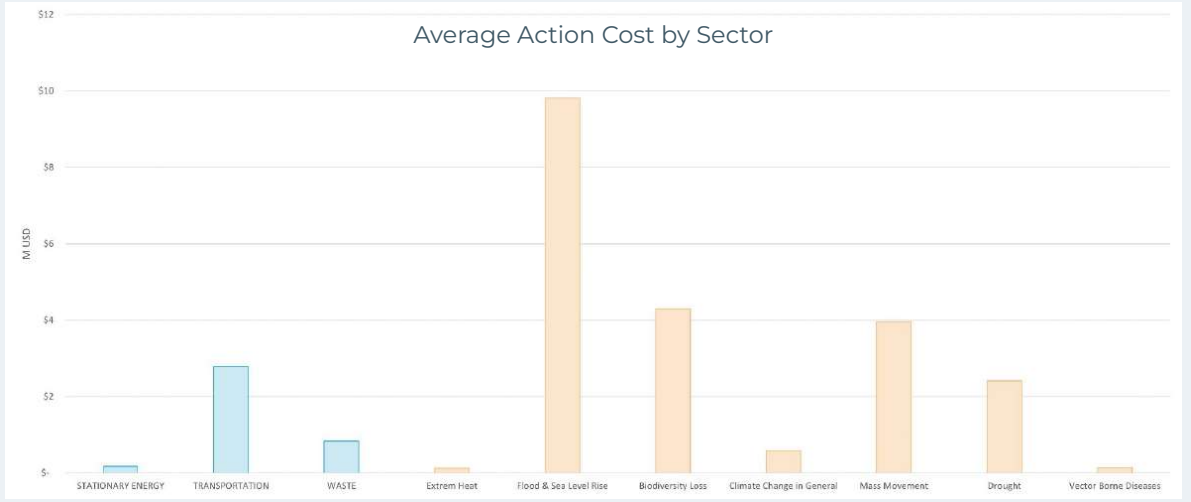
Climate Actions: Detailed Analysis Action Costs by Sector

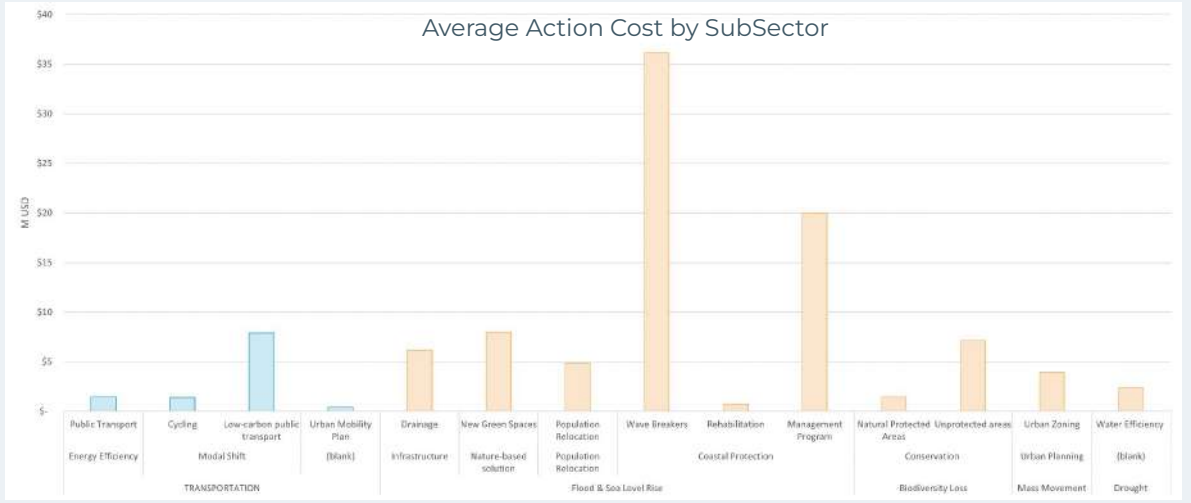
Without outliers, flood & sea-level rise ($11M), biodiversity loss($4.3), mass movements($4M), transportation ($2.8M) and drought($2.4M) have the highest average costs.

Breaking those sectors up into sub-sectors **coastal protection actions, specifically wave breakers ($36M) and a management program($20M) are the most expensive actions**. In contrast, coastal rehabilitation is much cheaper ($0.7M). **All other flood & sea-level rise sub-sectors have more uniform costs that range from $4.8M to $8M.**

For the transportation sector fomenting modal shift through **increasing low-carbon public transport** has an average cost of $7.9M, this **is significantly higher than energy efficiency actions in public transport** ($1.4M), although this could be a result of the small sample size.

Finally, the **conservation of Natural Protected Areas($1.4 M) is less expensive than conservation efforts in unprotected areas ($7.15).**





Average Action Costs by Sector

- Mitigation
- Adaptation

Climate Actions: Detailed Analysis

Emission Reductions by Sector

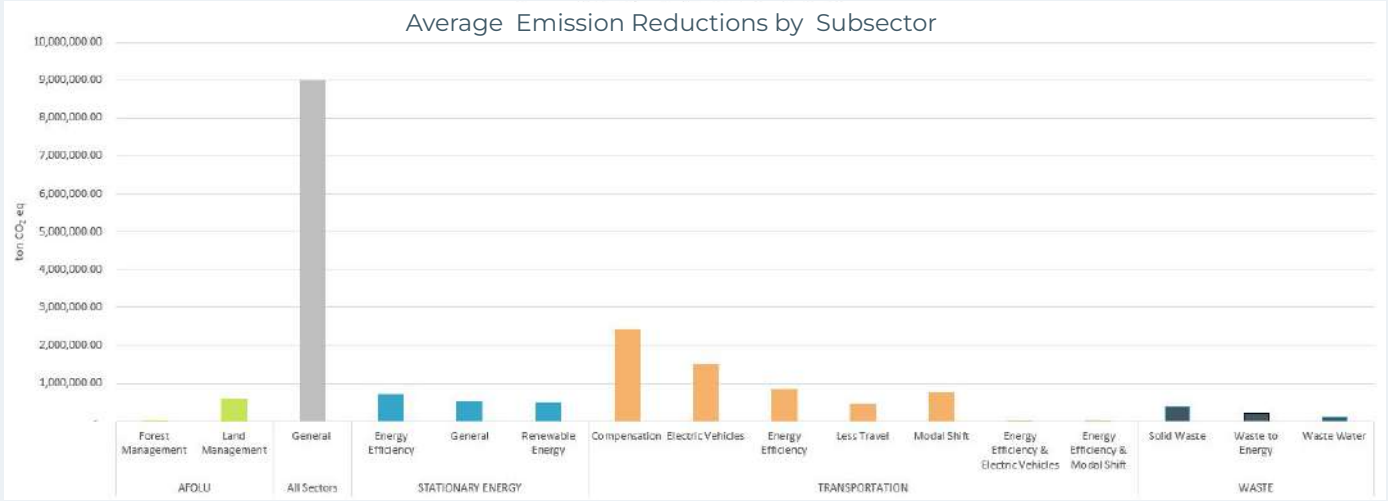
Looking at overall emission reductions from all the mitigation actions analyzed, the biggest contributors to emission reductions are the implementation of a **general emission reduction action** in Rio de Janeiro and the **compensation of transportation emissions** in Recife.

