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SIMULTANEOUS DISCLOSURE

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

ECUADOR

SUPPORT FOR THE TRANSITION OF THE ENERGY MATRIX IN ECUADOR II

(EC-L1265)

LOAN PROPOSAL

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REQUIRED

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2. Means of verification matrix
3. Monitoring and evaluation plan
4. Strategic social and environmental evaluation

OPTIONAL

1. Comparative matrix of changes to conditions
2. Analysis of compliance with the Public Utilities Policy
3. Regional Integration Annex
4. Report on the Program for Efficient Cooking
5. Analysis and evaluation plan of the Energy Efficiency Program for Induction Cooking and Electrical Heating to Replace Liquefied Petroleum Gas in the Residential Sector
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ABBREVIATIONS

BDH	Bono de desarrollo humano [cash transfer program]
BOE	Barrel of oil equivalent
CO_2eq	Carbon dioxide equivalent
FERUM	Fondo de Electrificación Rural y Urbano Marginal [Fund for Rural and Marginal Urban Electrification]
GDP	Gross domestic product
GWh	Gigawatt-hour
IMF	International Monetary Fund
kV	Kilovolt
kWh	Kilowatt-hour
LOSPEE	Ley Orgánica del Servicio Público de Energía Eléctrica [Electrical Utility Act]
LPG	Liquefied petroleum gas
MERNNR	Ministry of Energy and Nonrenewable Natural Resources
MW	Megawatt
NDC	Nationally determined contribution
OGE&EE	Optimización de Generación Eléctrica y Eficiencia Energética [Optimization of Power Generation and Energy Efficiency]
PEC	Programa de eficiencia energética para cocción por inducción y calentamiento con electricidad en sustitución del GLP en el sector residencial [Energy Efficiency Program for Induction Cooking and Electrical Heating to Replace Liquefied Petroleum Gas in the Residential Sector]
PRSND	Programa de Reforzamiento del Sistema Nacional de Distribución Eléctrica [Program to Strengthen the National Electricity Distribution System]
SINEA	Sistema de Interconexión Eléctrico Andino [Andean Electrical Interconnection System]
SNI	Sistema Nacional Interconectado [National Interconnected System]

PROJECT SUMMARY

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<table>
<tr><th colspan="5">Financial Terms and Conditions</th></tr>
<tr><td colspan="3" rowspan="2">Borrower: Republic of Ecuador</td><td colspan="2">Flexible Financing Facility[a]</td></tr>
<tr><td>Amortization period:</td><td>20 years</td></tr>
<tr><td colspan="3" rowspan="2">Executing agency: Ministry of Economy and Finance</td><td>Disbursement period:</td><td>1 year</td></tr>
<tr><td>Grace period:</td><td>5.5 years[b]</td></tr>
<tr><td>Source</td><td>Amount (US$)</td><td>%</td><td>Interest rate:</td><td>LIBOR-based</td></tr>
<tr><td rowspan="3">IDB (Ordinary Capital):</td><td rowspan="3">280,000,000</td><td rowspan="3">100</td><td>Credit fee:</td><td>[c]</td></tr>
<tr><td>Inspection and supervision fee:</td><td>[c]</td></tr>
<tr><td>Weighted average life:</td><td>12.69</td></tr>
<tr><td>Total:</td><td>280,000,000</td><td>100</td><td>Approval currency:</td><td>U.S. dollars</td></tr>
<tr><th colspan="5">Project at a Glance</th></tr>
<tr><td colspan="5">Project objective/description: To help Ecuador achieve its climate change objectives in the energy sector and to help strengthen its fiscal and external accounts, through policy reforms. The specific objectives of the second programmatic operation are to (i) support the replacement of fossil fuels with electricity and enhance energy efficiency measures; (ii) promote access to electricity and bolster conditions to increase use of renewable energy sources; and (iii) help Ecuador make progress toward its commitments for increased electricity exchanges in the region.

This is the second and final operation in a series originally designed as three independent but technically linked operations using the programmatic policy-based lending modality. The policy triggers for the second and third programmatic operations, as established in the first operation (loan 3420/OC-EC), have been combined in this operation.</td></tr>
<tr><td colspan="5">Special contractual condition precedent to the sole disbursement: Fulfillment, to the Bank’s satisfaction, of the policy reform conditions in accordance with the Policy Matrix (Annex II), the policy letter, and other provisions of the loan contract (paragraph 3.2).</td></tr>
<tr><td colspan="5">Exceptions to Bank policies: None.</td></tr>
<tr><th colspan="5">Strategic Alignment</th></tr>
<tr><td colspan="2">Challenges:[d]</td><td colspan="3">SI ☑ PI ☑ EI ☑</td></tr>
<tr><td colspan="2">Crosscutting themes:[e]</td><td colspan="3">GD ☐ CC ☑ IC ☑</td></tr>
</table>

[a] Under the terms of the Flexible Financing Facility (document FN-655-1), the borrower has the option of requesting changes to the amortization schedule, as well as currency, interest rate, and commodity conversions. The Bank will take market conditions as well as operational and risk management considerations into account when reviewing such requests.

[b] Under the flexible repayment options of the Flexible Financing Facility, changes to the grace period are permitted provided that they do not entail any extension of the original weighted average life of the loan or the last payment date as documented in the loan contract.

[c] The credit fee and inspection and supervision fee will be established periodically by the Board of Executive Directors as part of its review of the Bank’s lending charges, in accordance with applicable policies.

[d] SI (Social Inclusion and Equality); PI (Productivity and Innovation); and EI (Economic Integration).

[e] GD (Gender Equality and Diversity); CC (Climate Change and Environmental Sustainability); and IC (Institutional Capacity and Rule of Law).

I. Description and Results Monitoring

A. Background, problem addressed, and rationale

1.1 **Macroeconomic situation.** Between 2008 and 2014, the Ecuadorian economy averaged 4.7% annual growth—ahead of the regional average (3.2%)—and 4.6% annual inflation. The commodity supercycle,[1] combined with improved tax collection over that period, helped finance public expenditure equivalent to 39% of gross domestic product (GDP), which played a part in maintaining high rates of economic growth. This growth period also saw lower poverty rates, decreasing inequality indicators,[2] and an expansion of the middle class.

1.2 In late 2014, a drop in international oil prices ushered in a low-growth period of 0.6% average annual growth from 2015 to 2018.[3] That is because, prior to 2015, the oil sector accounted for over 50% of all exports and about 30% of tax revenues. Falling commodity prices widened the deficit in the nonfinancial public sector[4] from 4.6% of GDP in 2013 to 7.3% in 2017, while aggregate public debt rose from 24% of GDP in 2013 to 45% in 2017.[5]

1.3 In response, the Government of Ecuador adjusted its public finances by 3% of GDP in 2018, resulting in a deficit of 1.2% of GDP for that year, which marked an improvement over the previous year's fiscal situation. Despite its efforts to stabilize the economy, the Government of Ecuador requested support from the International Monetary Fund (IMF) to restore fiscal sustainability, strengthen dollarization, and return to a growth path similar to that of the early 2010s.[6] The IMF and other multilateral organizations are currently providing the Government of Ecuador with US$10.2 billion in financing between 2019 and 2021. Because reducing public expenditure is a major piece of the IMF's program, the Government of Ecuador has set out to cut subsidies for petroleum products, estimated at more than 5% of GDP in the 2007-2014 period.[7]

1.4 Despite these efforts, the declaration of a national emergency in early 2020 due to the coronavirus (COVID-19) pandemic poses major challenges for Ecuador's future economic development. The health and economic crisis caused by the pandemic is taking a heavy toll on all countries, leading to an across-the-board drop in economic activity.[8,9] The crisis is expected to have a major macroeconomic and social impact

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1 The commodity supercycle was an unusually long period of high prices on raw materials (oil, metals, energy, and food) from 2000 to 2014.

2 Poverty & Equity Brief, Latin America & the Caribbean: Ecuador, October 2019. For further discussion on inequality, see Gachet, Grijalva, Ponce, and Rodríguez. The Rise of the Middle Class in Ecuador During the Oil Boom. 2017.

3 The annual growth rates during this period were 0.1% (2015), -1.2% (2016), 2.4% (2017), and 1.1% (2018).

4 Training services, technical assistance, and advisory services provided by persons or entities in the public or private sectors.

5 Data from the Ministry of Economy and Finance, 2019.

6 IMF Report 19/379. Second and Third Reviews Under the Extended Fund Facility Arrangement and Request for a Waiver of Nonobservance and Modifications of Performance Criteria.

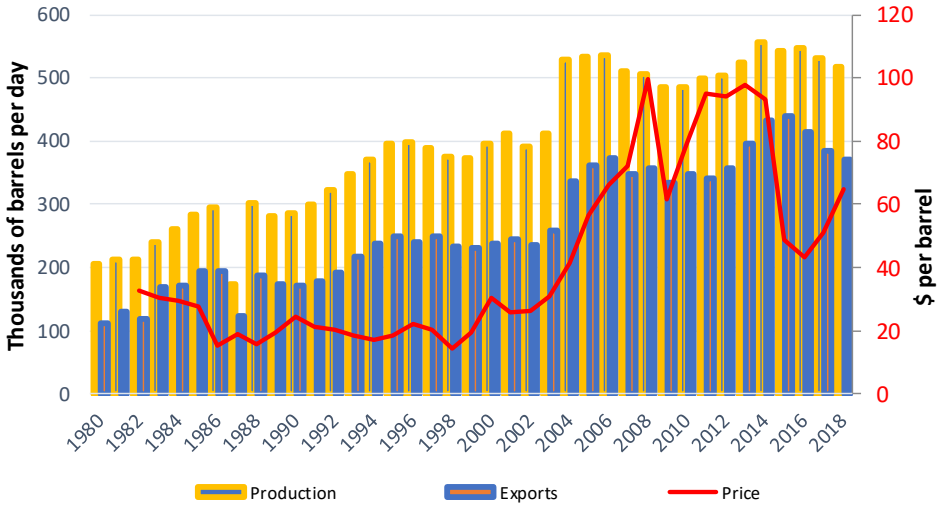
7 See Carrillo Maldonado, Díaz-Cassou, and Tejeda (2018).

8 Limiting the Economic Fallout of the Coronavirus with Large Targeted Policies. Gopinath, G. (2020).

9 The Global Macroeconomic Impacts of COVID-19: Seven Scenarios. McKibbin, W. and Fernando R., 2020.

in Latin America and the Caribbean, the extent of which will vary with conditions in each region and country.[10] According to the most recent data, Ecuador's economic growth rate in 2020 is projected between -3.6% and -6%,[11] a sharp drop from the IMF's previous growth projection (0.2%). As in most countries in Latin America and the Caribbean, decreased economic activity will likely lead to a decline in tax revenues, a drop that will be particularly significant in Ecuador as an oil-producing country.[12] This, combined with increased public expenditure to confront the effects of the crisis, can be expected to result in a significant increase in the fiscal deficit.

