



Board of Executive Directors

For consideration

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To: The Executive Directors

From: The Secretary

Subject: Ecuador. Proposal for a loan for the project "Support for the Transition of the Energy Matrix in Ecuador"

Basic Information: Loan type Programmatic Policy-Based Loan (PBP)
Borrower Republic of Ecuador
Amount up to US\$500,000,000
Source Ordinary Capital

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Remarks: This operation is the first loan in a programmatic series of three consecutive single-tranche operations, technically related to one another but independently financed as programmatic policy based loans, in accordance with document CS-3633-1, "Policy-based Loans: Guidelines for Preparation and Implementation. New version".

As established in document GN-1838-1, "Criteria and norms for Board and Management relations", dated 1 July 1994, policy-lending operations are considered by the Board of Executive Directors by Standard Procedure.

Reference: GN-1838-1(7/94), DR-398-11(4/11), GN-2200-13(4/05), CS-3633-1(6/14), CS-4073(12/14)

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

ECUADOR

**SUPPORT FOR THE TRANSITION OF THE ENERGY MATRIX
IN ECUADOR**

(EC-L1140)

LOAN PROPOSAL

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CONTENTS

PROJECT SUMMARY

I.	DESCRIPTION AND RESULTS MONITORING	1
A.	Background, current situation, and proposal	1
B.	Objectives, components, and costs	14
C.	Expected outcomes	16
D.	Economic analysis	16
II.	FINANCING STRUCTURE AND MAIN RISKS	16
A.	Financing instruments	16
B.	Environmental and social risks, and measures to manage them	17
C.	Fiduciary risk	17
D.	Execution risks	17
E.	Institutional risk	17
F.	Risk of access to financing resources	18
III.	SUMMARY OF IMPLEMENTATION MEASURES	18
A.	Summary of execution arrangements	18
B.	Summary of measures for monitoring and evaluating results	18
IV.	POLICY LETTER	19

ANNEXES	
PRINTED ANNEXES	
Annex I	Summary Development Effectiveness Matrix (DEM)
Annex II	Policy Matrix
ELECTRONIC LINKS	
REQUIRED	
1.	Policy Letter http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39350723
2.	Means of Verification http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39163656
3.	Results Matrix http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39163223
OPTIONAL	
4.	Economic Assessment of the Program http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39199615
5.	Monitoring and Evaluation Plan http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39163751
6.	Safeguard Policy Report http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39163047
7.	Program Justification Under the Public Utilities Policy (document GN-2716-6) and the Infrastructure Strategy (document GN-2710-5) http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39162891
8.	Report on Results of Implementation of the “Carchi Border Plan for Electric-induction Cook Stoves” http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=38699214
9.	Background on the Use of Liquefied Petroleum Gas (LPG) in Ecuador http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=38699465
10.	Terms of Reference for the Ex Post Economic/Financial Evaluation http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=38703608
11.	Master Plan for the Electrification of Ecuador 2013-2022, CONELEC http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=38272441
12.	“Buen Vivir” [“Good Life”] National Plan 2013-2017 http://www.senplades.gob.ec/
13.	Proposed Public Electric Power Service Act http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=38703503
14.	Use of Petroleum Products (historical and projected) http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39164826
15.	Analysis of the Macroeconomic Impact of Transforming the Energy Matrix – ECONOMIC http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39164830 http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39164838

16. Project to Reduce Diesel in Electricity Generation – PETROAMAZONAS EP
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39164863>
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39164866>
17. Lima Declaration on Andean Electrical Interconnection and Integration
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=38761537>
18. Technical Annex on Regional Integration
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39188415>
19. Reviewing the Fiscal Impact of the Increase in Oil Prices in Central America
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39242266>
20. Study on energy consumption, cooking habits, and electric equipment in the household
<http://idbdocs.iadb.org/wsdocs/getDocument.aspx?DOCNUM=39339504>

ABBREVIATIONS

AFD	Agencia Francesa de Desarrollo [French Development Agency]
AIFk	Average interruption frequency per kVA
BOE	Barrels of oil equivalent
CAF	Andean Development Corporation
CELEC EP	Empresa Pública Estratégica Corporación Eléctrica del Ecuador [Electricity Corporation of Ecuador, Strategic Public Enterprise]
CENACE	Centro Nacional de Control de Energía [National Energy Control Center]
CO ₂	Carbon dioxide
CONELC	Consejo Nacional de Electricidad [National Electricity Board]
EDE	Electricity distribution enterprise
EIRR	Economic internal rate of return
GCI-9	Ninth General Capital Increase of the IDB
GDP	Gross domestic product
GWh	Gigawatt-hour
km	Kilometer
kV	Kilovolt
kWh	Kilowatt-hour
LPG	Liquefied petroleum gas
LRSE	Ley de Régimen del Sector Eléctrico [Law of the Electricity Sector Regime]
MC-15	Mandato Constituyente No. 15 [Constitutional Mandate 15]
MEER	Ministry of Electricity and Renewable Energy
MRNNR	Ministry of Nonrenewable Natural Resources
MVA	Megavolt-ampere
MW	Megawatt
MWh	Megawatt-hour
OC	Ordinary Capital
OGE	Optimización de la Generación Eléctrica [Electricity Generation Optimization]
PCR	Project Completion Report
PETROAMAZONAS EP	Empresa Pública de Exploración y Explotación de Hidrocarburos [Hydrocarbon Exploration and Exploitation, Public Enterprise]
PETROECUADOR EP	Empresa Pública de Hidrocarburos del Ecuador [Hydrocarbon Public Enterprise of Ecuador]
PME	Plan Maestro de Electrificación [Master Plan for Electrification]
PNBV	Programa Nacional del Buen Vivir [“Good Life” National Plan]

PNCE	Programa Nacional de Cocción Eficiente [National Efficient Cooking Program]
PRSEND	Programa de Reforzamiento del Sistema Nacional de Distribución [Program to Strengthen the National Electricity Distribution Network]
SENPLADES	Secretaría Nacional de Planificación y Desarrollo [National Planning and Development Department]
SINEA	Sistema de Intereconexión Eléctrica Andina [Andean Electrical Interconnection System]
SND	Sistema Nacional de Distribución [National Distribution Network]
SNT	Sistema Nacional de Transmisión [National Transmission Network]
TITk	Total interruption time per kVA
V	Volt
WAL	Weighted average life

PROJECT SUMMARY

ECUADOR SUPPORT FOR THE TRANSITION OF THE ENERGY MATRIX IN ECUADOR (EC-L1140)

Financial Terms and Conditions				
Borrower: Republic of Ecuador Executing agency: Ministry of Finance			Flexible Financing Facility*	
			Amortization period:	20 years
			Weighted average life (WAL):**	12.75 years
			Disbursement period:	1 year
			Grace period:	12 years
Source	Amount	%	Inspection and supervision fee:	***
IDB (Ordinary Capital)	US\$500 million	100	Interest rate:	LIBOR-based
Total	US\$500 million	100	Credit fee:	***
			Currency:	U.S. dollars from the Bank's Ordinary Capital
Project at a Glance				
Program objective/description: The program's general objective is to support the country in the transition of its energy matrix, thereby contributing to the consolidation of its fiscal and external accounts, by reducing the importation of petroleum products and replacing the associated subsidies. The specific objectives of the first programmatic operation are to support: (i) the establishment of conditions for the effective implementation of the actions involved in changing the energy matrix; (ii) the strengthening of the conditions for responding to the demand for electric service; and (iii) the start of country commitments to more significant electric power exchanges in the region.				
This operation is the first in a programmatic policy-based series to be comprised of three contractually independent and technically connected loans, in accordance with document CS-3633-1.				
Special contractual conditions precedent to the first disbursement: The disbursement of Inter-American Development Bank resources will be subject to fulfillment of the policy reforms, as set forth in Annex II and in the Policy Letter, and compliance with the conditions contained in the loan contract (paragraph 4.1).				
Exceptions to Bank policies: None				
Project qualifies as:	SEQ []	PTI []	Sector []	Geographic [] Headcount []

* 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 and interest rate conversions. The Bank will take operational and risk management considerations into account when weighing such requests.

** The original maximum WAL of the loan and the grace period may be shorter, depending on the effective signature date of the loan contract.

