The Rio de Janeiro Low Carbon City Development Program

PROGRAM DOCUMENT

RIO PREFEITURA

World Bank Institute

Notes:
All tons = metric tons (t).
1 kiloton (kt) = 1,000 metric tons.

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The Rio de Janeiro Low Carbon City Development Program

PROGRAM DOCUMENT

ISO-CERTIFIED VERSION – JUNE 2012

Acknowledgements

Acronyms and Abbreviations

BAU: Business-as-usual

BRT: Bus rapid transit

BVRio: Bolsa Verde do Rio de Janeiro

CDM: Clean Development Mechanism

CER: Certified emission reduction (regulated under the CDM)

CME: Coordinating Management Entity

CO$_2$/CO$_2$e: Carbon dioxide/carbon dioxide equivalent

COPPE/UFRJ: The Instituto Alberto Luiz Coimbra de Pós-Graduação e Pesquisa de Engenharia (COPPE) at the Federal University of Rio de Janeiro or Universidade Federal do Rio de Janeiro (UFRJ)

DOE: Designated Operational Entity

ER: Emission reduction

GDP: Gross domestic product

GHG: Greenhouse gas

IBGE: Instituto Brasileiro de Geografia e Estatística (Brazilian Institute for Geography and Statistics)

IME: Information Management Entity

IPP: Instituto Pereira Passos

ISO: International Organization for Standardization

LCCDP: Low Carbon City Development Program

MRV: Monitoring, reporting and verification

MWG: Multi-Sector Municipal Working Group

RJ: Rio de Janeiro

TAE: Technical Advisory Entity

UNFCCC: United Nations Framework Convention on Climate Change

VCS: Verified Carbon Standard

VCU: Verified Carbon Unit (regulated under the VCS)

VVB: Validation/Verification Body

VVE: Validation and Verification Entity

WB: World Bank

Acronyms for Municipal Departments in Box A1

Table of Contents

Guide to this Program Document

This Program Document presents the Rio de Janeiro Low Carbon City Development Program (LCCDP). The first section, Rio de Janeiro and Sustainability, sets the stage and provides the context and insight into the situation on the ground that gave rise to the development of the Rio de Janeiro LCCDP. The second section, The Rio de Janeiro Low Carbon City Development Program, describes in detail the design of the Program, including the Program Roles and Process. Details on specific implementation-related aspects of the Program in the City of Rio de Janeiro are provided in the Annexes to this document.

Key Features:

- **Separation of design and implementation.** The descriptions of the Program design (provided in the second section) and specific implementation-related aspects of the Program (provided in the Annexes) are intentionally reported in separate sections of the document. This ensures that the Program Roles and Process are well-defined and maintain integrity during potential changes in municipal administrations or reorganizations of municipal departments over time. Annexes may be updated to reflect changes to role assignments, if needed.

- **Checklists.** Checklists are provided in Annex A.4 for each stage of the Program Process.

- **Quick reference table.** Table 5 provides a quick reference and page numbers for the criteria and checklists for each stage of the Program Process.

1. Rio de Janeiro and Sustainability

The City of Rio de Janeiro is home to a wealth of natural beauty and cultural richness. Situated among rolling hills covered in lush Atlantic rainforests, Rio is the city where the natural and the urban environment harmoniously co-exist. With this unique setting, Rio is the ideal place to host the international sustainability community during special occasions, such as the Earth Summit in 1992 and Rio+20 in June 2012. Rio has successfully showcased its magnificence and potential to the world, winning bids to host future mega events, including the 2014 World Cup and the 2016 Olympic Games. Rio de Janeiro is expecting an almost unprecedented influx of visitors and investment over the next couple years, and actions have been put forth in the City Government's 2016 Strategic Action Plan that ensure investment improves the quality of life for residents, increases access to services, and addresses climate change and other environmental issues. During this pivotal moment in its history, the City of Rio is taking the lead in showing the world how the city of the future can be sustainable and livable for all of its residents. With the paramount goal of being a world-class city with a high quality of life for all residents, Rio de Janeiro is leading the way on sustainable, low-carbon urban development.
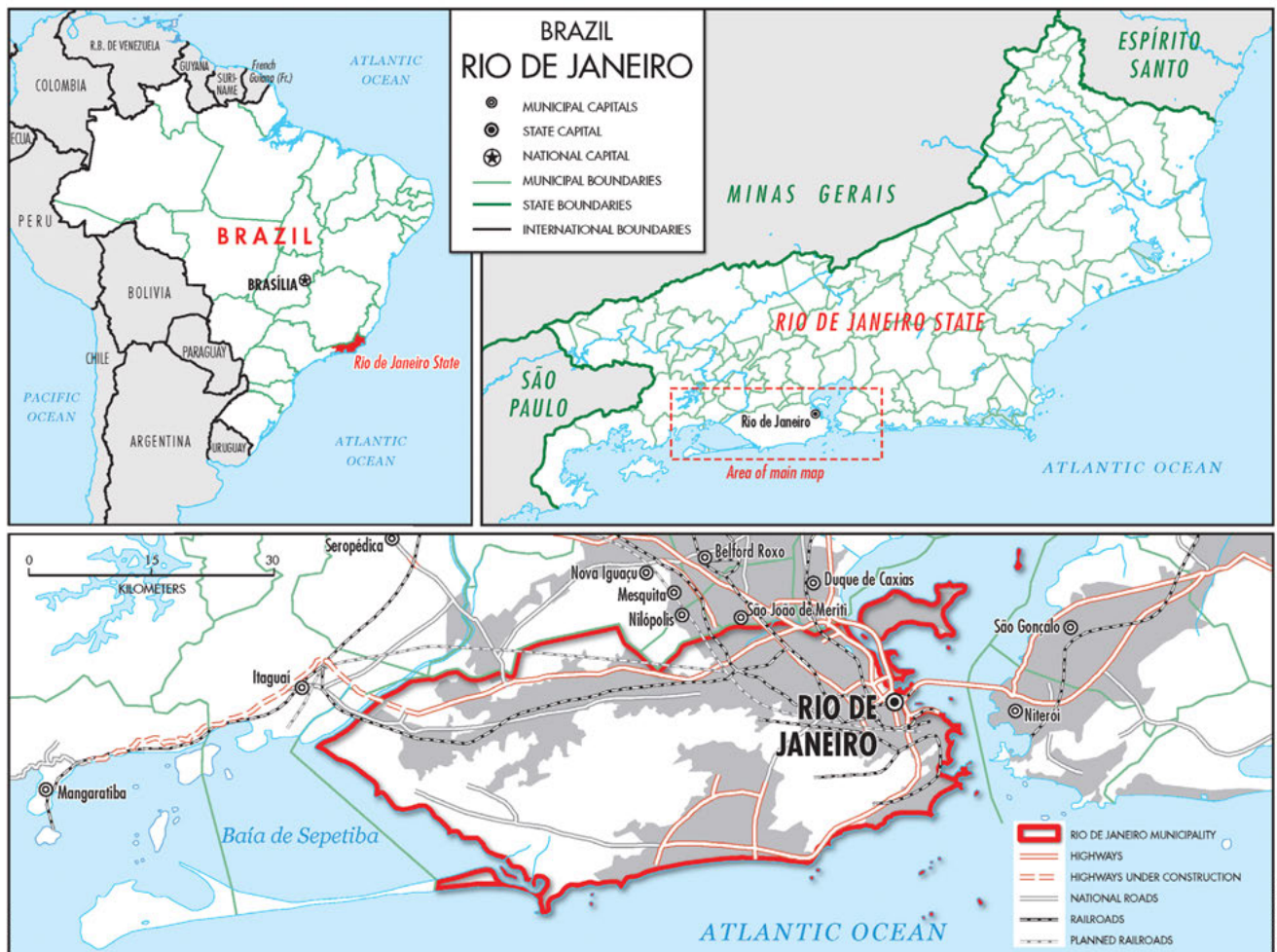
Figure 1: Map of the City of Rio de Janeiro, Brazil.
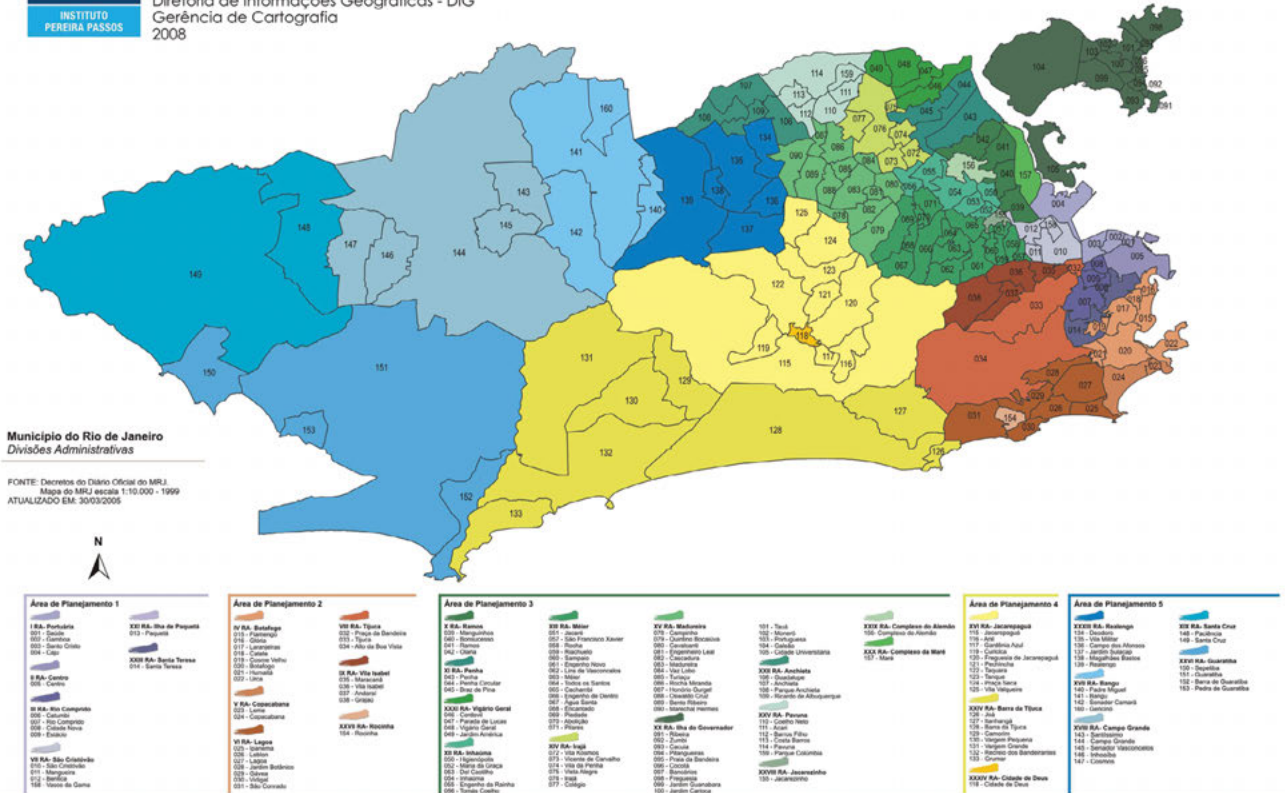
Figure 2: Administrative Divisions of the City of Rio de Janeiro.

1.1 PROFILE OF THE CITY OF RIO DE JANEIRO

GEOGRAPHIC BOUNDARIES AND ADMINISTRATIVE DIVISIONS OF RIO DE JANEIRO

The City of Rio de Janeiro is the administrative capital of the State of Rio de Janeiro, located in the southeast of Brazil. The city has a total land area of about 1,260 km², bounded by the Atlantic Ocean to the south, Sepetiba Bay to the west and Guanabara Bay to the east (Figure 1).

The City Government of Rio de Janeiro, known locally as Rio Prefeitura, currently has five Planning Areas, 33 Administrative Regions and 160 Districts (Figure 2).

