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Green City Development in Brazil: Financial and Technical Solutions for Sustainable Cities

Caixa Econômica Federal
World Bank, Latin America and Caribbean Region, Urban and Water Unit

Green City Development in Brazil: Financial and Technical Solutions for Sustainable Cities

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CAIXA

ESMAP
The Energy Sector Management Assistance Program

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Abbreviations and Acronyms

BNDES	National Bank for Economic and Social Development
BRT	Bus Rapid Transit
CDM	Clean Development Mechanism
CER	Certificate of Emissions Reduction
CETESB	Environmental Company of the State of Sao Paulo
COP	Conference of the Parties to the Convention, United Nations Framework Convention on Climate Change
CPF	Carbon Partnership Facility
ESCO	Energy Service Company
ESMAP	Energy Sector Management Assistance Program
ESPC	Energy Saving Performance Contracting
FGTS	Severance Pay Indemnity Fund
GEF	Global Environment Facility
GESAN	National Manager of Financial Products for Sanitation and Infrastructure, Caixa
GHG	Greenhouse Gases
ICLEI	International Council for Local Environmental Initiatives
INPE	National Research Institute
IPTU	Property taxes
LCSUW	Latin America and Caribbean Region, Urban and Water Unit, World Bank
LEED	Leadership in Energy and Environmental Design – building rating system
MCMV	Minha Casa, Minha Vida – national housing program
PAC	Growth Acceleration Program
PLANSAB	National Basic Sanitation Plan
PNLT	National Logistics and Transportation Plan
PoA	Program of Activities
PPA	Permanent Protection Area
PROCONVE	Program for Control of Air Pollution from Mobile Sources
SUSAN	National Superintendence for Sanitation and Infrastructure, Caixa

INTRODUCTION

The World Bank, in cooperation with the National Superintendence for Environmental Sanitation and Infrastructure of Caixa Economica Federal, organized the seminar "Financial and Technical Solutions for Sustainable Cities" in Brasília from June 8-9, 2010. The seminar agenda is included in Annex 1.

The purpose of the seminar was to bring together technical experts from the World Bank, Caixa Economica Federal, Brazilian government officials from the federal, state and municipal levels, as well as representatives from non-governmental organizations and research institutes to share knowledge and experiences about climate change and the challenges and opportunities facing Brazilian cities. Representatives were present from the municipalities of Cuiabá, Curitiba, Distrito Federal, Espírito Santo, Fortaleza, Manaus, Osasco, Rio de Janeiro, São Paul, as well Local Governments for Sustainability (ICLEI), the Euro-Brazilian Council for Sustainability, and the Green Building Council of Brazil. A full list of participants is included in Annex 2.

The main topics of the seminar included:

(i) The current situation of mitigation and adaptation activities of Brazilian cities;
(ii) Tools for preparing GHG emission inventories and vulnerability studies;
(iii) Global programs and experiences; and
(iv) Financing tools for municipalities in Brazil.

In final roundtable, diverse working groups were formed to discuss four broad questions:

- "What has your city done in regard to mitigation or adaptation to climate change?"
- "What opportunities do you see for your city?"
- "What are the main climate change challenges facing your city?"
- "What tools does your city need to address climate change?"

This report provides a summary of the presentations, main issues debated, and recommendations for actions towards mitigating GHG emissions from Brazilian cities and preparing Brazilian cities for the impacts of climate change.

PRESENTATIONS

This section presents a brief summary of each presentation made during the 2-day Seminar and their respective questions and answers. Links to the presentations are provided in Annex 3.

Part A. Overview of Cities and Climate Change in Brazil

Moderator: Adailton Ferreira Trinidade, National Manager of Financial Products for Sanitation and Infrastructure, Caixa

Sustainable Cities in Brazil

Sérgio Gonçalves, Director of the Urban Environment Department, Ministry of Environment

The presentation provided the Ministry of Environment's vision of the environmental challenges faced by cities in Brazil and some examples of programs currently being implemented. The presentation began with the question, "What is a sustainable city?" and argued that there are various views and perspectives on sustainability and that there is no single model or models, but major challenges for megacities. An historical retrospective of international (e.g. Club of Rome, UNCED, Habitat, Kyoto) and national (e.g. Statute of Cities and Agenda 21) urban and environment milestones from recent decades were discussed. The speaker highlighted some ongoing government programs such as the Environmental Agenda for Public Administration, the National Climate Change Program, PROCONVE, PLANSAB, Minha Casa Minha Vida (MCMV) and others of relevance to the sustainability of cities. The presentation concluded by underscoring the importance of the social dimension to addressing urban sustainability issues and strengthening dialogue among stakeholders in the formulation of public policies, in this as in other areas. Finally, the speaker highlighted the need for every city to prepare and implement its master plan, which should be a strategic, participatory, multi-sectoral and flexible tool.

Cities and Climate Change in Brazil: Initial Findings

Catherine Lynch, Urban Economist, World Bank

The purpose of the presentation was to share the preliminary findings of a World Bank study about cities and climate change in Brazil. It is primarily a desk review of available reports and news releases, and the next phase would be to collect input directly from municipalities. The study found that the dominance of GHG emissions from deforestation in Brazil masks the fact that emissions from other sectors, like energy, transport and waste, are growing quite rapidly in Brazilian cities. Moreover, as the economies in the Brazilian cities continue to grow, the trend towards higher emissions will persist. Urban form is a critical determining factor for the amount of transport emissions, and metropolitan areas in Brazil are growing in a sprawling manner. The study also analyzes the impacts that will be felt by Brazilian cities as a result of global warming, noting that floods, landslides, increased temperature, drought, and rising sea levels will be felt differently across the different regions of the country, but with likely major impact on the poorest populations. The work that local governments in Brazil have done to deal with the challenges posed by climate change was recognized, especially where local governments have established committees, made (or are doing) emission inventories and vulnerability assessments, set reduction targets, and are preparing action plans. The speaker presented some examples of international experiences in formulating local action plans for mitigation and adaptation to climate change, both as stand-alone policy documents and as part of integrated urban development plans.