Figure 1. Oil production, exports, and prices (1980-2018)[13]



1.5 Although Ecuador is an exporter of crude oil, it has historically depended on imports of petroleum products, as it lacks the refineries to meet growing demand (see Figure 1). Buying petroleum products at international prices and selling them to the public at regulated, subsidized prices entails a significant expenditure for the government. The challenge facing Ecuador is to reduce this dependency through reforms that allow for a transition of its energy matrix.[14] These reforms aim to (i) reduce the weight of subsidies by replacing fossil fuels with electricity in multiple

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10 Inter-American Development Bank (2020). Macroeconomic Report.

11 Credit Suisse, Goldman Sachs, JP Morgan Economist Intelligence Unit.

12 Between the start of the year and 20 March 2020, the price of West Texas Intermediate crude fell 63% (Bloomberg).

13 Source: Internal calculation based on the U.S. Energy Information Administration.

14 In 2014, falling oil prices exerted significant strain on the energy matrix transition initiative. The 2015 eruption of the Cotopaxi volcano led to a period of slow economic activity and emergency investment, and the 2016 earthquake cost the Ecuadorian government more than US$3 billion. These developments underscore the importance of the energy matrix transition in Ecuador. Among the positive effects of having a recovered sector was the immediate response in restoring electricity service after the earthquake, increased energy exports in this critical period for Ecuador's economy, the sector's response capacity in installing mobile substations in affected areas, and the fact that such a response would not have been possible just a few years earlier.

sectors of the economy; (ii) reduce imports of petroleum products, particularly those used in electricity generation, and replace them with renewable energies; and (iii) reduce demand for energy by implementing energy efficiency measures.

1.6 In 2015 Ecuador adopted the United Nations' 2030 Agenda for Sustainable Development as national government policy.[15] This agenda puts forward a transformational approach to economic, social, and environmental sustainability. Ecuador subsequently submitted its first nationally determined contribution (NDC) for the Paris Agreement under the United Nations Framework Convention on Climate Change, which outlines the measures and actions that Ecuador, with its resources and capacities, can carry out to achieve a 9% reduction in greenhouse gas emissions in the energy sector by 2025, as measured against a trend-based scenario.[16] The agenda includes targets for the agricultural, industrial processes, waste management, and energy sectors. The three lines of action of Ecuador's NDC for the energy sector are (i) promoting the use of renewable energy; (ii) strengthening energy efficiency and a shift in consumer behavior; and (iii) promoting and implementing sustainable transportation.

1.7 The lines of action pursued through the following initiatives are consistent with the specific objectives of the "Support for the Transition of the Energy Matrix in Ecuador" loan operation: (i) use of water resources to generate electricity; (ii) the Energy Efficiency Program, which promoted the Optimization of Power Generation and Energy Efficiency (OGE&EE) in the oil industry; (iii) use of wind and solar energy to generate electricity; (iv) the Energy Efficiency Program for Induction Cooking and Electrical Heating to Replace Liquefied Petroleum Gas in the Residential Sector (PEC), aimed at reducing consumption and imports of liquefied petroleum gas (LPG) by replacing LPG ranges with electric induction ranges; and (v) the initiative for efficient public transportation.

1.8 **The energy sector and transformation of the electricity subsector.** According to the National Energy Balance Sheet 2018, primary energy production in Ecuador is 87.5% from oil, 4.7% from natural gas, and 7.8% renewable energy (hydropower, sugarcane byproducts, wind power, photovoltaic power, and biogas)[17] (see Figure 2). Demand for energy is below primary energy production, as Ecuador is a net exporter of energy. In 2018, 48.8% of energy demand was from the transportation sector, 14.5% from the industrial sector, and 13.2% from the residential sector.

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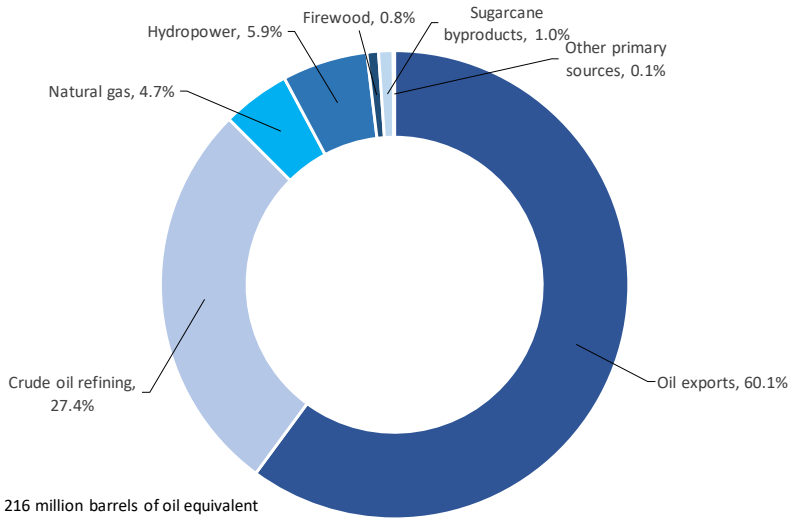
15 Through Executive Decree 371.

16 Ecuador was the first country to submit an NDC prepared through a participatory process, which included 150 institutions from various sectors.

17 National Energy Balance Sheet 2018.

Figure 2. Breakdown of the primary energy supply (2018)



1.9 Ecuador has made strides in transforming its energy matrix (paragraph 1.5) through significant works in the electricity subsector, including the development of hydropower plants, expansion and reinforcement of electricity transmission and distribution systems, and implementation of energy efficiency measures.[18]

1.10 Electricity generation in recent years transitioned from predominantly thermal (49.6%—and 46.14% hydropower—in 2014)[19] to predominantly renewable. In 2018, 29,243 gigawatt-hours (GWh) of electricity were generated, 21,224.31 GWh of it (72.58%) from renewable sources. Meanwhile, nonrenewable sources accounted for 8,019.28 GWh (27.42%); see Figure 3.[20] Installed capacity for electrical power generation in 2018 was 8,826.89 megawatts (MW), 60% of it from renewable energy installed capacity and 40% from nonrenewable sources. The breakdown of energy sources is as follows: 5,035 MW hydro, 1,959 MW thermal, 139 MW biomass, 24 MW solar, 16 MW wind, and 7 MW biogas.[21]

1.11 Hydropower generation is one alternative for adapting to and mitigating the potential impacts of climate change, as it provides renewable energy and helps diversify electricity generation, with generation plants used on a flexible, on-demand basis. The reservoir capacity at some of the plants helps to ensure firm power generation and reduce fossil fuel consumption. The projections reviewed by the Bank indicate that hydropower will remain a key factor in development of the electricity sector in Latin America and the Caribbean and will increase by 2 to 5 gigawatts per year on average (depending on the scenario).[22] This development will hinge primarily on support for the development of solar and wind power through the provision of key

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18 El impacto macroeconómico de la reforma energética ecuatoriana. Carrillo Maldonado, Díaz-Cassou, and Tejeda (2018).

19 National Energy Balance Sheet 2014.

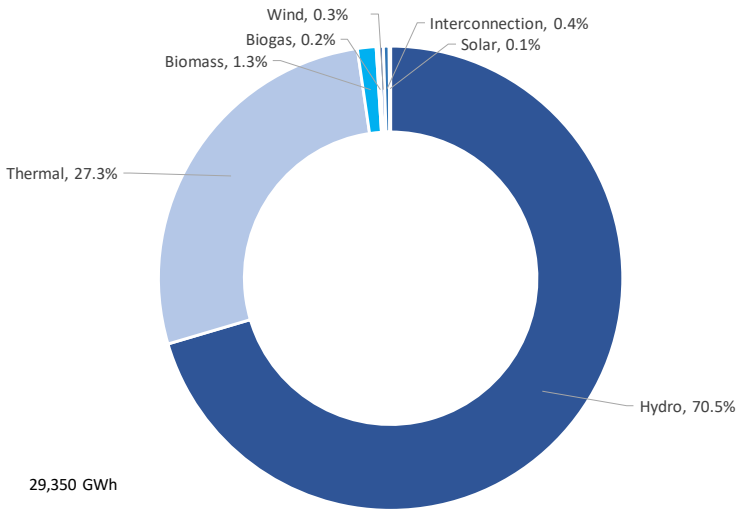
20 National Energy Balance Sheet 2018.

21 Figures related to energy sources have been rounded.

22 El sector hidroeléctrico en Latinoamérica: Desarrollo, potencial y perspectivas. Alarcón Rodríguez (2018).

auxiliary services for reliable supply. The hydropower sector is mature in terms of technology and its level of development in the region, where it has been the preeminent sector for decades now. Notably, the hydropower sector is adapting to new market models by learning to capitalize on new technologies, such as digitalization, for improved management, operation, and maintenance.

Figure 3. Electricity generation by source (2018)



1.12 The efficient use of generated electricity has been a primary focus of various programs, including programs for (i) efficient lighting in homes and public areas; (ii) replacement of old, energy-intensive refrigerators; (iii) use of technical standards and regulations for labeling of home appliances; (iv) implementation of management systems in Ecuador's leading industries; and (v) replacement of LPG with electricity.

1.13 **The sector's institutional framework.** The Ministry of Energy and Nonrenewable Natural Resources (MERNNR) is the lead agency for energy policy in Ecuador. It was created in 2018[23] by merging the Ministry of Hydrocarbons, the Ministry of Electricity and Renewable Energy, the Ministry of Mining, and the Hydrocarbons Secretariat. The sector's regulatory entities are (i) the Mining Regulation and Control Agency, (ii) the Hydrocarbons Regulation and Control Agency, and (iii) the Electricity Regulation and Control Agency. The sector includes public companies for mining, electricity, and hydrocarbons.[24,25] The Ministry of the Environment, meanwhile, designs environmental policies and coordinates strategies, projects, and programs to protect the ecosystem and ensure that natural resources are used sustainably (see optional link 2).

[23] Through Executive Decree 399.

[24] Empresa Nacional Minera, Petroamazonas and Petroecuador, Corporación Eléctrica del Ecuador, Corporación Nacional de Electricidad, and 10 electricity distribution companies.

[25] See organizational chart.

1.14 **Climate change**. With emissions totaling 80 million tons of carbon dioxide equivalent (CO_2eq) in 2012,[26] Ecuador accounts for 0.08% of worldwide greenhouse gas emissions.[27] While these numbers are insignificant in comparison to those of other countries at similar stages of development, in 2019 Ecuador committed to a 9% reduction in its greenhouse gas emissions by 2025 as part of the United Nations Framework Convention on Climate Change (paragraph 1.6).

1.15 **Measures to address the health and economic crisis caused by COVID-19.** In response to this global emergency, the Bank has announced that it will target its support to countries in Latin America and the Caribbean in four priority areas: (i) immediate public health response, (ii) vulnerable populations, (iii) productive fabric and employment, and (iv) public policy and fiscal management. This operation is in line with the Bank's efforts to provide fiscal support to Ecuador. The Ecuadorian government has taken a number of fiscal policy measures to confront the crisis, and the Bank is helping to strengthen fiscal management in the region and thereby alleviate the impacts of the health crisis and the economic fallout. The Bank's support will promote the timely availability and execution of public resources to address the health crisis, and it will help ensure the effective, continuous provision of essential goods and services through policy measures and public management.

