

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

COLOMBIA

**NATIONAL PROGRAM TO ENSURE A SUSTAINABLE AND EFFICIENT
ENERGY SUPPLY, PHASE II**

(CO-L1237)

LOAN PROPOSAL

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ABBREVIATIONS

CAN	Andean Community of Nations
CREG	Comisión de Regulación de Energía y Gas [Energy and Gas Regulatory Commission]
DNP	Departamento Nacional de Planeación [National Planning Department]
FENOG	Fondo de Energías No Convencionales y Gestión Eficiente de la Energía [Nonconventional Energies and Energy Management Fund]
IPSE	Instituto de Planificación y Promoción de Soluciones Energéticas para las Zonas No Interconectadas [Institute for Planning and Promotion of Energy Solutions for Non-Interconnected Zones]
kW	Kilowatts
kWh	Kilowatt hours
LIBOR	London Interbank Offered Rate
MHCP	Ministry of Finance and Public Credit
MME	Ministry of Mines and Energy
MW	Megawatts
NCRE	Nonconventional renewable energy sources
PAI-PROURE	Plan de Acción Indicativo de Eficiencia Energética y Programa de Uso Racional y Eficiente de Energía [Indicative Action Plan for Energy Efficiency under the Program for Rational and Efficient Energy Use]
PBP	Programmatic policy-based loan
PPP	Public-private partnership
SIEPAC	Sistema de Interconexión Eléctrica de los Países de América Central [Central American Electric Interconnection System]
SIN	Sistema Interconectado Nacional [National Interconnected System, the “national grid”]
SINEA	Sistema Interconectado Eléctrico Andino [Andean Electrical Interconnection System]
TJ	Terajoules
UPME	Unidad de Planeación Minero Energética [Mining and Energy Planning Unit]
ZNI	Zona(s) No Interconectada(s) [Non-interconnected zone(s)]

PROJECT SUMMARY

COLOMBIA NATIONAL PROGRAM TO ENSURE A SUSTAINABLE AND EFFICIENT ENERGY SUPPLY, PHASE II (CO-L1237)

Financial Terms and Conditions				
Borrower: Republic of Colombia			Flexible Financing Facility ^(a)	
			Amortization period:	19 years
Executing agency: Ministry of Finance and Public Credit (MHCP) in technical coordination with the National Planning Department (DNP) and the Ministry of Mines and Energy (MME)			Disbursement period:	1 year
			Grace period:	5.5 years ^(b)
Source	Amount (US\$)	%	Interest rate:	LIBOR-based
IDB (Ordinary Capital):	600,000,000	100	Credit fee:	(c)
			Inspection and supervision fee:	(c)
			Weighted average life:	12.46 years
Total:	600,000,000	100	Currency of approval:	U.S. dollars
Program at a Glance				
<p>Program objective/description: The general objective is to contribute to the sustainability of Colombia's energy sector through policy reforms that will ensure the efficient supply of electric power in the National Interconnected System (the national grid) and the non-interconnected zones, to reduce the sector's vulnerability to the effects of climate change and increase access to electric power. The specific objectives are to: (i) ensure a macroeconomic setting consistent with the program's objectives; (ii) help guarantee energy supply from the national grid by diversifying the energy matrix with nonconventional renewable energy sources and increasing international trade in energy, while establishing measures to increase and guarantee the supply of natural gas for power generation, to manage energy demand, and to optimize the functioning of the wholesale energy market; and (iii) promote access to energy in the non-interconnected zones through the use of nonconventional renewable energy sources.</p> <p>This operation is the second of two consecutive independent but technically linked loan operations being financed under the programmatic policy-based loan modality.</p>				
<p>Special contractual conditions precedent to the single loan disbursement: The single loan disbursement will be contingent on fulfillment, to the Bank's satisfaction, of the policy conditions established in Annex II (Results Matrix) and of the other conditions established in the loan contract (paragraph 3.2).</p>				
Exceptions to Bank policies: None.				
Strategic alignment				
Challenges: ^(d)	SI	<input checked="" type="checkbox"/>	PI	<input checked="" type="checkbox"/>
Crosscutting topics: ^(e)	GD	<input checked="" type="checkbox"/>	CC	<input checked="" type="checkbox"/>

^(a) Under 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 operational and risk management considerations into account when reviewing such requests.

^(b) Under the flexible repayment options of the Flexible Financing Facility, changes in the grace period are permitted provided that they do not entail any extension of the original weighted average life of the loan and 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 the 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 to be addressed, and rationale

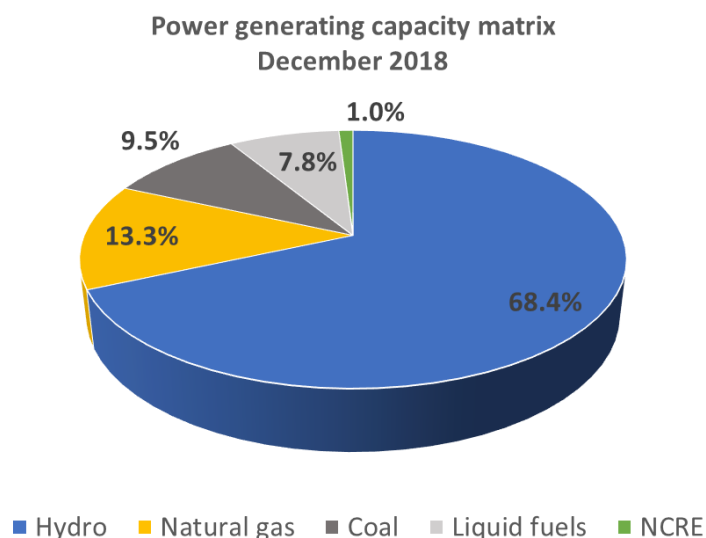
- 1.1 This operation is the second in a series of two operations under the programmatic policy-based loan (PBP) modality. For this series, an agreement was reached with the Government of Colombia to support structural measures to promote the sustainability of the country's energy sector through policy reforms that will ensure the efficient, reliable supply of electric power in the National Interconnected System (SIN) and the non-interconnected zones (ZNIs).
- 1.2 The policy measures proposed for this operation are consistent with and provide continuity to the objectives of the PBP. They also consolidate the policy reforms that Colombia has adopted to improve the sustainability of its energy sector.
- 1.3 **Macroeconomic situation.** The Colombian economy is still undergoing adjustments to achieve a new macroeconomic balance after a large oil-price shock in 2014, which had significant impacts. First, this shock had a direct effect on investment, economic activity, and public finances and external accounts. Starting in 2015, the subsequent necessary fiscal adjustment had an impact on economic activity, reducing the GDP growth rate. This rate bottomed out in 2017, when the annual growth rate was 1.8%. Second, the shock also caused a significant exchange rate depreciation (more than 70% between 2014 and 2016). Coupled with a slowdown in aggregate demand, this enabled an external account adjustment starting in 2016. Inflation has returned to the target range, enabling the implementation of a more expansionary monetary policy. In the current context and within the policy framework in effect, the economy is expected to resume an upward trend, with an annual 2.7% GDP growth for year-end 2018. In turn, the annual inflation rate as of December 2018 is projected at 3.3% (within the target range of 2% to 4%). In addition, a continued external adjustment will narrow the current account deficit to 2.9% of GDP.
- 1.4 **Status of the energy sector.** Colombia has an energy matrix that is relatively varied in fossil fuels and renewable resources. Colombia's energy exploitation and production is broadly composed of 93% primary resources of fossil origin, approximately 4% hydropower, and 3% biomass and waste. From this primary exploitation, approximately 69% is exported, mainly coal (about 94% of the amount produced, which accounts for 62% of energy exports) and oil (about 66% of the amount produced, which accounts for 36% of energy exports). Colombia also uses 31% of the resources exploited, of which 78% is from fossil resources and 22% from renewable resources.¹
- 1.5 The power sector has installed power generating capacity of 17,312 megawatts (MW) in the SIN.² Of this, 68.4% is from hydro generation, 29.4% from thermal (13.3% from natural gas, 7.8% from liquid fuels, and 9.5% from coal), and approximately 1% from nonconventional renewable energy sources (NCRE). This capacity has grown³ 25.2% in the past decade and 17.4% in the last five years.

¹ [Integración de las energías renovables no convencionales en Colombia](#). Mining and Energy Planning Unit (UPME).

² Monthly report on generation variables and the Colombian power market. December 2018. XM.

³ Monthly reports on generation variables and the Colombian power market 2010/2018 – UPME.

Since 2016, Colombia has had a regasification plant on the Caribbean coast, which helps diversify the matrix and increase energy security to address adverse events such as El Niño. This plant has a storage capacity of 170,000 cubic meters of liquefied natural gas and a regasification capacity of 400 million cubic feet per day.