Performance of Caixa in Environmental Sanitation, Infrastructure and Carbon Market

Rogério de Paula Tavares, National Director of Sanitation and Infrastructure (SUSAN), Caixa

The presentation opened with a brief overview of Caixa's investments in infrastructure within the context of Brazil's economic landscape during the last 30 years. The speaker pointed out several factors limiting the sustainability of cities - the "blackout" of urban planning that followed the period of economic stagnation, the subsequent budget restrictions and rigidity, the legal/regulatory limitations and judicial uncertainty that restrict opportunities for private participation in infrastructure. Or put another way, without economic growth there are no resources to invest in sustainability projects and infrastructure; it is macroeconomic stability that allows greater investments in infrastructure. The Growth Acceleration Program (PAC) 1 and 2 is a recent planning and infrastructure investment initiative that was launched after two decades of stagnation. The speaker presented Caixa's funding mechanisms and priority areas. All investments in the area of basic sanitation are eligible for Caixa financing. The capital for sanitation financing comes from the Severance Pay Indemnity Fund (FGTS), but other sources of capital are being sought to avoid the excessive dependence on FGTS. In addition to sanitation, Caixa has lines of financing for housing and urban upgrading; transportation, logistics and energy; industrial sanitation (e.g. water reuse, wastewater treatment, waste treatment) and environment (e.g. CDM projects, watershed protection and restoration, forestation and reforestation). The presenter stressed that Caixa's vision is that to finance sustainable urbanization is to finance actions that go beyond the boundaries of cities, so that the system of cities can function. Caixa has sought to expand their participation in various segments of infrastructure finance, seeking sustainable solutions to encourage private participation.

Questions and Answers

Three questions were posed to the presenters: (i) A representative from Fortaleza questioned the lack of mandatory requirements for sustainability in the MCMV program. It was explained that the program's goal is to reduce the housing deficit among the low-income population and the imposition of environmental requirements would make housing more expensive, undermining the goal of the program. In the first phase of the program, the use of solar water heaters is optional, but promoted through addition subsidy to developers. In phase 2 of the program, the use of solar equipment will become mandatory. Some concerns to be taken into account are the efficiency, quality and durability of equipment, training of contractors for the correct installation, and orientation of residents regarding equipment use. (ii) A representative from the Euro-Brazilian Sustainability Council requested clarification regarding wind energy and the criteria used for measuring deforestation in the World Bank study. It was indicated that the greatest potential for wind energy in Brazil is the state of Santa Catarina. The World Bank study was based on comparative data from the World Resources Institute, and therefore there may be small differences in relation to data from the Brazilian government. (iii) A representative from ICLEI asked about the status of the preparation of manuals on municipal plans on climate change by the Ministry of Environment and the availability of financial resources. The representative from the Ministry of the Environment offered to get in touch later to provide information about the status of the manuals. The World Bank and Caixa indicated that they have partnered to offer financial and technical support to municipalities, noting that there is already a line of credit for the solid waste sector (e.g. landfills, transfer stations) with emphasis on integrated actions (local consortia) and that a Caixa program was recently created through which projects to capture greenhouse gases emitted by landfills could be implemented, generating carbon credits through the Clean Development Mechanism (see summary of Part C).

Part B. Impact of Climate Change and City Actions

Moderator: Ming Zhang, Lead Urban Economist, World Bank

Brazilian Megacities: Vulnerabilities and Adaptation for Climate Change

Jose Marengo, National Research Institute (INPE)

The presentation provided the summary of a report that is soon to be released on the vulnerabilities of the City of Sao Paulo in regard to climate change. Some of the most obvious signs of global warming will be

more intense and frequent rain storms, a decrease in the number of cold days, and an increase in nighttime temperatures. The presenter stressed that the problems the city may suffer or incur as a result of global warming worsen as a result of human action and, in particular, he highlighted the chaotic urbanization that characterized Sao Paulo's expansion. The formation of heat islands, flooding and landslides due to the increase in paved surfaces and occupation of areas of risk has been observed. The risk of flooding between 2001-2030 remains approximately equal (around 25% of the urban area), however, the area of risk increases as the urban area is expected to expand during the period. The area at risk of landslides also increases greatly during the period. It is necessary to take into account not only the impact of climate change on infrastructure projects, but also their contribution to urban vulnerability, and it may eventually be concluded that some infrastructure works should be avoided. The challenges of climate change must be addressed together, with the participation of government, nongovernmental organizations, and international agencies. All infrastructure projects must address economic, ecological and social issues.

City Actions for Climate Change in Brazil

City of São Paulo
Alejandra Maria Devecchi, Municipal Secretariat of Environment

The presentation focused on two strategic issues: (i) addressing the urban footprint, and (ii) maintenance of areas that provide environmental benefits. Regarding the first theme, the presenter highlighted that 70% of emissions of greenhouse gases from São Paulo are a result of burning gasoline and diesel, making the issue of sprawl essential to the achievement of the emissions targets established by the City. Sao Paulo has great challenges arising from the paradoxes that surround its structure. There are underutilized properties in the area of the city where jobs are concentrated, with about 400,000 vacant housing units in the central area despite a citywide housing deficit of 200,000 units. Moreover, the vertical shape of the city is not associated with a high population density in the central area, resulting in a city where the densities are similar in high-rise and single-family housing residential areas. This leads to the need for large daily moves within the city, congestion of roads and consequent contribution to carbon emissions. The solution proposed by the city government is densification through the adoption of minimum population densities (300 inhabitants/ha) to enable the sustainable provision of urban services. The intensified use of the central area will be promoted through the rehabilitation of building and infill development. In regard to the second issue, the presenter highlighted the importance of protecting areas that provide environmental benefits. Because of real estate speculation driving up land prices, the government does not have sufficient resources to discourage landowners from developing areas that are essential to the maintenance of air and water quality standards. The solution was the expropriation of land. The government has identified massive areas of green space, declared them for public use and expropriated them. Ten percent of the municipality is in the process of expropriation, and the municipal government is preparing management plans for these areas. Finally, the speaker noted that in 2009, City of São Paulo's Climate Change Law was adopted, creating a legal framework for government measures and setting a target of 30% reduction in emissions. The projects aimed at reducing landfill emissions accounts for two thirds of the desired reduction.

Municipality of Rio de Janeiro
Nelson Moreira Franco, Secretariat of Environment

The speaker began by pointing out that, although the city is passing through a good period (e.g. resumption of economic growth, the location of several major international events in the coming years), it also faces major challenges such as controlling the expansion of slums, which among other factors threatens 32% of the municipal territory consisting of forest preservation areas. The initiative Sustainable Rio, launched in 2009, focuses on promoting the use of renewable energy and clean technologies for

reducing greenhouse gas emissions and sets reduction targets of 8%, 16% and 20% in years 2012, 2016 and 2020 with respect 2005 levels. An emissions inventory was prepared, and shows that most emissions come from transport and solid waste. The initiative includes several new projects, consolidates the old, and concentrates mainly on those two sectors, in addition to projects related to green areas. The presenter highlighted the Rio Bicycle Capital and Rio Green Capital programs, and several projects regarding the management of solid waste. The city is in the process of preparing a study of its vulnerability to climate change. In terms of vulnerabilities, the speaker highlighted that city's lack of a process to mobilize quickly and effectively to cope with crises, and a training program for staff of the Civil Defense is in progress.

