



Prefeitura de Fortaleza
Secretaria Municipal de
Urbanismo e Meio Ambiente

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Local
Governments
for Sustainability

URBAN LEDS
URBAN LOW EMISSION DEVELOPMENT STRATEGIES



2020 LOCAL CLIMATE **ACTION PLAN** OF THE CITY OF FORTALEZA

SUMMARY

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FOR A CITY FOR ALL

This publication presents a summary of the Local Climate Action Plan, prepared by the City of Fortaleza with ICLEI South America's support through the Urban-LEDS project in its second phase. It aims to adapt the territory and reduce the city's Greenhouse Gas Emissions to become carbon neutral and resilient by 2050.

The targets and priority actions to achieve these goals were designed from meetings and articulations held throughout 2020 between the Municipal Executive Power and the various sectors of society sectors from Fortaleza. This collective construction process only makes sense if the results reflect the collective desire for an inclusive city to the entire population, especially the socioeconomically vulnerable communities, which are historically and disproportionately more impacted by environmental injustices. Also, without leaving aside the knowledges and traditions materialised in the strong cultural heritage of Fortaleza.

Therefore, this document demonstrates the municipal public power's commitment to the city and its environment and its respect for the population's past, present, and future.

To read the full version of the Local Climate Action Plan of The City of Fortaleza, visit the website of the city's Municipal Secretary of Urbanism and Environment: <https://urbanismoe-meioambiente.fortaleza.ce.gov.br/>.

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PRESENTATION

ROBERTO CLÁUDIO, MAYOR OF FORTALEZA

"We have always valued the quality of our natural environment and its integration with the built environment and society. Integrated policies and actions to reduce environmental pollution are included in the adhesion of the city to the Urban-LEDS projects, implemented by ICLEI - Local Governments for Sustainability, an organisation linked to the United Nations (UN), defined as Low Carbon Urban Development Strategies, which mark a path of transition to a low carbon city and a green and inclusive urban economy, through its integration into plans and processes of the city development.

The partnership between the city hall and ICLEI, through the Urban-LEDS I and II projects, enabled the municipality to elaborate Greenhouse Gas Inventories in the city to create the Fortaleza Climate Change Forum - FORCLIMA. With that, it was possible to conceive the Low Carbon Plan of the Municipality of Fortaleza, which this document updates, and to support the elaboration of the Low Carbon Urban Development Policy of Fortaleza.

I also emphasise that, in the last eight years, besides the actions mentioned above, Fortaleza is undergoing transformations that directly influence the mitigation of Greenhouse Gas (GHG) emissions. This can be noticed especially in the segments of transport and urban mobility, in which there was the encouragement to use bicycles

in daily life and not only as a leisure activity. Some of the measures were increasing the length and scope of bike paths and lanes and expanding the public transport network with the BRT and the exclusive bus lanes. In the energy sector, there was improvement and development of the coverage of more efficient lighting, besides the increased use of LED.

Concerning waste, the Programa Reciclando Atitudes (Recycling Attitudes Programme) was implemented, which carries out several activities. This initiative was crucial during the Quixadá Biodiesel Plant operation, notably in the period between 2013 and 2016 when it promoted the collection of residual oils and fats for biodiesel production. Also in this axis, it is important to highlight the generation of RNG (Renewable Natural Gas), a procedure that, through the collection and burning of biogas, reduces the release of methane (CH₄) resulting from the anaerobic decomposition of solid waste in the atmosphere, reducing its polluting potential.

We know that these actions are daily challenges, both from the public power and the whole society involved in favour of a city that aims to jointly implement measures to mitigate Greenhouse Gas emissions and adapt to climate change impacts. All these efforts add to fulfil the United Nations Framework Convention on Climate

Change's purposes to stabilise Greenhouse Gas concentrations in the atmosphere. This is aimed at a level that would prevent dangerous anthropogenic interference with the climate system in time to allow ecosystems to adapt naturally to climate change and for economic development to proceed sustainably. We believe, however, that the challenge must be faced, and these actions add up to make Fortaleza a healthier and better city for all."



ÁGUEDA MUNIZ, MUNICIPAL SECRETARY OF URBANISM AND ENVIRONMENT OF FORTALEZA

"The challenge of having a greener, healthier and more balanced city is the main goal that moves the City Hall of Fortaleza in its actions. We believe that this will become a reality when, as citizens, we love our city more and more, and we take ownership of it with respect. For this, the municipal management works hard to improve our water bodies' bathing, control pollution, and expand and care for our city's vegetation cover and fauna.

Since 2013, the municipality of Fortaleza has reinforced its commitment to climate resilience issues. That year, the municipality joined ICLEI - Local Governments for Sustainability and became a model city for the Urban-LEDS I programme, implemented by that organisation

in partnership with UN-Habitat and funded by the European Union.

The Cell of Sustainability and Climate Change, part of the Coordination of Environmental Policies of the Secretariat of Urbanism and Environment of Fortaleza - SEUMA, together with ICLEI, articulate this, which is already the second municipal plan related to actions and goals for urban development with low Greenhouse Gas emissions. The Local Climate Action Plan of Fortaleza updates and reviews the targets and reduction strategies developed in 2015 in the Low Carbon Plan of the municipality of Fortaleza."



RODRIGO PERPÉTUO, EXECUTIVE SECRETARY OF ICLEI SOUTH AMERICA

"One of the transversal premises for good governance, especially the public one, is that it should be multilevel. This concept refers to the articulation between the different government levels and the feedback between the local and the international to improve the formulation of global policies and improve the possibility of their implementation in the world's different territories.

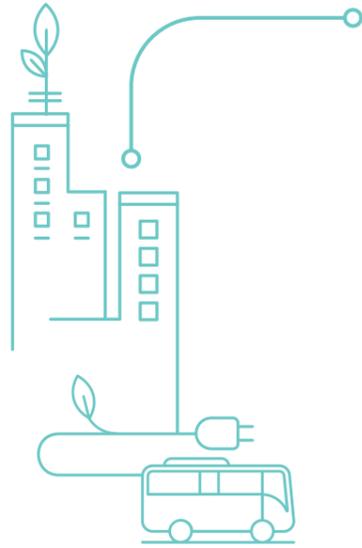
It is with this perspective, and also with great pride that we present Fortaleza's Local Climate Action Plan. A joint process of collective construction plans the city based

on the efforts already made and achieved by the municipality to catalyse the commitment towards the goals set out in the Paris Agreement. The Local Climate Action Plan presented here is integrated into the city's other urban planning instruments, reflecting the pace and tone given by the municipal public managers of Fortaleza to the necessary confrontations to the climate crisis and the permanent search for urban resilience.

Enjoy your reading!"



WHY IT IS IMPORTANT TO HAVE A CLIMATE ACTION PLAN FOR FORTALEZA



Climate change is an ongoing reality, and the city of Fortaleza has demonstrated public commitment to tackling the climate crisis, officially, since 2013, when it became associated with ICLEI and joined the CB27, the Forum of Environment Secretaries of Brazilian Capitals, as a member city. It will increasingly become a more inclusive, resilient and sustainable municipality to offer a good quality of life to its entire population.

Fortaleza's population growth was 0.92% per year in the last decade (1.36% in the Metropolitan Region), a rate higher than that of the State of Ceará, of 0.84%. Population densification has been part of the city's expansion history, and the social, economic and environmental challenges that follow this process gain amplitude when facing the impacts of climate change¹.

The distance of the commerce and service centres, concentrated in

Fortaleza, in relation to the places of greater population density, located in the neighbouring municipalities, was a determining factor for the appearance of a road structure, comprising road, underground, railway and port systems, which led to the integration of the cities, forming the Metropolitan Region of Fortaleza.

The preference for the use of individual motorised transport is still a reality. According to data from the State Traffic Department of Ceará (Detran-CE), in 2018, 208 new vehicles were registered every day in the capital of Ceará. Compared to the same period of the previous year, the number rose 58.7%. On average, there are 2.2 vehicles for each citizen, which ranks Fortaleza as the capital with the largest vehicle fleet in the North and Northeast and the seventh in the country. This contributes to making urban mobility a significant challenge.

Urbanisation also brought the occupation of risk areas, with part of the population living in precarious settlements. Regarding income concentration, 23.5% of the citizens of Fortaleza live below the poverty line, with per capita monthly household income below R\$ 448.00 (in 2019) or US\$ 5.50 per day (income value adopted by the World Bank to define poverty in developing countries).

