City Climate Action Plan Analysis in Latin America and the Caribbean

Argentina | Brazil | Chile | Colombia | Ecuador | Honduras | Jamaica | Mexico | Peru
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.
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### City Context

**Buenos Aires, Argentina**

#### 2020 CAP

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<th>Population</th>
<th>Economy</th>
<th>Geography</th>
<th>Weather</th>
<th>GHG Emissions Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Urban</strong></td>
<td><strong>202 km²</strong></td>
<td><strong>$24 B USD</strong></td>
<td><strong>Grassland</strong></td>
<td><strong>22°C</strong></td>
<td><strong>3.97 ton CO₂ eq / person</strong></td>
</tr>
<tr>
<td><strong>Density</strong></td>
<td><strong>14,851 people/km²</strong></td>
<td><strong>GDP/capita $8,196</strong></td>
<td><strong>Coastal</strong></td>
<td><strong>18°C</strong></td>
<td><strong>484 kg CO₂ eq / MUSD</strong></td>
</tr>
<tr>
<td><strong>Elderly</strong></td>
<td><strong>0.60% yearly growth rate</strong></td>
<td><strong>Service Sector 83%</strong></td>
<td><strong>Temperate</strong></td>
<td><strong>14°C</strong></td>
<td><strong>GHG Emissions (ton CO₂ eq)</strong></td>
</tr>
<tr>
<td><strong>Children</strong></td>
<td><strong>Vulnerable Groups</strong></td>
<td><strong>Commercial Manufacture</strong></td>
<td><strong>Area</strong></td>
<td><strong>Humid</strong></td>
<td><strong>2015-2020</strong></td>
</tr>
<tr>
<td><strong>People living in barrios</strong></td>
<td><strong>2015-2020</strong></td>
<td></td>
<td><strong>Area</strong></td>
<td></td>
<td><strong>3.97 ton CO₂ eq / person</strong></td>
</tr>
<tr>
<td><strong>Vulnerable Groups</strong></td>
<td></td>
<td></td>
<td><strong>Density</strong></td>
<td></td>
<td><strong>484 kg CO₂ eq / MUSD</strong></td>
</tr>
<tr>
<td><strong>Large-size</strong></td>
<td><strong>3.0 M people</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>GHG Emissions Inventory (scopes 1,2,3)</strong></td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td><strong>Population</strong></td>
<td><strong>Economy</strong></td>
<td><strong>Geography</strong></td>
<td><strong>Weather</strong></td>
<td><strong>Climate Risks and Vulnerabilities</strong></td>
</tr>
</tbody>
</table>

#### Vulnerable Groups
- Elderly
- Children
- People living in barrios

#### Economy
- **GDP**: $24 B USD
- **GDP/capita**: $8,196

#### Geography
- **Area**: 202 km²
- **Density**: 14,851 people/km²

#### Weather
- **Max**: 22°C
- **Mid**: 18°C
- **Min**: 14°C
- **Humid**: 1,100 mm rain per year

#### Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme heat
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation
**Mitigation** (current emissions vs reductions by 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 fleet 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 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.

**Quality of Action Design**

- Time Based
- Measurable
- Specific
- Ambitious
- Realistic

**Priority Actions**

Number of Priority Actions by Sector and Type

<table>
<thead>
<tr>
<th>Mitigation</th>
<th>Stationary Energy</th>
<th>Transportation</th>
<th>Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Mitigation Actions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture, Forestry and Other Land Use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stationary Energy</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adaptation</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>General Adaptation Actions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity Loss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Hazards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical Change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extreme Heat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flood and Sea Level Rise</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ambitious scenario does not specify what percentage of emission reductions corresponds to each sector.
## CAP Construction process

| Developed by Buenos Aires' City Hall | 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 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).

- 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

- 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

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

Urban
- Area: 119 km²
- Density: 216 people/km²

Economy
- GDP: $221 M USD
- GDP/capita: $8,579

Geography
- Agriculture and Livestock
- Fishing
- Tourism

Geographic scope
- 100% of Municipality*

Weather
- Av Max: 25°C
- Av Mid: 19.5°C
- Av Min: 13°C
- Humid: 1,075 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)
- 8.61 ton CO₂ eq / person
- 1,004 kg CO₂ eq / MUSD

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

*Not part of a metropolitan area.
Climate Action Plan Evaluation
La Paz, Argentina 2020 CAP

Mitigation (current emissions vs reductions by sector)

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

Adaptation Actions

- Increase the placement of rain tubes, decreasing gutter obstruction.
- Promote afforestation, reaching 1,800 trees planted by 2023.
- Increase tree cover by 1,500 trees in 2025 in the municipality.
- Implement an early warning system for storms.
- 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

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 Analysis in Latin American and Caribbean Countries

La Paz, Argentina 2020 CAP

Climate Action Plan Recommendations

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.

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.).
- 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.
- Include an estimated budget for all actions.

La Paz, Argentina 2020 CAP
Rosario, Argentina 2020 CAP

Population

- **large-size**
  - 992,323 people
- **0.70%** yearly growth rate (2001-2010)

Location

- **Urban**
  - Area: 178 km²
  - Density: 5,553 people/km²

Economy

- **GDP**
  - $8 B USD
- **GDP/capita**
  - $8,579

Geography

- **Area:** 178 km²
- **Density:** 5,553 people/km²

Weather

- **Humid**
  - 24°C (Av Max)
  - 17.6°C (Av Mid)
  - 12.6°C (Av Min)
  - 1,050 mm rain per year

Geographic scope

- **10.11%** of Metropolitan Area

GHG Emissions Inventory (scopes 1,2,3)

- 3.22 ton CO₂ eq / person
- 376 kg CO₂ eq / MUSD

Climate Risks and Vulnerabilities

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

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.
### CAP Construction process

<table>
<thead>
<tr>
<th>Developed by Rosario’s City Hall</th>
<th>Rosario’s 1st CAP</th>
<th>No budget mentioned</th>
</tr>
</thead>
</table>

- 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.

- 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.

- 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**
- **100% of Municipality***

### Weather
- **Temperate**
  - Av Max: 13.6°C
  - Av Mid: 8°C
  - Av Min: <1°C
  - 1,200 mm rain per year

### Climate Risks and Vulnerabilities

### GHG Emissions Inventory (scopes 1,2,3)
- **7.49 ton CO₂ eq / person**
- **873 kg CO₂ eq / MUSD**

### GHG Emissions (ton CO₂ eq)

<table>
<thead>
<tr>
<th>Year</th>
<th>Stationary Energy</th>
<th>Transportation</th>
<th>Waste</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2030 Goal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2030 Business as Usual</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Not part of a metropolitan area."
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 in residential buildings and to facilitate distributed energy generation.