- 1.6 **Organization of the power sector.** The organization of the Colombian power market is based on the vertical separation of activities in the value chain (generation, transmission, distribution, and marketing) carried out by State-owned, private, or semipublic enterprises. The sector is regulated by [Law 142 on Public Utilities](#) and [Law 143 on Electricity](#), from 1994.
- 1.7 The Ministry of Mines and Energy (MME) is the steering agency for the sector and is responsible for formulating, adopting, directing, and coordinating policies, plans, and programs for the energy sector, jointly with the National Planning Department (DNP). In turn, the MME oversees six entities,⁴ of which three are in the energy sector. These are: (i) the Mining and Energy Planning Unit (UPME); (ii) the Institute for Planning and Promotion of Energy Solutions for Non-Interconnected Zones (IPSE); and (iii) the Energy and Gas Regulatory Commission (CREG). There is also the Superintendency of Public Utilities, which is responsible for inspection, oversight, and control of public utility service providers.
- 1.8 The sector is divided into two service areas: the SIN and the ZNIs. The SIN—the national grid—is organized around a wholesale energy market, in which different power generating technologies freely compete to supply demand under scenarios of reliability, market price formation, and contracts and incentives (economic,

⁴ National Hydrocarbons Agency, National Mining Agency, UPME, IPSE, CREG, and Colombian Geological Service. The UPME performs comprehensive planning for the mining and energy sector, assessing supply and demand of resources for decision-making. The IPSE is tasked with identifying, preparing, and promoting energy access projects in the ZNIs and making them viable. The CREG is responsible for economic and technical regulation of the sector.

dispatch, marketing, etc.) resulting from sectoral and regulatory policy decisions. Price formation in the market is based on the prices offered by generators, which reflect their variable costs, including fuel and the opportunity cost of water, collection of the “reliability charge,”⁵ and their perception of the risk associated with dispatch. Short-term transactions are conducted through the power exchange mechanism, while long-term transactions take place using financial contracts.

- 1.9 In the power exchange, the price of energy under normal operating conditions corresponds to the highest offer price for units with centralized dispatch that have been programmed to generate power under ideal dispatch conditions. There is also a sales price ceiling known as the scarcity price, which is the maximum value that the country’s demand can pay for energy. When the scarcity price surpasses the trading price, this indicates that there is a critical situation in the system, and a rule⁶ is activated to regulate the price at which energy is purchased.
- 1.10 **Diagnostic assessment and challenges for sector reform.** In Colombia, Laws 142 and 143 of 1994 established a new operating framework for the power sector. Market liberalization, the introduction of competitive price formation for power generation, regulation of transmission and distribution through incentives, and institutional advances have enabled the sector to have a reliable supply and a business model that has become an international benchmark. However, efforts still need to be made to ensure a reliable supply with efficient prices, increase resilience against weather phenomena, and achieve better service quality and coverage, as demonstrated by Colombia’s ranking as 79th (of 137) in the World Economic Forum’s Global Competitiveness Index,⁷ in terms of the country’s quality of electricity supply. In addition, industry changes such as advances in information technology, telecommunications, control and supervision, and a trend toward increased decentralization of energy production activities and related transactions, *inter alia*, offer opportunities to boost competition, diversify the power generation portfolio, increase the share of demand, automate distribution grids, exploit local resources embedded in distribution grids, and modernize market architecture and regulations.
- 1.11 Under this scenario, in 2017 the Bank approved the first PBP operation to support reforms that ensure a sustainable and efficient energy supply (loan 4415/OC-CO). The specific problems diagnosed, the progress achieved since the first operation was approved in 2017, and the milestones that are expected to be reached in 2019 are detailed below.
- 1.12 The challenges regarding the reliable supply of power, particularly in times of low water supply, have to do with: (i) an energy matrix that is highly concentrated in hydro resources; (ii) limited regional integration; (iii) generation restrictions in the natural gas market; (iv) limited use of efficient electricity demand management

⁵ The reliability charge is a compensation mechanism that ensures the viability of investment in power generating resources needed to meet power demand efficiently under critical supply conditions, through long-term signals and revenue stabilization for the generator.

⁶ CREG Resolution 140 (2017), which defines the methodology for calculating the scarcity price (it is determined based on the variable costs associated with the SIN and fuel prices).

⁷ World Economic Forum. *The Global Competitiveness Report. 2017-2018*.

practices for energy savings; and (v) rigidities in the functioning of the wholesale energy market.

1.13 Concentration and dependence of the energy matrix on hydro resources.

Based on studies conducted by the Marine and Coastal Research Institute and the Hydrology, Meteorology, and Environmental Studies Institute, Colombia is highly vulnerable to the impacts of climate change.⁸ This risk correlates with the pronounced dependence of the SIN on hydro resources, since almost 70% of the installed generation capacity is hydropower. This concentration makes the system vulnerable to critical water supply conditions, such as those resulting from the cyclical recurrence of the El Niño phenomenon. During periods of normal water supply, when contributions are similar to the historical average (such as in 2017), 86% of the demand was met with the hydropower generated. In contrast, during periods of critical water supply conditions, such as during El Niño in 2009-2010 and 2015-2016, sources of thermal power generation covered more than 50% of the demand. These thermal plants (liquid fuels, natural gas, and coal-fired) have higher generating costs than do hydro stations under normal conditions.⁹

The risk of higher generating costs under drought scenarios could be reduced by diversifying the generating mix and boosting the share of NCRE, which have variable costs close to zero. The Government of Colombia committed to adding 1,500 MW of NCRE by 2022, and they are expected to account for between 13% and 18% of the power grid generation by 2031, according to the two scenarios in the 2017-2031 Generation and Transmission Expansion Plan. To incorporate NCRE into the national system, the UPME has approved¹⁰ 102 connection requests with capacity for 3,782 MW (see Table 1).

Table 1: Installed capacity of projects made viable through technology

Type of NCRE	Estimated capacity (MW)	Number of projects
Wind	1,662	12
Solar	1,420	30
Biomass	13	3
Small hydroelectric plants	686	57
Total	3,782	102

Source: Authors' calculations based on UPME data.

1.14 The first programmatic operation made progress with the tax incentive regulations for NCRE projects proposed under Law 1715 of 2014 (renewable energy law) and issued regulations that set forth the conditions for the process to connect, meter, and deliver to the national grid the surpluses of large-scale autogenerators.

1.15 Nevertheless, to achieve the government's ambitious NCRE penetration targets, it is still necessary to approve policy and regulatory guidelines that define the

⁸ [Impacto del Cambio Climático en Colombia.](#)

⁹ For example, in 2015 the trading price for power generated from liquid fuels was \$0.31/kWh, compared to \$0.08/kWh from hydro resources (US\$0.000096/kWh and US\$0.000025/kWh, respectively).

¹⁰ September 2018.

mechanisms for long-term contracting of these sources of generation, as well as to move forward with the invitation to bid for the first auction of large-scale NCRE projects.¹¹ The introduction of this type of energy should be accompanied by: (i) regulating and launching the Nonconventional Energies and Energy Management Fund (FENOGE),¹² the main objective of which is to: (i) promote and foster NCRE; and (ii) implement an information system that features the projects benefited by the tax incentive program for NCRE. In addition, regulations and rules are needed to establish: (i) technical conditions and requirements for facilities that use NCRE for power generation; (ii) conditions for the connection and operation of autogenerators; and (iii) regulations for the marketing of surpluses of small-scale autogenerators. These aspects will be part of the development of the second operation and are detailed under Component I.

- 1.16 **Limited international power exchanges.** Despite the efforts undertaken, power exchanges with neighboring countries are still very limited,¹³ not just due to the lack of infrastructure, but also because of the need to adjust the regulatory, commercial, and operating framework that governs international electricity transactions. For example, the transmission capacity of the interconnection with Ecuador could be increased by at least 150 MW by investing in the grid in southern Colombia and the current connections.
- 1.17 For the first PBP operation, the Agreement for Power Services Regulators of the Andean Community of Nations (CAN) was signed by Colombia in December 2016, together with the other member countries of CAN. This was an agreement to design a draft regulatory framework decision for subregional interconnection of power systems and community electricity exchanges. Likewise, in April 2017, Colombia approved CAN Decision 816, which calls for the preparation of operating, commercial, and market coordination regulations to move ahead with the consolidation of the regulatory framework that will govern power exchanges among the countries.
- 1.18 The second operation will act upon CAN Decision 816 and will provide support to prepare commercial regulations, indicating the conditions and procedures for the

¹¹ The first such auction was held on 26 February 2019. Although nine generation projects and 12 buyers qualified, two of the three conditions for competition established by the CREG were not met, and the projects could not be assigned. The Government of Colombia announced that it would hold another auction by 30 June 2019.