1.16 This emergency calls for strengthening public policy and fiscal management by designing and implementing effective, fiscally responsible policy measures. Public policy and fiscal management play a crucial role in the timely availability and execution of resources. Fiscal support will help Ecuador maintain continuous electricity service, which has been declared essential due to its importance in ensuring the continuity of health care systems and facilities, support for other essential services, and the availability of electricity in the homes of all residents.

1.17 Along these lines, Ecuador is pursuing changes to facilitate increased budget allocations for (i) financing the provision of goods and services for the health emergency; (ii) containing the spread of the virus and providing health care to those who have it; (iii) ensuring that supplies are available to the health sector by making procurement requirements more flexible; (iv) adjusting tariffs on medical products needed for emergency response, thereby facilitating the availability of medicines and supplies to address the effects of the virus; (v) banning the export of personal protective equipment; and (vi) suspending utility (including electricity) disconnections due to failure to pay, for as long as the emergency lasts.

1.18 **The energy sector: diagnostic assessment and challenges**. Strengthening and transforming the energy sector requires measures to consolidate these efforts. In 2015 the Bank approved the first operation of this programmatic policy-based loan, Support for the Transition of the Energy Matrix (loan 3420/OC-EC). The operation has made significant strides toward transforming Ecuador's energy sector in terms of (i) a cleaner, more efficient, and more reliable electricity system; (ii) reduced consumption of petroleum products; (iii) increased electricity coverage; and (iv) increased electricity transactions in the region, since the Ecuadorian government

[26] Third national communication from Ecuador to the United Nations Framework Convention on Climate Change. May 2017.

[27] According to 2010 data from Colombia's Institute of Hydrology, Meteorology, and Environmental Studies, submitted as part of the first biennial update and third national communication on climate change.

has made it a priority to leverage the systems' complementarity and surplus generation capacity. Given the amount of time that has elapsed between the first operation and the request from the Government of Ecuador, this second operation in the programmatic series joins tranches II and III, to recognize all the measures the sector has taken in that time and promote new policy actions that consolidate the energy sector's transformation.

1.19 **The program**: **diagnostic assessment and gains.** The specific problems diagnosed through the program are described below, along with the gains made since the first operation was approved, which this operation seeks to build on.

1.20 **Component II**:[28] **Sustainable energy sector.** Ecuador imports nearly 80% of the LPG that it consumes, and it sells LPG at highly subsidized prices. The residential sector consumes about 85% of the LPG, and a significant amount is diverted to contraband,[29] which entails a large economic and political cost for the State. The widespread use of subsidies also has negative impacts in terms of inequality, and policies that avoid such distortions have a favorable impact on income distribution.[30] Multiple Ecuadorian administrations have weighed various options for rationalizing the system of energy subsidies. Rate reforms, although complex, impact different parts of the economy's production chain and people's consumption. Structural changes to policy tend to create significant policy resistance. Gradual, well-structured long-term plans should therefore be crafted that create buy-in among citizens and ensure protection of the most vulnerable populations.

1.21 One of the main drivers of the energy matrix transition has been to maximize the use of renewable resources for electricity generation and focus on using this electricity to replace petroleum products (which are mostly imported) in various sectors of the economy. This has helped to gradually reduce the economic, social, and political weight of subsidies for fossil fuels, as the strategy unfolds and implementation advances.

1.22 Along these lines, and as part of the first programmatic policy-based loan, the Ecuadorian government has implemented, *inter alia,* two significant initiatives to replace the use of fossil fuels with electricity: the **PEC**[31] and the **Energy Efficiency Program**, the latter of which primarily deals with pipelines in the petroleum industry and water pumping in the shrimp sector[32] (paragraph 1.7). The PEC is part of an innovative long-term strategy to reduce the use of LPG through voluntary adoption

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28 Note that Component I of the operation deals with the macroeconomic situation, which is not addressed in the sector-specific part.

29 A large portion of the LPG is diverted as contraband to Colombia and Peru; exact figures are not available, but estimates range from 18% to 22% of consumption. LPG in Ecuador is priced at US$1.60 per 15 kilograms, up to one-tenth the price in Colombia and Peru (Fuel subsidies and income redistribution in Ecuador, 2018).

30 A study by the Latin American Energy Organization simulates the various ways in which LPG subsidies impact income distribution.

31 In designing the PEC, the Ecuadorian government carried out (i) a pilot initiative on induction ranges in Carchi province; (ii) a Bank-financed study of cooking habits in Ecuador; (iii) a rate analysis for exchanging LPG for electricity; (iv) an analysis and identification of suppliers of induction ranges, with a focus on domestic manufacturers.

32 Shrimp is Ecuador's leading non-petroleum export. Diesel is heavily used in shrimp production, and efforts have focused on making electricity available for the equipment operated by the shrimp industry.

of induction ovens, which simultaneously avoids sociopolitical distortions associated with the use of LPG. Adoption of this new technology has a direct impact on public accounts, reducing the gap caused by LPG subsidies as more people become interested in the new technology and have increasingly less dependence on subsidized LPG.

1.23 Through the PEC, the Ecuadorian government seeks to replace the use of LPG with electricity in cooking by replacing LPG-based ranges, which have an efficiency rating of 40%, with induction ranges, which are about 80% efficient. The PEC was started in the second half of 2014 with a target of putting induction ranges in 3 million homes[33] by 2024. The original design of the PEC included incentives for people to use induction ranges, including (i) financing for ranges, cookware, and electric water-heating equipment; (ii) a free allotment for residential customers to use 80 kWh per month for cooking and 20 kWh per month for heating water[34] (incremental consumption); (iii) free delivery of induction ranges to bono de desarrollo humano [cash transfer program] (BDH) beneficiaries;[35] (iv) tariff and value-added tax exemptions for imported induction ranges and heating equipment; and (v) incentives for people without access to electricity.

1.24 Under the PEC, 596,082 induction ranges—19% of the target for 2024—were installed, benefiting some 2.2 million people. BDH beneficiaries received 7,112 (2.5%) of these ranges free of charge. Ecuadorian companies manufactured 67% of these ranges, benefiting multiple sectors and creating local jobs. The LPG subsidies averted by replacing LPG are approximately at US$101,030,000. The energy savings associated with the new induction ranges were estimated at 1,184,621 MWh.[36]

1.25 The PEC, however, has been stagnant since 2017. Range sales declined, and some of the incentives that had spurred the mass rollout of ranges in the opening years of the program are no longer in place. Manufacturers and sellers are no longer using the door-to-door marketing strategy that helped place ranges in homes. To analyze potential solutions and impacts, an evaluation (optional link 5) should be carried out to (i) better understand how Ecuadorian families adapt to induction ranges; (ii) quantify the benefits of the initiative thus far; (iii) determine the net cost of implementation for the State; and (iv) evaluate the performance of the efficient cooking fund as a key financial instrument for sustainable energy efficiency measures. The Bank is providing support in the form of an independent midterm evaluation, now in preparation, which will evaluate the program, propose adjustments in response to contextual changes (economic, industrial, political, and social), and incorporate lessons learned to date, to structurally adjust the subsidy targeting strategy, with public involvement.

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[33] This program has required parallel investments to reinforce the national distribution system and transition from 110-volt to 220-volt distribution.

[34] Current rate schedule of the Electricity Regulation and Control Agency.

[35] The BDH is a direct cash payment from the Ecuadorian government, and it is aimed at (i) reducing levels of chronic malnutrition and preventable disease in children under 5; (ii) encouraging school dropouts to resume their education and keeping children ages 5 to 18 in school; (iii) protecting older adults and persons with disabilities; and (iv) ensuring a minimum level of consumption for nuclear families, *inter alia*.

[36] The total electricity subsidy allocated by the government as an incentive is US$100,032,289.

1.26 Under the Energy Efficiency Program (paragraph 1.21), the government has been working since 2009 to replace subsidized diesel in electricity generation associated with the oil industry by reusing associated gas and supplying hydropower from the National Interconnected System (SNI). This allows the sector to use electricity from the SNI, much of it renewable energy, to replace the bulk of electricity generated by industry for self-supply with electricity from the SNI. The program fits within Ecuador's national development policies as well as its sector policies for energy, the environment, climate change, and Petroamazonas EP. The program, which began as part of the OGE&EE initiative, is one of the most ambitious projects in Ecuador's energy sector. By implementing this infrastructure of technological change for the energy supply, the program has helped establish a new energy development model that is low in greenhouse gas emissions by transforming the common practice of burning off gas associated with the petroleum industry and through optimal use of renewable electrical power. This has reduced consumption of fossil fuels in Ecuador's oil industry.

1.27 The first programmatic policy-based loan made strides in executing this program by increasing transfer capacity from the SNI to the hydrocarbon sector. The following outcomes were achieved between 2009 and 2018: (i) greenhouse gas emissions reduced by 1,359,896 tons of CO_2eq by replacing diesel in hydrocarbon activity; (ii) 26,213,744 cubic feet of associated gas recovered for electricity generation; (iii) 544 million gallons of diesel saved; and (iv) US$900 million in net economic savings due to reduced consumption. The second operation will continue these efforts and will continue reducing the demand for diesel in hydrocarbon activity by replacing it with electricity, thereby intensifying the use of electricity generated from renewable sources and further reducing greenhouse gas emissions.[37]

1.28 In addition to strengthening actions to reduce fossil fuel consumption, the policy framework also needs to be strengthened to make the sector sustainable as a whole. To this end, a national plan that includes Ecuador's efforts to reduce greenhouse gas emissions needs to be developed. This second operation seeks to turn these climate-change actions into government policy. Ecuador is also starting to prepare its NDC implementation plan and will subsequently design a long-term strategy in accordance with the Paris Agreement.

1.29 **Component III**: **Strengthening of the electricity subsector.** In Ecuador, the State reserves the right to administer, regulate, control, and manage strategic sectors in accordance with principles of environmental sustainability, safety, prevention, and efficiency. One of these strategic sectors is energy and the provision of electrical utility service through electricity distribution companies. The government sets policies based on the National Development Plan and participates in running these companies and in sector control and regulation.

1.30 Under the first operation, the Ecuadorian government passed the Electrical Utility Act (LOSPEE), repealing the old Electricity Sector Regime Act (which had been in effect since 1996) and including the following: (i) modernization of electrical grids by taking into account regulatory considerations, transportation and power distribution

[37] Consumption of leading fuels was reduced between 2009 and 2018—diesel by 45%, fuel oil by 17.33%, fuel waste by 26.56%—due to the incorporation of new hydropower plants, according to Annual and multiyear statistics in Ecuador's electricity sector (Electricity Regulation and Control Agency, 2018).

networks, distributed generation, storage, smart metering, active demand management, and opportunities to provide new products and services; (ii) provision of electrical utility service by the State, as a tool for developing the industry; and (iii) the new legal framework for the electricity sector in accordance with the Ecuadorian constitution, prevailing conditions in the country, and an updated institutional structure. The second operation seeks to issue regulations and requirements for implementation of LOSPEE in accordance with constitutional principles of accessibility, continuity, quality, efficiency, and participation, while ensuring transparency throughout all phases and processes.