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

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
- Fire prevention plan.
- Hydraulic plan
- Wetland protection.
- Land-use plan
### CAP Construction process

<table>
<thead>
<tr>
<th>Developed by San Carlos de Bariloche’s City Hall</th>
<th>San Carlos de Bariloche’s 1st CAP</th>
<th>No budget mentioned</th>
</tr>
</thead>
</table>

- 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.
- 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.
- 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 detailing 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
  - Grassland
  - Inland

Geography
- Geographic scope: 100% of Municipality
  - Not part of a metropolitan area.

Weather
- Average Max: 26°C
- Average Mid: 18.5°C
- Average Min: 12°C
- Humid
  - Temperate
  - 1,100 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)
- GHG Emissions (ton CO₂ eq)
  - Current Base Year: 2018
  - 2030 Goal
  - 2030 Business as Usual

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Analysis in Latin American and Caribbean Countries | ARGENTINA
**Climate Action Plan Evaluation**

**San Carlos Sud, Argentina**

**2020 CAP**

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**Priority Actions**

**Mitigation** (current emissions vs reductions by sector)

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

  - 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.**
- **Continue to support the municipal tree nursery, and increase the number of trees in public spaces.**
- **Creation of Natural Pasture Conservation Law.**
- **Include the creation of water reservoirs in new urbanization development.**

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**Climate Action Plan Analysis in Latin American and Caribbean Countries | ARGENTINA**

**Table: Number of Priority Actions by Sector and Type**

<table>
<thead>
<tr>
<th>Sector and Type</th>
<th>Number of Priority Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>3</td>
</tr>
<tr>
<td>Transportation</td>
<td>5</td>
</tr>
<tr>
<td>Stationary Energy</td>
<td>4</td>
</tr>
<tr>
<td>General Adaptation Actions</td>
<td>2</td>
</tr>
<tr>
<td>Biodiversity Loss</td>
<td>1</td>
</tr>
<tr>
<td>Extreme Heat</td>
<td>1</td>
</tr>
<tr>
<td>Flood and Sea Level Rise</td>
<td>2</td>
</tr>
</tbody>
</table>

**Quality of Action Design**

- Specific
- Time Based
- Measurable
- Related
- Ambitious

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**San Carlos Sud, Argentina 2020 CAP**

Current Emissions distribution (outer circle) vs Planned Emission Reductions distribution (inner circle)
**CAP Construction process**

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

<table>
<thead>
<tr>
<th>Developed by San Carlos Sud’s City Hall</th>
<th>San Carlos Sud’s 1st CAP</th>
<th>No budget mentioned</th>
</tr>
</thead>
</table>

**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
- Area: 18 km²
- Density: 517 people/km²

Weather
- Sub-humid
  - 26°C Av Max
  - 16°C Av Mid
  - <0°C Av Min
- 800 mm rain per year

Geographic scope
- 100% of Municipality

GHG Emissions Inventory (scopes 1,2,3)
- 6.75 ton CO₂ eq / person
- 787 kg CO₂ eq / MUSD

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation
The ambitious scenario only considered the Stationary Energy, Transportation and Waste Sectors.

Mitigation (current emissions vs reductions by sector)

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%).

Adaptation Actions

- Creation of recreational spaces in streambanks and provide retention gaps to reduce flash flood episodes.
- Strengthen the forest-fire early warning system.
- Increase natural protected areas and promote private natural protected areas.
**Climate Action Plan Evaluation**  
**Villa General Belgrano, Argentina 2018 CAP**

### CAP Construction process

<table>
<thead>
<tr>
<th>Developed by Villa General Belgrano's' City Hall</th>
<th>Villa General Belgrano's' 1st CAP</th>
<th>No budget mentioned</th>
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<td>Partner Organization</td>
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- No financing identified for the implementation of the mitigation and adaptation strategies.

### Best practices

- The GHG inventory 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 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.).

- 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 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
### City Context
#### Recife, Brazil

- **2020 CAP**

#### Population
- **large-size**
  - 1.6 M people
- **Vulnerable Groups**
  - Low Income Communities (25.3% of population below poverty line)
- **0.73% yearly growth rate**
  - 2010-2020

#### Location
- **Urban**
  - Area: 218 km²
  - Density: 7,555 people/km²

#### Economy
- **GDP**
  - $10 B USD
  - GDP/capita: $6,084

#### Geography
- **Civil Construction Service Sector**
- **Tropical forest**
- **Coastal**

#### Geographic scope
- **6.8% of Metropolitan Area**

#### Weather
- **Av Max**
  - 30°C
- **Av Mid**
  - 26°C
- **Av Min**
  - 22°C
- **Humid**
  - 2,000 mm rain per year

#### Climate Risks and Vulnerabilities
- **Rain flooding**
- **Costal flooding**
- **Storms**
- **Landslides**
- **Extreme cold**
- **Heat waves**
- **Drought**
- **Wildfire**
- **Contagious disease**
- **Biodiversity loss**
- **Chemical change**
- **Soil degradation**

#### GHG Emissions Inventory (scopes 1,2,3)
- **Current Base Year: 2017**
- **2050 Goal**
- **2050 Business as Usual**
  - 1.84 ton CO₂ eq / person
  - 303 kg CO₂ eq / MUSD

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**Recife, Brazil**

2020 CAP
Climate Action Plan Evaluation
Recife, Brazil

2020 CAP

Mitigation (current emissions vs reductions by sector)

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.

The ambitious scenario visualizes a carbon neutral Recife by 2050.

Adaptation Actions

- Upgrade macro and micro-drainage infrastructure.
- Guarantee the supply of drinking water to the entire population of Recife by 2025.
- Implement, by 2025, a system to monitor the city’s sea and river level.
- Carry out structuring actions for slope containment.
- 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.
**CAP Construction process**

- **Developed by** Recife's City Hall
- **Partner Organization** URBAN LEDS
- **Recife's 1st 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.

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**Best practices**

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

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**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 Analysis in Latin American and Caribbean Countries  
BRAZIL

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.