POPULATION DEMOGRAPHICS

The municipal census in the year 2000 counted an official population of 5,859,000 inhabitants in the City of Rio de Janeiro, according to the Instituto Brasileiro de Geografia e Estatística (Brazilian Institute for Geography and Statistics (IBGE)). In 2009, the IBGE-estimated population for the City of Rio de Janeiro was 6,186,710, with 11,812,482 people living in the greater metropolitan area. This makes the Rio de Janeiro metropolitan region the second largest urban agglomeration in Brazil.

The population growth rate in Rio has experienced ups and downs over the past century. Before the 1960s, intense immigration put Rio's population

growth rate above the national average. Since then, lower than average fertility rates, a phenomenon that has always characterized the city, has resulted in a population growth rate below the national average. In particular, between 1991 and 2000, the population growth rate in Rio did not even reach half of the national population growth rate. Figure 3 shows the population growth rate of the City of Rio compared to State of Rio and Brazil as a whole.

In the last 20 years, the metropolian area of Rio de Janeiro has grown at a faster rate than the city proper. According to demographic indicators of Brazil, the city's population grew at a mean annual rate of 0.75% and 0.8% in 1991-2000 and 2000-2006, respectively. In the metropolitan area, the mean annual population growth rates were 1.18% between 1991 and 2000 and 1.43% between 2000 and 2006. In general, the growth rate of municipalities in the greater Rio metropolitan area has accelerated, compared to a relatively smaller increase in the growth rate in the capital itself.
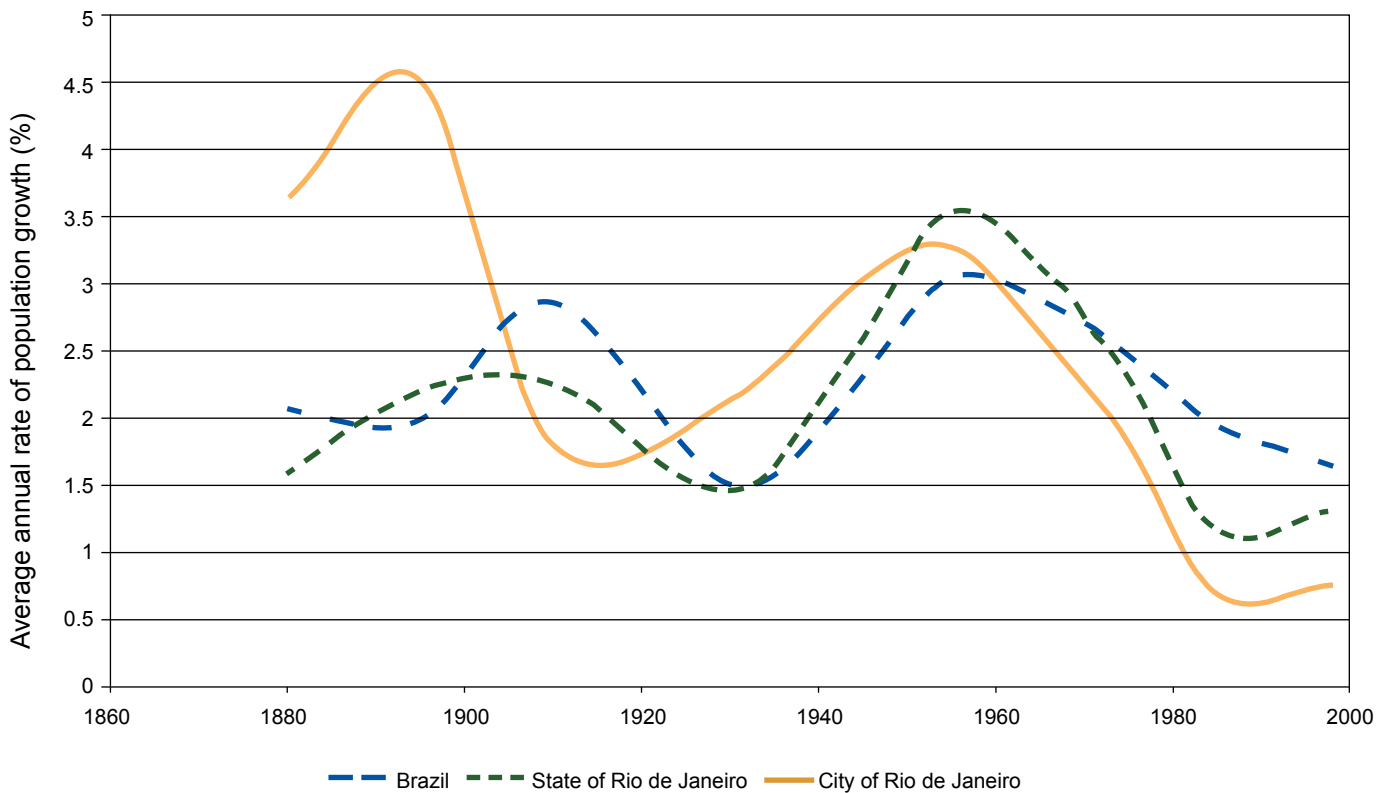
Figure 3: Average rate of annual population growth in Brazil, the State of Rio de Janeiro, and the City of Rio de Janeiro between 1872 and 2000.

Source: IBGE, various demographic censuses

ECONOMIC OVERVIEW

The gross domestic product (GDP) of the City of Rio de Janeiro, the State of Rio de Janeiro and Brazil during 2002-2005 are shown in Table 1. The GDP in the City of Rio grew by about 31% , while the State of Rio's GDP grew by about 44%. The share of value added by sector, shown in Table 2 for the City of Rio de Janeiro, is consistantly highest for the service sector, followed by industry and agriculture.

Table 1: Gross domestic product of the City of Rio de Janeiro, the State of Rio de Janeiro and Brazil between 2002 and 2005 (in million R$).

	2002	2003	2004	2005
City of Rio de Janeiro	90,940	95,681	112,587	118,980
State of Rio de Janeiro	171,372	188,015	222,945	246,936
Brazil	1,447,822	1,699,948	2,217,963	2,147,239

Source: IBGE, Research, Coordination of National Accounts.

Table 2: Share of value added by the service, industry and agriculture sectors in the City of Rio de Janeiro from 2002 to 2005 (%).

	2002	2003	2004	2005
Service	84.27	84.39	82.54	84.99
Industry	15.7	15.57	17.42	14.97
Agriculture	0.04	0.04	0.05	0.04

Source: IBGE, Research, Coordination of National Accounts.

1.2 RIO'S 2016 STRATEGIC PLAN

Mayor Eduardo Paes, the current mayor of the City of Rio, faced a number of challenges when he took office in 2009. For the previous two decades, Rio had experienced a declining economy, a crisis in public health, and a decrease in the quality of education. Disorder and informality were on the rise, and an insufficient supply of low-income housing led to increased illegal occupation and poverty. The urban infrastructure was degraded, environmental quality was deteriorating, and public transport was slow, expensive and poorly distributed.

Compounded onto these challenges were issues related to municipal governance. The City Government had limited investment capacity and high costs of debt. There were complaints of distance between the citizens and the Prefeitura and inefficient channels of communication. The structure of the Prefeitura did not align with services; there were poor management practices and excessive "red tape." In addition, there was low motivation among municipal staff, and lack of incentives and goals oriented to service delivery.

To address the many issues facing the City and its effective governance, one of the first actions Mayor Paes took while in office was to develop a new strategic plan for the city. Working with McKinsey and consulting with citizens and stakeholders, the Prefeitura developed the city's 2016 Strategic

Plan. The initial plan, for the period between 2009 and 2012, consisted of 47 strategic initiatives in 10 sectors (Table 3).

The Prefeitura also developed a new management and incentive structure to help reach the targets. Targets are tracked in a software tool, called PAMPE, which provides a platform for municipal secretariats to report on their progress. The Mayor meets with the management team on a weekly basis to track the progress of the strategic goals, and municipal staff working in the various secretariats receives bonuses for achieving their targets.

Every four years, the strategic plan is evaluated and revised based on the priorities of the Prefeitura and its constituency. The latest evaluation concluded that more than 80% of the 2009-2012 targets were reached. Accordingly, the 2013-2016 version of the plan will contain even more initiatives and goals for the city.

Table 3: The 47 strategic initiative in the 2009-2012 version of the Strategic Plan. Each initiative has its own sub-targets that are tracked and monitored by the Mayor.

Sector	Strategic Initiatives	
Health	• Present health • Restructuring of emergency care	• Home care program for the elderly • Creation of emergency units
Education	• Schools of tomorrow • Infant development spaces • Strengthening schools	• Health in schools • Rio Global Child
Public Order	• Planning actions • Modernization of the police force	• Surveillance cameras • Tourist safety corridors
Employment and Income	• Rio Environment for Business • Rio Office for Business • Rio Capital of Energy • Rio Capital of Fashion and Design	• Rio Capital of Tourism • Rio Global City • Rio Capital of Audiovisual
Urban Infrastructure	• City conservation • Port revitalization	• Neighborhood revitalization (3 programs)
Environment	• Drainage of the West Zone • Macro-drainage of Jacarepaguá • Sanitary landfills • Climate change policy	• Rio Bicycle Capital • Rio Green Capital • Squares and parks in the North Zone
Transport	• Tariff integration • BRT – TransCarioca	• BRT – TransOeste • BRT – TransOlímpica
Culture, Sports and Leisure	• Legal Lapa • Rio in Olympic Form • Culture in the street	• Arenas • Expansion of courts and Olympic villages
Social Assistance	• Carioca family allowance	
Management and Public Finances	• Measuring impact of results • Present Prefeitura – Rio Citizen	• Service University • Electronic invoices

Source: Rio Prefeitura, 2009. "2016 Strategic Plan: 2009-2012."

1.3 PLANNING FOR SUSTAINABILITY

Many of the initiatives in the 2016 Strategic Plan directly contribute to the sustainability of the city, such as the bus rapid transit (BRT) lines or the climate change legislation. For other initiatives, the primary objective may not be environmental sustainability, but there is potential for implementation in a sustainable manner. As will be described later, the Rio de Janeiro LCCDP acts as a channel for all the plans in the city. The Program will quantify the carbon component of the various initiatives, which in turn will help to maximize the potential for sustainable development. In Rio, sustainability is inherently related to other priorities of the city, such as social inclusion, cultural heritage and economic growth. This holistic vision, as well as Rio's progress on climate change issues, is described in Box 1 by Rio's Vice-Mayor and Municipal Environmental Secretary, Carlos Muniz.

Sustainable development requires careful planning, policy action and analysis. In January 2011, Rio passed its Municipal Law on Climate Change and Sustainable Development. The policy was shortly followed by the completion of Rio's greenhouse gas (GHG) inventory. The research group that conducted the inventory, the Instituto Alberto Luiz Coimbra de Pós-Graduação e Pesquisa de Engenharia (COPPE) at the Federal University of Rio de Janeiro (Universidade Federal do Rio de Janeiro (UFRJ)), also modeled scenarios for future levels of city-wide GHG emissions based on sets of actions planned by the city government. This research forms an essential basis towards planning for sustainability in Rio.

Box 1: Rio de Janeiro's Vision for Sustainability

"The world is anticipating the events and achievements that will take place in Rio de Janeiro in the next few years. The combination of the economic, social and historical factors brings together elements for a period of great changes. This opportunity must be used to build a future that is sustainable, a priority for the planet and for our civilization.

The history of Rio is closely linked with the environment. In this City, international awareness was focused on environmental preservation when, in 1992, the main political leaders of the world gathered in Rio to discuss sustainable development. The recent climate phenomena occurring on the planet reinforce the importance of environmental preservation as a condition for our evolution, and call on us to rethink the development model to be adopted.

During the last two years, the City of Rio de Janeiro, by means of firm actions practiced by the City Government, has been outstanding in tackling climate change, taking into consideration the cultural and political dimensions, in addition to the environmental, technological and economic dimensions. Facing climate change will demand the participation of all segments of society in Rio de Janeiro. Rio was one of the first cities in the country to define a Municipal Climate Change and Sustainable Development Policy (Law no. 5248/2011), an initiative that stood out as a joint effort between the Government and the City Council of Rio de Janeiro. The Rio de Janeiro Climate Change and Sustainable Development Forum was created, formed by people representing the public sector, private entities and civil society. It aims to

contribute to the search for feasible solutions for the adoption of public policies in this area. The climate policy of the City is executed by the Climate Change Management Office of the Municipal Secretary for the Environment.