Municipality of Curitiba
Alfredo Vicente Trindade, Technical Coordinator for Flora and Fauna, Vice-president of Curitiba's Climate Change Council

The presentation summarized the structure and status of preparation of Curitiba's Municipal Plan for Mitigation and Adaptation to Climate Change. The Plan is being developed in four phases: (i) completion of an inventory of carbon sinks, (ii) completion of an emissions inventory, (iii) preparation of a vulnerability study, and (iv) the proposal of a climate change law. The first phase was completed through a partnership between the municipal government and a local nongovernmental organization. Currently, the municipal government is preparing the emissions inventory. One of the initial findings of this exercise was that the stock of carbon sinks (forested areas that cover 18% of the city territory) correspond to about 2.5 years of emissions from the fleet of vehicles circulating in the city today. For the vulnerability study, Curitiba is using the methodology used by New York City as a reference. Preparation of the action plan/law will begin in 2012. The city government hopes to complete the studies so that, along with the citizens of Curitiba, that can met reduction goals and implement planned projects.

Questions and Answers

Three questions were posed to the speakers: (i) A representative from Espirito Santo asked what alternatives there are to increase urban density without removing the drainage capacity and permeability of the soil? The causes of impermeability vary from city to city, but some alternatives would be the containment of the paved area, the reduction, collections and compaction of garbage (which often clogs storm sewers), the modernization and expansion of sewers and/or stormwater drainage (in many cases built to handle the level of rainfall in the decades of the 40s to 70s), and protection of forested areas. Moreover, it is possible to increase density without increasing the impermeability by developing in areas that are abandoned or underutilized, through the rehabilitation of existing buildings and encouraging housing in central areas. (ii) A representative from Fortaleza asked about the ability of the government to promote more recycling of solid waste, including in MCMV projects? (iii) A representative from Osasco asked for details about how the emissions inventory in Sao Paulo was prepared? The inventory was prepared by COPPE/UFRJ, based on data from 2003.

Part C. Access to Carbon Finance

Moderator: Teresa Serra, Consultant, World Bank

Clean Development Mechanism (CDM): How does it work and how can cities access it?
Eduardo Ferreira, Consultant, World Bank

The objective of the presentation was to provide an overview of how the carbon market works, describe its various funds and funders, and explain how cities can access these resources. First, the speaker provided a brief overview of international agreements that guide the carbon market, the basic principles of the Clean Development Mechanism (CDM) established under the Kyoto Protocol, and financing tools

created to promote the implementation of projects to reduce emissions carbon (e.g. Global Environment Facility, Climate Investment Fund, Carbon Finance). Then, the speaker presented a summary of policies and instruments that can be used by countries to promote the mitigation of emissions (e.g. "cap & trade, carbon tax, emissions regulations, subsidies for the use of clean technologies, and research and development) as well as their pros and cons. Next, an explanation of how credits are generated, brought to the market, and accessed through various funds was provided. Finally, the speaker reiterated the need for clear long term policies to send positive signals to the market to take advantage of the 10 years of market experience and create new and better tools to facilitate the transition to low carbon economies. Intermediate instruments are needed until agreements for the replacement of the Kyoto Protocol are reached, as well as approaches on a larger scale (e.g. citywide) for reaching the goals of stabilizing emissions identified by the IPCC studies.

Caixa's Financing Tools for Sustainable Cities – the CPF Program

Adailton Ferreira Trinidade, National Manager of Financial Products for Sanitation and Infrastructure, Caixa

The objective of the presentation was to explain the financial mechanisms available in the carbon market through the Caixa Economica Federal. During COP-15 in December 2009, Caixa formed a partnership with the World Bank, the Carbon Partnership Facility, a program that will serve as an intermediary between producers and buyers of carbon credits in the Post-Kyoto (2012) period. Caixa facilitates the raising of funds from the CDM by local public or private entities, providing technical and financial support to projects that can qualify to receive carbon credit. As Caixa has a national presence and works in partnership with various levels of government and private entities, it can negotiate in blocks and use the framework of Programs of Activities, thereby reducing transaction costs, gaining scale and increasing returns. Caixa aims to support sustainability projects and emissions reductions in several areas, but currently its main focus is solid waste management in landfills associated with CDM. Few landfills currently capture methane due to a lack of guidance and technical training and difficulty of making such projects economically viable in the absence of a consortium between municipalities. For now, there is little demand for structuring and financing these projects, but Caixa thinks the market will expand once it establishes itself as qualified intermediary.

Questions and Answers

Four questions were posed to the presenters: (i) What is the difference between Carbon Finance and the Carbon Partnership Facility (CPF)? Carbon Finance refers to the set of programs and funding lines to support the reduction of emissions and the transition to low carbon economies. The CPF is a fund that has donations from European countries and works with the voluntary market because of the current stagnation in post-Kyoto planning. There is a direct interaction between buyer and seller through the CPF. The Carbon Finance Unit is the unit that manages these programs within the World Bank. (ii) How will the system of reduction targets work in the absence of a post-Kyoto agreement? It is believed that there will be a post-Kyoto agreement. Regardless, however, carbon markets should remain active because there is demand arising from the commitments already entered into, for example by European countries. The CPF will not interfere with the establishment of a post-Kyoto regime, but once established will follow its rules. (iii) Is there a Caixa funding line for projects focused on the management of construction waste and demolition of buildings? Caixa is financing such projects and currently has a project in the Midwest region. However, this project is not associated with CDM due to lack of an internationally adopted methodology. (iv) What other areas besides solid waste will the the CPF fund? So far, in Brazil, the CPF has only approved solid waste programs. Wind power projects are also contemplated, and nothing prevents there being more types of projects.

Part D. Energy Efficiency and Housing Sustainable

Moderator: Catherine Lynch, Urban Economist, World Bank

Public Procurement of Energy Efficiency Services

Jas Singh, Senior Energy Specialist, Energy Sector Management Assistance Program

The aim of the presentation was to present the advantages and difficulties in procurement of energy efficiency services and how to design an efficiency service project through public-private partnerships. The public sector is important for the implementation of efficiency measures, because, though small, it is homogeneous and, therefore, projects can be bundled and implemented at scale. Cities are natural platforms for multi-sector projects. The difficulty are the budgeting and procurement barriers that the public sector has, since they often operate under short-term budgets and have difficulties with projects and procurement that maximizes the benefits to the public agencies (rather than least-cost procurement). The procurement of energy saving (using energy savings performance contracts or ESPC) can be multisectoral and promote public-private partnership (using energy service companies - ESCOs). Based on the experience from other countries around the world, it is not necessary to change laws, only adjust procurement methods. As experience is gained, small projects can be bundled and grow in scale while facilitating financing. The idea is to analyze country-specific challenges, looking for custom solutions based in part on international experiences. There are a variety of solutions that countries can use or can create its own solutions, mixing and matching. Brazil has particular difficulties, but that can be overcome as shown by ESPC projects that have already been implemented.

