

## **Forging low emission development paths in Latin America and the Caribbean:**

### **Multi-level dynamics in the world's most urbanized region**

Scott A. Muller, Greenhouse Gas Management Institute;  
Jordan M. Harris, Adapt Chile; Joshua Sperling, National Renewable Energy Lab, Urban Futures and the Energy-X Nexus; and María José Gutiérrez, R.E. Responsabilidad y Estrategia Consultoría

May 2017

# Forging low emission development paths in Latin America and the Caribbean: Multi-level dynamics in the world's most urbanized region

---

Scott A. Muller, Greenhouse Gas Management Institute; Jordan M. Harris, Adapt Chile; Joshua Sperling, National Renewable Energy Lab, Urban Futures and the Energy-X Nexus; and María José Gutiérrez, R.E. Responsabilidad y Estrategia Consultoría

## Contents

---

Preface	iv
Highlights	v
1 Introduction	1
2 LEDS GP, the Subnational Integration Working Group, and LEDS LAC	1
3 Discussion	2
4 Situation analysis	10
5 Greenhouse gas targets—LAC	22
6 Select cases: Multilevel governance and climate policies/actions in LAC	23
7 Conclusion	46
Additional references	47
Acknowledgments	49
Endnotes	50

## Preface

Defining and implementing low emission development strategies (LEDS) across sectors and scales is a 21st century grand challenge, especially within the context of urbanization, climate change, and globalization. Within this grand challenge lies the opportunity to learn from regions such as Latin America and the Caribbean (LAC), now the most urbanized region in the world as a result of 60 years of significant urban population growth and shift.

This report presents an overview of trends in the LAC region with the aim of disseminating information and facilitating discussions on accelerating and achieving nationally determined contributions (NDCs) for reductions in greenhouse gas emissions and long term LEDS. An important high level assertion is that improving coordination and integration between the different levels of authority in a country is critical in determining both national and global capacity to govern climate change. Multilevel governance is increasingly emerging as a key component for LEDS. City and subnational governments require support from the national government, and vice versa, in order to design and implement intersectoral policies and actions for domestic decarbonization pathways.

The report was prepared in part to respond to a request at the fourth annual meeting of the Low Emission Development Strategies Global Partnership (LEDS GP) in the Dominican Republic in October 2015, where members asked for more comprehensive information on the associations between urbanization trends, greenhouse gas emissions, LEDS, and—more specifically—how city, regional, and national governments can improve collaboration to achieve NDCs.

It also complements the series LEDSinLAC and the ‘Policy Paper on Inter-institutional Coordination Mechanisms for an Effective Climate Policy in Latin America and the Caribbean,’ both prepared by the LEDS Regional Platform for Latin America and the Caribbean (LEDS LAC). LEDSinLAC 2016,<sup>1</sup> released in March 2017, is the second edition of this initiative, which broadly maps and analyzes the state of LEDS in the LAC region.

The **Low Emission Development Strategies Global Partnership (LEDS GP)** was founded in 2011 to enhance coordination, information exchange, and cooperation among countries and international programs working to advance low emission, climate resilient growth. LEDS GP currently brings together LEDS leaders and practitioners from more than 160 countries and international institutions through innovative peer to peer learning and collaboration via forums and networks. For the full list of participants and more information on partnership activities, see [www.ledsgp.org](http://www.ledsgp.org)

## Highlights

- The relationship between the different levels of authority in a country is critical in determining both national and global capacity to govern climate change.
- Effective public investment requires coordination between national and subnational governments.
- Dynamic multilevel governance and subnational integration can provide support at every stage of the climate policy/action pathway, as well as across all infrastructure services.
- Global population growth is being led by second and third tier cities in developing countries. While this presents new opportunities, it also brings profound, unfamiliar governance challenges.
- Today, cities and towns account for an estimated 75–80% of global energy use and the associated CO<sub>2</sub> emissions.
- Latin America and the Caribbean (LAC) is the most urbanized region in the world, the result of 60 years of significant urban population growth and shift—soaring from 40% to 80% of the total population living in cities between 1950 and 2010.
- While the total population rise in LAC between 1990 and 2015 was 185 million, in the same period the urban population increased by more than 189 million.
- In the majority of the 48 countries analyzed, the percentage change in urban population since 1990 was greater than the percentage change in total population of the country. In some cases the difference is quite large. This has important implications for shifting governance dynamics.
- Rapid urbanization in LAC is reducing the density of cities, with the physical, spatial growth of urban areas reaching rates as high as three times the population growth rate in some cities.
- Since 1990, the subregions of LAC have been rapidly urbanizing without delivering emission reductions. Carbon emissions from the combustion of fossil fuels and cement production are rising faster than the rate of urban population growth, which again is increasing faster than the rate of national population growth. This trend is especially evident in South America.
- Urbanization has contributed to much of the significant economic gain across LAC. However, urbanization does not correlate to GDP growth.
- Spectacular increases in GDP can pervert carbon intensity data. Decreasing carbon intensities do not represent emission reductions below critical ceilings and climate change thresholds. For example, while the carbon intensity of the economies in Chile and Panama decreased impressively between 1990 and 2015 (–56% and –45%, respectively), their CO<sub>2</sub> emissions from fossil fuels and cement have increased (+143% and +295%, respectively).
- The challenges presented by continued urbanization, social inequities, and rising CO<sub>2</sub> emissions emphasize the need for new multilevel governance strategies and intersectoral collaboration to achieve nationally determined contributions (NDCs) and long term LEDS in LAC.

- The evolving political and institutional context in LAC over recent decades has produced an increase in once national responsibilities gradually devolving to the regional and municipal levels. There is a growing interdependency between the different tiers of government.
- Cities and regions in LAC have not yet had notable influence on national climate governance frameworks. The approach and financing of climate policy has been characterized by an uncoordinated, top down approach.
- In general, the NDCs in LAC do not represent the collective view of stakeholders on the best approach to emission reductions and were not produced with adequate consultation.
- Across LAC, there are 162 cities and 29 regions/provinces that have registered intentions for climate actions with the Non-State Actor Zone for Climate Action (NAZCA). However, in the UNEP DTU Partnership's Cities & Regions Pledges Pipeline (which includes only regions with a higher commitment than their country, and only cities with a higher commitment than their country or region), there are just 13 cities and seven subnational regions in LAC on the list.
- National and subnational governments, and the private and civil society sectors, each possess unique assets and attributes that can be coordinated and integrated in productive ways to achieve NDCs and LEDES through transformational climate policies and actions in urban environments. These may be vertical as well as horizontal interactions, for example between municipalities in the same metropolitan area.
- A fundamental first step for improving multilevel governance/subnational integration requires institutional mapping—the accurate identification of functions, responsibilities, authorities, and their interactions across scales and sectors—especially for addressing connections between climate action, energy, the economy, and the environment.
- The ability of subnational governments to make substantive contributions to the formulation and implementation of NDCs and long term LEDES is limited in LAC by fragmented, polycentric approaches to subnational governance.
- In addition to improving decentralization and vertical collaboration between national and subnational governments, addressing fragmentation issues is a key part of unlocking multilevel governance's contribution to LEDES and domestic NDC pathways.
- Some countries in LAC are evolving innovative collaboration tools and frameworks that are helping surmount the legacy of fragmented governance at the metropolitan scale.
- There are significant synergies and additional development impacts and co-benefits being achieved by improving the coordination and vertical integration of data, actions, policies, investments, and monitoring across multiple levels of governance.
- Although multilevel governance and intersectoral collaboration towards domestic implementation of the NDCs and long term LEDES in LAC is still incipient, there are important examples of progress. These include: the creation of interministerial climate cabinets; national councils comprised of multiple levels of government as well as civil society; cities providing important leadership and regional input to national policy; intermunicipal cooperation to reduce fragmentation; regional climate change science and strategic action committees; and national networks of municipalities on climate change.
- Some countries with growing urban populations and increasing GDP per capita are decoupling this growth from per capita CO<sub>2</sub> emissions.

## 1 Introduction

Multilevel governance presents a dynamic conceptual framework to explore opportunities for coordinating and integrating low emission development strategies (LEDS) between cities, regions, and national governments, as well as interactions with the private sector and nongovernmental actors. The shared development goal in this case is to identify, unlock, and implement transformational greenhouse gas mitigation and climate adaptation policies and actions, which are complementary to other national and local development priorities.

To support debate, decisions, and actions towards that end, this report presents:

- an interactive, web-based platform that combines different data sets to visualize national trends between 1990 and 2015 on population, urbanization, CO<sub>2</sub> emissions related to fossil fuel combustion and cement manufacturing, GDP, and carbon intensity
- comparison and discussion of national trends related to urbanization
- select examples of diverse types of multilevel governance efforts for the implementation of climate action policies and measures by national, subnational, and/or overlapping efforts in Latin America and the Caribbean (LAC)
- recommendations to national and subnational authorities for future initiatives to improve multilevel governance, intersectoral coordination, and integration of policies, programs, and finance that support climate action.

Although the process of urbanization varies across countries, most trends have been shaped by a common array of factors and systems. These can include cultural, social, political, economic, technological, and environmental systems. Changes in local governance systems and urban infrastructure have influence on each of these systems, with direct impacts on energy demand and consumption, taxation and regulation, spatial distribution, resource flows, demographics, migration, vulnerability and risk management, waste streams, biodiversity, land use, social equity, and more. Importantly, these development issues transcend the physical urban geopolitical boundaries, and can have both positive and negative impacts far removed from the immediate urban environment. Urbanization can have a significant transformational influence on surrounding rural areas as well as overall national development strategies and indicators.

Today in LAC, rapid urban expansion often occurs without regard to policy gaps or technology, and is rapidly advancing with or without planning or adequate resources. This is a critical 21st century grand challenge—cities account for 75–80% of global energy consumption, and if current trends in urban expansion continue, urban energy use may increase more than threefold by 2050, from 240 to 730 exajoules. Therefore current trends of urbanization and multilevel governance are quickly becoming core concerns for climate and energy policymakers at all levels.

## 2 LEDS GP, the Subnational Integration Working Group, and LEDS LAC

Since its launch in 2011, the LEDS Global Partnership (LEDS GP) has grown to include the active participation of more than 220 member institutions, of which 160 are governmental institutions. Within the various initiatives of the Global Partnership, the thematic Subnational Integration Working Group was created in 2013 to facilitate and support learning on intersectoral cooperation and the integration of climate policies and actions between national and subnational governments (vertically and horizontally), as well as with the private sector and civil society.

The Subnational Integration Working Group strives to accelerate climate resilient LEDS by addressing the challenges, opportunities, and distinct priorities determined within each of the different regional LEDS platforms across Asia, Africa, Europe and Eurasia, and LAC. This report focuses on LAC, the most urbanized region in the world. It is an intriguing case because, despite sustained periods of economic growth, the region continues to face infrastructure development challenges, high levels of urban air pollution, gender inequality, violence, and continued deforestation, exacerbated by disruptions from changing precipitation patterns, extreme weather events, falling water tables, and sea level rise.

Over the past three years, the Subnational Integration Working Group has built relationships and engagement within and across the LAC region by hosting peer learning dialogues and exchanges, publishing reports and case studies, facilitating technical workshops and webinars, providing remote expert assistance and in depth technical analysis, and organizing panels at multiple regional and global forums. Diverse communities of practice across LEDS LAC are realizing shared learning and exploring intersectoral climate actions and multilevel governance challenges and opportunities, with insights that may be relevant to other members in the LEDS GP.<sup>2</sup>

### 3 Discussion

The current global phenomenon of urbanization has an undeviating impact on our collective ability to maintain global average temperature change below 1.5–2.0°C. In particular, urbanization is a substantial factor shaping the ability of countries to successfully achieve, or increase ambition on, their official Nationally Determined Contributions (NDCs) to global climate targets. Unfortunately, multilevel governance and vertical collaboration towards the subnational implementation of NDC domestic pathways is still nascent in most countries.

As urban areas increasingly become hubs for more concentrated populations, economic activities, and infrastructure services, these areas and associated institutions will play pivotal roles in achieving NDCs. Many cities in the global north and south are investing as never before in urban infrastructure development, management, and disaster resilience. They are experimenting with new innovations while generating increasingly more wealth, attracting more foreign and domestic investment, producing larger portions of GDP, and generating more taxes and revenues. Coordinated and integrated approaches to governance and improving institutional capacity for LEDS are becoming increasingly critical.

The biophysical, social, and financial drivers of rapid urbanization are also expanding resource supply chains and affecting greenhouse gas emissions. This force, along with globalization and climate change, is driving a rapid evolution in subnational, national, and multilateral governance, and motivating more effective intersectoral and transboundary approaches as well.

Accurately understanding current urbanization trends and related factors for multilevel governance opportunities is an important step in the design and pursuit of long term LEDS and domestic NDC pathways. At the same time, this can also strengthen the capacity to govern carbon emissions synergistically, while achieving the post-2015 Sustainable Development Goals,<sup>3</sup> fulfilling the New Urban Agenda (Habitat III),<sup>4</sup> and responding to other complementary development priorities.

#### 3.1 Urbanization

The dramatic growth of urban environments<sup>5</sup> has critical ramifications for systems of energy, governance, and the critical infrastructure services they provide (power, transportation, water supply, sanitation, food, etc.). It was estimated in 2012 that approximately 60% of the infrastructure systems and services needed to be in place by 2030 did not yet exist.<sup>6</sup>

Importantly, there is a fundamental shift from the urbanization trends of the past century, which have shaped today's national–subnational governance dynamic. Specifically, in the next 15 years the planet's urban population will reach more than five billion persons, and by 2040 will swell to 5.7 billion. This is two billion more urban residents than at present. Of the nearly 190,000 new city dwellers being added globally every day since 2012, around 91% are born in a developing country. Importantly, within those countries the fastest growing urban environments are typically cities under one million people. Global growth, led by these second and third tier cities in developing countries, presents new opportunities as well as unfamiliar governance challenges.

On the one hand, if harnessed properly, this rapid and continued urbanization provides for a concentrated demand as well as a distinct conduit for the financing, uptake, and rapid scaling of clean energy solutions. These cities can also provide the critical space and density needed for the emergence of a new culture of low carbon lifestyles.

However, on the other hand, the necessary infrastructure development and additional resource consumption required to support one billion more urban residents in the next generation is massive. Cities and towns already account for an estimated 76% of global energy use and associated CO<sub>2</sub> emissions, despite the fact that 30–40% of urban residents in developing countries do not have access to modern forms of energy, such as electricity or clean cooking fuels. For many nations, urbanization is a story of demand outstripping supply, as the planning and construction sectors in many cities are simply unable to keep pace with the need for additional hard infrastructure. The results include a lack of basic services; erratic real estate speculation; increased vulnerability from inadequate regulation, zoning, and quality controls; more associated health risks; and resource management challenges, among others.

In LAC in particular, 60 years of significant urban population growth and shift—an increase from 40% of total population living in cities to 80% between 1950 and 2010—has led to several vital regional challenges. These include water provision, sanitation, transportation, air pollution, and waste management. In addition, the past 10 years of sustained economic growth in LAC have led to considerable success in addressing extreme poverty, yet have not notably improved social equity in the region. The cities of LAC continue to develop, spatially and socially, in a profoundly segregated manner. In fact, the cities of LAC demonstrate the greatest social and economic inequalities in the world. One consequence is that 41 of the 50 most dangerous cities in the world are in LAC.

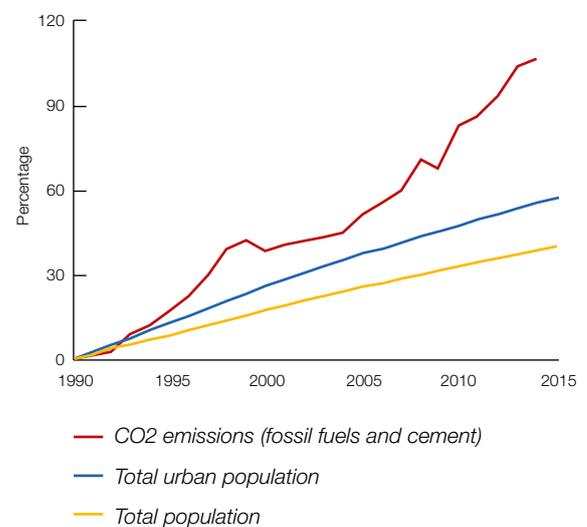
An exceptionally challenging characteristic of this rapid urbanization in LAC is the declining density of cities, driven by spontaneous, unplanned expansion and real estate speculation, among other social, environmental, and economic factors. Globally, the physical spatial growth of urban areas is on average twice as fast as urban population growth, but reaches rates as high as three times as fast in some LAC cities. Recent global analysis reveals that, despite increasing urbanization, actual urban density has decreased over the past years in developed and developing countries by 53% and 38%, respectively. As a result of these trends, the global increase in urban land cover in the first three decades of the 21st century are expected to be greater than the cumulative urban expansion in all of human history. As urbanized settings from the global north have demonstrated, a lock in to high thresholds of energy and resource intensive lifestyles can ensue.

The subregions of LAC are rapidly urbanizing without delivering greenhouse gas emission reductions. The CO<sub>2</sub> emissions from the combustion of fossil fuels and cement production are rising faster than the rate of urban population growth, which again is increasing more quickly than the rate of national population growth (Figure 1). This diverging trend is especially evident in South America.

A major, fundamental, multilevel governance challenge lies ahead to deliver sustainable low emission energy systems and transboundary infrastructure services, with improved spatial planning and resource use in order to avoid locking in high greenhouse gas emission patterns for urban living and travel.

The challenge to improve sustainability, resilience, and human wellbeing must increasingly be addressed within the intersectoral urban context. Maintaining global average temperature change below 1.5–2.0°C will require the next two to three terms of elected officials, at all levels, to work in concert with the private sector and civil society to aggressively transform rapid urbanization from unplanned spontaneous growth into low emission, climate resilient development.

**Figure 1. South America: Change in CO<sub>2</sub> emissions since 1990**



Source: <http://ledsgp-data.netlify.com> (compiled data sources from UNDESA, CDIAC)

### 3.2 Multilevel governance and subnational integration of LEDS

Opportunities for achieving NDCs and LEDS via transformational climate policies and actions in urban environments are being shaped by the increasing diversity of the governmental and nongovernmental actors involved. National and subnational governments, and the private and civil society sectors, each possess unique assets and attributes that can be coordinated and integrated in a productive way to solve complex problems. This may be through vertical and horizontal interactions, for example between municipalities in the same metropolitan area.

#### Nonstate actors

The fundamental premise that nonstate actors<sup>7</sup> are key agents to help achieve not only local, but also national and international climate targets is supported by several current progressions. One is the positive trend of increasing commitments to LEDS by nonstate actors at the subnational level. This growth is demonstrated by the launch of the Non-State Actor Zone for Climate Action (NAZCA) by the Government of Peru and the United Nations Framework Convention on Climate Change (UNFCCC) at the 20th Conference of the Parties (COP 20) in December 2014. Across LAC, 162 cities (from 15 countries) and 29 regions/provinces (in five countries) have registered intentions for climate actions.