Once again, Rio is a pioneer in environmental matters. Rio became the first city in Latin America to update its Greenhouse Gas Emissions Inventory, published by the City Government of Rio de Janeiro in partnership with COPPE/UFRJ, an important environment research center. The study is more than a compilation of the carbon dioxide emissions in the City; it represents invaluable material to guide city policies and development.

In addition to the Greenhouse Gas Emissions Inventory, the path to achieving sustainable development became clearer. The City Government and COPPE/UFRJ developed distinct greenhouse gas emissions scenarios indicating potential directions to be taken. The prognoses were developed based on ongoing changes in the City, such as the installation of a new waste treatment plant and the implementation of TransCarioca, TransOlímpica and TransOeste bus rapid transit (BRT) corridors. This information is fundamental to achieve the greenhouse gas reduction targets in the coming years, which have been incorporated into the municipal environmental legislation. The studies also resulted in the development, by the City Government and COPPE/UFRJ, of an Action Plan contemplating the measures to be taken by the City Government to reach its GHG reduction targets. For example, measures in the Action Plan include doubling the length of bicycle pathways, expanding the reforesting program, the installation of waste treatment plants, and improvements to public transportation, among others.

Developments ahead will have significant environmental impacts, such as the operation of the industrial facility *Complexo Siderúrgico da Zona Oeste*. We must not fear such challenges, which will generate jobs and income in areas of the City that need them most. We must manage these challenges with clear minds and transparency, in the name of our collective interests. The important issue is to internalize and spread sustainability awareness, so that it becomes a central part of our way of life and aggregates value to the legacy of future generations."

Carlos Alberto Vieira Muniz
Vice-Mayor and Municipal Environmental Secretary of City of Rio de Janeiro

MUNICIPAL LAW ON CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT

The City of Rio de Janeiro passed its Municipal Law on Climate Change and Sustainable Development (Law No. 5.248) on January 27, 2011. Article 6 of the law set Rio's voluntary GHG reduction targets of 8%, 16% and 20% for the years 2012, 2016 and 2020, respectively, compared to 2005 emission levels. In other words, 2005 emissions are taken as a reference point for emission reductions (ERs) to be cumulatively achieved at the end of the respective reporting periods in 2012, 2016 and 2020. This corresponds to cumulative reduction goals of 908 $ktCO_2e$ in 2012, 1,816 $ktCO_2e$ in 2016, and 2,270 $ktCO_2e$ in 2020. For more information on Rio's GHG reduction targets, see Box 2.

This law creates the legal framework that allows the municipality to establish climate change

mitigation strategies and promote effective actions necessary to achieve its self-set, voluntary targets. To assist with planning for sustainability, one of the directives of the law is to encourage emissions inventory updates every four years. This will help assess the city's overall GHG emissions profile and encourage actions that contribute to reducing overall emissions.

In general terms, the municipal climate change policies laid out in the law are as follows:

- Establish a strategy to reduce GHG emissions
- Promote effective actions to protect the climate system
- Ensure environmental and climate protection while pursuing socioeconomic development
- Promote Clean Development Mechanism (CDM) projects, as well as other instruments and mechanisms to reduce GHG emissions while increasing GHG sinks
- Raise awareness about climate change issues
- Establish mechanisms to encourage changing patterns of production and consumption, economic activities, and transportation that focus on environmental sustainability and GHG reductions
- Increase the use of renewable energy
- Identify vulnerabilities and promote effective actions to adapt to the impacts of climate change
- Ensure the participation of civil society in the consultative and deliberative processes related to climate change
- Promote the disclosure of climate change issues
- Stimulate research and development related to the climate system
- Encourage the use and exchange of technologies and environmentally responsible practices for mitigation and adaptation to climate change

- Stimulate cooperation with other levels of government, non-governmental organizations, the private sector, academia and multilateral organizations to implement climate change policies and encourage the implementation of sustainable development strategies

A series of strategies will ensure the achievement of the above-mentioned targets with activities in the waste management, transport and energy sectors. However, the following is important to note: overall city-level emissions will continue to increase due to the massive influx of investment and increased economic activity prior to the mega events in 2014 and 2016. In addition to promoting sustainable development in general, the LCCDP will enable the City of Rio to transparently demonstrate the achievement of its self-set mitigation goals (Box 2). Rio's municipal climate change law makes reference to an absolute number of ERs (expressed as a percentage of 2005 emissions) to be achieved in the respective reporting year (2012, 2016, 2020). Hence, while overall city-level emissions will continue to grow, the monitoring of and accounting for the ERs generated by various mitigation activities implemented across different municipal sectors will enable the city government to comply with its climate change law. In other words, compliance cannot solely be measured by periodically updating the city's top-down GHG inventory. The City of Rio needs to engage in bottom-up monitoring of mitigation actions across sectors, which is one of the features of the Program. Accordingly, this feature may be considered a prototype model for assessing mitigation compliance.

Box 2: Rio de Janeiro's Voluntary GHG Reduction Targets

Article 6 of Rio's climate change law sets voluntary GHG reduction targets of 8%, 16% and 20% for the years 2012, 2016 and 2020, respectively, compared to 2005 emissions levels. These goals are interpreted to correspond to absolute volumes of ERs to be cumulatively achieved by the end of the respective reporting year. Since Rio's 2005 emissions were 11,351.7 $ktCO_2e$, the targets correspond to cumulative reduction goals of 908 $ktCO_2e$ in 2012, 1,816 $ktCO_2e$ in 2016, and 2,270 $ktCO_2e$ in 2020.

Rio will implement a series of strategies to achieve its targets. However, the following is important to note: while strategies are put in place to reduce emissions, overall city-level emissions will continue to increase due to the massive influx of investment and increased economic activity prior to the mega events in 2014 and 2016. The only way to demonstrate compliance with the climate change law is to monitor and account for the ERs generated by the individual mitigation activities: a bottom-up accounting approach. By counting the ERs produced from each mitigation intervention, the city will be able to show that the cumulative total from all activities has reached the targets: 908 $ktCO_2e$ in 2012, 1,816 $ktCO_2e$ in 2016, and 2,270 $ktCO_2e$ in 2020.

In addition to promoting sustainable development in general, the Low Carbon City Development Program will enable the City of Rio to transparently demonstrate the achievement of its self-set mitigation goals by providing a framework for bottom-up mitigation action accounting.

Top-down Inventory Monitoring

Bottom-up Mitigation Action Accounting

Citywide GHG Emissions

Cumulative ERs

Business-as-Usual Scenario

Low Carbon Development Scenario

Target: *at least 2,270 $ktCO_2e$*

20,000 · 16,000 · 12,000 · 8,000 · 4,000 · 0 · -4,000

1996 · 1998 · 2005 · 2012 · 2016 · 2020 · 2025
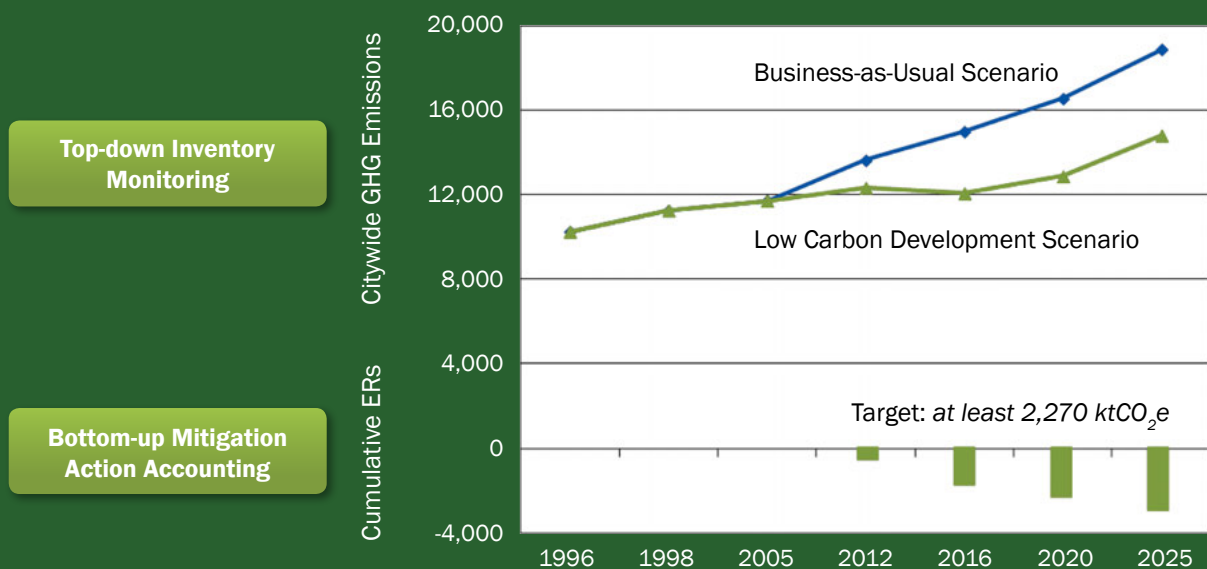
THE GREENHOUSE GAS INVENTORY FOR THE CITY OF RIO DE JANEIRO

The GHG emissions inventory for the City of Rio de Janeiro, conducted by COPPE/UFRJ, found that the city emitted 11,351.7 $ktCO_2e$ in the year 2005 (Figure 4). Sectors with the highest percentage of emissions were road transport (37%), urban solid waste (16%) and industry (12%). Elements of the Intergovernmental Panel on Climate Change (IPPC) methodology for calculating national-level inventories were used; however, some adjustments were made to reflect the emissions related to consumer decisions and socioeconomic activities for which the city is responsible.
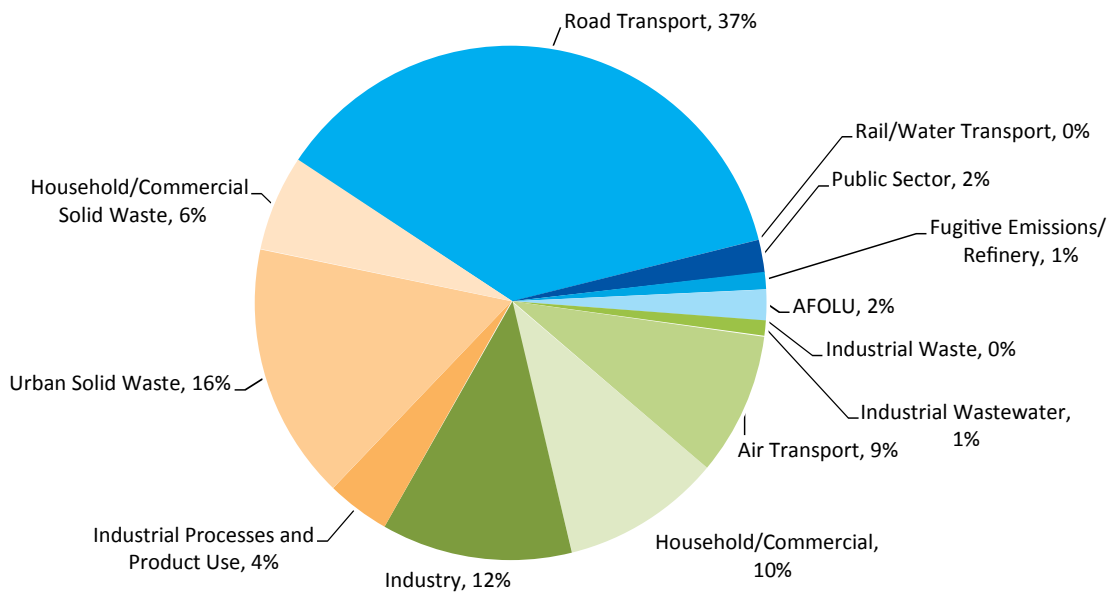
Figure 4: GHG emissions in the City of Rio de Janeiro, percentage by sector.

Source: COPPE/UFRJ, 2011. "Inventário e Cenário de Emissões dos Gases de Efeito Estufa da Cidade do Rio de Janeiro."