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.
City Context
Rio de Janeiro, Brazil 2021 CAP

Population
- Large-size: 6.7 M people
- Yearly growth rate: 0.78% (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

Weather
- Av Max: 30°C
- Av Mid: 24°C
- Av Min: 20°C
- Humid
- 1,069 mm rain per year

Geographic scope
- 16% of Metropolitan Area

Economy
- GDP: $62 B USD
- GDP/capita: $9,268

Service Sector:
- Industrial activity
- Agribusiness

Geography
- Tropical forest
- Coastal

GHG Emissions Inventory (scopes 1,2,3)
- GHG Emissions (ton CO₂ eq)
- 3.06 ton CO₂ eq / person
- 330 kg CO₂ eq / MUSD

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

GHG Emissions Base Year: 2017
- Current: 10,000,000.00
- 2050 Goal: 5,000,000.00
- 2050 Business as Usual: 2,500,000.00

Climate Action Plan Analysis in Latin American and Caribbean Countries | BRAZIL
BRAZIL

Quality of Action Design

Mitigation (current emissions vs reductions by sector)

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.

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

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.

Implement the revitalization of 300 km of public spaces, prioritizing pedestrian-scale design with sustainable urban drainage.

Establish Nature Conservation Units in 100% of areas identified as relevant Environmental Interest (ARIA), by the Municipal Secretary of the Environment.

Reduce by 50% the housing deficit and inadequacy in the city.

Conduct at least 20 simulated responses to emergencies to the impacts of climate extremes.

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

- 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.
- No budget mentioned

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.

Partner Organization:
Developed by Rio de Janeiro’s City Hall

Rio de Janeiro’s 2nd CAP

No budget mentioned

C40 Cities

Partner Organization

Rio de Janeiro, Brazil 2021 CAP

Partner Organization

Developed by Rio de Janeiro’s City Hall

Best practices

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Partner Organization

Developed by Rio de Janeiro’s City Hall

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Partner Organization

Developed by Rio de Janeiro’s City Hall

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Partner Organization

Developed by Rio de Janeiro’s City Hall

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Partner Organization

Developed by Rio de Janeiro’s City Hall

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Partner Organization

Developed by Rio de Janeiro’s City Hall

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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.

- 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 and cost estimates for each action should be included.
City Context
Salvador, Brazil 2020 CAP

Population
- Large-size: 2.8 M people
- Yearly growth rate: 1.32%
  (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
- 16% of Metropolitan Area
- Area: 693 km²
- Density: 4,121 people/km²

Weather
- Humid
  - Average Max: 30°C
  - Average Mid: 25°C
  - Average Min: 23°C
- Tropical
  - Rainfall: 1,871 mm per year

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

GHG Emissions Inventory (scopes not specified)
- 1.07 ton CO₂ eq / person
- 259 kg CO₂ eq / MUSD
- 2015-2020 growth rate: 1.32%
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.
## CAP Construction process

<table>
<thead>
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<th>Developed by the Municipal City Government of Salvador</th>
<th>Salvador’s 1st CAP</th>
<th>No budget mentioned</th>
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</table>

- 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.

- 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 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
- Vulnerable Groups:
  - Low Income Communities
  - Elderly
  - Indigenous Population
  - People of Color
  - Women
  - Children
- 1.08% yearly growth rate (2015-2020)

Location
- Urban:
  - Area: 1,523 km²
  - Density: 1,521 people/km²

Weather
- Temperate
  - Avg Max: 27°C
  - Avg Mid: 22°C
  - Avg Min: 12°C
- Humid
  - 1,616 mm rain per year

Geography
- Forest
- Inland

Economy
- GDP: $135.6 B USD
- GDP/capita: $11,001
- Service Sector: 82%
- Industrial Sector: 9.9%

Geographic scope
- 19% of Metropolitan Area

GHG Emissions Inventory (scopes 1,2,3)
- Current Base Year: 2017
- 2050 Goal
- 2050 Business as Usual

Climate Risks and Vulnerabilities
- Low Income Communities
- Elderly
- Indigenous Population
- People of Color
- Women
- Children

Vulnerable Groups
- Yearly growth rate: 1.08%
- 2015-2020

Economy
- GDP: $135.6 B USD
- GDP/capita: $11,001
- Service Sector: 82%
- Industrial Sector: 9.9%

Geography
- Forest
- Inland

Weather
- Temperate
  - Avg Max: 27°C
  - Avg Mid: 22°C
  - Avg Min: 12°C
- Humid
  - 1,616 mm rain per year
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: Sao Paulo’s 2nd CAP
- No budget mentioned

Gaps
- 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.

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
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- Strengthen the governance of the Municipal Civil Defense System for intersectoral and cross-cutting disaster management and risk reduction
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CAP Construction process

- Developed by Sao Paulo’s City Hall
- Partner Organization: Sao Paulo’s 2nd CAP
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- CAP used an action selection tool.
- Very detailed GHG inventory.
- Vulnerable groups are mapped by area.
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.

- 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.
City Climate Action Plan Analysis in Latin America and the Caribbean

Chilean Cities Climate Action Plans Analysis
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: 10,551 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

- **Arid**
  - Av Max: 30.6°C
  - Av Mid: 14°C
  - Av Min: 4.1°C
  - 362 mm rain per year

Climate Risks and Vulnerabilities

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

GHG Emissions Inventory

- **0.94 ton CO₂ eq / person**
- **71 kg CO₂ eq / MUSD**
- **GHG Emissions (ton CO₂ eq)**
  - 2015 Base Year: 2015
  - 2030 Goal
  - 2030 Business as Usual
  - GHG Emissions Inventory (scopes not specified)

Climate Action Plan Analysis in Latin American and Caribbean Countries | CHILE
Climate Action Plan Evaluation
Independencia, Chile 2020 CAP

Mitigation (current emissions vs reductions by 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 vehicles 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 management 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

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

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

### CAP Construction process

<table>
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<th>Developed by Independencia’s City Hall</th>
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**Climate Action Plan Evaluation**

**Independencia, Chile**

**2020 CAP**

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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

Weather
Humid

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

400-800 mm rain per year

There is no emission inventory in the Climate Action Plan

Climate Risks and Vulnerabilities
Rain flooding
Coastal flooding
Stones
Landslides
Extreme cold
Heat waves

Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

GHG Emissions Inventory (scopes 1,2,3)

Economy
$3 B USD
GDP/capita $13,307

GDP/capita $13,307
Commercial Manufacture
Real estate

Geography
Arte
Forest
Valley

Geographic scope
2.66% of Santiago Province
As part of their mitigation efforts, Peñalolén 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 inclusive recycling program.