Housing and Climate Change

Carlos Martin, Sustainable Construction Consultant, World Bank

The presentation provided an overview of measures that can be used to make buildings more sustainable, both in the case of new buildings and existing ones, with special focus on the housing sector. A relevant portion of carbon emissions comes from residential buildings. However, few projects to reduce carbon emissions deal with the construction of dwellings. Besides the consumption of energy embedded in materials and spent in the actual building process (indirect) and that associated with the use of buildings by the residents (direct), the civil construction sector, and specifically the localization of housing developments, has a great influence on the generation of emissions associated with transport within urban areas. Besides climate change, other issues of relevance are air pollution, construction waste, the water supply and sewerage, landscape etc. that have an impact on the environment, health and family budgets. Sustainability needs to be considered during development/construction planning, citing, incorporating technological solutions already common and affordable in the market, such as efficient lighting, solar heating, collecting and reusing rainwater, selective collection and recycling, in addition to "passive" solutions in architectural design that take into account a proper solar orientation and ventilation. Sustainable low-income housing is a challenge because of limitations to the initial cost of sustainable technologies, but emissions reductions can be attained through architectural design solutions without significantly burdening the cost of the units. Other challenges include the training of builders and orientation of the end-users. The speaker concluded by highlight the risk of the false “greening” of projects without a base in real environmental benefits.

Questions and Answers

Three questions were posed to the presenters: (i) In regard to the use of high efficiency public lighting: LED lamps have a payback of 10-15 years and, thus, have not been financed by the Bank to date. Traffic lights and interior lighting are cost-effective for LED applications, so these are eligible for funding. (ii) In

regard to the incorporation of sustainability criteria in the infrastructure works planned for international events in the coming years in Brazil (World Cup, Olympics, Rio +20) and availability of funding from the World Bank: The emphasis of the World Bank program is to combat poverty. However, the Bank believes that the upcoming events are a great opportunity for cities to redefine their image by investing in infrastructure, housing, etc. as long as they are thought of in terms of generating medium and long term benefits for their populations. The Bank has projects in several cities where the events will happen but it is worth noting that, although they must contribute to the events, they are not targeted specifically for them. The main funders of the infrastructure works are Caixa and the National Economic and Social Development Bank (BNDES), in partnership with the federal government. (iii) In regard to the incorporation of neighborhood condition in the criteria for assessing low income housing sustainability: There are several ways to make cities and buildings more efficient and economical. The technology that promotes sustainability is universal, but there are still issues of cost and dissemination especially in developing countries. The sustainability issue associated with neighborhood characteristics is complex. It depends largely on the existing zoning, which is a local policy decision, not the developer or builder's decision. The LEED building rating system adopted in the U.S. takes into account amenities and services incorporated into residential developments, but fails to capture aspects of sustainability relating to the location of the building in the urban context. It is easier to define criteria for sustainable buildings and materials than for dimensions related to urban planning.

Part E. GHG Emissions Inventories and Low-Carbon Economies

Moderator: Ming Zhang, Lead Urban Economist, World Bank

The Citywide Approach to Carbon Finance

Monali Ranade, Carbon Finance Specialist, World Bank

A new approach for accessing carbon credit for initiatives to reduce emissions through integrated projects in urban areas was presented. The speaker noted that the implementation of carbon finance projects supported by the CDM is evolving rapidly and summarized the three methods already adopted: in addition to projects focused on specific investments (e.g. Transmilenio or BRT in Bogota), which is the most common, there are projects through consortiums of cities (e.g. water pricing in India), and sectoral projects via financial intermediaries (e.g. Caixa's program for solid waste management with methane capture). A major challenge of these projects is the calculation and verification of proposed emissions reductions, which may be made by specific activity (the most common), by geographic area, or by industry. In the case of the citywide approach that is being proposed, a package of interventions that could be implemented in different sectors would be prepared. A coordinating body is appointed to ensure the compatibility of the proposed actions and to help the different sectors to implement the program efficiently. As in other approaches, it is necessary to have an inventory of emissions, which serves as a reference for monitoring the program and results achieved in reducing carbon emissions through specific projects. The proposed approach allows great flexibility in the range of projects that could be implemented, provided that an integrated program is established. It is worth noting that this approach is not yet approved by the international manager of CDM, but is being presented in June 2010.

GHG Emission from Transport and the Path for Low Carbon Growth in Brazilian Cities

Fuad Jorge Alves José, LOGIT

The objective of the presentation was to summarize the results of a study commissioned by the World Bank on GHG emissions in the transport sector in Brazil and its impact on the prospects of the country's transition to a low carbon economy. The presentation began with a summary of the contribution of the transport sector to Brazil's total emissions and the specific contribution of different modes of transport,

highlighting the contribution of light and heavy vehicles (responsible, for example, for 70% of greenhouse gases in São Paulo). This situation is expected to worsen in coming decades due to the increasing rate of motorization and the increasing the number of trips made. The scenarios recommended by the National Energy Plan in 2030 were taken as the basis for World Bank study. The study highlights the difficulty of diversifying modal options in Brazil due to the lack of demand for certain modes. For example, the subway takes bus passengers but is less effective in reducing the use of cars. The study projects that emissions from the transport sector will increase 70% by 2030, with half of that increase coming from urban areas. The speaker also highlighted that it is useless to make investments in mass transport infrastructure alone. It is also necessary to manage demand, restricting car use in major cities, encouraging the use of public transport and modal integration, creating bike lanes and facilitating the movement of pedestrians, and integrating transportation planning with sustainable urban land use. In addition, the adoption of small and flexfuel or electric vehicles should be promoted given that the biggest challenge remains the use of individual cars.