MODELING SCENARIOS TO REACH RIO'S GREENHOUSE GAS REDUCTION TARGETS

With the projected increases in economic and population growth, the GHG emissions for the city are expected to rise in the future. Figure 5 shows three possible scenarios for the future emissions profile of the city.
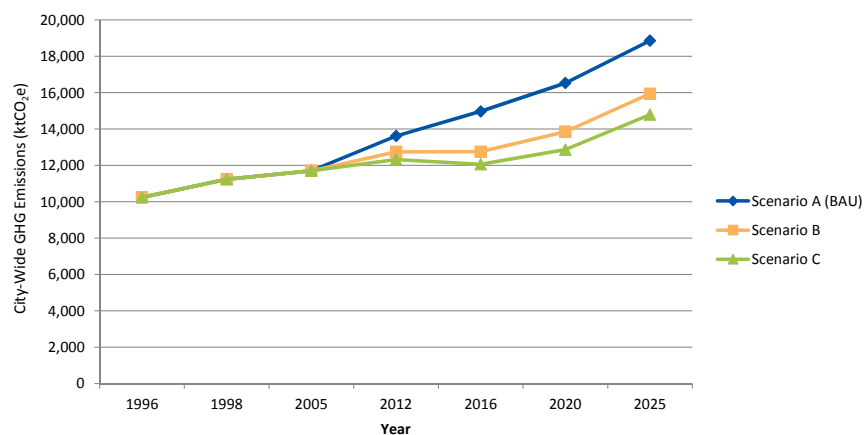
Figure 5: Three scenarios for growth of citywide GHG emissions.

Source: COPPE/UFRJ, 2011. "Inventário e Cenário de Emissões dos Gases de Efeito Estufa da Cidade do Rio de Janeiro."

SCENARIO A

The business-as-usual (BAU) scenario considers that no mitigation action will be implemented by the municipality.

SCENARIO B

This scenario incorporates action and policy options that are planned by the municipality alone or jointly with other levels of government (state or federal). It shows the potential GHG emission reductions that could be achieved with these measures. Examples of actions and policies included in this scenario are as follows:

Energy

- Efficiency of public lighting (LED) – 20%
- LED traffic lights – 1,000 units replaced
- Solar thermal water heaters in new "Minha Casa, Minha Vida" construction – 1,000 households
- Replacement of cast iron piping with polyethylene for the natural gas distribution network

Transport

- BRT TransCarioca – 380,000 passengers/day
- BRT TransOeste – 220,000 passengers/day
- BRT TransOlímpica – 100,000 passengers/day
- Increasing load capacity of the Metro – 550,000 passengers/day
- Expansion of Jardim Oceanico Metro line – 230,000 passengers/day
- Expansion of bicycle lanes – 280 km
- Program for inspection and maintenance of light vehicles
- Biodiesel fuel share of 5%

Waste

- 100% garbage collection
- 5% selective collection
- Waste to diesel pilot plant – 300 metric tons of waste/day
- Biogas collection from Gramacho Landfill for industrial use
- New Seropedica Landfill – 9,000 metric tons of waste/day
- Biogas collection from Seropedica Landfill for industrial and energy use
- Waste to energy power plant – 30 MW; 1,000 metric tons of waste/day

SCENARIO C

This scenario includes bolder actions that could be adopted by the municipality and projects that can be feasible in the medium and long term. Examples of the bolder actions and policies included in this scenario are as follows:

Energy

- Efficiency of public lighting (LED) – 100%
- LED traffic lights – 50,000 units replaced
- Solar thermal water heaters in new "Minha Casa, Minha Vida" construction – 10,000 households

Transport

- Increasing load capacity of the Metro from 2012 onwards, reaching 665,000 passengers/day in 2025
- Expansion of bicycle lanes – 420 km
- Program for inspection and maintenance of light vehicles
- Biodiesel fuel share gradually increasing from 5% in 2010 to 10% in 2020

Waste

- 9% selective collection
- New Seropedica Landfill – increasing capacity to 12,000 metric tons of waste/day
- Biogas collection from Seropedica Landfill for industrial energy use and vehicles

Modeling the three scenarios helps to capture the GHG potential in various actions to be implemented by the city, as well as provide an initial assessment as to whether they are sufficient to meet the targets. Scenario B, which is the scenario that assumed the implementation of planned municipal low-carbon actions at the time of the assessment, had a reduction potential consistent with the 2012 and 2016 goals. However, by 2020, the reduction (as compared to 2005 levels) would reach only 18.3% (Table 4). This demonstrated to lawmakers that further planning of actions was needed to reach the goals.

Table 4: Rio's reduction targets and the cumulative GHG emission reductions for Scenarios B and C.

	2012	%	2016	%	2020	%
Emission Reduction Targets	908.1	8.0%	1,816.3	16.0%	2,270.3	20%
Emission Reductions for Scenario B	1,102.4	9.7%	1,972.0	17.4%	2,080.8	18.3%
Emission Reductions for Scenario C	1,586.6	14.0%	2,647.8	23.3%	3,001.0	26.4%

2. The Rio de Janeiro Low Carbon City Development Program

The Rio de Janeiro Low Carbon City Development Program, herein referred to simply as "the Program," is a novel and ambitious cross-sectoral climate change mitigation program implemented by the City of Rio de Janeiro. There are many plans and initiatives on the horizon for Rio, as outlined in Section 1, and the Program acts as a channel to help distill the carbon reduction potential from them. The Program will also enable the City of Rio to transparently demonstrate the achievement of its self-set mitigation goals through bottom-up mitigation action accounting.

Sustainability in Rio is linked to the city's other priorities, such as social inclusion and economic growth. The upcoming investments in the city ahead of the 2014 World Cup and the 2016 Olympic Games make a low-carbon development program a particularly appealing business model to improve Rio's overall sustainability. By quantifying the potential carbon savings in different interventions, the Program may help to remove existing barriers to implementation. The Program helps to create a low-carbon investment perspective, or "carbon lens," through which future municipal investments are evaluated, ensuring investments contribute to a legacy of sustainability in Rio for many years to come.

The Program will help the City Government of Rio identify and finance climate change mitigation opportunities across a number of urban sectors. It provides the framework and processes to quantify and mobilize ERs. The Program is designed to be flexible and allows for the inclusion of many municipally-driven activities, with methodologies from different carbon standards or newly developed methodologies permitted to quantify ERs. The defined Program Roles (Section 2.1) and Program Process (Section 2.3) ensure the integrity of the ERs generated under the Program. The ERs will either be sold to external buyers, or they will be counted towards Rio's municipal reduction targets and hence "retired." In the long term, the Program will expand horizontally to impact a vast array of if not all urban sectors. The Program is also designed to expand vertically in order to integrate with future state-level and national-level climate mitigation interventions.

The Program is a city-led climate change mitigation initiative that is being implemented at a time when sub-national entities have an increasingly important role in the global landscape of climate change mitigation actors. Activities in cities are responsible for the majority of global GHG emissions, and cities hold significant potential for systemic climate change mitigation impacts. The conclusion from COP17 in Durban in December 2011 was that action from an internationally agreed climate agreement is expected only by 2020, at the earliest. This clearly emphasizes the importance of sub-national and local engagement in the area of climate change. Voluntary concrete actions and leadership on the ground, particularly by cities, will be critical for success in this "make or break" decade. For these reasons, the development of city-wide climate change mitigation activities and carbon finance is rapidly emerging and strategically important. This in turn makes the Rio de Janeiro Low Carbon City Development Program a pioneering business model that is important to disseminate to other cities throughout the world.

2.1 PROGRAM ROLES

There are five Program Roles under the Program.

1. Coordinating Management Entity

The **Coordinating Management Entity (CME)** is the central body within the municipality that oversees the coordination and management of the Program. The CME is housed strategically at a sufficiently high level in the municipal government to have coordinating authority across all municipal departments. The multi-sectoral nature of the Program means that it spans all urban sectors and will potentially include interventions from all municipal departments. Therefore, it is essential that the CME has authority within the municipal government to both make requests of all municipal departments and enforce and monitor compliance. The CME is responsible for coordinating all aspects of the Program, including planning and evaluation. In addition, the CME will make decisions regarding the inclusion of new interventions under the Program and the final destination of the ERs (i.e., either retired internally against the municipality's ER goal or sold externally). The CME will oversee the coordination of all carbon sales and transactions with potential buyers, as well as coordinate with state- and national-level registries.

2. Multi-Sector Municipal Working Group

A **Multi-Sector Municipal Working Group (MWG)** will be coordinated by the CME and act as an advisory committee to the CME. The MWG deliberates decisions regarding eligibility of interventions to enter the Program. The MWG will assess interventions proposed by each of the departments and provide opinions based on sector expertise, knowledge of existing municipal activities and institutional arrangements, and an understanding of the specific situation on the ground. The opinions and conclusions of the MWG will be reported back to the CME to inform CME decisions.

3. Technical Advisory Entity

The **Technical Advisory Entity (TAE)** will provide technical input to help move interventions forward through the Program process. When an intervention has been selected for inclusion in the Program by the CME, based on the recommendation of the MWG, the TAE will identify and recommend an appropriate methodology to use to quantify the ERs and an appropriate asset class to pursue (e.g., Verified Carbon Standard (VCS), CDM, Gold Standard, etc.). The TAE will also conduct an initial estimate of the potential ERs to be generated by the intervention and report this information back to the CME for input into its decision-making process.

4. Validation and Verification Entity

The **Validation and Verification Entity (VVE)** will validate and verify the ERs generated by interventions under the Program, as well as evaluate the appropriateness of new methodologies to be used. The validation and verification process is an essential quality-control measure to ensure that each ER generated under the Program exists and is properly accounted for. The VVE must have the necessary expertise and experience to conduct such an audit. To avoid conflicts of interest, the VVE must operate externally and independently of the CME. Based on an intervention-level evaluation and decision of the CME, the VVE will act as a Designated Operational Entity (DOE) or Validation and Verification Body (VVB) to certify the carbon credits as per the regulatory standard of the chosen asset class.

5. Information Management Entity

The **Information Management Entity (IME)** is the central body that coordinates and manages all information and data related to the Program. It houses the Program Monitoring, Reporting

and Verification (MRV) System. The data from interventions used to quantify and monitor ERs will be provided by the respective municipal departments. Therefore, the IME must have both coordinating capabilities with all municipal departments and experience collecting and managing large quantities of data. The IME is best suited to be located strategically within the municipality's existing data collection structure, but it may also be an external entity with a mandate to collect data from municipal departments and report to the CME. As required by the specific methodology and regulatory systems of the chosen asset class, the IME will generate annual monitoring reports that a VVE can use to verify ERs. The IME reports to the CME on data results and data input compliance from the respective municipal departments.

The assignment of each role will be subject to the following guidelines:

- The responsibilities and requirements of each role are fixed.

- The assignments of the CME and IME are fixed in the short-term, though they may change in the long-term to reflect changing municipal administrations and structures.

- The composition and attendance of the MWG may vary from intervention to intervention, but it will always be coordinated by the CME.

- The assignments of the TAE and VVE may change from intervention to intervention and will be clearly stated every time a new intervention goes through the Program Process. For any intervention, the TAE and the VVE must not be the same entity to insure integrity in the audit process and avoid conflict of interest.

A list of entities assuming each Program Role is provided in Annex A.1.

2.2 PROGRAM PLANNING

As with all municipal activities, the Program should undergo a process of planning. The CME should coordinate this process.

As part of the planning process, it is good practice to define the following:

- the scope of the Program

- the objectives of the Program

- the targets of the Program, as well as a plan to achieve them

- the implementation plan for the Program

The planning procedures for the Program are described in Annex A.2.