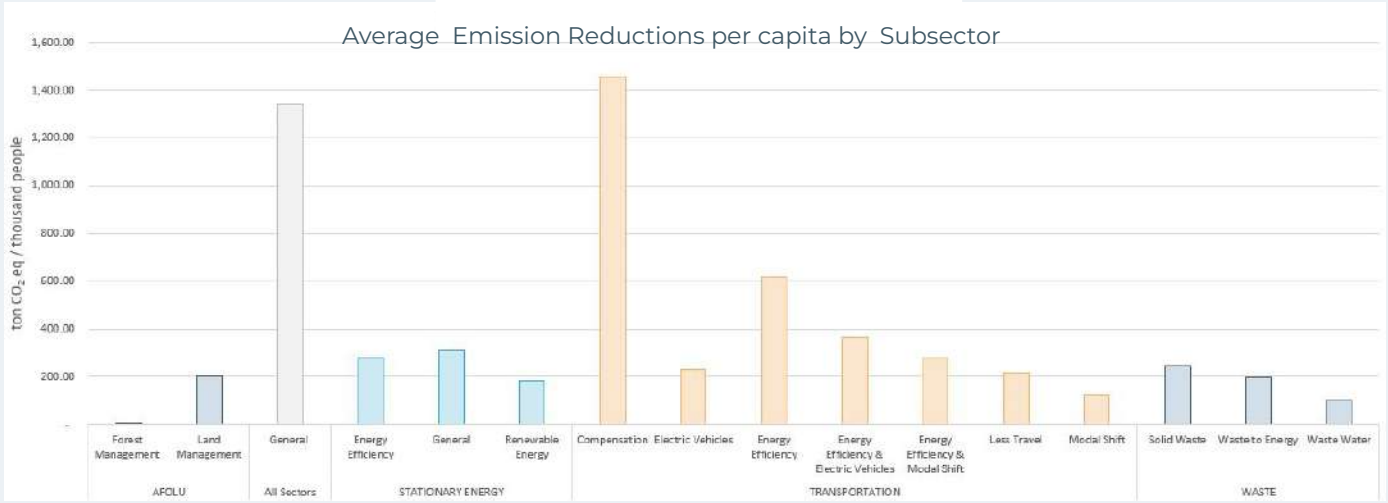
After those two outliers, **electric vehicles, energy efficiency** (both in **transportation** and **stationary energy**) and **modal shift** have the largest emission reductions.

However, total emission reductions per action do not account for the differences between countries and their GHG emissions. When comparing emissions per capita the distribution of emission reductions changes.

Now, **general stationary energy actions** and **energy efficiency** (in both **transportation** and **stationary energy sectors**) have a bigger contribution to per capita emission reductions than **electric vehicles.**

Solid waste actions have similar per capita emission reductions to **land management actions.**





Climate Actions: Detailed Analysis: Mitigation Actions

	Best Sellers	# actions	Largest Emission Reduction	CO_2 ton $_{eq}$ / k people
Stationary Energy	**Energy efficiency** in existing buildings	71.5	**Energy efficiency** in existing buildings	740
	Distributed **renewable energy**	48.5	**Energy efficiency** in the industrial sector	370.2
	Energy Efficiency in Public lighting	25.8	**General** stationary energy reductions	309.6
Transport	**Modal Shift** to:		Emission **Compensation**	1,456.3
	Public Transport	47.3	Increase in private **vehicle efficiency**	791.6
	Cycling	36.2	Increase **vehicle efficiency** and electric vehicles	366.9
	Walking	37	Urban Planning to **reduce travel**	356.8
Waste	Recycling of **solid waste**	34.9	Composting of **solid waste**	508.5
	Improving **solid waste** collection	29.8	Promotion of **Circular Economy**	341.3
	Wastewater treatment	26.7	Not specific **waste to energy**	206.6

Climate Actions: Detailed Analysis: Adaptation Actions

	Best Sellers	# actions	Costs	USD per capita
General Adaptation Actions	○ **Education** & Communication	111.6	○ **Education** & Communication	5.16
	○ Update **Policy Instruments**	56.7	○ Territorial Planning	0.39
	○ Increase **Civil Defense** Capabilities	22	○ Update **Policy Instruments**	0.50
Flooding/ Sea level rise	○ Drainage **Infrastructure**	22.6	○ Drainage Infrastructure	195.91
	○ New **Green Spaces**	19.7	○ Wave Breakers	172.88
	○ Wetland **Conservation**	10.3	○ Coastal Protection	65.76
Biodiversity loss	○ Urban **Afforestation**	27.1	○ **Conservation** of unprotected areas	29.6
	○ **Conservation** of Natural Protected Areas	23.3	○ **Conservation** of Natural Protected Areas	1.07
	○ **Monitoring & restoration**	20		
Drought	○ **Water Efficiency**	19.1	○ **Water Efficiency**	11.53
	○ **Rainwater recovery**	11.5		
	○ **Conservation** of water basin	11		
Extreme Heat	○ Increase **tree cover**	19.3	○ Increase **tree cover**	0.53
	○ **Green roofs** and/or **walls**	7.8		
Mass Movements	○ **Urban Zoning**	10.2	○ **Urban Zoning**	3.90
	○ **Urban resettlement**	6.8		

How do cities compare?

Takeaways: Best Practices found in CAPs

Mitigation

Diagnostic

- GHG Emission Inventories are **as detailed as possible** (Sao Paulo, Mexico City).
- In addition to emission reduction scenarios, CAP developed a **future emission baseline scenario (BAU)** which can then be used to evaluate mitigation goals (most CAPs).
- BAU and Emission reduction scenarios **include the same sectors as the Emission Inventory** (most CAPs).

Actions

- Mitigation actions **include an estimate of the expected mitigation reductions** produced after the action is implemented. This would facilitate action prioritization and provide an additional indicator to measure the actions' success (La Paz, Recife, Rio de Janeiro).

Adaptation

Diagnostic

- The CR&V Analysis is **thorough and has a clear explanation of the methodology** used (Villa General Belgrado, Cartagena, Quito, Bahia de Banderas).
- Climate risks **include potential economic loss related to climate change** (Salvador, Independencia, Montego Bay).
- The CR&V Assessment **prioritizes climate risks** (Cartagena).

Actions

- Adaptation actions **have a metric for risk reduction potential** (Medellin).

All Climate Actions

- Actions are budgeted and **cost estimates for each action are included** (No CAP included costs for all actions but both Cartagena and Zapopan included cost estimated for all adaptation actions).
- Most actions have **identified financing sources** (La Paz, Salvador, Rio de Janeiro, Independencia).
- Selected **actions are prioritized**. This is especially useful for adaptation actions that do not have a clear mechanism for comparing expected impact (Independencia, Peñalolén, Honduras).
- PACs **describe the criteria used for action selection** such as cost-benefit, cost-effectiveness, multicriteria analysis, etc. (Rio de Janeiro, Salvador, Bahia de Banderas).
- Cities **identify barriers and opportunities for CAP implementation** (Medellin).