*** 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 the applicable policies.

I. DESCRIPTION AND RESULTS MONITORING

A. Background, current situation, and proposal

- 1.1 **Macroeconomic situation.** Between 2008 and 2013 Ecuador's real gross domestic product (GDP) grew at an average annual rate of 4.7%, higher than the regional average of 3.2%. This economic expansion occurred in a context of price stability (inflation averaged 4.8% between 2008 and 2013 and 3.7% in 2014). The favorable economic conditions in Ecuador have led to historic lows in unemployment (4.65% in September 2014) and a reduction in the incidence of poverty.¹
- 1.2 One factor explaining the recent growth of Ecuador's economy is the increase in spending and public investment: between 2008 and 2014, total nonfinancial public sector outlays increased 82.9% in nominal terms. During that period, State investment rose from US\$7.001 billion (11.3% of GDP) to US\$16.078 billion (16% of GDP). In line with the targets of the "Good Life" National Plan (PNBV), this trend reflects efforts by the Government of Ecuador to lay the foundation for changing the country's energy and productive matrix.
- 1.3 Despite the fact that there was also an increase in State revenues as a result of improved tax management and higher prices for crude, the previously cited change in spending led to a fiscal deficit of 3.9% of GDP in 2014.² Energy subsidies—which have increased in line with trends in demand and in international energy prices—are another contributing factor in the fiscal situation. According to the country's central bank, between 2009 and 2013 the difference between the cost of importing and revenues from the domestic sale of subsidized petroleum products increased from US\$1.085 billion to US\$3.666 billion (8.8% of total public spending).³
- 1.4 There has also been an increase in the current account deficit, which amounted to 0.6% of GDP in 2014 and 1.3% of GDP in 2013, compared with deficits of 0.4% of GDP in 2012 and 2011. This trend is attributable in part to imports of capital goods and raw materials associated with the large infrastructure works currently in progress. Similarly, between 2009 and 2013, the value of imports of petroleum products increased from US\$2.338 billion to US\$6.080 billion (23.3% of the total imports of goods in 2013).
- 1.5 During the last quarter of 2014, there was a significant drop in Ecuadorian crude export prices, which went from US\$96.40 per barrel on average in the first half of the year to less than US\$50 per barrel in the last days of the year. The Government of Ecuador has responded to this drop in prices with a package of

¹ Between 2009 and June 2014 the income-poverty rate declined from 36% to 24.5% (Source: Ecuadorian Statistics and Census Bureau—INEC).

² Estimates of Ecuador's Ministry of Finance. The fiscal deficit was 1.1% of GDP in 2012 and 0.01% of GDP in 2011.

³ Source: Central Bank of Ecuador.

measures aimed at mitigating its impact on public finances and the balance of payments. These measures include: (i) tax reform to increase the collection of specific taxes; (ii) a US\$839.8 million cut in the 2015 investment plan, postponing the execution of projects with a high import component; (iii) a US\$580 million cut in current spending, including a freeze in the wages of civil servants.

- 1.6 **Transformation of Ecuador's energy matrix.** Ecuador is carrying out an ambitious process to strengthen and transform its energy matrix, aimed at: (i) increasing the capacity for more efficient hydroelectric and thermal generation to meet projected growth in demand over the medium term; (ii) reducing the consumption of petroleum products; (iii) expanding and strengthening transmission and distribution networks; (iv) expanding electric power coverage in rural and marginal urban areas; (v) establishing a cleaner and more efficient and reliable electric system, with a balanced use of its primary energy sources; and (vi) working to change the country's productive matrix.
- 1.7 The process of transforming the energy matrix began in 2009, as part of the 2009-2013 PNBV and the 2009-2020 Master Plan for Electrification (PME). As a central part of this process, the Government of Ecuador is developing new hydroelectric projects, as well as more efficient thermoelectric plants, with 75% of the power based on natural gas.⁴ With the new infrastructure, the effective installed capacity will increase from 5,063 MW_[2013] to 8,200 MW_[2017].⁵
- 1.8 The expectation is that, by displacing a large portion of the current installed thermal capacity on which the system relies, investments under way will help decrease the use of petroleum products for interconnected electric power generation, thereby reducing the associated imports and subsidies. At the same time, the Ecuadorian government plans to carry out sector reforms to support the investments, in an effort to help reduce the consumption of petroleum products in the electric power generation of hydrocarbon activity and in the residential sector, replacing subsidized household consumption of liquefied petroleum gas (LPG) with electricity, through the National Efficient Cooking Program (PNCE⁶). The

⁴ The Generation Expansion Plan provides for an investment of US\$9.172 billion, of which 81% includes the construction of hydroelectric plants, with the remainder to be used for thermal and nonconventional generation.

⁵ 2013-2022 PME. In 2022, the electricity generation matrix will have an effective installed capacity of 9,730 MW and will generate 49,220 GWh/year.

⁶ The PNCE is one of the Ecuadorian government's priority initiatives under the transition of the energy matrix and has an innovative approach in that it proposes using more efficient (80%) induction cook stoves instead of less efficient (40%) LPG cook stoves. To design them, the Ministry of Electricity and Renewable Energy (MEER) conducted studies that included: (i) an induction cook stoves pilot plan in Carchi, Ecuador ([IDBDOCS#38699214](#)); (ii) an IDB-financed study of cooking habits in Ecuador ([IDBDOCS#39339504](#)); (iii) a rate analysis for the transition from LPG to electricity; and (iv) analysis and identification of induction cook stove suppliers with a large domestically manufactured component.

process of transforming the energy matrix also involves promoting electric power exchanges with neighboring countries and restoring refining capacity.

- 1.9 **Situation of the energy sector.** Ecuador is energy self-sufficient overall, allowing it to export its surplus of nonrenewable energy. However, the country imports petroleum products, due to the fact that its growing demand exceeds its refining capacity.⁷ In 2013 Ecuador produced 192 million barrels of oil, generating exports valued at US\$13.412 billion (14.2% of GDP). In the same year, domestic consumption of petroleum products (gasoline, fuel oil #4, fuel oil #6, diesel, LPG, etc.) increased to 80 million barrels of oil equivalent (BOE), of which 54% was produced locally, while 46% was imported.⁸
- 1.10 Historically, the electricity sector has trended toward greater use of thermoelectric generation capacity based on liquid fossil fuels. Most of these fuels are produced in the country, and some, such as fuel oil #6, are sold below their price of production. However, the growth in demand for electricity led to increased use of other fuels with technologies that could be implemented more rapidly, as is the case with diesel generation. In 2013, with 47.5% of installed electric capacity coming from thermal generation, the volume of liquefied petroleum products used for electric power generation rose to 19 million BOE,⁹ with fuel oils #4 and #6 being the most heavily used (13.5 million BOE in that year). Consumption of those two products relied entirely on national production. The role of natural gas has been increasing: in 2013 some 2.8 million BOE were used for generation, followed by diesel #2 with 2.3 million BOE, with national production insufficient to meet demand.¹⁰
- 1.11 Sale prices for petroleum products at national terminals are set periodically by the Executive Branch; however, the adjustments made to date have not kept pace with the typical variability in hydrocarbon prices, causing a gap between the current sale price and the costs of production and importation. This gap, calculated based on the difference between the cost of production and the sale price for fuel oils #4 and #6, rose to US\$32 million at the beginning of 2013. Using a calculation based on the difference between the import price and the sale price for generation, the subsidies associated with diesel #2 and naphtha rose to US\$159 million and US\$5 million, respectively, in the same year. Electricity generation that supplies hydrocarbon activity not connected to the National Transmission Network (SNT) relies on diesel, and generated a subsidy totaling US\$578 million in 2013 for the imported portion.

⁷ The Esmeraldas Refinery will be taken off line in 2014 for maintenance and to recover capacity. Operations are expected to resume by the second half of 2015.

⁸ Imported petroleum products consist primarily of naphta (30%), diesel #2 (40%), and LPG (18%). Import prices are higher than the terminal prices for domestic sales. Although national production prices have been below domestic sale prices for fuel oils #4 and #6 and for diesel #2, that difference declined at the end of 2013, leading to a deficit in relation to national production.

⁹ 2013-2022 PME; Central Bank Statistics 2013.

¹⁰ In 2013, 21 million BOE of diesel were imported, and 7 million BOE were produced nationally.