2.3 PROGRAM PROCESS

Every new intervention must follow the Program Process, which dictates the procedures and criteria against which interventions are assessed to be registered in the Program, as well as the process of monitoring, reporting and verifying the ERs generated by interventions. Figure 6 shows the Program Process in general terms.
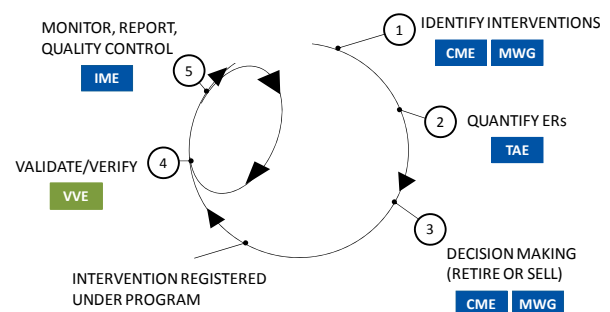
Figure 6: The Program Process

Accordingly, the Program Process consists of two sub-processes: 1) the Intervention Registration Process (Section 2.4); and 2) the Intervention MRV Process (Section 2.5).

2.4 INTERVENTION REGISTRATION PROCESS

The Intervention Registration Process consists of four stages between identification and registration: 1) establish eligibility; 2) assess ERs; 3) decide to retire or sell ERs; and 4) validation/verification (Figure 7). Following registration, interventions and their ERs are monitored according to the Intervention MRV Process (Section 2.5).
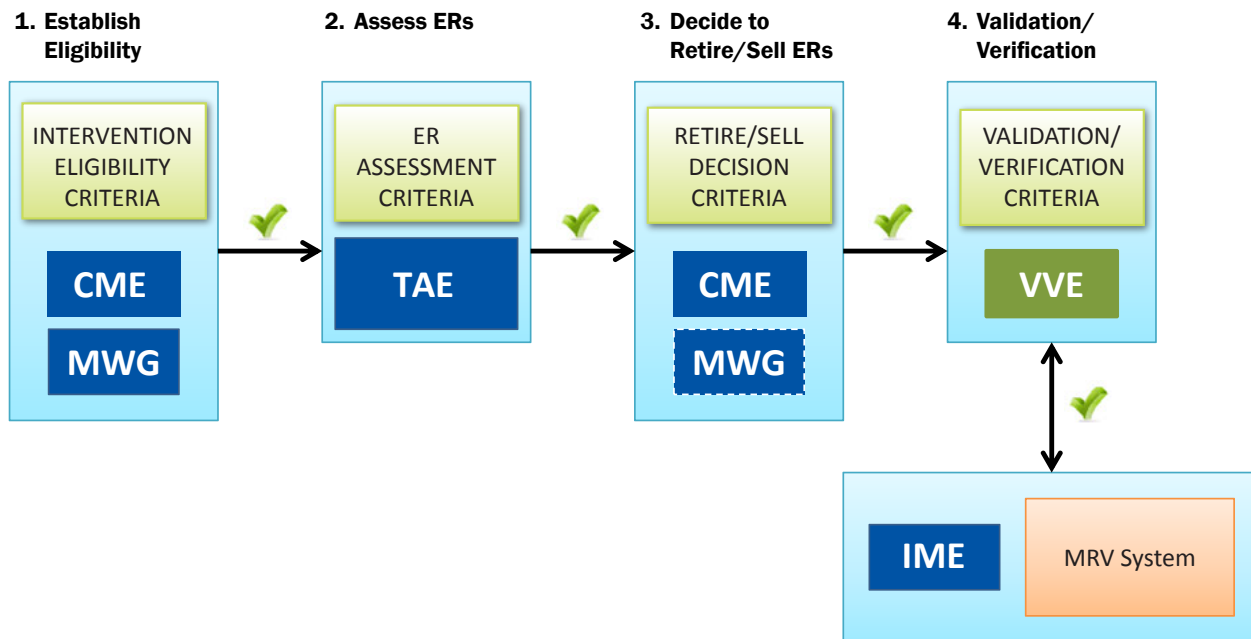
Figure 7: The Intervention Registration Process stages and associated responsibilities. A figure customized with assigned Program Roles is provided in Annex A.4.

1. **Establish Eligibility**
   To embark on the Intervention Registration Process, an identified intervention must be eligible to be included in the Program. Eligibility is established by the CME based on input by the MWG, which assesses eligibility based on the INTERVENTION ELIGIBILITY CRITERIA.

2. **Assess ERs**
   Once included in the Program, each intervention must undergo an assessment of the ERs it will generate. An appropriate methodology must be chosen for the intervention and its procedures followed. All methodologies permitted for use under the Program must follow the METHODOLOGY ASSESSMENT CRITERIA.

The TAE conducts the assessment of an intervention's ERs according to the EMISSION REDUCTION ASSESSMENT CRITERIA.

3. **Decide to Retire of Sell ERs**
   Following an initial assessment of the expected amount and asset class of intervention ERs, the decision must be made to either retire the ERs towards the municipality's self-set ER reduction target or sell the ERs to an outside buyer. The decision to retire or sell project ERs is made by the CME on behalf of the municipality, with the option for opinions and input by the MWG or other stakeholders. The decision to retire or sell follows the RETIRE OR SELL DECISION CRITERIA.

4. Validation/Verification

The intervention must undergo validation to ensure quality and integrity. A VVE conducts the validation according to the VALIDATION/VERIFICATION CRITERIA. The validation/verification process may be conducted at a frequency determined by the CME or the relevant carbon asset regulatory body (if applicable).

Advancing from one stage to the next requires satisfactory completion of the Process Checklist for the respective stage and approval by the CME. The Process Checklists to be completed during each stage of the Intervention Registration Process are provided in Annex A.4. Descriptions, responsible entities, criteria and process checklists for each stage of the Intervention Registration Process are summarized in Table 5.

Table 5: Summary and references for each stage of the Intervention Registration Process.

	1. Establish Eligibility	2. Assess ERs	3. Decide to Retire or Sell ERs	4. Validation/ Verification
Description	Assessment of intervention against eligibility criteria for inclusion in the Program	Determination of the methodology and assessment of ERs	Decision to retire or sell intervention ERs	Validation to ensure quality and integrity of the intervention and ERs
Responsible Entities	**Coordinating Management Entity** based on input by the **Multi-Sector Municipal Working Group**	**Technical Advisory Entity**	**Coordinating Management Entity** with the option for opinions and input by the **Multi-Sector Municipal Working Group**	**Validation and Verification Entity** with frequency of subsequent validations/verifications determined by the **Coordinating Management Entity** or the relevant carbon asset regulatory body (if applicable)
Process Criteria	INTERVENTION ELIGIBILITY CRITERIA (2.4.1)	EMISSION REDUCTION ASSESSMENT CRITERIA (2.4.2) and METHODOLOGY ASSESSMENT CRITERIA (2.4.3)	RETIRE OR SELL DECISION CRITERIA (2.4.4)	VALIDATION/VERIFICATION CRITERIA (2.4.5)
Process Checklist	*Eligibility Checklist* (A.4.1)	*ER Assessment Checklist* (A.4.2) and *Methodology Assessment Checklist* (A.4.3)	*Retire or Sell Decision Checklist* (A.4.4)	*Validation/Verification Checklist* (A.4.5)

2.4.1 INTERVENTION ELIGIBILITY CRITERIA

The INTERVENTION ELIGIBILITY CRITERIA ensure that each intervention and its associated ERs comply with the principles of integrity held by the Program. By adhering to the INTERVENTION ELIGIBILITY CRITERIA and the Intervention Registration Process, it will be ensured that ERs produced by interventions under the Program do not have dual ownership and are not being double counted. Each intervention must be:

1. **Within the Intervention Inclusion Parameters**

   The Program must define the Intervention Inclusion Date for including interventions in the Program, as well as the parameters for inclusion (e.g., financial commitment to the intervention, intervention inclusion in municipal plan, etc.). This should be based on conditions in the city and existing municipal processes.

2. **Transparent about Registration with Other Programs**

   It must be fully disclosed if the intervention is registered or seeking registration with the CDM, VCS, Gold Standard or any other carbon finance program. Registration with other programs may impact the ownership of the ERs generated by the intervention. Disclosure of an intervention's registration or intention to register with other programs will inform *Intervention Eligibility Criteria #4* and the *Retire or Sell Decision Criteria*. This proactively prevents double ownership and double counting of ERs by disclosing if ERs produced by interventions under the Program are already allocated to another program or entity.

3. **Located within the City's Geographical Boundaries**

   The intervention must be located within the geographical boundaries of the city. This ensures the laws and regulations of the municipality apply to the intervention.

4. **Under the Ownership and/or Control of the Municipality**

   The intervention must be under the ownership or control, even if partially, of the municipality through either direct implementation or agreement. For example, the intervention could be implemented:

   (i) directly by a municipal department;

   (ii) by a municipal department through a sub-contractor;

   (iii) by a municipal department through a public-private partnership with a private sector company;

   (iv) by a civil society organization in cooperation with a municipal department; or

   (v) by financial or other incentives introduced by the municipality to encourage behavior change (the intervention does not include a physical activity).

   The agreement will be required to include a clause specifying the transfer of ER ownership to the municipality or the terms of shared ownership, including any revenue-sharing arrangement. The terms must reflect that, while ERs from an intervention may be owned by multiple parties in various shares, each individual ER is owned exclusively by only one party.

5. **In a Sector Governed by the Municipality**

   The intervention must be in a sector that is governed and/or influenced by municipal decisions. The intervention implements a technology or measure under the sectoral reach of the municipality. For example, sectoral scopes defined by the UN Framework Convention on Climate Change (UNFCCC) for the CDM include:

   1. Energy industries (renewable/non-renewable)

   2. Energy distribution

   3. Energy demand

4. Manufacturing industries

5. Chemical industries

6. Construction

7. Transport

8. Mining/Mineral production

9. Metal production

10. Fugitive emissions from fuel (solid, oil and gas)

11. Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride

12. Solvents use

13. Waste handling and disposal

14. Afforestation and reforestation

15. Agriculture

6. **Not Legally Mandated by Higher Levels of Government**

The technology or measure implemented by the intervention must not be a legally mandated requirement by higher levels of government, such as state- or federal-level governments.

7. **One that Results in Emission Reductions**

The intervention must result in ERs, of any quantity, that are beyond what would occur in a baseline scenario. *Note: Interventions that seek to generate carbon assets, such as certified emission reductions (CERs) or verified carbon units (VCUs), will be required to fulfill all the criteria imposed by the relevant regulatory body.*

8. **In Compliance with Environmental and Legal Requirements**

The intervention must fulfill all environmental and other legal requirements of the city, state and national governments. This ensures the intervention embodies environmental and legal diligence.

The **Eligibility Checklist** to be completed by the MWG is provided in Annex A.4.1.

2.4.2 EMISSION REDUCTION (ER) ASSESSMENT CRITERIA

The EMISSION REDUCTION ASSESSMENT CRITERIA ensure that ERs generated by interventions under the Program are assessed and monitored with integrity. The ER Assessment also helps inform the decision to retire or sell ERs and will be conducted by the TAE. It will include the following requirements:

1. **An Approved Methodology to Quantify ERs**

The methodology used to quantify ERs generated by the intervention must be approved for use by the Program. To be approved, it must have undergone an assessment and received a recommendation by the MWG and a VVE in accordance with the METHODOLOGY ASSESSMENT CRITERIA.

2. **Confirmation of Compliance with Methodology Applicability Conditions**

The intervention must comply with the applicability conditions of the chosen methodology.

3. **An Initial Estimate of ERs Relative to a Baseline Scenario**

The initial estimate of ERs generated by the intervention relative to a baseline scenario must be conducted using equations provided in the methodology.

4. **Parameters Required at Validation**

Parameters required at validation that are specified in the methodology must be provided.

5. **A Monitoring Plan**

A monitoring plan that complies with the requirements in the methodology must be provided.

6. **A Recommendation of Asset Class to Pursue for the ERs**

A recommendation must be provided regarding the asset class to pursue for the ERs. If the intervention seeks to generate carbon assets, such as CERs or VCUs, it must fulfill all the criteria imposed by the relevant regulatory body. If the recommendation already includes a carbon asset, an assessment of the feasibility and fulfillment of criteria imposed by the relevant carbon asset regulatory body should be provided.

The *ER Assessment Checklist* to be completed by the TAE is provided in Annex A.4.2.