1.31 Also approved during the first operation were (i) the National Electricity System Expansion and Development Plan 2013-2022; (ii) the priority determination for the Distribution Improvement Program to help implement the PEC; (iii) the ministerial agreement creating the interagency committee for implementation of the National Smart Grids Program; (iv) use of a sustainability methodology to finance rural electrification projects with grid expansion, as well as development and approval of the cost-efficiency methodology for selecting projects for electrification in isolated rural areas; and (v) development and approval of a strategy for evaluating the impact of rural electrification projects.

1.32 The increase in productive activity adds electrical loads that will impact the system, such as electric public transportation projects, incorporation of new productive developments, and mass migration from traditional LPG-based cooking to electrical ranges, among other projects aimed at supporting the energy matrix transition by avoiding the use of fossil fuels. This will result in an estimated 7.5% annual increase in demand (from 20,634 GWh in 2013 to 42,701 GWh in 2022) (optional link 12).

1.33 Future demand for electricity, reflecting growth in the aforementioned activities, will be met largely through hydropower[38] (paragraph 1.11) in accordance with plans for transforming Ecuador's energy matrix by emphasizing investment in renewable, clean energy sources.

1.34 To respond to this new electricity generation and emphasis on electrical power (over other energy sources) under the Distribution Improvement Program, which was approved with support from the first operation, national initiatives have been reinforced and expanded: (i) subtransmission lines; (ii) distribution substations; (iii) medium- and low-voltage grids; and (iv) public lighting and installation of service drops and meters, combining modernization, automation, reliability, continuity, resilience, and service quality. The electrical infrastructure installed under the Distribution Improvement Program provides an installed capacity to meet the demand for electricity in all sectors. The quality of electricity service was substantially improved, as evidenced by the decrease in average frequency and total duration of outages. Continuous electricity service was provided, and outages were promptly addressed.

1.35 Another challenge for Ecuador in transforming the sector (paragraph 1.18) is closing the electricity access gap in an equitable manner. The government approved investments through the **Fund for Rural and Marginal Urban Electrification (FERUM)**. Universal electrification is a Millennium Development Goal for reducing

[38] The hydropower plants are strategically located, taking into account the complementarity among Ecuador's water basins, so that not all of them suffer the effects of the dry season at the same time.

poverty and inequality. Access to electricity enhances productive capacity, family well-being, and access to education for new generations.[39] FERUM has provided US$361 million in financing and benefited 49,247 households as of 2018. Ecuador had 93.8% electricity coverage in 2008. The specific objectives of FERUM are to (i) enhance quality of life in rural and marginal urban areas through access to electricity, (ii) promote the use of technologies based on renewable energy, (iii) expand electricity coverage, and (iv) promote productive uses of electricity.

1.36 FERUM projects for rural and marginal urban electrification have (i) benefited residents in disadvantaged, historically excluded sectors in marginal urban and rural areas, who previously had used candles or kerosene; (ii) benefited the residents farthest removed from conventional grids by serving them through renewable power generation, thereby fostering an environment of prosperity for children and women in the household; (iii) provided electricity and improved service for schools, medical clinics, and community spaces in rural and marginal urban areas; (iv) enhanced productivity in the agroindustrial, craft, and small business sectors; (v) promoted small agroecological farms that use clean energy, with electrical fencing for efficient livestock management; (vi) pumped water for agricultural production and for the food sovereignty of families and communities located far from the project; and (vii) helped create Internet service areas to support the education of children and young adults. The second operation aims to promote the FERUM program in grid expansion projects as well as renewable energy projects for electrification in isolated rural areas.

1.37 **Component IV: Support for regional electrical integration.** Ecuador's electricity system is complemented by exchanges through electrical interconnections with Colombia and, to a lesser extent, Peru. Ecuador has two interconnections with Colombia—one at 138 kilovolts (kV) and another at 230 kV—with a maximum carrying capacity of 535 MW. With Peru it has one 230-kV interconnection with a carrying capacity of 100 MW. Both of these countries, however, have limited opportunities to leverage their installed capacity to maximize electricity exchanges because the grids' current topology keeps the systems separate during transactions. Energy exports from Ecuador grew 454% from 2015 to 2018 due to surplus generation, but exports to Peru (22.13 GWh) accounted for only 9% of the total (233.53 GWh) because of limitations in the interconnection infrastructure. The project for the 500-kV Ecuador-Peru interconnection system is needed to enhance the capacity for energy exchanges.

1.38 In terms of integration initiatives, Ecuador is part of the Andean Electrical Interconnection System (SINEA),[40] which promotes the interconnection of Colombia, Ecuador, Peru, Chile, and Bolivia. Agreements were established under SINEA to pursue a roadmap to prioritize binational interconnections, optimize and reinforce existing interconnections, and harmonize regulatory frameworks as a necessary step toward regional integration. Under the first operation, a binational agreement

[39] A Bank study on rural electrification in Brazil found a significant decrease in the school dropout rate (Mejdalani et al., 2018).

[40] SINEA originated in the Galapagos Declaration, signed in 2011 by the Governments of Bolivia, Chile, Colombia, Ecuador, and Peru, in which the energy ministers agreed that regional electrical interconnection would bring significant benefits and constitute a necessary step toward their countries' economic integration and development.

was reached on the scope of a high-voltage (500 kV) transmission line for the Ecuador-Peru interconnection, and a policy proposal was developed to harmonize regulatory frameworks for greater exchanges of electricity with Peru at the existing 230-kV connection.

1.39 **Program rationale and proposal**. Consolidating outcomes and assisting in actions still pending in Ecuador's energy transformation agenda requires continuity in policy actions and sector reforms. Failure to complete this process would result in (i) increased consumption of petroleum products, with greater dependence on imports, thereby exerting greater pressure on public finances through subsidies and on the trade balance through imports; (ii) a squandering of investments in generation, distribution, and transmission that emphasized the use of electricity to replace fossil fuels in productive sectors; and (iii) a failure to hit targets and fulfill commitments related to reduced greenhouse gas emissions and climate change actions.

1.40 To complement the reform process, the Government of Ecuador requested the Bank's support in implementing the second operation of the programmatic policy-based loan, "Support for the Transition of the Energy Matrix in Ecuador II." The program brings continuity to the important policy reforms implemented thus far and puts forward specific proposals to close gaps in the sector by (i) supporting the replacement of fossil fuels with electricity and enhancing energy efficiency measures; (ii) promoting access to electricity and strengthening conditions for the increased use of renewable energy sources; and (iii) supporting the country's commitments for increased electricity exchanges in the region. The reforms supported through both operations entail profound shifts in the energy sector that benefit the country's finances and the battle against climate change. Despite the change of administration between approval of the first and second operations, the sector priorities have remained intact and have been strengthened by actions such as the call for bids for the use of nonconventional renewable energy, passage of an Energy Efficiency Law, increased rural electrification projects, increased electricity exchanges, and implementation of climate change measures as government policies.

1.41 **Effectiveness of sector policy reforms.** According to the Organisation for Economic Co-operation and Development,[41] regulatory reforms complement fiscal and monetary reforms by creating conditions conducive to a country's sustainable development. Sector policies should evolve at the same pace at which economies are transformed to ensure that infrastructure does not become a bottleneck, but rather an engine for economic development. How infrastructure-related services are used is what ultimately determines the impact on users and, therefore, is a key factor in the comprehensive development of an economy.

1.42 Limitations in institutional structure, regulation, and management can interfere with the provision of public infrastructure services, thereby reducing the quality and efficacy of public capital and undermining incentives for enterprises to invest. Evidence has shown that sector policies are essential to improving the performance of the electricity sector and that sector policy reforms can lead to increased

[41] Recommendation of the Council on Regulatory Policy and Governance, Organisation for Economic Co-operation and Development. 2012.

investment and higher quality service, thus making the electricity sector more efficient and financially sustainable. The project completion report for the operation "Support to the Institutional and Operational Strengthening of the Energy Sector III" (loan 2848/OC-SU) concludes that programmatic policy-based loan operations are effective ways to support sector reforms involving multiple actors and that, with a diversified and sustainable energy supply, end consumers are the primary beneficiaries of these interventions.

1.43 **The Bank's support for Ecuador's energy sector.** The Bank has extensive knowledge and experience in Ecuador's energy sector as a result of its ongoing technical and financial support. With a total of US$1,657,700,000 in financing since 2010 and some US$10 million in technical cooperation, as well as the Bank's leading role in support from other multilateral organizations, resources have been primarily focused on (i) improving the management of electricity distribution companies, (ii) strengthening Ecuador's electrical infrastructure, (iii) modernizing the sector and pursuing energy efficiency, and (iv) narrowing the gap in access to electricity.

1.44 Ecuador's current energy portfolio includes six investment loans: 3167/OC-EC, 3494/OC-EC and 3494/CH-EC, 3710/OC-EC and 3710/KI-EC, 3906/OC-EC, 4343/OC-EC, and 4600/OC-EC. These operations have helped expand, reinforce, and modernize the electricity system, resulting in improved indicators such as coverage, quality, and reliability of electrical service.

1.45 Through technical-cooperation resources, the Bank has supported Ecuador in designing projects, studies, regulations, standards, plans, and policies in the aforementioned areas, in addition to ongoing support for project execution. The Bank has positioned itself as an important strategic partner of the Government of Ecuador in the electricity subsector, both as a source of investment financing and for generating knowledge and strengthening institutions.

1.46 **Lessons learned for operation design**. In designing this second phase of the program, the lessons learned from the first phase (loan 3420/OC-EC) have been taken into account, as have those from other Bank-financed policy-based loan operations, the most recent of which have been in Colombia (loan 4773/OC-CO), Panama (loan 4234/OC-PN), Honduras (loan 3619/BL-HO), Mexico (loan 4501/OC-ME), and Bolivia (loan 4606/BL-BO). Notable among these lessons are the following: (i) to bolster the impact of the proposed sector-specific institutional and regulatory reforms, studies should be carried out to provide input for the development and implementation of policy commitments; (ii) policy measures, particularly for regulatory policy, require a gradual approach to implementation, and the program's policy commitments should be pursued in a sequential manner with clearly defined responsibilities; (iii) to ensure sustainable impacts, emphasis should be placed on substantive policy commitments such as ministerial decrees and resolutions; (iv) experiences of Bank-financed projects in execution, as well as ongoing dialogue with sector authorities, should be taken into account to identify institutional and policy changes; and (v) the country's social and political situation should be taken into account to promote feasible reforms and ensure successful implementation.

