

# DIRECTIONS IN URBAN DEVELOPMENT

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## The Rio de Janeiro Low Carbon City Development Program

*A Business Model for Green and Climate-Friendly Growth in Cities*

**The Rio de Janeiro Low Carbon City Development Program is an ISO-certified framework and set of comprehensive requirements to help the city to plan, implement, monitor, and account for low carbon investments and climate change mitigation actions across all sectors in the city over time.**

The Program will enable the city to plan and implement the mitigation actions needed to achieve its city-wide mitigation goals, as well as credibly and transparently demonstrate the achievement of those goals through diligent monitoring and accounting of the actions taken. These mitigation actions are municipality-driven activities, called interventions, including policies and project developments that reduce greenhouse gas (GHG) emissions. Climate finance is expected to play an essential role in catalyzing future investments in low carbon city development.

**This issue of *Directions in Urban Development* describes the context underlying the development of the Program in Rio, and the key components of such an ISO-certified program including roles and responsibilities, planning and evaluation, and the program process.**

The Rio Low Carbon City Development Program goes beyond the approach seen in the past in municipalities and other organizations that focused on isolated actions, such as individual carbon offset projects, individual policies, etc. The Program includes a broader scope starting at the strategic planning level: establishing clear objectives and targets that ensure interventions to reduce emissions are integrated with other strategic actions in the city.

The Rio Low Carbon City Development Program was jointly developed by the City of Rio de Janeiro and the World Bank. This paper was prepared by Sebastian Scholz and Lorraine Sugar of the World Bank's Latin America and Caribbean Region Sustainable Development Department with significant editorial input and review by Marcus Lee of the World Bank's Urban Development Unit, as well as review by Alexandrina Platonova-Oquab of the Carbon Finance Unit and Monali Ranade of the World Bank Institute. The World Bank Institute's Climate Change Practice supported the development of the Rio Low Carbon City Development Program through the CF-Assist Trust Fund. The authors would like to thank Rodrigo Rosa, Special Advisor to the Mayor and Rio's Low Carbon City Development Program Coordinator.



Photo provided by the City of Rio de Janeiro.

The Program is integrated with Rio's climate change mitigation goals, Rio's strategic plan, and the expected investments ahead of the World Cup in 2014 and the Summer Olympics in 2016 (see Box 1).

The various components of the Program, described below in further detail, aggregate to form a 'carbon lens' that enables the city to implement its forthcoming projects and policies in a low-carbon way, as well as quantify and monitor the reductions in emissions over time. Accordingly, it is envisaged that the targets and actions under the Program will be closely aligned and incentivized through the overall municipal management structure that supports the implementation of Rio's strategic plan.



**What happens in Rio doesn't stay in Rio.** The Rio de Janeiro Low Carbon City Development Program was launched in June 2012 at the Rio+20 conference with the presentation of its achievement of multiple International Organization for Standardization (ISO) accreditations (see Box 2). The ISO-certification makes the Program a prototype for a business model that can be replicated in cities around the world.

As more and more cities institute programs to plan, implement, monitor, and account for climate change

### **Box 1. The Broader Context of Rio's Low Carbon City Development Program**

*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 urban environments co-exist harmoniously side-by-side. In this unique setting, Rio was the ideal place to host the international sustainability community during occasions such as the Earth Summit in 1992 and Rio+20 in 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. Accordingly, the city is expecting an almost unprecedented influx of visitors and investments over the coming years from both domestic and foreign sources. The city government is tasked with ensuring that these investments improve the quality of life for residents, increase access to services, and address climate change and other environmental issues. With the paramount goal of being a world-class city with a high quality of life for all residents, Rio de Janeiro is committed to sustainable, low-carbon urban development.*

Mayor Eduardo Paes, the current mayor of the City of Rio de Janeiro, faced a number of challenges when he first took office in 2009. During the previous two decades, Rio had experienced a declining economy, degrading urban infrastructure, and deteriorating environmental quality. Compounding these challenges were issues related to municipal governance. Among its many challenges, the city government – called Rio Prefeitura – had limited investment capacity and a structure that did not align with the services provided.