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

### Mitigation

#### 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.
### CAP Construction process

**Developed by Peñalolén’s City Hall**

**Partner Organization**

**Peñalolén’s 2nd CAP**

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

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

### 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 Inventory, 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 inventory 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

Location
- Urban
- Area: 22.4 km²
- Density: 18,037 people/km²

Economy
- GDP: $5 B USD
- GDP/capita: $13,307
- Commerce Service sector
- Service sector

Geography
- Forest
- Valley
- Geographic scope
- 1.09% of Santiago Province

Weather
- Arid
  - Av Max: 30.6°C
  - Av Mid: 15.4°C
  - Av Min: 4.2°C
  - 312.5 mm rain per year

Arid
- 312.5 mm rain per year

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

GHG Emissions Inventory
- GHG Emissions (ton CO₂ eq)
- 1.71 ton CO₂ eq / person
- 128 kg CO₂ eq / MUSD
- 2015 Base Year
- 2030 Goal
- 2030 Business as Usual

2015-2020
- Growth rate:
- 0.73%

Vulnerable Groups
- Migrants (21% of population)

Population Growth
- 404,495 people
- 2015-2020
- 0.73%

City
- Santiago, Chile

GHG Emissions Inventory
- GHG Emissions (ton CO₂ eq)
- 1.71 ton CO₂ eq / person
- 128 kg CO₂ eq / MUSD
- 2015 Base Year
- 2030 Goal
- 2030 Business as Usual

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

2015-2020
- Growth rate:
- 0.73%
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 generate energy from waste through the production of biodiesel or biogas.

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.
**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**.

---

**CAP Construction process**

- 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.

**Developed by Santiago's City Hall**

**Santiago's 2nd CAP**

**Partner Organization**

GLOBAL COVENANT FOR MAYORS ON CLIMATE & ENERGY

**No budget mentioned**
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**
- **Area**: 53.66% of Metropolitan Area
- **Density**: 608 people/km²

Weather
- **Humid**
  - **25°C**
  - **1,258 mm rain per year**
- **Temperate**
  - **2°C**

GHG Emissions Inventory
- (scopes not specified)
- There is no emission inventory in the Climate Action Plan

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation
**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.

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.

**Priority Actions**

Number of Priority Actions by Sector and Type

<table>
<thead>
<tr>
<th>Sector and Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Mitigation Actions</td>
<td>3</td>
</tr>
<tr>
<td>Agriculture, Forestry and Other Land Use</td>
<td>2</td>
</tr>
<tr>
<td>Waste</td>
<td>1</td>
</tr>
<tr>
<td>Transportation</td>
<td>0</td>
</tr>
<tr>
<td>Stationary Energy</td>
<td>6</td>
</tr>
<tr>
<td>General Adaptation Actions</td>
<td>2</td>
</tr>
<tr>
<td>Biodiversity Loss</td>
<td>1</td>
</tr>
<tr>
<td>Drought</td>
<td>0</td>
</tr>
<tr>
<td>Flood and Sea Level Rise</td>
<td>0</td>
</tr>
</tbody>
</table>

**Quality of Action Design**

- Specific
- Time-Based
- Measurable
- Realistic
- Ambitious
## CAP Construction process

<table>
<thead>
<tr>
<th>Developed by Temuco’s City Hall</th>
<th>Temuco’s 2nd CAP</th>
<th>No budget mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Partner Organization</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 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 inventory 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: 26.3 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
Semi-arid
30.4°C
18°C
4.3°C
412 mm rain per year

Climate Risks and Vulnerabilities
Rain flooding
Costal flooding
Hillsides
Extreme cold
Heat waves
Drought
Wildfire
Contagious disease
Biodiversity loss
Chemical change
Soil degradation

GHG Emissions Inventory (scopes 1,2,3)
0.27 ton CO₂ eq / person
20 kg CO₂ eq / MUSD

GHG Emissions (ton CO₂ eq)

Current Base Year: 2018
2030 Goal
2030 Business as Usual

Total
Mitigation

The 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.
### CAP Construction process

<table>
<thead>
<tr>
<th>Developed by</th>
<th>Vitacura’s City Hall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner Organization</td>
<td>GLOBAL COVENANT OF MAYORS FOR CLIMATE &amp; ENERGY</td>
</tr>
</tbody>
</table>

**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 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 **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
# Bogotá, Colombia

## City Context

### Population
- **Location**: Bogotá, Colombia
- **Population**: 2020 CAP 7.4 M people
- **Yearly growth rate**: 2.46%
- **GDP (USD)**: $37 B USD
- **GDP/capita**: $5,045

### Location
- **Mixed**
- **Area**: 1,636 km²
- **Density**: 4,529 people/km²

### Geography
- **Grassland**
- **Mountain**
- **Temperature**: 23°C (Av Max), 14°C (Av Mid), 7.7°C (Av Min)
- **Weather**: Sub-humid
- **Rainfall**: 840 mm per year

### Economic Context
- **Service Commerce Industrial**
- **GDP (USD)**: $37 B USD
- **GDP/capita**: $5,045

### Geographical Scope
- **100% of Metropolitan Area**

### Climate Risk and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

### GHG Emissions Inventory
- **2015-2020**: 1.54 ton CO₂ eq / person
- **2030 Goal**: 305 kg CO₂ eq / MUSD

---

**Note:** This information is a summary of the Climate Action Plan Analysis in Latin American and Caribbean Countries for Bogotá, Colombia, focusing on the 2020 CAP and relevant data.
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.

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.
## CAP Construction process

<table>
<thead>
<tr>
<th>Developed by Bogotá’s City Hall</th>
<th>Bogotá’s 2nd CAP</th>
<th>No budget mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner Organization</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 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 25.5%
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
Humid
Temperate
1,200 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)
GHG Emissions (ton CO₂ eq)
Current Base Year: 2015
2050 Goal
2050 Business as Usual
1.60 ton CO₂ eq / person
300 kg CO₂ eq / MUSD

Climate Risks and Vulnerabilities
Rain flooding
Costal flooding
Storms
Landslides
Extreme cold
Heat waves
Drought
Wildfires
Contagious disease
Biodiversity loss
Chemical change
Soil degradation
**Climate Action Plan Analysis in Latin American and Caribbean Countries** | **COLOMBIA**

---

**Priority Actions**

<table>
<thead>
<tr>
<th>Number of Priority Actions by Sector and Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Mitigation Actions</td>
</tr>
<tr>
<td>Agriculture, Forestry and Other Land Use</td>
</tr>
<tr>
<td>Waste</td>
</tr>
<tr>
<td>Transportation</td>
</tr>
<tr>
<td>General Adaptation Actions</td>
</tr>
<tr>
<td>Biodiversity Loss</td>
</tr>
<tr>
<td>Biological Hazards</td>
</tr>
<tr>
<td>Extreme Heat</td>
</tr>
<tr>
<td>Drought</td>
</tr>
<tr>
<td>Wildfire</td>
</tr>
<tr>
<td>Mass Movement</td>
</tr>
<tr>
<td>Flood and Sea Level Rise</td>
</tr>
</tbody>
</table>