¹² The FENOGE will be financed with resources collected by the Commercial Exchange System Administrator, corresponding to Col\$1.90/kWh dispatched (US\$0.00059) in the wholesale energy market exchange, of which Col\$0.40 (US\$0.00012) will be allocated to financing the fund. It could also be financed with resources that include the national government, private or public enterprises, multilateral and international organizations, domestic or foreign combined capital enterprises, and international cooperation resources.

¹³ The power grid is supplemented with electricity traded through interconnections with Ecuador and, to a lesser extent, Venezuela. With Ecuador, there is an interconnection of 138 kV and of 230 kV, with maximum design capacity to export 535 MW and import 295 MW. However, due to operating restrictions, the maximums allowed are 300 MW for exports and 200 MW for imports. With Venezuela, there are three interconnections, with maximum capacity to export 336 MW and import 205 MW. During El Niño 2015-2016, Colombia imported 420 GWh from Ecuador, which together with power saving measures from the campaign Apagar Paga [It Pays to Turn it Off], made it possible for the country to avoid rationing power consumption. Colombia went from being a net exporter to being a net importer in the past two years.

determination, billing, and payment of international electricity transactions; the type of financial guarantees; calculation methodology; and procedures for their implementation. Moreover, and after 10 years of studies, this operation will help propose concrete options to move forward with the interconnection with Panama.

- 1.19 **Supply restrictions on natural gas for power generation.** While Colombia has 5.2 tera cubic feet of reserves, the lack of new discoveries along with a decline in production in the current fields is limiting the medium- and long-term gas supply.¹⁴ Demand for gas in 2017 was 863 million cubic feet per day—a 10% drop from 2016. This was mainly due to low consumption from thermal plants that were not used at their maximum capacity because of the high water levels recorded in the country. The UPME estimates that, with the average consumption expected for the 2018-2027 period, the gas supply would become insufficient as of September 2022. Moreover, since the producing wells are highly concentrated and located in only two regions (the northeast, in Guajira; and the east, in the eastern plains), the gas pipeline has a radial structure with unidirectional flows toward consumption centers and lacks the operational flexibility to reverse these flows. Up until now, the options to increase supply have included: (i) installing a terminal to receive liquefied natural gas in the North coast, with delivery capacity of 400 million cubic feet per day, to supply thermal plants in the region during periods of low water levels; and (ii) exploring areas that have potential, with modest results. According to the UPME, if the prospects for new reserves were verified, they would be available in the domestic market starting in 2027.
- 1.20 Given this context and to mitigate the risk of a natural gas shortage, the following took place under the first PBP operation: (i) Decree 2345 of December 2015 was issued, which established the demand sectors that will be prioritized when supply restrictions are insurmountable; (ii) MME Resolution 40006 of January 2017 was issued, which adopted an Interim Plan for Natural Gas Supply. This plan calls for: (a) construction of a regasification plant in the Pacific and a gas pipeline between this plant (Buenaventura) and the last southern point in the gas pipeline network (Yumbo); and (b) renovation of the infrastructure to improve the capacity of the gas pipeline network; and (iii) the natural gas market manager was put into operation and assigned responsibility for managing primary and secondary natural gas markets, and for compiling, centralizing, and publishing transactional information.
- 1.21 The second operation, to continue with the support, will focus on the following measures: (i) a public invitation to bid for the construction of a regasification plant in the Pacific and its associated gas pipeline; (ii) introduction for the first time in Colombia of bidirectional gas flow in the transportation grid, which is an innovation that will completely change the marketing mechanism for gas transportation capacity; (iii) regulatory modifications to establish the types of contracts allowed in the primary gas market and the rules for participants in the invitation to bid for the regasification plant and gas pipeline; and (iv) consolidation of the market manager's operations.
- 1.22 **Limited use of electricity demand management.** The country began to meet significant commitments related to efficient demand management with the adoption of the 2017-2022 Indicative Action Plan for Energy Efficiency under the Program

¹⁴ The decline in well production is based on producing gas to meet demand.

for Rational and Efficient Energy Use (PAI-PROURE). According to the PAI-PROURE, through the use of energy-efficiency measures, there could be consumption savings of 699,678 terajoules (TJ) in the power sector for 2017-2022. The plan also sets indicative savings targets by sector (see Table 2). In addition, the plan identifies specific measures to be adopted in each sector, as well as the impacts of each of these measures with respect to the baseline scenario.

Table 2: Indicative savings targets 2017-2022

Sector	Savings target (TJ)
Transportation	424,408
Industrial	131,859
Tertiary	87,289
Residential	56,121
Total	699,678

Source: 2017-2022 PAI, UPME.

- 1.23 In this context, the first programmatic operation provided support to move forward with the adoption of the technical regulations for labeling and consumer information on energy efficiency, and a manual for formulating and implementing efficient energy management plans in public entities was published. Likewise, a road map for implementing smart grids that will produce energy savings was published, and provisions for implementing demand response mechanisms were adopted.
- 1.24 To achieve the targets set forth in the PAI-PROURE, the second operation will: (i) regulate and ensure the financing of the FENOGE, which will be an important step in guaranteeing the financing and implementation of energy efficiency measures; (ii) update the regulatory framework to provide access to tax incentives for energy efficiency projects; (iii) design and launch dissemination and training tools for implementing appliance labeling mechanisms; and (iv) prepare the second phase of the technical regulations for labeling for other subsectors, such as light vehicles, street lighting,¹⁵ and boilers. There are also plans to promote large-scale energy efficiency programs to accelerate their penetration, have an impact on reducing household consumption, and decrease the fiscal burden on the national budget.
- 1.25 **Rigidities in the functioning of the wholesale energy market.** The functioning of the wholesale energy market has shown rigidities, particularly during El Niño events. These have evidenced problems related to gas transportation for thermal plants in the interior and supplying those on the coast (2009-2010), as well as inconsistencies between fuel prices and scarcity prices (2015-2016) that forced the government administrations to take emergency measures to avoid having to ration

¹⁵ Eficiencia Energética en Alumbrado Público. Technical note (2017). IDB.

- energy.¹⁶ There are also regulatory shortcomings related to binding dispatch, intraday markets, demand response, reform of the grid code, and security dispatch rules that the regulatory agency needs to analyze, to strengthen the functioning of the wholesale energy market.
- 1.26 The first PBP operation provided support with studies and regulations to make the wholesale energy market more efficient and reliable, including¹⁷ having the CREG issue regulations that established a new methodology for calculating the marginal scarcity price.¹⁸ This provides incentives for plants that have acquired firm energy obligations¹⁹ to fulfill them and prevents mismatches between local generating costs and fuel price indicators in the international market. This is a key regulation, since it prevents situations like the one that happened during the El Niño crisis of 2015-2016, when the low scarcity price that thermal plants were being paid was far below their generating costs, due to the high cost of fuel. These plants did not operate as expected under these circumstances, and the sector had to use more hydropower generation, exposing the country to a high risk of energy rationing.
- 1.27 In addition, the CREG made progress on key regulatory and policy issues to strengthen the wholesale energy market, including: (i) issuing the final methodology to determine firm energy with the reliability charge for photovoltaic plants;²⁰ (ii) approving the methodology for small producers to be able to autoproduce and sell energy in the SIN; (iii) issuing regulations defining remote areas, as well as the criteria for their demarcation, and establishing special conditions to provide power service there; and (iv) preparing studies to add advanced metering in the country. The issuance of regulations to modernize the institutional and regulatory framework to facilitate the inclusion of new agents, new technologies, and transactional mechanisms in the power market sets a new path in Colombian regulations toward the participation of regulated users in managing their electricity consumption and makes it possible for them to become “prosumers” (producers and consumers).
- 1.28 This second loan operation will continue to strengthen the functioning of the wholesale energy market, with commitments aimed at ensuring the reliability of power supply through: (i) an invitation to bid for the reliability charge; and (ii) adoption of the 2017-2031 Generation and Transmission Expansion Plan, taking into account renewable energy sources. Adopting these two elements will send a clear signal about the short- and medium-term needs to expand power generation and transmission and will reduce the risk of shortages that may arise in Colombia starting in 2022. It is also important for the CREG to adopt regulations

¹⁶ The measures that the CREG and the MME implemented during the 2015-2016 El Niño phenomenon included CREG Resolution 178 of 2015, modifying the scarcity price; MME Decree 2018 of 2015, empowering the CREG to make decisions in extraordinary situations; and more than 28 resolutions issued by the CREG between 2015 and 2016, of which eight were directly related to El Niño, aimed at regulating trading prices, energy availability and system flexibility, the financial stability of generators, etc.