- 1.12 In 2013, national consumption of LPG totaled 12 million BOE, of which 21% came from national production and 79% from imports. The domestic sale price of LPG (US\$12.1/BOE) is below the price of production (US\$37.6/BOE) and the price of importation (US\$79/BOE), generating subsidies amounting to US\$657 million in 2013. As a result of the subsidized price, it is estimated that approximately 19% of supply is being diverted as contraband.¹¹ Of the remaining available supply, 98% was consumed by the residential sector, while 2% was used for vehicles and agribusiness.
- 1.13 **Situation of the electricity subsector.** According to the 2013 National Energy Balance Sheet, current effective installed capacity is 5,063 MW¹² and annual supply is 23,086 GWh. Moreover, hydrocarbon activity has diesel-based electric capacity of 365 MW.¹³ Annual energy demand increased by 6.1% from 2011 to 2012. By 2020 average annual increases of 8.4% are expected, totaling 6,684 MW of power.¹⁴ This projected increase in demand is related to a number of factors, including increased industrial use, shifting of household use from LPG to electricity, and the rollout of strategic projects.¹⁵
- 1.14 While the hydroelectric power reserve margins are high, they are not exempt from variations that occur between the rainy season and the dry season; this, coupled with the limited water resource storage capacity and the periodic maintenance requirements of generation units, increases the vulnerability of the system. However, the new hydroelectric projects under construction are planned to take advantage of the benefits of the complementarity of watersheds¹⁶ located on the country's Pacific and eastern slopes. In addition, increased natural gas-based firm capacity is expected to be added.¹⁷
- 1.15 The investments envisaged in the PME's Transmission Expansion Plan for 2013-2022 total US\$954 million. These investments include works for expansion, rehabilitation, replacement, strengthening, and modernization of the National Transmission Network. The Empresa Eléctrica Pública Estratégica Corporación Nacional de Electricidad [Electricity Corporation of Ecuador, Strategic Public Enterprise] (CELEC EP), through its business unit TRANSELECTRIC, is

¹¹ Source: ECONOMICA with statistical information, June 2014 – Central Bank of Ecuador and 2013-2022 PME.

¹² Distribution of national effective capacity: hydroelectric, 44.0%; thermal, 55.9%; and nonconventional renewable 0.01%.

¹³ By 2022, this capacity could exceed 500 MW.

¹⁴ 2013-2022 PME.

¹⁵ Pacifico Refinery, Electricity Generation Optimization Project (OGE&EE) of PETROAMAZONAS, etc.

¹⁶ Reference: Cevallos Escobar, Juan Gabriel; Macas Díaz, Diego Fernando; Jaramillo, Marcelo. Analysis of the hydrological complementarity of the Amazonian and Pacific slopes in Ecuador, taking into account the new hydroelectric plants projected through 2016. National Polytechnic School. Quito, January 2012.

¹⁷ Some of the most efficient new hydroelectric and thermal projects are coming on line in 2014.

constructing 400 kilometers of Ecuador's first 500-kv high-voltage transmission system (System-500) for the evacuation of power from new hydroelectric projects.¹⁸

- 1.16 In terms of distribution, the quality and coverage of electric service has improved in recent years, making it possible to meet current demand more efficiently. The rates for average interruption frequency per kVA installed (AIFk) and total interruption time per kVA installed (TITk), which measure service quality, are close to the regulatory levels established by the National Electricity Board (CONELEC), of 13.7 and 15.2, respectively.¹⁹ The cash recovery index averages 80 points nationally, while the index of total electricity losses is 12.7%. Though the latter is considered a successful effort by the Ecuadorian government to reduce electricity losses, the substantial projected increase in electricity demand and supply, as well as the rollout of strategic projects based on mass consumption of electric power by the residential sector, could reverse the current trend and translate to increased losses in the system. National electricity coverage reached 96.7% at the end of 2013; however, some provinces have coverage rates of close to 91.6%, particularly in rural areas that need rural electrification programs to continue and their sustainability promoted. The investments envisaged in the PME's 2013-2022 Distribution Expansion Plan total US\$2.544 billion. These investments are aimed at strengthening and modernizing the National Distribution Network (SND)²⁰ to operate at 220 volts, as well as at expanding it to achieve greater coverage. The SND investments are essential to the process of changing the energy matrix. The projected demand and the electricity supply under construction mean that the SND will be more robust, while also ensuring: (i) implementation of the PNCE; (ii) continued electricity coverage; (iii) electricity losses of less than 14%; and (iv) quality parameters consistent with national regulations.
- 1.17 **Structure of the energy sector.** The National Constitution of 2008 establishes energy, in all of its forms, as a strategic sector, thus giving the State the right to manage and regulate the sector according to principles of environmental sustainability, safety, and efficiency. In that framework, the Ministry of Strategic Sector Coordination was created, with functions that include directing the policies and actions of institutions that make up the strategic sectors. Specifically, the Ministry of Electricity and Renewable Energy (MEER) has the mission of meeting the country's electric power needs. In turn, the Ministry of Nonrenewable Natural Resources (MRNNR) is charged with ensuring the hydrocarbon and

¹⁸ System-500 will cover a large portion of the country and come on line in two stages, the first in 2015 and the second in 2016.

¹⁹ AIFk: Average Interruption Frequency per kVA installed; TITk: Total Interruption Time per kVA installed.

²⁰ 2013-2022 PME: Current installed capacity in distribution transformers of approximately 8,113 MVA. This capacity has been sufficient to meet current electricity demand.

mining subsectors' sustainable and sovereign exploitation of nonrenewable natural resources.

- 1.18 **Regulatory and institutional legal framework of the hydrocarbon subsector.** Legislation of the hydrocarbon subsector in Ecuador is based principally on the 2008 Constitution of the Republic of Ecuador, and on the following regulations and institutions: the Hydrocarbons Law and its amendments;²¹ the Regulations implementing the amendments to the Hydrocarbons Law; the Hydrocarbon Operations Regulations; the Petroleum Product Price Control Regulations and amendments thereto; Executive Decree 315, which establishes the Empresa Pública de Hidrocarburos del Ecuador [Hydrocarbon Public Enterprise of Ecuador] (PETROECUADOR EP); and Executive Decree 314, which establishes the Empresa Pública de Exploración y Explotación de Hidrocarburos [Public Enterprise for Hydrocarbon Exploration and Exploitation] (PETROAMAZONAS EP).
- 1.19 The MRNNR oversees the Hydrocarbons Regulation and Control Agency, which regulates all activities of the subsector; the Hydrocarbons Department, which is responsible for hydrocarbons management and administration; PETROAMAZONAS EP, which is responsible for participating in “upstream” activities; and PETROECUADOR EP,²² which participates in all activities in the hydrocarbon value chain. In 2012, 72% of oil production was carried out by State-owned enterprises, with 14 private enterprises accounting for the remaining production.
- 1.20 According to Article 72 of the Hydrocarbons Law, sale prices for petroleum products in the domestic market are regulated by the Executive Branch. Since promulgation of the Petroleum Product Price Control Regulations in 2005, and its subsequent amendments, domestic prices for certain products, such as gasoline, diesel, fuel oil, and LPG, have been set by the Executive Branch.

²¹ The most recent amendment was on 24 November 2011. It created the Hydrocarbons Regulation and Control Agency and the Hydrocarbons Department.

²² PETROECUADOR EP sells the following in the domestic market: 47% of fuel oil #4; 32% of diesel; 26% of gasolines and naphtas; and 0.4% of LPG. Refining is carried out in three refineries: Esmeraldas, La Libertad, and Complejo Industrial Shushufindi. A fourth State refinery (Lago Agrio) produces products for the company's internal consumption.