This effort to stimulate climate actions by nonstate actors is being supported by a plethora of international organizations, many of which are emerging and rapidly evolving as transnational municipal networks (see Table 1). Within this phenomenon of the rise of transnational municipal networks, there are wide differences between levels of ambition regarding greenhouse gas emission reduction targets and monitoring or reporting requirements. One interesting example that speaks to the opportunity for multilevel governance to accelerate and scale climate action is the UNEP DTU Partnership’s Cities and Regions Pledges Pipeline.<sup>8</sup> This pipeline includes only regions and provinces with a higher climate action commitment than their country, and only cities with a higher commitment than their country or region. Taking those factors into account, in LAC there are just seven regions (from two countries) and 13 cities (from five countries) in the pipeline (Figure 2).<sup>9</sup>

**Table 1. Examples of transnational municipal networks**

Organization/initiative	Description	Greenhouse gas target requirements	Measurement, reporting, and verification
<b>C40 Cities</b> <a href="http://www.c40.org">www.c40.org</a>	With an emphasis on large cities, focuses on mitigation and adaptation actions within a structure of 17 city led networks, organized under six initiative areas.	None	Voluntary
<b>R20 Regions of Climate Action</b> <a href="http://www.regions20.org">www.regions20.org</a>	Supports subnational governments to develop and communicate low carbon and climate resilient economic development projects.	None	Mandatory
<b>Compact of States and Regions</b> <a href="http://www.theclimategroup.org/Compact%20">www.theclimategroup.org/Compact%20</a>	Focuses on states, provinces, and regions measuring and managing their greenhouse gas emissions. Collects data from 62 governments.	Requested by 2017	Annual since 2015
<b>Under 2 MOU</b> <a href="http://www.under2mou.org">www.under2mou.org</a>	Focuses on national and subnational governments to reduce greenhouse gas emissions 80% to 95%, or maintain per capita emissions below 2 t CO <sub>2</sub> per year by 2050. Signed by 165 jurisdictions in 33 countries.	Mandatory, by 2050	Voluntary
<b>World Mayors Council on Climate Change</b> <a href="http://www.worldmayorscouncil.org">www.worldmayorscouncil.org</a>	Focuses on local governments. Open to mayors and leaders of municipal governments.	None	None
<b>100 Resilient Cities</b> <a href="http://www.100resilientcities.org">www.100resilientcities.org</a>	Rockefeller Foundation initiative helping cities around the world become more resilient to physical, social, and economic challenges.	None	Voluntary
<b>Global Covenant of Mayors for Climate and Energy</b> <a href="http://www.compactofmayors.org/globalcovenantofmayors">www.compactofmayors.org/globalcovenantofmayors</a>	Commitments from local authorities in 7,100 cities in 119 countries.	Achieve or surpass relevant NDC	Mandatory
<b>ICLEI—Local Governments for Sustainability</b> <a href="http://www.iclei.org">www.iclei.org</a>	Network representing over 1,500 cities, towns, and regions. Supports other transnational municipal networks.	Voluntary	None
<b>We Mean Business Coalition</b> <a href="http://www.wemeanbusinesscoalition.org">www.wemeanbusinesscoalition.org</a>	Engages the private sector in creating low carbon commitments: 494 companies, 183 investors.	Voluntary	None
<b>CDP (formerly the Carbon Disclosure Project)</b> <a href="http://www.cdp.net">www.cdp.net</a>	Global disclosure system for companies, cities, states, and regions. Supports other transnational municipal networks.	Yes	Mandatory
<b>Climate Initiatives Platform</b> <a href="http://www.climateinitiativesplatform.org">www.climateinitiativesplatform.org</a>	Online database for tracking climate initiatives driven by nonstate actors, hosted by the UNEP DTU Partnership. Provides data to NAZCA platform and Cities and Regions Pledges	Yes	Yes
<b>Carbon Neutral Cities Alliance</b> <a href="http://usdn.org/public/page/13/CNCA">http://usdn.org/public/page/13/CNCA</a>	Collaboration of international cities committed to achieving aggressive long term carbon reduction goals.	Voluntary	Voluntary
<b>REDCISUR (Red de Ciudades Suramericana/ Network of South American Cities)</b> <a href="http://www.facebook.com/redciudades.suramericanas.1">www.facebook.com/redciudades.suramericanas.1</a>	Focuses on South American cities for regional integration and good practice exchanges for urban management, sustainable development, and good living standards.	None	None

<p><b>Mexico City Pact</b>  <a href="http://mexicocitypact.org/pactomexicocity/indexEN.php">http://mexicocitypact.org/pactomexicocity/indexEN.php</a></p>	<p>Voluntary initiative of mayors and local authorities committing to 10 action points, including reduction of emissions, adaptation to climate change impacts, and fostering city to city cooperation. Endorsed by 185 cities.</p>	<p>Yes</p>	<p>Yes</p>
<p><b>Red Latinoamericana de Territorios, Municipios y Ciudades ante el Cambio Climático/Latin American Network of Territories, Municipalities and Cities on Climate Change (RedLat-CC)</b>  <a href="http://www.embafrancia-argentina.org/IMG/pdf/declaracion_de_rosario_esp_.pdf?5156/111ecec233ebfc-c33164405d9a9929ee7e-a18fbbf">www.embafrancia-argentina.org/IMG/pdf/declaracion_de_rosario_esp_.pdf?5156/111ecec233ebfc-c33164405d9a9929ee7e-a18fbbf</a></p>	<p>Includes over 150 municipalities. Focuses on climate change mitigation and adaptation.</p>	<p>None</p>	<p>None</p>
<p><b>United Cities and Local Governments</b>  <a href="http://www.uclg.org/en/agenda/global-agenda-of-local-regional-governments">www.uclg.org/en/agenda/global-agenda-of-local-regional-governments</a></p>	<p>Works to increase the role and influence of local government and its representative organizations in global governance, and to lead the transition toward low carbon, resilient cities and regions</p>	<p>None</p>	<p>None</p>

**Decentralization**

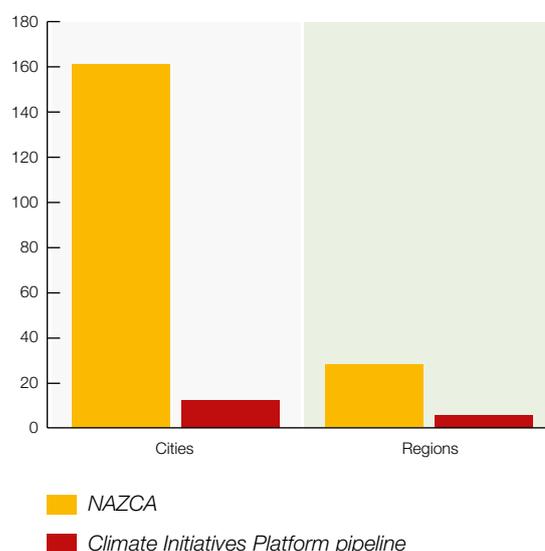
One of the key conclusions of the 2011 UN Habitat Global Report on Human Settlements<sup>11</sup> was that the relationship between the different levels of authority in a country is critical to shaping the global capacity to govern climate change. However, across LAC there is a wide range of political systems, including federations such as Argentina, Brazil, Mexico, and Venezuela; overseas countries and territories such as Aruba, the British Virgin Islands, Puerto Rico, and Saba; more unitary, centralized, autocratic, or oligarchic systems; and, importantly, many strong indigenous territories, chiefdoms, and first peoples with different degrees of sovereignty and autonomy—some protected by national constitutions (e.g. Panama’s Indigenous Comarcas including Kuna Yala, Embera-Wounan, Madugandi, Ngäbe-Buglé, and Wargandi). At the same time, there are very different stages and levels of commitment within the region to finding the right balance of centralized, decentralized, and more hybrid political, fiscal, and administrative responsibilities.

Nevertheless, the legacy of top down policies in LAC is undoubtedly evolving. The changing political and institutional context in recent decades has produced an increase in once-national responsibilities gradually devolving to the regional and municipal levels, stimulating a growing interdependency between the different tiers of government (Figure 3).

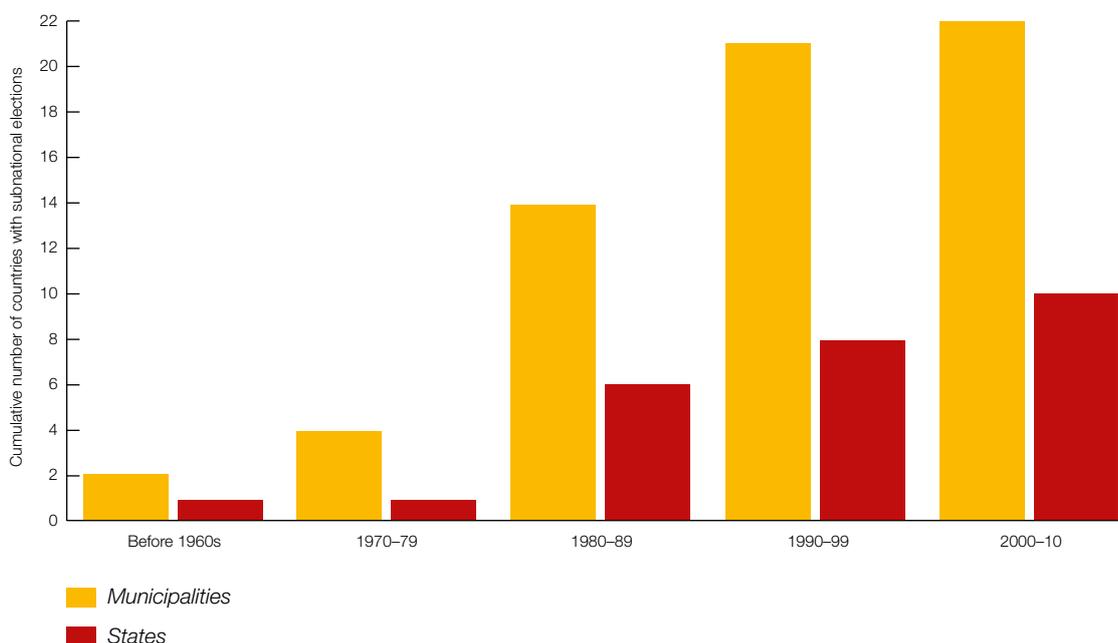
**Fragmentation**

Alongside the slow pace of decentralization, the ability of subnational governments to collaborate with each other (horizontally) and to make substantive contributions to the formulation and implementation of NDCs and long term LEDES is

**Figure 2. Climate targets for LAC<sup>10</sup>**



**Figure 3. Political and administrative decentralization: Countries with subnational elections in LAC<sup>12</sup>**



limited by fragmented, polycentric approaches to subnational governance. Across LAC, urban governance can be viewed as a mixture of three general dynamics: jurisdictional fragmentation, functional fragmentation, and metropolitan-wide government. Any of these can result in poor monitoring and limited access to information, insufficient collaboration and inadequate interaction with civil society, short institutional memory, and political/institutional barriers. Fragmentation also causes missed opportunities for service provision efficiencies, spillover effects across jurisdictional boundaries, as well as income and service level inequalities. It can also lead to other contextual challenges, such as menial technical capacities and lack of access to financial lines of credit, among other impediments that stunt the ability to implement collective actions or invest in bold regional transformations.

As LEDS are subject to collective action challenges, addressing subnational governments' fragmentation issues is one part of unlocking multilevel governance's contribution to LEDS and domestic NDC pathways. This is where the uncoordinated, fragmented pursuit of LEDS by separate municipalities and regions can actually lead to suboptimal or maladapted results for all parties concerned, as for example in the case of one municipality building cement walls to channel a river and contain flooding, only to accelerate and displace the floods to downstream municipalities.

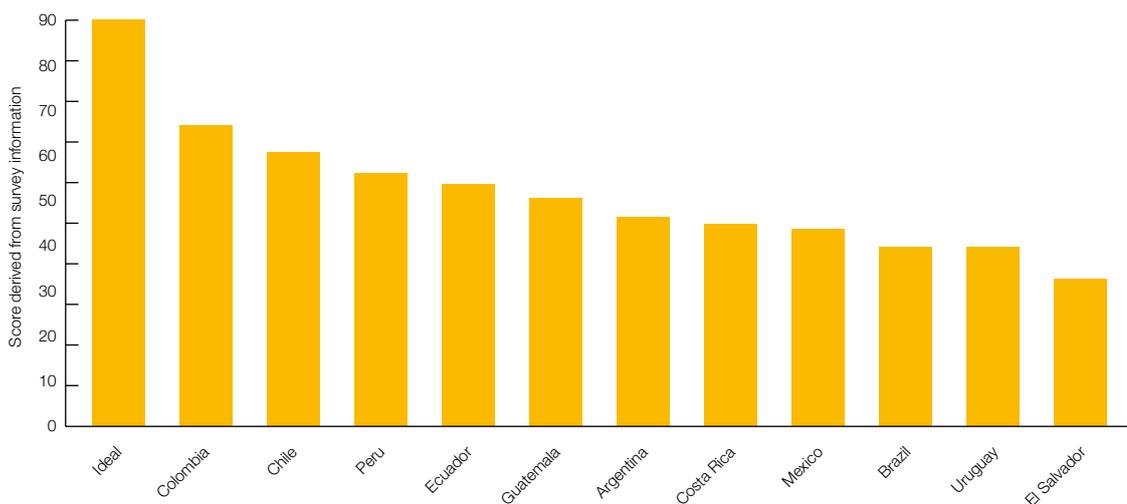
As recently noted in UN Habitat's New Urban Agenda, creating a culture of collaboration can help surmount the legacy of fragmented governance at the metropolitan scale. At the 2016 UN Habitat III conference in Quito, Ecuador, many participants shared experiences with these emerging coordination mechanisms, such as legal incentives for cooperation, new intermunicipal collaborative planning and development agencies, *mancomunidades* (a local entity within the national legal framework, to which member municipalities delegate some of their functions and powers), cost sharing arrangements for metro-wide service delivery, metropolitan-focused development funds, coordinated tax agreements, pooled financing, improved linkages between national and local government programs, and policies to ensure efficiency and reduce imbalance, among others. A key conclusion was that sharing and exchange on LEDS tools for innovation is still in the early stages.

### Multilevel governance challenges

Despite evolving innovative, horizontal, and vertical collaboration tools, many multilevel governance challenges remain for LEDS in LAC. As recently noted by the Intergovernmental Panel on Climate Change (IPCC), the majority of cities in the developing world lack the institutional, financial, and technical capacities needed to transition to low emission development pathways. The ability of subnational governments to create, implement, enforce, and finance policies for low carbon infrastructure depends to a great extent on powers permitted and mandated by national or provincial authorities.

Unfortunately, to date, cities and regions in LAC have not yet had notable influence on national climate governance frameworks. In general, the climate policy frameworks and financing have been characterized by an uncoordinated, top down approach. This fact is demonstrated by the results of a recent survey by the Climate Finance Group of Latin America on the Intended Nationally Determined Contribution (INDCs) and citizen participation in 11 countries (Figure 4).<sup>13</sup> It concluded that, even though each country in the analysis did comply with the delivery of an official INDC, the contributions did not represent an integrated vision of the country and were not produced with adequate public participation. The majority did not take into account the needs or proposals from the country’s most vulnerable sectors, nor did they consider domestic capacity to support comprehensive implementation of the mitigation and adaptation climate targets presented.

**Figure 4. General qualification of INDCs and citizen participation<sup>14</sup>**



Nevertheless, subnational governments undoubtedly play many key roles that can unlock and support decarbonizing national economies and improve climate resilience. Subnational governments understand local needs, are accountable to the local electorate, and manage crucial information on local vulnerability and potential LED hotspots. They can coordinate efficiently with residents to identify benefits, educate stakeholders, plan and implement projects, and address local conflicts. In addition, subnational governments can control land use, spatial layout, and individual behaviors (e.g. transportation and energy use) through taxes and fees. They are also well placed to collect and collate monitoring and evaluation information that is useful to inform data-driven decisions on investment priorities and drive adaptive management strategies.

It has been demonstrated that significant synergies and additional development impacts and co-benefits can be achieved by improving the coordination and vertical integration of data, actions, policies, investments, and monitoring across different levels of governance. The interplay of different levels of government can enable and accelerate climate action across many sectors, capturing additional co-benefits at multiple levels. For example,

in the Millennium Development Goals<sup>15</sup> work program as well the implementation of the Hyogo Framework for disaster risk reduction,<sup>16</sup> national targets were achieved more often when subnational governments assumed increased responsibilities in line with national objectives. Stemming from those successes, cities and subnational governments were identified as a critical axis for delivering both the post-2015 Sustainable Development Goals<sup>17</sup> and the Sendai Framework for Disaster Risk Reduction 2015–2030.<sup>18</sup> Each highlights the key roles of subnational governments, and the importance of mechanisms for coordination within and across sectors and stakeholders at all levels, in order to improve implementation and cooperation between international, regional, subregional, and transboundary organizations and initiatives.<sup>19</sup>

### 3.3 Synergistic climate actions and policies

Multilevel governance, understood as the synergistic interplay between institutions, levels of government, and civil society organizations that shape how policies and actions are defined and implemented, can involve vertical and/or horizontal interactions and may take numerous forms, driven by top down, bottom up, or hybrid institutional arrangements.

Dynamic multilevel governance can support every stage of the climate policy/action pathway, as well as virtually all infrastructure services—transportation, buildings, water, sanitation systems, solid waste management, energy systems, information and communication technologies, flood control, and cultural heritage, as well as human health and emergency systems, among others.

#### Objectives of multilevel governance climate actions

In a 2015 working paper by the LEDES GP Subnational Integration Working Group,<sup>21</sup> some of the objectives of multilevel governance and coordinated, integrated climate actions and policies were identified as follows:

- Raise national government ambitions for more aggressive greenhouse gas mitigation commitments.
- Help alleviate domestic political constraints.
- Scale up, as well as unlock, additional and new mitigation opportunities at the subnational level.
- Accelerate the effective implementation of national targets, strategies, and development priorities by ‘localizing’ them. This can also provide opportunities for bundled approaches and increasing co-benefits by linking local priorities with diverse development objectives.
- Improve the consistency of subnational and national climate data sets, strengthening measurement, reporting, and verification.
- Create a more bankable ‘low risk’ environment for infrastructure finance and private sector investments.

**Figure 5. MLG: Climate policy and action pathway<sup>20</sup>**



- Expand and accelerate the flow of international public and private climate finance to cities, urban infrastructure, and local priorities.
- Enable safe learning and strengthen domestic institutions.
- Address recognized challenges and limits to subnational climate actions by nonstate actors.
- Help address some of the persistent collective action challenges to multilateral climate agreements.

Despite this potential, improving multilevel governance is often neither clear nor easy, with expected and understandable tensions between jurisdictions, political parties, cultures, and administrative and financial structures. At the same time, some departments and institutions are rooted in long histories of structures and norms based on how funding is distributed and work plans are monitored, which can increase levels of effort and transaction costs when increased coordination is desired. As noted above, metropolitan regions comprised of abutting municipalities also provide particular challenges due to fragmentation and/or competition for scarce resources.

In the functionally ideal climate action framework, national, state/provincial, and municipal governments coordinate the pursuit of integrated, transformational domestic measures, in consultation with the private sector and civil society, to define and achieve official NDCs for global greenhouse gas emission reduction targets. The roles of transnational municipal networks and multilateral financial institutions must also be considered.

### **Mapping multilevel governance**

The fundamental first step for improving multilevel governance requires institutional mapping: the accurate identification of functions, responsibilities, and authorities. While this concerns political, legal, and financial boundaries, it also covers infrastructure services such as energy systems, water provision, or pollution controls. This process can also reveal new opportunities, but also gaps, the significance of which may risk subverting the original objective of the institutional mapping exercise (e.g. by reopening unresolved political divisions or highlighting past policy failures). The Organization for Economic Co-operation and Development (OECD) has written extensively about the challenges that confront countries when pursuing the multilevel governance of public policies.<sup>22</sup> These governance gaps (see Figure 6) apply to LEDS as well.

While coordinated and vertically integrated approaches to climate actions are still nascent, there are precedents for multilevel governance to deliver increased response capacities. For example, capital cities with high levels of political and economic leadership, such as Buenos Aires, Mexico City, and Santiago, commonly function as early administrators of national policies. In other cases, most notably in Mexico City, climate policy and legal frameworks developed and implemented in the capital preceded similar developments on a national scale. Specific examples are elaborated in Section 6.

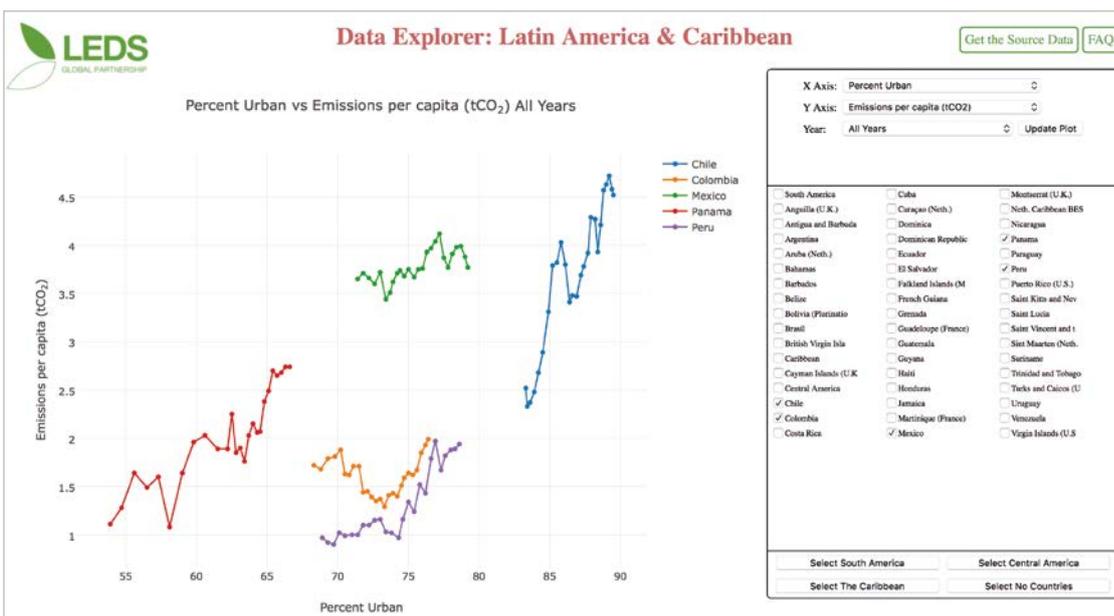
## **4 Situation analysis**

Relevant data on urbanization and CO<sub>2</sub> emissions have been collated for this report in an effort to support discussions on multilevel governance and the subnational integration of LEDS. As well as providing insights for a better understanding of subnational/national contexts, the data are also valuable for comparing trends between different countries and regions. This can calibrate objectives and ambition levels, as well as identifying partners for learning and sharing best practices. Towards this objective of creating a community of practice, this report includes a simple, web based [Data Explorer](#) that can be used to analyze current and historical relationships between population, urbanization, CO<sub>2</sub> emissions from the combustion of fossil fuels and cement manufacturing, and GDP.<sup>24</sup> For example, graphing the relationship between the growth of urban population and CO<sub>2</sub> emissions per capita reveals how both Mexico and Colombia have effectively urbanized with minimal increases in emissions per capita (Figure 7).