This data also refers to the concept of climate vulnerability, referring to the predisposition of populations and ecosystems to be affected by climate change and their capability to deal with its consequences. Undoubtedly, the climate threat affects all citizens, but the risks are increased in the case of the most socially vulnerabilised population due to their low response capacity.

Aware of the need to fight the consequences of climate change in its territory and aiming at bringing a better quality of life to its citizens, Fortaleza elaborated, in 2020, the Local Climate Action Plan (LCAP), having as a guideline the neutralisation of Greenhouse Gas Emissions (GHG)² until 2050.

The LCAP was built on the ICLEI-guided Five Pathways to sustainable growth, which drive local action for

low-carbon, nature-based, equitable, resilient and circular development.

At the beginning of the process, a mapping of the targets already foreseen by the Low Carbon Plan of the Municipality of Fortaleza (prepared in 2015) and the Fortaleza 2040 Plan (2016) was carried out to understand how to make them feasible and ambitious. From the sectors prioritised in the Low Carbon Plan of the Municipality of Fortaleza, four strategic axes were defined - energy, sanitation, mobility and resilience - to give direction to the actions of this new plan, in alignment between the municipal public power, civil society, academia and the private sector. The results achieved by the city so far were also evaluated, and new objectives, targets and actions were defined in search of an ambitious outcome.

From that, this LCAP was elaborated, whose main goal is the neutralisation of GHG emissions up to 2050. That is, the city decided that it will become carbon neutral³ in 30 years. The plan's approach is holistic, so it brings a series of other benefits: creating socio-economic opportunities, reducing poverty and inequality, improving people's health, and increasingly integrating Nature into the city.

2. These gases absorb part of the Sun's rays and redistribute them as radiation in the atmosphere, warming the planet (greenhouse effect). The excess of these gases in the atmosphere, however, is responsible for climate change. Among the main GHG are: CO₂ (carbon dioxide), CH₄ (methane), N₂O (nitrous oxide) and CFCs (chlorofluorocarbon).

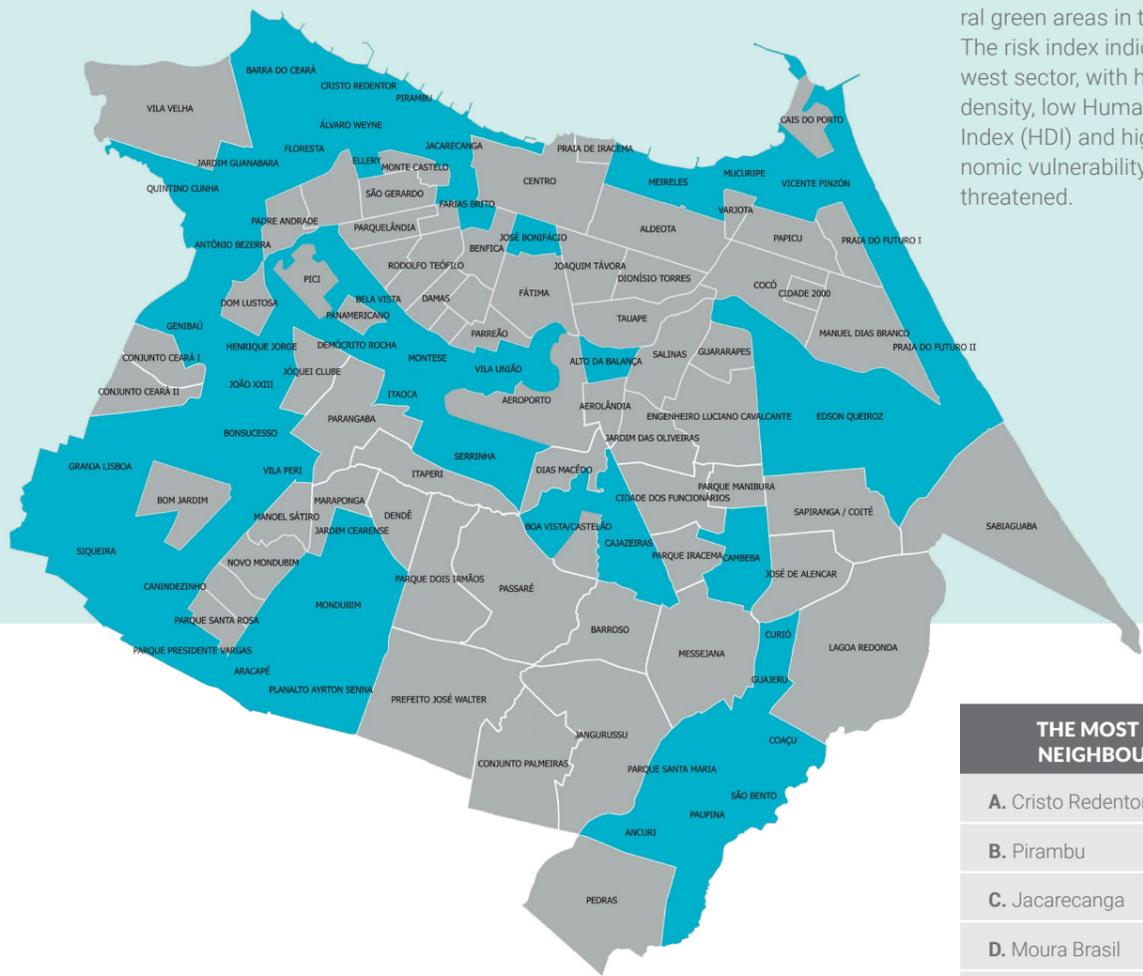
3. Climate neutrality in the context of local governments is defined as the planned reduction and prevention of GHG emissions in their operations, in the community and across all sectors to an absolute net-zero emission level no later than 2050.

The LCAP is aligned with Fortaleza's future vision of being a carbon-neutral, resilient, sustainable and inclusive city by 2050.

MAIN RISKS AND VULNERABILITIES

The *Climate Change Vulnerability Index and Adaptation Plan of Fortaleza**, prepared in 2019, identified four main risks and vulnerabilities in the city..

FORTALEZA'S MAP OF CRITICAL RISK (REFERENCE PERIOD 1976 - 2005)



TEMPERATURE RISE in Fortaleza must be felt more by neighbourhoods near the coast due to the high rate of occupation, infrastructure and buildings replacing natural green areas in these regions. The risk index indicates the city's west sector, with high population density, low Human Development Index (HDI) and higher socioeconomic vulnerability, as the most threatened.



PROLONGED DROUGHTS are related to rainfall occurrence below the expected amount in a certain period and region. In the dry period, between September and November, a 9% reduction in precipitation is expected by 2040 and up to 29% by 2100. The scarcity of rain, combined with the growing demand for water supply due to population growth, compromises the recharge of underground water and may affect the availability of this natural resource in Fortaleza. The study shows a higher risk in areas lacking a water supply infrastructure, especially in the city's extreme east.



EXTREME RAINFALL cause floods, overflows and landslides and, during the rainy season (from March to May), there is an increase in the daily amount of rain, which intensifies the occurrence of these events. Some territorial factors aggravate the impacts generated by rainfall, such as the city's sealing due to urbanisation and the inadequate disposal of civil construction waste in water bodies, which leads to silting. Neighbourhoods with high population density and low HDI are the most sensitive, as the constructions present there are less resistant to these impacts.



SEA LEVEL RISE is already a phenomenon that affects the Brazilian coast. Over the last 50 years, there has been a 40 cm rise in the sea level along the country's shores, higher than the global average of 10 cm over the same period. It is notable the frequent events of sea rebound, in the period from May to September, resulting from an over-elevation caused by the force of the waves, tides and winds. The main risks identified in the coastal neighbourhoods include: erosion of dunes and beaches; damage to urban infrastructure; impacts on coastal ecosystems (such as mangroves); and potential flooding of the areas of influence of large rivers.