**Mitigation**

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.
- Design and implement nature-based solutions, community participation, and infrastructure works to reduce climate change vulnerability.
- Increase the vegetation cover through conservation and restoration actions.
- 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

- **Quality of Action Design**
- **Mitigation**
  - Current Emissions distribution
  - CAP does not include BAU or Emission Reduction Scenarios

---

**Current Emissions distribution**

- Stationary Energy: 58%
- Transportation: 27%
- Waste: 15%
- AFOLU: 0%

---

**Adaptation Actions**

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

<table>
<thead>
<tr>
<th>Developed by Santiago de Cali’s City Hall</th>
<th>Santiago de Cali’s 1st CAP</th>
<th>No budget mentioned</th>
</tr>
</thead>
</table>

- 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

<table>
<thead>
<tr>
<th>Population</th>
<th>Location</th>
<th>Economy</th>
<th>Geography</th>
<th>Weather</th>
<th>GHG Emissions Inventory (scopes 1,2,3)</th>
<th>Climate Risks and Vulnerabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>large-size</strong> 1 M people</td>
<td><strong>Mixed</strong></td>
<td><strong>Industrial</strong> 42.1%</td>
<td><strong>100% of Municipality</strong>*</td>
<td><strong>34°C</strong></td>
<td><strong>6.01 ton CO₂ eq / person</strong></td>
<td><strong>Rain flooding</strong></td>
</tr>
<tr>
<td><strong>1.27%</strong> yearly growth rate</td>
<td></td>
<td><strong>Construction, finance and housing 24.8%</strong></td>
<td></td>
<td><strong>27.5°C</strong></td>
<td><strong>1,260 kg CO₂ eq / MUSD</strong></td>
<td><strong>Coastal flooding</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Commerce and tourism 9.6%</strong></td>
<td></td>
<td><strong>22.2°C</strong></td>
<td></td>
<td><strong>Storms</strong></td>
</tr>
<tr>
<td><strong>Vulnerable Groups</strong> People in the periphery of the city</td>
<td></td>
<td></td>
<td></td>
<td><strong>Tropical</strong></td>
<td></td>
<td><strong>Landslides</strong></td>
</tr>
<tr>
<td><strong>Area:</strong> 609 km²</td>
<td></td>
<td></td>
<td></td>
<td><strong>Humid</strong></td>
<td></td>
<td><strong>Extreme cold</strong></td>
</tr>
<tr>
<td><strong>Density:</strong> 1,663 people/km²</td>
<td></td>
<td></td>
<td></td>
<td><strong>1008 mm rain per year</strong></td>
<td></td>
<td><strong>Heat waves</strong></td>
</tr>
<tr>
<td><strong>GDP</strong> $4.8 B USD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Drought</strong></td>
</tr>
<tr>
<td><strong>GDP/capita</strong> $4,768</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Wildfire</strong></td>
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<td><strong>Contagious disease</strong></td>
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<td><strong>Biodiversity loss</strong></td>
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<td><strong>Chemical change</strong></td>
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<td><strong>Soil degradation</strong></td>
</tr>
</tbody>
</table>

*Not part of a metropolitan area.
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.
## Climate Action Plan Analysis in Latin American and Caribbean Countries

### Cartagena, Colombia

#### 2018 CAP

<table>
<thead>
<tr>
<th>CAP Construction process</th>
<th>Best practices</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed by Cartagena’s City Hall</td>
<td>The CR&amp;V Assessment prioritizes climate risks.</td>
<td>CAP gives a range of emission reduction costs but does not provide costs for specific mitigation actions.</td>
</tr>
<tr>
<td>Partner Organization</td>
<td>A cost-benefit analysis was conducted for adaptation actions to specific climate hazards.</td>
<td>Mitigation actions are not specific enough. Only the expected emission reductions of two actions are included in the CAP.</td>
</tr>
<tr>
<td>Cartagena’s 1st CAP</td>
<td>CAP includes an urban growth study and future scenarios.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All Adaptation Actions have identified costs and sources of funding.</td>
<td></td>
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<tr>
<td>$1.98 Billion USD</td>
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</tr>
</tbody>
</table>

#### 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.

- Cartagena’s 1st CAP: $1.98 Billion USD

- 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 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
- **Vulnerable Groups**: Children, elderly, migrants, professional recyclers, people with disabilities, indigenous people
- **1.37% yearly growth rate (2015-2020)**

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
- **Humid**: 1,685mm rain per year

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

GHG Emissions Inventory (scopes 1,2,3)
- **2015-2020**
  - **1.87 ton CO₂ eq / person**
  - **245 kg CO₂ eq / MUSD**
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 of gases 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 Medellin’s forest coverage through protection, restoration, and sustainable management actions.
## CAP Construction process

<table>
<thead>
<tr>
<th>Developed by Medellín’s City Hall</th>
<th>Medellín’s 1st CAP</th>
<th>No budget mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner Organization</td>
<td></td>
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</tr>
</tbody>
</table>

- 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

Ecuadorean Cities Climate Action Plans Analysis
City Context

Quito, Ecuador
2020 CAP

Population
- large-size: 2.7 M people
- Vulnerable Groups:
  - Children
  - People with disabilities
  - Women
  - Elderly
  - Low-income communities
- 2.20% yearly growth rate (2001-2010)

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
- Temperate
- Sub-humid
- Weather:
  - Av Max: 28°C
  - Av Mid: 15°C
  - Av Min: 4°C
- 960 mm rain per year
- Area: 4,231 km²
- Density: 657 people/km²

GHG Emissions Inventory (scopes 1,2,3)
- 2.74 ton CO₂ eq / person
- 348 kg CO₂ eq / MUSD

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation

Climate Action Plan Analysis in Latin American and Caribbean Countries | ECUADOR
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.

Mitigation goal is net zero emissions by 2050, however the CAP envisions 3% of residual emissions compare to BAU.