- 1.21 **Regulatory and institutional legal framework of the electricity subsector.** Electricity subsector legislation of the is underpinned by the 2008 Constitution of the Republic of Ecuador, and by the following regulations and institutions: Constitutional Mandate 15 (MC-15); the Law on the Power Sector Regime (LRSE²³) and its amendments 2006-55; the 2009 Public Enterprises Act;²⁴ and Executive Decree 220 of 2010, establishing CELEC EP.
- 1.22 Responsibility for regulation and control of electricity supply resides with CONELEC. The transmission function is assigned to CELEC EP-Transelectric, the purpose of which is to transmit electric power and ensure free access to the transmission lines by agents of the wholesale electricity market.²⁵ Distributing electric power is the responsibility of the 11 electricity distribution enterprises (EDEs), most of which are owned by the State.
- 1.23 MC-15 directs CONELEC to establish a single rate²⁶ for EDEs to apply for each type of consumer. The transmission and distribution rate takes into account the costs of operation and maintenance, quality of service, and socio-environmental management, with due consideration given to the fact that the planned investment is covered pursuant to the provisions of MC-15.²⁷ The transmission rate²⁸ is applied to distributors and large consumers for use of the transmission lines, power substations, and other elements that make up the SNT. Since 2001, all EDEs have been attached to trusts administered by local banking entities, which collected the revenues derived from providing electric service, including contributions from the Government of Ecuador's "*Tarifa Dignidad*" low-income subsidy."²⁹
- 1.24 As part of efforts to reform the sector, in April 2014 the MEER announced a new structure for electric service collection and payments that includes the Central

²³ The LRSE and MC-15 govern the sector. Other related instruments include: Resolution 173, whereby the Ministry of the Environment accredited CONELEC to act as the lead environmental enforcement authority; and CONELEC Regulation 003/06, which establishes a typology of electric power transmission lines that require environmental impact studies.

²⁴ The LRSE sets the objectives for electricity generation, transmission, and distribution. The Public Enterprises Act contains elements related to the establishment and management of public enterprises, including those in strategic sectors.

²⁵ The wholesale electricity market is made up of generators, distributors, and large consumers.

²⁶ According to the MC-15, the flat rate to be applied by EDEs reflects operation and maintenance costs.

²⁷ Since 2008, with the MC-15, the Government of Ecuador reserves the right to administer, regulate, control, and manage the sector, establishing that investments in generation, transmission, and distribution will be financed from the Ecuadorian government's General Budget, eliminating the investment component from the rate structure.

²⁸ The transmission rate in effect in 2013 was US\$1.77 per kW for maximum demand month (CONELEC Resolution 008/2013).

²⁹ The "*Tarifa Dignidad*" low-income subsidy is calculated as 50% of the effective residential rate on the books of each EDE. The beneficiaries are residential users whose monthly energy consumption is up to 110 kWh per month in the mountain regions and up to 130 kWh per month in the coastal, eastern, and insular regions.

Bank. Under this arrangement, a Technical Supervision and Control Committee was created, made up of the MEER, two EDE representatives, two representatives from the generation and transmission market, one representative from the National Energy Control Center (CENACE), and one from CONELEC. During the first half of 2014, the Executive Branch submitted a proposed Public Electric Power Service Act to the National Assembly. The new law, once published in the Official Registry, will replace the current LRSE, seeking to ratify the principles—embodied in MC-15 and in the LRSE—of efficiency, quality, and sustainability in the delivery of electric service. The law will maintain the sector’s structure of responsibilities, focusing on the roles of the MEER, CONELEC, and CENACE, according to their respective mandates. CONELEC and CENACE will become the Electricity Regulation and Control Agency and the National Energy Operator, respectively. The board of CONELEC announced an increase in the electricity rate of US\$0.01 for residential customers and US\$0.02 for commercial and industrial clients, starting in 2014.

- 1.25 **The Ecuadorian government’s strategy in the sector.** The 2013-2017 PNBV ratifies the objectives of bringing about change in the country’s energy and productive matrix. To achieve these objectives, the Government of Ecuador is seeking to reduce the consumption and importation of petroleum products, improve national refining capacity to meet domestic demand, and increase exports. These actions are expected to help improve the sector’s indicators, reduce fiscal and external trade deficits, and thus strengthen the country’s macroeconomic sustainability. To this end, investments in the sector include: (i) increasing the electricity supply; (ii) reducing the use of petroleum products in the generation of electricity of the National Interconnected System and of hydrocarbon activity; (iii) reducing the use of LPG in the residential sector, and replacing subsidies; and (iv) restoring refining capacity. In addition, efforts to improve access to, and the quality of, electric service, and to maintain control over electricity loss indicators, are expected to continue.
- 1.26 **The problem.** The process of changing the energy matrix is at a crucial point, given the number of infrastructure investments currently under way (paragraphs 1.7, 1.15, and 1.34) that require distinct actions and the support of specific sector reforms³⁰ to meet the targets (paragraphs 1.24 and 1.25). Failing to complete this process successfully would result in: (i) an increase in the use of petroleum products, with greater dependence on imports, which could exert significant pressure on public finances (through subsidies) and on the country’s trade balance (through imports); and (ii) the gains in reducing electricity losses could be reversed, and progress in providing sustainable access to electricity, particularly in rural areas, could be delayed.

³⁰ The reforms intended as part of the sector’s transformation include: approval of the Public Electric Power Service Act; approval of the electricity rate increase; a strategy for replacing LPG subsidies and targeting subsidies to vulnerable populations; and regulations to promote increased energy exchanges in the region.

- 1.27 Based on the demand projections envisaged in the PME—and assuming that without changes to the energy matrix, growth would be covered primarily by thermal generation—the consumption of petroleum products for electricity generation could reach 38 million BOE in 2017,³¹ an increase of 120% over 2013 (17 million BOE³²). At the same time, if the PNCE^{33 34} fails to achieve the officially predicted results, spending related to LPG use would continue.
- 1.28 If this scenario were to occur, in 2017 fuel subsidies for generation would increase to US\$612 million (compared with US\$196 million in 2013), while LPG-related subsidies would reach US\$676 million (compared with US\$657 million in 2013), causing a major increase in the fiscal deficit (paragraph 1.3).
- 1.29 Similarly, the trade balance would also be affected, given that, of the 38 million BOE of petroleum products needed to supply the electricity generation system in 2017, 8.6 million BOE would have to be imported, at a cost equivalent to US\$1.056 billion. By way of comparison, in 2013 the generation system required the importation of 1.7 million BOE, at a cost of US\$226 million. In order to meet domestic demand for LPG, in 2017 it would be necessary, absent a change in the energy matrix, to import nearly 9.3 million BOE, at a cost of approximately US\$660 million.
- 1.30 **Proposal:** To achieve the desired macroeconomic results and impacts, there needs to be institutional coordination for gradual execution and ongoing monitoring of the actions and investments now under way, and a series of public measures to provide sufficient incentives for the efficient production, use, and exchange of energy. This requires policy actions and sector reforms that will need to be implemented in the coming years, including: (i) establishing a regulatory framework for replacing energy subsidies; (ii) adjusting the rate schedule to ensure a shift from LPG to electricity; (iii) preparing a National Energy Agenda that ensures suitable institutional coordination and the implementation of investments; (iv) creating and ratifying a national committee to promote improvement in the quality of electric service, through the implementation of intelligent networks; (v) strengthening EDEs, in order to ensure improvements in coverage and service quality, while reducing electricity losses; (vi) focusing

³¹ The main results of the new generation coming on line are expected to be seen beginning in 2017.

³² Does not include natural gas. This hydrocarbon is produced locally.

³³ In order to implement the PNCE, a temporary subsidy for clients that use induction cook stoves will be created. This technology will improve cook stove efficiency from 40% to 80%.

³⁴ The subsidy will enter into effect in the second half of 2014 and will remain in force until 2018. It will consist of bringing to zero charges for the first 80 kWh of electricity for consumers using induction cook stoves to prepare food, and for the first 20 kWh used to heat water. Higher levels of consumption will be charged at the corresponding residential rate. In 2017, electricity consumption for induction cook stoves would be 2.8 GWh, at a subsidized cost of US\$171 million. However, an overall increase in electricity rates in 2014, as announced by the Ecuadorian government, will reduce the costs associated with implementing this initiative.

institutional roles and ratifying the principles of sustainability, as established in Constitutional Mandate 15, under a new electricity subsector law; (vii) adjusting electricity rates, to promote the sustainability of electric service under the new generation matrix; and (viii) reaching international agreements to establish an Andean electricity market that facilitates power exports and imports.