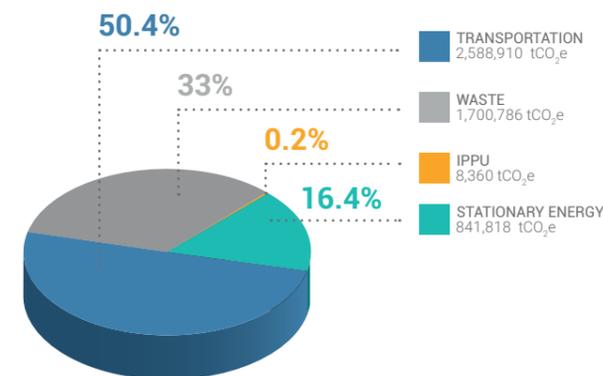
THE MOST CRITICAL NEIGHBOURHOODS

- A. Cristo Redentor
- B. Pirambu
- C. Jacarecanga
- D. Moura Brasil
- E. Cais do Porto
- F. Edson Queiroz
- G. Airport
- H. Demócrito Rocha
- I. Bonsucesso
- J. Campina do Barreto

* Elaborated by the City Hall, in the scope of the initiative *Ciudades y Cambio Climático en América Latina* ("Cities and Climate Change in Latin America"), stemming from the agreement of the French Development Agency (AFD) and the Development Bank of Latin America (CAF) for the Latin America Investment Facility (LAIF) of the European Union.

GREENHOUSE GAS EMISSIONS (GHG) - FORTALEZA (2014)

GHG emissions in 2014 were corresponding to a total of 5,139,514 tCO₂e, according to inventory. The contribution of the sectors, by %:



Stationary Energy: emissions from fuel combustion and fugitive emissions provided by the processes of generation, distribution and consumption of energy (such as electricity).

Transport: emissions from the burning of fuels or the use of electricity from the network for road, rail and air transport.

Waste: emissions from the treatment and final disposal of solid waste, biological treatment of waste and treatment and disposal of liquid effluents (sewage).

Industrial Processes and Product Use (IPPU): emissions from physical or chemical transformation processes in the manufacturing and use of products.

THE PATH TAKEN SO FAR

It is not new that Fortaleza acts to tackle climate change. In 2013, the municipality was chosen as one of the Urban-LEDS I Project model cities, an initiative funded by the European Commission and implemented by ICLEI - Local Governments for Sustainability, in partnership with UN-Habitat.

Urban-LEDS promotes the elaboration of low-carbon urban development strategies to achieve a more sustainable city. The project is active in eight countries, involving more than 60 cities, eight of which are in Brazil.

With the support of phase I of this project, Fortaleza built its climate governance, creating the Fortaleza Climate Change Forum - FORCLIMA (Municipal Decree 13.639/2015), which reaffirms the municipality's commitment to debate the climate issue in a participatory environment. (Learn more on page 12).

This step forward was formalised in 2017 with Fortaleza's Municipal Environmental Policy, established by Law 10.619/2017. The same legislation established the Municipal System of Environment (SIMMA) and the Municipal System of Information and Environmental Registry (SICA) that together stipulated as guidelines for action to reduce air pollution levels and encourage the use of non-polluting energy sources.

Besides, it was a milestone for the municipality the enactment of

the Low Carbon Urban Development Policy in the same year (Law 10.586/2017) to meet the targets for the gradual reduction of anthropogenic GHG emissions⁴, considering the specificities of each sector, as well as the search for resilience to the inevitable effects of climate change.

From the technical support of the Urban-LEDS project, the city's first Greenhouse Gas Emissions Inventory (GHG) was prepared in 2014, having as baseline the year 2012. The next step was the elaboration of the Low Carbon Plan of the Municipality of Fortaleza. Finalised in 2015, the plan envisaged actions for reductions in the transport, waste, construction and energy sectors.

The second inventory was published in 2016, with the baseline year of 2014, being prepared in the context of the 2015 Cities Footprint ("Pegada de Cidades"). This project resulted in the Action Plan for the Reduction of the Carbon and Water Footprints of the City of Fortaleza, developed jointly by the Municipality of Fortaleza and Servicios Ambientales S.A. (SASA), with funding from the Development Bank of Latin America (CAF) and the Climate and Development Knowledge Network (CDKN - Alianza Clima y Desarrollo) and facilitation from the Fundación Futuro Latinoamericano (FFLA). This document also considers the Low Carbon Plan's actions of the Municipality of Fortaleza, 2015.

Several actions set out in the Low Carbon Plan were implemented and monitored over the years. For example, in the Transport and Urban Mobility sector, there was advancement in the extension of the cycling network, which exceeded the goal set for 2020 already in 2018, reaching a total of 292.3 kilometres. In the Energy sector, the city government adopted energy efficiency measures and modernisation in lighting with LED lamps' implementation. In Waste, recycling actions were implemented with 61 Eco-points and the use of organic waste with composting. The sector of Civil Construction and Sustainable Urban Development, in turn, relied on the creation of the Sustainable Certification Green Factor for enterprises.

In the environmental education area, besides workshops and seminars - objects of the Recycling Attitudes project, actions are taken to stimulate the affective relationship and shared responsibility with the population, such as the project Uma Criança, Uma Árvore (One Child, One Tree). In the area of environmental requalification, the program Fortaleza Cidade Sustentável (FCS - Fortaleza Sustainable City) was carried out, a financing operation entirely focused on environmental issues, carried out with the World Bank. Its goal is to improve the population's urban-environmental quality through integrated actions, such as the recovery of the seaside bathing and the requalification of Rachel de Queiroz Park. Besides working as an instrument

to strengthen Fortaleza's Natural Systems Network, as it is an extensive linear park, the environmental requalification has a series of Nature-based Solutions to manage the ecosystem and water resources.

Already in 2016, intending to establish short, medium and long-term goals for a more efficient and participatory public management, the Fortaleza 2040 Plan was created, which brings together, under one umbrella, the Urban Master Plan, the Mobility Plan and the Economic and Social Development Plan. The plan's general objective is to holistically integrate the city's priority axes and contemplate the complexity of the expanded metropolitan region from effective governance.

In 2019, the third GHG inventory was launched, with the baseline year of 2016. In the same year, the city established an agreement with the French Development Agency (AFD) and

the Latin American Development Bank (CAF) for Latin America Investment Facility (LAIF) of the European Union to produce the Index of Vulnerability to Climate Change in the city of Fortaleza, through the project Ciudades y Cambio Climático (Cities and Climate Change).

The launch of the vulnerability assessment came in the context of the resumption of the Urban-LEDS II project, which presupposes the continuity of the implementation of the Low Carbon Plan of the Municipality of Fortaleza (2015) and its more ambitious update, with the elaboration of this **Climate Action Plan (LCAP)**.

With the updated targets and actions in this LCAP, Fortaleza should continue to achieve significant advances in its climate agenda, focusing on being carbon neutral and resilient by 2050.

The Urban-LEDS project promotes the elaboration of resilient and low-carbon urban development strategies.

4. Non-natural emissions, caused by human action.

FORTALEZA IN ACTION
A BRIEF HISTORY OF THE FIGHT AGAINST CLIMATE CHANGE



CLIMATE GOVERNANCE:
FORCLIMA

The FORCLIMA - Fortaleza Climate Change Forum, created via Municipal Decree 13.639/2015, plans and executes actions to address climate change effects by articulating the Municipal Executive Power with organised civil society institutions. It is formed by representatives of the following bodies: Secretary of Government; the Office of the Deputy Mayor; Municipal Secretary of Urbanism and Environment (SEU-

MA), Secretary of Citizen Security (SESEC), represented by the Municipal Coordinator of Protection and Civil Defense (COMPDEC), Municipal Secretary of Tourism (SETFOR), Municipal Secretary of Health (SMS), Municipal Secretary of Conservation and Public Services (SCSP), Municipal Secretary of Infrastructure (SEINF), Municipal Secretary of Planning, Budget and Management (SEPOG), Municipal Secretary of Economic Development (SDE); of the special coordinators for Popular Participation (CEPP), and Articulation of

Regional Secretariats; the Fortaleza Planning Institute (IPLANFOR); the Coordinator for Science, Technology and Innovation in Public Policies (CITINOVA); the Fortaleza Housing Development Foundation (HABITAFOR); and the Autarchy for Regularisation, Inspection and Control of Public Sanitation Services (ACFOR).

Besides these bodies, representatives of federal, state and municipal entities are invited, as well as experts in the environmental area and representatives of other sectors

that are interested in contributing to the vision of Fortaleza as a carbon-neutral city in 2050.

With this governance, which allowed the engagement and commitment of several actors, it was possible to articulate technical, institutional and political capacity for the maturing and the advancement of the city of Fortaleza towards local action to fight climate change.



