



Urban
Pathways

ECUADOR

POLICY ENVIRONMENT PAPER

BERLIN, 2018



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UN HABITAT
FOR A BETTER URBAN FUTURE

UN environment

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Urban Pathways Replication Cities

ABSTRACT

Ecuator, responsible for 0.15% of the world GHG emissions, aims to reduce its energy related emissions in up to 45.8% depending on the availability of resources and the support of the international community. In order to achieve this goal, Ecuador has started to transform its energy matrix with the construction of 8 hydropower plants. In the future, Ecuador plans to produce 80% of its electricity with hydropower, 16% with thermoelectricity and 4% with other renewable sources. In terms of transport, which accounts for 21% of the national emissions, Ecuador launched the Programme RENOVA in 2008 to replace cars older than 10 years. This includes incentives for the purchase of electric and hybrid vehicles. Concerning public transport, Quito and Cuenca lead the way with the construction of the first subway line and the first tramline, respectively. Finally, in 2010 Ecuador implemented the National Programme of Integrated Solid Waste Management by which it supports the implementation of the technology to capture and use the biogas from municipal landfills.





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COUNTRY OVERVIEW

The Republic of Ecuador is an Andean country situated over 256,370 km² of area space located in the northwest of South America. It has an estimated population of 16.7 million people (INEC, 2018), which represents only 2.6% of the Latin American total population. However, it is the Latin American country with the highest population growth rate in the past 50 years (MAE, 2017). An estimated 63% of the Ecuadorian population live in urban areas. Quito, the capital, and Guayaquil, home of Ecuador's most important port infrastructure, both hosting 2.7 million inhabitants each, are the largest cities in the country accounting for more than 30% of the total population. These two cities contribute to more than 50% of the country's GDP. This demonstrates a strong concentration of population and economic activity in the two

largest cities of Ecuador. Meanwhile, Cuenca, the third largest city, has a population of 0.6 million and accounts for only 4% of the national GDP. Despite the fact that Quito and Guayaquil continue to attract large numbers of new inhabitants every year, their population growth rates have decreased in the past two decades. Meanwhile, the rates of medium-sized cities have increased significantly. In 2016, Ecuador generated a GDP of 98,613.97 million USD, which per capita represents 6,018.50 USD, i.e., a middle-income country (World Bank, 2016). Ecuador's economy is based on oil extraction, which accounted for 43% of total exports in January 2018, and the production of primary agricultural goods for export (39%) such as bananas, cocoa beans, coffee, seafood, and flowers (BCE, 2018).

SUMMARY OF ECUADOR'S NATIONALLY DETERMINED CONTRIBUTION (NDC)

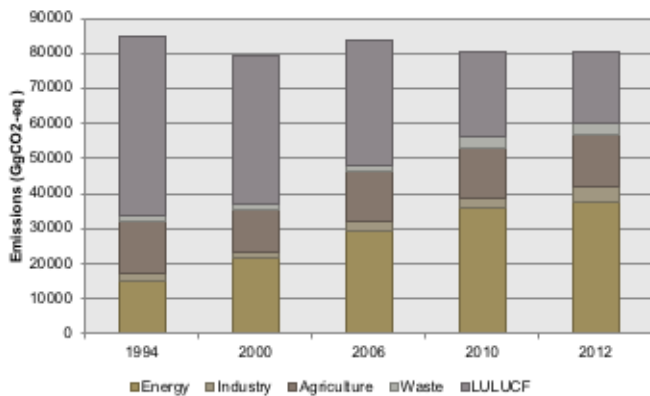
In its Intended Nationally Determined Contributions (INDC), Ecuador commits to reduce by 2025 its emissions in the energy sector in 20.4% - 25% below its 2011 levels. Furthermore, it states that with the proper availability of resources and support from the international community, Ecuador could reduce its emissions in the sector in up to 45.8%. When it comes to adaptation, Ecuador aims at enhancing the adaptive capacity of at least 50% of the most vulnerable municipalities in the country, establishing early warning systems countrywide, and reaching a zero deforestation rate (Ecuadorian Government, 2015).

