

Integrating greenhouse gas inventories as a decision making tool for informed action

Aiming to develop an effective strategy to address climate change mitigation solutions, Fortaleza used its first GHG Emissions Inventory to complement existing studies for improvements in strategic sectors such as transport, which were later embedded in the city's Climate Action Plan.

Summary

Under the Urban-LEDS project, the model city of Fortaleza took charge of its low emission development using the GreenClimateCities (GCC) methodology to Analyze, Act and Accelerate local climate action. The GCC enabled the City to: mobilize key stakeholders across municipal departments; develop a greenhouse gas inventory; integrate its results with other technical studies; and ultimately embed the results into the City's political agenda for strategic sectoral action. The result of Fortaleza's methodological Measurable, Reportable and Verifiable (MRV) approach can be observed in the Plan of Urgent Actions for Traffic and Urban Mobility (PAITT) and the municipal Climate Action Plan. This integrated approach and use of technical tools for evidence-based decision making is an outcome which the City seeks to replicate over the next months for other sectors such as waste and buildings.

The initial focus on the transport sector has resulted in GHG emission reductions estimated at 11,630 tons of CO_{2e} as result of the successful implementation of 135 km of exclusive bus lanes, a bike sharing program with 80 stations built from 2014-2016, and the expansion of the bicycle path network from 68.6 km to 131.6 km.

Introduction: the importance of the GreenClimateCities methodology and MRV tools for local climate action

Local climate and energy action is taking place across many cities and towns. However, this action is often not coherently planned or managed, but rather dealt with in an ad-hoc basis when capacity becomes available. Thus, it is difficult to ensure continuity and to track impacts.

The GCC framework and its Measurable, Reportable, Verifiable (MRV) process can be used by any local government to transition from ad-hoc to a comprehensive coherent approach. The GCC can be used by a local government to:

- develop institutional capacity for Low Emission Development
- enhance the understanding of local potentials, strengths and challenges
- create (or adapt) processes and structures to integrate Low Emission Development into urban planning, policies and projects, across municipal departments
- engage and empower stakeholders in a meaningful, inclusive way



Facts & Figures

Population / Land area
2.45 million (2010) / 315 km² (2010)

Municipal budget
45,652.17 million (2013)

Greenhouse gas inventory
Yes (2015)

- approve an effective strategy to meet objectives and targets
- strengthen enabling conditions by with policies and regulations
- introduce mechanisms for delivery of programs and projects over time
- improve monitoring and reporting capacity
- demonstrate results and progress in a transparent and credible way

First coined in 2007 at the COP13 in Bali, Indonesia, the importance of transparent “MRV climate action” has continued to grow in significance and scope – as evident in the 2015 COP21 Paris Climate Agreement, in which nations unilaterally committed to set ambitious targets, and accountably report their progress on addressing climate change through Nationally Determined Contributions.

A key component of the GCC includes the development of a greenhouse gas inventory in order to identify low emission development priorities and measure and track progress. Throughout the implementation of the GCC methodology, the City of Fortaleza consistently sought to integrate existing initiatives and studies with the Urban-LEDS activities, resulting in tangible actions with measurable progress indicators and metrics.

Photo 1: Business by the beach is the norm in Fortaleza

Photos 2 & 3: Bicycle lanes integrated with the BRT line



Fortaleza in context

Fortaleza is the 5th most populous city in Brazil and one of the three largest cities in the Northeast region, together with Recife and Salvador. As the 4th most popular destination in the country, the port city has a thriving tourism industry and is a hub of industry and commerce.

Although Fortaleza was ranked the 10th wealthiest city in Brazil in 2014, it is one of the most economically inequitable cities in the country, with 134,000 inhabitants living below the extreme poverty line. Social inequality in the city is exacerbated by its spatial configuration; poorer districts along the city's periphery often lack access to adequate public services such as public transportation, sanitation infrastructure, public lighting, and waste collection.

The beginning of Fortaleza's Urban-LEDS journey in 2012 coincided with a time in which many citizens were also eager to push low-carbon development forward. Organized civil society groups mobilized to demand improvements to the bus system and the integration of bicycle infrastructure at certain bus terminals. Many citizens were already taking matters into their own hands: in several districts, groups of citizens constructed “illegal” bicycle paths to connect primary routes to official bicycle lanes extending outwards from the city center.

When the current administration took office in January 2013, the City placed education, health and poverty alleviation at the core of its political agenda, along with a low emission development (LED) approach to bolster environmental policy, sustainable infrastructure and the green economy.

Despite the political will to mitigate climate change, the City faced sizable implementation constraints. At the beginning of the Urban Low Emission Development Strategies (Urban-LEDS) Project in 2013, the City expressed the lack of a comprehensive approach and



expertise to tackle climate change. The City also identified the importance of designing a Measurable, Reportable and Verifiable (MRV) approach to analyze the local context, and guide evidence-based local LED action.