2.4.3 METHODOLOGY ASSESSMENT CRITERIA

To be approved for use by the Program, methodologies must have undergone an assessment and received a recommendation by the MWG and a VVE. Should an approved methodology not exist for a particular intervention, the TAE may work with the MWG and the VVE to identify or develop the best available alternate methodology based on global best practices. The scope of assessment of a new methodology will be based on the following set of principles and elements:

1) Principle of integrity and avoidance of politically and ethically contentious issues

2) Applicability of methodology for the specific intervention type

3) Appropriate definition of the intervention's physical boundary

4) Procedure for determining the baseline scenario

5) Method for calculating the baseline and intervention emissions

6) Adequacy of the monitoring methodology, data and parameters

7) Relationship to methodologies already in use by interventions under the Program

The *Methodology Assessment Checklist* is provided in Annex A.4.3.

2.4.4 RETIRE OR SELL DECISION CRITERIA

The RETIRE OR SELL DECISION CRITERIA ensure that each unit of ERs generated by interventions will have only ONE final destination: it will be retired and counted towards the municipality's self-set ER reduction target OR it will be sold. This prevents double ownership and double counting of ERs. The Retire or Sell Decision must include:

1. **The Amount of ERs to be Retired**

The amount of ERs that will be retired against the municipality's self-set target must be clearly stated.

2. **The Amount of ERs to be Sold**

The amount of ERs that will be sold must be clearly stated.

3. **Confirmation that Each Unit of ERs has Only One Final Destination**

The sum of the amount of ERs that will be retired and the amount of ERs that will be sold must equal 100%. This provides confirmation that each unit of ERs has only one final destination and is not subject to double ownership and double counting.

The *Retire or Sell Decision Checklist* to be completed by the CME is provided in Annex A.4.4.

2.4.5 VALIDATION/VERIFICATION CRITERIA

The VALIDATION/VERIFICATION CRITERIA accompanies an essential quality-control process to ensure that each ER generated under the Program exists, has integrity and is properly accounted for. It ensures all aspects of the Program Process are checked and approved by an external and neutral party. Upon review by the VVE, the intervention must be found to:

1. **Comply with the INTERVENTION ELIGIBILITY CRITERIA**

   The intervention must comply with the INTERVENTION ELIGIBILITY CRITERIA to confirm proper inclusion in the Program.

2. **Comply with the EMISSION REDUCTION ASSESSMENT CRITERIA**

   The intervention must comply with the EMISSION REDUCTION ASSESSMENT CRITERIA to confirm appropriate assessment and monitoring of ERs.

3. **Comply with the RETIRE OR SELL DECISION CRITERIA**

   The intervention must comply with the RETIRE OR SELL DECISION CRITERIA to confirm there are no instances of double ownership and double counting of ERs.

4. **Be on Track to Produce/Be Producing ERs as Planned**

   The intervention must comply with all requirements of the chosen methodology and be confirmed to be on track to produce/be producing ERs as planned.

5. **Fulfill all criteria imposed by the relevant carbon asset regulatory body (if applicable)**

   If the intervention seeks to generate carbon assets, such as CERs or VCUs, it must fulfill all the criteria imposed by the relevant regulatory body.

The *Validation/Verification Checklist* to be completed by the VVE is provided in Annex A.4.5.

2.5 INTERVENTION MONITORING, REPORTING AND VERIFICATION (MRV) PROCESS

The Program's MRV System stores and analyzes data that is used to quantify and monitor ERs generated by interventions under the Program. It is managed by the IME and is used by the CME for three core functions: 1) to track the implementation of interventions; 2) to monitor ERs produced by the interventions; and 3) to assess and issue carbon assets. As ERs are generated by interventions, the MRV System will clearly indicate the asset class of each asset issued.

The Intervention MRV Process has five stages: 1) top-down regulatory mandate to deliver data; 2) data delivery; 3) data analysis; 4) reporting; and 5) verification of ERs (Figure 8). The Intervention MRV Process ends with the issuance of carbon assets to the Registry.

1. **Top-Down Mandate to Deliver Data**

   The CME provides a top-down regulatory mandate to the municipal departments to deliver requested data to the IME. It also monitors and enforces compliance.

2. **Data Delivery**

   The IME works with the municipal departments to ensure the necessary data is delivered to quantify ERs and fulfill intervention monitoring plans.

3. **Data Analysis**

   The IME conducts analyses according to the chosen methodology to quantify the ERs generated by the interventions.
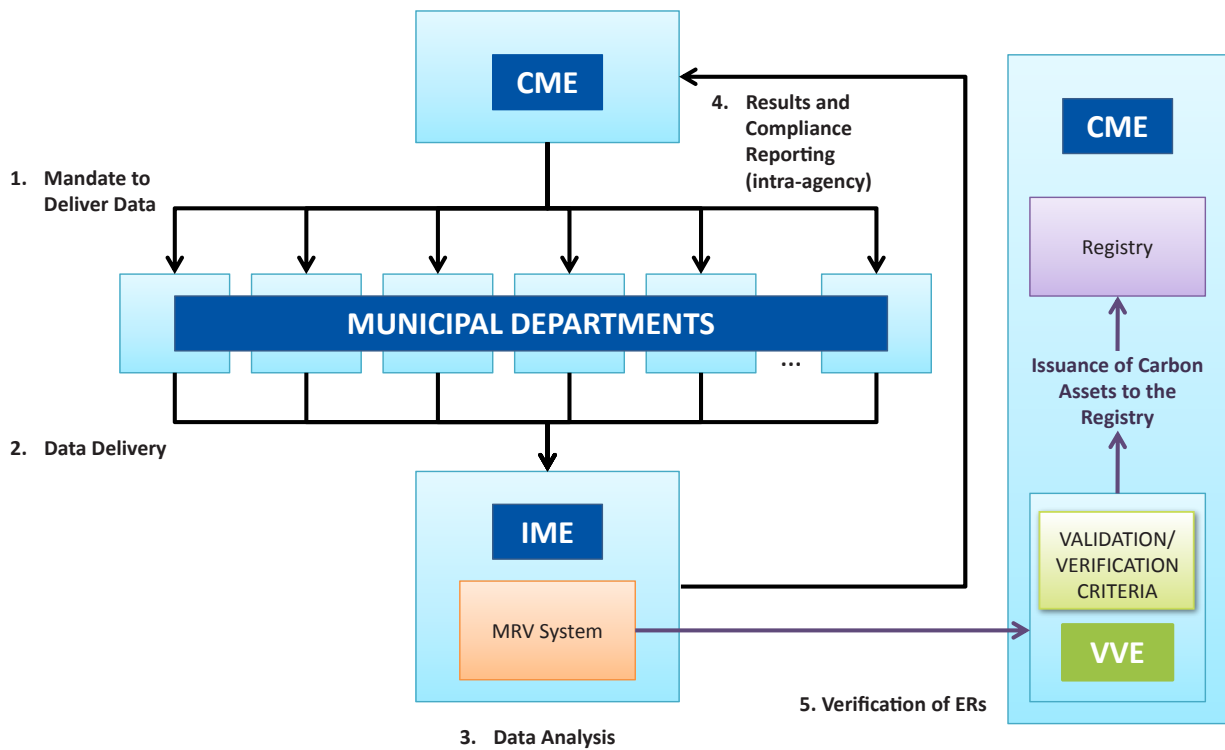
Figure 8: The Intervention MRV Process stages and associated responsibilities. A figure customized with assigned Program Roles is provided in Annex A.5.

4. Results and Compliance Reporting

Once data has been delivered and analyzed, the IME reports back to the CME on results and compliance. This intra-agency results and compliance reporting takes place at pre-defined, regular intervals.

5. Verification of ERs

Prior to credit issuance, the ERs must undergo verification to ensure quality and integrity. Upon initiation by the CME, a VVE conducts the verification according to the VALIDATION/ VERIFICATION CRITERIA. The validation/ verification process may be conducted at a frequency determined by the CME or the relevant carbon asset regulatory body (if applicable).

Upon completion of the Intervention MRV Process, carbon assets may be issued to the Registry. More details about the Intervention MRV Process and the Registry are provided in Annex A.5.

2.6 PROGRAM EVALUATION

To complement the planning process, the Program should undergo a process of periodic evaluation. The CME should coordinate this process.

As part of the evaluation process, it is good practice to reflect on the following:

- the scope of the Program
- the objectives of the Program
- the targets of the Program, as well as the plan to achieve them
- the implementation plan for the Program

The periodic evaluation procedures for the Program are described in Annex A.6.

ANNEX. Implementation of the Rio de Janeiro Low Carbon City Development Program

A.1 PROGRAM ROLES

While the responsibilities and requirements of each role are fixed, the specific assignment of each Program Role may change over time to reflect changing municipal administrations and municipal structures (i.e., CME and IME) or on an intervention-by-intervention basis (i.e., TAE and VVE). The current assignment of each role as of the date of this document is outlined below.

Coordinating Management Entity

The Secretariat of Casa Civil serves as Rio Prefeitura's coordinating agency, responsible for the planning and execution of strategic interventions and management of the municipal administration. Casa Civil also plays a role in the political, institutional and administrative coordination,

integrating the actions of the government across sectors, while assessing and monitoring the actions of other agencies and public entities.

Multi-Sector Municipal Working Group

The MWG is coordinated by Casa Civil and may consist of representatives from various municipal departments (Box A1).

Technical Advisory Entity

The TAE must have sufficient technical expertise to fulfill its role and duties. For example, two entities in the City of Rio de Janeiro that may fulfill this role include: 1) the *Bolsa Verde do Rio de Janeiro* (BVRio) Environmental Assets Division, a private sector working group of subject-matter experts;

Contact	Position	Information
Rodrigo Rosa	Special Advisor of the Mayor, Rio+20 Municipality Executive Coordinator	Prefeitura da Cidade do Rio de Janeiro Rua Afonso Cavalcanti 455, Cidade Nova Rio de Janeiro-RJ, 20211-110 Email: realrodrosa@gmail.com

and 2) COPPE/UFRJ, a research center with expertise in climate change and quantification of GHG emissions.

Validation and Verification Entity

The VVE must be either a VVB accredited under the VCS, a DOE accredited under the CDM, another validation/verification entity accredited under an ISO-certified carbon finance program (such as Gold Standard or Climate Action Reserve), or an ISO-accredited environmental auditor.

Information Management Entity

Pereira Passos Institute (IPP) is responsible for urban planning in the City of Rio. It provides support for the continuous improvement of public policies implemented in the city, focusing in three main areas: 1) production of map information, geography and statistics; 2) fostering economic activities and strategic development of a favorable business environment, especially in the sectors of energy, creative industry, and information technology and communication; and 3) development of strategic programs and projects for social integration.

Box A1: Municipal Departments in Rio Prefeitura

MAYOR'S CABINET

Coordination of International Relations (CRI): municipal agency that assists the Mayor in the preparation and execution of projects and international agendas.

Coordination of the Youth Citizenship (CJC): formulates and manages policies for citizens of 15-29 years of age.

Coordination of Sexual Diversity (CEDS): proposes public policies for promoting a culture of respect for sexual orientation and gender identity, as well as guard duties to promote the visibility and social recognition of the national LGBT - lesbian, gay, bisexual and transgender people.

Special Coordination of Policy for the Promotion of Gender Equality (CEPIG): fosters, formulates, articulates and discusses gender policies in Rio de Janeiro, ensuring the conditions that lead to freedom and equal rights, with a focus on gender issues.

Special Coordination of Promotion Policy for the Prevention of Addictions (CEPPDQ): defines, plans and coordinates the prevention of misusing narcotics and addictive drugs.

SECRETARIATS

Municipal Secretariat of Environment (SMAC): central unit of the Municipal Environmental Management System. It issues environmental licenses and monitors potentially polluting activities. SMAC's main priorities are to: promote the defense and ensure the maintenance, restoration and protection of the environment; identify potentially polluting activities to safeguard the environment; coordinate the environmental management system for implementing environmental policy; provide environmental restoration and reforestation of degraded areas; and implement the policy of reducing greenhouse gas emissions within the municipality.

Parks and Gardens Foundation (FPJ): responsible for city landscaping projects, including planting trees in public spaces. It was integrated into SMAC in 1993, assuming new responsibilities concerning the conservation of environmental heritage in the city of Rio de Janeiro, with about 2,000 squares, parks and landscaped areas under its responsibility.