According to the National GHG Inventory (INGEI by its Spanish acronym), in 2012 Ecuador produced 80,627 Gg CO₂-eq, which in comparison with the world emissions represent only 0.15%. Latin Amer-

ica generates 11% of the total GHG emissions. The sources of GHG emissions in Ecuador are, in order of importance, the energy sector (47%), Land Use, Land Use Change and Forestry (LULUCF) (25%), agriculture (18%), industry (5%) and waste (4%) (MAE, 2017). The emission trends from 1994 to 2012 by sector can be observed in Figure 1 (GHG emission trend in Ecuador from 1994 to 2012 by sector).

Ecuador's energy sector produced 37,594.03 Gg-CO₂-eq in 2012, which represents 47% of national emissions. Between 1994 and 2012 the GHG emissions of this sector increased 151%. Transport is the most pollutant sub-sector accounting for 46% of the energy sector's emissions and 21% of the country's total emissions. It is followed by the energy industry with 32% of emissions (MAE, 2017).

MITIGATION PLANS AND ACTIONS



Source: MAE (2017)

The transport sub-sector generated 16,977.02 GgCO₂-eq in 2012 with an increase of 123% in relation to 1994. More than 85% of the energy is used by terrestrial transport, which runs mostly on fossil fuels (gasoline and diesel). Almost 2 million vehicles were registered in 2015, which in comparison to 2010 represents an increase of 57%. Moreover, 28% of the registered vehicles are older than 12 years (INEC, 2016).

The electricity generation emitted 12,032.44 GgCO₂-eq in 2012. In 2015, 26,462 GWh of electricity were produced, from which 52% came from renewable sources, mainly from hydroelectric power plants, and the rest from thermoelectric power. The contribution of other renewable sources was very low with approximately 2%, from which the majority comes

from biomass (MAE, 2017). However, the studies conducted by the national government to assess the generation potential of different renewable sources show that the solar energy potential in Ecuador is 911 MW and only 1MW is being produced; wind power potential is 884 MW, from which only 2.1% is being used; and geothermal energy has a potential of 952 MW, which has not been exploited at all (MAE, UNDP, & FOCAM, 2015).

The waste sector produced 3,377.83 GgCO₂-eq in 2012, which accounts for 4% of national emissions, more than 80% of which comes from solid waste. Between 1994 and 2012 the GHG emissions of the waste sector increased in 136%. In 2016, the solid waste generated daily amounted to 12,450 tonnes, from which 61% was organic waste, 11% plastic, 9% paper and 2.6% glass. Solid waste management in Ecuador is a competence of the municipal authorities. Nevertheless, in the majority of cases they lack the knowledge, resources and capacity to manage waste disposal adequately. As a consequence, 125 out of 221 municipalities (57%) dispose their solid waste in open-air dumps, which causes air, soil and water pollution, as well as human health problems, mainly for informal waste pickers. The other 96 municipalities have controlled sites for final waste disposal, but they still lack the technical knowledge for an appropriate waste disposal (MAE, 2017).



POLICIES AND STAKEHOLDER MAPPING

Ecuador is governed by a presidential, unicameral representative democracy. After a decade of political instability and traditional parties in power, which lasted from 1996 until 2006, a new party was created and elected. Despite its environmental-friendly discourse, it based its economy, like previous regimes, on the exploitation of natural resources such as oil and copper. Nevertheless, it created a comprehensive legal framework to address the challenges of climate change that allows the design, planning, and implementation of policies and measures for its mitigation and adaptation. It is worth noting that despite its value, it has been conceived from a very centralised perspective, by which subnational governments have limited action possibilities.