**Figure 6. OECD’s ‘Mind the gaps’ diagnosis tool for coordination and capacity challenges<sup>23</sup>**

Information gap	Asymmetries of information (quantity, quality, type) between different stakeholders, either voluntary or not <b>→ Need for instruments for revealing and sharing information</b>
Capacity gap	Insufficient scientific, technical, infrastructural capacity of local actors, in particular for designing appropriate strategies <b>→ Need for instruments to build local capacity</b>
Funding gap	Unstable or insufficient revenues undermining effective implementation of responsibilities at subnational level or for crossing policies <b>→ Need for shared financing mechanisms</b>
Policy gap	Sectoral fragmentation across ministries and agencies <b>→ Need for mechanisms to create multidimensional/systemic approaches at the subnational level, and to exercise political leadership and commitment</b>
Administrative gap	‘Mismatch’ between functional areas and administrative boundaries <b>→ Need for instruments for reaching ‘effective size’</b>
Objective gap	Different rationalities creating obstacles to adopting convergent targets <b>→ Need for instruments to align objectives</b>
Accountability gap	Difficulty in ensuring transparency of practices across different constituencies <b>→ Need for institutional quality measurement</b> <b>→ Need for instruments to strengthen integrity framework at the local level</b> <b>→ Need for instruments to enhance citizens’ involvement</b>

**Figure 7. Data Explorer: Results for relationship between growth of urban population and CO<sub>2</sub> emissions per capita in selected countries**



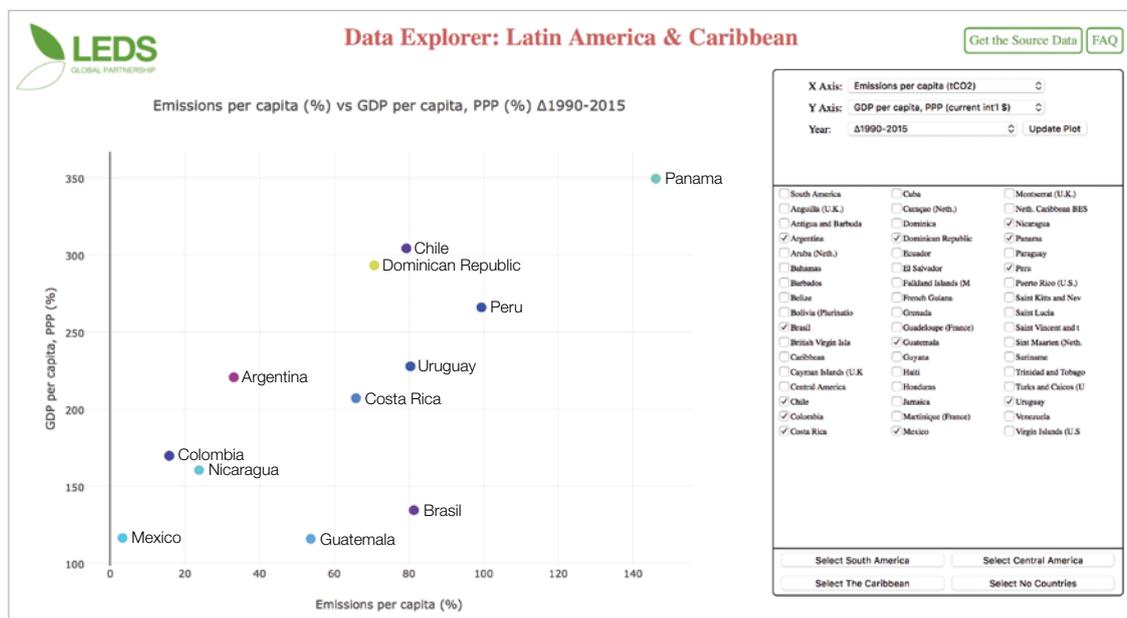
The data are available by country for individual years between 1990–2015 (in most cases); as a trend line stretching from 1990–2015; or as the percentage difference between 1990 and 2015 (see Table 2). In addition, the axis selection option allows for comparisons of novel ratios such as the change in urban population versus change in CO<sub>2</sub> emissions per capita, or the relationship between urbanization and CO<sub>2</sub> emissions of a country. Information on each variable (e.g. year, country) appears on hover. The entire data set can be downloaded in Excel.

Another comparison useful to facilitate insightful discussions plots the difference in CO<sub>2</sub> emissions per capita versus the difference in GDP per capita (as percentages) between 1990 and 2015 (see Figure 8). In both of these examples, Mexico and Colombia stand out compared with Chile, Peru, or Panama.

**Table 2. Data Explorer: Latin America and Caribbean**

Driving metrics	Outcome metrics
Country population	Country GDP (PPP) per capita
Urban population in country	Country CO <sub>2</sub> emissions per capita from fossil fuels and cement production
Percentage of country population that is urban	Carbon intensity of GDP (kg CO <sub>2</sub> /GDP)
Country population density (persons/km <sup>2</sup> )	
Country GDP (PPP) (current Intl.\$)	
Country CO <sub>2</sub> emissions from fossil fuels and cement production, excluding bunker fuels	

**Figure 8. Data Explorer: Results for difference in CO<sub>2</sub> emissions per capita versus difference in GDP per capita in selected countries**

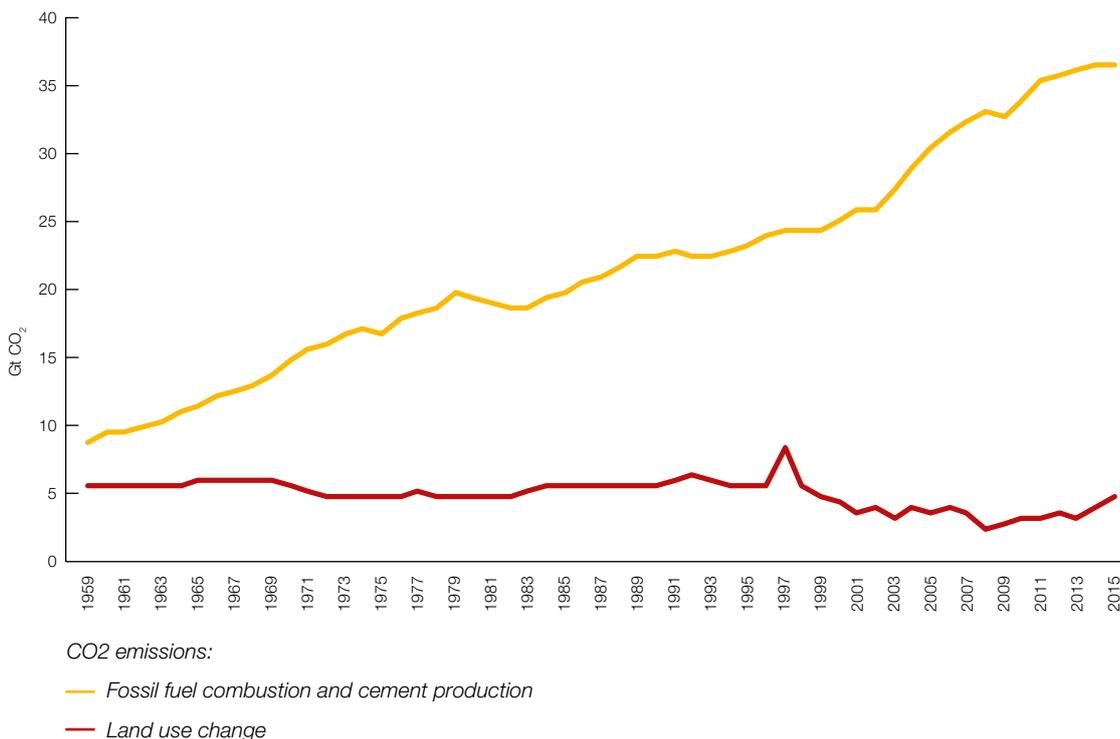


## 4.1 CO<sub>2</sub> trends

### Fossil fuels

The data on CO<sub>2</sub> emissions in this analysis are *not* the complete profile of a country's total greenhouse gas emissions. Rather, this report only considers the available, quantifiable, objective data for CO<sub>2</sub> emissions from the combustion of fossil fuels (primarily coal, fuel oil, or natural gas) and cement production as compiled by the Carbon Dioxide Information Analysis Center (see Figure 9).<sup>25</sup>

**Figure 9. Global emissions (Gt CO<sub>2</sub>)<sup>26</sup>**



Decarbonizing all flows of greenhouse gas is complex. While CO<sub>2</sub> emissions from land use and land use change are significant in many countries—and tropical forests represent critically important carbon sinks—a primary endeavor for LEDS is resolving growing urban dependency on fossil fuels and cement.

Stretching back to 1751, more than 1,437 Gt of CO<sub>2</sub> (1,437,000 Mt) globally have been released to the atmosphere from the combustion of fossil fuels and the production of cement.<sup>27</sup> Distressingly, more than 45% of this total has been put into the atmosphere since the year 1990.<sup>28</sup>

### Cement

Concrete is the primary building material of cities. Commensurate with current urbanization trends, today concrete is the second most consumed substance on Earth (the first is water).<sup>29</sup> The principal ingredient in concrete is cement.<sup>30</sup> In the past decade alone, global emissions from cement production have more than doubled. Accurately understanding the contribution of cement to greenhouse gas emissions is equally important to appreciating the impacts of fossil fuel consumption—especially as they relate to urbanization. In fact, advances in clean renewable energy far outpace progress towards ‘net zero’ cement.

Cement is made from limestone, which is heated to 1400°C and ground into clinker, then combined with gypsum to form cement. This process requires around 4.7 MMBTU energy per ton of cement produced. For example, it takes ±180 kg of coal to produce 1 ton of cement. The intensive energy that is generated to drive this process is an indirect source of CO<sub>2</sub> emissions.

But cement also generates direct emissions of CO<sub>2</sub> through the process of calcination. This occurs as limestone is heated and subsequently breaks down into calcium oxide and CO<sub>2</sub>. These direct process-related emissions are equal to or greater than the indirect emissions from the massive energy footprint in the cement manufacturing process.

### **Latin America and the Caribbean**

Between 1990 and 2015, the LAC region emitted more than 38,000 Mt CO<sub>2</sub> from the combustion of fossil fuels and the production of cement, not including bunker fuels.<sup>31</sup>

As a whole, LAC regional annual emissions have increased by almost 90% since 1990, while process-related emissions from the production of cement have increased over 115%, and emissions from gas fuels (e.g. propane and compressed natural gas) have increased 165%.<sup>32</sup>

The countries with some of the largest and smallest increases in CO<sub>2</sub> emissions from fossil fuels and cement production are shown in Tables 3 and 4.

## **4.2 Population trends**

### **National density**

Between 1990 and 2015, the population density of Central America increased by more than 51%, from 47 to 71 persons/km<sup>2</sup>. The population density of South America grew 41%, from 17 to 24 persons/km<sup>2</sup>. Impressively, the Caribbean on average added an additional 41 persons on every square kilometer of available land—growing from 152 to 207 persons/km<sup>2</sup> (see Table 5).

### **Urban population**

Between 1990 and 2015, the total population of LAC increased by 42%, from just over 445 million to around 630 million. Concurrently, the urban population of LAC increased by 60%. More specifically, while the total population of LAC increased by 185 million, the total urban population increased by more than 189 million. In 2015 alone, each week more than 133,000 new city dwellers were added to the urban population of LAC.

Today, LAC is the most urbanized region in the world, with 80% of the population living in cities.<sup>34</sup> This amounts to 503 million people living in cities, up from 314 million in 1990 (see Table 6). This population growth is supported by a unique endowment of energy and natural resources: LAC possesses 25% of the planet's arable land, 22% of the world's forest area, 31% of freshwater resources, and the largest proven fossil fuel reserves in the world (Venezuela).

### **Population rate of change: Total versus urban**

The UN Department of Economic and Social Affairs estimates that by 2030 the total population of LAC will have increased by 14%—an additional 91 million people. At the same time, the urban population will increase by well over 92 million more residents. This dynamic process is driven primarily by rural–urban migration as well as the intense urbanization process occurring in small and medium-sized cities throughout the region, and natural demographic growth in large metropolitan areas.

**Table 3. Percentage change in national CO<sub>2</sub> emissions from fossil fuels and cement production, 1990 vs 2015**

Largest gains (%)		Smallest gains (%)	
Country	(%)	Country	(%)
<b>CENTRAL AMERICA</b>			
Panama	295	Mexico	50
Honduras	267	Belize	74
Guatemala	181	Nicaragua	87
Costa Rica	169		
El Salvador	164		
<b>SOUTH AMERICA</b>			
Bolivia (Plurinational State of)	277	French Guiana	-3
Peru	185	Suriname	21
Ecuador	162	Falkland Islands (Malvinas)	60
Brazil	147	Colombia	72
Chile	143	Guyana	79
<b>CARIBBEAN</b>			
Turks and Caicos (UK)	1785	Aruba	-47
Anguilla (UK)	223	Curaçao (Netherlands)	-9
British Virgin Islands (UK)	179	Sint Maarten (Netherlands)	7
Saint Vincent and the Grenadines	171	Jamaica	8
Trinidad and Tobago	167	Cuba	23

Source: <http://ledsgp-data.netlify.com> (compiled data sources from UNDESA, CDIAC and IMF)

Since 1990, the total population of Central America has increased by 49%, while the urban population has increased 69%. Following the same trend, the statistics for South America are 40% versus 58%, and for the Caribbean 26% versus 53%. This means that in the Caribbean as a whole, the urban population is growing twice as fast as national populations.

It is also important to note that, while large metropolitan areas and capital cities in the region represent the most important economic growth poles in each country, the current role of small and medium sized cities (in rural areas or on the outskirts of metropolitan areas) in terms of urban population growth is significant. In fact, 50% of the urban population in LAC lives in cities of fewer than 100,000 inhabitants, and this trend is expected to continue.

In the majority of the 48 countries analyzed (excluding Montserrat),<sup>35</sup> the percentage change in urban population since 1990 was greater than the percentage change in total population of the country. In some cases the difference is quite large (see Table 7).

This has important implications for shifting governance dynamics, including increasing institutional capacity for responses across key infrastructure sectors such as transport, energy, water, waste

**Table 4. Percentage change in per capita CO<sub>2</sub> emissions from fossil fuels and cement production, 1990 vs 2015**

Largest gains (%)		Smallest gains (%)	
Country	(%)	Country	(%)
CENTRAL AMERICA			
Panama	146	Belize	-6
El Salvador	120	Mexico	3
Honduras	114	Nicaragua	24
Costa Rica	66		
Guatemala	54		
SOUTH AMERICA			
Bolivia (Plurinational State of)	132	French Guiana	-56
Peru	99	Suriname	-10
Chile	79	Venezuela	-10
Brazil	81	Falkland Islands (Malvinas)	7
Uruguay	80	Colombia	16
CARIBBEAN			
Turks and Caicos (UK)	732	Aruba (Netherlands)	-68
Montserrat (UK)	303	Curaçao (Netherlands)	-14
Grenada	169	Jamaica	-10
Saint Vincent and the Grenadines	169	Cayman Islands (UK)	-7
Trinidad and Tobago	142	Sint Maarten (Netherlands)	1

Source: <http://ledsgp-data.netlify.com> (compiled data sources from UNDESA, CDIAC and IMF)

management, buildings, and land use. As growing hubs of socioeconomic development, the proportion of national GDP output from cities is growing, and an increasingly significant amount of revenue is generated by city residents for national governments. Buenos Aires, for example, accounted for more than 52% of Argentina's GDP in 2008. Of the 16,000 cities in LAC, the 198 largest generated US\$3.6 billion, 60% of the total GDP of LAC in 2007. And in that year the 10 biggest cities in LAC generated US\$1.7 billion, 30% of the region's total.

Emerging impacts of decentralization (administrative, financial, and political) in LAC create debates on how best to finance and generate investments and revenue streams for subnational LEDS—whether through local to regional property tax revenues from land value capture, sales taxes, or future carbon pricing. Mexico and Chile are both working on carbon pricing strategies.

Shifts towards more decentralized systems (when supported by changes in consumer behavior, cross-scale planning, and policy) have exciting potential for enhancing LEDS and resilience, and increasing energy efficiency.

**Table 5. Percentage change in population density of nations, 1990–2015**

Largest gains (%)			Smallest gains (%)		
Country	pax/km <sup>2</sup> <sup>33</sup>	(%)	Country	pax/km <sup>2</sup>	(%)
<b>CENTRAL AMERICA</b>					
Belize	9–16	93	El Salvador	254–296	17
Guatemala	86–153	78	Nicaragua	35–51	47
Honduras	44–73	65	Mexico	44–66	48
Panama	34–53	59			
Costa Rica	61–95	55			
<b>SOUTH AMERICA</b>					
French Guiana	2–4	136	Falkland Islands (Malvinas)	1	0
Ecuador	42–65	58	Guyana	4	5
Paraguay	11–17	58	Uruguay	18–20	10
Bolivia (Plurinational State of)	7–10	57	Argentina	12–16	33
Venezuela	23–36	57	Suriname	3–4	35
<b>CARIBBEAN</b>					
Turks and Caicos (UK)	13–37	196	Montserrat (UK)	108–152	–52
Cayman Islands (UK)	105–250	140	Saint Vincent and the Grenadines	276–281	2
Netherlands–Caribbean BES	40–76	91	Dominica	95–97	2
British Virgin Islands (UK)	110–201	83	Virgin Islands (US)	295–304	3
Anguilla (UK)	93–163	75	Puerto Rico (US)		5

Source: <http://ledsgp-data.netlify.com> (compiled data sources from UNDESA, CDIAC and IMF)

### 4.3 GDP trends

Many countries in LAC have delivered impressive, rapid gains in GDP (see Table 8).<sup>36</sup> Much of this is ascribed to a boom in international commodity prices during the first decade of the 21st century, boosting the economic growth of commodity exporters.<sup>37</sup> For example, between 2003–2013 oil prices in current US dollars quadrupled, and metal prices tripled. In addition, food prices doubled and the price of agricultural products rose by 50%.

Rapid urbanization has undoubtedly contributed to much of the economic gain across LAC, but it cannot be said that rapid urbanization directly correlates to GDP growth. Nevertheless, new infrastructure has delivered jumps in productivity and decreased the costs of delivering basic services.

Unfortunately, the decade of abundance in the extractive sector, which started in the early 2000s, has reversed. Since 2011, commodity prices have plummeted, as have fiscal revenues and investment flows to the LAC region.

So while the rapid urbanization of cities in Latin America has delivered significant ‘easy’ productivity gains, GDP growth following rapid urbanization will require higher order economic clusters through good governance and investments in education, technology, new skills, and climate resilient infrastructure.

**Table 6. Percentage change in total urban population, 1990–2015**

Largest gains (%)			Smallest gains (%)		
Country	Percentage of population that is urban (1990–2015)	Percentage change in urban population since 1990	Country	Percentage of population that is urban (1990–2015)	Percentage change in urban population since 1990
<b>CENTRAL AMERICA</b>					
Costa Rica	50–77	150	Mexico	71–79	61
Honduras	41–55	132	El Salvador	49–67	63
Guatemala	41–52	129	Nicaragua	52–59	70
Panama	54–67	98			
Belize	47–44	72			
<b>SOUTH AMERICA</b>					
French Guiana	74–84	154	Guyana	30–29	8
Paraguay	49–60	103	Uruguay	89–95	18
Bolivia	56–69	100	Suriname	66	36
Falkland Islands	50–67	100	Argentina	87–92	36
Ecuador	55–63	85	Chile	83–90	46
<b>CARIBBEAN</b>					
Turks and Caicos (UK)	75–94	256	Saint Lucia	30–18	-17
Haiti	29–59	207	Antigua and Barbuda	36–24	0
Cayman Islands (UK)	100	140	Puerto Rico (US)	93–94	5
British Virgin Islands (UK)	38–45	117	Barbados	33–31	6
Dominican Republic	55–79	110	Trinidad and Tobago	9	10

Source: <http://ledsgp-data.netlify.com> (compiled data sources from UNDESA, CDIAC and IMF)

#### 4.4 Carbon intensity

Although decoupling economic growth from fossil fuel consumption is a major challenge, several attributes of urbanization present unique opportunities to decarbonize while continuing economic growth. Such attributes include population density, malleable social networks, green infrastructure, and the rise of the service economy, to name a few. Exploring the early lessons from declining carbon intensities in LAC can inform new subnational LEDS and NDC implementation roadmaps.