Takeaways

Mitigation

- Some cities need to improve their mitigation diagnostic information, mostly Chilean cities.
- **Energy efficiency measures were the most popular stationary energy action and had the largest emission reduction potential of all stationary energy mitigation actions,** this might be because cities often have very little control over their electricity mix but more control over public lighting and building regulations.
- **The transport sector shows the largest emission reduction potential, particularly in increasing vehicle efficiency. CAPs tend to focus more on modal shift actions,** probably because they align with other municipal development plans and are easier to implement than programs aimed at increasing vehicle efficiency.
- **Waste is the only sector where the % of sector actions is consistently larger than emission %.** An explanation could be that waste management usually falls directly under the municipalities' administration and is, therefore easier for most cities to implement mitigation actions. Also, improving waste management has a series of health co-benefits

Adaptation

- Some cities destine a large percentage of their adaptation actions towards strengthening education and communication programs as well as updating policy instruments. **This actions are important first-steps for a city to develop the conditions that might enable further climate adaptation actions.** We can expect that as cities gain more experience and **create enabling conditions for climate action, their climate actions will become more specific**
- **Most cities focus on flooding risk much more than on any other climate hazard.** Because of the different methodologies and reporting formats used across CAPs, it is difficult to compare flooding risk per city. However, all cities have identified flooding as a climate hazard and include adaptation actions that directly address flooding risk.
  An explanation for the larger focus on floods could be that climate change adaptation includes disaster risk management and floods are one of the most recurrent natural disasters.

  Despite their larger costs drainage infrastructure actions were the second most common flood adaptation action.
- **Nature-based solutions actions were the most common flood and extreme heat adaptation actions.** This could be due to their lower implementation cost and multiple co-benefits.

Glossary

Climate Action Plan Recommendations

Biological Hazards: bacteria, viruses or parasites, and insects carrying disease-causing agents.

Chemical Change: chemical pollution in the air, water, and soil.

General Adaptation Actions: actions that do not address any of the listed mitigation hazards specifically but create enabling conditions for adaptation actions.

General Mitigation Actions: actions that i) do not focus on any of the listed emission sectors but create enabling conditions for mitigation actions.

Mass Movements: movement of soil under the force of gravity. The most common mass movements are landslides.

Appendix 1

Climate Action Classification by sector

Mitigation Actions

Adaptation Actions

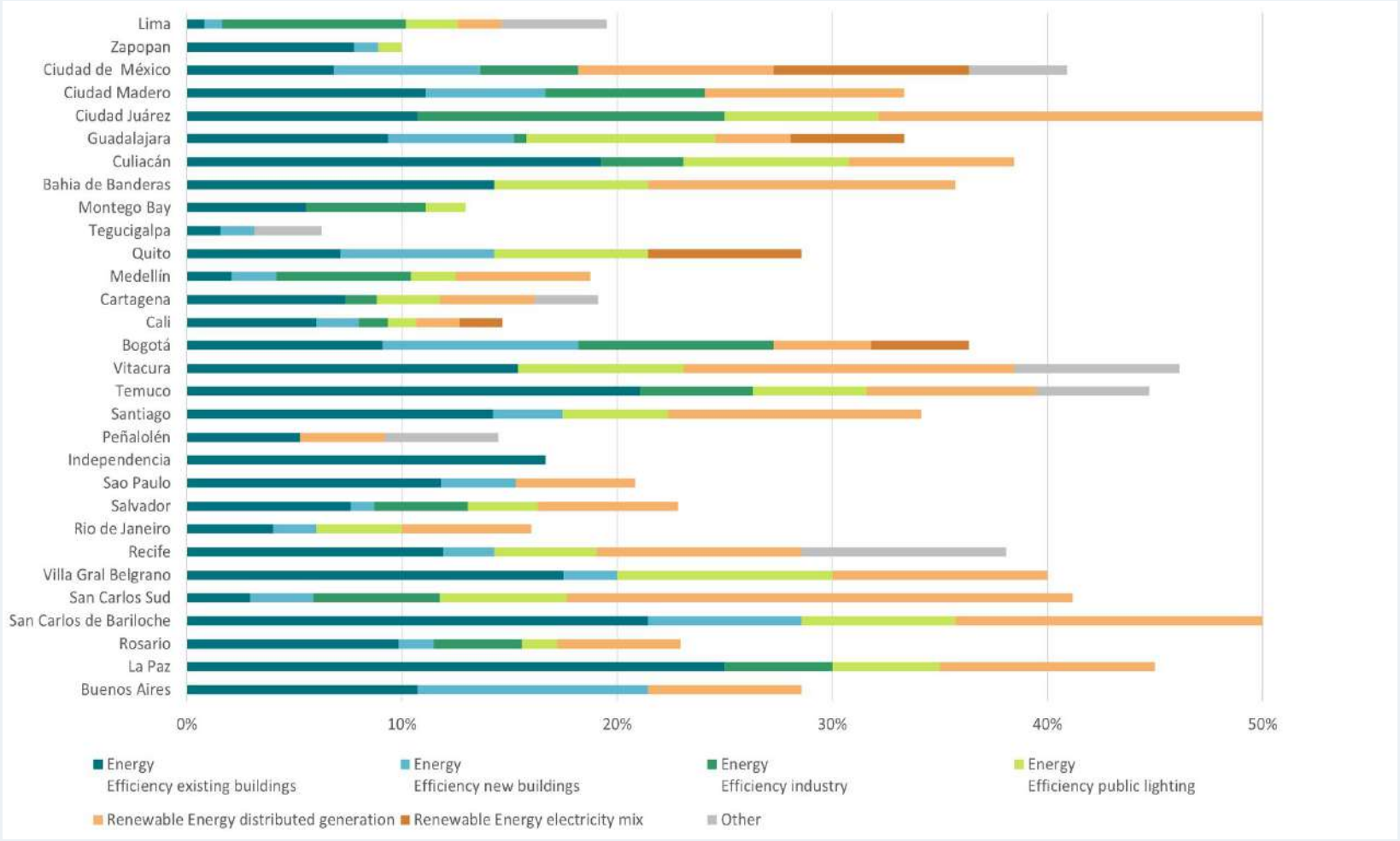
Information about Mitigation and Adaptation actions in each city.

How do cities compare?

Mitigation Actions

Stationary energy sector

Most cities focus on achieving energy efficiency in buildings (44%), followed by distributed generation (24%).