This new legal architecture started with the National Constitution, approved in 2008, by which Ecuador became the first country in the world to grant rights to nature. The Ecuadorian Constitution also determines that the state will take action to mitigate and adapt to climate change. Following this constitutional mandate, in 2010 the Inter-institutional Committee of Climate Change (CICC by its Spanish acronym) was created in order to implement and monitor all climate change policies and actions including the development and monitoring of the National Climate Change Strategy 2012-2025 (ENCC by its Spanish acronym). The lead of the CICC is the Ministry of Environment through the Technical Secretariat of Climate Change

(MAE, 2017).

As the national climate change authority, the Ministry of Environment issued a series of ministerial agreements, where it sets the norms and guidelines for climate change programs such as NAMA, REDD+, as well as for the elaboration of Climate Change Plans at the subnational level (MAE, 2017).

For the latter, the ENCC stipulates that all subnational governments have to include a climate action plan/strategy as part of their master plans to be approved by the Ministry of Environment. For this purpose, during 2013 and 2014 the Technical Secretariat of Climate Change developed a technical norm to guide the elaboration of these plans. Until 2015, more than 40 subnational governments included climate action plans in their planning processes (MAE, 2017). The elaboration of these plans counted on the technical and financial assistance of international organizations such as GEF, UNDP, GIZ, WWF, etc. However, climate action at the local level started in 2009 with Quito's Climate Change Strategy, which has evolved over time and become visible at the international level. In 2017, Quito launched its Urban Resilience Strategy in the framework of the 100 Resilient Cities Programme from the Rockefeller Foundation. Cuenca, on the other hand, was selected in 2013 by the Emerging and Sustainable Cities Initiative (ESCI) from the Inter-American Development Bank (IADB) to conduct an assessment and elaborate an Urban Sustainability Action Plan for the city.



ENERGY

Ecuador has put most of its GHG emission reduction efforts on the energy generation sector. Accordingly, 8 hydroelectricity plants are being built, 3 of which are already operating. These projects will add 2,832 MW to the Ecuadorian energy system with an investment of USD 4.7 billions and an estimated emission reduction of 6.29 Gg CO₂-eq. In relation to other renewable sources, there are also some interesting initiatives. One of the most important ones is the Initiative Zero Fossil Fuels for the Galápagos Islands, which aims to base the energy consumption of the Islands solely on renewable energy. With this aim, 1 wind power plant and 3 photovoltaic power plants have been built in different islands. The mitigation potential of this project is 5,867.18 tCO₂-eq. Another flagship project is the wind power plant Villonaco, which is known for its high performance. It is the first wind power plant in the world to have an average speed of 12.7 m/s at an altitude of 2,700 meters above sea level. Villonaco became operational in 2013 and produces 16.5 MW with 11 wind turbines (MAE, 2017).

This ambitious plan aims at the emission reduction in the residential and industry sectors. At the same time it has the goal of reducing public spending through

the elimination of the high natural gas and electricity subsidies that the government currently grants. The residential sector in Ecuador relies highly on natural gas for cooking and water heating. Accordingly, some complementary Energy Efficiency programs are being implemented to switch from gas to clean electricity. One of the programmes has the goal to give the adequate incentives to change 3 million gas stoves to electric ones, as well as 750,000 gas based water heaters. Another program that is being implemented is RENOVA. This program seeks the renovation of old, inefficient refrigerators. Thus, 330,000 refrigerators older than 10 years should be replaced nationwide. In regard to the industrial sector, a programme of energy efficiency in industries, financed partly by the GEF and supported by the United Nations Industrial Development Organisation (UNIDO) was implemented with annual energy savings of 13,000 MWh and 200,000 gallons of diesel, which correspond to an emission reduction of 31,000 tCO₂-eq (MAE, 2017). The final outcome of these programmes, according to Ecuador's plan, should be reflected in a significant change in the energy matrix producing 80% of electricity with hydropower, 16% with thermoelectricity and 4% with other renewable sources (MAE, 2017).