Across LAC, the combustion of gas fuels has increased by 165% since 1990 due to the many benefits of replacing coal and diesel in electricity generation and motor vehicles with natural gas, including cleaner combustion and reduced particulates, along with price. This has also delivered a reduction in the carbon content of energy.

However, context is critically important when discussing carbon intensity: reducing fossil fuel consumption and associated greenhouse gas emissions must remain paramount. Eventually, the gains from the rise in the use of gas fuels replacing coal and diesel levels out. And with the latent value of service markets and the

**Table 7. Most significant difference in population change, 1990–2015**

Country	National population (%)	Urban population (%)
Haiti	49	207
Costa Rica	62	150
Turks and Caicos (UK)	183	256
Dominican Republic	47	110
Honduras	72	132
Falkland Islands (Malvinas)	50	100
Guatemala	83	129
El Salvador	20	63
Panama	60	98
Bolivia (Plurinational State of)	62	100
Paraguay	65	103
British Virgin Islands (UK)	81	117
French Guiana	124	154
Ecuador	60	85
Brazil	36	58
Saint Vincent and the Grenadines	1	22
Peru	43	63

Source: <http://ledsgp-data.netlify.com> (compiled data sources from UNDESA, CDIAC and IMF)

knowledge economy still set to grow in many countries, continued spectacular increases in GDP can pervert carbon intensity data. Decreasing carbon intensities do not represent the successful achievement of carbon budgets or the reduction of emissions below critical ceilings and climate change thresholds. It can be misleading to celebrate falling carbon intensities while total CO<sub>2</sub> emissions continue to increase. For example, while the carbon intensity of the economies in Chile and Panama decreased impressively between 1990–2015 (by –56% and –45%, respectively; see Table 9), their annual CO<sub>2</sub> emissions from fossil fuels and cement have skyrocketed by +143% and +295%.

Further analysis of the current trends of CO<sub>2</sub> to GDP ratios will clarify the associations between urbanization and carbon intensity, especially with multiple factors driving investments in cleaner and more affordable energy systems. Nevertheless, to sustain reductions in carbon intensity, increased mass public transportation, electrification of the transport sector, a cleaner power system that can absorb new transport demand, renewable energy for the desalination of water, and grid integration across regional economies will all be critical.<sup>38</sup>

**Table 8. Change in GDP per capita PPP, 1990–2015 (current Intl.\$)**

Largest gains (%)			Smallest gains (%)		
Country	1990–2015 (Intl.\$)	(%)	Country	1990–2015 (Intl.\$)	(%)
<b>CENTRAL AMERICA</b>					
Panama	4,865–21,865	349	Guatemala	3,587–7,743	116
Costa Rica	4,875–14,972	207	Mexico	8,216–17,784	116
El Salvador	2,879–8,240	186	Honduras	2,041–4,874	139
Belize	3,303–8,750	165			
Nicaragua	1,923–5,008	160			
<b>SOUTH AMERICA</b>					
Chile	5,831–23,567	304	Venezuela	9,397–16,481	76
Guyana	1,902–7,127	275	Paraguay	3,868–8,670	124
Peru	3,413–12,488	266	Brazil	6,687–15,675	134
Uruguay	6,536–21,418	228	Ecuador	4,765–11,300	137
Argentina	7,192–23,057	221	Suriname	6,703–16,588	148
<b>CARIBBEAN</b>					
Trinidad and Tobago	7,921–32,892	315	Haiti	1,306–1,768	35
Dominican Republic	3,574–14,053	293	Bahamas	15,281–23,624	55
Saint Vincent and the Grenadines	3,639–11,055	204	Jamaica	5,284–8,762	66
Grenada	4,677–13,093	180	Saint Lucia	5,942–10,973	85
Saint Kitts and Nevis	9,415–25,073	166	Barbados	8,641–16,153	87

Source: <http://ledsgp-data.netlify.com> (compiled data sources from UNDESA, CDIAC and IMF)

**Table 9. Percentage carbon intensity, 1990–2015 (kg CO<sub>2</sub>/\$ GDP)**

Country	(%)
Belize	-65
Suriname	-64
Argentina	-58
Guyana	-57
Colombia	-57
Dominican Republic	-56
Chile	-56
Nicaragua	-52
Mexico	-52
Venezuela	-49
Costa Rica	-46
Peru	-46
Jamaica	-46
Panama	-45
Uruguay	-45
Trinidad and Tobago	-42

Source: <http://ledsgp-data.netlify.com> (compiled data sources from UNDESA, CDIAC and IMF)

## 5 Greenhouse gas targets: LAC

There are several reports that present details of the NDCs of the countries in LAC. The only UN country in LAC that has not submitted an NDC is Nicaragua. Table 10 summarizes the NDCs with explicit targets for greenhouse gas emission reductions (both conditional and unconditional), along with a snapshot of registered commitments from nonstate actor cities and regions.

**Table 10. Summary of greenhouse gas emission reduction targets in LAC**

Country	NDC greenhouse gas target reduction			NAZCA		Climate Initiatives Platform pipeline	
	(%)	By year	Versus	Cities	Regions	Cities	Regions
Argentina	18	2030	BAU	58		(1) Buenos Aires	
Bahamas	30	2030	BAU				
Barbados	37	2025	BAU				
	44	2030	BAU				
Belize	62	2030	BAU				
Bolivia	–			1			
Brazil	37	2025		38	10	(4) Rio de Janeiro, Sao Paulo, Belo Horizonte, Florianópolis	(4) Mato Grosso, Minas Gerais, Rio de Janeiro, Sao Paulo
	43	2030	2005				
Chile	30 per unit of GDP	2030	2007	7			
Colombia	20	2030	BAU	14	2	(2) Bogota, Monteria	
Costa Rica	25	2030	2012	2			
	Up to 40	2030	2012				
Dominica	44.7	2030	2014				
Dominican Republic	25	2030	2010	1			
Ecuador	20.4–25	2030	BAU	2	1	(1) Quito	
Grenada	30	2025					
	40	2030	2010				
Guatemala	11.2	2030	2005	1			
	Up to 22.6	2030	2005				
Haiti	5	2030	BAU				
Honduras	15	2030	BAU	1			
Jamaica	7.8	2030	BAU				
Mexico	22	2030	BAU	24	10	(5) Cuernavaca, Hermosillo, León de los Aldamas, Puebla, Toluca de Lerdo	(3) Baja California, Jalisco, Yucatán

Panama	–			5			
Paraguay	10	2030	BAU	1			
Peru	20	2030	BAU	4	6		
	Up to 30	2030	BAU				
Saint Kitts and Nevis	22	2025	BAU				
	35	2030	BAU				
Saint Lucia	16	2023	BAU				
	23	2030	BAU				
Saint Vincent and the Grenadines	22	2025	BAU				
Trinidad and Tobago	30 in public transportation	2030	2013				
	15 in total greenhouse gas	2030	2013				
Uruguay	25 CO <sub>2</sub> per unit of GDP	2030	1990				
Venezuela	–			2			

Note: BAU = Business as usual

Source: NDC Registry – UNFCCC ([https://unfccc.int/focus/ndc\\_registry/items/9433.php](https://unfccc.int/focus/ndc_registry/items/9433.php))

## 6 Select cases: Multilevel governance and climate policies/actions in LAC

To demonstrate the importance and effectiveness of subnational integration in shaping how climate policies and actions are implemented, some examples are presented from Mexico, El Salvador, Guatemala, Chile, Colombia, Argentina, Antigua and Barbuda, Dominican Republic, and Jamaica.

Some of the queries to guide the desktop research and stakeholder interviews included the following.

- How are national and subnational governments working together on LEDS/NDCs? What is the ‘interplay’ between different levels of government and institutions?
- Where is the coordination happening?
- What are potentially effective coordination mechanisms for interinstitutional and cross scale/sectoral/national LEDS LAC approaches?
- Who is taking the lead on subnational integration action and investment?
- Did the multilevel governance have an impact on:
  - organizational structures
  - budget and asset management
  - enhanced mobilization of endogenous resources
  - integrated urban planning
  - inclusive service delivery
  - enforcement of legal frameworks
  - promotion of economic and social development as well as gender responsive planning and budgeting.

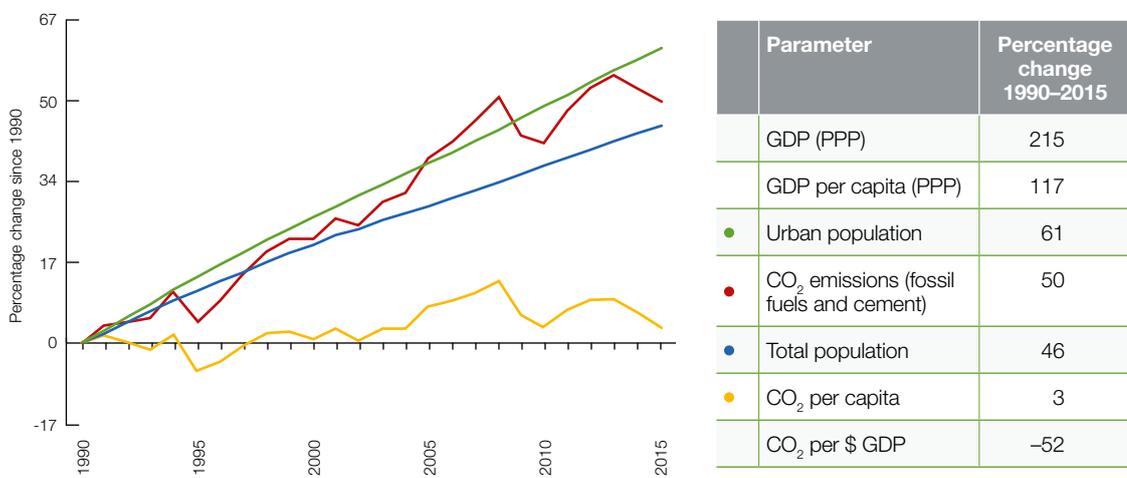
In the sampling of subnational integration examples, whether top down, bottom up, or horizontal, we tried to consider:

- If/how climate policies/actions are crossing policy gaps?
- If/how policies are engaging, enabling, and/or motivating climate action?

### 6.1 Mexico

The legal and institutional framework for climate change in Mexico is one of the most robust in all of Latin America, and the multilevel governance actions of Mexico City were instrumental for the passage of the General Law on Climate Change in 2012, which was then followed by the National Climate Change Strategy in 2013.

**Figure 10. Mexico—NDC greenhouse gas target: 22% by 2030 versus BAU**



Source: <http://ledsgp-data.netlify.com> (compiled data sources from UNDESA, CDIAC and IMF)

Impressively, Mexico’s CO<sub>2</sub> emissions per capita (from fossil fuels and cement production) rose only 3% between 1990 and 2015.

Often there are competing development priorities at the local level, including providing basic services and improving environmental health and safety. Local authorities are often faced with a relatively complex decision environment and significantly fewer resources than state or national level counterparts.

However, at the same time, subnational governments have led early climate policy and actions. Prior to comprehensive and ambitious climate policies at the national level, climate governance was principally led by local and state governments in Mexico, even though they have been constrained in their ability to influence state and national climate policies due to barriers of limited coordination, central execution, and authority. Typically, municipal governments have limited influence and legislative powers to reduce greenhouse gas emissions (e.g. in terms of owning/operating infrastructure systems, setting/enforcing policies, controlling relevant budgets, and setting vision).

One example of the interplay and overlap of government jurisdictions related to LEDS is the Metropolitan Area of Mexico City. Authority here is fragmented among the Federal Government with its seat in the Federal District, individual national ministries, the State of Mexico with its governor, 35 separate con-urbanized

(abutting) municipalities, and the 16 delegations of the Federal District (which functions as a quasi state with its own governor).

In recent history, neoliberal reforms in Mexico have devolved some additional responsibilities to the state and local levels. While this allowed state and local authorities to begin planning and undertaking actions to deal with environmental issues, overall coordination and central execution and authority have been lacking until more recently.

For the Federal District government, there has been relatively recent and significant institutionalization of climate change governance, including the creation of a Climate Change Division within the Ministry of Environment. This division is responsible for the accounting and monitoring of greenhouse gas emissions at the local level. It has had full responsibility for the development and implementation of the Mexico City Climate Action Plan, with its existence now sustained over multiple electoral cycles, therefore allowing for more formal organizational structures and stakeholder support, which have helped to mainstream climate action expertise, planning, and funding.

In 2010, the Mexico City Federal District passed the Law for Mitigation and Adaptation to Climate Change (Mexico Federal District General Assembly, 2010), supported by the Climate Change Division of the Ministry of Environment. However, distinct implementation, capacity building, and finance challenges remained, due to fragmented governance arrangements, asymmetries in access to information, and top down and technocratic decisionmaking.

One interesting component of the Federal District's Climate Change Act was the establishment of climate change as a line item in the city's budget. This was an important step to institutionalize climate action as part of the city's development and investment activities.

Overall, it was Mexico City's early efforts that helped to inform the 2012 General Law on Climate Change passed by the Mexican Federal Government, which sets the NDCs and national greenhouse gas reduction targets. At the same time, Mexico City's targets and commitments (30% reductions by 2020 using a 2008 baseline) outpace the national level's unconditional NDC target of a 22% reduction by 2030.

In fact, in January 2016, as part of the reform effort to decentralize power and move towards statehood, the Mexico City Federal District formally changed its name to Mexico City, moving the city towards becoming a state in its own right.

Mexico's General Law on Climate Change, issued in 2012, defines planning and policy instruments, and institutional arrangements, and provides general guidance for the implementation of climate policy. It also incorporates a long term, systematic, decentralized, participatory, and integrated approach to adaptation and mitigation actions. Under the General Law on Climate Change, the Federal Government is mandated to formulate and guide national climate change policy. The role of subnational governments is also specified, including the elaboration of state level inventories and climate programs. To coordinate action at the subnational level, the Federal Congress is part of the National Climate Change Strategy, as well as the States and National Association of Municipal Officials. This Association is composed of the Mexican National Confederation of Municipalities, the Mexican Association of Local Authorities, and the National Association of Mayors.

As part of the National Climate Change Strategy, state governments were encouraged to develop State Climate Change Action Programs (Programas Estatales de Acción ante el Cambio Climático, PEACC). One

of the objectives of this approach was to generate ties between state and local municipal climate change planning and actions, within the general framework of the National Strategy. To date, 17 of the 32 Mexican states have completed their plans, and all others are in various stages of preparation. The PEACC highlight both intersectoral and multilevel governance, requiring they require the creation of intersectoral commissions with representation of all pertinent state level departments. The PEACC strive to integrate municipal level concerns and existing action frameworks. All municipalities are being encouraged to develop their own complementary local climate change strategies for the future.

Financing challenges have limited both the development and implementation of PEACC in Mexico. To date, there has been a heavy dependence on international funding by bilateral and multilateral development organizations, mixed with limited federal and state funds in order to finance the PEACC. Innovative funding models and finance flows that involve multilevel coordination and multisectoral participation are a much needed stepping stone to unlock the potential for transformational climate actions in Mexico.

Another example of multilevel governance to accelerate climate action is taking place on the Yucatan peninsula, where a horizontal collaboration of three Mexican states (Yucatan, Campeche, and Quintana Roo), along with intermunicipal networks, have associated through the PEACC generation processes. Strong cultural ties on the 'Mayan Peninsula' have historically established strong levels of coordination among the three states on various social, environmental, and economic issues. For example, during the 2010 UNFCCC COP 16 in Cancun, a peninsula-level dialogue began that created a climate action strategy initially based on three strategic areas of cooperation: conservation of the Yucatan jungles; water security and access; and coastal protection. Since then, these programs have been supported through different multilateral initiatives, international organizations, and programs, including REDD+, Japanese and Spanish international cooperation, the Inter-American Development Bank (IADB), the United Nations Development Programme, and the World Bank. Implementation of these programs' activities has required close coordination between the various international organizations, the Federal Government of Mexico, and the three states of the Yucatan peninsula, along with the substantial involvement of intermunicipal associations, local communities, and academia.

One innovative initiative of this multilevel governance coordination is the Yucatan Peninsula Climate Action fund (YPCA). This fund, established between the three states and supported by the World Bank, was launched in September 2016. The YPCA is nongovernmental and will be managed and administered by a consortium of three public universities, one from each state. Funding comprises a combination of state funds, the World Bank's Forest Carbon Partnership Facility, and social investment seed capital from the private group, Althelia Ecosphere. The YPCA represents a creative public-private partnership model that is designed to attract, manage, and distribute resources for climate change mitigation and adaptation actions. Because it is being administered by universities, the fund achieves a high standard of transparency and prioritizes specific actions (e.g. greenhouse gas emission reductions, reducing deforestation, restoration of ecosystems, coastal protection). The YPCA represents a flexible financial partnership because it will function as a financial intermediary, develop project portfolios, and provide technical assistance, as well as being capable of operating through reimbursable funds, grants, guarantees, and facilitating access to financial services.

According to Mr Roberto Illich Valluejo, Director of Sustainability Planning and Policy for the Secretariat of Urban Development and Environment for the Yucatan State of Mexico:

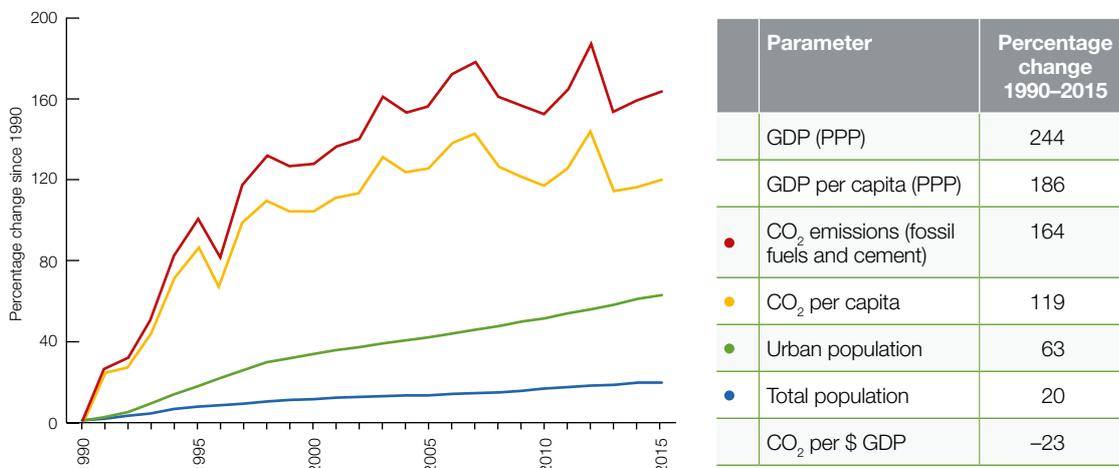
Strong political will and support is a major factor for success on the peninsula. There is a high level of cooperation, information sharing and mutual support between the three states regarding

policy creation. The YPCA will aid the implementation of climate change strategies that are already aligned between Yucatan, Campeche, and Quintana Roo, and will also assist in further strengthening ties with local municipalities and communities in order to increase adaptive capacity, disaster preparedness, forest conservation, greenhouse gas reduction, and water management capabilities throughout the Yucatan peninsula.<sup>39</sup>

## 6.2 El Salvador

Historically, El Salvador, like most Central American countries, has had a high dependence on oil and other fossil fuels for its energy production. However, as demonstrated in Figure 11, El Salvador is also Central America’s largest producer of geothermal energy: by 2010, more than 20% of electricity generation was from geothermal and a further 38% from hydroelectricity. Unfortunately, for many years of oil-based transportation has resulted in heavy CO<sub>2</sub> emissions. The country has also demonstrated vulnerability to international economic crises: the Mexican financial crisis of 1995 and the 2008 global financial crisis both clearly influenced energy and emissions. The lull in emissions at the turn of the century could also be associated with manufacturing operations moving to Mexico and Asia as a result of the North American Free Trade Agreement and the Asian financial crisis, respectively. During the late 1990s, and similarly to other Central American countries, El Salvador underwent a marked process of privatization of its primary utilities sector, in which the national government sold most primary energy production activities to private, transnational companies.

**Figure 11. El Salvador—NDC greenhouse gas target: N/A**



El Salvador is vulnerable to the impacts of extreme weather events and climate change, including hurricane events, sea level rise, and increasing flooding and droughts. Adaptation actions, and specifically disaster risk reduction and response, are clear priorities for El Salvador as demonstrated by the Ministry of Public Works. For example, in recent years, in partnership with local municipalities, the Ministry has implemented multiple projects designed to mitigate the impacts of flooding from rivers, including risk mapping exercises. This was realized with close participation from local governments and communities, which together organized the relocation of entire neighborhoods from high risk areas that were vulnerable to mudslides and flooding due to erosion. The Ministry has also implemented new erosion control infrastructure that has increased protection of neighboring populated areas. In an interministerial collaboration between the Ministry of Public Works and the Ministry of Environment, ecological restoration programs have been implemented

(such as the National Ecosystem and Landscape Restoration Program), focusing primarily on deforested areas and deteriorated mangrove forests. These areas serve as natural barriers to hurricanes and sea level rise, as well as providing for the subsistence and economic development of local populations. The implementation and coordination of such projects represent precedents for potential new activities on the vertical coordination of LEDS via a past history of collaboration between national ministries, local governments, and local communities.