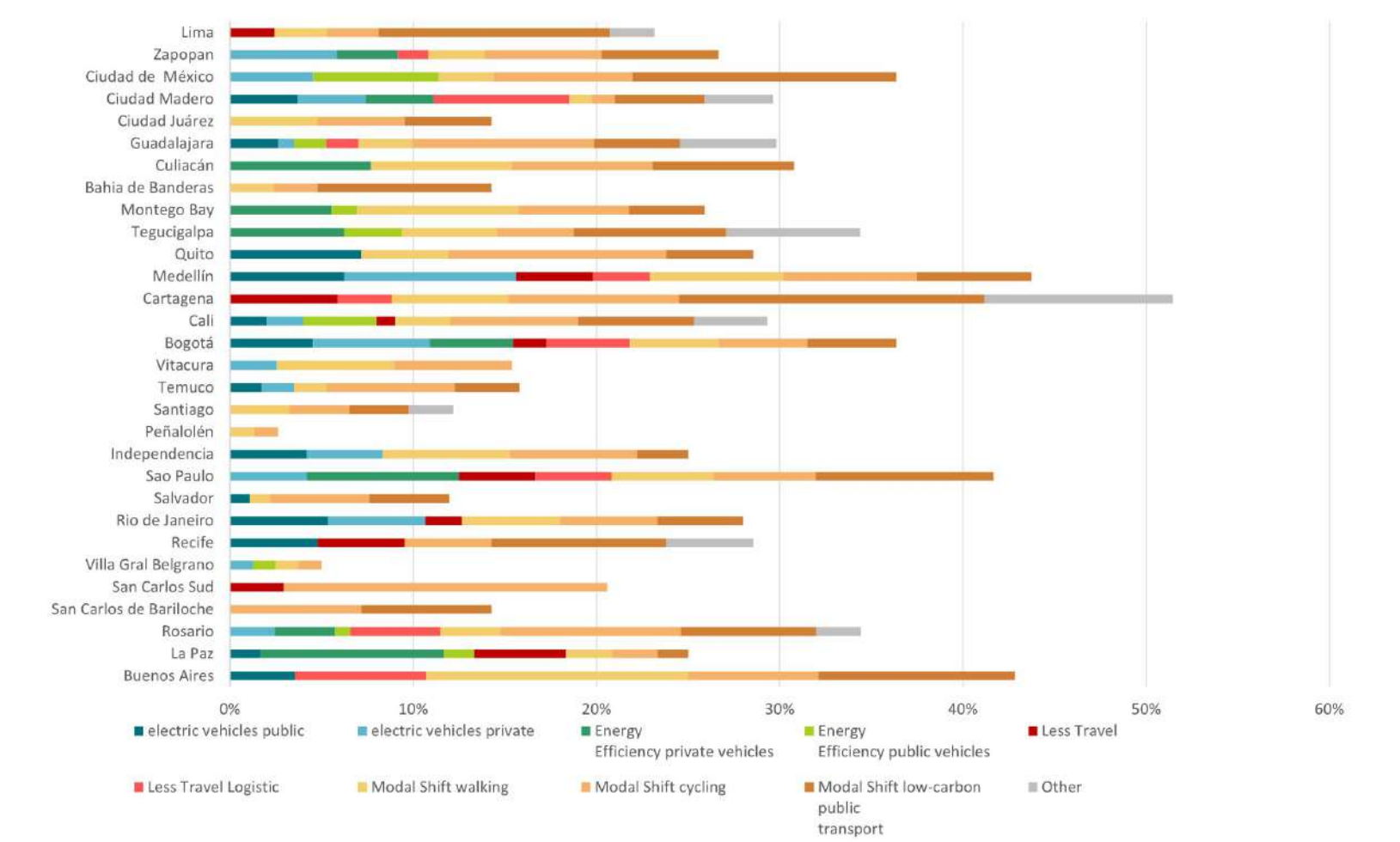


How do cities compare?

Mitigation Actions

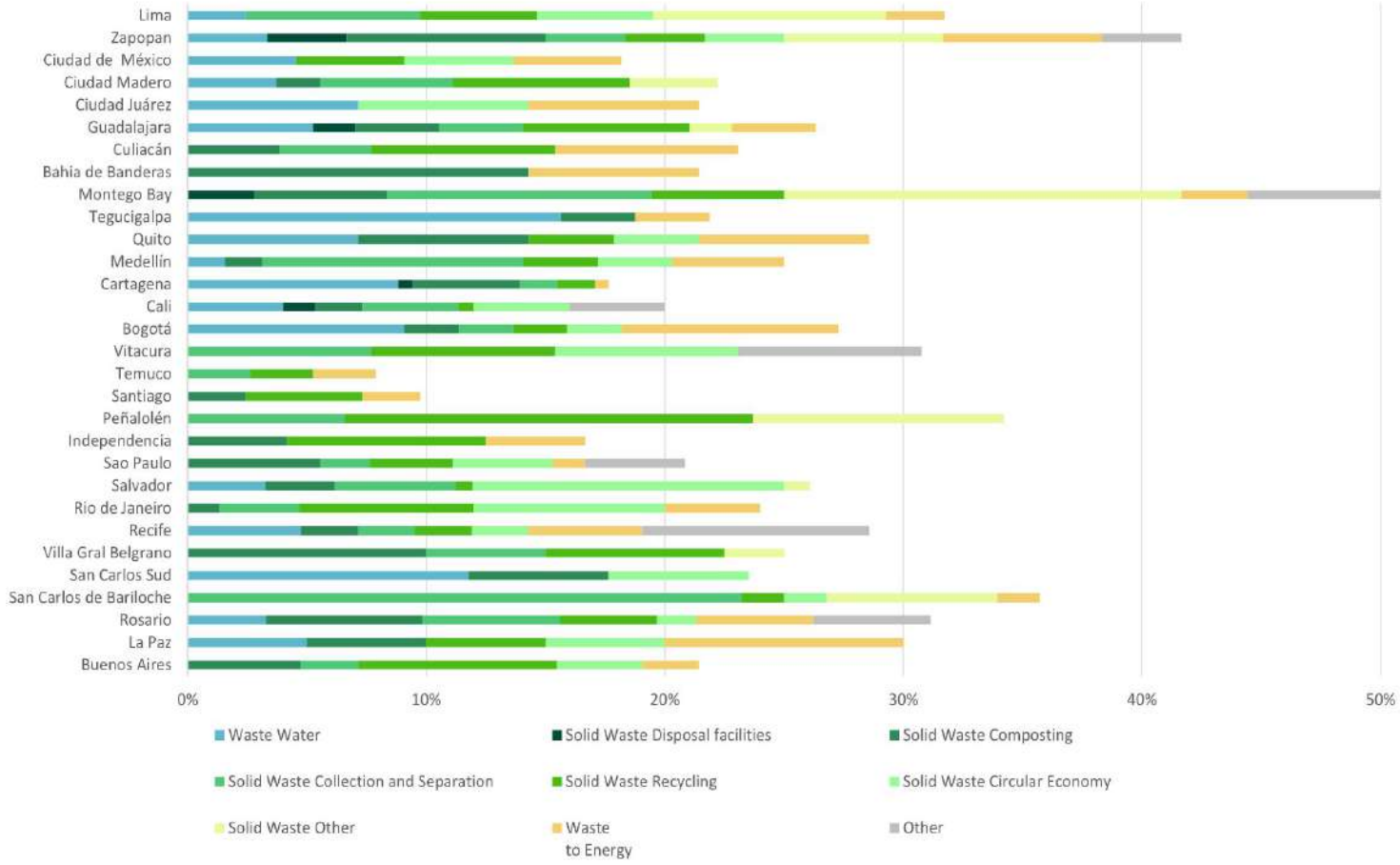
Transportation sector

Most cities focus on the role of modal shift (62%), distributed in walking(14%), cycling (24%)and low-carbon public transport, with (24%).