METHODOLOGY

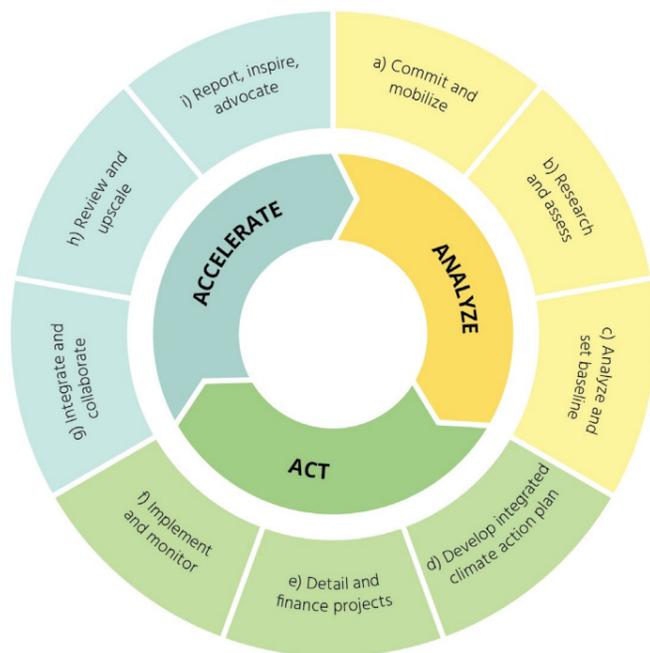


The strategy to tackle climate change in Fortaleza, of which the LCAP is part, was elaborated based on the Green Climate Cities - GCC methodology, developed by ICLEI in the Urban-LEDS I Project framework following the UN-Habitat principles. The GCC provides a step-by-step approach for city managers to take action in the fight against climate change. This methodology is premised on sustainable development as low carbon, nature-based, equitable, resilient and circular.

Based on these premises and methodology, the construction of the LCAP followed, in general terms, the following steps:

- Analysis of documents and legislation of the municipal power related to the climate issue, as well as commitments and sectoral plans that demonstrate the city's commitment to the agenda;
- Interviews with public managers and technicians of the municipal management to understand the status of policies, programs and actions, raise more references, assess strengths and capacities of the city and gather information from relevant actors;
- Holding participatory workshops with FORCLIMA, as well as representatives from academia, third sector, civil society and the private sector for presentation, validation of information and prioritisation of actions;
- Meeting with representatives of the youth from Fortaleza to collect perceptions and suggestions from the city's different realities, contributing to the targeting of actions and refinement of principles.

THE LCAP DIRECTLY CONTEMPLATES THE ANALYSIS AND ACTION STAGES AND DRIVES THE BASES TO ACCELERATE, IN THE GCC METHODOLOGY:



Source: ICLEI - Local Governments for Sustainability

THE THREE PRINCIPLES OF THE ACTION PLAN

Fortaleza's LCAP is based on three main principles defined in alignment with the city's aspirations, collected in discussions held in 21 encounters throughout 2020 with the participation of, in total, 190 people. Among those present were representatives of the municipal management, strategic institutions and civil society.

PRINCIPLES THAT RULE THE CONTENT OF THE LCAP



CLIMATE JUSTICE

Climate Justice links human rights and low carbon development to achieve a people-centred and environmentally responsible logic. This concept proposes that public policies, risk reduction strategies and infrastructure construction use a holistic approach that includes social participation, community empowerment and cooperation between different sectors and institutions. Vulnerabilised populations must receive special attention since they are the most impacted by climate change due to a lack of basic, adapted and resilient infrastructure.



NATURE-BASED SOLUTIONS

According to the International Union for Conservation of Nature (IUCN), Nature-based Solutions (NbS) are actions to protect, restore and sustainably manage natural and modified ecosystems by effectively and adaptively addressing societal challenges and promoting benefits to biodiversity⁵ and human well-being. NbS strengthen the adaptive capacity and resilience of cities.

Examples of NbS are: rain gardens, which contribute to reducing the surface runoff of rainwater and can promote infiltration into the soil; green roofs, which improve the microclimate and bring more thermal comfort; and recovery of mangroves and sandbanks ("*restingas*"), used to soften the effects of tidal flooding.

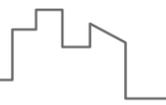


GREEN ECONOMY

The United Nations Environment Programme (UNEP) understands the Green Economy to be one that improves human well-being and builds social equity while reducing environmental risks and ecological scarcities. It is low carbon-intensive, efficient in the use of natural resources and socially inclusive.

Examples of Green Economy activities are: agroecology, biofuel production, renewable energy generation, ecotourism, sustainable fishing and recycling.

5. The variability among living organisms, including, among others, terrestrial and aquatic ecosystems and the ecological complexes of which they are part, as well as diversity within species, between species and of ecosystems, according to the UN Convention on Biological Diversity.



THE FORTALEZA 2050 ACTION PLAN

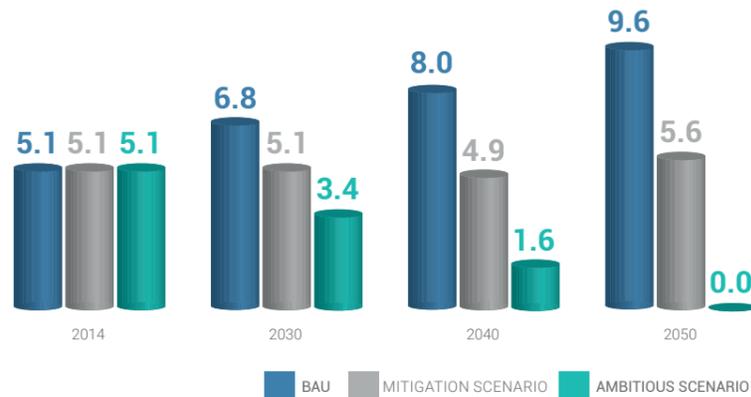
The main goals of the **Local Climate Action Plan (LCAP)** of the City of Fortaleza are:

- Reduce Greenhouse Gas emissions until the city becomes emission neutral in 2050;
- Promote the city's adaptation and resilience to climate change.
- Make Fortaleza a reference of sustainability and social inclusion for the entire metropolitan region and its residents, especially the most vulnerabilised communities.

With this, the city contributes to tackling climate change and will be prepared for the impacts that are already being felt and the ones to come.

This is an ambitious scenario, but a feasible one, as it is the result of a process that is careful in applying

COMPARISON BETWEEN PROJECTED MITIGATION SCENARIOS (IN MILLIONS OF TONS OF CARBON DIOXIDE EQUIVALENT - tCO₂e)



adequate methodologies; participatory, in the sense of promoting the listening of different sectors of society; and objective in its targets and actions. Moreover, it addresses solutions for the main risks and vulnerabilities identified to develop resilience that is so necessary to the city.