Beginning in 2007, a clear decoupling process has occurred in El Salvador, in which GDP continues to grow (barring the effects of the 2008 crisis), while per capita and energy based emissions rates fall and level off. This has coincided with the formation of the National Energy Council, made up of a series of national ministries that have coordinated a new strategic line of work on energy planning, which culminated in the National Energy Policy 2010–2014. The primary objectives of the policy have been to increase energy efficiency and autonomy through an increase in nonconventional renewable energy (NCRE) within the national matrix, in order to decrease dependence on fossil fuels, as well as to strengthen the role of the state in strategic energy development in the country. For example, since 2007, El Salvador has been increasing renewable energy generation capacity, including from resources ranging from geothermal energy to wind, hydropower, and biomass. Ethanol is also exported to the United States. At the same time, increasing energy prices have motivated private companies to employ different forms of NCRE for their own operations. The National Energy Council has produced effective user manuals for a number of different sectors, enabling those interested in employing energy efficiency and NCRE development strategies to do so with public guidance.

In terms of energy efficiency, large cities in El Salvador have also begun to change their public lighting systems to LED technology. In recent years, El Salvador has been forced to curtail unsustainable subsidies that historically were provided for energy consumption, both of electricity and propane gas for cooking. The removal of these subsidies has provided an incentive for higher levels of efficiency and reduced consumption among both the general population and the private sector.

In terms of energy governance, there is a balance of state owned and private operators. For example, all transmission is owned and operated by the government owned Empresa Transmisora de El Salvador, while distribution is controlled by five privately owned companies. Similarly, 18 of the 22 active generation plants (as of 2006) were held in private hands (including 11 generation companies), while 97% of hydroelectric capacity was owned by a public company. According to Salvador Nieto, Coordinator of the Dominican Republic–Central America Free Trade component of the Regional Climate Change Program of CATIE (the regional Tropical Agricultural Research and Higher Education Center) and former UNFCCC representative of El Salvador within the Ministry of Environment:

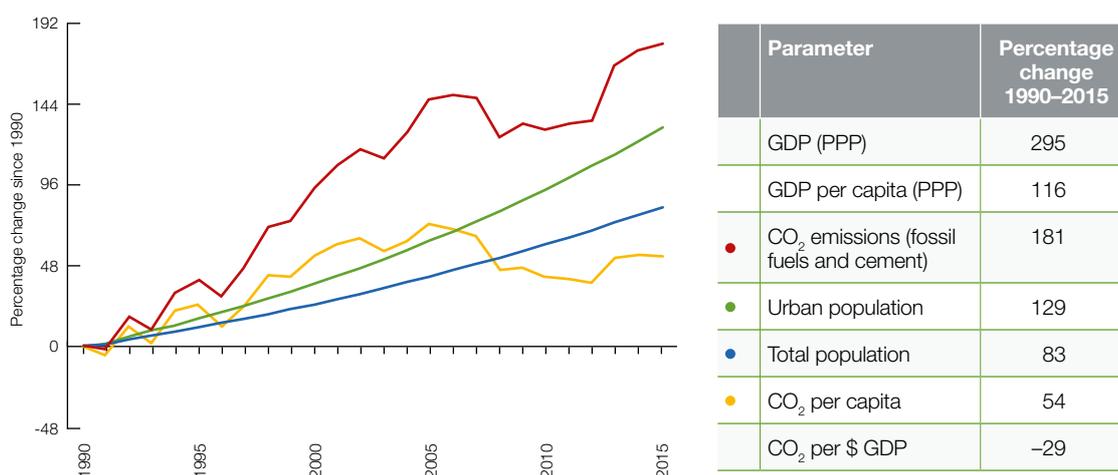
There has been improvement in the energy sector as a result of the National Energy Policy, but there is still much more to be done. As energy technology and solutions are still primarily market driven in El Salvador, it is necessary to create the conditions that provide the private sector with options to reduce their emissions through a balance of incentives and regulations, coordinated through sound energy policy implemented by the state.

### 6.3 Guatemala

Guatemala is extremely exposed and vulnerable to the impacts of climate change. These include hurricanes and tropical storms, droughts, floods, extreme cold temperature waves, and wide climate variability due to El

Niño–Southern Oscillation events. Between 1.3% and 3.7% of total national GDP is lost each year due to the impacts of severe weather, with the agricultural sector suffering most. Disaster risk reduction, food security, human health, and security are the priority climate planning issues for Guatemala.

**Figure 12. Guatemala—NDC greenhouse gas target: 11.2% by 2030 versus 2005; up to 22.6% by 2030 versus 2005**



Guatemala is one of the few countries in LAC that has developed a legal framework to address climate change. The Framework Law for Regulating the Reduction of Vulnerability, Obligatory Adaptation to the Effects of Climate Change, and the Mitigation of Greenhouse Gases was passed in 2013. This law followed the National Climate Change Policy of 2009, which established the primary objectives and responsibilities for different actors and agents in Guatemala regarding vulnerability reduction, adaptation, mitigation, and the development of carbon markets. The primary objective of the law is to establish regulations to prevent, plan, and respond to climate change impacts, providing a sense of urgency and stressing the importance of developing coordinated and sustained response mechanisms.

One of the most innovative elements of the law is the extent to which it highlights and includes different sectors and levels of Guatemalan society in both the planning and implementation of climate adaptation and mitigation actions. One way this is accomplished is through a clear institutional structure established with the creation of the Vice-Ministry of Natural Resources and Climate Change, including the Climate Change Department, within the Ministry of Environment and Natural Resources (MARN). This institutional structure is responsible for developing and implementing policies, plans, programs, projects, and strategies aligned with the framework law.

The 2013 law also established the National Climate Change Council. This council has the responsibility of regulating and supervising the implementation of actions as well as conflict resolution. This includes monitoring the implementation of climate actions specified by the law. The council is a strong example of intersectoral collaboration and multilevel governance as it is comprised of members of the Presidential Council and the Ministries of Environment and Natural Resources, Agriculture, Livestock and Food, Energy and Mining, Communications, Infrastructure, and Housing, along with other government and public sector institutions. In addition, the council includes representatives of indigenous and farmers' organizations, the

National Association of Municipalities, several industrial and private sector associations, and representatives of NGOs and Guatemalan universities.

One key role of the National Climate Change Council is regulation of the National Climate Change Fund, also established by law and managed by MARN. The objective of the fund is to finance plans, programs, and projects related to risk management and vulnerability reduction, adaptation, and mitigation; as well as capacity building, protection of ecosystem services, water production, and biodiversity conservation, among others. The fund is supported by several sources, including income from the payment of compensation for greenhouse gas emissions required by the new law, debt for climate action schemes, both national and international cooperation funds, direct funding from the national budget, and other potential sources compliant with Guatemalan law.

The framework law also stimulates the integration of climate change adaptation and mitigation into local land use planning instruments in two major ways. First, it instructs MARN, the Ministry of Agriculture, Livestock and Food, and the Presidential Planning Secretariat to aid local municipalities and urban and rural development councils in the modification of their land use planning instruments in order to integrate climate adaptation and greenhouse gas mitigation considerations aligned with the law and the National Communications of Guatemala to the UNFCCC. Specifically, Urban and Rural Development Councils are formal entities, recognized by the Guatemalan Constitution, which are made up of community representatives charged with local development.

The second way was to produce guidelines to support strong climate policies and actions in urban and rural development. In 2013, MARN and the Ministry of Agriculture published two technical and practical guides for local governments. The first focused on 'Technical orientation for institutionalizing environmental and risk management in municipal processes';<sup>40</sup> the second on 'Climate change and its inclusion in municipal land use plans.'<sup>41</sup> This multilevel governance dynamic supports strong integration between local land use plans and national objectives and strategies, as well as providing an incentive for local governments to receive training on how to integrate climate change into planning. This incentive is achieved through Article 10 of the framework law that establishes the right of the Urban and Rural Development Councils to integrate climate change considerations into their development policies, plans, programs, and projects, and—most importantly—that the Presidential Planning Secretariat and the Ministry of Public Finance are to provide priority funding to those public entities that have included climate policies and actions in these plans, programs, and projects.

Such incentives can adapt to the approaches and methodologies for climate smart land use planning and management. For example, in 2015–2016 the International Union for the Conservation of Nature utilized a unique methodology for community water planning and management with a micro-basin approach. The integrated and participatory micro-basin management model involved the participation of municipal authorities and local communities, government agencies, the private sector, and civil society, and resulted in strategic alliances in the form of micro-basin councils that produced collaborative detailed management plans. These micro-basin councils are based on the legal figure of the Local Development Councils and therefore have both legal and local legitimacy.

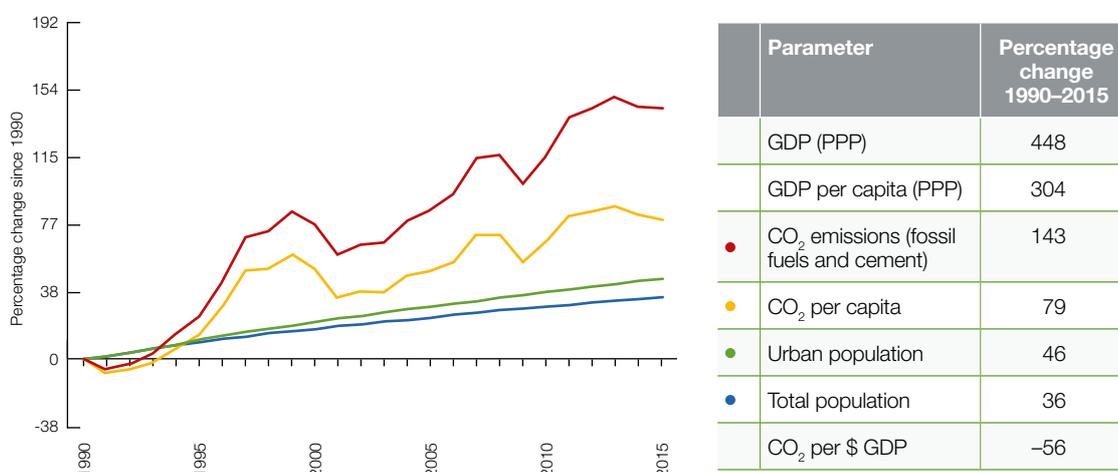
Guatemala has been a pioneer in international voluntary carbon trading markets (including programs such as REDD+), and has stimulated participation in international carbon market mechanisms under the framework law. In this way, the law established a formal registry of certified greenhouse gas reduction projects and their legal ownership. The effort is regulated by MARN and allows private individuals, organizations, and public entities (such as local governments) legal ownership of carbon reduction projects and eligible to participate

in international carbon markets. In fact, an early experience in 2011 (before the framework law) included the direct participation of the local municipal governments of San Jose and San Francisco. These municipalities benefited from the purchase of bonds by the Global Carbon Group based on their participation in forest conservation efforts through AGEXPORT, a private nonprofit Guatemalan agricultural export advocacy group. This was one of the first experiences in Latin America that directly involved a local government in a carbon trade transaction.

These examples of multilevel governance and intersectoral collaboration in Guatemala are directly due to the creation of a legal and institutional environment for climate change planning and action.

## 6.4 Chile

**Figure 13. Chile—NDC greenhouse gas target: 30% per unit of GDP by 2030 versus 2007**



Historically, Chile has had a relatively centralized form of governance, where the subnational levels of government (e.g. provincial and municipal) have functioned primarily as administrators of top down national policies. For example, climate action planning activities in the capital city Santiago have generally been less autonomous due to operating in this more centralized system. This is illustrated by the limited information on municipal level greenhouse gas reduction targets, compared with the clear targets set at the national level.

There has been a trend – starting in the 1990s – away from political volatility in favor of greater decentralization, liberalization, and democratization. These trends are also influencing the evolution of multilevel governance dynamics as it relates to LEDS and local development priorities.

In recent decades, Chile’s macroeconomic growth has been one of the strongest and steadiest in Latin America. But this growth has also increased energy demand and production, including a doubling of electricity production from coal resources between 2000 and 2010. And since the energy intensive mining industry is a large part of the economy, Chile is a net importer of fossil fuels. Today, the population of Chile is more than 90% urban, and soaring demand from increases in GDP per capita, city expansion, and increased consumption has led to high electricity prices.

The crosscutting problem of increasing capacity and improving energy efficiency has challenged development for years.

To date, economic growth and the increasing use of coal fueled energy generation has resulted in increasing emissions from energy. At the same time, slumps in the growth of per capita and energy based emissions rates were clearly visible during the initial period of economic deceleration from 1999–2003, beginning with the economic recession in 1999, which had a profound impact on the manufacturing sector. Starting in 2004, Chile also experienced another period of sustained GDP growth, interrupted only by the effects of the 2010 earthquake. With some of the highest utility bills in the world, and a history of energy crises resulting from dependence on fossil fuel imports, the country has recently shifted its energy policy towards prioritizing renewables. Interestingly, beginning in 2012, per capita and energy based emissions rates began to decline, displaying increased potential for decoupling greenhouse gas emissions from economic growth. This trend is most likely a result of recent changes to Chile's energy policy, resulting in a significant influx of foreign direct investment in NCRE projects, led by the flourishing solar energy market. Overall, clean power investments increased by 151% between 2004 and 2015.

In recent years, Chile has started to take ambitious and concrete steps towards increased energy autonomy and efficiency at the national level. This has included the passage of the 20/25 Energy Law in 2013 (formalizing a 20% renewables target by 2025); the unconditional NDC commitment to decrease the carbon intensity of GDP by 30% below 2007 levels; and recent approval of the national Energy Policy 2050, which includes a 70% renewables target by 2050. New public–private partnership models, combined with streamlined concessions and readily available low interest loans, have resulted in more investment in renewables in the past four years than the total investment in this sector over the past 20 years. In fact, from 2013 to 2015 the total installed capacity of NCRE shot up from 6.3% to 11.4%, and as of February 2016 was hovering at 9.7%.<sup>42</sup> While significant challenges remain regarding the construction of adequate infrastructure to support the newly evolving power grid needed to sustain the burgeoning solar sector, such progress is already reflected in the continued decoupling of GDP growth and emissions rates.

With respect to the agriculture and land use change sector, the net contribution to greenhouse gas emissions is negative since its ability to capture CO<sub>2</sub> exceeds its emissions. Carbon sinks are mainly from second growth natural forest, from the regeneration of managed native forest, and from mostly exotic forest plantations. Due to the contribution to mitigation capacity from the 'land use, land use change, and forestry' sector in its NDC, Chile shows a specific contribution for this sector associated with sustainable forest management and recovery. As a key instrument to meet this forest related goal, the National Forestry Corporation (Corporación Nacional Forestal, CONAF) is formulating and implementing the National Strategy on Climate Change and Plant Resources (Estrategia Nacional de Cambio Climático y Recursos Vegetacionales, ENCCRV) in order to establish a legal, technical, operational, and financial platform to regulate and promote the conservation, recovery, and rational use of plant resources. This strategy utilizes an approach that contributes to mitigation and adaptation to climate change, and to the consequent desertification, drought, and land degradation processes, with an emphasis on those territories with greater social, economic, and environmental vulnerability in the country.

On an institutional level, the National Climate Change Action Plan 2008–2012 (Plan de Acción Nacional de Cambio Climático, PANCC) established the primary strategic objectives and lines of climate action for the country, while also creating the Climate Change Department within the Ministry of Environment. The PANCC also establishes a network of climate change focal points in various national ministries responsible for coordinating implementation of the plan throughout national government institutions. A new version of this

action plan (2017–2022) was developed during 2016 and should be available soon. The 2017–2022 PANCC will focus on early action for implementing Chile's NDC. This Action Plan has been developed with inputs from relevant public actors in order to adequately integrate their visions and various sectoral priorities. In addition, the National Climate Change Adaptation Plan of 2014 determined a national institutional structure for climate change adaptation governance in Chile. This structure, led by the Ministerial Council for Sustainability and Climate Change (presided over by the Ministry of Environment), includes the formalization of a Technical Interministerial Climate Change Team (made up of the climate change focal points in each ministry), and the establishment of Regional Climate Change Committees (Comités Regionales de Cambio Climático, CORECC). As of January 2017, two CORECC have been formalized in the Tarapaca and Valparaiso regions of Chile. These regional committees are presided over by the Regional Governor, and are made up of representatives of the Regional Government and Regional Council, climate change focal points in the Regional Ministerial Secretariats, a representative of the Regional Commission on Coastal Land Use (when applicable), a representative of the Regional Consultation Council (including private, civil society, and academic sectors), as well as municipal representatives interested in the application of adaptation and mitigation actions within their jurisdictions. The primary function of the CORECC is to promote and facilitate the implementation of sectoral adaptation plans on both regional and local levels, as well as climate change actions approved by the Ministerial Council according to local and regional needs.

The national government has recently become active in supporting transitions towards energy efficiency at the local scale. In September 2014, the Municipality of Santiago, in partnership with the National Ministry of Environment and the Ministry of Transportation, registered the first transport based Nationally Appropriate Mitigation Action (NAMA) with the UNFCCC, creating the Santiago Green Transportation Zone (Zona Verde para el Transporte en Santiago, ZVTS). This is also the first NAMA in Chile to be implemented at the municipal level, highlighting the potential for increased coordination between the national and local levels on climate action. The project was designed with initial funding by the British Embassy in Chile and the IADB, and was implemented with funding from the Development Bank of Latin America (Corporación Andina de Fomento, CAF). The ZVTS NAMA utilized an innovative public–private partnership model, integrating local taxi and bus services into the plan. The ZVTS operates based on a program of technological innovation and urban redesign within the historical area downtown, which is frequented by over two million people per day. The program includes the integration of zero and low emissions vehicles into the fleet of municipal vehicles, local taxi services, and public transportation buses. Additional efforts include fostering nonmotorized transportation by increasing bicycle paths, expanding the public bicycle system, and integrating bicycle traffic into local traffic. Public transportation is encouraged by restricting private automobile use along strategic streets, expanding pedestrian walkways, and generating exclusive bus lanes. Next steps include monitoring and evaluation of the emissions reductions as a result of the program and then scaling up the strategy to strategic areas throughout the Metropolitan Region of Santiago, and potentially other metropolitan areas in Chile.

According to Donatella Fuccaro, Head of the Environmental Department of the Municipality of Santiago during the project and responsible for the ZVTS project implementation:

The ZVTS represents an innovative program of local urban planning, design, and technological transfer that promotes emissions reductions in line with national and regional targets. The complexity of the intervention has required high levels of cooperation and coordination between the municipality and several national ministries, as well as with the private sector and local communities in the area, which in the context of Chile is quite rare. The initial results have been very positive, and discussions are currently under way in order to move on with the monitoring and evaluation phase, in order to scale up the experience to other areas of Santiago, and in cities throughout Chile as well.

Finally, in the context of the Chilean Energy Policy 2050, the Chilean Ministry of Energy has created the Communal Energy Program in order to work directly with municipalities towards achieving the ambitious NCRE and efficiency targets. To these ends, the Ministry has implemented the Local Energy Strategy project to support local energy development strategies in municipalities throughout the country. Through a competitive and public bidding process, the Ministry has awarded contracts to private consultancies and civil society groups in order to generate local energy assessments and participatory planning processes that integrate municipalities, the private sector, local communities, and civil society in the creation of local energy strategies aimed at increasing local energy autonomy and efficiency. These strategies result in the establishment of specific action plans and proposed measures. These plans will then give participating municipalities priority access to future funds provided by the Ministry and other public entities for project implementation. Together with the ZVTS NAMA, such initiatives represent an emerging trend in Chile towards local actions in line with national emissions reductions goals. This has the potential to unlock urban LEDS and transform Chilean cities to deliver national targets.