¹⁷ [CREG accountability.](#)

¹⁸ CREG Resolution 140 of 2017.

¹⁹ Firm energy obligations are a product designed to ensure the reliability of the long-term supply of firm energy at efficient prices. These obligations are auctioned and assigned among generating agents during reliability charge auctions.

²⁰ CREG Resolution 201 of 2017.

establishing the principles and conditions to be fulfilled by mechanisms to market electricity, in order for their prices to be recognized as part of the cost component for energy purchases made by regulated users. This regulation is very important for marketers to be able to pass on to users the cost of energy purchases, including in nonconventional renewable energy auctions. The CREG should also continue making progress on regulatory issues that strengthen and modernize the functioning of the wholesale energy market and that ensure that new energy sources that are added make the most of technological advances. This should be reflected in the 2019 CREG Regulatory Agenda.

- 1.29 **Electricity coverage in non-interconnected zones.** Colombia has approximately 1.8 million persons who lack access to electricity. According to IPSE, currently 51% of Colombia's territory contains non-interconnected zones, including several departments with coverage below 50% in rural areas. The ZNIs tend to be located in remote and at times isolated areas, with low average consumption, low ability to pay, and difficulties managing service. Service delivery costs tend to be high, since the majority of ZNIs are powered with diesel with high operating costs, particularly due to the difficulty of transporting fuel to these areas. The State generally subsidizes these high operating costs. According to the Superintendency of Public Utilities, in 2017 the annual cost of the subsidy for every new user was Col\$1.2 million (US\$374).
- 1.30 NCRE-based technologies make it possible to offer environmentally friendly solutions and provide electricity in isolated areas using methods that are often simpler, faster, and at times less expensive. It is essential for these solutions to be accompanied by a sustainability mechanism to ensure that the systems installed operate correctly and that maintenance processes are carried out, to meet the objective of contributing to the well-being of the population. Colombia has great potential to develop nonconventional renewable energy sources for power generation, which is a development opportunity for the non-interconnected zones. The first programmatic operation made progress with the adoption of policy guidelines for expanding power service coverage in the non-interconnected zones using NCRE-based projects and in rules for a registry of these types of projects connectable to the grid and for the development of these zones.
- 1.31 The second operation will seek to make progress as follows: (i) create and implement a registry of generating projects with NCRE for the ZNIs; (ii) develop mechanisms to expand coverage to users that can be interconnected; (iii) structure the first public-private partnership (PPP) project to serve the ZNIs; and (iv) adopt the guidelines for the 2018-2031 National Rural Electrification Plan, in order to expand electricity coverage, giving priority to NCRE.
- 1.32 **Gender considerations.** The mining and energy sector in Colombia is a driver of the country's development and is one of the sectors that contribute the most to the national economy. However, the sector's economic impact cannot be isolated from the social, cultural, and environmental transformations involved in launching its activities. The sector's development strategy needs to be accompanied by an inclusive, sustainable, and comprehensive vision that values the work of men and women equally and recognizes their contributions to the country's economic

- growth. Based on information from the MME's Departmental Mining Census²¹ for the 2010-2011 period, conducted in 23 departments in Colombia, only 7% of the women held executive positions, while approximately 45.5% held administrative positions, and the remainder worked in operations.
- 1.33 Several years ago, Colombia took on the challenge of promoting respect for human rights, including principles such as gender equality. In 2015, a national human rights strategy was defined and a national action plan was formulated, to guarantee adequate human rights protection from the State. In 2016, the Mining Policy of Colombia was adopted through Resolution 40391, seeking to generate company and human rights policies for the mining and energy sector.
- 1.34 While Colombia has achieved progress in its human rights policies, it now needs to specifically deepen the gender focus, so it is included in the plans, projects, and programs of the mining and energy sector. Therefore, this PBP will work with and provide support to the Government of Colombia to adopt policies that at a minimum: (i) promote coordination with sector entities on actions for which some impact on gender issues is anticipated; (ii) formulate an action plan that includes specific actions and targets to ensure gender equality; and (iii) make it possible to collect, process, analyze, and disseminate indicators to carry out, monitor, and supervise these actions. This way, the MME could become a benchmark for the entire sector and other sectors of the economy, with the ability to change the vision on gender equality.
- 1.35 **Climate change.** With emissions of 224 million tons of carbon dioxide equivalent in 2010, Colombia is responsible for 0.46% of greenhouse gas emissions worldwide.²² While these numbers are insignificant compared to emissions from other countries with similar development characteristics, in 2015 Colombia committed, within the United Nations Framework Convention on Climate Change,²³ to reducing 20% of its greenhouse gas emissions by 2030. The mining and energy sector,²⁴ which accounts for approximately 30% of the country's emissions, set a reduction target of 11.13 million tons of carbon dioxide equivalent. Within this sector, electricity needs to reduce 4.74 million tons of carbon dioxide equivalent. The main actions to reduce these emissions as part of the Nationally Determined Contribution include: (i) development of a NCRE portfolio; (ii) energy efficiency in the demand, transformation, and production sectors; (iii) generation mechanisms with NCRE and hybrid systems, plus energy efficiency strategies for non-interconnected zones; and (iv) reduction of energy transportation losses.

²¹ Prepared to gather information about the technical, socioeconomic, organizational, and administrative conditions of the mining production units in 23 departments in Colombia. This census measured mining exploitation units such as pitheads, quarries, sand and gravel pits, and in general all types of underground and open-pit exploitation.

²² Based on 2010 data from the Hydrology, Meteorology, and Environmental Studies Institute submitted for the First Biennial Update Report and Third National Communication on Climate Change.

²³ Colombia committed to reducing its greenhouse gas emissions 20% by 2030.

²⁴ Intersector Climate Change Committee. Second round of "Priorización sectorial de medidas para el cumplimiento de la reducción de emisiones en la contribución nacionalmente determinada de Colombia" [Sector prioritization of measures to comply with the reduction of emissions in Colombia's Nationally Determined Contribution].

- 1.36 **The country's sector strategy.** The foundation of the 2018-2022 National Development Plan highlights the importance of the quality and efficiency of public utilities and aims to achieve a more innovative energy sector that fosters market competition, clearly addresses the risk of shortages, and achieves significant progress in adding renewable energy sources. The share of NCRE is expected to increase to 10% by 2022. Likewise, the plan includes making progress on electricity coverage with new technologies, streamlining subsidies, and improving demand management.
- 1.37 **Program rationale.** The power sector plays a fundamental role as a productive input and as a service for boosting the economic development and living standards of the Colombian population. The country needs a regulatory and institutional framework that permanently ensures the efficient, reliable supply of electric power. This sector support program reinforces necessary measures by the government, taking into account the economic benefits in terms of marginal costs and/or level costs of power generation, resulting from increased use of natural gas for generation or of nonconventional renewable energy sources in the grid. These benefits have been analyzed extensively in countries including Chile, Mexico, Bolivia, and the United States, where the share of these sources in the energy matrix has increased. For Colombia, a comparison of operating costs by generating source has revealed the advantages of using natural gas and NCRE and is documented in the evaluation of characteristic projects in execution. As evidence of the effectiveness of the proposed intervention, McCarthy and Henderson (2014) analyzed the growth impact of NCRE and of a variety of instruments to promote these sources in the regulatory framework of 27 countries, including Colombia, over a 10-year period. The study found that the greatest growth impact is achieved through tax incentives, combined with measures that guarantee access for NCRE to the grids. Measures of this kind are included in the reforms that the program supports.
- 1.38 **Proposed intervention.** The policy actions under the first tranche gave priority to formulating policy frameworks (national plans, sector policies, decrees, resolutions, regulations, and technical standards approved by the CREG, the MME, and sector entities) to make the electricity supply in the sector more reliable and efficient, both in the interconnected system and in the ZNIs, by issuing regulations for laws promoting the development and use of NCRE, adopting indicative plans, road maps, and designs for mechanism to promote regional economic integration, ensuring reliable natural gas supply for generation, improving demand management, strengthening the wholesale energy market, and facilitating the expansion of coverage with NCRE. The actions under the second tranche not only promote major adjustments to the power sector's policy framework, but they also support the implementation of significant infrastructure projects that ensure the diversification of the generation matrix and the sector's reliability. Together, the two tranches will help close the following electricity sector gaps in the SIN: (i) achieve a reliable, efficient energy supply by diversifying the matrix with NCRE and through international exchanges; (ii) strengthening the wholesale energy market with measures to increase and guarantee the supply of natural gas for generation, improve energy demand management, strengthen the operation of the wholesale energy market, and promote management of gender and equity issues in the sector. For the ZNIs, the two tranches seek to close gaps related to electricity

coverage through renewable sources. It is noteworthy that, even though there was a change in government between the first operation's approval and this second operation, sector priorities have not only remained in effect, but have been strengthened with concrete commitments, such as an invitation to bid for the first NCRE auction, tendering for natural gas sector projects, and progress in international interconnections. The Bank has extensive regional experience designing and implementing such activities and has been advising the Government of Colombia on its electricity sector reforms through technical cooperation operations and projects.