1.47 **Coordination with other donor entities**. The Bank has played a major role in Ecuador's energy sector by serving as a leader and coordinator of the country's efforts alongside other multilateral banks, development agencies, and

international cooperation funds. For the PEC, the Government of Ecuador also received financing from the Japan Bank for International Cooperation. The Bank has supported the sector with financing, cofinancing, and parallel financing for rehabilitation and reinforcement of the electricity system, rural electrification, system modernization, and energy efficiency in both transmission and distribution lines, at various phases and times, with the Development Bank of Latin America, the French Development Agency, the Global Environment Facility, the China Cofinancing Fund for Latin America and the Caribbean, and the Korea Infrastructure Development Cofinancing Facility for Latin America and the Caribbean.

1.48 **The Bank's country strategy with Ecuador 2018-2021.** The program is aligned with the Bank's country strategy with Ecuador 2018-2021 (document GN-2924), as it will contribute to the objectives of (i) strengthening public finances, and (ii) supporting productivity and private sector development as drivers of growth. The operation is aligned with the following priority areas: (i) institutional strengthening and (ii) access to quality public services. The project specifically contributes to the following proposed actions identified in the country strategy in support of: (i) the investments needed to move forward with the energy reform; (ii) the process of modernization of the State, prioritizing initiatives that generate efficiencies; and (iii) improving the welfare of the rural population through the provision of public services.

1.49 **Strategic alignment.** The program is consistent with the second Update to the Institutional Strategy 2020-2023 (document AB-3190-2) and is aligned with the challenges of (i) Productivity and Innovation, as it strengthens the energy sector as a pillar of economic growth and promotes energy efficiency and the use of nonconventional renewable energy sources; (ii) Social Inclusion and Equality,[42] as it supports expanded access to electricity, makes modern electrical cooking equipment more affordable (lowering the barrier to private financing for families), provides targeted subsidies for new ranges in low-income households, and creates a strategy to reduce distortions caused by widespread use of LPG subsidies and promote the adoption of modern cooking equipment; and (iii) Economic Integration, as it promotes the integration of Ecuador's electricity market with other countries in the region. The program is also aligned with the crosscutting themes of (i) climate change and environmental sustainability, as it promotes and develops nonconventional renewable energy sources and implements energy efficiency measures that lower greenhouse gas emissions. In accordance with the multilateral development banks' joint methodologies for tracking climate finance, 83.33% of the operation's resources are invested in climate change mitigation activities; these resources contribute to the IDB Group's target of increasing financing for climate change projects to 30% of all approvals by 2020; and (ii) Institutional Capacity and Rule of Law, as it promotes reforms to strengthen institutional capacity in the energy sector.

[42] This operation does not include policies on gender or persons with disabilities, but the Bank's support for Ecuador includes investment loans for (i) preparing strategies on both of these issues for the energy sector (loan 4343/OC-EC) and (ii) an action plan for narrowing the inequality gap in the sector (optional link 10) (optional link 11).

1.50 The program is consistent with the Energy Sector Framework (document GN-2830-8) in the areas of energy access, sustainability, security, and governance, as it promotes policy reforms for (i) increased energy access, (ii) sustainable sector development, (iii) diversification of the energy matrix, (iv) efficient use of energy, and (v) regional integration. It is also consistent with the Climate Change Sector Framework (document GN-2835-8), as the proposed energy policy reforms entail a reduction in greenhouse gas emissions. The program is aligned with the Corporate Results Framework 2020-2023 (document GN-2727-12) through the regional context results indicators by reducing greenhouse gas emissions and through the development results indicators by increasing installed power generation capacity from renewable sources and enhancing regional integration. The program is also included in the 2020 Operational Program Report (document GN-2991-1).

1.51 **Consistency with the Public Utilities Policy (document GN-2716-6).** The program is consistent with the objectives of the Public Utilities Policy. It complies with the principles of the policy by supporting strategies to reduce fossil fuel consumption, support modernization of the electricity subsector for greater sustainability and reliability, and develop regulations that encourage energy efficiency, generation based on renewable energy, and regional electrical integration. Also, to comply with the specific conditions in the Public Utilities Policy (Section IV, document GN-2716-6), a cost-benefit and cost-efficiency estimate of the proposed reforms and a financial sustainability analysis have been carried out for this policy-based operation, as described in the economic section of optional link 2.

1.52 The analysis performed found that the progress in changing the energy production matrix[43] produced savings in gallons of diesel for power generation that translate into significant monetary savings for the country. The same was found in the analysis of the PEC program, the FERUM, and the programs to improve distribution systems and for interconnection between Ecuador and Peru. Cumulative economic benefits for Ecuador for the period 2014-2018 were an estimated US$1,414.3 million. See optional link 6.

B. Objectives, components, and cost

1.53 **Objectives.** To help Ecuador achieve its climate change objectives in the energy sector and to help strengthen its fiscal and external accounts, through policy reforms. The specific objectives of the second programmatic operation are to (i) support the replacement of fossil fuels with electricity and enhance energy efficiency measures; (ii) promote access to electricity and bolster conditions increase use of renewable energy sources; and (iii) help Ecuador make progress toward its commitments for increased electricity exchanges in the region.

1.54 In view of the time elapsed since approval of the first operation (2015) and the government's request for a second operation, as well as the political and sectoral changes in Ecuador since then, this second operation combines the triggers for the second and third programmatic policy-based loan operations, and in many instances strengthens these triggers, resulting in a more robust, up-to-date Policy Matrix. This change from the original plan of three programmatic operations reflects an adjustment to developments in the country and aims to make the Bank's support

[43] Multiyear Statistics for Ecuador's Electricity Sector 2009-2018. ARCONEL.

more relevant and significant in the policy-based program (paragraph 2.1).[44] The program's four components are described below, along with the changes made to the matrix:

1.55 **Component I. Macroeconomic framework.** The objective of this component is to ensure that a macroeconomic context consistent with program objectives is maintained in accordance with the Policy Matrix and the sector policy letter.

1.56 **Component II. Sustainable energy sector.** This component supports actions to replace and reduce fossil fuel consumption and associated subsidies in the residential sector and in electricity generation. This second operation leaves four policy conditions from the planned second programmatic policy-based loan unchanged and modifies three of them (see optional link 1). As for the original third operation, three conditions have been left unchanged, and three have been modified. In addition, this component has been strengthened with three new conditions.

1.57 The unchanged conditions of the second and third programmatic operations are (i) that the plan to replace the use of LPG with electricity in the residential sector is in execution (2.1);[45] (ii) that the rate schedule for transitioning from LPG to electricity in the residential sector with access to electricity service is published and implemented (2.3); (iii) that annual demand for diesel in hydrocarbon activity has been reduced and replaced by electricity through the OGE&EE initiative and the annual target achieved (2.4); and (iv) that the National Energy Balance Sheet has been prepared and published (2.7).

1.58 The second programmatic operation called for a proposed policy of the Ministry of Energy and Nonrenewable Natural Resources on replacement of subsidized LPG with electricity, reaching out to vulnerable populations with no access to electric service, to be designed and a draft completed; the third programmatic operation called for this policy to be approved by sector authorities. This was accomplished through Ministerial Agreement 264, which provided for an induction kit (induction range, cookware set, installation of a 220-volt internal circuit, and a rate incentive for up to 80 kWh per month) to be provided free of charge to BDH recipients, i.e. the most vulnerable population, living in poverty or extreme poverty. Although this agreement did not become policy, it did benefit 7,112 Ecuadorian households, and therefore this condition is deemed to have been fulfilled. However, a policy condition aimed at benefiting vulnerable populations is included to strengthen the results in this area (paragraph 1.58). The second programmatic operation also called for Ecuador's 2015-2040 energy forecast to be prepared and approved. While this has not yet been completed, in July 2019 the MERNNR, in accordance with a decision of the National Planning and Development Department, identified the study for "development of the energy forecast and planning in Ecuador" as a priority. As for the conditions that have been modified, the third programmatic operation included a condition that the annual target of the PEC should be achieved. The PEC has a final

[44] In accordance with the guidelines for preparation and implementation of policy-based loans (document CS-3633-2), the definition of conditions (triggers) for a programmatic operation may become more specific since the results of the first operation provide the foundation for more specific program elements in subsequent operations.

[45] This number corresponds to the policy condition listed in the policy matrix. The numbers at the end of each policy condition have been provided for ease of reference to the conditions listed in the Policy Matrix.

target of 3 million efficient ranges installed by 2024, but it does not have clearly defined annual targets. Therefore, this condition has been adjusted for the second operation to state that the PEC should be in execution, which the Bank has supported (paragraph 1.24). Lastly, the condition related to preparing the National Energy Agenda, submitting it for consideration by the (now defunct) Ministry of Strategic Sector Coordination, and publicizing the agenda has been modified (paragraph 1.60).

1.59 Under the second programmatic operation, Component II on energy efficiency—a key tool for mitigating the effects of climate change—has been strengthened by including the following conditions: (i) approval of the Energy Efficiency Act, including measures for efficiency in urban public transportation through the use of electric vehicles (2.5). This law aims to establish the legal and operational framework for the National Energy Efficiency System and promote the efficient, rational, sustainable use of energy in all its forms, declaring it a matter of national interest and State policy, in order to increase energy security in Ecuador. With greater energy efficiency, the law will help boost energy productivity, foster competitiveness in the country's economy, build a culture of environmental sustainability and energy efficiency, contribute to climate change mitigation, and uphold the right to live in a healthy environment. The law also includes a principle of transparency and adequate information for consumers and decision-makers. It calls for incentives for consumers who implement energy efficiency actions in their processes. The law takes a very important step in terms of energy efficiency in the transportation sector, as it requires that all vehicles on urban and suburban public transportation routes run on electricity by 2025. The law also requires decentralized autonomous municipal governments to establish incentives for the use of electric vehicles for a period of 10 years after the law goes into effect.

1.60 Another condition that has been included is (ii) approval of construction standards that promote energy efficiency (2.2). As the residential sector is a leading consumer of energy in Ecuador, construction methods need to be altered[46] to reduce energy consumption in buildings, and a legal framework put in place governing efficiency throughout a building's useful life. To this end, a set of technical requirements are needed to regulate the energy features of buildings and establish official minimum standards for the country.

1.61 The Government of Ecuador, acting through the Ministry of Urban Development and Housing as the lead agency for human settlements and habitat, has pursued a structural change in housing and building policy nationwide through documents that promote the orderly development of human settlements and access to decent housing. The Ecuadorian Construction Code updates construction standards and establishes new building requirements. It promotes the design and construction of buildings with a view to sustainability, efficiency, and stewardship of resources, thereby reducing fossil fuel consumption, the use of nonrenewable resources, and associated greenhouse gas emissions. The code requires all housing units to have a dedicated circuit for an electric range and another dedicated circuit for shower- equipped bathrooms for heating water. This applies to all types of housing, including low-income housing, and further promotes the use of electric ranges among vulnerable populations by providing the installations needed for induction

[46] Ecuadorian Construction Code.

ranges. The aim is to continue reducing the use of LPG-based ranges, thereby reducing LPG consumption in this specific sector.