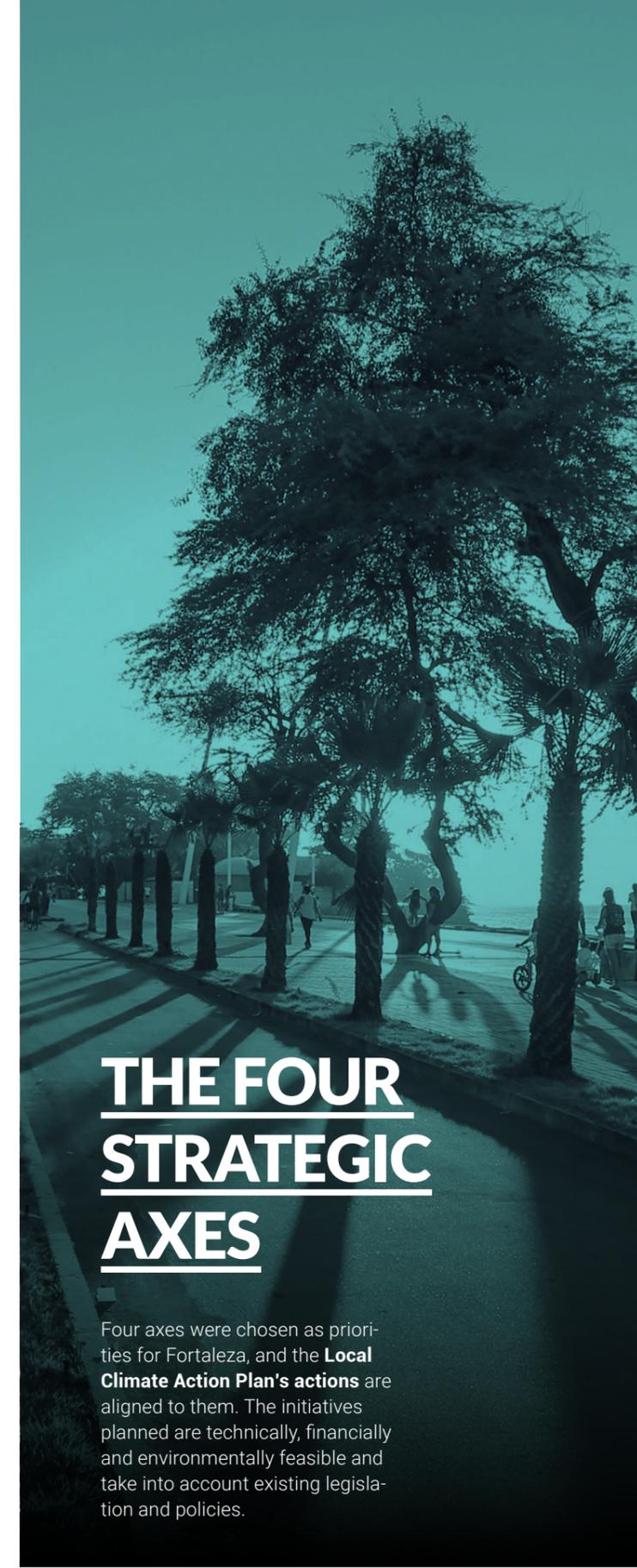
The year 2014 was chosen as the starting point for the projection of the city's emissions scenarios until 2050, for being the baseline of the inventory most consistently updated by the municipality. The inventories of Fortaleza follow the international methodology Global Protocol for Community-Scale GHG Emissions - GPC, jointly developed by ICLEI, World Resources Institute (WRI) and C40 Cities Climate Leadership Group, with the collaboration of the World Bank, UNEP and UN-Habitat.

Until 2050 may seem a long time, but the projection for this plan has temporal "milestones" that show the reduction in stages: 2030 (30%), 2037 (50%) and 2050 (100%).

The year 2030 was chosen because there are already projections of low carbon actions for this period, contained in the Low Carbon Plan of the Municipality of Fortaleza; the year 2040, because the city develops a planning with strategies for the short, medium and long term, as part of the Fortaleza 2040 Plan; and 2050 was selected for binding to the commitments of the Paris Agreement⁶, which envisages that, by that year, there must be a balance between GHG emissions and removals, reaching climate neutrality.

6. Global agreement, approved by 196 countries in 2015, whose main objective is to reduce GHG emissions to limit the average increase of global temperature to 2°C, with efforts to keep it below 1.5°C.

Based on the 2014 GHG emissions inventory, three GHG emissions scenarios were designed on how much GHG the city will emit by 2050. The BAU (Business As Usual) shows what will happen if nothing is done. The second, mitigation scenario, reveals what will happen to emissions based on actions already taken or planned. And the third is the most ambitious scenario, where emissions are reduced more quickly, and it is the one targeted by this LCAP.



THE FOUR STRATEGIC AXES

Four axes were chosen as priorities for Fortaleza, and the **Local Climate Action Plan's actions** are aligned to them. The initiatives planned are technically, financially and environmentally feasible and take into account existing legislation and policies.

The **Energy Axis** involves the consumption of electricity and fossil fuels (such as natural gas, Liquefied Petroleum Gas - LPG and diesel) in commercial, institutional and residential buildings, industries, and construction as in buildings and projects of the municipal administration. The actions focus on reducing GHG emissions through energy efficiency and energy use from renewable sources and adopting ways to offset the emissions that cannot be avoided.

The **Sanitation Axis** is related to solid waste and sanitary sewage management. In other words, it is about reducing the waste generated, promoting recycling and sewage collection and treatment. It brings actions that reduce emissions and improve the environment, health and people's quality of life.

The **Mobility Axis** addresses reducing emissions from cars, buses and other vehicles circulating in the city. But it is also related to encouraging the use of public transportation and implementing and improving bike paths and pavements, contributing to raise the air quality, mitigate atmospheric pollution and promote well-being to the population.

The **Resilience Axis** aims to make the city more prepared to respond to extreme weather events and their consequences. It is also related to the promotion of education for sustainability for all citizens. And, also, with initiatives aimed at the most vulnerabilised populations, who will suffer to a greater extent the impacts of climate change, such as lack of water, floods and landslides.



The energy supply needed for the city's growth must be based on energy efficiency and renewable energy sources.

01 ENERGY



The Stationary Energy sector emissions are responsible for 16.4% of the city's total emissions, mainly related to electricity consumption from the grid and the burning of liquefied petroleum gas - LPG (cooking gas). More than half of these emissions come from residential buildings (55%). Commercial and institutional buildings account for another 35%.

Electricity is the modality that most contributes to the sector's emissions, with 61.9% of the total. Of these, 4% are from public lighting on the city streets.

If nothing is done, the sector's emissions tend to increase 114.4% by 2050 in Fortaleza, totalling 1.8 million tCO_{2e}. Besides being a city with high average temperatures most of the year, climate change may result in more temperature rise and prolonged droughts, increasing energy consumption in the city and may expose even more those populations most vulnerable to thermal discomfort.

The reduction of electric energy consumption is necessary to fight the sector's emissions; therefore, it is essential to invest in energy efficiency initiatives.

In this sense, the Fortaleza 2040 Plan intends the city to be a national reference in energy efficiency through initiatives of distributed generation⁷ and energy use, focusing on industrial, commercial, public and residential buildings of class A and B. It also foresees the municipal power articulation with the energy distributor and large consumers so that the energy matrix is from renewable sources.

The three targets addressed in this axis involve various economic sectors of the city for effective implementation, as well as their

commitment to adjust their own consumption levels to meet the following objectives:

- Ensure 100% electricity from renewable sources by 2040.
- Minimise and neutralise emissions from fossil fuels.
- Promote the reduction of the city's energy consumption through energy efficiency measures.

7. Small electric power generation performed by the consumer agent itself.

TARGETS	ACTIONS	HOW IT WILL BE DONE	EXPECTED OUTCOME
 <p>TARGET 1 Ensure that, by 2040, 100% of the electricity supplied to the city of Fortaleza is of renewable origin.</p>	<p>I.A. Ensure, together with ENEL Distribuidora and free-market energy consumers that 50% of the electricity distributed in Fortaleza comes from a renewable source by 2030 and 100% by 2040.</p> <p>I.B. Expand the use of renewable energy (mainly solar) to reach 10 thousand GWh/year by 2040.</p>	<p>By defining, through the Committee for Renewable Energies and Energy Efficiency of Fortaleza - CERF, strategies to expand the distributed generation for Fortaleza with 100% renewable source until 2040;</p> <p>Defining, by 2022, together with ENEL and large free-market energy consumers, through CERF, a strategy and action plan to ensure that, by 2040, all the energy distributed in Fortaleza is from a 100% renewable source;</p> <p>Formulating incentives for the use of renewable energy in homes and commercial and industrial facilities by 2024;</p> <p>Prioritising the installation of renewable energy sources for new popular dwellings, focusing on low-income populations and those in risk situations;</p> <p>Establishing, until 2024, together with ENEL, the conditions to advance the smart grid infrastructure;</p> <p>Contracting photovoltaic energy to supply public institutions, aiming to cover 30% of consumption by 2030; 40% by 2040; and 50% by 2050;</p> <p>Elaborating normative technical documents for renewable energy projects, aligned with the energy sector's federal and state regulations, in partnership with CERF, until 2023.</p>	<p>With action I.A, emissions reduction of 670 thousand tCO_{2e} by 2050 (concerning the total emitted in 2014). With action II.B. (and III.A., reducing electricity consumption in all economic sectors), to reduce another 345 thousand tCO_{2e} by 2050.</p>
 <p>TARGET 2 Turn neutral the GHG emissions generated by stationary fossil fuel consumption in the city of Fortaleza by 2050.</p>	<p>II.A. Require, starting in 2025, the compensation of emissions to the relevant sectors.</p> <p>II.B. Reduce and/or compensate up to 30% of fossil fuel emissions from stationary energy by 2030; 60% by 2040, and 100% by 2050.</p>	<p>Identifying, by 2022, the most relevant fuel-intensive economic sectors;</p> <p>By establishing, until 2024, incentives for the substitution of fossil fuels by renewable ones;</p> <p>By elaborating, until 2024, policies for substitution of fuels in the residential and commercial/institutional sectors;</p> <p>Establishing the legal regulation with the criteria and requirements of inventories and compensation of GHG emissions, especially for intensive activities, in the use of fossil fuels in the city.</p>	<p>Reduction of 555 thousand tCO_{2e} in emissions by 2050.</p>
  <p>TARGET 3 Reduce in 27.6% the energy consumption of all economic sectors in Fortaleza by 2050 in relation to the Business As Usual scenario.</p>	<p>III.A Reduce the electricity consumption of all economic sectors in Fortaleza by 12.3% until 2030; 20% until 2040; and 27.6% until 2050, in relation to the Business As Usual scenario.</p>	<p>Identifying, until 2021, the main energy-intensive economic sectors of the city;</p> <p>Promoting and developing, until 2022, incentive policies for energy efficiency and fuel substitution in the residential, public, commercial and industrial sectors;</p> <p>By preparing an expansion and energy modernisation plan for public lighting in Fortaleza, including the implementation of 100% LED lamps by 2025 and the expansion of lighting points, considering the positive influence on public safety;</p> <p>Contracting public works, including for the construction of popular housing, that privilege sustainable materials and projects that contemplate eco-efficiency, sustainability and Nature-based Solutions;</p> <p>Fostering the Green Factor Certification programme, including the definition of annual certification goals, the establishment of partnerships and agreements with relevant institutions to advance the agenda (CAU/CE, CREA/CE, SINDUSCON/CE, among others) and the creation of incentives to obtain recognition.</p>	<p>Reduction of emissions with energy efficiency possible thanks to the technological evolution in devices used for air conditioning, entertainment, cooking, water heating, refrigeration and other services by 233 thousand tCO_{2e} by 2050 compared to 2014. Still, the reduction in energy consumption (plus the I.B. target) will further decrease 345 thousand tCO_{2e} in the same period.</p>