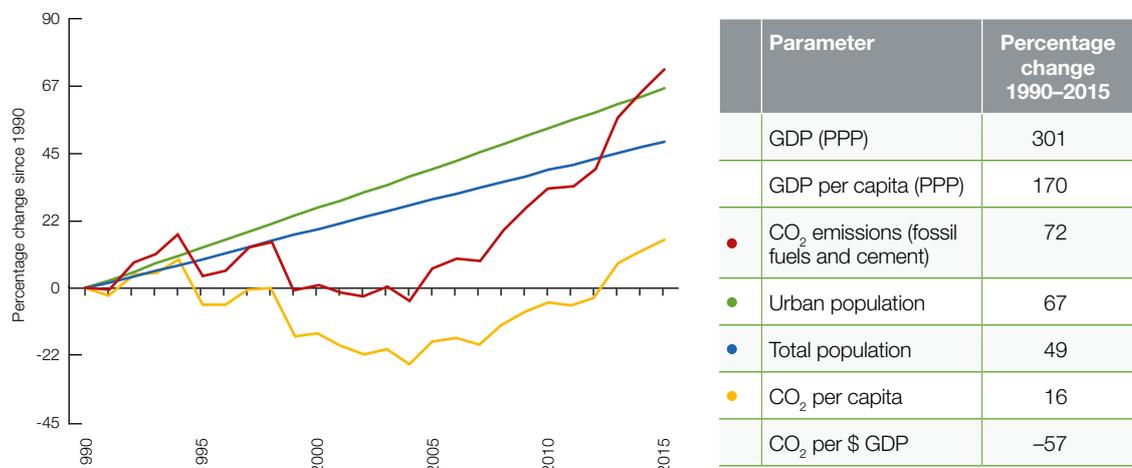
According to Fernando Farias (Head of Climate Change at the Ministry of Environment of Chile):

The Government of Chile is willing to involve actively provincial and municipal authorities to cope with the new challenges posed by Climate Change in the country, as stated in Chile’s upcoming National Climate Change Action Plan 2017–2022.

### 6.5 Colombia

Colombia’s National Development Plan 2010–2014, ‘Prosperity for All’, defined four primary mechanisms for dealing with climate change: the National Climate Change Adaptation Plan (Plan Nacional de Adaptación al Cambio Climático, PNACC); the Colombian Strategy of Low Carbon Development (Estrategia Colombiana de Desarrollo Bajo en Carbono, ECDBC); the National Strategy for the Reduction of Emissions due to Deforestation and Forest Degradation (ENREDD+); and the financial strategy to reduce State fiscal vulnerability to natural disasters.

**Figure 14. Colombia—NDC greenhouse gas target: 20% by 2030 versus BAU**



## **CONPES 3700**

Given the complexity, scale, and intersectoral objectives of these strategies, it was clear that an interinstitutional framework was necessary that would be capable of coordinating climate change related activities among a variety of sectors and levels of government. In 2008, Colombia's highest national planning authority, the National Council for Economic and Social Policy, began to work on an Institutional Strategy for the articulation of climate change policies and activities in Colombia. The process was formally active across 17 different ministries and took more than three years to complete. In July 2011, the strategy, known as CONPES 3700 (Consejo Nacional de Política Económica y Social), was adopted.<sup>43</sup>

Colombia recognizes climate change as a crucial challenge for future economic and social development, and so CONPES 3700 was designed to enable collaboration across all economic sectors and levels of government. It does this by facilitating the development and implementation of crosscutting climate change policies, programs, methodologies, incentives, and projects. A fundamental aspect of this institutional strategy is the inclusion of governance mechanisms that ensures the participation of local territories and communities in the country's climate change governance system.

## **All for a New Country**

The subsequent National Development Plan 2014–2018, 'All for a New Country,' gives continuity to the previously mentioned mechanisms and strategies by presenting an integrated vision of climate change policy and laws. The 2014–2018 National Development Plan defines intersectoral strategies of Strategic Competitiveness and Infrastructure; Social Mobility; Rural Transformation; Good Governance; and Security, Justice, and Democracy for Peace Construction. It also makes explicit the need to consolidate the National Policy on Climate Change, seeking its integration with environmental, territorial, and sectoral planning. Among other precedents, the new law calls for different sectors to set quantitative greenhouse gas emissions reduction goals for 2020, 2025, and 2030. The law also created the National Emissions Reductions Registry.

In accordance with the development of the policy and international commitments, in September 2015 Colombia submitted its INDC to the UNFCCC. The mitigation target was to reduce greenhouse gas emissions by 20% by 2030. In terms of adaptation, and based on the progress made under PNACC, by 2030 Colombia intends that 100% of the national territory will be covered by active climate change plans; a National Adaptation Indicator System will be available to monitor and evaluate the implementation of adaptation measures; implementation of tools for managing water resources, taking into account variability and climate change considerations in the country's priority basins; and inclusion of climate change considerations in planning instruments and innovative adaptation actions in six priority sectors of the economy.

## **SISCLIMA**

More recently, at the beginning of 2016 the Colombian Ministry of Environment and Sustainable Development (Ministerio de Ambiente y Desarrollo Sostenible, MADS) established the National Climate Change System (Sistema Nacional de Cambio Climático, SISCLIMA). This is part of the implementation of CONPES 3700 (the national regulations that established the basis for a decentralized climate change governance in the country). SISCLIMA is made up of public, private, and civil society sector actors charged with coordinating all climate change policies, regulations, instruments, and mechanisms for the planning and implementation of adaptation and mitigation actions. SISCLIMA includes a multilevel governance approach through the formation of Regional Climate Change Nodes (Nodo Regional de Cambio Climático, NRCC). Each NRCC is made up of a set of local departments that represent regionalized replicas of the national structure, and is designed to support the implementation of climate policy. In this way, the NRCCs have a strong intersectoral focus and emphasize public participation by representatives of multiple sectors and

scales. This is achieved by requiring each NRCC to comprise representatives from the regional department, local municipalities and districts, environmental authorities, private sector associations, academia, civil society, the Colombian Department of National Parks, research centers, and the Territorial Council on Disaster Risk Management.

While still nascent, this newly formed climate governance system intends to fuse climate planning and action from local municipal plans, up through the Regional Autonomous Corporations (governance units for environmental planning), regional departments, NRCCs, and the national level Intersectoral Commission on Climate Change (Comisión Intersectorial de Cambio Climático, COMICC), the body that oversees the SISCLIMA system.

Within SISCLIMA there are cross-cutting committees: the Financial Management Committee and the International Committee. The rapidly evolving Financial Management Committee was created to coordinate and articulate public and private sector actors as well as international institutions, and to mobilize resources to finance adaptation and mitigation actions. The International Committee facilitates access to international technical and financial cooperation resources to support the development of local climate change policies and actions.

### **Amazon Vision**

One new program that also reflects Colombia's multilevel governance and intersectoral approach is the 'Amazon Vision' initiative. This is supported by funding from German, British, and Norwegian international cooperation agencies through the REDD Early Movers program. Amazon Vision is a comprehensive, sustainable forest management program that seeks to systematically reduce and eventually halt deforestation in the Amazon Region of Colombia by implementing locally controlled management models under the authority of local communities. An initial US\$6 million fund was the first installment of up to US\$100 million that is available to Colombia. This future potential funding will be based on verifiable results such as reduced deforestation and sustainable management practices. The funds are administered by the Natural Heritage Fund of Colombia.

The program is designed as a multilevel governance system in which political, managerial, and operational decisionmaking processes are functionally distributed among differing entities. The global vision is managed on a national scale, while simultaneously prioritizing decentralized administration on a local scale by communities and local governments in order to assure local appropriation and continued operational capacity over time. In order to fulfill the program's overall goals of reducing deforestation, there is a strong component for improving alternative local development models, based on sustainable productive practices, that encourage forest management and involve participation by local farmers, agriculturalists, and indigenous communities. To these ends, the program stipulates that 60% of all funds must be spent to directly benefit local communities.

The Amazon Vision program is extremely relevant to low emissions development in the Colombian context, as, according to the country's Third National Communication report to the UNFCCC, the agriculture, forestry, and other land uses (AFOLU) sector was responsible for 58% of Colombia's total emissions in 2010, followed by a 32% contribution by the energy sector. By 2012 AFOLU was responsible for 43% of total emissions compared with 44% by the energy sector.

The emissions reductions in the AFOLU sector are primarily attributable to reductions in deforestation rates, while the energy sector experienced a boom in oil and gas exploration and production, with exploration contracts doubling between 2004–2009, and increasing again by over 50% from 2009–2010. Sustained production increases in oil and gas continue to this day.<sup>44</sup>

## **ECDBC**

The Colombian Strategy for Low Carbon Development is also an epitome of multilevel governance, and a work in progress. The ECDBC is a short, medium, and long term development planning program that seeks to decouple greenhouse gas emissions from national economic development. It is led by the MADS through the Directorate of Climate Change, with the support of the National Planning Department, the Colombian Sectoral Ministries, and different international and multilateral organizations.

The creation and development of the strategy has received technical and financial support from the USA (EC-LEDS) and Germany (Deutsche Gesellschaft für Internationale Zusammenarbeit and World Resources Institute), and from the Center for Clean Air Policy, IADB, European Union-United Nations Development Programme, Mitigation Action Plans and Scenarios, Partnership for Market Readiness, and the World Bank. It was formulated considering all stakeholders. The capacity building component was developed starting in 2012 through high level meetings and workshops with experts from the different sectors. These events fulfilled two objectives: to socialize and build capacities in the sectors related to climate change mitigation and the ECDBC; and to receive feedback and inputs to the process from key public and private sector actors.

The first component of the ECDBC aims to identify and formulate sectoral alternatives for low emission development through studies on emission reduction costs and work with sectoral experts. The results of this component are the construction of future greenhouse gas emissions scenarios up to 2040; identification of mitigation actions by sector; assessment of costs and mitigation potential of identified mitigation measures; and evaluation by sectoral experts of the co-benefits of identified mitigation measures. The sectors that participate in the ECDBC are agriculture, energy, housing, industry, mining, transport, and waste.

The main objective of the second component is the development of low carbon Sectoral Action Plans (Planes de Acción Sectorial, PAS) composed of actions, programs, measures, and policies. These will be prioritized by taking into account four main aspects: contribution to the development objectives of the sector; potential for reducing greenhouse gas emissions; economic, social, and environmental co-benefits; and implementation costs.

Each PAS contemplates an implementation strategy that includes financing tools, public-private agreements, incentives, and training tools, among others. Additionally, a third component of the ECDBC seeks to design and establish the monitoring and reporting system. This includes the assessment of different aspects of plans such as progress, investment, reduced greenhouse gas emissions, and co-benefits.

The final component of the ECDBC is the creation of a platform for communication and international cooperation. This platform allows for the widespread dissemination, through different means of communication, of everything related to the ECDBC.

Although ECDBC utilizes a multilevel scheme of governance that integrates the participation of different stakeholders, it is in an early stage of implementation and is still pending approval by the National Congress. A pending challenge is to precisely define how national policies will be implemented at regional and local levels, and how SISCLIMA will perform within a decentralized governance framework. Meanwhile, the ECDBC has become the roadmap for the public and private sectors to accomplish the NDC commitments by 2030.

## **Transforming urban public transportation**

One specific example of Colombia's multilevel governance and intersectoral approach to climate action is the concerted effort towards transforming urban public transportation systems.

The 'National Sustainable Mobility Week' initiative raises awareness in various cities throughout the country by bringing together public sector agencies with civil society, academia, and associations that support sustainable mobility. The purpose of the varied events and activities during this week is simply to share experiences and collect information to inform the design of sustainable transportation projects. Each city produces a comprehensive report based on their experiences. The organized events include training workshops for local authorities and decisionmakers. Overall, the activities support the strategic lines of action defined by the Ministry of Construction. This is highlighted in the Cycle Path Infrastructure Guide<sup>45</sup> and the Climate Change and Urban Mobility Guide.<sup>46</sup> To date, Colombia has successfully realized two National Sustainable Mobility Weeks, the most recent in September 2016 with 30 different cities participating across Colombia.

Also supporting multilevel governance climate action in the urban transportation sector is the intersectoral 'City Move Group' comprising representatives from different Colombian Ministries, including transportation, housing, cultural planning, and others. The function of this working group is to increase the quantity and quality of public spaces within public transportation systems. This is an example of an integrated approach to public transportation, urban planning, and climate change mitigation through sustainability mobility.

### **NAMAs**

Finally, there are NAMAs active in Colombia that are specifically focused on LEDS and urban transportation. These NAMAs support integrated national and city level policymaking processes, as well as concrete pilot projects in specific cities.

One of these is the Green Corridor project in Cali—a revitalization of an abandoned rail line that has been converted into public space and utilized for sustainable mobility. Another is the new Entre Rios Metro Station in Medellin, the only Colombian city with a metro system. This project also includes a renovated urban space component, which opens a public corridor that promotes nonmotorized transport. These and other initiatives represent national planning objectives realized at the local level.

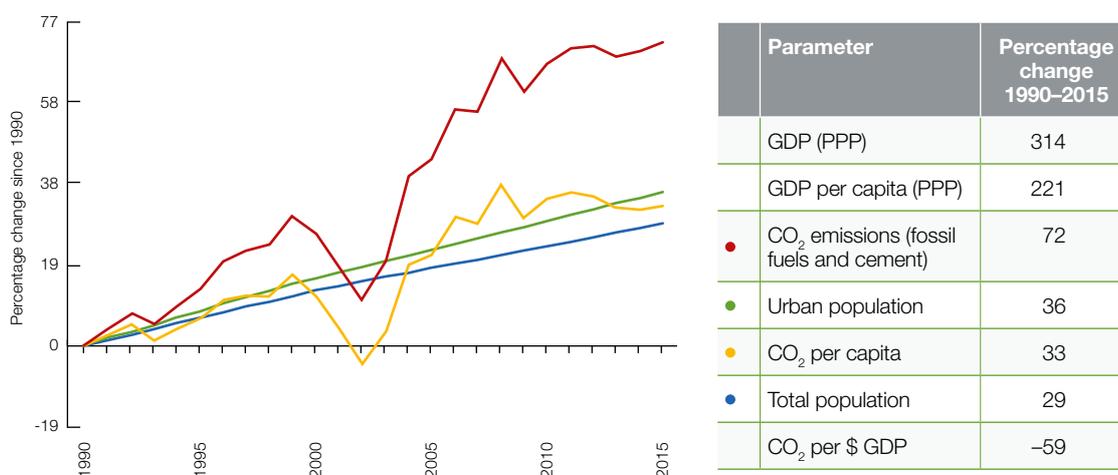
According to Juan Felipe Martinez, Coordinator of the Environmental Affairs and Sustainable Development Group within the Colombian Ministry of Transportation:

It is in the local territories where the implementation of concrete actions and the most significant results regarding climate change mitigation are achieved. It seems simple, but it is not yet so clear for many countries in the region. The implementation of such lines of action goes hand in hand with the particular contexts of local territories. Recognizing this is a very important step forward in this process, which will lead to further achievements in the short, medium and long term.

## **6.6 Argentina**

Official climate policy and actions in Argentina are incipient. However, in 2016, after a long process, the national government achieved the goal of establishing an intersectoral and multilevel governance approach to address climate change.

As an initial step, the Ministry of Environment and Sustainable Development was founded in December 2015, elevated from secretariat status. A few months later, in April 2016, the Federal Cabinet on Climate Change was created by presidential decree. The Cabinet is an interministerial technical entity that includes 12 different ministries. Among these are the Ministries of Environment, Transport, Agriculture, Energy, and Production. In addition, the Cabinet includes a representative of the Federal Council on Climate Change,

**Figure 15. Argentina—NDC greenhouse gas target: 18% by 2030 versus BAU**


which is comprised of several provincial environmental authorities from across the country. This technical cooperation between ministries in Argentina is rare, made even more so by the inclusion of a multilevel governance approach at the provincial and federal levels.

The Cabinet's first major act was the development and signing of the Federal Commitment on Climate Change in November 2016. This was a consensus among the federal ministries and provincial authorities regarding the need for a National Climate Change Policy, and includes explicit commitments towards implementing the measures included in Argentina's NDC. Interestingly, the NDC was revised to increase unconditional national greenhouse gas emissions reductions to 18% by 2030 (up from 15%). Even though this is generally considered to be an insufficient target that will be met mainly by policies and programs that have already been put in place, it is worth noting that Argentina became the first country to revise its initial NDC as presented at the COP21 in Paris, in order to include more ambitious emissions reduction goals.

Argentina's primary actions on climate change to meet these national goals include the elimination of deforestation and the recovery of degraded lands, low emission public transportation systems, and significant modifications to the country's energy matrix to include renewable energy sources.

Regarding the latter two areas, important new legislation was passed in 2016 that spearheads Argentina's actions in these areas. The Renewable Energy law seeks to increase renewable energy production to 20% of total energy production by 2025. At the same time, Law 27.132 aims: to increase public transportation by rail; to provide incentives to increase the efficiency of freight and cargo transportation; and to replace older vehicles with newer, more efficient models. In addition, new modifications to the norms associated with the Biofuels Law (Law 26.093), adopted in March 2016, require a minimum 12% of bioethanol blend in transportation fuels and seek to gradually increase this to 20% over time.

The focus on emissions reductions has also permeated provincial and municipal governments in Argentina. The Argentinean Network of Municipalities on Climate Change was formed in 2010 as the first national climate change network of local governments in Latin America, well before the issue was taken up in earnest by the national government. Today the network includes over 115 municipalities, both large and small, as well as five provincial governments of Argentina, and is currently focused on implementing greenhouse gas

inventories at both municipal and provincial scales. On a municipal level, members of the network are now committed to developing a baseline greenhouse gas inventory with updates every two years, and an official Climate Action Plan that includes emission reductions in strategic areas. The Climate Action Plans will also include indicators that measure green employment opportunities geared towards strategic transformation of the local economy.

The provincial governments are being trained to utilize the IPCC methodologies, in harmony with the national government. This is a concerted effort to align provincial strategies and actions with national NDC goals. According to Ricardo Bertolino, Executive Secretary of the Argentinean Network of Municipalities on Climate Change:

Without a doubt, the methodology developed is a work in progress: the IPCC consistently reviews its proposed methodologies of greenhouse gas inventories, and the Network does as well. It is important to highlight that it is essential that municipalities learn to perform their own greenhouse gas inventories, as this is very useful when evaluating the impacts of their own actions. Our measurements do not seek perfection, but rather the training and involvement of local government managers and technicians on the issue of climate change, and the definition of sustainable local policies.

Transportation, as one of the key strategic sectors to achieve the NDC, is particularly relevant to the local level. With support from the Sustainable Transportation and Air Quality Project funded by the Global Environment Facility (GEF) of the World Bank, institutional and planning capacity was strengthened in four Argentinean cities: Rosario, Cordoba, Tucuman, and Posadas. In each case, steps were taken towards the development of sustainable transport master plans, including planning instruments, new policies, and regulatory frameworks, in order to provide incentives for sustainable transportation systems and behaviors. Initiatives, such as bus rapid transit, public bicycle sharing systems and bicycle paths (*ciclovías*), sustainable transportation publicity campaigns, new and more efficient public buses, and exclusive bus lanes have all been recently implemented. The GEF program worked closely with local government authorities and technical teams to assure installed capacities accompanied the development of plans, projects, and infrastructure. This has resulted in marked decreases in greenhouse gas emissions as well as modified habits of urban inhabitants. For example, the 'Green City' initiative in Buenos Aires has enabled intermodal public transportation by extended metro-bus services that coincide with the subway system, collective taxis, and a new public bicycle program. As emissions from the transportation sector have been steadily rising in Argentina over the years, such programs will have a significant impact on emissions reductions in the coming years.

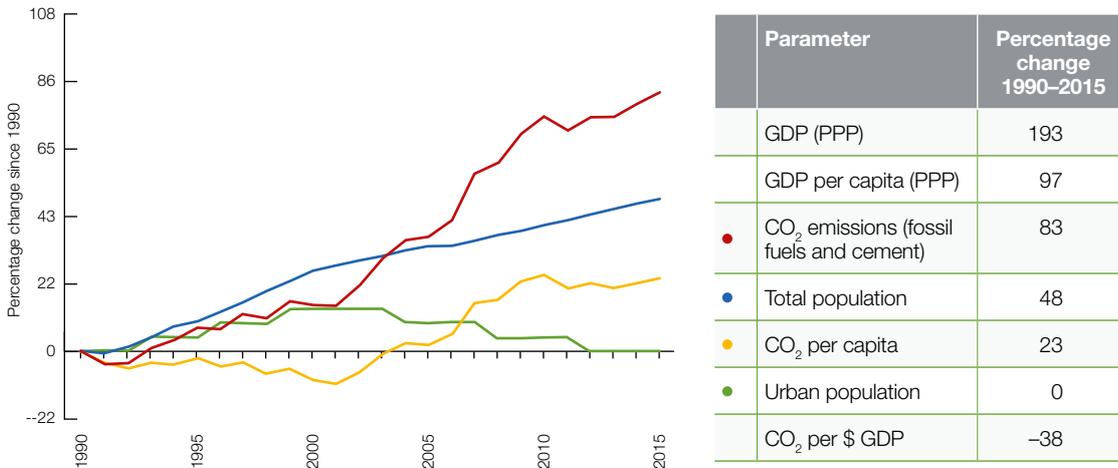
The success of the national targets in this area will depend on the extent to which successful programs can be put into place that involve multilevel governance and intersectoral cooperation from the national level down to local municipalities, and the sharing of best practices and experiences between cities.