GHG Emission from Solid Waste and the Path for Low Carbon Growth in Brazilian Cities

João Wagner Silva Alves, Advisor, Department of President, CETESB

The objective of the presentation was to describe a model created by CETESB to support a World Bank study on carbon emissions in the solid waste sector. This is a simple tool that makes an estimate of GHG emissions (especially CO2 and N2O) based on patterns of behavior, producing graphs that facilitate the assessment of impacts of different policies and/or projects on emissions from waste solids in an urban area. The model takes into account the volume of waste produced, its composition, and different management alternatives that may be applied (e.g. recycling, incineration, landfill methane capture), and calculates its influence on the levels of carbon emissions. The model thus facilitates the inclusion of GHG emissions in discussions about solid waste management and, more specifically, an analysis of the capture of methane for power generation and its technical limits. This tool is being used to evaluate management programs in several metropolitan areas in Brazil, including Belo Horizonte, Rio de Janeiro, Sao Paulo, and Curitiba.

Questions and Answers

The following questions were posed to the presenters: (i) Regarding the reduction in construction costs of buildings through reuse of waste and whether there is some kind of market logic that prevents it: There is currently not a methodology accepted by the CDM that deals with construction waste, but there is demand for it be developed. There is a methodology for the embodied energy in construction materials, but not for the building itself. (ii) Is the preparation and processing of the project smaller in the Program of Activities (PoA) approach? The new approach, once adopted should be tested. It is assumed that the time of preparation and processing of projects will be similar to today; the benefits will accrue from the fact that it is a comprehensive program of integrated actions, which if processed one-by-one would require much more time and cost. (iii) Could the integration of micro and small enterprises in CDM programs be made through consortia or associations, thereby overcoming the difficulties of scale and dispersion? The World Bank has made efforts regarding small businesses, but problems remain (high costs because of their size, difficulty of access and check the accounts of such companies). You can overcome these difficulties through a coordinating agent that groups small businesses and gives scale to the process. The Caixa is positioned as coordinating agent. (iv) Are there examples of projects that have accessed credits in the transport sector? In theory, transportation projects can be of three types: modal exchange, exchange of fuels, and energy efficiency. There is a certification process for a project to establish public transportation in Colombia (the only one in the world), but there is a great technical difficulty in measuring emissions from the transport sector. In theory, again, it is possible to calculate the emission savings from switching fuels or making a comparison of urban energy use, but in practice this has proven quite difficult. (v) In

regard to waste incineration: You must consider the environmental and economic costs in the analysis of incineration versus landfill. The arguments in favor of incineration include compactness (there is a shortage of land and restrictions from neighborhoods on the creation of landfills), and the establishment of biogas for use as energy by the city, allowing the city to make a decision about what to burn to have a better energy and environmental balance. The arguments against are that the plastic must be removed, which is costly, and the fact that incineration results in the emission of many harmful gases. (vi) Regarding carbon inventories and the exclusion of carbon embedded in exported products: There are two ways to calculate emissions – either where the product is consumed (which prevents double counting), or only where it is produced (which may lead of double counting if ends up also being counted at the point of consumption).

ROUNDTABLE DISCUSSION

During the roundtable discussion session, four questions were posed to participants to discuss in small groups. Each discussion group was composed of 4 to 9 participants of city representatives as well as representatives from non-governmental organizations, Caixa, and the World Bank. The summary below outlines some of the key responses and themes discussed during this session.

Question: What has your city done in regard to mitigation or adaptation to climate change?

Responses:

The city representatives listed a variety of initiatives underway that contribute to mitigate and/or adapt to climate change. While many initiatives relate to similar projects - such as selective collection of garbage, bus corridors, and bicycle lanes - the key is the development and establishment of regulatory frameworks for climate change and development and/or updating of GHG emissions inventories. Representatives of non-governmental organizations, Caixa and the World Bank also contributed to the discussions with the measures that their institutions are taking.

Projects in the Municipality of Cuiaba include installation of methane capture and power generation at a new landfill (currently the city government is studying the area to build the new landfill), an Urban Tree Program, plan for an emissions inventory and a project to offset emissions from public vehicle fleets.

Projects of the Municipality of Manaus include installation of methane capture and flaring at the landfill (currently in phase of experimental flaring), study of heat islands and subsequent reforestation plan to be included in the master plan.

The Municipality of Curitiba is drawing up a plan of steps to identify the drivers of emissions and their control, prepare an inventory and study of vulnerability, as well as projects like the Green Line for 12 buses that use 100% biofuel, 100% collection selective waste, among others.

The Municipality of Fortaleza began the process of preparing its emissions inventory, plans to develop new technologies and operational advances in the management and storage of waste, and implements projects such as the collection of cooking oil.

The Municipality of Rio de Janeiro set targets for reducing emissions, established a regulatory framework for public policies on climate change and a community forum. In addition, it is updating the emissions inventory and implementing projects related to green roof, energy efficiency, and sustainable revitalization of the port. There are plans to expand selective garbage collection from 1% to 5%.

The Municipality of Osasco is committed to preparing an emissions inventory, but has so far only taken isolated actions: selective waste collection, composting, recycling of construction waste, recovery of green areas and parks, efficient public lighting.

The initiatives of the State of Espírito Santo include creating the Capixaba Forum on Climate Change and the Law on Payment for Environmental Services - for recovery of watersheds, reforestation, among others, with support from GEF - and allows for the establishment of the State Policy on Climate Change. The State also implements projects such as the No Dumps Program - a consortium of municipalities and landfills with goal of 100% of waste being disposed of in sanitary landfills by 2011 and operational cost and selective collection responsibility delegated to municipalities - and the exclusive bus corridor in the metropolitan area.

The Federal District has not made any direct action. However, it has developed a law on final disposal of solid waste, and has the Integrated Brasilia transport project, and the Brasilia Environmentally Sustainable program in partnership with the World Bank. Water reuse and recycling will help to mitigate emissions.

Projects in the City of São Paulo include the Bicycle Lane Improvement Program, the Vehicle Inspection Program, the Urban Tree Program (1 million trees) and construction of additional 100 urban parks. Moreover, it passed the Municipal Law on Climate Change, with an expected reduction target of 30%, and emissions inventory. A second revision to the law will include the creation of an inventory of public lands provide environmental services/benefits.

Measures adopted by the Municipality of Florianopolis include the creation of bike lanes, increase in the selective garbage collection in neighborhood, the establishment of a Municipal Coastal Management Plan, and surveillance of risk areas. Furthermore, 42% of the city is PPA and there a law with incentives (tax reductions) for sustainable buildings.

The Euro-Brazilian Council for Sustainable Development organizes Bright Green Cities and ICLEI has contributed to the empowerment of local governments, implementing awareness campaigns, programs, and pilot projects. Caixa is developing a strategy focused on climate change with credit lines and CER trading.

Question: What opportunities do you see for your city?