To address the many issues facing the city and to improve its governance, one of the first actions Mayor Paes took when he entered office back in 2009 was to develop a new strategic plan for the city. Consulting with residents and stakeholders and working with McKinsey & Company, the Prefeitura developed Rio's 2016 Strategic Plan (Rio Prefeitura 2009). The Prefeitura also developed a new management structure to support the implementation and tracking of the specific targets and milestones of its strategic plan. In this context, the Rio Low Carbon City Development Program can provide a critical link between long-term strategic planning and medium- to short-term implementation of mitigation-related interventions to support the implementation and tracking of the specific targets and milestones of its Strategic Plan.

mitigation actions, they are filling the void created by the lack of an international climate change policy framework. For example, a recent report from the Carbon Disclosure Project (2012) surveyed 73 cities from around the world, counting nearly 630 activities that reduce emissions ranging from tree planting to energy efficiency measures in buildings. Low Carbon City Development Programs would allow these cities to transparently and credibly quantify and monitor the emission reductions from their mitigation activities in a comprehensive manner across sectors, as well as plan and implement more interventions in the future.

### **Rio's Targets for Reducing GHG Emissions**

The Municipal Law on Climate Change and Sustainable Development (Law No. 5.248), passed on January 27, 2011, set the quantities for Rio's voluntary GHG reduction targets at 8%, 16% and 20% of 2005 emission levels for the years 2012, 2016 and 2020, respectively. These targets are for absolute volumes of emission reductions (expressed in tons of CO<sub>2</sub>e reduced) to be cumulatively achieved by the end of the respective reporting year.

Rio's most recent GHG inventory conducted by COPPE, the post-graduate engineering research department of the Federal University of Rio de Janeiro, found that

### **Box 2. Certifications for the Low-Carbon City Development Program and Implications for Future Climate Finance**

The Rio Low Carbon City Development Program was independently certified by Det Norske Veritas (DNV) according to the new Low Carbon City Development Program Protocol (World Bank and DNV forthcoming). The certification process ensured that the Program complied with international standards for GHG emission reductions accounting and environmental management systems. Programs that comply with the Low Carbon City Development Protocol also achieve certification according to the following standards:

- ISO 14064-2: the standard for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements;
- ISO 14001: the standard for the certification of environmental management systems; and
- The GHG Protocol's Project Accounting Protocol and Guidelines (WRI and WBCSD 2005).

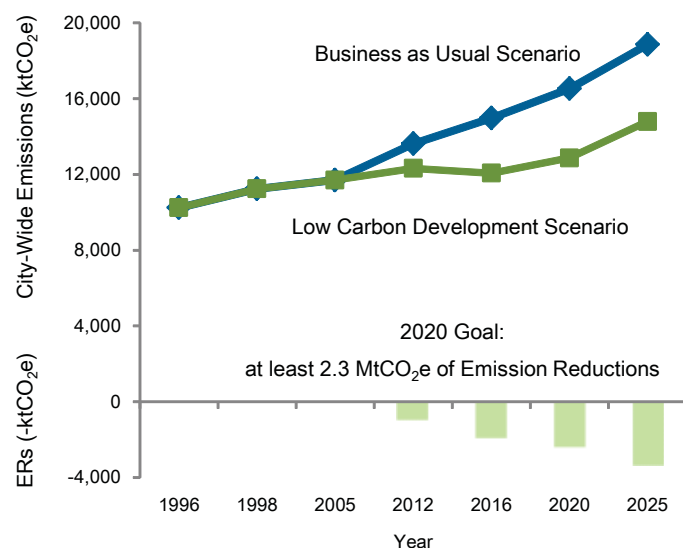
Through compliance with these standards, the Rio Program prepares the city to participate in climate finance at both the sub-national and international levels. In this sense, the Low Carbon City Development Program builds upon and expands previous examples of enhancing climate finance opportunities for cities, including the City-Wide Approach to Carbon Finance (World Bank 2010).