The selection of Fortaleza as a Model city for the Urban-LEDs project was based on ICLEI and UN-Habitat's recognition of the City's willingness and ambition to create an inclusive model of governance, with low emission development at its core. The City's request for a guided MRV approach aligned with the Urban-LEDs GreenClimateCity methodology and comprehensive tools to measure and track GHG emissions.

Table 1: City and energy profile indicators

Energy consumption per inhabitant (MWh/hab/year)	1,861,506.88 MWh
Community GHG emissions:	3,830,518.09 tCO₂e (2012)
Annual community emissions from the Transport Sector:	2.338.261,05 tCO₂e
% of population with access to electricity	99%
% of population with access to municipal water system	94%
% of population served by municipal drainage system	64%
% of population served by municipal solid waste collection	99%
% of municipal area served by selective collection of waste for recycling	25%
Solid waste generation per inhab. (kg/hab/year)	474,5 kg/hab
% of pop. living in informal settlements	11,9%
Public transportation modes available: BRT, Bus, Metro, Bike Sharing Scheme	

Low-carbon transportation planning and action with the GCC

Phase I: Analyze

The implementation of the GreenClimateCities (GCC) methodology in Fortaleza commenced in May 2013. In line with Phase 1 - "Analyze", as an initial step, the City secured the necessary political commitment in order to pursue a low emission development Climate Action Plan.

1. Commit and Mobilize Stakeholders for a Low Emission Development Approach

Throughout 2013, the City of Fortaleza, together with support from the ICLEI South America Secretariat, identified and engaged stakeholders to form a pioneering Working Group for the development of the first greenhouse gas emissions inventory, using the Global Protocol for Community-scale Greenhouse Gas Emission Inventories (GPC) framework.

The Working Group, led and coordinated by the Municipal Secretariat for Urbanism and Environment, encompassed sub-groups corresponding to the key GPC framework sectors: Energy, Transport, Waste, Agriculture and Land Use and Use of Products and Industrial Processes and Transport.

2. Research and Assess Local Context and Frameworks

The formation of a new institutional LED Working Group coincided with the beginning of the data collection process for the Plan of Urgent Actions for Traffic and Urban Mobility (PAITT), undertaken by local civil servants and a specialized consultancy. Aware of the added value of PAITT's research findings, the City involved the technicians responsible for gathering relevant transport data such as the municipal fleet count, modal split, and fuel consumption into the City's Working Group, therein integrating PAITT data into the GHG inventory and Climate Action Plan process.

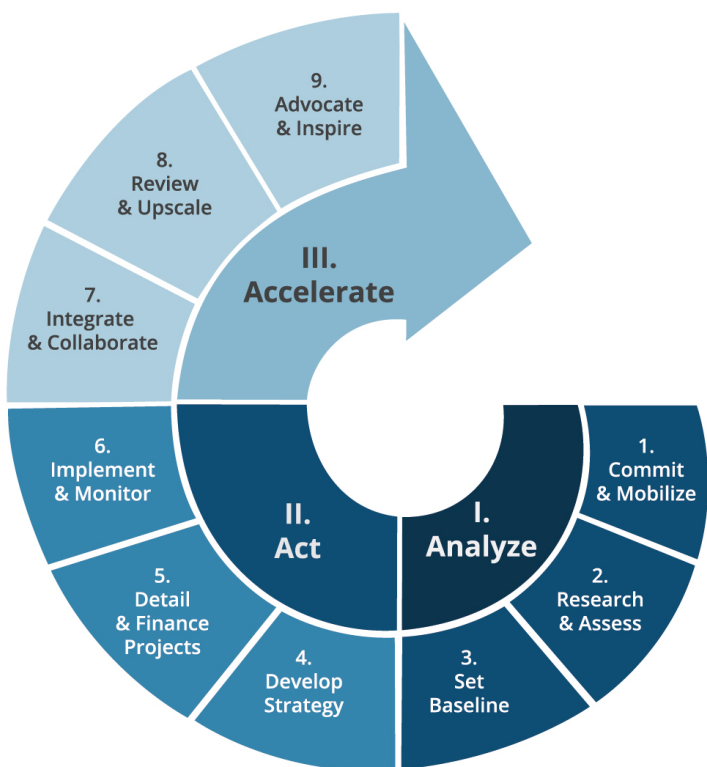


Figure 1: The Green Climate Cities (GCC) methodology

3. 3. Identify Priorities

During the first Urban-LEDS meetings, municipal technicians and authorities argued that transport could be the main driver of GHG emissions, as well as the best opportunity to transformatively promote low emission development.