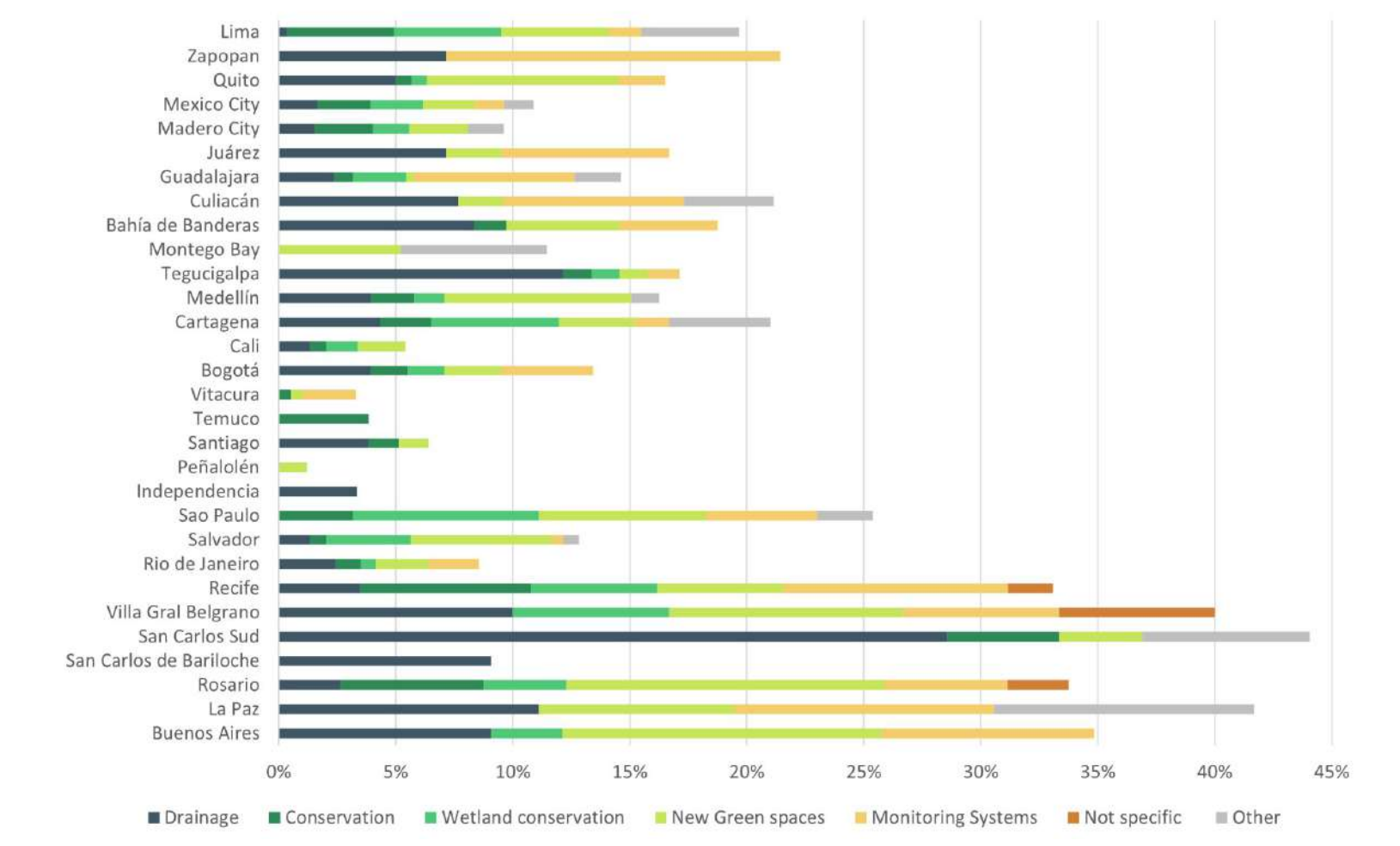
How do cities compare?
Mitigation Actions Waste sector

Most cities focus on an adequate management of solid waste to reduce waste emissions with 69% of waste actions.
The main solid waste management actions were: recycling (18%), improving the waste collection (15%), and compost (14%).



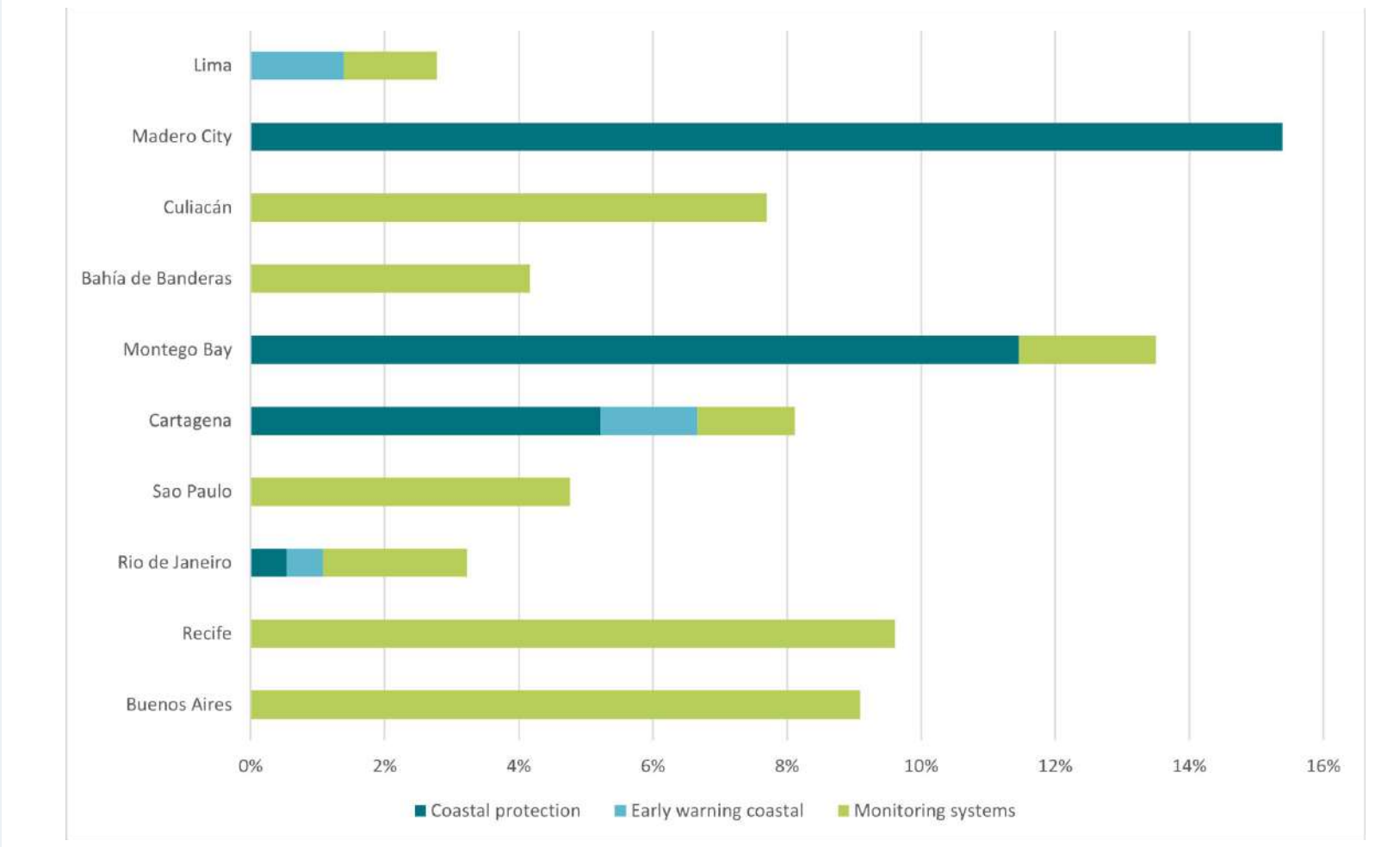
How do cities compare?
Adaptation Actions Floods

All cities identified floods as a climate threat. only about 25% of the cities have less than 10% of their actions aimed at floodings. Chile is the country with the fewest actions in this area.
Drainage actions predominate (25%), followed by implementing new green spaces (22%).