Reducing the waste generated and promoting recycling and sewage collection and treatment contributes to the environment and the population's health.

02_

SANITATION



According to the 2nd GHG Emissions Inventory of Fortaleza (base-line year 2014), the waste sector is the second-largest contributor to the municipality's GHG emissions, with 33.1% of emissions. No less than 96.6% of this total comes from the final disposal of solid waste. The other 3.4% correspond to the treatment and final disposal of liquid effluents, especially domestic sewage.

Fortaleza already has a Municipal Plan of Integrated Management of Solid Residues (PMGIRS) to protect the public health and ensure the environmental quality of the city; fomenting the non-generation, re-

duction, reutilisation, recycling and treatment of residues; adopting cleaner residue treatment technologies; and universalising the rendering of public services of cleaning and urban management of solid residues.

The solid waste generated in the city is sent to the Metropolitan West Caucaia Landfill (ASMOC - Aterro Sanitário Metropolitano Oeste de Caucaia), located in the municipality of Caucaia. The landfill has a Clean Development Mechanism (CDM) project that already recovers CH₄ emissions from waste decomposition. In the long term, it is necessary to think about the lifespan of land-

fills given the current consumption pattern and to significantly reduce the recent exponential growth of packaging and product waste.

Another issue to be considered is the inadequate disposal of solid waste on slopes and public areas that, when related to extreme rainfall events, cause landslides, silting up of hydric bodies, overflows and clogging of the urban drainage system which causes flooding. Actions focused on urban drainage are placed on the Resilience Axis, even though they are sanitation components.

Finally, it is necessary to universalise the sewage collection coverage, according to Fortaleza's Municipal Sanitation Plan, whose coverage index was 61% in 2013. The evolution of increased access to collection

and treatment services must be done sustainably, accompanied by the implementation of clean technologies that minimise emissions over time.

The objectives to be achieved are:

- **Increase the collection, recycling and reuse of solid waste.**
- **Implement technologies to minimise GHG emissions in waste disposal and treatment;**
- **Universalise the sanitary sewage service with solutions that minimise GHG emissions.**

TARGETS	ACTIONS	HOW IT WILL BE DONE	EXPECTED OUTCOME
 <p>TARGET 1 Reduce by 60.6% waste disposal in landfills until 2050.</p> 	<p>IV.A. Reduce, until 2030, the disposal of solid waste in landfills by 26.6%, 51.2% until 2040 and 60.6% until 2050, according to the Fortaleza 2040 Plan.</p>	<p>Regulating reverse logistics with the creation of municipal regulations by 2030.</p> <p>Developing a sectoral agreement for packaging until 2040;</p> <p>By creating, until 2022, a policy to encourage and promote recycling, composting and biodigestion in the industrial, commercial and residential sectors;</p> <p>By developing, until 2022, specific recycling and composting requirements for large-sized projects, according to local environmental regulations;</p> <p>Creating incentives for collectors and artisans of recyclable materials;</p> <p>Elaborating a programme to improve eco-points, with particular attention to lighting and afforestation of the respective places;</p> <p>Formulating incentives for recycling practices, employing environmental licensing instruments;</p> <p>By installing, until 2024, composting centres with products directed to community gardens and/or organic agriculture, and schools, associated to environmental education initiatives;</p> <p>By promoting the recycling of class "A" waste through implementing a recycling plant for civil construction waste until 2024.</p>	<p>Reduction of 189 thousand tCO₂e by 2050 in relation to 2014.</p>
 <p>TARGET 2 Ensure that the city's waste treatment is carbon neutral by 2040.</p>	<p>V.A. Ensure that methane emitted by waste decomposition in landfills is burned or used for energy purposes by 50% until 2030 and 100% from 2040 onwards.</p> <p>V.B. Offset emissions related to all waste treatments (incineration of health service waste; composting, etc.) by 30% until 2030, 60% until 2040 and 100% until 2050.</p>	<p>By setting up, until 2021, working groups with representatives of the landfill operating companies to enable total burning and/or energy use of GHGs from waste decomposition;</p> <p>Establishing a compensation policy for emissions related to the waste sector.</p>	<p>Reduce the emission of 1,079 thousand tCO₂e until 2030, in relation to 2014; 1,673 thousand tCO₂e until 2040; and 1,626 thousand tCO₂e until 2050.</p>
 <p>TARGET 3 Universalise sanitary sewage with the guarantee that the city's effluent treatment is carbon neutral by 2050.</p> 	<p>VI.A. Achieve 72% of sewage collected and treated by 2030 and 100% by 2040.</p> <p>VI.B. Implement methane burning technologies or use of methane in Wastewater Treatment Plants using 10% by 2030, 50% by 2040 and 100% by 2050.</p> <p>VI.C. Establish offset policy for residual emissions related to effluent treatment (methane and nitrous oxide), with 30% of GHG emissions offset by 2030; 60% by 2040; and 100% by 2050.</p>	<p>Setting up of a working group with CAGECE representatives to enable the use of new ecological solutions, of micro-scale, and technologies that burn or take advantage of the GHGs from the ETEs;</p> <p>Impact assessment of ecological sanitation measures, such as biological treatment micro stations, wetlands, filtering gardens, evapotranspiration tanks, etc. And if the analysis is positive, develop modelling to scale up the city.</p>	<p>The three actions implemented together could avoid the emission of 466 thousand tCO₂e by 2050 compared to 2014.</p>



Actions to improve people's coming and going allow them to take advantage of bike paths, pavements and public transportation, in addition to reducing emissions.

03 — MOBILITY



In Fortaleza, there are 5 million daily commutes, according to data from the Origin-Destination Survey 2019, carried out by the city hall. The analysis shows that 32% of trips are made on foot; 28%, by bus; 26%, by car; 9%, by motorbike; and 5% by bicycle. The preference for the use of buses, cars and motorbikes shows how the city has expanded over the last century: from an urban model focused on roads, with expressways and flyovers, to meet the growing presence of individual vehicles, powered by fossil fuels, to the detriment of caring for the infrastructure for pedestrians and cyclists and the use of public transport with renewable energies.

According to data from the State Traffic Department of Ceará (Detran-CE), in 2018, every day, 208 new vehicles were registered in the capital. Compared to the same period of the previous year, the number rose 58.7%. On average, for each person from Fortaleza, there are 2.2 vehicles, which positions the city as the capital that holds the largest fleet of vehicles in the North and Northeast regions. Individual transport is directly related to GHG emissions and places the transport sector as the leading emitter in the municipality, responsible for 50% of emissions in 2014. The gasoline consumed accounts for 49% of these emissions, followed by diesel, 29%, and aviation fuel, 22%.