1.62 Also included as a condition is (iii) submittal of the NDC for 2012-2025 to the United Nations Framework Convention on Climate Change (2.6). This is the policy framework for sector sustainability and sets forth a national plan that includes the country's actions to reduce greenhouse gas emissions. This condition supersedes that of the aforementioned National Energy Agenda (paragraph 1.56) as a strategic document for sector planning and coordination. While the National Energy Agenda was prepared for the period 2016-2040, the NDC articulates an up-to-date national plan that includes broader actions than an energy agenda and has a specific focus on climate change. The mitigation component of the NDC addresses the five sectors prioritized in the National Climate Change Strategy 2012-2025, and energy is one of them.

1.63 **Component III. Strengthening of the electricity subsector.** This component will support efforts to advance and fulfill commitments on efficiency, modernization, innovation, and sustainability in the provision of electricity service. This second operation keeps the policy conditions in place with adjustments to two of them.

1.64 The following conditions remain in place and are being strengthened: (i) that the cash recovery index of electricity distribution companies be raised above 75%, and that the indicator of total electricity losses be below 14% (3.3); (ii) that smart network principles are incorporated in projects of the Program to Strengthen the National Electricity Distribution System (PRSND) (3.4); and (iii) that the MERNNR has approved the final impact evaluation report on rural electrification projects[47] (3.8). The second operation seeks to continue improving electric utility distribution, as reflected in a variety of indicators, and to continue modernizing, innovating, and digitalizing the electricity subsector to make it more sustainable and reliable and to accommodate the additional loads resulting from the energy matrix transition, including progress in raising the cash recovery index, reducing electricity losses, and incorporating smart networks in PRSND projects.

1.65 The following conditions have been strengthened for the second operation: (i) that the auction announcement is issued for nonconventional renewable energy generation projects (3.1); (ii) that regulations are issued for the Electric Utility Act, including preparation and dissemination of the proposed regulations titled "Marco normativo para la participación de la Generación Distribuida" [Regulatory framework for participation of distributed generation] (3.2); (iii) that the plan for improving electricity distribution systems is updated (3.5), that the first phase of the PRSND is complete, and that the third phase reaches 50% completion; (iv) that at least two additional renewable energy projects for electrification in isolated rural areas are completed (3.6); and (v) that at least 200 rural electrification projects to replace and reduce the use of diesel are completed, including grid expansion, and that these projects have been incorporated into the electricity distribution companies' business system (3.7). The latter two conditions have been slightly modified to specify the number of projects, and the conditions related to advancing the plan to improve the National Electricity Distribution System have been strengthened.

[47] The rural electrification projects were carried out in phases, and therefore an impact evaluation could be conducted before program completion.

1.66 This second operation has eliminated the target of generating at least 100 MW with natural gas in order to focus solely on technologies low in greenhouse gas emissions. The condition of commissioning renewable power generation projects for at least 2,000 MW has also been eliminated and replaced by the government's commitment to install generation capacity with nonconventional renewable energy and with private sector participation. This condition was changed because, while the target was achieved in terms of installed capacity, it was done without Bank-financed investment and, therefore, the thorough ex post social and environmental review that Bank policies require for inclusion in this programmatic series was never conducted.

1.67 **Component IV. Support for regional electrical integration.** This component will help move forward with the regional SINEA agreements, making it possible to increase electricity exchanges in the region and providing for the exportation of surplus energy from the new energy matrix over the medium and long terms, while ensuring a national energy supply in the event of potential adverse scenarios and reducing the use of thermal generation.

1.68 The programmatic document included two policy conditions in the first and second programmatic operations under this component, both of which were fulfilled. This programmatic policy-based loan strengthens the original conditions as follows: (i) that the bidding process has begun for the final engineering study of the 500-kV Ecuador-Peru Electrical Interconnection System project, which seeks, *inter alia,* to increase exchanges of renewable energy between the two countries (4.1); this condition is aimed at developing a new regional interconnection infrastructure, pursuant to the SINEA agreements, and is related to the previous condition of awarding and finalizing the preliminary designs for the high-voltage (500 kV) transmission line for the Ecuador-Peru interconnection;[48] and (ii) that exchanges of electricity of renewable origin with Peru at the existing 230-kV connection is increased (4.2); this condition is related to the previous condition of approval of regulations by the Government of Ecuador to increase electricity exchanges with Peru at the existing 230-kV connection.

C. Key results indicators

1.69 This programmatic policy-based loan is expected to yield the following main outcomes: (i) climate-related: contribution to climate change mitigation through greater use of renewable energy, increased use of electricity in cooking and transportation, and greater energy efficiency; (ii) economic: reduced consumption of petroleum products in electricity generation and in the residential sector; and (iii) institution-strengthening: improved management of the energy sector, enhanced supply of electrical power, and stronger capacity for regional electrical integration by moving forward with the integration roadmap. The outcomes and outputs in the results matrix remain unchanged and relevant to the operation. The results matrix includes an explanation for each adjusted target. When the programmatic policy-based loan was designed in 2014, targets were set for 2018 with the idea that

[48] The second condition of this component dealt with regulations for increasing electricity exchanges with Peru at the existing 230-kV connection. Progress in this commitment is evidenced in the results indicator of energy exports from Ecuador to Peru.

results would be measured at the end of each phase. To maintain consistency with the targets set at that time, data from 2018 are reported as the results achieved.

1.70 The programmatic series has helped narrow gaps and address the aforementioned problems. Notable among these achievements is an enhanced and modernized electric utility service, including sustainability, reliability, and accommodation of additional loads resulting from the energy matrix transition. In addition, hundreds of families have benefited from the rural electrification program, and exchanges of electricity have increased significantly. Continued efforts are needed to better target LPG subsidies and more quickly incorporate nonconventional renewable energy in order to continue reducing fuel imports.

1.71 **Economic evaluation.** Based on the recommendations of the Office of Evaluation and Oversight in its 2011 Evaluability Review of Bank Projects[49] and the findings of the review of evaluation practices and standards for policy-based loans prepared by the Evaluation Cooperation Group (made up of the independent evaluation offices of the multilateral development banks),[50] included in paragraph 1.3 of document GN-2489-5, "Review of the Development Effectiveness Matrix for Sovereign Guaranteed and Non-Sovereign Guaranteed Operations," which state that it is not necessary to prepare an efficiency analysis of the use of financial resources,[51] the determination was made that no economic analysis is to be performed for this type of loan, and the Bank's Board of Executive Directors was notified to that effect. Accordingly, this loan operation does not include an economic analysis, and, consequently, the economic analysis is not taken into account in measuring the evaluability score in the Development Effectiveness Matrix (DEM) for this program.

1.72 **Program beneficiaries.** The program will benefit all residents of Ecuador through development of an energy matrix that is more sustainable, diversified, and climate change resilient, and less polluting to the environment.

II. Financing Structure and Main Risks

A. Financing instruments

2.1 This operation is structured under the programmatic modality (the second and final in a series of operations), based on the guidelines and directives set forth in the New Lending Framework (document GN-2200-13) and the guidelines for preparation and implementation of policy-based loans (document CS-3633-2). The programmatic modality is justified by (i) the complex nature of the reforms; (ii) the varying timelines for implementation of each reform; (iii) the coordination of reforms between different institutions; (iv) support for policy dialogue in the country; and (v) the supervision needed to implement the reforms, as well as the monitoring of

[49] Document RE-397-1: Currently, the economic analysis section is computed as the maximum between the cost-benefit analysis and the cost-effectiveness analysis. Yet neither a cost-benefit analysis nor a cost-effectiveness analysis is applicable to policy-based loans.

[50] Good Practice Standards for the Evaluation of Public Sector Operations. Evaluation Cooperation Group, Working Group on Public Sector Evaluation, 2012 revised edition. February 2012.

[51] According to the Evaluation Cooperation Group, policy-based loans should be evaluated based on relevance, effectiveness, and sustainability. Efficiency was not included as a criterion, since the dimensioning of policy-based loans is associated with a country's financing gap, regardless of the benefits of the operation.

results and provision of feedback. As the Bank's support is being provided in phases, this instrument offers the flexibility to adapt to changing circumstances in the country.[52]

2.2 **Dimensioning of the operation.** In accordance with paragraph 3.27(b) of Policy-based Loans: Guidelines for Preparation and Implementation (document CS-3633-2), the size[53] of the operation was based on the country's fiscal resource needs. Moreover, in accordance with paragraph 2.2 of the same document, the size of the loan is not necessarily related to the cost of the policy reforms or institutional changes supported by the policy-based loan, but rather development financing requirements. The programmatic policy-based loan is designed to help borrowing member countries confront a macroeconomic crisis. The amount of this operation is US$280 million.

B. Environmental and social risks

2.3 In accordance with the Environment and Safeguards Compliance Policy (Operational Policy OP-703), this program is classified as a programmatic policy-based loan under Directive B.13. The program may have nationwide environmental and social impacts associated with the implementation of development plans and policies that will change and influence the country's overall energy matrix (policies aimed at interventions in rural areas, interconnections, renewable energy, etc.) and with the financing of infrastructure previously built by the Government of Ecuador without Bank supervision. Thus, a strategic environmental and social assessment (required link 4) was conducted to identify countrywide and local impacts of previously built infrastructure and potential liabilities associated with the interventions, evaluate institutional capacity, and determine mitigation measures. The assessment identified no significant social or environmental impacts or liabilities. Mitigation measures will be included in the loan contract.

C. Fiduciary risks

2.4 Ecuador has an extensive track record in managing external loan resources, and no financial management risks are anticipated. No procurement processes are expected in the program.

D. Sustainability

2.5 The sustainability of the reforms rests on three main pillars: (i) the Ecuadorian government's commitment to sector reform; (ii) fulfillment of commitments in the first operation of the programmatic series; and (iii) progress in completing the reforms proposed for this second operation. Also, the Government of Ecuador maintains its commitment (see policy letter) to increased competitiveness and sustainability through a policy reform process in the energy sector.

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[52] Paragraph 2.6, Policy-based Loans: Guidelines for Preparation and Implementation (document CS-3633-2).

[53] The first operation had specified that the amount of subsequent operations would be determined through the programmatic exercise with the Bank.

III. Implementation and Management Plan

A. Summary of implementation arrangements

3.1 **Borrower and executing agency**. The borrower is the Republic of Ecuador, and the executing agency is the Ministry of Economy and Finance, in technical coordination with the MERNNR. The Ministry of Economy and Finance, acting through the MERNNR, will be responsible for (i) supporting the fulfillment of policy objectives, (ii) providing evidence that policy conditions have been fulfilled, and (iii) gathering and providing information that enables the Government of Ecuador and the Bank to measure and evaluate program results.