Responses:

Government representatives cited several opportunities for application in their cities. Cuiabá and Manaus commented on the concentration of resources in the Southeast and South regions of Brazil, which makes the financing of cities outside of this axis difficult. As such, they are interested in the financing of solid waste, the Carbon Neutral Financing Program and use of tourism activities to finance actions related to carbon neutrality. They cited the use of the National Logistics and Transportation Plan to develop better alignment between transportation and municipal environmental goals.

Curitiba highlighted opportunities related to the development of a master plan and solid waste treatment options. Fortaleza, mentioned the expansion of solid waste recycling and reduction of its production. Rio de Janeiro, identified the new landfill and generating energy from methane capture and increasing transport efficiency and the use of alternative fuels. Osasco, indicated the efficiency of public transport and the use of landfills for biogas production.

Espirito Santo, the Federal District, the Euro-Brazilian Council, and ICLEI agreed that legal frameworks to serve as a guide and incentive for the transition to a low carbon economy, Brasilia as a host city of the 2014 World Cup, and reduced costs for new technologies with emissions reduction are opportunities.

Florianopolis, Curitiba and Sao Paulo believe that the recent widespread environmental tragedies can be an opportunity for change; the development of green tourism generates economic development, with new niche markets and job creation; and that urban planning that needs to be more appropriate and popular, as well as training.

Caixa and the World Bank highlighted the citywide approach, sectors that generate CERs and a reorientation in municipal planning to include climate change issues as opportunities for cities.

Question: What are the main challenges facing your city in regard to climate change?

Responses:

City representatives indicated similar obstacles in each group. Cuiabá and Manaus highlighted their low debt capacity, the lack of real guarantees, and low capacity of public servants on the topic of climate change.

Curitiba, Fortaleza, Rio de Janeiro, and Osasco indicated the lack of awareness among public officials on the subject, the difficulty of the flow of information, lack of regulatory frameworks, poor allocation of resources, and cultural issues (education and awareness) as the main obstacles.

Espírito Santo, the Federal District, the Euro-Brazilian Council, and ICLEI highlighted the administrative, cultural and social barriers, lack of knowledge, lack of financial resources and integration in sectoral policies, as well as coordination among the various levels of government as obstacles.

Florianopolis, Curitiba, and Sao Paulo indicated the lack of commitment of public management, the need for mainstreaming across all sectors of administration, lack of environmental education on climate change, an unsustainable tourism economy, national development policies based on a model of consumption, poor capacity for project execution, and low budget and resources as obstacles.

The main obstacles identified were the low capacity/knowledge of officials on the topic, limited resources, cultural and social barriers, all challenges that Caixa agrees exist.

Question: What tools does your city need to address climate change?

Responses:

According to the representatives of Cuiabá and Manaus, the instruments needed are institutional strengthening, specific budget allocation, capacity building, feasibility analysis to incorporate social and environmental benefits, and expanded partnerships, especially outside the Rio-São Paulo (Southeast) axis.

For the representatives of Curitiba, Fortaleza, Rio de Janeiro, and Osasco, needed instruments include financing, regulation, surveillance, awareness, and, above all, political will.

For Espirito Santo, the Federal District, the Euro-Brazilian Council, and ICLEI, needed instruments include planning, funding, training of managers, and dissemination of technical information to all levels of society.

For Florianopolis, Curitiba, and Sao Paulo, needed tools include urban planning that is customized to the municipality, public participation, identification of vulnerabilities in the city, emissions inventories, and training of public managers.

Caixa and the World Bank agree that the main instruments needed are financial resources, capacity building, urban planning, emissions inventories, and implementation of the National Basic Sanitation Plan.

Summary of the Roundtable

	Mitigation and/or adaptation actions	Approaches/opportunities	Main obstacles	Needed instruments
Group 1	• New landfill with energy generation capacity • Urban tree planting program • Emissions inventory • Heat island study	• Financing • Tourism • Transport	• Low debt capacity • Few guarantees • Low capacity of public servants	• Institutional strengthening • Specific budget allocation • Technical training • Integration of socio-environmental benefits • Increase in partnerships
Group 2	• Plan of action • Emissions inventory • Vulnerability study • New technology and operational advances • Emissions reduction goals • Regulatory framework • Council	• Master Plan • Recycling • Landfill energy generation • Transport • Alternative fuels	• Lack of knowledge among public managers • Information flow • Lack of regulatory frameworks • Low allocation of resources • Cultural barriers	• Financing • Regulation • Monitoring • Awareness • Political will
Group 3	• Council • Regulatory framework • Conferences • Training • Awareness campaigns	• Legal framework • Low carbon economy • International events • Reduction in the cost of new technologies	• Administrative discontinuity • Cultural and social barriers • Lack of awareness • Lack of financial resources • Lack of integration of policies among government levels	• Planning • Financial resources • Training • Information dissemination
Group 4	• Transport • Urban tree planting • Regulatory framework • Emissions reduction goals • Emissions inventory • Inventory of public land that provide environmental benefits • Protection of high risk areas	• Environmental tragedies as opportunity for change • Green tourism • Urban planning • Training	• Lack of commitment among public managers • Need for cross-sectoral coordination • Absence of environmental education • Unsustainable tourism economy • Consumption-based model of development • Low capacity/training • Low budget and resources	• Appropriate urban planning • Public participation • Identification of vulnerabilities • Inventories • Training
Group 5	• Credit lines • Carbon market • PoA approach • Training • Ne w financial products	• Citywide approach • CERs • Urban planning	• Low capacity/training • Low knowledge about CDM • Low awareness • Low of integration of policies among government levels	• Financial resources • Training • Urban planning • Inventory • Nation Sanitation Plan

CONCLUSIONS AND RECOMMENDED ACTIONS

After the Roundtable session, the World Bank and Caixa concluded the Seminar by summarizing some of the ideas discussed.

There were four key points. First, Brazil has a wide variety of cities, and actions need to be customized to the particularities of each case. Secondly, the Seminar has contributed to the broader understanding of cities on the topic of climate change, raising awareness among the participants in regard to impacts and vulnerabilities. Climate change is cross-sectoral. Third, where there already is awareness, we must develop methodologies, studies, inventories; some cities are working on this, but it is a process. This process requires training and learning, and Brazil has many good examples that can be shared, aiding the development of new projects. The World Bank aims to facilitate this exchange of knowledge with reports and seminars like this one, which was superficial, but important for initiating a debate that may continue through the internet. Finally, the issue of funding is important. In Brazil, the major funders are Caixa and the federal government. The World Bank's role is to collaborate through technical support and partnerships, as it has with Caixa.

Caixa has strived to create financial solutions for municipalities in relation to climate change, since the carbon market is an area that requires a high level of technical skill. Market recognition is still low, however, demand is growing. The conclusion is that the carbon economy is here to stay and we must adapt. This is Caixa’s objective in partnership with the World Bank.