The reduction of GHG emissions in the mobility sector necessarily requires a migration from individual transport to collective and active transport. Urban mobility comes up against other aspects of chronic problems in the city, such as insecurity and drivers' lack of traffic awareness. All this, added to climatic aspects, such as rainy events and intense heat at different times of the year, leads to the lack of thermal comfort and is configured as a challenge to be faced to increase the use of public transport.

ive bus lane and the elaboration of the Fortaleza's Municipal Plan for Walkability.

The objectives to be achieved with the three targets set for this axis in the LCAP are:

- **Prioritise collective and active means of transport;**
- **Encourage the use of renewable fuels in urban mobility;**
- **Compensate for residual⁸ GHG emissions from transport until 2050.**

Between 2014 and 2020, however, the city has already advanced to reverse this situation with a series of measures, such as the extension of the cycling network (292.3 km); the implementation of the bike-sharing system, with 123 stations in total; the development of BRT (Bus Rapid Transit - 17.4 km); the expansion of the Metro/Tram (54.5 km); the implementation of 116 km of exclu-

8. Therefore, emissions that could not be avoided entirely should be compensated through initiatives that capture carbon from the atmosphere, such as planting trees.

TARGETS	ACTIONS	HOW IT WILL BE DONE	EXPECTED OUTCOME
 <p>TARGET 1 Provide infrastructure and necessary conditions so that, until 2050, 15% of the individual transport use (cars and motorbikes) is migrated to collective and active transport.</p>	<p>VII.A. Implement 8.55 km of BRT by 2025, totalling 25.95 km.</p> <p>VII.B. Implement 82 km of exclusive bus lanes, totalling 195.2 km.</p> <p>VII.C Expand the metro-railway system by implementing the Parangaba-Mucuripe LRT until 2021 and completing the East Line until 2025.</p> <p>VII.D Implement 524 km of cycling networks by 2040.</p> <p>VII.E. Adjust and upgrade the road space for pedestrians and people with reduced mobility or difficulty in directional orientation, increasing the attractiveness of pedestrian displacement, promoting inviting and accessible public spaces for people on the move, aiming at: road safety, attraction, pavements, environment, mobility and public safety, following Fortaleza's Municipal Plan for Walkability (PMCFOR).</p>	<p>Setting up a working group with state, municipal and civil society instances to define, until 2022, the priority projects of urban mobility for the reduction of GHG emissions and taking into account the climate risks (mainly related to floods, heat islands, landslides and sea level rise);</p> <p>Establishing, by 2022, the long-term planning of exclusive bus lanes in the city and implementing it until 2040;</p> <p>Implementing 82 km of exclusive lanes, totalling 195.2 km by 2030;</p> <p>Implementing 8.55 km of BRT, totalling 25.95 km by 2025;</p> <p>Expanding the metro-railway system, completing the Parangaba-Mucuripe LRT by 2021 and the East Line by 2025;</p> <p>Defining, until 2023, the plan to improve collective and active transportation in the city of Fortaleza;</p> <p>Implementing safety improvements in the cycling network;</p> <p>Expanding the VAMO car-sharing system from 20 to 100 cars by 2030;</p> <p>Developing incentives to pedestrianisation with safety improvements, such as paving and accessibility of pavements, valuing mixed land use and spaces for coexistence, taking into account strategies established in the Fortaleza's Municipal Plan for Walkability;</p> <p>Identifying and implementing regions where the access with individual vehicles is restricted;</p> <p>Developing, until 2023, policies and incentives to reduce the need to commute to work and use flexible hours or telecommuting;</p> <p>Developing actions to raise awareness and promote cultural change in search of life standards that prioritise low carbon transportation.</p>	<p>Reduction of 424 thousand tCO₂e by 2050 compared to 2014, combining the four proposed actions' efforts.</p>
 <p>TARGET 2 Ensure that the public transportation fleet is made up of 100% electric vehicles by 2050.</p>	<p>VIII.A. Encourage the electrification of urban mobility, ensuring that the public transport fleet is composed of 10% electric vehicles by 2030; 35% by 2040; and 100% by 2050.</p>	<p>Setting up a working group on Urban Mobility, until 2022, with several sectors to define strategies to replace fossil fuels by clean fuels (electric, hybrid, biofuels, etc.) in the public transport fleet;</p> <p>Also, through this working group, by developing strategies to reduce GHG emissions from the city's private fleet;</p> <p>Establishing energy efficiency standards for the fleet circulating in the city (vehicle labelling) until 2023;</p> <p>By establishing, until 2024, incentives for the advancement of means of transport based on clean fuels;</p> <p>Defining, until 2024, a legal framework to create the necessary conditions and incentives for the replacement of fossil fuels by clean fuels by 2050.</p>	<p>Reduction of 1,301 thousand tCO₂e by 2050 compared to 2014, considering all actions.</p>
 <p>TARGET 3 Offset the Residual Transport Emissions.</p>	<p>IX.A. Compensate for residual transportation emissions by 30% until 2030; 60% until 2040; and 100% until 2050.</p>	<p>Setting up a working group, until 2022, to define strategies to offset residual GHG emissions from the Transport sector;</p> <p>Defining, until 2024, a legal framework for the compensation policy of emissions in the Transport sector, including the definition of financial instruments and compensation alternatives, contemplating 30% of GHG emissions compensation until 2030; 60% until 2040; and 100% until 2050;</p> <p>To account for the annual emission reductions of the fossil fuel distributors in its territory, according to the goals and regulations established by the National Petroleum Agency (ANP).</p>	<p>Reduction of 3,767 thousand tCO₂e by 2050 compared to 2014.</p>



To prepare the city for climate change impacts involves having more green areas, fostering environmental education and improving disaster warning systems.

04_ RESILIENCE



Temperature rise, prolonged droughts, extreme rainfall and sea level rise are the main climate risks indicated by the Climate Change Vulnerability Index in the city of Fortaleza. They present direct impacts on the urban infrastructure, environmental balance, health and well-being of the population.

Guiding the city towards a more resilient path to climate change impacts, therefore, implies improving its response capacity to extreme climate events, anticipating, preventing, absorbing and recovering from these impacts.

The coastal zone of Fortaleza is where the neighbourhoods that are most exposed to temperature rise are concentrated, motivated by intense urban occupation and a high rate of substitution of natural areas, which intensify the creation of heat islands. The Index foresees a maximum temperature increase of 3.3% by 2045 and 10.5% in 2100. The areas of the city with less water infrastructure present a higher risk of prolonged droughts, with significant water supply vulnerability, both due to the low recharge capacity of water bodies and the pollution of supply sources, such as the Cocó River.

Extreme rainfall is also a reality for most of Fortaleza. The most affected neighbourhoods are those with infrastructure and topography more vulnerable to the consequences of this climatic phenomenon, such as high waters, landslides and flooding. Furthermore, the urban drainage works are compromised by the high degree of impermeability (due to asphalted and built-up areas) and the volume of waste, especially from construction, concentrated in water bodies. The impacts, such as flooding, once again affect, in their majority, those populations that are more economically vulnerable. According to the Fortaleza Civil Defence, between 2013 and 2016, 11,578 families were assisted by weather-related occurrences.

The coastal region, which presents a growing urbanisation index, suffers directly from the sea level rise along its entire length and the surroundings of the large rivers with a direct interface with the sea. Beach erosion in the Metropolitan Region of Fortaleza has already been a reality for several years, with significant financial impacts. Between the years 2008 and 2011, there were at least 41 sea waves cases

damaging the built patrimony. Despite all these risks, Fortaleza had not yet developed an integrated and holistic contingency plan for these extreme weather events. That is why this LCAP is essential.

The four targets defined aim to:

- Promote ecological connection and social integration and strengthen the relationship between society and green urban space through the implementation of a Green Connector pilot project, expanding the city's green area.
- Make Fortaleza more capable of responding to changing rainfall patterns and other extreme events.
- Increase the warning capacity for natural disasters and foster the environmental education policy.
- Approve the Climate Change Adaptation Plan.