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.
### CAP Construction process

| Developed by Quito’s City Hall | 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 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
City Context
Tegucigalpa, Honduras 2015 CAP

Population

large-size
1.24 M people

Vulnerable Groups
Marginalized communities
Informal settlements

2.2% yearly growth rate
2004-2014

Location

Mixed

Area:
195.6 km²

Density:
6,337 people/km²

GHG Emissions Inventory (scopes 1,2,3)

2.36 ton CO₂ eq / person
1,130 kg CO₂ eq / MUSD

Climate Risks and Vulnerabilities

Weather

Arid

27.9°C

21.8°C

17.3°C

62.9 mm rain per year

Geographic scope

12.9% of Municipality

*Not part of a metropolitan area.

Economy

$2.5 B USD

GDP/capita $2,085

Commercial Services
Industrial

Geography

Forest

Mountain

City Context
Tegucigalpa, Honduras

Population

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1.24 M people

Vulnerable Groups
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City Context
Tegucigalpa, Honduras

Population

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City Context
Tegucigalpa, Honduras

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62.9 mm rain per year

Geographic scope

12.9% of Municipality

*Not part of a metropolitan area.

Economy

$2.5 B USD

GDP/capita $2,085

Commercial Services
Industrial

Geography

Forest

Mountain
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, to 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.

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 Analysis in Latin American and Caribbean Countries

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 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
## Montego Bay, Jamaica

### 2015 CAP

**City Context**

### GHG Emissions Inventory (scopes 1,2,3)

- **GHG Emissions (ton CO₂ eq)**
  - Current Base Year: 2010
  - 2030 Goal
  - 2030 Business as Usual

- **7.73 ton CO₂ eq / person**
- **3,455 kg CO₂ eq / MUSD**

### Location

- **Mixed**
  - Area: 63 km²
  - Density: 1,740 people/km²

### Population

- **mid-size**
- **110,115 people**
- **0.4% yearly growth rate**
- **2020**

### Vulnerable Groups

- Marginalized communities
- Informal settlements
- Children
- Elderly

### Economy

- **GDP**: $246 M USD**
- **GDP/capita**: $83
- **Tourism Service sector**

### Geography

- **Forest**
- **Coastal**

### Weather

- **Humid**
  - **Av Max**: 31.6°C
  - **Av Mid**: 27.6°C
  - **Av Min**: 23.6°C

- **1,684 mm rain per year**

- **Tropical**

### Geographic scope

- **100% of Municipality**

---

*No data available for Montego Bay, this data corresponds to Jamaica

**City GDP was scaled from national GDP according to population

***Not part of a metropolitan area.

---

**Climate Risks and Vulnerabilities**

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

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.
## CAP Construction process

<table>
<thead>
<tr>
<th>Developed by Montego Bay’s City Hall</th>
<th>Montego Bay’s 1st CAP</th>
<th>425.7M USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner Organization</td>
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</tr>
</tbody>
</table>

- 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
## 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

### Geography
- **Tropical forest**
- **Coastal**

### Weather
- **Av Max**: 30°C
- **Av Mid**: 26°C
- **Av Min**: 17°C
- **Humid**: 1,306 mm rain per year

### Economic Context
- **GDP**: $223 M USD
- **GDP/capita**: $1,349
- **Transport services**
  - Commerce
- **Mining and manufacture**

### Geographic Scope
- **52.5%** of Metropolitan Area

### GHG Emissions Inventory
- **3.88 ton CO₂ eq / person**
- **2,875 kg CO₂ 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**
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 Urban 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.

The ambitious scenario does not specify what percentage of emission reductions corresponds to each sector.
## CAP Construction process

<table>
<thead>
<tr>
<th>Developed by Bahía de Bandera city Hall</th>
<th>Partner Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahía de Bandera’s 1st CAP</td>
<td>No budget mentioned</td>
</tr>
</tbody>
</table>

- 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

<table>
<thead>
<tr>
<th>Vulnerable Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marginalized communities</td>
</tr>
<tr>
<td>Children</td>
</tr>
<tr>
<td>Elderly</td>
</tr>
<tr>
<td>People with disabilities</td>
</tr>
</tbody>
</table>

Population:

- large-size 905,265 people
- 1.95% yearly growth rate 1990-2010

Location

- Mixed
  - Area: 6,264 km²
  - Density: 144 people/km²

Economy

- GDP $6 B USD
- GDP/capita $7,094

GDP/capita $7,094

Geography

- Tropical forest
- Coastal

Geographic scope

- 71.86% of Metropolitan Area

Weather

- Dry
  - Av Max 40°C
  - Av Mid 25.4°C
  - Av Min 12.3°C
- Sub-humid
  - 658.1 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)

- 6.13 ton CO₂ eq / person
- 863 kg CO₂ eq / MUSD

Climate Risks and Vulnerabilities

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

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

**Mitigation (current emissions vs reductions by sector)**

**Adaptation Actions**

- Develop and/or update school’s Civil Protection Programs.
- Establish a permanent protocol for cleaning and maintenance of streams and canals.
- Update the ecology and environmental protection regulation.
- Integrate eco-technologies in construction regulations.
Climate Action Plan Evaluation
Culiacán, Mexico 2020 CAP

CAP Construction process

- Developed by Culiacán’s City Hall
- Partner Organization
- 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

Location
Mixed
Area:
3,265 km²
Density:
1,592 people/km²

Economy
$54 B USD GDP
GDP/capita
$10,538

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
Sub-humid
952 mm rain per year

GHG Emissions Inventory
3.10 ton CO₂ eq / person
294 kg CO₂ 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
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 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 reducing 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.
- Relocate the population living in areas at risk from mass movements or floods.
- Implement a climate risk health care system.
- Create a continuous inter-municipal reforestation plan in highly-fragility areas for biodiversity conservation and reduction of heatwaves.
- 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

<table>
<thead>
<tr>
<th>CAP Construction process</th>
<th>Best practices</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed by Guadalajara's City Hall</td>
<td>● Some mitigations actions have an emission reductions estimate.</td>
<td>● BAU and Ambitious scenarios do not specify emissions per sector.</td>
</tr>
<tr>
<td>Partner Organization</td>
<td>● Mitigation and adaptation actions are congruent with the emission inventory and the CR&amp;V Assessment.</td>
<td>● Not all mitigation actions have identified expected emission reductions.</td>
</tr>
<tr>
<td>Guadalajara's 1st CAP</td>
<td></td>
<td>● CAP does not include a cost estimate for the implementation.</td>
</tr>
<tr>
<td>No budget mentioned</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

---

**Guadalajara, Mexico**

**2020 CAP**

**Partner Organization**

Developed by Guadalajara’s City Hall
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
- Yearly growth rate: 0.92% (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
- Mixed
- Desert
- Valley