- 1.39 **Effectiveness of sector policy reforms.** According to the Organization for Economic Cooperation and Development, regulatory reforms complement fiscal and monetary policies by creating suitable conditions for the sustainable development of countries. Sector policies should evolve at the same pace that economies transform, to ensure that infrastructure does not become a bottleneck but rather a driver of a country's economic development. How the services associated with this infrastructure are used determines the impact on users. Therefore, it is a key factor in supporting the comprehensive development of economies.
- 1.40 Evidence has shown that stable, well-designed sector policies are essential to improve the performance of the power sector and that sector policy reforms may lead to an increase in investment and enhance service quality by improving the efficiency of the power sector and its financial sustainability. The project completion report for loan 2848/OC-SU concluded that programmatic policy-based loans are appropriate instruments for supporting sector reforms involving multiple actors. Moreover, the main beneficiaries of these interventions are end consumers, in terms of their access to a diversified and sustainable energy supply.
- 1.41 **IDB support for the electricity sector in Colombia.** The IDB has gained extensive knowledge of the sector, having provided technical and financial support for more than 20 years. Its activities include financing projects involving power generation, energy efficiency, rural electrification, and institutional capacity-building in the sector. Two loan operations and four technical cooperation projects that are consistent with the measures planned for this program are currently in execution, as follows: (i) regarding rural electrification, it is financing the Water, Basic Sanitation, and Electrification Program for the Colombian Pacific Region (loan 3610/OC-CO), which has a US\$91 million electrification subcomponent and is receiving support from the technical cooperation operations "Support for the Sustainable Powering of the Comprehensive Plan for Intervention in the Pacific" (ATN/OC-15194-CO) and "Public Policy to Remove Barriers to Renewable Energy Solutions in ZNI" (ATN/TC-15540-CO); (ii) for energy efficiency, it is financing Efficient Demand-Side Management of Energy in Non-Interconnected Zones – San Andrés, Providencia, and Santa Catalina Archipelago Pilot Program (loan 3747/TC-CO) for US\$10 million, and technical cooperation operation "Support for the Caribbean Energy Efficiency Program" (ATN/JF-16804-CO); and (iii) regarding institutional capacity-building, it is financing the technical cooperation operation "Support for the National Program to Ensure Sustainable and Efficient Energy Supply" (ATN/OC-16739-CO), which supports fulfillment of this program's commitments. Colombia is also a beneficiary of the regional technical cooperation operation, Complementary Studies to Support the Andean Energy Integration

Process (ATN/FG-15606-RG, ATN/OC-15607-RG), which supports the SINEA initiative.

- 1.42 **Lessons learned for program design.** The design of this second phase of the program took into account the lessons learned from the first phase (loan 4415/OC-CO) and from other IDB-financed policy-based loan operations in the energy sector. The most recent operations were: Chile (loan 3821/OC-CH), Panama (loan 4234/OC-PN), Honduras (loan 3619/BL-HO), Mexico (loan 4448/BL-HO), and Bolivia (loan 4606/BL-BO).
- 1.43 During the process of identifying policy commitments and program design for the second phase, the lessons learned from those operations that were applied to this one include: (i) preliminary support was provided to develop technical tools such as action plans and studies, which will serve as inputs to prepare and implement policy commitments, seeking to enhance the impact of institutional and regulatory sector reforms proposed; (ii) the program's policy commitments were designed to be developed sequentially and with clearly defined responsibilities, since policy measures, particularly regulatory measures, will require gradual implementation; (iii) substantive policy commitments such as decrees and ministerial resolutions were prioritized and a horizontal relationship maintained between the commitments for the program's two loan operations; (iv) the experiences from Bank-financed projects in execution (3747/TC-CO and 3610/OC-CO) and technical cooperation operations (ATN/OC-15194-CO, ATN/OC-15540-CO, ATN/OC-16739-CO, and ATN/JF-16804-CO), as well as an ongoing dialogue with local sector authorities, were taken into account in identifying institutional and policy changes; and (v) the executing agency, together with other relevant sector institutions, such as the Ministry of Mines and Energy, the National Planning Department, the Energy and Gas Regulatory Commission, and the Mining and Energy Planning Unit were involved in all stages of program design.
- 1.44 **Coordination with other donors.** The Bank coordinates its support for the sector with other multilateral banks, development agencies, and cooperation funds in Colombia. For energy efficiency, the Bank is executing a technical cooperation operation (ATN/JF-16804-CO) financed by the Japan Quality Infrastructure Initiative, the objective of which is to design an energy efficiency program for Colombia's Caribbean region. The Government of Colombia has prioritized this program to seek financing from the Green Climate Fund. With respect to incorporating NCRE into the energy matrix, the Bank has coordinated its support with the World Bank and the Kreditanstalt für Wiederaufbau, which have conducted studies regarding the design of the first NCRE auction and of the FENOGE, respectively. The Bank is processing a technical cooperation operation financed by the British infrastructure fund, to build capacity in the sector on institutional and technical issues related to incorporating large-scale NCRE into the power grid. As requested by the MME, the Bank will support a Mission for Transition of the Energy Matrix and Sector Reform that the government announced in late 2018. The objective of this mission is to transition toward a more diverse, resilient energy matrix and toward institutional and regulatory frameworks that enable the addition of new energy sources and make the most of technological advances.

- 1.45 **The Bank's strategy with the country.** The program is consistent with the IDB Country Strategy with Colombia 2019-2022 (document GN-2832), through the strategic area of social mobility and consolidation of the middle class, contributing to the strategic objective of increasing equitable access to quality basic services. It contributes to the strategic area of effectiveness of public management, under the objective of increasing the quality of expenditure and the capacity to manage public investment at all levels of government.
- 1.46 **Strategic alignment.** The program is consistent with the Update to the Institutional Strategy 2010-2020 (document AB-3008) and is aligned with the following development challenges: (i) social inclusion and equality, by supporting the expansion of access to energy in the ZNIs; (ii) productivity and innovation, by promoting improved functioning of the natural gas and electricity markets, so as to avoid price fluctuations that can affect industrial competitiveness; and (iii) economic integration, by fostering the integration of Colombia's electricity market with other countries in the region through SINEA and SIEPAC.
- 1.47 The program is aligned with the crosscutting areas of: (i) climate change and environmental sustainability, by supporting sector reforms that promote the development of NCRE and the implementation of energy efficiency measures to reduce greenhouse gas emissions. Approximately 68.42% of the loan proceeds will be associated with policies to promote climate change mitigation, following the joint [methodology](#) of the multilateral development banks for estimating climate finance. These funds will contribute to the IDB Group's target of increasing financing for climate change-related projects to 30% of operation approvals by the end of 2020; (ii) institutional capacity and rule of law, by promoting reforms that will build the capacities of institutions in the power sector; and (iii) gender equality and diversity, by promoting gender equity in the sector with the adoption of a sector public policy that includes a gender focus. The program is also aligned with the priority areas of the Strategy for Sustainable Infrastructure for Competitiveness and Inclusive Growth (document GN-2710-5), with actions that will promote rationalization in the use of energy infrastructure via energy efficiency and the development of infrastructure for more reliable, efficient systems.
- 1.48 The program is also aligned with the Corporate Results Framework 2016-2019 (document GN-2727-6) through the indicators on reduction of emissions, installed power generation from renewable energy sources, and households with new access to power. The program is consistent with the Energy Sector Framework (document GN-2830-5), in the thematic areas of energy access, sustainability, security, and governance, by promoting policy reforms that will encourage: (i) provision of energy in the ZNIs and increased access to energy; (ii) sustainable development of the sector; (ii) diversification of the energy matrix through the use of nonconventional renewable energy sources; (iv) efficient use of energy; and (v) regional integration. The operation is also consistent with the Climate Change Sector Framework (document GN-2835-8), as the proposed energy policy reforms would reduce greenhouse gas emissions by promoting efficient electricity demand management and use of nonconventional renewable energy sources. The program is also included in the 2019 Operational Program Report (document GN-2948).
- 1.49 **Sustainable infrastructure.** The program aligns with the Bank's overall framework for sustainable infrastructure (Technical note IDB-TN-1388), particularly

through the principles of sustainability: (i) economic and financial sustainability with respect to economic and social returns by promoting service access and tax and regulatory incentives for sustainability; (ii) environmental sustainability, including climate resilience, particularly the efficient use of resources to promote energy efficiency and use of renewables; (iii) social sustainability, particularly human and labor rights by promoting gender and diversity inclusion in sector projects; and (iv) institutional sustainability, by contributing to national strategies that support Colombia's commitments for sustainable development.