- 1.31 As a result of this process, the country's new effective electricity generation capacity is expected to consist of 80% hydroelectric, 16% thermal, and 4% renewable energy sources. This will produce direct environmental benefits through reduced CO₂ emissions, which will drop from an annual 3.7 million tons in 2013 to 1.3 million tons in 2017. Furthermore, the reduction in the use of petroleum products associated with this new energy matrix is expected to have a significant macroeconomic impact.³⁵ On the fiscal side, comparing projections with and without a change to the energy matrix, in 2017 the net savings in subsidies associated with the use of petroleum products for generating electricity for the National Interconnected System could amount to as much as US\$574 million; savings in subsidies for diesel used to generate electricity in hydrocarbon activity could total US\$272 million; and savings from LPG subsidies could amount to US\$678 million. Lastly, the overall increase in electricity rates could bring in additional annual revenues of US\$321 million, more than the annual cost of the subsidy associated with the use of induction cook stoves (US\$171 million). Thus, in 2017 the change in the energy matrix would generate fiscal savings of approximately US\$1.674 billion,³⁶ or nearly 1.4% of GDP.³⁷
- 1.32 In terms of the trade balance, the change to the energy matrix will make it possible to reduce petroleum product imports and export surpluses. A comparison of projections with and without changes to the energy matrix suggests that in 2017 3.1 million BOE of fuel oil #4, 0.5 million BOE of fuel oil #6, 4.8 million BOE of diesel, and 0.15 million BOE of naphtha would not be imported. Moreover, taking into account the expected change in the country's refining capacity, some 4.5 million BOE of fuel oil #4 and 10.3 million BOE of fuel oil #6 would be exported. Also, with the change in the energy matrix, the net contribution that would be gained from lower imports of LPG would amount to US\$637 million in 2017 and that of hydrocarbon generation from a reduction in imported diesel would total US\$398 million. This change in the import and export of petroleum products means that, if the change to the energy matrix is completed

³⁵ According to the study, "*Revisando el impacto fiscal de los precios del petróleo en Centroamérica*" [Reviewing the fiscal impact of oil prices in Central America] (IDB), notable among the parallel lines of action is the need to more rapidly mobilize change in the electricity sector toward renewables, and to promote improvements in energy efficiency. Investments in programs and projects to reduce the use of hydrocarbons through actions on both the supply and demand sides in these countries—at least, in those most exposed to vulnerabilities—currently have a high shadow or social value. Their financing should be accompanied by commitments by the countries to redesign subsidies. [DOCNUM=39242266](#)

³⁶ *Análisis del Impacto Macroeconómico de la Transformación de Matriz Energética* [Analysis of the Macroeconomic Impact of Transforming the Energy Matrix] – ECONOMICA.

³⁷ For purposes of this calculation, *World Economic Outlook* projections for nominal GDP were used.

- successfully, the 2017 trade balance will exceed by US\$3.492 billion (approximately 2.9% of projected GDP for the year) the trade balance that would result if the energy matrix was not reformed.
- 1.33 Over the long term the investments in electricity transmission and distribution are expected to help reduce electricity losses, with energy recovery equivalent to US\$527 million per year beginning in 2022.³⁸ At the same time, the increase in generating capacity will make it possible for Ecuador to increase its energy exchanges with other countries in the region, through the existing 230-kv line and, in the medium term, through a 500-kv system.
- 1.34 **IDB support.** Since 2010, the IDB has been assisting this process of transformation through a number of investment operations totaling US\$504 million, along with a series of nonreimbursable technical-cooperation operations amounting to nearly US\$8 million on issues related to developing capacities, generating knowledge, and supporting execution.³⁹ The Bank-financed projects are an integral part of plans to expand the PME, and include the loans “Support for the Transmission Program” (2457/OC-EC)⁴⁰ and the “National Transmission System Strengthening Program” (3167/OC-EC),⁴¹ whose objective is to help expand and strengthen the SNT to ensure effective transmission of electricity from the new hydroelectric projects to SND delivery points.
- 1.35 The IDB is also helping to finance the Distribution Expansion Plan. Works financed in recent years include: the “Electrification Programs for Rural and Marginal Urban Areas” (2608/OC-EC and 3087/OC-EC),⁴² and the “Program to Strengthen the National Electricity Distribution Network” (PRSND) (3187/OC-EC and 3188/CH-EC),⁴³ which seek to improve the coverage and quality of electric service.
- 1.36 Among the main results obtained from the investments cited are: expansion of the SNT; construction and rehabilitation of electric substations; and improvements in voltage profiles and reduced chargeability, pursuant to CONELEC Regulation 004/02.⁴⁴ A portion of the new investments envisaged in loan 3167/OC-EC is

³⁸ The PME projects total electricity losses of 7.5% by 2022.

³⁹ During 2015, additional IDB support was requested in the form of technical cooperation operations EC-T1312 (Preparation of the National Energy Efficiency Plan), EC-T1313 (Preparation of the National Energy Agenda), and EC-T1316 (Efficient Use of Stranded Associated Gas Before Flaring), to meet the commitments of the program’s second programmatic operation.

⁴⁰ Loan 2457/OC-EC, for US\$64.5 million, began execution in 2011 and will conclude in the first half of 2015.

⁴¹ Approved by the IDB Board of Executive Directors on 23 April 2014 for US\$150 million.

⁴² These operations, identified as FERUM I and FERUM II, have IDB financing of US\$40 million and US\$30 million, respectively. Execution of FERUM I concluded, and 50% of the resources for FERUM II have been disbursed.

⁴³ IDB loan for US\$170 million, approved in June 2014, of which 72% has been disbursed.

⁴⁴ Reactive Power Transactions on the Wholesale Electricity Market, which establishes the permissible bands of variation in voltage on the SNT’s busbars at 0.93 p.u. and 1.05 p.u. for the 138-kV lines.

- intended to ensure effective transmission of electricity from the new hydroelectric projects to SND delivery points. Some of the results observed as a result of the strengthening of the SND include broader electricity coverage, reduction in total electricity losses, and improved indicators for service quality in the system (paragraph 1.16).
- 1.37 Regional electricity interconnection efforts, one of the country's priorities, are being channeled through the "Andean Electrical Interconnection System" (SINEA), born out of the Galapagos Declaration signed by the governments of Bolivia, Chile, Colombia, Ecuador, and Peru on 2 April 2011. During the meeting that gave rise to the Declaration, ministers and senior officials from the energy sector agreed on the importance of the benefits that would result from regional electrical interconnection, constituting a fundamental step toward the economic integration and development of these countries.⁴⁵ At the SINEA meeting held on 25 April 2014 in Lima, Peru, agreements were reached to advance the agenda, including placing priority on creating binational interconnections and optimizing existing ones, as an indispensable step toward regional integration.⁴⁶
- 1.38 **Programmatic support by the IDB.** The Government of Ecuador requested that the IDB continue to support the sector through programmatic series of policy-based operations ("**Support for the Transition of the Energy Matrix in Ecuador**" EC-L1140) ("the program"). The present operation, the first in a series structured into three operations, will contribute to maintaining liquidity in a context of robust investment, and will support the institutional changes needed to maximize the positive impact of these investments. The subsequent operations under the program will contribute to the consolidation of actions undertaken to achieve the expected goals of reducing the consumption and importation of petroleum products. Implementation of this operation is expected to benefit the general population by bringing about changes to the energy matrix and promoting its sustainability, while reducing the system's vulnerability and encouraging the use of more efficient technologies in the residential sector.
- 1.39 The IDB has had extensive experience and benefits from lessons learned in structuring reforms of this type in the Dominican Republic (DR-L1050), Nicaragua (NI-L1074), Suriname (SU-L1022), and Peru (PE-L1121). As with this program, the Project Completion Report for project PE-L1121 – New Sustainable Energy Matrix in Peru (NUMES⁴⁷) concluded that programmatic operations are appropriate instruments for supporting sector reforms involving multiple actors

⁴⁵ Through technical cooperation operation RG-T2056 (ATN/OC-13350-RG), the IDB financed infrastructure and regulation studies to further the SINEA dialogue.

⁴⁶ Lima Declaration on Andean Electrical Interconnection and Integration. [IDBDOCS#38761537](#).