Geographic scope
- 100% of Metropolitan Area

Weather
- Arid
- Av Max: 38°C
- Av Mid: 25°C
- Av Min: <0°C
- Dry
- 262 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)
- 2010-2015
- 5.59 ton CO₂ eq / person
- 692 kg CO₂ eq / MUSD

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation
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 action for the stationary energy sector is 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.
## Climate Action Plan Evaluation
### Juarez, Mexico
#### 2020 CAP

### CAP Construction process

<table>
<thead>
<tr>
<th>Developed by Juárez City’s City Hall</th>
<th>Juárez City’s 1st CAP</th>
<th>No budget mentioned</th>
<th>No financing identified for climate actions.</th>
</tr>
</thead>
</table>

### 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.).
- **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.
City Context
Madero City, Mexico 2020 CAP

Population
- mid-size
- 209,175 people
- 1.19% yearly growth rate (2010-2015)
- Vulnerable Groups:
  - Children
  - Elderly
  - Woman
  - Low Income Communities

Location
- Urban
  - Area: 47.3 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
  - Tropical
  - Max: 34°C
  - Mid: 24°C
  - Min: 10°C
  - Sub-humid
  - 927.8 mm rain per year

GHG Emissions Inventory (scopes 1,2,3)
- 4.56 ton CO₂ eq / person
- 170 kg CO₂ eq / MUSD

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation
The main mitigation actions for the transportation sector are the creation of the Comprehensive Urban Mobility Plan and the implementation of programs to improve 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.
- Promote water use programs to keep water levels stable, thus avoiding shortages, especially in dry seasons.
- Protect and rehabilitate the coastal zone to avoid possible risks of natural disasters.
- Establish a reforestation program through the use of native species.
- Map and relocate the most vulnerable population to lower-risk areas.
### CAP Construction process

<table>
<thead>
<tr>
<th>Developed by Madero City’s City Hall</th>
<th>Madero City’s 1st CAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner Organization</td>
<td>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</td>
</tr>
</tbody>
</table>

- 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

Climate Actions
- 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.
- 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
- **Geographic scope**
  - 19.0% of Metropolitan Area

- **Weather**
  - **Humid**
    - Av Max: 34°C
    - Av Mid: 17°C
    - Av Min: -3°C

    - 700-1,200 mm rain per year

  - **Temperate**
    - Valley
    - Forest

GHG Emissions Inventory (scopes 1,2,3)
- **2.99 ton CO₂ eq / person**
- **165 kg CO₂ eq / MUSD**

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation
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.

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

<table>
<thead>
<tr>
<th>CAP Construction process</th>
<th>Best practices</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed by Mexico City’s City Hall</td>
<td>● Mitigation and adaptation actions are congruent with the emission inventory.</td>
<td>● The ambitious scenario does not specify expected emission reductions by sector.</td>
</tr>
<tr>
<td>Mexico City’s 2nd CAP</td>
<td>● There is a cost-benefit analysis for mitigation actions.</td>
<td>● Although the transportation and stationary energy action lines do specify emission reduction potential for certain changes, those are not specified in mitigation actions.</td>
</tr>
<tr>
<td>Partner Organization</td>
<td>● Mitigation actions are budgeted.</td>
<td>● CAP does not include action prioritization or mention of a cost-benefit, cost-effectiveness, or multi-criteria analysis for adaptation actions.</td>
</tr>
<tr>
<td>Economic analysis of mitigation actions states that the total cost for mitigation actions is $334.4 million MXN. Adaptation actions are not budgeted.</td>
<td>● CR&amp;V Assessment identifies social vulnerability by region and adaptation capacity.</td>
<td>● 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.</td>
</tr>
</tbody>
</table>

**Mexico City, Mexico**

2020 CAP

**Partner Organization**

Developed by Mexico City’s City Hall

C40 CITIES
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
  - Forest
  - Inland

Geography
- 31.15% of Metropolitan Area
- Temperate
  - Area: 1,017 km²
  - Density: 1,333 people/km²

Weather
- Sub-humid
  - 32.1°C Av Max
  - 20.5°C Av Mid
  - 8.4°C Av Min
  - 943 mm rain per year

Geographic scope
- 31.15% of Metropolitan Area

GHG Emissions Inventory (scopes 1,2,3)
- 4.21 ton CO₂ eq / person
- 388 kg CO₂ eq / MUSD

Climate Risks and Vulnerabilities
- Rain flooding
- Coastal flooding
- Storms
- Landslides
- Extreme cold
- Heat waves
- Drought
- Wildfire
- Contagious disease
- Biodiversity loss
- Chemical change
- Soil degradation
Mitigation

The main mitigation actions for the transportation sector are to reduce the use and emissions of official vehicles and to systematically increase 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.
### CAP Construction process

<table>
<thead>
<tr>
<th>Developed by</th>
<th>Zapopan’s City Hall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner Organization</td>
<td>Zapopan’s 2nd CAP</td>
</tr>
</tbody>
</table>

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

### 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.

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Climate Action Plan Evaluation
Zapopan, Mexico 2020 CAP
Climate Action Plan Recommendations
Zapopan, Mexico

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
City Context
Lima, Perú
2021 CAP

Population

- **Location**: Lima, Perú
- **Population**: 2021 CAP
- **Weather**: Mixed
- **Geographic scope**: 93.7% of Metropolitan Area
- **Economy**: GDP $90 B USD, GDP/capita $10,606
- **Geography**: Desert, Coastal
- **Weather**: 22°C (Av Max), 18°C (Av Mid), 12.5°C (Av Min)
- **Arid**: <50 mm rain per year
- **Vulnerable Groups**: Women, children, elderly, Indigenous populations, Persons with disabilities, informal settlements, Low-income communities
- **GDP**: 93.7% of Metropolitan Area
- **GHG Emissions Inventory**: 2.08 ton CO₂ eq / person, 196 kg CO₂ eq / MUSD
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.
### CAP Construction process

- **Developed by Lima’s City Hall**
- **Partner Organization**: C40Cities
- 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&S 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?

- CAP Analysis: 134
- Information GAPs in CAP: 135
- GHG Emissions: 136
- Future GHG Emissions Scenarios: 139
- Climate Actions: 141
- Climate Actions: Mitigation: 142
- Climate Actions: Adaptation: 156
- Climate Actions: Detailed Analysis: 164
- Takeaways: 170
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.

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.
How do cities compare?
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.
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** (16.1M 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.
How do cities compare?  

**GHG Emissions Emissions per GDP vs Emissions per capita**

When it comes to emissions per GDP, Montego Bay, Bahía 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.