- 1.50 **Public Utilities Policy** (document GN-2716-6). The program is consistent with the objectives of the Public Utilities Policy. The policy reforms will promote conditions for economic assessment and financial sustainability and will contribute to the technical, operational, and financial sustainability of the energy sector, by encouraging competition in the domestic and regional markets and improving rate-setting schemes and processes. Likewise, to fulfill the conditions established specifically in the Public Utilities Policy (Section IV of document GN-2716-6), for this policy-based loan, cost-benefit and cost-effectiveness evaluations of the reforms were prepared, as well as an analysis of its financial sustainability, which is available in the [Analysis of Compliance with the Public Utilities Policy](#).

B. Objectives, components, and cost

- 1.51 **Objectives.** The objective is to contribute to the sustainability of Colombia's energy sector through policy reforms that will ensure the efficient supply of electricity in the National Interconnected System (SIN) and the non-interconnected zones (ZNIs), to reduce the sector's vulnerability to the effects of climate change and increase access to electric power. The specific objectives are to: (i) ensure a macroeconomic setting consistent with the program's objectives; (ii) help guarantee energy supply from the national grid by diversifying the energy matrix with nonconventional renewable energy sources (NCRE) and increasing international trade in energy, while establishing measures to increase and guarantee the supply of natural gas for power generation, to manage energy demand, and to optimize the functioning of the wholesale energy market; and (iii) promote access to energy in the non-interconnected zones through the use of nonconventional renewable energy sources. The program includes the following three components:
- 1.52 **Component I. Macroeconomic stability.** The objective of this component is to maintain a macroeconomic setting consistent with the program's objectives, as established in the Policy Matrix and the Sector Policy Letter.
- 1.53 **Component II. Support for the reliability of power supply from the national grid.** The objective of this component is to help ensure a reliable, efficient, and sustainable power supply by: (i) diversifying the energy matrix with NCRE and increasing international energy exchanges; (ii) strengthening the functioning of the wholesale energy market with measures to increase and ensure a reliable supply of natural gas for electricity generation and to manage demand; and (iii) strengthening the gender focus in the sector. This component's measures and actions are aligned with the government's strategy to diversify the energy matrix with NCRE, ensure the grid's reliability by strengthening international interconnections, and launch policies and projects that guarantee the reliability of natural gas supply for the power sector, implementation of demand management

measures, and strengthening and modernization of the regulatory framework for the wholesale energy market.

- 1.54 **Subcomponent 2.1. Support for diversifying the energy matrix and for regional electric power integration.** Activities for this subcomponent will support the adoption of policies aimed at diversifying the energy matrix by promoting and incorporating large-scale NCRE into the national grid and promoting regional power interconnections with the objective of ensuring an efficient and reliable power supply for the national grid. For this second operation in the programmatic series, one condition remains unchanged, and three conditions are strengthened. The unchanged condition is that the FENOGÉ is operational and has earmarked financial resources.
- 1.55 The first condition modified is the additional regulation to Law 1715 of 2014. Originally, this called for the implementation of a computerized information system for processing the tax incentives contained in Law 1715. That system was implemented in 2017. This second operation will seek more concrete and transformational progress in incorporating NCRE into the energy matrix through policy and physical infrastructure actions. Therefore, commitments include: (i) adopting policy guidelines and mechanisms for long-term procurement of nonconventional renewable energy; and (ii) issuing an invitation to bid for the first NCRE auction.²⁵
- 1.56 The second commitment is being modified because the regulation of a program of tax incentives for NCRE was implemented in late 2017. This adjustment calls for a systematic report of the projects that benefited from tax incentives, meaning that the program is not only in effect but is also effective and its benefits have materialized. The modified commitment is as follows: implement an information system that features the projects benefited by the tax incentive program for NCRE.
- 1.57 The third commitment modified is regarding the regulation establishing the requirements necessary for connection of NCRE to the national grid and the non-interconnected zones. It was strengthened by including: (i) issuing of regulations for small-scale autogenerators in the non-interconnected zones that establish the technical requirements for facilities and the procedures for connection and operation of autogenerators; and (ii) establishment of procedures for marketing energy from small-scale autogenerators.
- 1.58 **Regional energy integration.** This second phase of the program maintains the initial commitment to design a draft regulatory framework decision for subregional interconnection of power systems and community exchange of electricity and adds a new commitment. For the first operation, the commitments included the implementation of the SINEA road map (interconnection studies and regulatory framework for international transactions) and, for the Plan for Expansion of Power Generation and Transmission, to include an analysis of the Colombia-Ecuador interconnection to reliably and securely meet power demand in the medium and long terms. The new commitment involves making systematic progress on the Colombia-Panama interconnection project, for which studies have been done for a decade, and specific action is required. This commitment is included taking into

²⁵ The auction for the long-term contract was held on 26 February 2019.

account its strategic role for bilateral transactions and access to new markets such as Panama and the Central American countries through SIEPAC.

- 1.59 **Subcomponent 2.2. Strengthening the electricity market.** This subcomponent will strengthen the wholesale energy market with measures that can increase and guarantee the supply of natural gas for generation and manage energy demand.
- 1.60 **Natural gas.** In the second loan, the commitments for this subcomponent are to: (i) submit for consultation the regulation that incorporates adjustments to the marketing mechanisms for natural gas; (ii) implement the Interim Plan for Natural Gas Supply; and (iii) put into operation the natural gas market manager. Commitments (i) and (iii) remain unchanged from the first operation. Commitment (ii) was modified, since the Government of Colombia decided not to issue an indicative plan, but to focus its efforts instead on implementing the Interim Plan for Natural Gas Supply adopted in 2017. Therefore, the commitment focuses on actions that are actually effective in implementing the Interim plan, such as: (a) the regasification plant in the Pacific; (b) the Buenaventura-Yumbo gas pipeline; and (c) four infrastructure modifications to enable bidirectional gas flow in the transportation grid, which will modernize the grid and the marketing of gas transportation.
- 1.61 **Efficient energy demand management.** The commitment accepted for the first operation was the development of technical, legal, economic and financial planning and information instruments for the Program for Rational and Efficient Energy Use (PROURE) for 2016-2021. For this component, two conditions remain unchanged, and four are modified. The unchanged conditions are: (i) adoption of provisions for implementing demand response mechanisms; and (ii) design of mechanisms for voluntary disconnection as a way of making the SIN more reliable.
- 1.62 The modified conditions are: (i) update the legal framework for granting tax incentives; (ii) promote the inclusion of sustainability criteria within the lifecycle of buildings with criteria for efficient energy use; (iii) move ahead with a second stage of the consumer labeling and information system on energy efficiency, including regulation of the street lighting service that establishes mandatory quality and energy efficiency targets; and (iv) establish mechanisms to implement advanced metering infrastructure for electricity.
- 1.63 Modifying the first condition helps ensure that the new regulation is consistent with environmental and market best practices. The second condition is modified and strengthened to expand the subject of energy efficiency in buildings, turning it into a national policy. Modifying the third condition demonstrates that actions have focused on strengthening implementation of the first stage of the labeling system and on making applicable interagency consultations for light vehicles, street lighting, and boilers. Lastly, the fourth condition is modified so that mechanisms for advanced metering for electricity are adopted through a resolution based on the conclusions from the study for the original commitment. The modification of these conditions strengthens the regulatory framework and the adoption of measures and mechanisms aimed at adopting energy efficiency guidelines in various subsectors that are major power consumers, to make them more efficient and less polluting.