Municipal Secretariat of Planning Department (SMU): establishes guidelines for planning, monitoring and control policies.

Municipal Secretariat Transport (SMTR): regulates and monitors conventional and special buses, taxis, the bidding phase of the local public transport system, supplementary special transportation and school transportation.

Municipal Secretariat of Works (SMO): coordinates all public works, which is greatly integrated with all municipal departments. SMO works with the General Project Coordinator, Coordinator General of Works, River-Waters, RioUrbe and Geo-Rio.

Municipal Secretariat Administration (SMA): coordinates the municipal administration system in accordance with the city's master plan, and acts as a central office of human resources, infrastructure, logistics and general services.

Municipal Secretariat of Finance (SMF): oversees the economy, tax administration, budget and property of the municipality of Rio de Janeiro.

Municipal Secretariat of Education (SME): supports the development of educational policy of the municipality of Rio de Janeiro, coordinates and evaluates the results.

Municipal Secretariat of Social Services (SAMS): responsible for public welfare development through inclusion policies.

Municipal Secretariat of Health and Civil Defense (SMSDC): formulates and executes the municipal health policy.

Municipal Secretariat of Sports and Recreation (SMEL): promotes a sports action strategy with five pillars: social education, social technology, special policies, leisure, and participation and performance.

Municipal Secretariat of Labor and Employment (SMTE): executes labor and employment policies through municipal and federal programs.

Municipal Secretariat of Culture (SMC): encompasses 53 cultural facilities — including theaters, tarpaulins, libraries, museums, cinemas, theaters, planetariums and others — spread across the city, offering wide and rich programming and stimulating learning experiences.

Municipal Secretariat of Housing (SMH): acts on urbanization and regularization of slums and settlements, while promoting the construction of housing for poor.

Municipal Secretariat of Persons with Disabilities (SMPD): articulates and promotes public policies that guarantee the process of social inclusion of people with disabilities and their families.

Municipal Secretariat of Conservation and Public Services (SECONSERVA): centralizes and coordinates the work of entities, municipalities and municipal companies, responsible for the city's conservation.

Special Secretariat of Tourism/Rio de Janeiro Municipal Tourism Enterprise (RIOTUR): is a mixed-capital company and the executive organ of the Special Secretariat of Tourism; implements tourism policy, in line with the guidelines and programs dictated by the Municipal Administration.

Special Secretariat of Consumer Protection (SEDECON): acts as a liaison between businesses and consumers and promotes activities and services in defense of consumer rights in Rio.

Special Secretariat of Public Order (SEOP): regulatory and supervisory body of economic activity, and the municipal ordinances regulating the use of public space.

Special Secretariat for Healthy Aging and Quality of Life (SESQV): promotes actions, programs and projects that favor the maintenance of quality of life and autonomy in old age.

Special Secretariat for Economic Outreach (SEATS): formulates and implements public policies designed to expand the market and democratize access to the city's economy.

Special Secretariat for the Promotion and Defense of Animals (SEPDA): works on behalf of animals, promoting a respectful coexistence with society.

Special Secretariat of Science and Technology (SECT): implements the Municipal Science and Technology Policy, aimed at setting up Rio as a leader in the field of information, innovation and knowledge.

Special Secretariat for Development (SEDE): plans and implements actions to promote development in the City, attracts new businesses that contribute to employment generation and income, promotes the improvement of the business environment of the City, and advises the Mayor on international contacts with governments and private and public entities.

Comptroller General of the Municipality (CGM): exercises control of accounting, finance, budgeting, operation and property of entities of direct and indirect administration.

Attorney General of the Municipality (PGM): is responsible for judicial and extrajudicial defense of the city of Rio de Janeiro and the legal advice of the municipality, as well as for the registration and collection of outstanding municipal debt.

A.2. PROGRAM PLANNING

As part of the planning process for the Program, the following criteria should be defined:

SCOPE OF THE PROGRAM

The scope of the Program is to develop a cross-sectoral, low-carbon, climate change mitigation program intensively over the next two to four years, with a longer-term implementation period expected (e.g., 20 years).

The Program includes interventions with financial commitment confirmed on or after January 1, 2007, as this is the year in which the City of Rio de Janeiro first started taking action in response to global climate change, catalyzed by the publication of the IPCC Fourth Assessment Report. In 2007, the Mayor first became aware of the importance of planning for climate change and initiated the first climate change research studies in the city, conducted by the municipal secretariats with local researchers. From this year onwards, climate change was in the minds and hearts of the city officials; therefore, ER-producing interventions committed to in or after 2007 may be included in the Program.

OBJECTIVES OF THE PROGRAM

The Program has the following objectives:

- to promote sustainable development in Rio de Janeiro;
- to channel the various municipal plans and initiatives in the city and distill the carbon component;
- to quantify the ERs produced by actions in the city that began in or after 2007, and to create a carbon 'lens' through which all future municipal investments and interventions are evaluated;
- to remove barriers to implementation of interventions by leveraging their ER potential;

- to transparently demonstrate Rio's achievement of its self-set GHG reduction target by providing a framework for bottom-up mitigation action accounting; and
- to pilot a pioneering business model for climate change mitigation action in cities that can be disseminated throughout the world.

TARGETS OF THE PROGRAM, AS WELL AS A PLAN TO ACHIEVE THEM

The Program aims to achieve *at least* 2.3 MtCO$_2$e towards Rio's self-set GHG reduction target; however, the Program's target is to achieve many more ERs as the Program Process becomes mainstreamed into municipal operations.

The scenarios outlined in Section 1.3 describe a very preliminary plan for achieving the targets. Scenario B describes a plan to achieve the city's self-set GHG reduction target, and Scenario C is a more aggressive scenario that produces even more ERs. Going forward, the plan to achieve the Program Targets will be captured in the Intervention Feasibility Assessment (provided in supplementary information).

The Intervention Feasibility Assessment is an ongoing assessment of the interventions to be included under the Program, their feasibility, and their contribution to the Program's Objectives and Targets. Assessment criteria may vary with available information and priorities of the Prefeitura, and it may include items, such as: i) assessment of risk; ii) technology options; iii) financial considerations; iv) potential contribution to sustainable economic development; and v) stakeholder input. The Intervention Feasibility Assessment will be updated every six months at first, with the understanding that this is subject to change as required to meet the planning needs of the Prefeitura.

IMPLEMENTATION PLAN FOR THE PROGRAM

The Program Implementation Plan is an ongoing plan associated with the implementation of the Rio LCCDP. The tasks are sorted by the expected timeframe of their implementation, and may vary according to the planning needs of the Prefeitura. The Program Implementation Plan will be evaluated and adjusted as part of the Program Evaluation: every year at first, with the understanding that this is subject to change to meet the planning needs of the Prefeitura.

Individual interventions will follow the planning procedures required by all municipal activities (e.g., a public consultation period to ensure involvement of local stakeholders, budgeting, timelines, etc.).

A.3. PROGRAM PROCESS

MONITOR, REPORT, QUALITY CONTROL — IPP

VALIDATE/VERIFY — VVE

INTERVENTION REGISTERED UNDER PROGRAM

1 IDENTIFY INTERVENTIONS — CASA CIVIL | MWG

2 QUANTIFY ERs — COPPE, BVRio

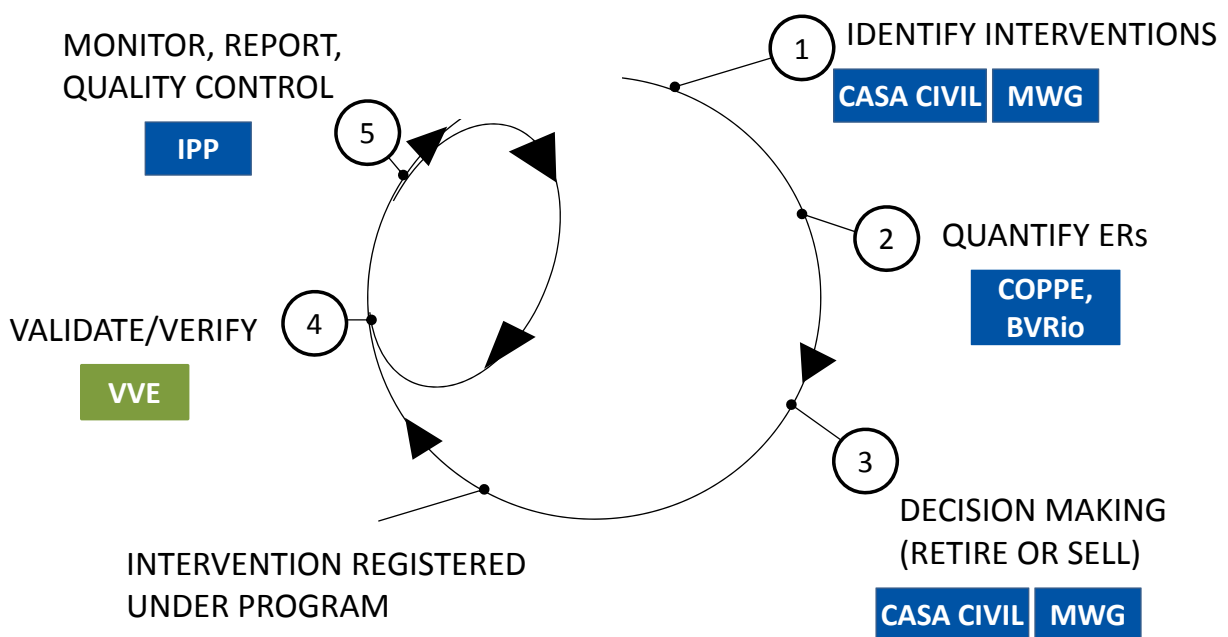3 DECISION MAKING (RETIRE OR SELL) — CASA CIVIL | MWG

Figure A1: The Program Process and associated responsibilities, based on the assigned Program Roles described in Annex A.1.

A.4. INTERVENTION REGISTRATION PROCESS

While the responsibilities and requirements of each role are fixed, the specific assignment of each Program Role may change over time to reflect changing municipal administrations and municipal structures (i.e., CME and IME) or on an intervention-by-intervention basis (i.e., TAE and VVE). The current assignment of each role as of the date of this document is described below.
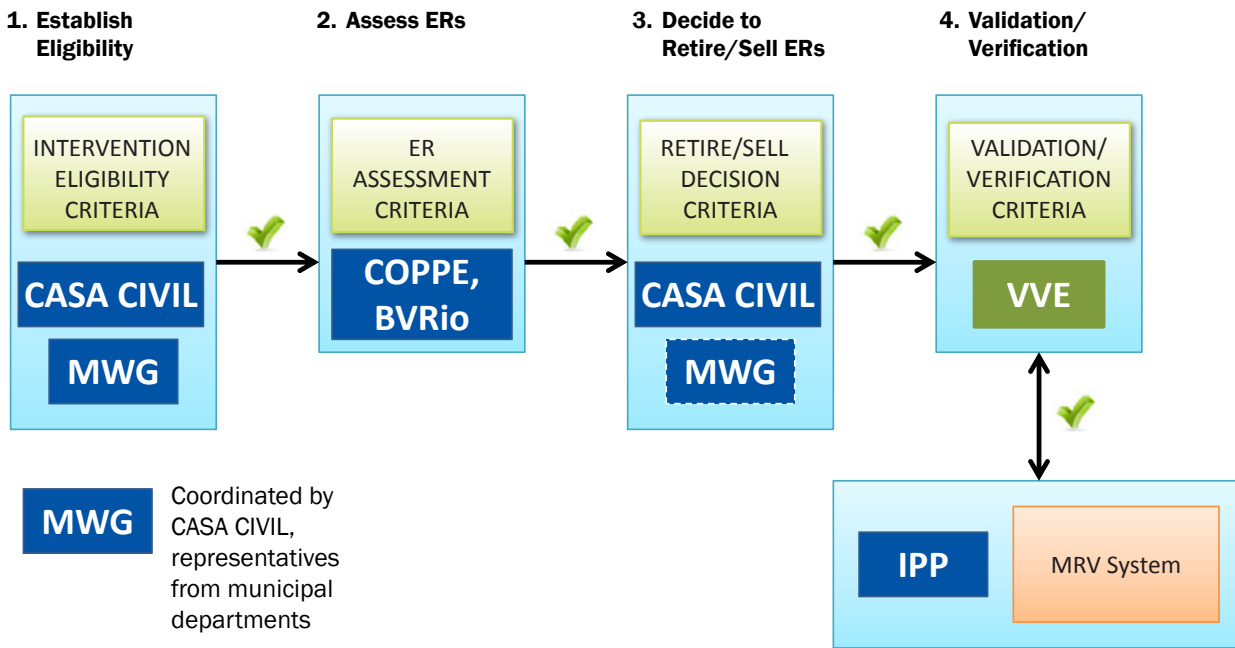

Figure A2: The Intervention Registration Process stages and associated responsibilities, based on the assigned Program Roles described in Annex A.1.