2005 emissions were 11,351.9 ktCO<sub>2</sub>e in total (COPPE and Rio Prefeitura 2011<sup>1</sup>). Therefore, the targets correspond to cumulative emissions reductions of 908 ktCO<sub>2</sub>e to be reduced by end of 2012, 1,816 ktCO<sub>2</sub>e to be reduced by 2016, and 2,270 ktCO<sub>2</sub>e to be reduced by 2020 (see Figure 1).

There are two possible ways through which Rio could track the achievement of its emission reduction targets. The first is a top-down approach in which a GHG inventory is calculated and compared to a projected business-as-usual case. This approach gives a big-picture perspective on target achievement; however, the major drawback is that estimating the projected city-wide business-as-usual case is difficult and varies considerably with different input conditions, such as population growth, economic growth, and growth of major emitting industries.

The second approach is bottom-up mitigation action accounting. In this approach, each mitigation intervention is considered individually and emission reductions are calculated compared to what would have occurred in the absence of that intervention. This is the approach used under the framework of the Low Carbon City Development Program. Existing methodologies, standards, and auditing practices ensure the integrity of these calculations. Although the City of Rio will continue to measure its top-down city-wide GHG inventory, the bottom-up mitigation action accounting approach represents a credible and transparent way to quantify and achieve its self-set emission reductions goals.

**Figure 1. Rio's greenhouse gas reduction targets are to reduce at least 2.3 million tons of CO<sub>2</sub>e cumulatively by the end of 2020, by diverting from a business-as-usual scenario to a low-carbon-development scenario**



As part of the GHG inventory research work, Rio Prefeitura and COPPE also conducted an initial modeling of the future GHG emissions of the city according to three scenarios:

1. a business-as-usual scenario (shown in Figure 1);
2. a scenario based on the planned mitigation actions in the transport, waste, and energy sectors at the time of the assessment; and
3. a scenario with bolder actions that are feasible in the medium and long term (COPPE and Rio Prefeitura 2011).

When the second scenario showed that Rio would not reach all of its targets with the existing planned actions alone, city officials realized that more mitigation interventions would need to be implemented and quantified in order to reach the targets. Furthermore, different kinds of mitigation interventions would need to be considered, such as policies and projects across all urban sectors.

In the long term, Rio's Low Carbon City Development Program will contribute to plans for green, low-carbon economic growth and job creation in the city, while upgrading the urban infrastructure and improving environmental quality. This will be achieved mainly through a targeted set of planning and selection priorities when assessing future investments, supported by the institutional structure, managerial practices, and standards put in place through the Low Carbon City Development Program. In the medium to longer term, Rio aims for a low-carbon environmental goods and services industry<sup>2</sup> that would rival London's, which currently has more than 9,200 companies, more than 160,000 jobs, and more than £24 billion (US\$39 billion) in revenue (BIS 2012).

## The ISO-Certified Low Carbon City Development Program

The foundation of the Rio Low Carbon City Development Program is its clearly defined municipal institutions and processes, which operate together to provide the framework that enables Rio to plan, implement, monitor, and account for its mitigation actions. As described in further detail below, there are clearly characterized **Program Roles**, processes for **Program Planning and Evaluation**, and each new activity that reduces emissions—called an intervention—goes through the same five-step **Program Process** (see Figure 2). Taken together, these form the organizational structure of the ISO-certified Rio Program and constitute the Low Carbon City Development Program business model that can be implemented in cities around the world.



## Program Roles

The Low Carbon City Development Program has five Program Roles with fixed responsibilities and requirements. Two of the roles require fixed assignments linked to the overall Program, and three of the roles have assignments that may vary with each intervention that goes through the Program Process.

### Fixed Assignments

**Coordinating Management Entity (CME):** The CME is the central body within the municipality that oversees the coordination and management of the Program. It is housed strategically at a sufficiently high level in the municipal government to have coordinating authority across all municipal departments. *Fulfilling this role in Rio:* The Mayor's Office (known as 'Casa Civil').