Having technicians from the Transport, Urbanism and Environment, Conservation, and Services Secretariats working together in two strategic studies enabled Fortaleza to promote a low emission development perspective through the Transport actions to be implemented in the city. The finalization of the GHG Inventory and the initial design of the Climate Action Plan were informed by the preliminary data from the PAITT. This contributed to the elaboration of accurate emission scenarios and estimates of emission reductions from existing projects, thus strengthening the benefits of implementing mobility solutions outlined in such documents.

This set of documents was spread widely among all secretariats and strategic departments, leveraging further technical reviews and debates

on the results. When several local authorities requested more discussions on the results presented by the GHG Inventory, PAITT and the Climate Action Plan, the Secretariat of Urbanism and Environment led a series of workshops explaining these results and gathering subsequent recommendations, thereby providing additional applicable information to decision makers.

Phase II: Act

1. & 2. Develop, prepare and approve an Action Plan

Throughout 2015, the final results of PAITT and the finalization of the Climate Action Plan were used to confirm that the pathway adopted by the City, focusing on transport to mitigate GHG emissions and improve local infrastructure, was coherent with the political agenda. The final version of PAITT presents four main axes of actions:

- Public Transport
- Bicycles
- Road Circulation
- Pedestrians

3. Implementing for low-carbon transportation action

Between 2013 and 2015 the city implemented ten solutions split across these four axes. Four of these ten were prioritized in the climate action plan: exclusive bus lanes, infrastructure for bicycles, a bike sharing scheme, and innovation in road circulation (please see the “Results” section below). Implementing these solutions on the basis of studies such as PAITT and the GHG Inventory helped the city to measure the benefits of such “low hanging fruit” activities. Namely: GHG emission reductions and other social-environmental benefits such as linking degraded areas to touristic sites, improving accessibility, and promoting the use of non-motorized and public transport.

Phase 3: Accelerate

Having accurate GHG reduction estimations for each proposed measure outlined in the Climate Action motivated the city to maintain its efforts to turn Fortaleza into the Brazilian capital for sustainable urban mobility. With this goal in mind, the City announced a procurement process for an electric car sharing program in December, 2015.

The initial focus on the transport sector, based on its political relevance as well as technical feasibility, has left a blueprint for action which will be replicated for other sectors such as waste and buildings (i.e. energy efficiency). For these two sectors comprehensive studies are planned which might result in assessments similar to PAITT and the Climate Action Plan.

The GCC process finished in December 2015 when Fortaleza joined the Compact of Mayors and the minutes of the Policy for Climate Change and the Climate Action Plan were sent to the local city council to be approved as a municipal law, securing the a legacy of low emissions development in Fortaleza.

GCC Methodology

The GreenClimateCities methodology (GCC) underpins the Urban-LEDS project. It incorporates nine steps across three phases: Analyze, Act, and Accelerate.

Fortaleza was supported through the Urban-LEDS project to develop and integrate their GHG emissions inventory with previous studies and streamline existing practices and policies according to the steps of the GCC methodology.

Results

Integrating the results from technical tools such as the GHG inventory, feasibility studies such as PAITT and other detailed assessments of specific mitigation solutions, assisted the city to accelerate the implementation of actions based on accurate information and forecasted results. The prioritized actions selected by Fortaleza to be included in its Climate Action Plan have already delivered the following results:

- **Only in 2015, the Exclusive Bus Lanes were estimated to contribute to reducing over 229,000 tons of CO_{2e} emissions.** Between December 2014 and January 2015 17 dedicated bus lanes stretching 84.6 km were implemented; by February 2016, a total of 135 km had been implemented, including the creation of eight additional dedicated lanes.

Photo 4: Active stakeholder engagement, as seen below, is an integral aspect of the GCC methodology



- **Fortaleza has the most efficient bike sharing program in Brazil in terms of number of trips per bicycle, therein avoiding more than 400 tons of CO_{2e} emissions in 2015.** Between December 2014 and March 2016, 80 bike sharing stations were put in place and used by 97,044 registered participants. Compared with other Brazilian cities with similar programs, Fortaleza has the highest number of trips per bike: 6.7 per day (compared to 5 in Rio de Janeiro and 2.3 in Brasilia).
- **The Urban-LEDS project enabled the installation of four bike park stations in bus terminals to integrate different modes of transportation, and enhanced the expansion of the bicycle network.** When Urban-LEDS started the implementation of the GCC methodology in 2012, the city had 68.6 km of bicycle lanes. By December 2015, there were 131.6 km implemented. The improvements made in the expansion of bike lanes and cycle paths are estimated to have reduced 11,000 tons of CO_{2e} emissions in 2015 alone.
- **Achievements of previous solutions in the mobility sector outlined in the Climate Action Plan and PAITT helped to accelerate the selection process for sponsors of the electric car sharing scheme.** Based on studies of similar cases, in particular Paris and Barcelona, Fortaleza decided to implement an electric car sharing program at zero cost to the municipal budget. In January 2016, a public call was open to select the best offer from sponsors willing to grant at least 15 electric cars to be placed in 10 stations only in 2016. The target is to have at least 30 stations by 2017.
- **The implementation of different solutions in transport is turning Fortaleza into a national reference for urban mobility.** One of the potential legacies from the 2014 FIFA World Cup for Brazilian cities would be the improvements in local urban mobility. However, as a great part of the investments and financial resources did not arrive on time to complete implementation before the start of the event, many cities decided to stop these public works. Fortaleza decided to maintain its focus on sustainable transport and is forging ahead with its plan to become a leader in this field.