Each stage of the Intervention Registration Process requires satisfactory completion of the following checklists:

A.4.1. ELIGIBILITY CHECKLIST

The **Eligibility Checklist** is to be completed by the MWG during the "Establish Eligibility" stage.

	Eligibility Criteria	Confirmation
1.	Financial commitment to the intervention was confirmed on or after the Intervention Inclusion Date: January 1, 2007.	Yes/No (Provide details)
2.	The intervention is transparent about whether it is registered or seeking registration with the CDM, VCS, Gold Standard or any other carbon finance program.	Yes/No (Provide details)
3.	The intervention is located within the geographical boundaries of the City of Rio de Janeiro.	Yes/No (Provide location details)

	Eligibility Criteria	Confirmation
4.	The intervention is, at least partially, under the ownership and/or control of Rio Prefeitura through either direct implementation or agreement. The agreement includes a clause specifying the transfer of ER ownership to the municipality or the terms of shared ownership, including any revenue-sharing arrangement. The terms reflect that, while ERs from an intervention may be owned by multiple parties in various shares, each individual ER is owned exclusively by only one party. For example, the intervention may be implemented: (i) directly by a Secretariat or entity in the Prefeitura; (ii) by a Secretariat or entity in the Prefeitura through a sub-contractor; (iii) by a Secretariat or entity in the Prefeitura through a public-private partnership with a private sector company; (iv) by a civil society organization in cooperation with a Secretariat or entity in the Prefeitura; or (v) by policy and/or financial incentives introduced by the Prefeitura to encourage behavior change (the intervention does not include a physical activity).	Yes/No (Describe how the intervention will be implemented and, if not implemented directly by the Prefeitura, provide proof of transfer of ER ownership to Rio Prefeitura)
5.	The intervention implements a technology or measure under the sectoral reach of Rio Prefeitura. For example, sectoral scopes defined by the UNFCCC for the CDM include: 1. Energy industries (renewable/non-renewable) 2. Energy distribution 3. Energy demand 4. Manufacturing industries 5. Chemical industries 6. Construction 7. Transport 8. Mining/Mineral production 9. Metal production 10. Fugitive emissions from fuel (solid, oil and gas) 11. Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride 12. Solvents use 13. Waste handling and disposal 14. Afforestation and reforestation 15. Agriculture	Yes/No (Specify the intervention's sector and justify its governance by Rio Prefeitura)
6.	The technology or measure implemented by the intervention is not a legally mandated requirement in the State of Rio de Janeiro or in Brazil.	Yes/No

	Eligibility Criteria	Confirmation
7.	The intervention results in ERs, of any quantity, that are beyond what would occur in a baseline scenario. *Note: Interventions that seek to generate carbon assets, such as CERs or VCUs, will be required to fulfill all the criteria imposed by the relevant regulatory body.*	Yes/No (Broadly describe the baseline scenario which will be elaborated in the ER Assessment Checklist.)
8.	The intervention fulfills all environmental and other legal requirements of Rio Prefeitura, the State of Rio and Brazil.	Yes/No

A.4.2. ER ASSESSMENT CHECKLIST

The **ER Assessment Checklist** to be completed by the TAE during the "Assess ERs" stage.

	ER Assessment Criteria	Confirmation
1.	The intervention uses a methodology that has undergone assessment and received a recommendation by one of the following: (i) a VVB; (ii) a DOE; (iii) another VVE accredited under an ISO-certified carbon finance program (such as Gold Standard or Climate Action Reserve); or (iv) an ISO-accredited environmental auditor.	Yes/No (Specify the methodology to be used)
2.	The intervention complies with the applicability conditions of the chosen methodology.	Yes/No (Specify the applicability conditions and reasons for compliance)
3.	The initial estimate of ERs to be generated by the intervention is provided. Calculations use the equations specified in the methodology and available data and/or reasonable estimates.	Yes/No (Specify the ERs estimated, equations, baseline estimates and data sources)
4.	The parameters required at validation specified in the methodology are provided.	Yes/No (Specify parameters and data sources)
5.	A monitoring plan is provided that complies with the methodology.	Yes/No (Specify the monitoring plan)
6.	A recommendation is provided as to which assets class to pursue for the ERs. If the recommendation includes carbon assets, such as CERs or VCUs, an assessment of the feasibility and fulfillment of the criteria imposed by the relevant regulatory body is provided.	Yes/No

A.4.3. METHODOLOGY ASSESSMENT CHECKLIST

The **Methodology Assessment Checklist** to be completed by the TAE and/or the MWG, as well as the VVE, to approve new methodologies for use under the Program.

	Methodology Assessment Criteria	Confirmation
1.	The methodology upholds principles of integrity and avoids politically and ethically contentious issues.	Yes/No
2.	The methodology states applicability conditions specific to intervention type.	Yes/No
3.	The methodology has an appropriate definition of the intervention's physical boundary.	Yes/No
4.	The methodology has an appropriate procedure for determining the baseline scenario.	Yes/No
5.	The methodology states an appropriate method for calculating the baseline and intervention emissions.	Yes/No
6.	The methodology has an adequate monitoring methodology, data and parameters, as well as precision requirements.	Yes/No
7.	The methodology specifies how to address relationships to methodologies already in use by interventions under the Program.	Yes/No

A.4.4. RETIRE OR SELL DECISION CHECKLIST

The **Retire or Sell Decision Checklist** to be completed by the CME during the "Decide to Retire of Sell ERs" stage.

	Retire or Sell Decision Criteria	Confirmation
1.	The amount of ERs generated by the intervention that will be retired and counted towards the City of Rio de Janeiro's self-set ER target of 2,270 $ktCO_2e$ is specified.	Yes/No (Specify the percentage of ERs generated by the intervention that will be retired)
2.	The amount of ERs generated by the intervention that will be sold is specified.	Yes/No (Specify the percentage of ERs generated by the intervention that will be sold)
3.	The sum of Criteria 1 and Criteria 2 is 100%, confirming that each unit of ERs generated by the intervention has only <u>ONE</u> final destination: 1. It will be retired and counted towards the City of Rio de Janeiro's self-set ER target of 2,270 $ktCO_2e$; **OR** 2. It will be sold.	Yes/No

A.4.5. VALIDATION/VERIFICATION CHECKLIST

The **Validation/Verification Checklist** to be completed by the VVE during the "Validation/Verification" stage.

	Validation/Verification Criteria	Confirmation
1.	The intervention complies with the PROGRAM ELIGIBILITY CRITERIA.	Yes/No
2.	The intervention complies with the EMISSION REDUCTION ASSESSMENT CRITERIA.	Yes/No
3.	The intervention complies with the RETIRE OR SELL DECISION CRITERIA.	Yes/No
4.	The intervention complies with all requirements of the chosen methodology and will produce/is producing ERs as planned.	Yes/No
5.	If the intervention seeks to generate carbon assets, such as CERs or VCUs, it fulfills all the criteria imposed by the relevant regulatory body.	Yes/No

A.5. INTERVENTION MRV PROCESS

While the responsibilities and requirements of each role are fixed, the specific assignment of each Program Role may change over time. The current assignment of each role as of the date of this document is described in Figure A3.
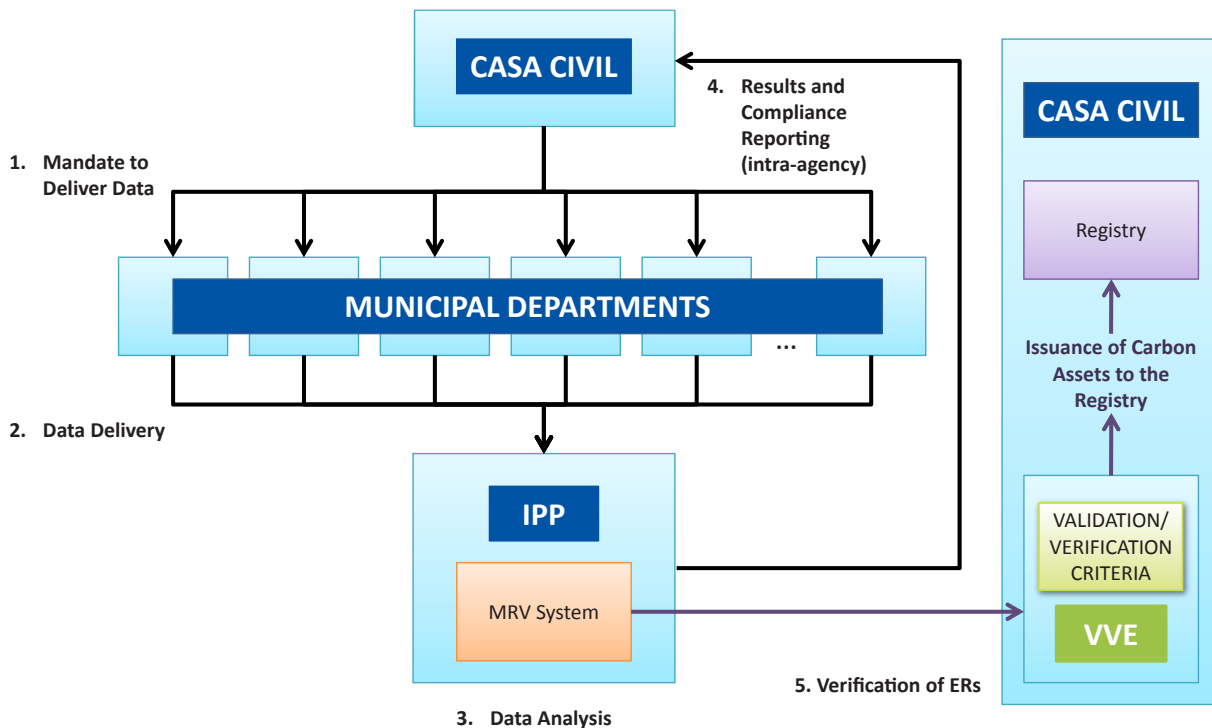

Figure A3: The Intervention MRV Process stages and associated responsibilities, based on the assigned Program Roles described in Annex 1A.

The MRV System, housed in IPP, will be the central data repository for the Program. The software system will be designed to include forms for documentation of each intervention in accordance with the documentation procedures.

The registry will be the "bank account" of ERs produced by the Program. The registry helps ensure that no double counting of ERs. Each ER will be uniquely tagged based on its asset class and have only one final destination: it will be retired or sold. The transactions of ERs will be tracked in the Registry.

A.6. PROGRAM EVALUATION

To complement the planning process, the Program will undergo two tracks of periodic evaluation:

1) Ongoing evaluation of the Intervention Feasibility Assessment, which will be updated every 6 months at first, with the understanding that this is subject to change as needed to meet the planning needs of the Prefeitura.

2) Periodic evaluation and adjustment of the Program, which will be assessed based on its performance and suitability to meet the needs of the Prefeitura. The Program may undergo revision and adjustment, if needed. The criteria to be assessed may include:

- Scope
- Objectives
- Targets
- Relevance to evolving market conditions and incentive instruments
- Status of the Program Implementation Plan

Program Evaluation will occur every year at first, with the understanding that periodicity and assessment criteria are subject to change as needed to meet the planning needs of the Prefeitura.

Individual interventions will follow the evaluation procedures required by all municipal activities (i.e., those applicable to the 2016 Strategic Plan, described in Section 1.2).