How do cities compare?
Adaptation Actions Sea-level rise

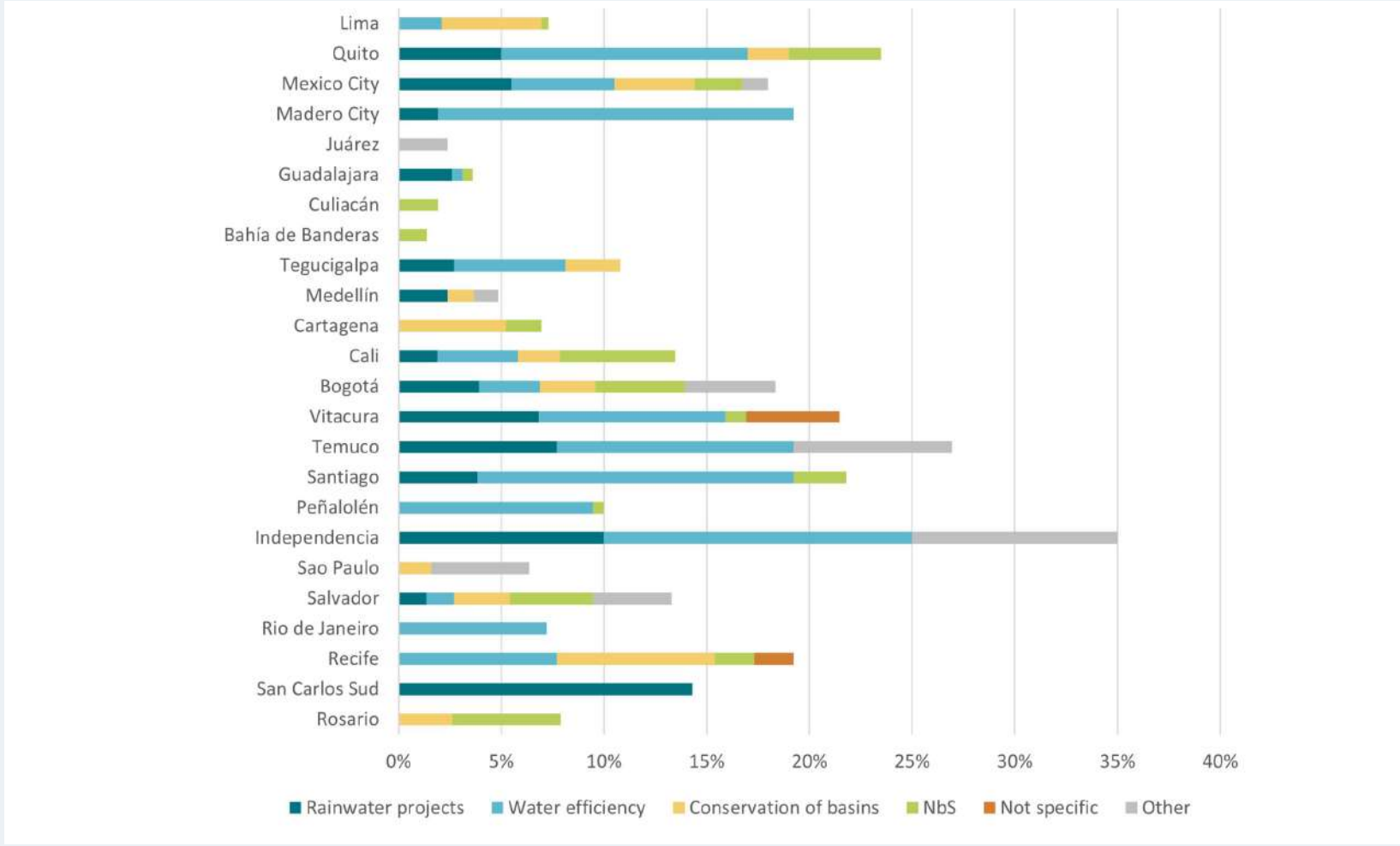
All coastal cities address sea-level rise in their adaptation actions. Monitoring systems accounted for 66% of sea-level rise actions and only 28% were destined for coastal protection.



How do cities compare?
Adaptation Actions Drought

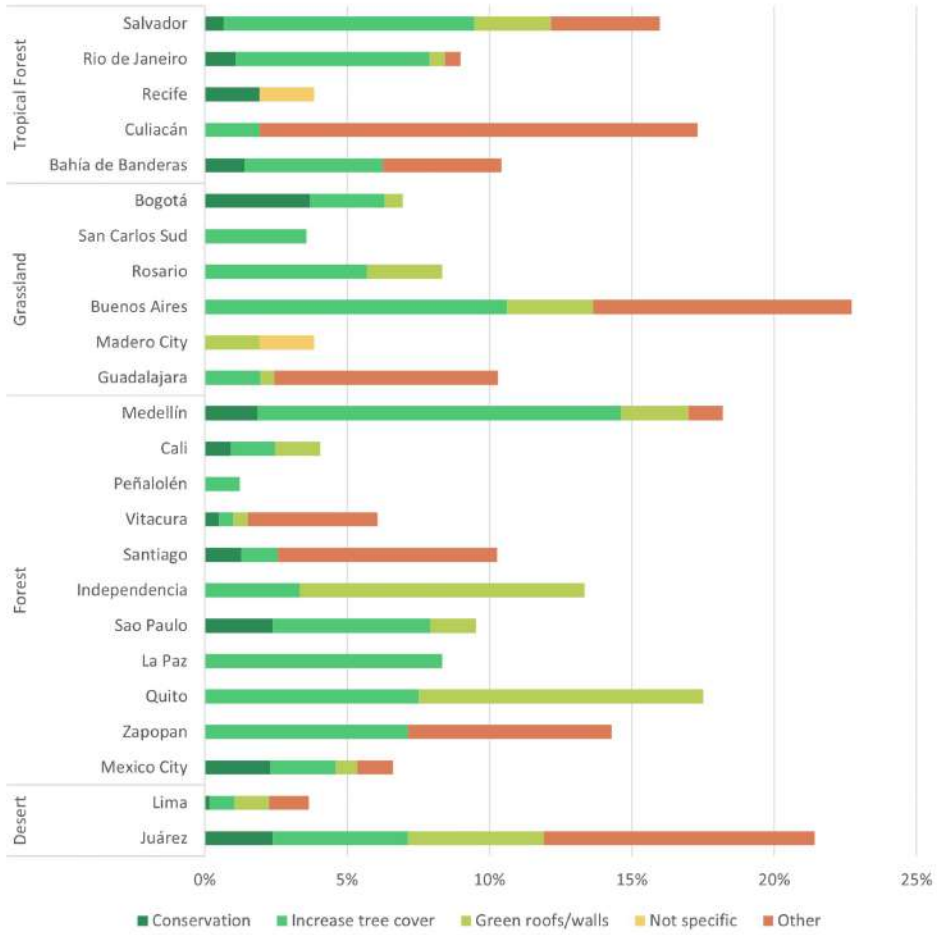
Despite 70% of cities identified droughts, 80% included actions.