**Information Management Entity (IME):** The IME is the central body that coordinates and manages all information and data related to the Program. The IME must ideally have both coordinating capabilities with all municipal departments and experience collecting and managing large quantities of data. *Fulfilling this role in Rio:* Instituto Pereira Passos (IPP), which is responsible for Rio's urban planning. Among its many duties, IPP is the data center of the city, focusing on production of map information, geography, and statistics.

### Variable, Intervention-linked Assignments

**Multi-Sector Municipal Working Group (MWG):** The MWG is a working group consisting of members from across the municipality with multiple areas of relevant expertise. It acts as an advisory committee to the CME. The MWG gives opinions based on sector expertise, knowledge of existing municipal activities and institutional arrangements, and an understanding of the specific situation on the ground in the city. The composition and attendance of the MWG may vary

from intervention to intervention, but it will always be coordinated by the CME.

**Technical Advisory Entity (TAE):** The TAE is an entity or consultant with technical expertise in the quantification of emission reductions. It provides the necessary technical input to help move an intervention forward through the Program Process.

**Validation and Verification Entity (VVE):** The VVE is an ISO-accredited environmental auditor. It validates and verifies the emission reductions generated by interventions under the Program. The VVE must operate externally and independently of the CME. While an entity may have sufficient expertise to act as both a TAE and a VVE, for any given intervention the TAE and the VVE must not be the same entity to insure integrity in the audit process and avoid conflict of interest.

## Program Planning and Evaluation

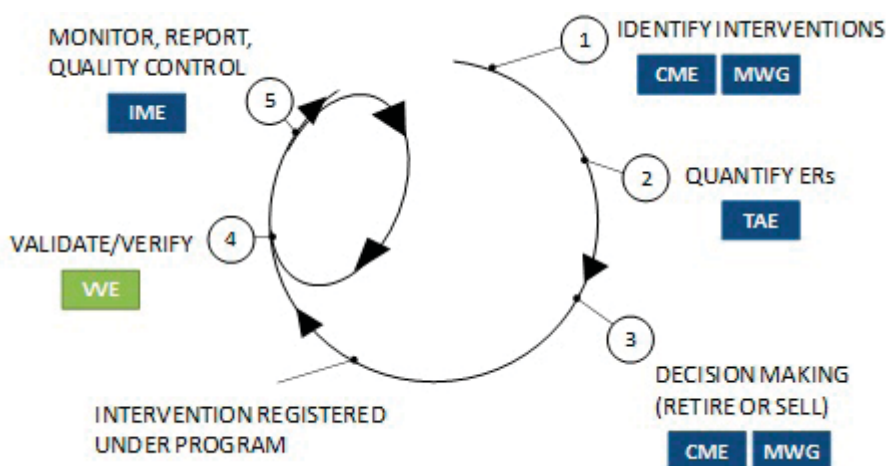
The CME coordinates Program Planning and Evaluation. Program Planning helps to define the Program's objectives, targets, and an implementation strategy. Program Evaluation involves reflecting on the progress towards the objectives and targets, as well as the overall Program Roles and Process, to ensure that the Program continues to meet the needs of the city. As the CME, the Mayor's Office on Rio coordinates the Program's implementation strategy. Implementation will take place intensively over the next two to four years, and a longer term operational period is expected (e.g., 20 years). Program Evaluation of the Rio Program will initially occur every year during the intensive implementation period.

## Program Process

Every intervention must follow the 5-step Program Process (see Figure 2). The Program Process prescribes the procedures and criteria against which interventions

**Figure 2. The Program Process has five distinct steps:**

1. identify interventions
2. quantify emission reductions (ERs)
3. decision-making (retire or sell)
4. validate/verify
5. monitor, report and quality control



are assessed to be registered in the Program, as well as the process of monitoring, reporting, and verifying the emission reductions generated by interventions. The Program Process has five general steps:

1. **Identify interventions:** The CME works with the MWG to identify interventions. An intervention must meet the intervention eligibility criteria to be included in the Program (see Box 3).
2. **Quantify Emission Reductions:** An estimate of the quantity of emission reductions that the intervention will produce is conducted by the TAE. The TAE determines the most appropriate methodology to use for calculations. Any existing carbon finance methodology approved for use by an ISO-14064 compatible carbon standard (such as the Verified Carbon Standard, or the Clean Development Mechanism) may be used. Should a methodology not exist under any carbon standard for the intervention, a new methodology may be suggested that fulfills the methodology assessment criteria (see Box 4).