3.2 **Special contractual condition precedent to the sole disbursement: Fulfillment, to the Bank's satisfaction, of the policy reform conditions in accordance with the Policy Matrix (Annex II), the policy letter, and other provisions of the loan contract.**

B. Summary of arrangements for monitoring results

3.3 A detailed monitoring and evaluation plan, which includes results indicators that are consistent with the policy reform process set forth in the Policy Matrix (Annex II), has been prepared. These indicators are reflected in the Results Matrix. The evaluation will determine and measure program results in terms of sustainability of the energy sector, strengthening of the electricity subsector, and support for regional electric integration.

3.4 **Evaluation.** Upon completion of the second operation, an ex post evaluation of program results will be conducted. The evaluation strategy consists of (i) a before-and-after analysis of results indicators' performance; (ii) a review of the intervention's change theory; (iii) a review of evidence in the literature on the effectiveness of similar interventions in comparable contexts; and (iv) a qualitative evaluation providing complementary information on the attribution of results attained in the program. The evaluation will include results for the entire series (first and second programmatic policy-based loans). The program completion report will be prepared by the Energy Division in accordance with the Bank guidelines set forth in document OP-1242-5.

IV. Policy Letter

4.1 The policy letter reaffirms the commitment of the Government of Ecuador to the objectives and actions planned for the entire programmatic series. In addition, the Bank and the Government of Ecuador have agreed on the Policy Matrix, which describes the policy actions to be carried out in this programmatic operation.

Development Effectiveness Matrix		
Summary	EC-L1265	
I. Corporate and Country Priorities		
1. IDB Development Objectives		
Development Challenges & Cross-cutting Themes		-Social Inclusion and Equality -Productivity and Innovation -Economic Integration -Climate Change and Environmental Sustainability -Institutional Capacity and the Rule of Law
Country Development Results Indicators		-Reduction of emissions with support of IDBG financing (annual million tons CO2 e)* -Installed power generation from renewable energy sources (%)* -Regional, sub-regional and extra-regional integration agreements and cooperation initiatives supported (#)* -Government agencies benefited by projects that strengthen technological and managerial tools to improve public service delivery (#)* -Households with new or improved access to electricity supply (#)* -Companies supported in innovation activities (#)*
2. Country Development Objectives		
Country Strategy Results Matrix	GN-2924	(i) strengthening of public finances; (ii) support for productivity and development of the private sector as engines of growth
Country Program Results Matrix	GN-2991-1	The intervention is included in the 2020 Operational Program.
Relevance of this project to country development challenges (If not aligned to country strategy or country program)		
II. Development Outcomes - Evaluability		Evaluable
3. Evidence-based Assessment & Solution		7.7
3.1 Program Diagnosis		3.0
3.2 Proposed Interventions or Solutions		1.7
3.3 Results Matrix Quality		3.0
4. Ex ante Economic Analysis		N/A
5. Monitoring and Evaluation		8.5
5.1 Monitoring Mechanisms		2.5
5.2 Evaluation Plan		6.0
III. Risks & Mitigation Monitoring Matrix		
Overall risks rate = magnitude of risks*likelihood		High
Identified risks have been rated for magnitude and likelihood		Yes
Mitigation measures have been identified for major risks		Yes
Mitigation measures have indicators for tracking their implementation		Yes
Environmental & social risk classification		B.13
IV. IDB´s Role - Additionality		
The project relies on the use of country systems		
Fiduciary (VPC/FMP Criteria)		
Non-Fiduciary		
The IDB's involvement promotes additional improvements of the intended beneficiaries and/or public sector entity in the following dimensions:		
Additional (to project preparation) technical assistance was provided to the public sector entity prior to approval to increase the likelihood of success of the project		

Note: (*) Indicates contribution to the corresponding CRF's Country Development Results Indicator.

Evaluability Assessment Note: *This $280 million operation is the second and final of a series of programmatic PBLs originally designed in three independent operations. The general objective of the operation is to support Ecuador in achieving its climate change objectives in the energy sector, and to contribute to the consolidation of its fiscal and external accounts through policy reforms. Its specific objectives are (i) to support the advancement of the substitution of fossil fuels for electricity and to increase energy efficiency measures; (ii) to promote access to electricity and strengthen conditions for increasing the use of renewable energy sources; and (iii) to advance the implementation of the country's commitments for greater cross-border electricity trade in the region. The POD presents the challenges of Ecuador's fiscal and external sector accounts, their relationship with the energy sector and with the country's Nationally Determined Contribution (NDC) under the United Nations Framework Convention on Climate Change. It includes and discusses the magnitudes of these challenges and the factors that contribute to them. The Ecuadorian economy is dependent on oil and its derivatives. The program seeks to support the reduction of this dependence through energy reform that allows for a transformation of its energy matrix. The proposed interventions are linked to the challenges identified in the sector. The result matrix has a vertical logic. The POD presents the results that are expected to be obtained at the end of the series of programmatic PBLs and as compared to the indicators of the first operation. The products correspond to the proposed policy measures. All results and product indicators are SMART, have baselines, goals, and sources of information. The project was analyzed using a counterfactual analysis. The economic benefits are clearly specified. However, neither an estimation of the costs necessary to obtain the estimated benefits nor a sensitivity analysis are carried out. The project has an evaluation and monitoring plan and the program will be evaluated using an ex post cost-benefit analysis. The POD does not present evidence of internal validity, which has lowered the evaluability score in item 3.2 (Interventions or Proposed Solutions) of the DEM.*

POLICY MATRIX

Objective: To help Ecuador achieve its climate change objectives in the energy sector and to help strengthen its fiscal and external accounts, through policy reforms. The specific objectives of the second programmatic operation are to: (i) support the replacement of fossil fuels with electricity and enhance energy efficiency measures; (ii) promote access to electricity and bolster conditions for increased use of renewable energy sources; and (iii) help Ecuador make progress toward its commitments for increased electricity exchanges in the region.

Components / policy objectives	Policy conditions Programmatic operation I	Policy conditions Programmatic operation II[1]	Fulfillment status of conditions for Programmatic operation II
Component I: Macroeconomic framework			
Stable general macroeconomic policy framework.	1.1 Macroeconomic framework consistent with program objectives and with guidelines set forth in the sector policy letter.	1.1 Macroeconomic framework consistent with program objectives and the guidelines set forth in the sector policy letter.	Fulfilled
Component II: Sustainable energy sector			
Formulation of strategy and implementation of actions to reduce fossil fuel consumption and replace subsidies associated with fossil fuels in the residential sector and in electricity generation.	2.1 Decision by the National Planning and Development Department (SENPLADES) on the initiative to replace the use of liquefied petroleum gas (LPG) with electricity in the residential sector, approved.	2.1 Plan to replace the use of LPG with electricity in the residential sector, in execution.	Fulfilled (Q1 2019)
	2.2 Scope of the proposed policy of the Ministry of Nonrenewable Natural Resources (MRNNR) on the replacement of subsidized LPG with electricity, reaching out to vulnerable populations with no access to electric service, designed.	2.2 Construction standards that promote energy efficiency, approved.	Fulfilled (Q1 2018)

[1] This information is merely indicative in nature as of the preparation of this document. In accordance with document GN-3633-2 (Policy-based Loans: Guidelines for Preparation and Implementation), the fulfillment of all disbursement conditions, including maintenance of an appropriate macroeconomic policy framework, will be verified by the Bank at the time of the corresponding disbursement request by the borrower and reflected in the disbursement eligibility memorandum.

Components / policy objectives	Policy conditions Programmatic operation I	Policy conditions Programmatic operation II[1]	Fulfillment status of conditions for Programmatic operation II
	2.3 Rate schedule for transitioning from LPG to electricity in the residential sector with access to electric service, designed and approved.	2.3 Rate schedule for transitioning from LPG to electricity in the residential sector with access to electric service, in effect.	Fulfilled (Q4 2019)
	2.4 Policy for the optimization of electric power generation (OGE&EE) in hydrocarbon activities, designed by Petroamazonas in agreement with MRNNR, in execution.	2.4 Reduction in demand for diesel in hydrocarbon activity and replacement with electricity through the OGE&EE initiative, annual target achieved.	Fulfilled (Q4 2018)
	N/A	2.5 Energy Efficiency Act, including measures for efficiency in urban public transportation through the use of electric vehicles, approved.	Fulfilled (Q1 2019)
Development of a national plan that includes Ecuador's actions to reduce greenhouse gas emissions.	2.5 National Energy Agenda of Ecuador, proposed methodology approved.	2.6 Nationally determined contribution for 2020-2025, submitted to the United Nations Framework Convention on Climate Change.	Fulfilled (Q3 2019)
Preparation and updating of the National Energy Forecast and Balance Sheet.	2.6 National Energy Balance Sheet 2014, prepared and published.	2.7 National Energy Balance Sheet 2018, prepared and published.	Fulfilled (Q1 2020)
Component III: Strengthening of the electricity subsector			
Reduction in the consumption of liquid fuels for generation, and expansion of generating capacity using renewable energy sources.	3.1 National Electricity Board Resolution on the Plan for Expansion and Development of the National Electricity Network 2013-2022, approved.	3.1 Auction announcement for nonconventional renewable energy generation projects, issued.	Fulfilled (Q4 2019)
Modernization of the electricity subsector to improve its sustainability and reliability and to accommodate new loads resulting from the energy matrix transition.	3.2 Proposed Electric Utility Act (LOSPEE), submitted to the National Assembly and approved.	3.2 Regulations for LOSPEE, including preparation and dissemination of the proposed regulations titled "*Marco normativo para la participación de la Generación Distribuida*," providing for, *inter alia,* increased generation of renewable energy, issued.	Fulfilled (Q3 2019)
	3.3 Policy for reducing the rate deficit by increasing electricity rates, approved by the National Electricity Board.	3.3 Cash recovery index of electricity distribution companies, above 75%; and total electricity losses indicator, below 14%.	Fulfilled (Q4 2018)

Components / policy objectives	Policy conditions Programmatic operation I	Policy conditions Programmatic operation II[1]	Fulfillment status of conditions for Programmatic operation II
	3.4 Ministerial agreement for creating an interagency committee to implement the National Smart Grids Program, approved.	3.4 Smart network principles, incorporated into projects of the Program to Strengthen the National Electricity Distribution System (PRSND).	Fulfilled (Q4 2018)
	3.5 Priority decision issued by SENPLADES for the Distribution Improvement Program in order to facilitate implementation of the National Efficient Cooking Program, approved and first phase in execution.	3.5 Plan for improving electricity distribution systems, updated; first phase of the PRSND, completed; third phase, at 50% execution.	Fulfilled (Q4 2018)
	3.6 Sustainability methodology for the financing of electrification projects for isolated rural areas, prepared and approved by the Ministry of Electricity and Renewable Energy (MEER).	3.6 At least two renewable energy projects for electrification in isolated rural areas, completed.	Fulfilled (Q4 2018)
Improved delivery of electricity distribution services in rural areas.	3.7 Sustainability methodology for the financing of rural electrification projects 2013-2014 with grid expansion, implemented.	3.7 At least 200 rural electrification projects to replace and reduce the use of diesel, including grid expansion, completed and incorporated into the electricity distribution companies' business system.	Fulfilled (Q4 2018)
	3.8 Strategy for evaluating the impact of rural electrification projects, approved by the MEER and in the process of being implemented.	3.8 Final report on the impact evaluation of rural electrification projects, approved by the MRNNR.	Fulfilled (Q1 2020)
Component IV: Support for regional electrical integration			
Development of a regulatory framework and infrastructure to facilitate commercial transactions in the region.	4.1 Binational agreement on the scope of the proposed project for a high-voltage (500 kV) transmission line connecting Ecuador and Peru, concluded.	4.1 Bidding process for the final engineering study of the 500-kV Ecuador -Peru Electrical Interconnection System project, which seeks, *inter alia,* to increase exchanges of renewable energy between the two countries, begun.	Fulfilled (Q4 2019)
	4.2 Proposed policy for regulatory harmonization to increase electricity exchanges with Peru at the existing 230-kV connection, prepared.	4.2 Exchanges of electricity of renewable origin with Peru at the existing 230-kV connection, increased.	Fulfilled (Q4 2019)

RESULTS MATRIX

Program objectives:	To help Ecuador achieve its climate change objectives in the energy sector and to help strengthen its fiscal and external accounts, through policy reforms. The specific objectives of the second programmatic operation are to: (i) support the replacement of fossil fuels with electricity and enhance energy efficiency measures; (ii) promote access to electricity and bolster conditions for increased use of renewable energy sources; and (iii) help Ecuador make progress toward its commitments for increased electricity exchanges in the region.