⁴⁷ NUMES Program: PE-L1061, PE-L1055, PE-L1054, and PE-L1121. PCR [IDBDOCS#38564331](#).

and benefits for end consumers, with the possibility of improving the diversified and sustainable supply of energy.⁴⁸

- 1.40 **IDB country strategy with Ecuador (document GN-2680).** In line with the PNBV, the Bank's country strategy with Ecuador 2012-2017 assigns priority to investments aimed at promoting the increase and sustainable diversification of electricity generation, along with improved electrical system reliability, energy efficiency, and greater electricity coverage. Specifically, the program supports the objectives of the Bank's country strategy by supporting the implementation of sector reforms associated with: (i) increasing renewable energy sources in the generation matrix; (ii) strengthening the SNT and SND to improve service reliability and coverage; and (iii) reducing electricity losses.⁴⁹
- 1.41 **Consistency with the Ninth General Capital Increase (GCI-9).** This program will contribute to the following lending priorities established in the GCI-9 report (document AB-2764): (i) lending to small, vulnerable countries; (ii) climate change, renewable energy, and environmental sustainability initiatives through increased use of renewable energy sources; and (iii) regional cooperation and integration of infrastructure through support for electrical interconnection with Peru, pursuant to the classification in documents GN-2650 and GN-2733⁵⁰ (paragraph 1.43). The program will also contribute to the regional goal of reducing CO2 emissions and to output indicators: (i) international trade transactions financed; and (ii) percentage of power generation from low-carbon-emission sources out of total generation financed.
- 1.42 Similarly, the program is aligned with the Public Utilities Policy OP-708 (document GN-2716-6) with respect to the electricity subsector, fulfills the conditions of financial sustainability and economic evaluation (paragraph 1.52), and is aligned with the IDB's Sustainable Infrastructure for Competitiveness and Inclusive Growth Strategy (document GN-2710-5).⁵¹
- 1.43 **Consistency with the Strategy to Support Competitive Global and Regional Integration (document GN-2565-4).** The strategy indicates that regional integration operations will be identified according to four non-mutually exclusive indicative criteria. This program contributes to those criteria through: (i) cross-country focus – contributes to aligning internal policies and future national

⁴⁸ Similarly, the NUMES programmatic series contributed to: (i) establishing prices for the sustained development of electricity generation; (ii) diversifying the generation structure and promoting different primary energy sources; (iii) developing energy sources in an integrated manner; and (iv) ensuring greater total coverage of electric service, particularly in rural areas.

⁴⁹ As of December 2013, SND electricity losses amounted to 12.7%, with the figure projected to be 7.5% by 2022 (2013-2022 PME).

⁵⁰ Guidelines for the Classification and Validation of Operations Eligible for the GCI-9 Regional Cooperation and Integration Lending Priority.

⁵¹ Program rationale under the Operational Policy on Public Utilities (document GN-2716-6) and the Sustainable Infrastructure for Competitiveness and Inclusive Growth Strategy (document GN-2710-5). [IDBDOCS#39162891](#).

investments with cross-border impacts; (ii) national subsidiarity – supports national-level policy reforms through national programs that are part of a cross-border initiative; and (iii) regional additionality – incorporates international and/or regional cooperation objectives (SINEA), by supporting dialogue to improve existing binational connections and promoting energy exchanges in the region.

- 1.44 **Coordination with other multilateral development banks.** This program is related to the execution of IDB-financed operations (2608/OC-EC, 3087/OC-EC, 3187/OC-EC, and 3188/CH-EC), and to PRSND projects currently in the approval process for financing by the Andean Development Corporation (CAF) and the French Development Agency (AFD).⁵²

B. Objectives, components, and costs

- 1.45 The program's general objective is to support the country in the transition of its energy matrix, thereby contributing to the consolidation of its fiscal and external accounts by reducing the importation of petroleum products and replacing the associated subsidies. The specific objectives of the first programmatic operation are to support: (i) the establishment of conditions for the effective implementation of the actions involved in changing the energy matrix; (ii) the strengthening of the conditions for responding to the demand for electric service; and (iii) the start of country commitments to more significant electric power exchanges in the region.
- 1.46 **Component I. Macroeconomic stability.** This component will focus on consistency within the macroeconomic environment, in line with the program's objectives, and will provide ongoing monitoring to ensure alignment with the Policy Matrix.
- 1.47 **Component II. Sustainable energy sector.** This component will support the preparation of policy commitments and the monitoring of actions aimed at reorienting subsidies in the sector, as well as the formulation of the Energy Agenda and information management tools to be used for planning and monitoring sector investments through: (i) a directive for implementing the initiative, replacing LPG use with the use of electricity in the residential sector; (ii) a policy of replacing LPG subsidies with electricity, reaching out to vulnerable populations with no access to electric service; (iii) a rate structure⁵³ for the transition from LPG to electricity in the residential sector where there is access to electricity; (iv) a policy for Electricity Generation Optimization in hydrocarbon activity;⁵⁴ (v) approval of the proposed methodology for the National

⁵² PRSND projects are executed by the MEER, regardless of their funding source. The design and execution structure established in conjunction with the IDB is used in collaboration with the CAF and the AFD. The AFD requested that the IDB share its monitoring and supervision procedures during execution.

⁵³ Includes zero charges for consumption of the first 80 kWh until 2018 for people using the Program to Replace LPG with Electricity in the Residential Sector.

⁵⁴ The main objective of the initiative is to replace diesel with recovered associated gas.

- Energy Agenda of Ecuador; and (vi) approval of the 2014 National Energy Balance Sheet. Programmatic operations II and III include the implementation and monitoring of these agreed commitments, on the basis of which the expected impact will be evaluated.
- 1.48 **Component III. Strengthening of the electricity subsector.** This component will support efforts to fulfill the sector's efficiency and sustainability commitments. In particular, it will support actions designed to reduce the use of liquid fuels for generation and expand generating capacity using renewable energy sources and natural gas. The component will also seek to further electricity subsector modernization and to increase the sustainability of electricity distribution services.
- 1.49 Specifically, Component III will support the following commitments: (i) approval of the proposed Public Electric Power Service Act; (ii) approval of a policy to reduce the rate deficit, by increasing electricity rates; (iii) resolution facilitating publication of the 2013-2022 Plan for the Expansion and Development of the National Electricity System; (iv) priority decision for the development of the Distribution Improvement Program⁵⁵ to facilitate implementation of the National Efficient Cooking Program; (v) ministerial agreement on the establishment of an Interagency Committee for Implementation of the National Intelligent Networks Program; (vi) adoption of a sustainability methodology for financing rural electrification projects and expansion of the network in 2013-2014; (vii) preparation and approval of a cost-efficiency methodology for the selection of electrification projects for isolated rural areas; and (viii) preparation and approval of a strategy for evaluating the impact of rural electrification projects. Programmatic operations II and III include carrying forward these commitments and continuing the program to reduce electricity losses.
- 1.50 **Component IV. Support for regional electricity integration.** This component will contribute to the coordination of regional SINEA agreements, making it possible to increase electric power 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 national energy supplies in the event of potential adverse scenarios and reducing the use of local thermal generation.⁵⁶ These targets will be achieved through: (i) a draft agreement for a high-voltage (500 kv) transmission line between Ecuador and Peru; and (ii) preparation of a policy proposal for harmonizing regulations, in order to boost existing electricity exchanges with Peru at the 230-kv level. Programmatic operations II and III will continue the process of electricity integration.

⁵⁵ The Distribution Improvement Program is financed through the National Program to Strengthen the Electricity Distribution Network (PRSND), and includes three stages, for a total approximate cost of US\$500 million.

⁵⁶ In 2012, 1% of the national electricity supply was attributed to binational interconnections with Peru and Colombia.

C. Expected outcomes

- 1.51 The main expected outcomes involve achieving the objectives of the three individual policy-based programmatic loan operations, as detailed in the Policy Matrix (Annex II), namely: (i) reducing the importation and use of petroleum products in electricity generation and in the residential sector; (ii) improving management and coordination of the energy sector; (iii) improving the supply of electric power, with renewable energy and natural gas playing an increased role; (iv) improving the sector's efficiency and sustainability in providing electric service; (v) advancing the agenda for regional electricity integration; and (vi) working to mitigate climate change. The Results Matrix sets forth the program's main indicators and targets.

D. Economic analysis

- 1.52 The cost-benefit analysis concluded that the program is well conceived and will bring significant benefits to the country. The analysis examined specific activities related to changing the energy matrix, such as: (i) investments in hydroelectric plants; (ii) investments in the National Distribution Network and the National Transmission Network; and (iii) the program for replacing LPG with electricity. The principal benefit from the investments in hydroelectric plants is a reduction in the costs of generating electricity by reducing the use of fossil fuels. In terms of the program to replace LPG with electricity, the following benefits were identified: reduction in inefficient consumption caused by the LPG subsidy; optimization of electricity use; and elimination of contraband. The internal rates of return are estimated at 14% and 23%, while the net present value is reckoned at US\$16 million and US\$7.136 billion, respectively, using a discount rate of 12%.