### Box 3. Intervention Eligibility Criteria

To be eligible for inclusion in the Low Carbon City Development Program, each intervention must be:

1. Within the Program's intervention inclusion parameters that are based on existing conditions in the city (for example: in Rio, the intervention inclusion parameters require financial commitment to the intervention on or after January 1, 2007. This is the year the IPCC Fourth Assessment Report on Climate Change was published [IPCC 2007], which catalyzed the first climate change research studies conducted by city secretariats with local researchers);
2. Transparent about whether the intervention is registered or seeking registration with the CDM, VCS, Gold Standard, or any other program/standard for verifying GHG emission reductions;
3. Located within the city's geographical boundaries;
4. Under the ownership and/or control, even if partially, of the municipality through either direct implementation or agreement;
5. In a sector governed and/or influenced by municipal decisions;
6. Implemented without a legal mandate from higher levels of government, such as state- or federal-level governments (as with criteria #4 and #5, this ensures that the municipality is driving the implementation of the intervention);
7. Resulting in emission reductions, of any quantity, that are beyond what would occur in a baseline scenario; and
8. In compliance with environmental and legal requirements of the city, state and national governments.

### Box 4. Methodology Assessment Criteria

To be approved for use by the Program, new methodologies must have undergone an assessment and received a recommendation by both the MWG and a VVE. The scope of assessment of a new methodology is based on the following set of principles and elements:

- Principle of integrity and avoidance of politically and ethically contentious issues
- Applicability of methodology for the specific intervention type
- Appropriate definition of the intervention's physical boundary
- Procedure for determining the baseline scenario
- Method for calculating the baseline emissions and intervention emissions
- Adequacy of the monitoring methodology, data and parameters
- Relationship to methodologies already in use by interventions under the program

3. **Decision-making (retire or sell):** The CME works with the MWG to make a decision about whether to retire the intervention's emission reductions towards the city's target (in accordance with its climate change law) or to sell them to an outside buyer to generate revenue from climate finance. Each unit of emission reduction must have only one final destination to prevent double-counting.
4. **Validate/verify:** The intervention and its emission reductions must undergo validation to ensure quality and integrity. The VVE conducts the assessment, validating the intervention's compliance with the intervention eligibility criteria and the methodology used for calculations. The assessment verifies that the intervention is on track to produce emission reductions as planned. If the intervention seeks to generate carbon assets such as Certified Emission Reductions or Verified Carbon Units<sup>3</sup>, it must also fulfill all the criteria imposed by the relevant regulatory body.
5. **Monitor, report, and exercise quality control:** Every intervention and its emission reductions must be monitored over the lifetime of the Program. Monitoring, reporting, and quality control, as well as all the data collection, analysis, and storage, is conducted for each intervention, then bundled and managed by the IME through the Program's monitoring, reporting, and verification (MRV) system. Different municipal departments feed data about interventions and baselines into the MRV system, which performs the analysis for calculation of emission reductions. The CME and VVE can access the MRV system to track the implementation of inter-

ventions and monitor/verify emission reductions produced by the interventions.

## Looking Forward: Demonstration Projects

An intervention under the Low Carbon City Development Program may be any activity that reduces emissions, including projects as well as municipal policies, from any urban sector<sup>4</sup>. In this sense, the Program has the potential to **expand horizontally over time** to include a wide range of municipal activities—institutionalizing a ‘carbon lens’ through which ultimately all municipal activities may be viewed. The first projects that embark on the Program Process will allow the city to demonstrate how the Program works in practice.