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MOBILITY

The RENOVA program in the transport sub-sector aims to replace the commercial and public transport fleet, which has already reached the end of its useful life (between 10 and 18 years). More than 15,000 vehicles were removed between 2008 and 2014. This policy includes the necessary incentives to foster the purchase of electric and hybrid vehicles. Another program is the construction of bike lanes throughout the country. To date 157 km have been built and another 70 km are on construction (MAE, 2017). Moreover, there are two important infrastructure works related to sustainable urban mobility being

implemented at the moment, i.e. the first subway line in Quito, and the first tramline in Cuenca. The first project is a 22 km line, which will cross the city from north to south, has 15 stations and a capacity of 400,000 passengers per day. The second project consists of a 10.7 km tramline with 27 stations, which will serve an average of 120,000 passengers per day (MAE, 2017).

In the Amazon region, on the other hand, where river transport plays an important role, electric boats based on solar energy have been implemented in 6 communities (MAE, 2017).



WASTE MANAGEMENT

One of the most important policies in the field of waste is the National Program of Integrated Solid Waste Management. This program, approved in 2010, aims at promoting integrated and sustainable solid waste management in the 221 Ecuadorian municipalities. This program with the support of the Facility for performance based Climate Finance in Latin America (CAF and KfW) is implementing the technology to capture and use biogas in disposal sites of 5 pilot cities. These projects aim at reducing 500,000 tCO₂-eq emissions. Beyond this pilot cities there are 13 municipalities that have implemented integrated composting in their waste management system, as well as capture and use of biogas technologies (MAE, 2017).



CUENCA

Cuenca, the third largest city in Ecuador with a population of 614,539, was selected by the Inter-American Development Bank (IADB) to participate in its Emerging and Sustainable Cities Initiative (ESCI). In the assessment conducted for this initiative, Cuenca showed low emission rates and a very good performance in the provision of basic services such as water, sanitation, electricity, waste collection and man-

agement, etc.

It produces 2.42 tCO₂-eq per capita (Ecuadorian average is 2.56 tCO₂-eq) which is significantly less than the 5 tCO₂-eq set as threshold by the ESCI to define a sustainable city. Cuenca aims at reducing its GHG emissions in at least 30% by 2050 in comparison to the levels of 2009.

ENERGY IN CUENCA

In terms of efficient service provision, the City of Cuenca shows very good indicators. In fact, 99.6% of Cuenca's inhabitants have access to electricity in their homes and consume annually 1,228.50 kWh per person. The industrial and commercial sectors account for 43% of the total energy consumption. Moreover, 32% of the energy used comes from renewable

sources, mainly from hydropower plants. To reduce its emissions in accordance to its reduction goal, the City of Cuenca has to increase the share of renewable energy in its energy matrix, as well as to improve the energy efficiency, in particular in the industrial and commercial sectors (IDB & Cuenca, GAD municipal, 2014).

TRANSPORT IN CUENCA

On the other hand, Cuenca faces challenges such as urban sprawl and decrease in the use of public transport. The latter has decreased 20%, going from 58% to 38% of the total trips. Accordingly, the transport sector generates 57% of the total GHG emissions of the city. To reverse the trend, the City of Cuenca started the construction of its first tramline, which is expected to begin operations at the end of 2018. However, according to the Urban Sustainability Action Plan developed by the municipality of Cuenca and the ESCI team, the mobility and land use strategies are not aligned. Hence, 2 out of the 4 prioritised actions of the plan are 1) smart urban growth and 2) sustainable urban mobility. An articulation between the new tramline and the land use plan is necessary to densify



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Pathways

the surrounding area and generate a polycentric structure (IDB & Cuenca, GAD municipal, 2014).

WASTE MANAGEMENT IN CUENCA

Regarding waste, the City of Cuenca collects 98.6% of solid waste and disposes 100% of it in a municipal landfill, which possesses the environmental certification ISO 14001 and follows the guidelines of the US Environmental Protection Agency. The biogas generated in the landfill is turned into energy, generating 2 MW/h of electricity. Moreover, Cuenca is the first city in the country to have implemented a waste separation at source scheme (IDB & Cuenca, GAD municipal, 2014).



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