- Water efficiency actions predominate (39%), followed by rainwater recovery projects (18%) and Basin conservation (18%).



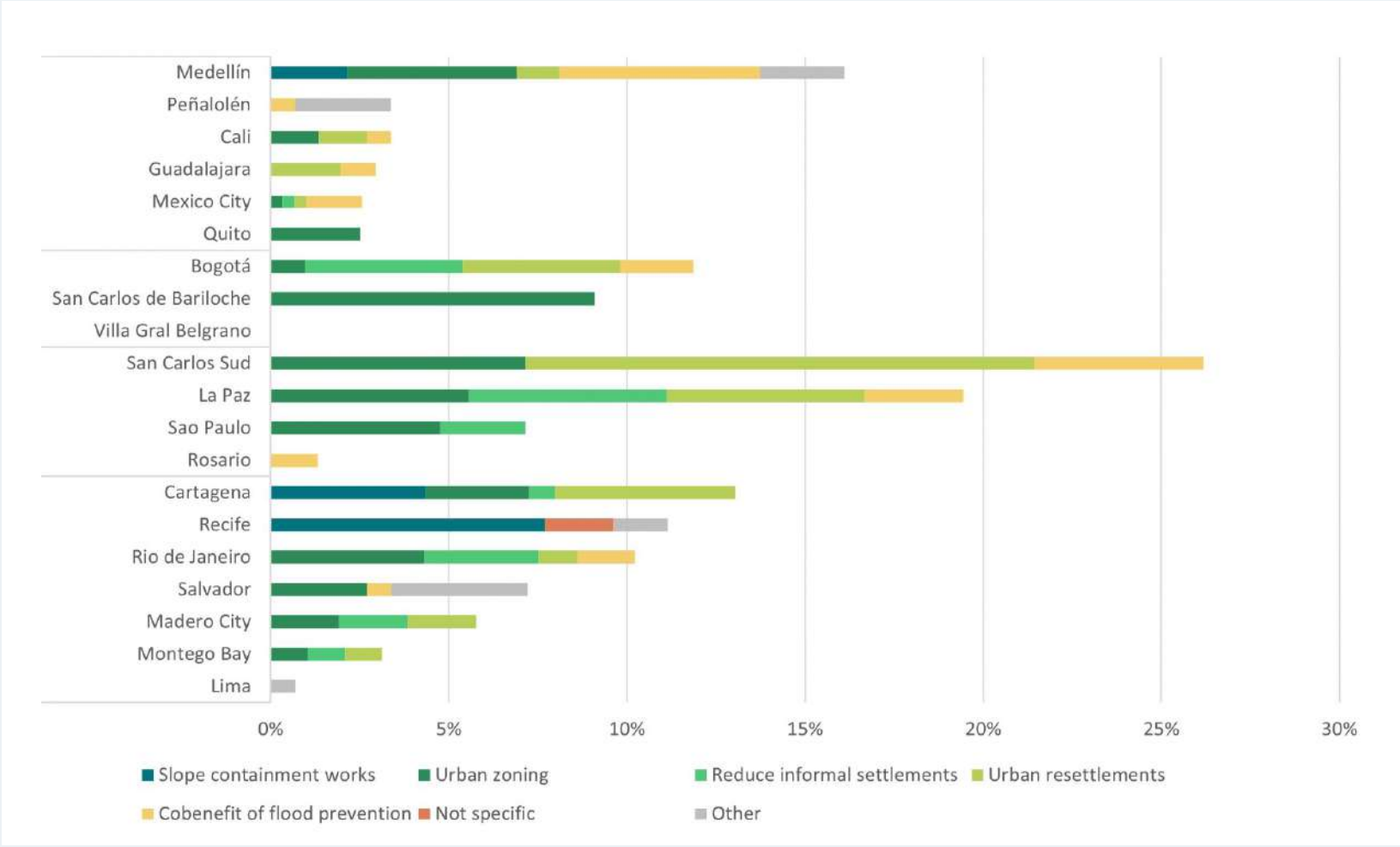
How do cities compare?
Adaptation Actions Extreme heat

- Most cities are looking to increase their tree cover to reduce the risk of extreme heat (42%). The second-largest % of extreme heat actions is “other” (31%), some of the actions included in this category are extreme temperature warning systems and health measures to prevent heat strokes among the population.
- Cities that have more percentage of actions aimed to reduce the risk of extreme heat have large populations, for example, Buenos Aires, Juárez, and Medellín.