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.
How do cities compare?

**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 Chile’s 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.
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.
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 emission reductions is congruent with the current emission distribution.
How do cities compare?

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 (6.4%).
- Energy efficiency in public lighting, 25.8 actions (3.4%).

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.
**Stationary Energy Actions**

On average, the largest % of stationary energy mitigation actions can be found in Argentinian and Mexican CAPs, while "other" 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.

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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 than 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.

1 Quito, Tegucigalpa, Montego Bay, and Lima.
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.

How do cities compare?

Mitigation Actions
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.
How do cities compare?

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", 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.

1 Quito, Tegucigalpa, Montego Bay, and Lima
How do cities compare?

**Mitigation Actions**

**Waste Actions**

On average, it 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.
How do cities compare?

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” 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.
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.

1 Quito, Tegucigalpa, Montego Bay, and Lima
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.
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.
How do cities compare?
Climate Actions: Adaptation

Adaptation actions were classified by threat: rain flooding / 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 mitigation 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.
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%).
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

% 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.
How do cities compare?

**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, Bahía 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.
How do cities compare?

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.
How do cities compare?

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.
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.
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**
- 73 estimated emission reductions
- 4 estimated both emission reductions and cost
- 12 estimated action costs
- 1% Mitigation Actions with both emission reductions and cost estimated
- 8% Mitigation Actions with only emission reductions estimated
- 27% Mitigation Actions with neither emission reductions or costs estimated
- 93% Mitigation Actions with estimated costs

**Adaptation Actions**
- 27 estimated action costs
- 3% Adaptation Actions with estimated costs
- 97% Adaptation Actions without estimated costs
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.
How do cities compare?

Climate Actions: Detailed Analysis

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).
How do cities compare?
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

<table>
<thead>
<tr>
<th>Stationary Energy</th>
<th>Best Sellers</th>
<th># actions</th>
<th>Largest Emission Reduction</th>
<th>CO₂ ton eq / k people</th>
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<tbody>
<tr>
<td></td>
<td>Energy efficiency in existing buildings</td>
<td>71.5</td>
<td>Energy efficiency in existing buildings</td>
<td>740</td>
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<td>Distributed renewable energy</td>
<td>48.5</td>
<td>Energy efficiency in the industrial sector</td>
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<td></td>
<td>Energy Efficiency in Public lighting</td>
<td>25.8</td>
<td>General stationary energy reductions</td>
<td>309.6</td>
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<table>
<thead>
<tr>
<th>Transport</th>
<th>Modal Shift to:</th>
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<th>Emission Compensation</th>
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<tr>
<td></td>
<td>Public Transport</td>
<td>47.3</td>
<td>Increase in private vehicle efficiency</td>
<td>791.6</td>
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<tr>
<td></td>
<td>Cycling</td>
<td>36.2</td>
<td>Increase vehicle efficiency and electric vehicles</td>
<td>366.9</td>
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<tr>
<td></td>
<td>Walking</td>
<td>37</td>
<td>Urban Planning to reduce travel</td>
<td>356.8</td>
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<table>
<thead>
<tr>
<th>Waste</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Recycling of solid waste</td>
<td>34.9</td>
<td>Composting of solid waste</td>
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<tr>
<td></td>
<td>Improving solid waste collection</td>
<td>29.8</td>
<td>Promotion of Circular Economy</td>
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<tr>
<td></td>
<td>Wastewater treatment</td>
<td>26.7</td>
<td>Not specific waste to energy</td>
</tr>
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</table>
### How do cities compare?

#### Climate Actions: Detailed Analysis: Adaptation Actions

<table>
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<tr>
<th>General Adaptation Actions</th>
<th># actions</th>
<th>Costs USD per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>○ Education &amp; Communication</td>
<td>111.6</td>
<td>○ Education &amp; Communication</td>
</tr>
<tr>
<td>○ Update Policy Instruments</td>
<td>56.7</td>
<td>○ Territorial Planning</td>
</tr>
<tr>
<td>○ Increase Civil Defense Capabilities</td>
<td>22</td>
<td>○ Update Policy Instruments</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Flooding/ Sea level rise</th>
<th># actions</th>
<th>Costs USD per capita</th>
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<tr>
<td>○ Drainage Infrastructure</td>
<td>22.6</td>
<td>○ Drainage Infrastructure</td>
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<tr>
<td>○ New Green Spaces</td>
<td>19.7</td>
<td>○ Wave Breakers</td>
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<td>○ Wetland Conservation</td>
<td>10.3</td>
<td>○ Coastal Protection</td>
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<th>Biodiversity loss</th>
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<tr>
<td>○ Urban Afforestation</td>
<td>27.1</td>
<td>○ Conservation of unprotected areas</td>
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<tr>
<td>○ Conservation of Natural Protected Areas</td>
<td>23.3</td>
<td>○ Conservation of Natural Protected Areas</td>
</tr>
<tr>
<td>○ Monitoring &amp; restoration</td>
<td>20</td>
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<table>
<thead>
<tr>
<th>Drought</th>
<th># actions</th>
<th>Costs USD per capita</th>
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<tbody>
<tr>
<td>○ Water Efficiency</td>
<td>19.1</td>
<td>○ Water Efficiency</td>
</tr>
<tr>
<td>○ Rainwater recovery</td>
<td>11.5</td>
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<tr>
<td>○ Conservation of water basin</td>
<td>11</td>
<td></td>
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<table>
<thead>
<tr>
<th>Extreme Heat</th>
<th># actions</th>
<th>Costs USD per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>○ Increase tree cover</td>
<td>19.3</td>
<td>○ Increase tree cover</td>
</tr>
<tr>
<td>○ Green roofs and/or walls</td>
<td>7.8</td>
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<table>
<thead>
<tr>
<th>Mass Movements</th>
<th># actions</th>
<th>Costs USD per capita</th>
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<tbody>
<tr>
<td>○ Urban Zoning</td>
<td>10.2</td>
<td>○ Urban Zoning</td>
</tr>
<tr>
<td>○ Urban resettlement</td>
<td>6.8</td>
<td></td>
</tr>
</tbody>
</table>
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).
How do cities compare?

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.
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.
## Climate Action Classification by sector

### Mitigation Actions
- **Stationary Energy** 174
- **Transport** 175
- **Waste** 176

### Adaptation Actions
- **Floods** 177
- **Sea-level rise** 178
- **Drought** 179
- **Extreme heat** 180
- **Mass movements** 181
- **Wildfire** 182
- **Biodiversity loss** 183

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%).
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%).
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.
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.
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%).