"Fortaleza needs to take the lead and responsibility in the global movement to address drastic reduction of GHG emissions in order to promote resilient and eco-efficient cities".

- Mayor Roberto Cláudio



Photo 5: Mayor Roberto Cláudio signing the Municipal Policy on Climate Change, alongside Secretary for the Environment, Águeda Muniz,

Lessons Learned

- Shaping the GCC implementation by considering existing agendas and local issues was necessary to avoid political conflicts and to establish the prioritization of the climate agenda across sectors and secretariats. The GCC implementation was triggered both technically and politically once other secretariats realized that the Urban-LEDS project could leverage attention and resources for their sectoral initiatives if these were embedded in the Climate Action Plan.
- Bringing together city staff familiar with different studies from various secretariats and sectors enabled project decision makers to internalize technical knowledge, resulting in a quicker implementation process.
- Mitigation solutions which did not already have an accurate, detailed feasibility assessment can be prioritized, which is helpful in order to accelerate their implementation.
- Obtaining estimates of GHG emission reductions, the number of beneficiaries, indirect social improvements and the potential of expanding actions helped decision makers to take action, trigger investment from the private sector, and create innovative financing models.
- Even though the GHG emissions inventory started after the other technical studies, the dissemination of its results assisted different secretariats to analyze the mitigation contribution of their small-scale projects, therein promoting the GCC methodology's cross-cutting approach in all sectors with the potential to mitigate GHG emissions.
- Creating a culture of developing technical tools upon which to base political decisions has given more confidence to municipal staff to communicate project proposals, results, barriers, and provided the support they need to overcome challenges and access finance.



Photo 6: Bicycle lanes have proliferated in Fortaleza

Key Contacts

ICLEI South America Secretariat

Igor Reis de Albuquerque,
Climate Change Manager
Rua Ibirapuera, 226, Vila
Madalena

São Paulo / SP - Brazil

+55 11 5084-3079

urban-leds-brasil@iclei.org

ICLEI World Secretariat (WS)

Kaiser-Friedrich-Str. 7

53113 Bonn, Germany

Tel. +49-228 / 97 62 99-00

Fax +49-228 / 97 62 99-01

urban-leds@iclei.org

<http://urbanleds.iclei.org/>

Acknowledgements

Author: Igor Reis de
Albuquerque, Climate Change
Manager, ICLEI South America
Secretariat

Editors: Michael Woodbridge,
Lucy Price, and Kathrine
Brekke, ICLEI World
Secretariat

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Replication

Certain measures, actors, and policies can help lead to successful application of the GCC in any city. These include chief political figures in the city becoming champions of the project, the inclusion of civil society, and the development of effective communication channels.

Costs and Funding

Through the Urban-LEDS project implemented in by ICLEI and UN-Habitat, and funded by the European Commission, funding was made available for training, capacity building, and the dissemination of documented information, with the overall aim of making Fortaleza a "Model City".

Further Reading

<http://urbanleds.iclei.org/index.php?id=177>

About the Urban-LEDS Project



The Urban-LEDS project, funded by the European Commission, and implemented by UN-Habitat and ICLEI, has the objective of enhancing the transition to low emission urban development in emerging economy countries.

Selected local governments in Brazil, India, Indonesia and South Africa a comprehensive methodological framework (the GreenClimateCities methodology) to integrate low-carbon strategies into all sectors of urban planning and development.



This series of local case studies is produced within the Urban-LEDS project funded by the European Commission, and implemented by UN-Habitat and ICLEI, which has the objective of enhancing and the transition to low emission urban development in emerging economy countries.

They represent solely the views of the authors and cannot in any circumstances be regarded as the official position of the European Union.

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ICLEI World Secretariat. Kaiser-Friedrich-Straße 7, 53113 Bonn, Germany
Email: urban.research@iclei.org

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