EXPECTED OUTCOMES

Objectives	Outcome	Indicator / unit of measure	Baseline (2013)	Target from first operation (2018)[1]	Outcome for second operation (2018)[2]	Means of verification
I. Macroeconomic framework						
Stable general macroeconomic policy framework	1.1. Macroeconomic framework consistent with program objectives and the guidelines set forth in the sector policy letter	Stable macroeconomic framework	1	1		Report on the Bank's independent assessment of macroeconomic conditions

[1] The values in this column reflect the targets that were set for 2018 in preparing the first operation.

[2] When the programmatic policy-based loan was designed in 2014, targets were set for the end of the three-part series, which was expected to be completed in 2018. The project team is taking 2018 as the end of the series (as initially established by the Bank), and the values listed here are from that year. In addition, the vast majority of available statistical information and project results are from 2018. For this reason, final targets and results for 2018 have been maintained here.

Objectives	Outcome	Indicator / unit of measure	Baseline (2013)	Target from first operation (2018)[1]	Outcome for second operation (2018)[2]	Means of verification
II. Sustainable energy sector						
Formulation of strategy and implementation of actions to reduce fossil fuel consumption and replace subsidies associated with fossil fuels in the residential sector and in electricity generation	2.1 Reduced imports of petroleum products	Barrels of oil equivalent (BOE) of fuel from imported oil, annually (millions of BOE)	36.8	25	37.8	Statistics of the Central Bank of Ecuador
	2.2 Reduced subsidies associated with liquefied petroleum gas (LPG) consumption	Annual subsidies associated with LPG consumption (US$ million)[3]	676.8	406.0	460.6	Statistics of the Central Bank of Ecuador
III. Strengthening of the electricity subsector						
Reduction in the consumption of liquid fuels for generation, and expansion of generating capacity using renewable energy sources	3.1 Reduced consumption of liquid hydrocarbons in electricity generation	Annual volume of liquid fuels used in electricity generation millions of BOE)[4]	15.2	11.3[5]	10.6	National Energy Balance Sheet 2018
	3.2 Diversified electricity generation matrix with increased share of renewable sources	% of electricity generated from renewable sources[6]	54.3%[7]	75%	83.65%	Annual report from the national electricity operator (CENACE), 2013-2018

[3] While the first operation set a very ambitious final target for the energy-efficient cooking program known as PEC, the actual result came very close to the target. See the loan proposal for more details. The PEC installed ranges in 596,082 homes, displacing 1.3 million BOE of LPG per year and saving the government US$123 million in subsidies in 2014-2018. In addition, the social benefit of reducing residential CO_2 is estimated at US$29.4 million.

[4] To ensure that the indicator and unit of measure reflect program objectives to strengthen the electricity subsector, this second operation is only counting liquid fuels used for electricity generation, rather than the total volume of all liquid fuels, which was used in the first operation. Fuels used for transportation and other activities have been excluded, and the baseline and target have been updated accordingly.

[5] This target has been updated to account for the 26% increase in renewable energy generation from 2014 to 2018, which will lead to a commensurate decrease in the consumption of liquid fuels for thermal generation.

[6] This reflects electricity generation within the national distribution system.

[7] The baseline has been updated using data from 2013. The previous baseline of 62% reflected 2012 data from the National Electricity Board.

Objectives	Outcome	Indicator / unit of measure	Baseline (2013)	Target from first operation (2018)[1]	Outcome for second operation (2018)[2]	Means of verification
	3.3 Reduced CO_2	Annual CO_2 emissions (millions of tons of CO_2eq)[8]	9.2	8.3[9]	6.1	Annual and multiyear statistics on the electricity sector, Electricity Regulation and Control Agency (ARCONEL)
Modernization of the electricity subsector to improve its sustainability and reliability and to accommodate new loads resulting from the energy matrix transition	3.4 Reduced electricity losses in the national electricity distribution system	Percentage of total electricity losses (%)	12.7	12.1	11.4	Report from the Ministry of Energy and Nonrenewable Natural Resources (MERNNR)
	3.5 Increased sustainability of electricity services / national cash recovery index	National cash recovery index (%)[10]	78	80	87.2	MERNNR report
	3.6 Increased access to electricity in rural areas	# of families benefited by access or improvements to electricity service in rural or marginal urban areas	0	89,314	49,247[11]	MERNNR report
	3.7 Increased reliability of the national electricity distribution system	Average frequency of outages in the electricity distribution system (# outages per kVA)	13.72	9.6	7.6	MERNNR report

[8] This indicator was under Component I in the first operation, with a baseline of 3.7 tons of CO_2 equivalent in emissions in the energy sector. The indicator for the second operation uses emissions in the electricity and residential sector, avoiding the distortion caused by emissions from other activities outside the purview of the program (transportation sector) in order to achieve alignment with the objective of this second component.

[9] This target has been updated in view of Ecuador's first nationally determined contribution, which includes a 9% reduction in greenhouse gas emissions in the energy sector.

[10] The cash recovery index measures amounts collected or billed against electricity losses.

[11] From 2008 to 2019, the Fund for Rural and Marginal Urban Electrification reached 899,999 households. Of this number, 840,208 households were served in 2008-2013, while 49,247 were served in 2013-2019. The program is expected to reach 90,000 families between 2020 and 2022.

Objectives	Outcome	Indicator / unit of measure	Baseline (2013)	Target from first operation (2018)[1]	Outcome for second operation (2018)[2]	Means of verification
IV. Support for regional electrical integration						
Development of a regulatory framework to facilitate commercial transactions in the region	4.1 Increased exports of electricity from Ecuador to Peru	Annual electricity exports from Ecuador to Peru (GWh)	0.5	2.0	22.13	Annual and multiyear statistics on the electricity sector, ARCONEL

Outputs of programmatic operation II	Baseline 2013	Target 2018	Means of verification
II. Sustainable energy sector			
Plan for replacing the use of LPG with electricity in the residential sector	0	1	Official letter on favorable decision from SENPLADES (SIP-2019-0112-OF) and memorandum MERNNR-COGPGE-2019-0082-ME
Construction standards that promote energy efficiency	0	1	Ministerial agreement issuing standards on electrical installations and energy efficiency in the Ecuadorian Construction Code
Rate schedule for transitioning from LPG to electricity in the residential sector with access to electric service	0	1	ARCONEL Resolution 035/19
Energy Efficiency Act, including measures for efficiency in urban public transportation through the use of electric vehicles	0	1	Supplement to *Registro Oficial* number 449 of 19 March 2019
Nationally determined contribution for 2020-2025 to the United Nations Framework Convention on Climate Change	0	1	*Registro Oficial* supplement 23 of 22 August 2019 published Executive Decree 840, which implements as State policy the first nationally determined contribution for the Paris Agreement under the United Nations Framework Agreement on Climate Change for 2020-2025
National Energy Balance Sheet 2018, prepared and published.	0	1	National Energy Balance Sheet 2018

Outputs of the second tranche	Baseline 2013	Target 2018	Means of verification
III. Strengthening of the electricity subsector			
Auction announcement for nonconventional renewable energy generation projects	0	1	Agreement MERNNR-MERNNR-2019-0045-AM
Regulations for the Electric Utility Act issued and published	0	1	Supplement to *Registro Oficial* 21 of 20 August 2019, which published Decree 856 titled "Reglamento General de la Ley Orgánica del Servicio Público de Energía Eléctrica" [General Regulations for the Electrical Utility Act]
Energy Efficiency Act, including measures for efficiency in urban public transportation through the use of electric vehicles	0	1	Supplement to *Registro Oficial* 449 of 19 March 2019
Program to Strengthen the National Electricity Distribution System (PRSND) active, including use and implementation of smart network principles, increased cash recovery index, and reduced total losses	0	1	Reports on projects to strengthen the national distribution system Status report on losses in electricity distribution companies
Plan for improving electricity distribution systems, updated and in execution; the first phase of the PRSND, completed; and phase three, at 50% execution	0	1	Reports on projects to strengthen the national distribution system PRSND status report
Electrification projects with grid expansion and renewable energies, in operation; and at least two renewable energy projects for electrification in isolated rural areas and grid expansion	0	1	Report on rural electrification projects
Final report on the impact evaluation of rural electrification projects	0	1	Official letter MERNNR-SDCEE-2020-0278-OF, which grants the no objection for publication of the final report
IV. Support for regional electrical integration			
Start of the bidding process for the final engineering study of the electrical interconnection system project for the high-voltage (500 kV) transmission line for the interconnection with Peru	0	1	Resolution authorizing the start of the procurement process titled "Servicio de Consultoría para el Diseño del Sistema de Interconexión Eléctrica Ecuador-Perú a 500kV" [Consulting Services for Design of the 500-kV Ecuador-Peru Electrical Interconnection System]
Increased exchanges of electricity with Peru at the existing 230-kV connection	0	1	Multiyear statistics on the electricity sector from ARCONEL

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

PROPOSED RESOLUTION DE-__/20

Ecuador. Loan ____/OC-EC to the Republic of Ecuador
Support for the Transition of the Energy
Matrix in Ecuador II

The Board of Executive Directors

RESOLVES:

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the Republic of Ecuador, as borrower, for the purpose of granting it a financing to cooperate in the execution of the program “Support for the Transition of the Energy Matrix in Ecuador II”. Such financing will be for the amount of up to US$280,000,000 from the resources of the Bank’s Ordinary Capital, and will be subject to the Financial Terms and Conditions and the Special Contractual Conditions of the Project Summary of the Loan Proposal.

(Adopted on ___ _____ 2020)

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