ANNEXES

Annex 1: Seminar Agenda

June 8, 2010

Time	Activity	Speaker
8:00 – 8:30	Registration / Welcome Coffee	
8:30 – 9:00	Opening: Welcome Remarks and Conference Introduction	Rogério Tavares, CAIXA Jennifer Sara, Sector Leader, World Bank
Cities and Climate Change in Brazil		
9:00 – 9:20	Sustainable Cities in Brazil	Sergio Gonçalves, Ministry of Environment
9:20 – 9:40	Cities and Climate Change in Brazil – Initial Findings	Catherine Lynch, World Bank
9:40 – 10:00	Performance of CAIXA in Environmental Sanitation, Infrastructure and Carbon Market	Rogério de Paula Tavares, National Director SUSAN - CAIXA
10:00 – 10:30	Discussion	
Impact of Climate Change and City-level Actions		
10:30 – 10:50	Vulnerability of Megacities in Brazil	Jose Marengo, INPE
10:50 – 11:30	City Actions for Climate Change in Brazil	São Paulo: Alejandra Maria Devecchi Rio de Janeiro: Nelson Moreira Franco Curitiba: Alfredo Vicente Trindade
11:30 – 12:00	Discussion	
BREAK –LUNCH		
Financing Tools for Sustainable Cities in Brazil		
14:00 – 14:30	MDL: How does it work and how cities can access?	Eduardo Ferreira, World Bank
14:30 – 15:00	CAIXA's Financing Tools for Sustainable Cities – the CPF Program	Adailton Ferreira Trindade, National Manager GESAN - CAIXA
15:00 – 15:30	Discussion	
Energy Efficiency and Sustainable Housing		
15:30 – 16:00	Public Procurement of Energy Efficiency Services	Jas Singh, World Bank
16:00 – 16:30	Climate Change and Housing	Carlos Martin, Sustainable Housing Consultant
16:30 – 17:00	Discussion	
17:00	Reception	

June 9, 2010

Time	Activity	Speaker
GHG Emissions Inventories and Low-Carbon Economies		
9:00 – 9:30	A City-wide Approach to Carbon Finance	Monali Ranade, World Bank
9:30 – 10:00	GEE Emission from Transport and Path for Low Carbon Growth in Brazilian Cities	Fuad Jorge Alves José, Consultant, LOGIT
10:00 – 10:30	GEE Emission from Solid Waste and Path for Low Carbon Growth in Brazilian Cities	João Wagner Silva Alves, CETESB
10:30 – 10:45	Discussions	
10:45 – 11:00	Coffee Break	
City-level Actions for Sustainable Development		
11:00 – 12:30	Roundtable on City-level Actions for Sustainable Development	Participating Cities
12:30 – 1:00	Closing	
1:00	Lunch	

Annex 2: Participant List

NAME	INSTITUTION	TELEPHONE	E-MAIL
Clarismino Luiz Pereira Jr.	AMMA/ Goiânia- GO	(62) 3524-1413	clarisminojr@amma.goiania.go.gov.br
Ana Maria Borges Tomé	Caixa		
Anislene Tavares	Caixa		
Eduardo A. Brandão Pena	Caixa		
Luiza E. V. Piauilino	Caixa		
Roseli de Moraes	Caixa		
Sandra C. B. S. Quinto	Caixa		
Max Mauran Pantoja Castro	Caixa - GAPRE		
Cláudio Luis	Caixa - GEAGO		
Paulo M. Goulart	Caixa - GEC		
Analu de Andrade	Caixa - GECOA		
Demóstenes M. S. Brandão	Caixa - GECOA		
Eliabe F. Pires	Caixa - GECOA		
Leticia Rezende	Caixa - GECOA		
Lia Gomes	Caixa - GECOA		
Lilian Sonia Moreira Agate	Caixa - GECOA		
Marcia de Oliveira	Caixa - GECOA		
Renata Almeida Gomes da Rocha	Caixa - GECOA		
Alcivan Wanderley	Caixa - GEF		
Ana Paula Carneiro de Aguiar	Caixa - GEFUS		
Hamillton Navarro	Caixa - GEFUS		
Rodrigo R. C.	Caixa - GEFUS		
Sérgio Guimarães Pinto	Caixa - GEFUS/ SUFUS		

Lia de Castro Brandão	Caixa - GEFUS/SUFUS		
Mauro Xavier	Caixa - GEFUS/SUFUS		
Maria José de Oliveira	Caixa - GEIFI		
Mara Luisa A. Motta	Caixa - GEMEA		
Marcia Garbin	Caixa - GEMGE		
Mirna Bohlke	Caixa - GEMGE		
Gisela Faber do Nascimento	Caixa - GEOSI		
Humberto Rodrigues	Caixa - GEOSI		
Valter Haruo Takahashi	Caixa - GEOSI		
Marco Antônio de Gouvêa	Caixa - GEOST/SUSAN		
Wilson Araújo Ramel	Caixa - GERES		
Adailton Trindade	Caixa - GESAN		
Ana Tomé	Caixa - GESAN		
André Batista Cotia	Caixa - GESAN		
Carlos Andrade Morais	Caixa - GESAN		
Carlos André Lins Rodrigues	Caixa - GESAN		
Cecilia Tavares	Caixa - GESAN		
Cesar Ribeiro	Caixa - GESAN		
Daniele Silva Costas	Caixa - GESAN		
Denise Seabra	Caixa - GESAN		
Fernanda A. Merlo	Caixa - GESAN		
Francisca da Chagas Mello	Caixa - GESAN		
Heloísa Helena	Caixa - GESAN		
Hosmia Alves Santiago	Caixa - GESAN		
Jorge Bitencout	Caixa - GESAN		
Katiara Celeste F. Oliveira	Caixa - GESAN		