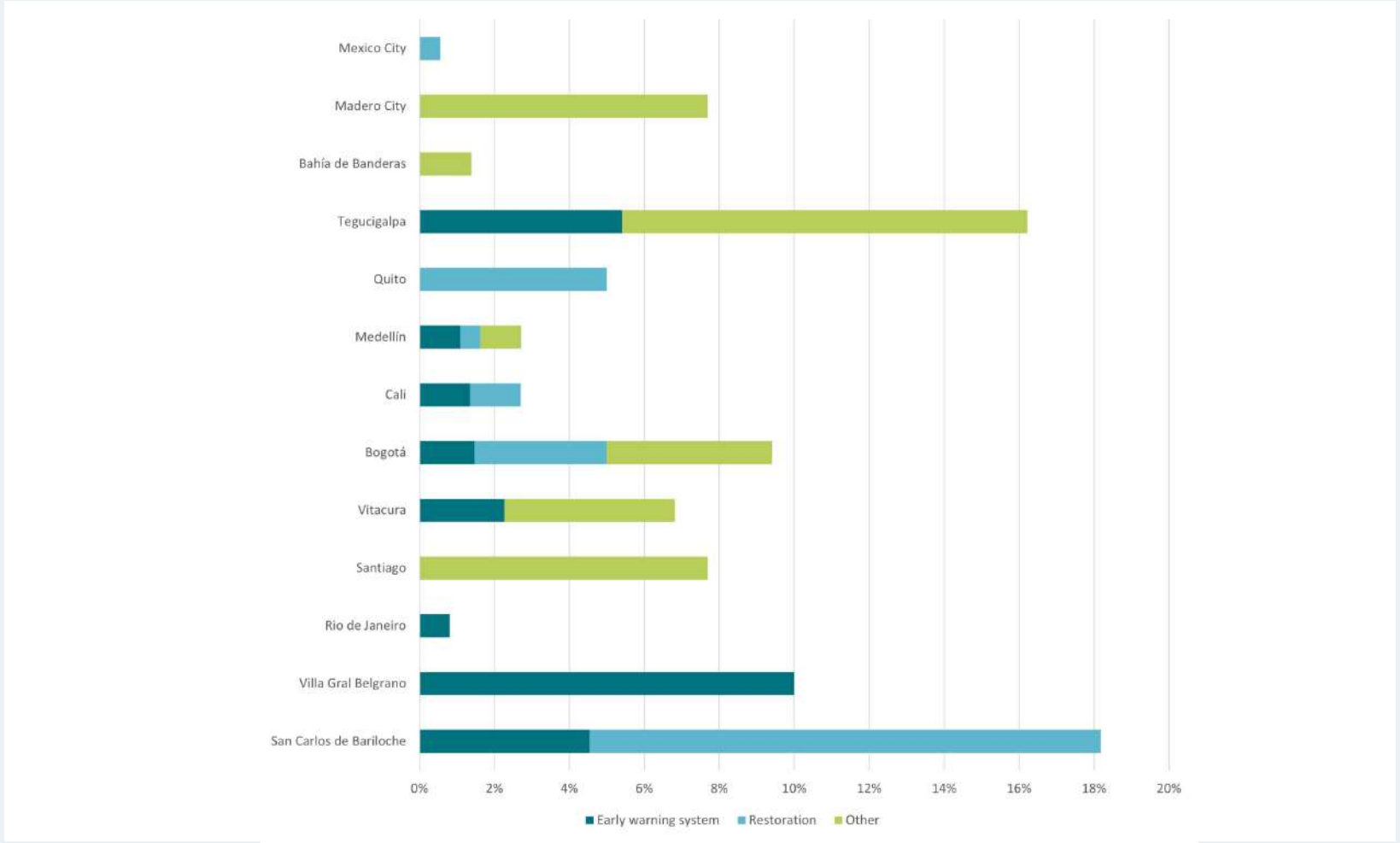
How do cities compare?
Adaptation Actions Mass movements

The majority of mass movement adaptation actions concentrate on Urban planning, mostly through urban zoning (29%) and urban resettlement (19%). Only 10% of actions relate to slope containment.



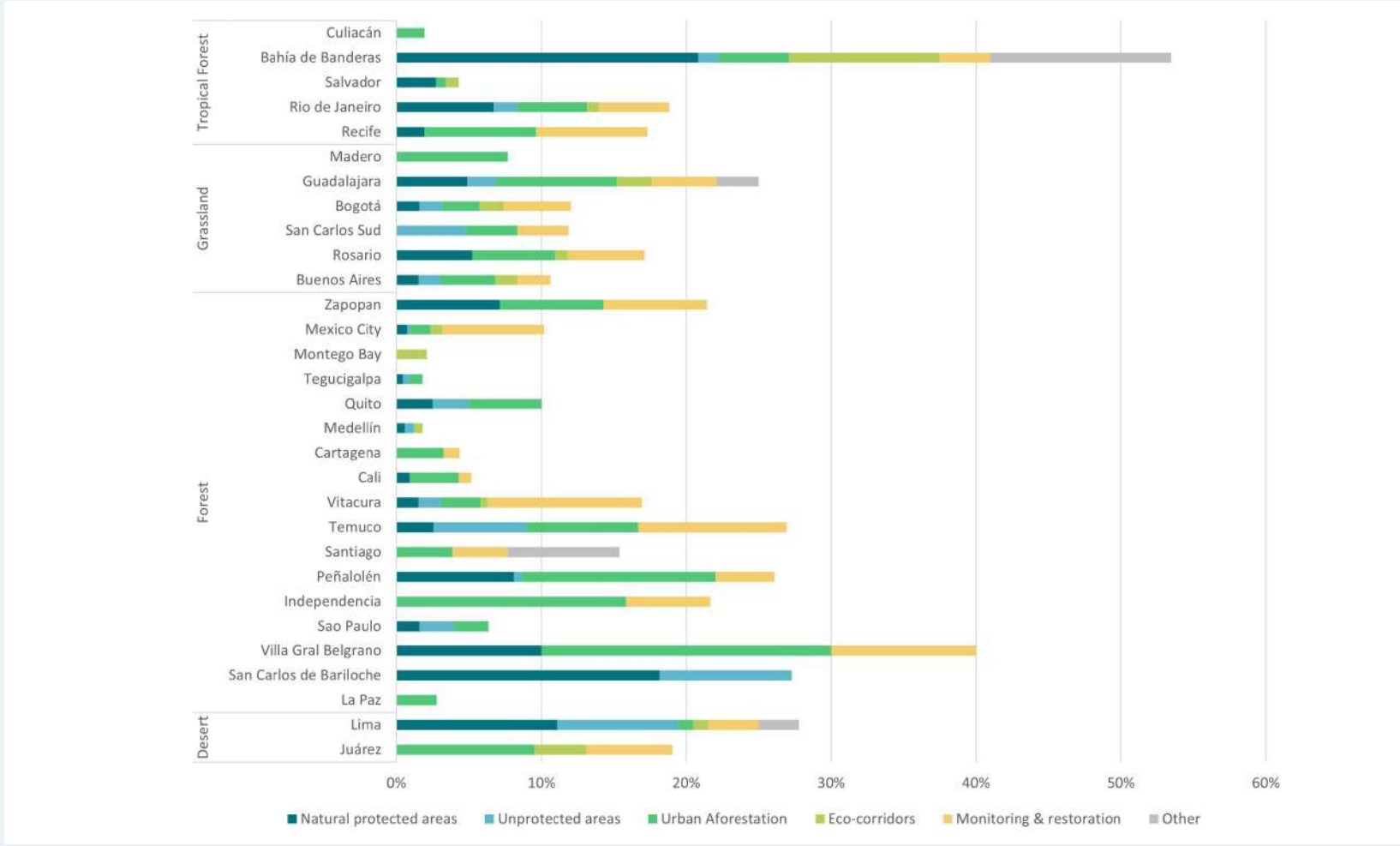
How do cities compare?
Adaptation Actions Wildfire

- Some examples of “other” wildfire adaptation actions are wildfire control and prevention. Unfortunately, the CAPs do not provide more specifications about particular mechanisms.



How do cities compare?
Adaptation Actions
Biodiversity loss

Conservation of natural protected areas (22%)predominated in biodiversity loss adaptation actions followed by urban afforestation (19%), and monitoring & restoration (14%).



Appendix 2

Exchange Rates Used

Argentina:	101.30	ARS / USD
Brazil:	5.15	BRS / USD
Chile:	839.12	CLP / USD
Colombia:	3,743.59	COP / USD
Ecuador:	The official currency of Ecuador is US dollar	
Honduras:	Tegucigalpa's CAP uses USD for all costs	
Jamaica:	114.70	JMD / USD
Mexico:	20.74	MXN / USD
Peru:	3.50	PEN / USD

City Climate Action Plan Analysis in Latin America and the Caribbean

Argentina | Brazil | Chile | Colombia | Ecuador | Honduras | Jamaica | Mexico | Peru

2022

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