## 6.7 Antigua and Barbuda

The small Caribbean country of Antigua and Barbuda has a dire need to cope with the dual challenges of water shortages and exposure to extreme precipitation events. Despite suffering 12 hurricanes and tropical storms in the past 20 years, the country is experiencing a severe drought. Therefore the country places a strategic focus on climate adaptation with greenhouse gas mitigation co-benefits.

Antigua and Barbuda's population of 92,000 people relies on at least 60% of its water supply from desalination—a highly energy intensive activity. This dependence reaches as much as 90% during times of

**Figure 16. Antigua and Barbuda—NDC greenhouse gas target: N/A**



drought. This presents a significant opportunity for the use of solar and wind power to replace the fossil fuels currently utilized for desalination activities. In this way, the country has committed to significant NDC goals, which include achieving all desalination activities as well as providing all essential services such as health, food storage, and emergency services with 100% renewable energy by 2030.

Currently, Antigua and Barbuda relies almost exclusively on imported fossil fuels for its energy needs in electricity, transportation, and cooking. This suggests that over 90% of the total emissions are produced from the energy sector. Almost 14% of total GDP is spent on fuel imports, with the inhabitants of the islands paying some of the highest electricity rates in the world.

However, at the same time, significant public funds are used for recovery efforts following hurricanes and tropical storm events. These are expected to increase in frequency and severity in the context of climate change. This points to the profound challenge of generating consistent funding for improving local resilience in the sectors of ecological conservation, energy, fresh water, transport, and waste management.

The small population of the islands represents both a challenge and an opportunity. On one hand, generating substantial internal funding for climate change adaptation and mitigation work is difficult; on the other hand, there are very real possibilities for generating multilevel and intersectoral cooperation for projects that will benefit the entire population.

In recent years, Antigua and Barbuda has developed an enabling legal, policy, and institutional environment for both low emissions development, and increased adaptation and resilience to climate change impacts. Most recently this has included the Renewable Energy Act of 2015, which seeks to create the legal, economic, and institutional basis for developing 50 MW of installed renewable energy sources on the islands by 2030. Along the same lines, the Environmental Protection and Management Act (EPMA) was adopted in 2014. The EPMA included the enactment in 2015 of the Sustainable Island Resource Framework Fund (SIRF), which has been accredited as a National Implementing Entity under the Adaptation Fund as well as the National Designated Authority under the Green Climate Fund. The SIRF operates according to three primary action windows: adaptation (protected areas management and biodiversity protection), mitigation (with a focus on the water/energy nexus), and risk management (cover and insurance for extreme events).

This fund represents a highly innovative financing mechanism that serves to channel all finance (both national and international) for the implementation of climate change adaptation and mitigation actions at the local level on the islands. It ensures very high levels of transparency, and a coordinated, intersectoral, multilevel, and systematic approach to climate change action. The fund's multidisciplinary technical advisory committee consists of 17 different government departments, along with representatives of NGOs, the private sector, and community interest representatives. This technical advisory committee is responsible for reviewing all project proposals, which provides for a concerted and cooperative effort from the onset regarding the determination of specific projects to be funded. In addition, because the fund serves as a source of direct access for the financing of local projects, it also provides a mechanism for close collaboration between national entities and local communities and stakeholders from various sectors.

Another innovative aspect of SIRF is its self financing methods through a variety of disbursement mechanisms. While most of SIRF's funding is expected to come from international sources, such as the Green Climate Fund, Adaptation Fund, Global Environment Facility, Caribbean Biodiversity Fund, as well as other bilateral and multilateral cooperation and development agencies, the fund also includes investments in renewable energy and sustainable technologies, a small loans and revolving funds program, an insurance provision, debt for climate swaps, and other innovative mechanisms. For example, investments in renewable energy for water production on the islands is expected to generate up to US\$15 million in annual savings, which can be reinvested into the fund. The small loans program seeks to provide low interest loans to vulnerable and high risk populations for the implementation of local adaptation and mitigation projects, while the revolving fund programs seek to provide low interest loans to small businesses, farms, and homeowners for energy efficiency projects. Affordable insurance against extreme events is also provided to farms, coastal areas, and watersheds, which operate through a pooling of risk premiums. Other potential mechanisms for direct financing of the SIRF include fees for visits by tourists to protected areas, a water levy, a carbon tax, and interests from the small loans provided.

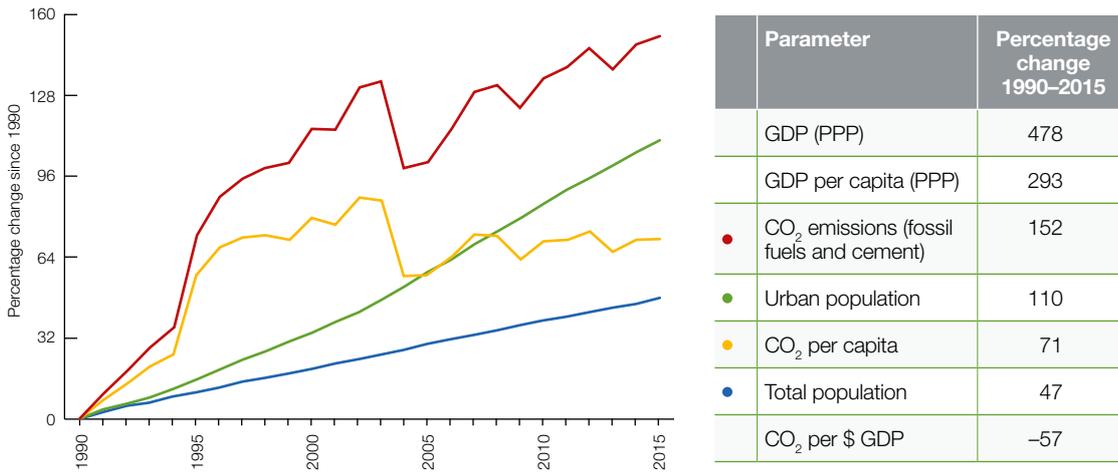
Another related innovative financing mechanism is the Antigua and Barbuda Marine Ecosystem Protected Area Trust (MEPA), formed in 2015 as a core national mechanism for sustained financing to support local community environmental initiatives. This was started with initial funding from the Caribbean Biodiversity Fund of the World Bank. The original objective of MEPA is to finance local projects for the protection and conservation of marine and land biodiversity, in which stakeholder and community involvement is a requirement for all projects implemented under the Trust. The Trust is governed by a board of directors consisting of 11 members, of whom at least six must be from NGOs while the remaining five are government representatives. Board members represent a wide range of civil society, private sector, and government entities and interests. Due to the high levels of transparency and legitimacy of the MEPA governance structure, it is expected that this funding mechanism will be a significant vehicle for local climate adaptation and resilience initiatives moving into the future.

All together, Antigua and Barbuda is developing the conditions and institutions necessary to streamline climate financing for adaptation and mitigation on the islands. The country is adopting a strategic, long term approach to generating installed funding capacity that builds on the concept of resilience through an expansive and cooperative governance structure including the participation of multiple sectors and scales. The focus of these mechanisms is twofold: first to provide high levels of financial sustainability for climate action through legitimized and transparent funding mechanisms that provide support for vulnerable populations and NGOs active in the implementation of climate solutions; and second to provide incentives for the adoption of sustainable technologies and local service providers.

### 6.8 Dominican Republic

The Dominican Republic boasts one of the largest economies in Central America and the Caribbean, and has experienced very rapid economic growth in recent decades. As the economy has transitioned from mining and agriculture to a largely service oriented base, demands placed on the construction, manufacturing, tourism, and waste management industries have increased. This is reflected in the increase of greenhouse gas emissions from these sectors.

**Figure 17. Dominican Republic—NDC greenhouse gas target: 25% by 2030 versus 2010**



The island nation and its wealth of natural resources are highly vulnerable to the impacts of climate change. Extreme weather events have caused significant economic losses (in the case of Hurricane Georges in 1998, equivalent to 14% of GDP) and have forced adjustments to national economic priorities. The nation’s most vulnerable sectors in the context of climate change and adaptation priorities, as established by the national government, include drinking water, energy, protected areas, human settlements, and tourism.

The National Council on Climate Change and Clean Development Mechanism was created in 2008 by Presidential Decree and is composed of 15 climate related ministries, with the President serving as head. The Council represents the first institutional structure intended to promote climate mitigation policy in the country. In 2011, the Climate Compatible Development Plan (CCDP) was developed in parallel with the Long Term Development Plan. The CCDP is a strategy for emissions reductions that is focused on the cement, energy, forestry, tourism, transport, and waste sectors. The CCDP seeks to double the national economy while halving emissions over the next 20 years by promoting a series of NAMAs to achieve significant short term emissions reductions in the waste and cement sectors.

In 2012, the nation’s emissions reduction target was formalized with the adoption by law of the National Development Strategy 2030. The goal of a 25% reduction of base year (2010) emissions by 2030 was presented as the Dominican Republic’s INDC to COP 21 in Paris in 2015. As stated in the INDC, this reduction is conditional upon favorable and predictable support, feasible climate mechanisms, and corrections to failures of existing market mechanisms. The cost of identified mitigation actions is estimated at US\$17 billion for the cement, energy, forestry, tourism, transport, and solid waste sectors for the period 2010–2030. The INDC additionally places focus on a transition to a culture of sustainable production and

consumption, risk management, the protection of environment and natural resources, and promoting climate change adaptation.

In 2012, the German Government signed an agreement to cooperate in the implementation of the CCDP with a contribution of €4.5 million. The project 'Support for implementing the Dominican Republic's Climate Compatible Development Plan in the cement and waste sectors' is financed through the International Climate Initiative (IKI) of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety. The project aims to support the development and implementation of NAMAs with measurement, reporting, and verification actions in order to advance the nation towards meeting its emissions reduction goals (25% under 2010 levels by 2030). Implementation began in April 2013 and the project is set to finalize in June 2018.

The project focuses primarily on mitigation potential in the waste management and cement sectors. These sectors have been identified as quick wins where relatively limited funding for mitigation actions can greatly reduce emissions in the short term. In the cement industry, alternative energy sources are promoted and 'co-processing' is explored as a means of reducing energy demands, emissions, and fossil fuel dependence. The implementation of appropriate waste management systems is fostered to reduce energy needs while also reducing emissions and other environmental pollution and providing new, alternative employment opportunities.

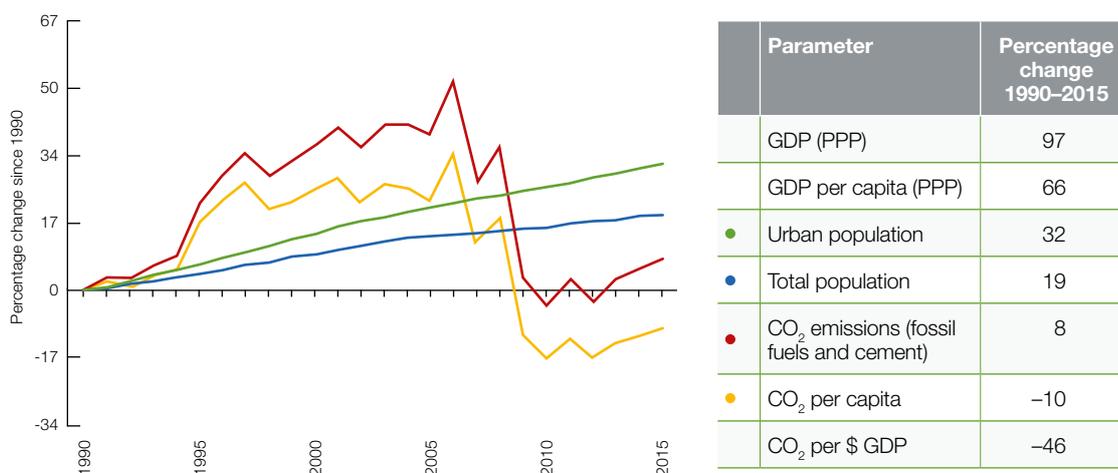
To facilitate these transitions, the project focuses on strengthening institutional structures and the existing knowledge base. To date, the project has undertaken the training of 15 institutions in measurement, reporting, and verification systems and NAMA approaches, and has provided technical expertise regarding regulations in waste management legislation, alternatives, and opportunities for revision of the regulatory environment. The project seeks to integrate multilevel actors in workshops and round tables to discuss and develop the supply chains and waste stream dynamics surrounding local and industrial waste management.

National circumstances, territorial conditions, and environmental features add to the challenges imposed by climate change as the nation seeks to meet the goals set out by its National Development Strategy and INDC. Additional development challenges, including poverty, education, health, and security, complicate adaptation processes and the decoupling of emissions from the economy. Responses to these challenges will be forced to incorporate elements of strategic planning and integrated management systems in order to maximize synergies between mitigation and adaptation actions.

## 6.9 Jamaica

Common to many small island developing states in the Caribbean, Jamaica faces the dual climate challenge of increasing droughts and, especially, exposure to hurricanes and tropical storms that are increasing in severity and frequency.

Another challenge is reliance on oil imports, which fuel 90% of the total energy supply of the island. This dependency makes the nation intensely vulnerable to international oil prices and economic crises. The impact can be clearly observed in the precipitous fall in energy based emissions in Jamaica in the wake of the international financial crisis of 2007–2008, which resulted in greatly increased international oil prices. This had profound effects on the Jamaican economy. In 2011, Jamaica spent up to 15% of total GDP on petroleum imports. Electricity prices on the island are among the highest in the world.

**Figure 18. Jamaica—NDC greenhouse gas target: 7.8% by 2030 versus BAU**


Jamaica suffered the impacts of at least 10 major extreme events between 2001–2012. The average economic impact per event was 2% of national GDP, reaching as much as 8% of GDP in the case of Hurricane Ivan in 2004. The country is also vulnerable to sea level rise, and the increasing effects of floods, droughts, heatwaves, and landslides are expected.

The national government is preparing for the impacts of climate change with a dual focus on adaptation and mitigation. The overarching goals are to increase resilience to climate impacts and extreme events, and to develop more energy autonomy and decrease energy related emissions through the use of indigenous renewable energy resources and improved energy efficiency.

Jamaica's National Development Plan, 'Vision 2030', was approved in 2009 and establishes climate change as a crosscutting issue that is integrated into all future national economic and social policies, legislation, and other plans. This will be pursued under dual national strategies for climate change adaptation and greenhouse gas emissions reductions.

In 2010, the National Energy Policy (NEP) 2009–2030 was adopted. Actions defined by this policy range from energy efficiency measures in the public sector and among the general population, to increasing renewable energy generation on the island from 11% to 20% by 2030. In addition, strategies related to climate change within the NEP include creating greenhouse gas emission limits, carbon trading and auctions, energy conservation and efficiency through technology transfer, biofuels policy to increase sugar and agriculturally based biofuel production, as well as a waste-to-energy policy in order to integrate the waste management and energy sectors through technology transfer.

In order to mainstream climate change activities across the government, the Ministry of Water, Land, Environment and Climate Change (MWLECC) established the Climate Change Division. In 2014, the Division created the Climate Change Focal Point Network to establish an institutional basis for climate change as an intersectoral issue, and to support the integration of climate change planning and action into multiple sectors and levels of government. Currently, this network comprises 27 focal points from all government ministries and various other government departments and agencies. In the near future, local government organizations and additional agencies will be appointed, formalizing a system of multilevel governance for climate policy and action.

In this context, Jamaican local parishes along with national level ministries such as the MWLECC and the Office of Disaster Preparedness and Emergency Management (ODPEM), among others, have been involved in various programs and projects funded by multilateral development agencies and bilateral cooperation, geared towards increasing community based adaptation and resilience.

Such projects include a pilot project on Community Based Adaptation to Climate Change,<sup>47</sup> a pilot project for Climate Resilience,<sup>48</sup> the Climate Change Adaptation and Disaster Risk Reduction Project,<sup>49</sup> as well as additional projects by the United States Agency for International Development, UK Department for International Development, German Government, and others. All these initiatives have involved work with national level authorities as well as local communities who are involved in the implementation of specific resilience based initiatives.

In addition, the Building Disaster Resilient Communities program of the Jamaican ODPEM (with initial funding by ACDI/VOCA) has been developing and strengthening community disaster resilience since 2013. This program establishes multiagency and community partnerships by providing training in disaster risk reduction and forming community disaster risk management groups and community emergency response teams.

The program also supplies community resources and equipment, and assists in the development of local hazard maps and community disaster risk management plans, working directly with local parishes and communities.

## 7 Conclusion

Analyzing the data for the period 1990–2015 from 48 countries in LAC reveals that:

- In 13 nations, the urban population has doubled or more than doubled.
- In 35 nations, the rate of increase in urban population has outpaced the rate of national population growth.
- In 26 of those 35 countries, CO<sub>2</sub> emissions are rising more quickly than the urban population.

Overall, as a region, urbanization in LAC is not delivering reductions in CO<sub>2</sub> emissions.<sup>50</sup> And while GDP per capita is increasing, so are CO<sub>2</sub> emissions per capita. In fact, since 1990 CO<sub>2</sub> emissions per capita have more than doubled in 11 countries. Together, these trends highlight the importance of addressing the threat of locking in high greenhouse gas emission patterns for urban living and resource intensive lifestyles.

Nevertheless, despite these intimidating trends, there is a discernible mega-opportunity.

The gap between the NDCs in LAC and the numerous subnational climate action commitments of cities and provinces across the region can be viewed as an opening, ready to be informed by multilevel governance initiatives to improve the subnational integration of LEDS. This will create opportunities for bundled approaches and increase co-benefits by linking diverse local priorities and broad national development objectives. Multilevel governance approaches to subnational integration of climate targets can also help soften domestic political constraints to decarbonization, unlock latent potential, reduce fragmentation between subnational governments, harness synergies, facilitate the participatory design and implementation of domestic NDC trajectories, and even increase ambitions on NDCs. Together, these activities combine to create a more bankable, low risk financial environment for urban infrastructure finance; improved measurement, reporting, and verification; and more enforceable carbon limits.

As highlighted in the nine cases presented here, there are early mover countries and emerging multilevel governance initiatives to accelerate LEDS in LAC. Some of these initiatives include the creation of interministerial climate cabinets, national councils comprised of multiple levels of government, as well as civil society. In addition, there are cities providing important leadership in delivering regional to national policy input, intermunicipal cooperations focused on reducing fragmentation, as well as the formation of regional climate change science and strategic action committees and national networks of municipalities on climate change.

LEDS GP has developed an open, well connected network that can be utilized to continue sharing these pioneering experiences to support continued learning on the multilevel governance to achieve the NDCs. As this community of practice evolves, opportunities will emerge to support some early movers in multilevel governance to foster joint climate actions between subnational and national governments.