Marcio Piery de L. Abreu	Caixa - GESAN		
Maria Auxiliadora de Almeida	Caixa - GESAN		
Marina Nascimento	Caixa - GESAN		
Mônica Barreto Nogueira Cavalcante	Caixa - GESAN		
Mônica Branco	Caixa - GESAN		
Naya Silva Genaro Toffanello	Caixa - GESAN		
Olivier de Mattos	Caixa - GESAN		
Omerico Ary de M. Peixo	Caixa - GESAN		
Pricila Dias	Caixa - GESAN		
Roberto Moreira	Caixa - GESAN		
Ronaldo do Aniceto	Caixa - GESAN		
Sandra Laderia Pinheiro	Caixa - GESAN		
Saulo L. Vasconcelos	Caixa - GESAN		
Uinália Maria Curvina	Caixa - GESAN		
Valéria Ribeiro Artiaga	Caixa - GIEREB/SUREB		
Ariana P. Bergmann	Caixa - SUSAN		
Dayana dos S. Schneider	Caixa - SUSAN		
Dayse Lourency	Caixa - SUSAN		
Francisco Filho	Caixa - SUSAN		
Simone dos S. Ferreira	Caixa - SUSAN		
Sofia Shellard	CDBDS		Sofia@cebds.org
Carlos Marcelo Martin	CEF	(61) 3206-8501	
João Wagner Alves	CETESB	(11) 3474-8500/8512	joaoa@cetesbnet.sp.gov.br
Marco Ziliotto	Ecoclima Institute	(41) 3223-0088	marcozilioto@uol.com.br
Robson Oliveira	EUBRA	(85) 3242-5441	Robson@eubra.org
Edgard Dias Magalhães	FEMACT – Roraima	(61) 9298-5174	Edgardo.magalhaes@gmail.com

Felipe Faria	GBC Brasil	(11) 4191-7805	ffaria@gbcbrasil.org.br
Florence Laloé	ICLEI	(11) 5084-3079	Florence.laloe@iclei.org
Jose Marengo	INPE	(12) 3103-5177	
Fuad Jorge Alves José	LOGIT Consultoria	(11) 3133-3156	Fuad.jorge@logitconsultoria.com.br
Cláudia M. F. de Albuquerque	Ministry of Environment	(61) 2028-2120	Claudia.albuquerque@mma.gov.br
Alexandra A. Maciel	MMA / SMCQ	(61) 2028-11-28	Alexandra.maciel@mma.gov.br
Sérgio Antônio Gonçalves	MMA/ SRHU/ DAU	(61) 2028-2117	Sergio.goncalves@mma.gov.br
Deodato Ramalho	Municipality de Fortaleza - CE	(85) 8814-1758	Deodatoramalho@gmail.com
Carlos Marx Alves	Municipality de Osasco – SP	(11) 3652-9278	cmarxalves@uol.com.br
Alfredo de Castro Trindade	Municipality of Curitiba	(11) 3350-9228	atrindade@smma.curitiba.pr.gov.br
Gulherme Dallacosta	SDS	(48) 3029-9002	dallacosta@sds.sc.gov.br
Rejane Jung Vianna	SEDUMA	(61) 3214-4105	rjvianna@gmail.com
Maria do Socorro Alves	Seduma/GDF	(61) 3214-4079	msadiaz@uol.com.br
Manyu Chang	SEMA –PR	(41) 3304-7724	Manyu@pr.gov.br
Alexandre Kise	SEMA/ Guarulhos	(11) 2475-1348	Alexandre.kise@guarulhos.sp.gov.br
Eugenio Pantoja	SEMA/AC	(68) 9984-1255	Eugenio.pantoja@ac.gov.br
Débora R. Paula	SEMMAS	(92) 9469-9656	Débora.paula@pmm.am.gov.br
Nelson Moreira Franco	SMAC- RJ	(21) 2293-7018	franconelson@uol.com.br
Eduardo Calhau	State of Espírito Santo	(27) 9978-0769	calhau@sedurb.es.gov.br
Regina Curitiba da Silva	State of Espírito Santo	(27) 9933-5996	Regina.curitiba@sedurb.es.gov.br
Carlos Martin	World Bank	1-202-459-3440	Carlos.martin@stanfordalummi.org
Catherine Lynch	World Bank	(61) 3329-1029	clynch@worldbank.org
Cecília Umetsu	World Bank	(61) 8181-2693	Cecilia.umetsu@gmail.com
Cristina Oliveira Roriz	World Bank	(61) 3329-8609	croriz@worldbank.org
Eduardo Ferreira	World Bank	1-202-460-5344	Eferreira1@worldbank.org
Eri Watanabe	World Bank		ewatanabe@worldbank.org

Jas Singh	World Bank	1-202-458-0343	Jsingh3@worldbank.org
Jennifer Sara	World Bank		jsara@worldbank.org
Ming Zhang	World Bank	1-102-413-4195	Mzhang1@worldbank.org
Monali Ranade	World Bank	1-202-4739571	mranade@worldbank.org
Teresa Serra	World Bank	(21) 2287-3402	tserra@jurea.com
Wanessa Matos	World Bank	(61) 3329-1000	wanmatos@yahoo.com.br
Carolina Arantes		(61) 3597-3265	carolarantes@yahoo.com

Annex 3: Links to Presentations

Speaker	Organization	Link
Sergio Gonçalves	Ministry of Environment	
Catherine Lynch	World Bank	http://siteresources.worldbank.org/BRAZILINPOREXTN/Resources/3817166-1279658706544/Lynch_CidadesMundancasClimaticas.pdf
Rogério de Paula Tavares	SUSAN - CAIXA	
Jose Marengo	INPE	http://siteresources.worldbank.org/BRAZILINPOREXTN/Resources/3817166-1279658706544/Marengo_Megacidades_SP.pdf
Alejandra Maria Devecchi	City of São Paulo	http://siteresources.worldbank.org/BRAZILINPOREXTN/Resources/3817166-1279658706544/Marengo_Megacidades_SP.pdf
Nelson Moreira Franco	City of Rio de Janeiro	http://siteresources.worldbank.org/BRAZILINPOREXTN/Resources/3817166-1279658706544/Franco_Rio.pdf
Alfredo Vicente Trindade	City of Curitiba	http://siteresources.worldbank.org/BRAZILINPOREXTN/Resources/3817166-1279658706544/Trinidade_Curitiba.pdf
Eduardo Ferreira	World Bank	http://siteresources.worldbank.org/BRAZILINPOREXTN/Resources/3817166-1279658706544/Ferreira_MDL.pdf
Adailton Ferreira Trindade	GESAN - CAIXA	
Jas Singh	World Bank	http://siteresources.worldbank.org/BRAZILINPOREXTN/Resources/3817166-1279658706544/Singh_Procurement.pdf
Carlos Martin	World Bank	http://siteresources.worldbank.org/BRAZILINPOREXTN/Resources/3817166-1279658706544/Martin_Habitacao.pdf
Monali Ranade	World Bank	http://siteresources.worldbank.org/BRAZILINPOREXTN/Resources/3817166-1279658706544/Renade_CitywideApproach.pdf
Fuad Jorge Alves José	LOGIT	http://siteresources.worldbank.org/BRAZILINPOREXTN/Resources/3817166-1279658706544/SilvaAlves_Transportes.pdf
João Wagner Silva Alves	CETESB	