II. FINANCING STRUCTURE AND MAIN RISKS

A. Financing instruments

- 2.1 The program is structured as a programmatic policy-based loan and comprises three independent operations. This first operation, for US\$500 million, is to be disbursed against execution of the corresponding loan contract and fulfillment of the policy commitments included in the Policy Matrix and its Means of Verification. With these resources, the Government of Ecuador would cover 5.7% of gross financing needs for 2015, according to the General State Budget approved by the National Assembly.⁵⁷ The amounts of the subsequent operations will be determined based on the programming exercise conducted with the IDB. The programmatic policy-based loan instrument was selected based on its

⁵⁷ According to the budget, gross financing needs will total US\$8.817 billion in 2015. The Ecuadorian government expects to cover 18% of this amount with domestic financing and the remaining 82% with external debt.

flexibility for planning for the needs of the subsequent tranches to be agreed upon with the Ecuadorian government.⁵⁸

B. Environmental and social risks, and measures to manage them

- 2.2 According to Directive B.13 of the Environment and Safeguards Compliance Policy (OP-703), the program, which is based on policy commitments, does not fall within an environment category, and no direct negative impacts are anticipated as a result of program execution. The expected positive impacts include improving the reliability, safety, and quality of service of the national electricity network, along with reducing electricity losses and, in particular, reducing the use of petroleum products.

C. Fiduciary risk

- 2.3 No procurement is anticipated under the program; thus, there are no associated risks.

D. Execution risks

- 2.4 The policy commitments are consistent with the program's objectives, and it is anticipated that they will be fulfilled prior to the approval of this operation. The high level of commitment on the part of the sector's institutions is expected to be maintained in carrying out the reforms; thus, no execution risks have been identified in this first tranche. A low level of risk has been identified regarding execution of subsequent tranches, including the possibility of delays in implementing the investments aimed at changing the energy matrix, which would delay achievement of the program's outcomes. However, the commitment shown by Ecuadorian government institutions to implementing and monitoring investments financed by the IDB is expected to continue, thus mitigating the above risk.

E. Institutional risk

- 2.5 The change in the energy matrix has the support and commitment of the highest level within the Ecuadorian government. Given the national scope of the initiative, coordinated efforts and the commitment of various public institutions are required. This, in turn, means that the actors involved in the reform processes must be empowered so that they can conduct discussions that generate solutions. The lack of coordination among actors at the operational level has been identified as constituting a low level of institutional risk. In this context, the program will receive support through technical cooperation ATN/OC-14433-EC, which includes resources to finance analytical workshops and studies to foster fulfillment of the reform commitments.

⁵⁸ The actions supporting the program are part of the Ecuadorian government's Economic Infrastructure Investment Program.

F. Risk of access to financing resources

- 2.6 There is a risk that an exogenous event could impede plans to obtain the additional financial resources needed to pursue the investments associated with changing the energy matrix in the planned time periods, such as a drop in international oil prices or an increase in international interest rates. A factor mitigating this risk is the success that the Ecuadorian government is having in diversifying its sources of financing, as evidenced by the bonds issued on the international financial markets for a total of US\$2 billion at the end of the first half of 2014.

III. SUMMARY OF IMPLEMENTATION MEASURES

A. Summary of execution arrangements

- 3.1 **Borrower and executing agency:** The borrower is the Republic of Ecuador and the executing agency is the Ministry of Finance, with the Ministry of Electricity and Renewable Energy and the Ministry of Nonrenewable Natural Resources serving as the sector's responsible institutions. CONELEC is the electricity subsector's regulatory body. The Ministry of Strategic Sector Coordination is the institution responsible for coordinating the policy actions of this and other strategic sectors. Given the priorities of the program's policy commitments for the sector, and their impact at the national level, the Government of Ecuador, through the Ministry of Finance, formed a sector coordination team⁵⁹ to assist in designing the program and fulfilling the policy commitments, based on the specified means of verification.
- 3.2 The Ministry of Finance will have the following responsibilities: (i) providing evidence that the policy commitments have been met and any other program-related evidence that the Bank needs in order to approve specific disbursements; (ii) supporting the actions required for continued compliance with the program; (iii) once the program disbursements have been assured, collecting information on the performance indicators for use in evaluating the program outcomes.

B. Summary of measures for monitoring and evaluating results

- 3.3 **Monitoring arrangements.** The provisions detailed in the Policy Matrix, Means of Verification, and Results Matrix constitute the key parameters for supervising and evaluating program results. The IDB will monitor program execution from its Country Office, as well as from the Energy Division. Fulfillment of the policy commitments will be verified by the coordination team formed by the Ministry of Finance.
- 3.4 **Evaluation arrangements.** Pursuant to IDB policy, the Project Completion Report (PCR) will be financed by the IDB and prepared at the conclusion of the last program operation. As described in the program's monitoring and evaluation

⁵⁹ Headed by the Ministry of Finance, with representatives from the institutions involved.

plan, the PCR will evaluate the results achieved, and will include an ex post economic evaluation.

IV. POLICY LETTER

- 4.1 The IDB and the Government of Ecuador agreed on the policy commitments to be supported through this program and reflected in the Policy Matrix, Means of Verification, and outcomes. Also included is fulfillment of the commitments confirmed in the Policy Letter presented by the Ministry of Finance, ratifying the Ecuadorian government's commitment to the program.

Development Effectiveness Matrix				
Summary				
I. Strategic Alignment				
1. IDB Strategic Development Objectives		Aligned		
Lending Program	i) Lending to small and vulnerable countries; ii) Lending to support climate change initiatives, renewable energy and environmental sustainability; and iii) Lending to support regional cooperation and integration.			
Regional Development Goals	CO2 emissions (kilograms) per \$1 GDP (PPP).			
Bank Output Contribution (as defined in Results Framework of IDB-9)	i) Number of international trade transactions financed; and ii) Percentage of power generation capacity from low-carbon sources over total generation capacity funded by IDB.			
2. Country Strategy Development Objectives		Aligned		
Country Strategy Results Matrix	GN-2680	Create a long-term energy strategy that promotes a sustainable energy framework, facilitates adequate energy supply, and improves access to electric power.		
Country Program Results Matrix	GN-2756-2	The intervention is not included in the 2014 Operational Program.		
Relevance of this project to country development challenges (If not aligned to country strategy or country program)				
II. Development Outcomes - Evaluability		Evaluable	Weight	Maximum Score
		8.3		10
3. Evidence-based Assessment & Solution		8.4	33.33%	10
3.1 Program Diagnosis		3.0		
3.2 Proposed Interventions or Solutions		2.4		
3.3 Results Matrix Quality		3.0		
4. Ex ante Economic Analysis		10.0	33.33%	10
4.1 The program has an ERR/NPV, a Cost-Effectiveness Analysis or a General Economic Analysis		4.0		
4.2 Identified and Quantified Benefits		1.5		
4.3 Identified and Quantified Costs		1.5		
4.4 Reasonable Assumptions		1.5		
4.5 Sensitivity Analysis		1.5		
5. Monitoring and Evaluation		6.5	33.33%	10
5.1 Monitoring Mechanisms		1.5		
5.2 Evaluation Plan		5.0		
III. Risks & Mitigation Monitoring Matrix				
Overall risks rate = magnitude of risks*likelihood		Low		
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/PDP Criteria)				
Non-Fiduciary				
The IDB's involvement promotes improvements of the intended beneficiaries and/or public sector entity in the following dimensions:				
Gender Equality				
Labor				
Environment				
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		Yes	In June 2014, the technical cooperation EC-T1297 was approved to support changes in Ecuador's energy matrix.	
The ex-post impact evaluation of the project will produce evidence to close knowledge gaps in the sector that were identified in the project document and/or in the evaluation plan				

This operation is the first project in a series of programmatic PBLs. The objective of the entire program is to support the diversification of the electricity generation matrix with greater participation of renewable energy; increase the sustainability, reliability and access to electricity services; reduce imports of petroleum products; reduce the subsidy associated to the consumption of GLP; and increase export of electricity to Peru and Ecuador.

The POD presents the problems of the energy sector and electrical subsector. Likewise, the magnitudes of these problems are provided as well as the factors that contribute to them. The proposed interventions are linked to the problems identified in the sector.

The results matrix has vertical logic. The outcomes expected to be generated at the end of the programmatic series are presented. The outputs correspond to the policy measures of this operation. All the outcome and output indicators are SMART, have baselines, targets and sources of information.