TARGETS	ACTIONS	HOW IT WILL BE DONE
<p> TARGET 1 Expansion of the quantity and accessibility of Green Areas in the city.</p> <p></p>	<p>X.A Implement a pilot project with a Green Infrastructure solution in areas with recurring flooding and similar events until 2024.</p> <p>X.B. Classify and map the existing green areas in Fortaleza and, based on the current situation, outline a reconstitution action plan for each type of green area per year until 2040.</p> <p>X.C. Maintain an updated virtual public cartographic base, showing the evolution of the city's environmental protection areas, including information on typology, use, area, accessibility, ecological functions and ensuring a record of the historical change (increase and/or reduction of protected areas).</p> <p>X.D Expand the accessibility of urban Green Areas.</p>	<p>Inventory the fauna and flora biodiversity of the city, assessing ecosystem services, and thus mapping plant species more adaptable and suitable to climate change;</p> <p>Identifying the main Hubs of green areas in the city and draw connection guidelines between them through the Green Connector project, including afforestation, urban agriculture, municipal parks and Permanent Preservation Areas (PPAs), until 2040;</p> <p>Elaborating an environmental diagnosis to identify the main flooding areas that demand green infrastructure as a solution for urban water management;</p> <p>Drawing up an action plan to implement green infrastructure in the city;</p> <p>Identifying and mapping strategic coastal regions for the implementation of ecological risk prevention solutions;</p> <p>Drawing up an action plan for each coastal area;</p> <p>Drawing up a document regulating the programme to adopt green areas, promoting its continuity;</p> <p>Documenting spatial identification of the heat islands of the urban acclimatisation Hubs and the characterisation of the local microclimate. The city heat map should be on a digital platform and be constantly updated;</p> <p>Adapting urban planning and building regulations;</p> <p>Elaborating a Municipal Plan of Urban Green Areas including data such as diagnosis, identification of ecosystem services, management and maintenance; establishing, within this plan, the planning for afforestation of bike lanes and sidewalks with execution of 80% by 2040, to achieve maximum shading;</p> <p>Including the Conservation Units (CUs) and PPAs in the municipal green areas system, ensuring the prevalence of the most protective legislation;</p> <p>Integrating knowledge and the Fortaleza 2040 Plan, creating a working group to monitor the actions;</p> <p>Surveying the physical accessibility of Green Areas with an area of at least 0.5 to 1 hectare at a linear distance of 300 meters (about 5 minutes on foot) from home/work or other living environments;</p> <p>Ensuring that the laws regulating these areas are respected, avoiding irregular occupation;</p> <p>Preparing the Degraded Areas Recovery Plan (PRAD) for the city's environmental areas;</p> <p>Creating buffer zones between areas of restricted use and urbanised areas, with an adequate transition between these environments;</p> <p>Supporting the work of non-governmental entities related to the valuation of natural areas;</p> <p>Elaborating a signalling plan for the city's main environmental Hubs, including PPAs, CUs and Municipal Parks. The terminals should inform about the environmental, ecological functions and social interaction activities;</p> <p>Fostering researches on the relation of the city's green areas with the existing heat islands.</p>
<p> TARGET 2 To reduce the urban, economic, social and environmental impacts resulting from extreme events.</p> <p></p>	<p>XI.A. Create an Urban Water Committee to promote coordination among institutions responsible for supply, sewage and drainage.</p> <p>XI.B. Adapt regulation to respond to extreme rainfall and floods by 2025.</p> <p>XI.C. Improve management of the warning system for extreme rainfall events.</p> <p>XI.D. Prepare diagnostic study on coastal areas' environmental vulnerability to identify and know the possible imminent risks of the sea rising on the coast of the city of Fortaleza and region.</p>	<p>Reviewing mappings and establishing planning units for water supply, sanitary sewage and stormwater drainage;</p> <p>Conducting water supply sizing study based on climate change forecasts;</p> <p>Developing and proposing nature-based solutions;</p> <p>Carrying out infrastructure works to reduce surface water runoff during periods of heavy rainfall; sizing micro and macro drainage structures and adjusting areas subject to flooding;</p> <p>Promoting low impact drainage actions in urban sub-basins (such as green roofs, rain gardens, drainage beds, bio-valets, cisterns, floodable areas, permeable paving etc.) to reduce the speed of rainwater runoff, increase water infiltration into the soil and provide alternative sources for non-primary uses;</p> <p>Promoting the renaturalisation of rivers and streams and the conservation of municipal lagoons;</p>

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TARGETS	ACTIONS	HOW IT WILL BE DONE
 <p>TARGET 2 To reduce the urban, economic, social and environmental impacts resulting from extreme events.</p>	<p>XI.E. Prepare a sectorial Strategic Plan to implement adaptive strategies per sector of the coastal region, prioritising the most vulnerabilised areas until 2024.</p>	<p>Developing and implementing regulations that inhibit construction and housing in areas at risk of flooding, as well as a plan for population resettlement in risk areas and provision of low-income housing;</p> <p>Informing and sensitising the population and professionals in the construction sector on climate risk and disaster management;</p> <p>Assessing protocols and tools in response to climate emergencies and identifying measures for improvement;</p> <p>Carrying out slope containment with priorities listed in the city's risk mapping;</p> <p>Carrying out non-structural actions of prevention, preparation and mitigation to reduce risks;</p> <p>Ensuring that, by 2040, all executive engineering projects for flood/slide sites are prepared, including NbS principles;</p> <p>Ensuring that a sector responsible for monitoring the advance of sea level rise in the city joins FORCLIMA, until 2021;</p> <p>Setting up a group, until 2022, for the parameters of adaptation to the confrontation of the advance of the sea;</p> <p>Preparing a diagnosis on the environmental vulnerability and a sectorial Strategic Plan for the implementation of adaptive strategies in the coastal region;</p> <p>Encouraging researches that relate rainfall rates with the sea level rise and flooding in the city districts;</p> <p>By defining, until 2023, the parameters that will compose the monitoring indicators related to the sea level rise and elaborate a strategy to face this advance until 2024.</p>
 <p>TARGET 3 Implement a climate risk alert system by 2024.</p>	<p>XII.A. Improve information and knowledge management in the municipality related to climate change adaptation until 2024.</p> <p>XII.B. Increase of the population with access to information until 2024.</p> <p>XII.C. Continue and strengthen the Environmental Education Programme until 2024</p>	<p>Implementing a monitoring room for extreme events in the Municipal Secretariat of Citizen Security;</p> <p>Evaluating and adapting the existing risk management system;</p> <p>Elaborating partnerships between institutions to exchange knowledge related to climate change adaptation and facilitate the formation of these partnerships from a legal point of view;</p> <p>Developing and using technology and communication tools for the wide dissemination of information;</p> <p>By establishing, until 2022, a committee to disseminate the Environmental Education Program and the Public Administration Environmental Agenda (A3P);</p> <p>By signing agreements, until 2022, with relevant stakeholders and entities to train multipliers;</p> <p>Promoting, starting in 2022, environmental education campaigns in partnership with the private sector and NGOs;</p> <p>Setting up a group from SEUMA and SMS for disease prevention programs related to the climate issue.</p>
 <p>TARGET 4 Approve the Climate Change Adaptation Plan by 2022.</p>	<p>XIII.A. Obtain approval of the Climate Change Adaptation Plan by 2022</p> <p>XIII.B. Develop Sectoral Plans for Climate Change Adaptation by 2024.</p>	<p>Approving, in the City Council, the Climate Change Adaptation Plan by 2022;</p> <p>Contracting Sectoral Climate Change Adaptation Plans by 2022 and developing and approving them by 2024.</p>



FORTALEZA: A POSSIBLE FUTURE

Fortaleza has a challenging mission for the coming years. Achieving climate neutrality in the city, which is the fifth most populated in the country, is a task that will only be possible with the mobilisation and involvement of many actors.

The city already suffers daily from the impacts of climate change, affecting the population's well-being and urban development. This Local Climate Action Plan (LCAP) indicates the path to be followed for the city to develop in a more just, resilient and integrated way.

For its full effectiveness, this plan must be applied following the other strategic planning documents for the city, such as the Master Plan

and the Sectoral Plans for Mobility, Sanitation, Land Use and Occupancy, Waste, Risk Management, besides the Sectoral Plans for Climate Change Adaptation.

It is also important to highlight that this document is dynamic and should be updated regularly, including its level of ambition, following the pace of technological advances and the city's development.

Besides all the benefits for Fortaleza, the LCAP is published with the expectation of inspiring other Brazilian cities in tackling climate change at a local level, positioning the municipality with due prominence in this journey.

ORGANIZATION



SUPPORT



FINANCING