- 1.64 **Functioning of the wholesale energy market.** Two conditions remain unchanged, and one condition is added. Those that remain unchanged are: (i) adoption of the 2017-2031 Generation and Transmission Expansion Plan; and (ii) publication of the 2019 CREG Regulatory Agenda, which includes proposals for modifying the functioning of the Colombian wholesale energy market that modernize and strengthen its operations. The new condition being added calls for the establishment of conditions to increase the energy supply in the wholesale energy market, through an invitation to bid for assigning energy obligations with the reliability charge and issuing a regulation establishing the requirements that marketers need to fulfill for their prices to be recognized in the electricity rate. This new condition ensures there is a reliable supply of firm energy for 2022 and that the marketers that buy energy in the long-term auction can pass on the costs to users.
- 1.65 **Gender and diversity.** A gender and diversity condition is added that will help narrow inequality gaps between men and women in the mining and energy sector, given the importance of this issue for the MME, the Government of Colombia, and the Bank. This condition refers to the adoption by the MME of a policy that includes a gender focus in the mining and energy sector, with an action plan involving specific actions and targets to ensure gender equality and implementation of measures to monitor progress on this issue. This policy also provides an opportunity for national and local entities, the private sector, and communities to strengthen their dialogue processes. It also improves the effectiveness of social investment in the territory where the operation takes place. The policy requires the Colombian government to implement this focus in its projects in order to move toward sustainable development, promotes cultural transformation, values the work of men and women equally, and recognizes their part in contributing to the country's economic and inclusive growth. This commitment will undoubtedly enable the MME to take concrete steps to achieve high levels of gender equality. [See Gender Analysis.](#)
- 1.66 **Component III. Promoting access to energy in the ZNIs through NCRE.** The objective of this component is to promote access to energy in the non-interconnected zones through the use of nonconventional renewable energy sources. This aligns with the government's objective expressed in the foundation for the 2018-2022 National Development Plan, which "*seeks universal, quality public service delivery to close gaps and develop territories with a comprehensive vision of energy in terms of available resources and long-term sustainability.*"²⁶ This component has four conditions, of which one remains unchanged, the second is modified and divided into two, and a fourth condition is added. The unchanged condition is for the registry of generation projects using NCRE connectable to the grid in ZNIs to be created and in operation. The modified condition is to: (i) develop mechanisms to expand coverage to users that are not interconnected; and (ii) structure the first PPP for the ZNIs, given the government's decision to foster PPP mechanisms for electricity service delivery in these zones instead of continuing with the process of concessioning exclusive service areas, as was planned during the preparation of the first stage of the program, facilitating implementation of the projects of public operators in the ZNIs who know the areas

²⁶ 2018-2022 National Development Plan.

and their communities, and of private investors. The fourth condition added is the adoption of the guidelines for the 2018-2031 National Rural Electrification Plan, aimed at universal electricity service nationwide by 2031.²⁷ These new conditions seek to accelerate the process of increasing coverage for users who do not yet have service in the ZNIs through more efficient mechanisms, such as extending the grid through existing operators and PPPs.

C. Key results indicators

- 1.67 To measure the expected results from reform measures in the medium term, a Results Matrix was prepared with the borrower that includes the program's expected outputs, outcomes, and impacts. Policy actions included in the operation are expected to have a positive impact on: (i) diversification and a greater share of NCRE in the national grid and in energy transfers with Ecuador and in the future with Panama; (ii) a stronger wholesale energy market, with measures that guarantee the supply of natural gas, manage demand, and improve the functioning of that market; and (iii) increased access to energy in the non-interconnected zones through the use of nonconventional renewable energy sources. As to its impact, the program is expected to ensure and increase the efficient supply of electric energy and to reduce greenhouse gas emissions.

Table 4 shows the expected impacts and outcomes and their associated indicators.

Table 4: Expected impacts and outcomes

Impact	Indicator
Efficient supply of electric power	Nominal generating capacity in the SIN
	Marginal long-term cost of operating the system
Reduction in greenhouse gas emissions	Greenhouse gas emissions by the power sector
Outcome	Indicator
Support for diversifying the energy matrix and for regional electric power integration	Installed capacity for NCRE in the SIN
	Effective net large-scale cogeneration capacity in the SIN
	Volume of electric energy traded bilaterally with Ecuador per year (energy exports and imports with Ecuador)
Strengthening of the electricity market	Annual supply by volume of natural gas for power generation
	Electricity consumption in the industrial sector
Promoting access to energy in the ZNIs	Installed capacity for NCRE in the ZNIs

- 1.68 **Program beneficiaries.** The program will benefit the country's entire population by developing an energy matrix that is more sustainable, diversified, and resilient to climate change. This will be done by incorporating nonconventional renewable energy sources on a large scale into the national grid and on a smaller scale into the non-interconnected zones and by making investments to ensure a more reliable supply of natural gas for generation and strengthening regional integration.

²⁷ The sector policy on human rights will play a relevant role in interventions in isolated areas, by helping to draw attention to and implement strategies to achieve concrete actions aimed at the inclusion of specially protected groups and ensuring gender equality as a fundamental condition for sustainable development and productivity.

This operation supports policies and interventions for institutional strengthening aimed at better planning, management, and control in the sector that will benefit electricity service users and various sector entities and companies. The interventions that help improve electricity coverage in the ZNIs will help to close the social and economic gap for households that lack electricity and reduce greenhouse gas emissions by generating power from nonconventional renewable energy sources instead of from diesel.

II. FINANCING STRUCTURE AND MAIN RISKS

A. Financing instruments

- 2.1 This is the second in a series of two operations under the programmatic policy-based loan modality (PBP). It is based on the guidelines and directives of “The New Lending Framework. Assessment Report and Recommendations” (document GN-2200-13) and of “Policy-Based Loans: Guidelines for Preparation and Implementation” (document CS-3633-2). The use of a programmatic modality is justified by: (i) the complex nature of the reforms; (ii) the diverse time periods to implement each of those reforms; (iii) the coordination of these reforms among all the partners involved; (iv) the support of the policy dialogue in the country; and (v) the supervision required for implementation of reforms, their monitoring, and feedback on results.
- 2.2 Dimensioning of the operation. Pursuant to paragraph 3.27(b) of “Policy-Based Loans: Guidelines for Preparation and Implementation” (document CS-3633-2), the operation has been dimensioned in light of the country’s fiscal needs. The financing needs of the central government are equivalent to 7.3% of GDP. The amount of the operation would cover a portion of that financing, representing 1.6% of total financing needs and 13.7% of financing from multilateral sources. A debt sustainability analysis showed that total public debt as a percentage of GDP will decrease in the medium term and will continue to be manageable, even if faced with large negative external shocks.

B. Environmental and social risks

- 2.3 The program is classified as a policy-based loan under directive B.13 of the Environment and Safeguards Compliance Policy (OP-703). The program could have significant environmental and social impacts on a national level associated with the implementation of development plans and policies that would have an effect on the country’s overall energy matrix (policies aimed at interventions in rural areas, use of natural gas, power interconnections, renewable energy, etc.). Therefore, a strategic environmental and social assessment was prepared to define the possible nationwide impacts, institutional capacity, and all necessary mitigation measures. In general, results of the assessment indicate that: (i) Colombia has solid legislation with respect to environmental and social issues; and (ii) the Ministry of Mines and Energy (MME), which is providing technical support for execution of the PBP, has sufficient knowledge to manage related aspects. However, to ensure the strengthening of the execution capacities of the MME and its Environmental and Social Unit, during preparation of the PBP two training workshops were held on environmental and social issues. These will

specifically cover international performance standards and the Bank's Operational Policies.

- 2.4 The strategic environmental and social assessment also included important recommendations for the MME to take into account as best practices on environmental and social matters when developing national strategies and presenting projects, such as: (i) include environmental and social considerations and mitigation costs in medium- and long-term planning for mining and energy; (ii) define a multilevel approach for environmental management that integrates strategic environmental planning, good engineering practices, and the country's public policy framework for the construction of sustainable infrastructure; (iii) strengthen environmental authorities and command and control tools to send clear signals to the market about environmental and social restrictions; (iv) strengthen the early alert mechanism; (v) implement a strategic environmental assessment to define expansion plans; (vi) include cumulative impact analysis; and (vii) conduct supervision and monitoring of projects. The issues presented in the strategic environmental and social assessment and the recommendations will be discussed and reviewed during the training activities. The objective is to find the best way to integrate them into the daily operations of the MME and establish a positive, fruitful path for the sustainable development of the sector.

C. Fiduciary risks

- 2.5 Colombia has a long track record in handling external loan resources, and no financial management risks are foreseen. The Ministry of Finance and Public Credit (MHCP) has broad experience in implementing reforms and will offer support to the sector authorities heading up the process that this PBP is supporting in the power sector. No procurement is anticipated under the program.

D. Sustainability

- 2.6 The sustainability of the reforms is based on three core tenets: (i) the commitment of the Government of Colombia to sector reform, reflected in the foundation of the 2018-2022 Development Plan; (ii) fulfillment of the commitments for the first operation in the programmatic series and design of this operation without significant changes with respect to the commitments agreed upon for the second operation that were identified during the first operation in the series; and (iii) the advanced level of fulfillment of the reforms proposed for this second operation. In addition, the government is still committed (see Policy Letter) to improving the country's competitiveness and environmental and social sustainability through policy reforms in the energy sector.