The project was analyzed using a cost-benefit analysis. The economic benefits were clearly specified and the costs include those necessary to obtain the benefits used. The assumptions used were presented and a sensitivity analysis was performed. The project has a monitoring and evaluation plan and the program will be evaluated using an ex post cost-benefit analysis.

POLICY MATRIX

Issues	Objectives	Trigger Mechanisms Programmatic Operation I	Trigger Mechanisms Programmatic Operation II	Trigger Mechanisms Programmatic Operation III
I. Macroeconomic stability				
	Stable general macroeconomic policy framework	Macroeconomic framework consistent with program objectives and with guidelines established in the sector policy letter	Macroeconomic framework consistent with program objectives and with guidelines established in the sector policy letter	Macroeconomic framework consistent with program objectives and with guidelines established in the sector policy letter
Sustainable energy sector				
Need for actions designed to reduce the use of fossil fuels	Formulation of a strategy and implementation of actions designed to reduce consumption, and replace subsidies associated with fossil fuels in the residential sector and in electricity generation	Decision issued 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	Plan to replace the use of LPG with electricity in the residential sector, in execution	Plan to replace the use of LPG with electricity in the residential sector, annual target achieved
		Scope of the proposed policy of the Ministry of Nonrenewable Natural Resources (MRNNR) on the <i>replacement of subsidized LPG with electricity, reaching out to vulnerable populations with no access to electric service, designed</i>	Draft of the proposed policy on the <i>replacement of subsidized LPG with electricity, reaching out to vulnerable populations with no access to electric service, concluded</i>	Proposed policy of the Ministry of Nonrenewable Natural Resources (MRNNR) on the <i>replacement of subsidized LPG with electricity, reaching out to vulnerable populations with no access to electric service, approved by the sector authorities</i>
		Rate schedule ¹ for transitioning from LPG to electricity in the residential sector with access to electric service, designed and approved	Rate schedule for transitioning from LPG to electricity in the residential sector with access to electric service, published and implemented	Rate schedule for transitioning from LPG to electricity in the residential sector with access to electric service, in effect

¹ Includes zero charge to consumers for the first 80 kWh until 2018 for users who subscribe to the policy of replacing LPG with electricity in the residential sector.

Issues	Objectives	Trigger Mechanisms Programmatic Operation I	Trigger Mechanisms Programmatic Operation II	Trigger Mechanisms Programmatic Operation III
		<i>Policy for the optimization of electric power generation (OGE&EE) in hydrocarbon activities,</i> ² designed by PETROAMAZONAS in accordance with MRNNR, in execution	Reduction in demand for diesel in hydrocarbon activity, through the OGE initiative, annual target achieved	Reduction in demand for diesel in hydrocarbon activity, through the OGE initiative, annual target achieved
Need for updated, coordinated sector information in order to improve planning for investments that contribute to the sector's sustainability	Development of a National Energy Agenda as a strategic planning and coordination document for the sector	National Energy Agenda of Ecuador, proposed methodology approved	National Energy Agenda of Ecuador prepared and submitted for consideration and approval by the Ministry of Strategic Sector Coordination (MICSE)	National Energy Agenda of Ecuador, explained and publicized to the sector's institutions
	Preparation and updating of the National Energy Forecast and Balance Sheet	National Energy Balance Sheet 2014, ³ prepared and published	2015 – 2040 Energy Forecast, prepared and approved 2015 National Energy Balance Sheet, prepared and published	2016 National Energy Balance Sheet, prepared and published
Strengthening of the electricity subsector				
Growing consumption of liquid fossil fuels in generating electricity is not sustainable	Reduction in the consumption of liquid fuels for generation, and expansion of generating capacity using renewable energy sources and natural gas	National Electricity Board Resolution on the Plan for Expansion and Development of the National Electricity Network 2013-2022, approved	Commissioning of new hydroelectric projects for at least 130 MW, with natural gas used for generation of at least 70 MW	Commissioning of new hydroelectric projects for at least 2,000 MW, with natural gas used for generation of at least 100 MW

² Replacement of diesel occurs under the OGE&EE initiative, whose objective is to reduce the use of diesel in hydrocarbon activity. Fulfillment of the objective is measured against targets established at the start of each year.

³ Based on sector information to 2013.

Issues	Objectives	Trigger Mechanisms Programmatic Operation I	Trigger Mechanisms Programmatic Operation II	Trigger Mechanisms Programmatic Operation III
Improved quality of electricity distribution service, and greater sustainability of rural electrification	Modernization of the electricity subsector to improve its sustainability and reliability, and to facilitate the incorporation of new loads resulting from changes to the energy matrix	Draft Public Electric Power Service Act (LOSPEE), submitted to the National Assembly and approved	Public Electric Power Service Act published, and its draft General Regulations prepared and submitted for consideration by the Office of the President	General Regulations of the Public Electric Power Service Act, published
		Policy for reducing the rate deficit by increasing electricity rates, approved by the National Electricity Board ⁴	Total electricity losses ⁵ indicator, below 14%	Cash recovery index of Public Electricity Distribution Enterprises, above 75%
		Ministerial agreement for creating an Interagency Committee to implement the National Intelligent Networks Program, concluded	Initial designs and training for incorporating the principles of intelligent networks in the National Distribution Network contracted	The projects under the Program to Strengthen the National Electricity Distribution Network, based on intelligent network principles, in execution
		Priority decision issued by SENPLADES for the development of the Distribution Improvement Program in order to facilitate implementation of the National Efficient Cooking Program, approved and first stage ⁶ in execution	National Program to Strengthen the Electricity Distribution Network, second stage in execution	First stage of the National Program to Strengthen the Electricity Distribution Network, advanced 50%, with execution of the third stage begun
		Sustainability methodology for the financing of electrification projects for isolated rural areas, prepared and approved by MEER	Electrification projects for isolated rural areas, selected and approved for financing, based on sustainability methodology	Electrification projects for isolated rural areas 2014, in execution

⁴ The new structure involves increasing electricity rates by US\$0.01 for residential consumers and by US\$0.02 for commercial and industrial clients.

⁵ Refers to the percentage of technical and nontechnical electricity losses in the national network (including the national transmission and distribution networks).

⁶ The Distribution Improvement Plan is being financed through the Program to Strengthen the National Electricity Distribution System (PRSND), and includes three stages, with a total approximate cost of US\$500 million.

Issues	Objectives	Trigger Mechanisms Programmatic Operation I	Trigger Mechanisms Programmatic Operation II	Trigger Mechanisms Programmatic Operation III
	Improved delivery of electricity distribution services in rural areas	Sustainability methodology ⁷ for the financing of rural electrification projects 2013-2014 with expansion of the network, implemented	Rural electrification projects with expansion of the network 2013-2014, under construction	Rural electrification projects with expansion of the network 2013-2014, constructed and incorporated in the commercial system of the Electricity Distribution Enterprises
		Strategy for evaluating the impact of rural electrification projects, approved by MEER and in the process of being implemented	Projects to deal with impact assessment strategy, executed	Final report on assessment of the impact of rural electrification projects, approved by MEER for publication
Support for regional electricity integration				
Need to foster commercial electricity exchanges in the region as a means of promoting regional energy integration, taking advantage of the systems' complementarity and the available surplus generating capacity	Development of a regulatory framework and infrastructure to facilitate commercial transactions in the region	Binational agreement on the scope of the proposed project for a high-voltage (500 kV) transmission line connecting Ecuador and Peru, concluded	Proposed project for a high-voltage (500 kV) transmission line for interconnection with Peru, preparation of designs awarded	Proposed project for a high-voltage (500 kV) transmission for interconnection with Peru, designs finalized
		Proposed policy for regulatory harmonization to increase electricity exchanges with Peru in the existing 230 kV connection, prepared	Proposed policy for regulatory harmonization to increase electricity exchanges with Peru in the existing 230-kV connection, explained and publicized in the two countries	Regulations to increase electricity exchanges with Peru in the existing 230-kV connection, approved by the Government of Ecuador

⁷ The sustainability methodology is based on a cost-benefit analysis of projects to be financed, for which the conditions of entry are: (i) PV billing \geq O&M Cost; and (ii) EIRR \geq 12%.

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

PROPOSED RESOLUTION DE-___/15

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

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 a program to support for the transition of the energy matrix in Ecuador. Such financing will be for an amount of up to US\$500,000,000 from the Ordinary Capital resources of the Bank, 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 _____ 2015)

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