## Additional references

- Andersson, M. (2015) *Unpacking metropolitan governance for sustainable development*. Eschborn, Germany: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.
- Bahl, R., Linn, J., and Wetzel, D. (2013) *Financing metropolitan governments in developing countries*. Cambridge, MA: Lincoln Institute of Land Policy. [www.lincolninstitute.org/sites/default/files/pubfiles/financing-metropolitan-governments-developing-full\\_0.pdf](http://www.lincolninstitute.org/sites/default/files/pubfiles/financing-metropolitan-governments-developing-full_0.pdf)
- Bansard, J.S., Pattberg, P.H., and Widerberg, O. (2016) 'Cities to the rescue? Assessing the performance of transnational municipal networks in global climate governance.' *Journal of International Environmental Agreements: Politics, Law and Economics* 17(2): 229–246.
- Berdegúe, J., Carriazo, F., Jara, B., Modrego, F., and Soloaga, I. (2015) 'Cities, territories, and inclusive growth: Unraveling urban–rural linkages in Chile, Colombia, and Mexico.' *World Development* 73: 56–71.
- Bulkeley, H., Schroeder, H., Janda, K. et al. (2009) *Cities and climate change: The role of institutions, governance and urban planning*. 5th Urban Research Symposium, Marseille.
- Cadena, A., Remes, J., Manyika, J. et al. (2011) *Building globally competitive cities: The key to Latin American growth*. McKinsey Global Institute. [www.mckinsey.com/insights/urbanization/building\\_competitive\\_cities\\_key\\_to\\_latian\\_american\\_growth](http://www.mckinsey.com/insights/urbanization/building_competitive_cities_key_to_latian_american_growth).
- CELADE-CEPAL (2008) *América Latina: Urbanización y Evolución de la Población Urbana 1950–2000*. Boletín Demográfico No. 75. Santiago: United Nations Economic Commission for Latin America and the Caribbean (ECLAC/CEPAL).
- Creutziga, F., Baiocchic, G., Bierkandtd, R., Pichlerd, P., and Seto, K. (2015) 'Global typology of urban energy use and potentials for an urbanization mitigation wedge.' *Proceedings of the National Academy of Sciences, USA* 112(20): 6283–6288.
- Dawson, R., Wyckmans, A., Heidrick, O. et al. (eds) (2014) *Understanding cities: Advances in integrated assessment of urban sustainability*. Final Report of COST Action TU0902. Newcastle, UK: Centre for Earth Systems Engineering Research. [www.researchgate.net/publication/260705179\\_Multi-level\\_climate\\_governance\\_and\\_urban\\_climate\\_action](http://www.researchgate.net/publication/260705179_Multi-level_climate_governance_and_urban_climate_action)
- Dobson, S., Hurtado, S., Coelho, D., Wyckmans, A., and Schmeidler, K. (2014) 'A policy and governance context for integrated urban sustainability strategies,' in Dawson et al. (eds) Op. cit.
- Harrison, N. and Muller, S. (2014) *What national governments can do to accelerate subnational action on climate*. Ecofys and LEDS Global Partnership. [http://unfccc.int/files/bodies/awg/application/pdf/ledsgp\\_sni\\_paper\\_bonn\\_2014.pdf](http://unfccc.int/files/bodies/awg/application/pdf/ledsgp_sni_paper_bonn_2014.pdf)
- Jordán, R. (2013) 'Urban sustainability in Latin America and the Caribbean,' presented at 'Urban Sustainability in Latin America and the Caribbean', CSTD 2012-2013 Inter-Sessional Panel, 7 January,

- Lima, Peru. Economic Commission for Latin America and the Caribbean. [http://unctad.org/meetings/en/Presentation/cstd2013\\_Jordan.pdf](http://unctad.org/meetings/en/Presentation/cstd2013_Jordan.pdf)
- Kalegaonkar, A. and Brown, L.D. (2000) 'Intersectoral cooperation: lessons for practice.' *IDR Reports* 16(2). <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.463.6777&rep=rep1&type=pdf>
- Kehew, R. and Vincent, A. (2013) *Addressing urban issues in national climate change policies*. Policy Note No. 3. Nairobi: UN-Habitat.
- Moreno, L. (2011) *The decade of Latin America and the Caribbean: A real opportunity*. Washington, DC: Inter-American Development Bank.
- Neulinger, C. and Marques, A. (2014) *Vertically Integrated Nationally Appropriate Mitigation Actions (V-NAMAs)*. Eschborn, Germany: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. [https://mitigationpartnership.net/sites/default/files/u1679/v-nama\\_-\\_guidance\\_on\\_vertically\\_integrated\\_namas\\_-\\_full\\_document\\_2014.pdf](https://mitigationpartnership.net/sites/default/files/u1679/v-nama_-_guidance_on_vertically_integrated_namas_-_full_document_2014.pdf)
- OECD (2015) *Reaching people with development financing: The role of cities and regions*. Third International Conference on Financing for Development, Addis Ababa, July. Paris: Organisation for Economic Co-operation and Development. [www.oecd.org/governance/regional-policy/sustainable-development-goals-development-financing.pdf](http://www.oecd.org/governance/regional-policy/sustainable-development-goals-development-financing.pdf)
- Robalino-López, A., García-Ramos, J.E., Golpe, A., and Mena-Nieto, A. (2015) 'CO<sub>2</sub> emissions convergence among 10 South American countries. A study of Kaya components (1980–2010),' *Carbon Management* 7(1/2): 1–12.
- Romero-Lankao, P., Hardoy, J., Hughes, S., and Gnatz, D. (2015) *Multilevel governance and institutional capacity for climate change responses in Latin American cities*. Adaptation to the Health Impacts of Air Pollution and Climate Extremes in Latin American Cities (ADAPTE), Inter American Institute of Global Environmental Change.
- Ryan, D. and Ramirez, A. (2016) *The politics of climate change at the city level: Insights from a comparative study of Buenos Aires, Sao Paulo and Mexico City*. London: Climate and Development Knowledge Network. [www.weadapt.org/knowledge-base/transforming-governance/the-politics-of-climate-change-at-the-city-level-insights-from-three-mega-cities](http://www.weadapt.org/knowledge-base/transforming-governance/the-politics-of-climate-change-at-the-city-level-insights-from-three-mega-cities)
- Sippel, M. and Jenssen, T. (2009) *What about local climate governance? A review of promise and problems*. Stuttgart, Germany: Institute for Energy Economics and Rational Energy Use, University of Stuttgart.
- UN Habitat (2012) *State of Latin American and Caribbean cities*. Nairobi: UN Habitat. <https://unhabitat.org/books/state-of-latin-american-and-caribbean-cities-2/>
- UN Habitat (2016) *Urban Impact* No. 3. August. [www.fukuoka.unhabitat.org/docs/publications/pdf/habitat\\_newsletter/UrbanImpact03.pdf](http://www.fukuoka.unhabitat.org/docs/publications/pdf/habitat_newsletter/UrbanImpact03.pdf)
- UNDP (2016) *An integrated framework to support local governance and local development*. New York: United Nations Development Programme. [www.undp.org/content/undp/en/home/librarypage/democratic-governance/local\\_governance/integrated-framework-to-support-local-governance-and-local-devel.html](http://www.undp.org/content/undp/en/home/librarypage/democratic-governance/local_governance/integrated-framework-to-support-local-governance-and-local-devel.html)
- United Cities and Local Governments (2010) *Local government finance: The challenges of the 21st century*. Second global report on decentralization and local democracy. Executive summary. Barcelona, Spain: United Cities and Local Governments. [www.cities-localgovernments.org/gold/Upload/gold\\_report\\_2/2010%20EXECUTIVE%20SUMMARY%20baixa.pdf](http://www.cities-localgovernments.org/gold/Upload/gold_report_2/2010%20EXECUTIVE%20SUMMARY%20baixa.pdf)
- United Nations (2002) *World urbanization prospects*. 2001 Revision. New York: United Nations Population Division.
- Van Pelt, M. et al. (2016) *Analysis of Intended Nationally Determined Contributions (INDCs)*. Washington, DC: USAID, RALI, and ICF. [www.climatelinks.org/file/2104/download?token=ICW6yp8i](http://www.climatelinks.org/file/2104/download?token=ICW6yp8i)
- Walter, M. (2016) *Extractives in Latin America and the Caribbean—The basics*. Technical Note IDB-TN-907. Washington, DC: Inter-American Development Bank.

## Acknowledgments

The authors would like to express their gratitude and appreciation to various members of the Subnational Integration Working Group for their research contributions, manuscript review, feedback, and sharing of unpublished results, as well as for the design, programming, and testing of the report's data visualizer and web interface. They include Betsy Bandy, Ricardo Bertolino, Patrick Cage, Fernando Farias, Donatella Fuccaro, Juliana Gutiérrez, Maria José Gutiérrez Murray, Lisa Hanle, Alexis Hevia, Gary W. Johnson, Juan Felipe Martinez, Lia Nicholson, Salvador Nieto, Jennifer Dayanna Herrera Salamanca, Araceli Suárez, Rodrigo Rodríguez Tornquist, and Roberto Illich Valluejo.



Solar panels used for street lighting in the Metropolitan Ring of Rio de Janeiro

## Endnotes

- 1 LEDSLAC (2017) *LEDSenLAC 2016: Hacia un desarrollo bajo en emisiones y resiliente al clima en Latinoamérica y el Caribe: Avances en las estrategias nacionales*. <http://ledslac.org/wp-content/uploads/2017/03/LEDS-en-LAC-2016.pdf>
- 2 More background and resources can be accessed at the websites of LEDSLAC (<http://ledslac.org>) and the LEDSGP Subnational Integration Working Group ([http://ledsgp.org/working-groups/subnational-integration-of-leds/?loclang=en\\_gb](http://ledsgp.org/working-groups/subnational-integration-of-leds/?loclang=en_gb)).
- 3 UN Sustainable Development Goals. <https://sustainabledevelopment.un.org/sdgs>
- 4 UN Habitat (2016) *Habitat III: New Urban Agenda*. Draft outcome document for adoption in Quito, September 10. Nairobi: UN Habitat. [www2.habitat3.org/bitcache/97ced11dcecf85d41f74043195e5472836f6291?vid=588897&disposition=inline&op=view](http://www2.habitat3.org/bitcache/97ced11dcecf85d41f74043195e5472836f6291?vid=588897&disposition=inline&op=view)
- 5 Over half of the people on Earth (54%) now live in cities, rising from 14% in 1900 and 38% in 1975. The UN Department of Economic and Social Affairs anticipates that this figure will rise to 66% by 2050, with more than 6 billion urban dwellers globally.
- 6 Seto, K., Güneralp, B., and Hutyra, L. (2012) 'Global forecasts of urban expansion to 2030 and direct impacts on biodiversity and carbon pools.' *Proceedings of the National Academy of Sciences, USA* 109(40): 16083–16088.
- 7 'Nonstate actors' refers to cities, provinces, states, the private sector, and civil society—in short, all actors outside the national government.
- 8 UNEP DTU Partnership (formerly UNEP Risk Centre) is a collaboration between UN Environment (UNEP) and the Technical University of Denmark (DTU). <http://climateinitiativesplatform.org/index.php/Welcome>
- 9 [www.unep.org/climatechange/pledgepipeline/Portals/50136/CitiesAndRegionsPipeline.xlsx](http://www.unep.org/climatechange/pledgepipeline/Portals/50136/CitiesAndRegionsPipeline.xlsx)
- 10 [www.unep.org/climatechange/pledgepipeline](http://www.unep.org/climatechange/pledgepipeline)
- 11 UN-Habitat (2011) *Global report on human settlements 2011. Cities and climate change: Policy directions*. Washington, DC: United Nations Human Settlements Programme.
- 12 Fretes, V. (2013) 'Fiscal decentralization in LAC: an overview.' Presentation at the Asia-Pacific and Latin America Interregional Forum on Managing for Results, May 20–22, Mexico City. Inter-American Development Bank. [https://wpqr4.adb.org/LotusQuickr/cop-mfdr/PageLibrary482571AE005630C2.nsf/OC30BCB7BA03F060C48257BA300249731/\\$file/Session%202a\\_IADB,%20Vicente%20Fretes.pdf](https://wpqr4.adb.org/LotusQuickr/cop-mfdr/PageLibrary482571AE005630C2.nsf/OC30BCB7BA03F060C48257BA300249731/$file/Session%202a_IADB,%20Vicente%20Fretes.pdf)
- 13 Guzmán, S. and Castillo, M. (2016) *INDCs y participación ciudadana en América Latina*. Climate Finance Group of Latin America and the Caribbean. <http://latinclima.org/documentos/indcs-y-participacion-ciudadana-en-america-latina>
- 14 Guzmán and Castillo (2016) Op. cit.
- 15 UN Millennium Development Goals. [www.un.org/millenniumgoals](http://www.un.org/millenniumgoals)
- 16 UNISDR (2005) *Hyogo Framework for Action 2005–2015*. Geneva: United Nations Office for Disaster Risk Reduction. [www.unisdr.org/we/coordinate/hfa](http://www.unisdr.org/we/coordinate/hfa)
- 17 UN Sustainable Development Goals. <https://sustainabledevelopment.un.org/sdgs>
- 18 UNISDR (2015) *Sendai Framework for Disaster Risk Reduction 2015–2030*. Geneva: United Nations Office for Disaster Risk Reduction. [www.unisdr.org/we/coordinate/sendai-framework](http://www.unisdr.org/we/coordinate/sendai-framework)
- 19 Muller, S.A. (2016) *Coordinating climate action: From the national to the local*. Low Emission Development Strategies Global Partnership. [http://ledsgp.org/resource/coordination-and-vertical-integration-of-climate-actions/?loclang=en\\_gb](http://ledsgp.org/resource/coordination-and-vertical-integration-of-climate-actions/?loclang=en_gb)
- 20 Corfee-Morlot, J., Kamal-Chaoui, L., Donovan, M.G., Cochran, I., Robert, A., and Teasdale, P.J. (2009) *Cities, climate change and multilevel governance*. OECD Environmental Working Papers No. 14. Paris: OECD Publishing. [www.oecd.org/governance/regional-policy/44232263.pdf](http://www.oecd.org/governance/regional-policy/44232263.pdf)
- 21 Muller, S.A. (2015) *The coordination and vertical integration of climate actions*. Low Emission Development Strategies Global Partnership. <http://ledsgp.org/wp-content/uploads/2015/10/Coordination-and-vertical-integration-of-climate-actions-web-final.pdf>
- 22 Corfee-Morlot et al. (2009) Op. cit.; and Charbit, C. (2011) *Governance of public policies in decentralised contexts. The multi-level approach*. OECD Regional Development Working Papers 2011/04. Paris: OECD Publishing. [www.oecd.org/governance/regional-policy/48724565.pdf](http://www.oecd.org/governance/regional-policy/48724565.pdf)
- 23 Charbit (2011) Op. cit.
- 24 Data Explorer: <http://ledsgp-data.netlify.com>
- 25 This paper's CO<sub>2</sub> data do not include emissions from bunker fuels (international aviation and maritime transport), waste, noncombustion related emissions from the industrial sector (except cement), or land use and land use change (agriculture, deforestation, etc).
- 26 Boden, T.A., Marland, G., and Andres, R.J. (2013) *Global, regional, and national fossil-fuel CO<sub>2</sub> emissions*. Oak Ridge, TN: Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy. [http://cdiac.ornl.gov/trends/emis/overview\\_2013.html](http://cdiac.ornl.gov/trends/emis/overview_2013.html); Houghton, R.A. et al. (2012) 'Carbon emissions from land use and land-cover change.' *Biogeosciences* 9: 5125–5142. [www.biogeosciences.net/9/5125/2012/bg-9-5125-2012.pdf](http://www.biogeosciences.net/9/5125/2012/bg-9-5125-2012.pdf)
- 27 Conversion note: 1 Gt = 1 gigaton = 1,000,000,000 tonnes = 1.0E+12 kg
- 28 Carbon Dioxide Information Analysis Center, *Global fossil-fuel CO<sub>2</sub> emissions*: [http://cdiac.ornl.gov/trends/emis/tre\\_glob\\_2013.html](http://cdiac.ornl.gov/trends/emis/tre_glob_2013.html)
- 29 WBCSD and IEA (2009) *Cement Technology Roadmap 2009*. Geneva and Paris: World Business Council for Sustainable Development and International Energy Agency. [www.wbcscement.org/pdf/technology/WBCSD-IEA\\_Cement%20Roadmap.pdf](http://www.wbcscement.org/pdf/technology/WBCSD-IEA_Cement%20Roadmap.pdf)

- 30 Concrete is comprised of cement mixed with aggregates such as sand or crushed stone.
- 31 Conversion note: 1 Mt = 1 megatonne = 1,000,000 tonnes = 1.0E+9 kg
- 32 UNFCCC (2015) and Boden et al. (2013) Op. cit.
- 33 pax/km<sup>2</sup>: persons per square kilometer.
- 34 In 1990, 70% of the population was urban, compared with 80% urban in 2015.
- 35 In July 1995, Montserrat's Soufrière Hills volcano, dormant for centuries, erupted and buried the island's capital, Plymouth, in more than 12 meters of mud, destroyed its airport and docking facilities, and rendered the southern part of the island, now termed the exclusion zone, uninhabitable and unsafe for travel.
- 36 No GDP data for Anguilla, Aruba, British Virgin Islands, Cayman Islands, Cuba, Curaçao, Guadeloupe, Martinique, Montserrat, Netherlands Caribbean BES, US Virgin Islands, Falkland Islands, or French Guiana.
- 37 Gruss, B. (2014) *After the boom – Commodity prices and economic growth in Latin America and the Caribbean*. IMF Working Paper 14/154. Western Hemisphere Dept. Washington, DC: International Monetary Fund. [www.imf.org/external/pubs/ft/wp/2014/wp14154.pdf](http://www.imf.org/external/pubs/ft/wp/2014/wp14154.pdf)
- 38 Vergara, W., Fenhann, J., and Scheltz, M. (2015) *Zero carbon Latin America – A pathway for net decarbonization of the regional economy by mid-century*. UNEP DTU Vision Paper. Nairobi and Copenhagen: United Nations Environment Programme and Technical University of Denmark. [http://orbit.dtu.dk/files/123115955/Zero\\_Carbon\\_Latin\\_America\\_rev.pdf](http://orbit.dtu.dk/files/123115955/Zero_Carbon_Latin_America_rev.pdf)
- 39 Quotes in Section 6 are from interviews conducted by the authors.
- 40 SEGEPLAN (2013) *Guía de fortalecimiento municipal: Orientaciones técnicas para institucionalizar la gestión ambiental y de riesgo en los procesos municipales*. Guatemala City: Secretaría de Planificación y Programación de la Presidencia, Gobierno de Guatemala. [www.segeplan.gob.gt/downloads/OT/GR/GM\\_2014.pdf](http://www.segeplan.gob.gt/downloads/OT/GR/GM_2014.pdf)
- 41 USAID and Government of Guatemala (2013) *El cambio climático y su inclusión en los planes de ordenamiento territorial municipal*. Washington, DC and Guatemala City: USAID and Government of Guatemala. [http://pdf.usaid.gov/pdf\\_docs/PA00K9XJ.pdf](http://pdf.usaid.gov/pdf_docs/PA00K9XJ.pdf)
- 42 Ministry of Energy (2016) *A good year for energy in Chile*. Santiago: Ministerio de Energía. [www.energia.gob.cl/sites/default/files/annual\\_progress\\_report\\_-\\_eng.pdf](http://www.energia.gob.cl/sites/default/files/annual_progress_report_-_eng.pdf)
- 43 CONPES 3700. [www.icbf.gov.co/cargues/avance/docs/conpes\\_dnp\\_3700\\_2011.htm](http://www.icbf.gov.co/cargues/avance/docs/conpes_dnp_3700_2011.htm)
- 44 PwC Colombia (2014) *Colombia oil & gas industry 2014: An overview*. Bogotá: PricewaterhouseCoopers. [www.pwc.com/gx/en/oil-gas-energy/publications/assets/pwc-colombia-oil-gas-industry-2014.pdf](http://www.pwc.com/gx/en/oil-gas-energy/publications/assets/pwc-colombia-oil-gas-industry-2014.pdf)
- 45 Ministerio de Transporte de Colombia (2016a) *Guía de ciclo-infraestructura para ciudades colombianas*. C. Pardo and A. Sanz, eds. Bogotá: Ministerio de Transporte de Colombia. [www.mintransporte.gov.co/Publicaciones/asuntos\\_ambientales/cambio\\_climatico\\_y\\_gestion\\_integral\\_del\\_riesgo/guia\\_de\\_ciclo-infraestructura\\_para\\_las\\_ciudades\\_colombianas](http://www.mintransporte.gov.co/Publicaciones/asuntos_ambientales/cambio_climatico_y_gestion_integral_del_riesgo/guia_de_ciclo-infraestructura_para_las_ciudades_colombianas)
- 46 Ministerio de Transporte de Colombia (2016b) *Guía de cambio climático para la movilidad urbana*. Bogotá: Ministerio de Transporte de Colombia. [www.mintransporte.gov.co/Publicaciones/asuntos\\_ambientales/cambio\\_climatico\\_y\\_gestion\\_integral\\_del\\_riesgo/guia\\_de\\_cambio\\_climatico\\_para\\_la\\_movilidad\\_urbana](http://www.mintransporte.gov.co/Publicaciones/asuntos_ambientales/cambio_climatico_y_gestion_integral_del_riesgo/guia_de_cambio_climatico_para_la_movilidad_urbana)
- 47 Funded by the Global Environment Facility. [www.thegef.org](http://www.thegef.org).
- 48 Funded by the Climate Investment Fund (Inter-American Development Bank and World Bank). [www-cif.climateinvestmentfunds.org/fund/pilot-program-climate-resilience](http://www-cif.climateinvestmentfunds.org/fund/pilot-program-climate-resilience)
- 49 Funded by the European Union.
- 50 From the combustion of fossil fuels and cement, not including bunker fuels or land use change.





This document is from the LEDSGP; a global program for which the United States National Renewable Energy Laboratory (NREL) and the Climate and Development Knowledge Network (CDKN) serve as the Secretariat. NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy LLC. CDKN is a program funded by the UK Department for International Development (DFID) and the Netherlands Directorate-General for International Cooperation (DGIS) for the benefit of developing countries; with further funding from the United States Department of State for the co-management of the Low Emission Development Strategies Global Partnership (LEDSGP). The views expressed and information contained in it are not necessarily those of, or endorsed by, DFID, DGIS, the US Department of State, NREL, US Department of Energy, or the entities managing the delivery of CDKN, which can accept no responsibility or liability for such views, completeness or accuracy of the information or for any reliance placed on them. This publication has been prepared for general guidance on matters of interest only, and does not constitute professional advice. You should not act upon the information contained in this publication without obtaining specific professional advice. No representation or warranty (express or implied) is given as to the accuracy or completeness of the information contained in this publication, and, to the extent permitted by law, the entities managing the delivery of CDKN and NREL do not accept or assume any liability, responsibility or duty of care for any consequences of you or anyone else acting, or refraining to act, in reliance on the information contained in this publication or for any decision based on it.