The City of Rio has selected two demonstration projects in sectors of great significance to Rio: urban forestry and non-motorized urban transport (bicycling). In urban forestry, the Program will quantify the carbon sequestered by Rio’s comprehensive reforestation and urban forest maintenance program, as well as bring awareness to the many co-benefits of Rio’s urban forest ecosystems. In non-motorized urban transport, the Program will develop a new methodology to quantify the carbon savings of Rio’s investments in bicycling infrastructure. These two demonstration projects are only the beginning and will lead the way for Rio to plan, implement, monitor, and account for low carbon investments and climate change mitigation actions across all sectors in the city for many years to come.

## End Notes

<sup>1</sup> The inventory methodology, developed by COPPE, was an adapted version of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006). Subsequent iterations of the inventory will follow the Global Protocol for Community-Scale Greenhouse Gas Emissions (C40/ICLEI/WRI 2012).

<sup>2</sup> The low-carbon environmental goods and services industry is described as “a flexible construct or ‘umbrella’ term for capturing a range of activities spread across many existing sectors such as

transport, construction, energy etc. but with a common purpose - to reduce environmental impact” (BIS 2012).

<sup>3</sup> Certified Emission Reductions (CERs) are a type of emission reduction unit (or carbon credit) issued by the Clean Development Mechanism (CDM) Executive Board for emission reductions achieved by CDM projects and verified by an independent entity (the so-called Designated Operational Entity, or DOE) as required under the rules of the Kyoto Protocol. Verified Carbon Units (VCUs) are issued by the Verified Carbon Standard (VCS). The VCS, formerly called the Voluntary Carbon Standard, is a standard of the voluntary carbon offset industry.

<sup>4</sup> An intervention must satisfy the eligibility criteria outlined in Box 3. Examples of interventions include activities such as bus rapid transit projects, energy efficiency retrofits in buildings, LED street lighting, green procurement policies, recycling policies, etc.

## References

- C40, ICLEI, and World Resources Institute. 2012. *Global Protocol for Community-Scale Greenhouse Gas Emissions*. Available: <http://live.c40cities.org/community-protocol/> (accessed 08/23/2012).
- Carbon Disclosure Project. 2012. *Measurement for Management: Cities 2012 Global Report*. Available: <https://www.cdproject.net/CDPResults/CDP-Cities-2012-Global-Report.pdf> (accessed 08/23/2012).
- COPPE and Rio Prefeitura. 2011. *Greenhouse Gas Inventory and Emissions Scenario of Rio de Janeiro, Brazil: Technical Summary*. Available: <http://www.rio.rj.gov.br/web/smac/exibeconteudo?articleid=2351770> (accessed 08/23/2012).
- Intergovernmental Panel on Climate Change (IPCC). 2007. *Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Available: [http://www.ipcc.ch/publications\\_and\\_data/publications\\_and\\_data\\_reports.shtml](http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml) (accessed 08/23/2012).
- Intergovernmental Panel on Climate Change (IPCC). 2006. *IPCC Guidelines for National Greenhouse Gas Inventories*. Available: [www.ipcc-nggip.iges.or.jp/public/2006gl/index.html](http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html) (accessed 08/23/2012).
- Rio Prefeitura. 2009. *Plano Estratégico da Cidade do Rio de Janeiro - Pós Rio2016 [Strategic Plan of the City of Rio de Janeiro - Post Rio2016]*. Available: <http://www.rio.rj.gov.br/planoestrategico/> (accessed 08/23/2012).
- United Kingdom Department for Business, Innovation, and Skills (BIS). 2012. *Low Carbon Environmental Goods and Services: Report for 2010/11*. Available: <http://www.bis.gov.uk/policies/business-sectors/green-economy/market-intelligence/market-data> (accessed 08/23/2012).
- World Bank. 2010. *A City-wide Approach to Carbon Finance*. Available: [http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/A\\_city-wide\\_approach\\_to\\_carbon\\_finance.pdf](http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/A_city-wide_approach_to_carbon_finance.pdf) (accessed 08/23/2012).
- World Bank and Det Norske Veritas (DNV). Forthcoming. *The Low Carbon City Development Program Protocol*. Publication forthcoming.
- World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD). 2005. *The Greenhouse Gas Protocol for Project Accounting*. Available: <http://www.ghgprotocol.org/standards/project-protocol> (accessed 08/23/2012).

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