III. IMPLEMENTATION AND MANAGEMENT PLAN

A. Summary of implementation arrangements

- 3.1 **Borrower and executing agency.** The borrower is the Republic of Colombia, and the executing agency is the Ministry of Finance and Public Credit (MHCP). The MHCP will be responsible for: (i) advancing achievement of the policy objectives; (ii) providing evidence that the agreed policy conditions have been met; and (iii) compiling and providing information with which the government and the Bank can measure and evaluate program results. The MHCP will hold regular meetings

for analysis and monitoring and will also coordinate the consolidation of the sector reform, working with the National Planning Department, the Ministry of Mines and Energy, the Energy and Gas Regulatory Commission, and the Mining and Energy Planning Unit.

- 3.2 **Special contractual conditions precedent to the single loan disbursement: Fulfillment, to the Bank's satisfaction, of the policy conditions established in Annex II (Results Matrix)** and of the other conditions established in the loan contract.

B. Summary of arrangements for monitoring results

- 3.3 A detailed [Monitoring and Evaluation Plan](#) has been prepared. It includes indicators of medium- and long-term outcomes and impacts consistent with the policy-reform process agreed in the Policy Matrix (Annex II). These indicators are reflected in the Results Matrix. The Monitoring and Evaluation Plan calls for follow-up and coordination meetings among the government agencies involved in implementing the policy reforms, to determine the evolution and results of the reforms. The government and the Bank have agreed to hold regular meetings to monitor and evaluate the Results Matrix.
- 3.4 **Evaluation.** Once the second operation has been implemented, there will be an ex post evaluation of program results. The objective of the evaluation will be to verify the impact of the policy actions implemented by the government with support from the Bank. The project team will prepare a project completion report, following Bank guidelines (document OP-1242-5) and evaluating the impacts obtained.

IV. POLICY LETTER

- 4.1 The [Policy Letter](#) reiterates the government's commitment to the objectives and actions of the entire programmatic operation. The Bank and the Government of Colombia also agreed to a Policy Matrix describing the policy actions of this programmatic operation.

Development Effectiveness Matrix		
Summary		CO-L1237
I. Corporate and Country Priorities		
1. IDB Development Objectives	Yes	
Development Challenges & Cross-cutting Themes	-Social Inclusion and Equality -Productivity and Innovation -Economic Integration -Gender Equality and Diversity -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 (#)* -Households with new or improved access to electricity supply (#)*	
2. Country Development Objectives	Yes	
Country Strategy Results Matrix	GN-2832	Increase equitable access to quality basic services
Country Program Results Matrix	GN-2948	The intervention is included in the 2019 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	7.9	
5.1 Monitoring Mechanisms	2.5	
5.2 Evaluation Plan	5.4	
III. Risks & Mitigation Monitoring Matrix		
Overall risks rate = magnitude of risks*likelihood	Low	
Identified risks have been rated for magnitude and likelihood		
Mitigation measures have been identified for major risks		
Mitigation measures have indicators for tracking their implementation		
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.

This operation is the second in a series of two operations under the programmatic policy-based loan modality, whose objective is to contribute to the sustainability of the country's energy sector through a process of policy reforms that will ensure the efficient supply of electric power in the National Interconnected System and the Non-Interconnected Zones, in order to reduce the sector's vulnerability to the effects of Climate Change and increase electricity access.

The diagnosis of the electricity sector highlights with evidence the challenges associated with: (i) an energy matrix highly concentrated in hydro power; (ii) limited regional integration; (iii) restrictions in the natural gas market for generation; (iv) limited use of Efficient Energy Demand Management practices as an energy saving mechanism; and (v) rigidities in the operation of the MEM. The results matrix exhibits a clear vertical logic, with results linked to the specific objectives of the operation. The indicators at all levels are SMART and include baselines, and goals established in order to facilitate the evaluation of compliance when the loan disburses.

The monitoring plan is adequate and the proposed evaluation includes a before and after for the outcome indicators and an ex-post cost-benefit analysis.

POLICY MATRIX

Objective: The objective is to contribute to the sustainability of Colombia's energy sector through policy reforms that will ensure the efficient supply of electric power in the National Interconnected System (SIN) and the non-interconnected zones (ZNIs), to reduce the sector's vulnerability to the effects of climate change and increase access to electric power. The specific objectives are to: (i) ensure a macroeconomic setting consistent with the program's objectives; (ii) help guarantee energy supply from the national grid by diversifying the energy matrix with nonconventional renewable energy sources (NCRE) and increasing international trade in energy, while establishing measures to increase and guarantee the supply of natural gas for power generation, to manage energy demand, and to optimize the functioning of the wholesale energy market; and (iii) promote access to energy in the non-interconnected zones through the use of nonconventional renewable energy sources.

Objectives	Commitments, Programmatic loan I	Commitments, Programmatic loan II	Fulfillment status ¹
Component I. Macroeconomic stability			
Stability of the overall macroeconomic policy framework.	Stable macroeconomic framework conducive to achieving program objectives and the guidelines set forth in the policy letter for the sector.	Stable macroeconomic framework conducive to achieving program objectives and the guidelines set forth in the sector policy letter.	To be fulfilled (fourth quarter, 2019)
Component II. Support for the reliability of power supply from the national grid			
Subcomponent 2.1. Support for diversifying the energy matrix and for regional electric power integration			
Help guarantee the supply of energy by diversifying the energy matrix with nonconventional renewable energy sources (NCRE) and increasing national energy exchanges.	NCRE		
	Regulations to Law 1715 of 2014 (the purpose of which is to promote development and use of NCRE in the national energy system) for:	Additional regulations to Law 1715 of 2014 on NCRE for:	Fulfilled (first quarter, 2018)
	Setting guidelines for implementing "incentives to invest in NCRE projects" (Chapter III of Law 1715 of 2014)	<ul style="list-style-type: none"> Defining policy guidelines and mechanisms for long-term procurement of nonconventional energy renewable energy Issuing an invitation to bid for the first NCRE auction 	Fulfilled (third quarter, 2018)
		Regulations issued for the Nonconventional Energies and Energy Management Fund (FENOGE)	Fulfilled (third quarter, 2017)
	Regulation establishing procedures and requirements for backing projects and accessing incentives for investment in NCRE projects	The FENOGE is operational and has been earmarked financial resources.	Fulfilled (fourth quarter, 2018)
		Implementation of an information system that features the projects benefited by the tax incentive program for NCRE	Fulfilled (fourth quarter, 2018)

¹ This information is of an indicative nature as of the date this document was prepared. Pursuant to the provisions of document CS-3633-2 (Policy-Based Loans: Guidelines for Preparation and Implementation), the Bank will verify compliance with any specified tranche release conditions, including the maintenance of an appropriate macroeconomic policy framework, when the borrower submits the applicable disbursement request. This will be reflected in a timely manner in the disbursement eligibility memorandum.

Objectives	Commitments, Programmatic loan I	Commitments, Programmatic loan II	Fulfillment status ¹
	Regulation establishing conditions for the connection, metering, and delivery to the national grid of the surpluses of large-scale autogenerators	Publication of the necessary regulations to establish conditions for the connection of NCRE to the national grid and non-interconnected zones, including: <ul style="list-style-type: none">Establishment of technical requirements for facilities that use NCRE for power generation (solar, wind, geothermal) and procedures for the connection and operation of autogenerators.Establishment of procedures for marketing energy from small-scale autogenerators.	Fulfilled (second quarter, 2018)
			Fulfilled (first quarter, 2018)
	Regional energy integration		
	Design of the draft regulatory framework decision for subregional interconnection of power systems and community electricity exchanges	Progress in the implementation of actions from the SINEA road map by modifying regulations of short-term international electricity transactions	Fulfilled (second quarter, 2018)
		Inclusion in the Plan for Expansion of Power Generation and Transmission of an analysis of the Colombia-Ecuador interconnection to reliably and securely meet power demand in the medium and long terms	Fulfilled (third quarter, 2018)
		Review the compensation options for the Colombia-Panama interconnection, to recommend a mechanism that enables the project to be financially viable and economically efficient	Fulfilled (third quarter, 2018)
Subcomponent 2.2. Strengthening of the electricity market			
Strengthen the wholesale energy market with measures that can increase and guarantee the supply of natural gas for generation and manage energy demand.	Natural gas		
	Design of the execution criteria under which adjustments will be made to the wholesale marketing of natural gas	Submit for consultation the regulation incorporating adjustments to the natural gas marketing mechanisms	Fulfilled (second quarter, 2018)
	Adoption of the Interim Plan for Natural Gas Supply	Begin implementation of the Interim Plan for Natural Gas Supply adopted in 2017	Fulfilled (second quarter, 2018)
	The natural gas market manager is operational and is responsible for managing primary and secondary natural gas markets and for compiling, centralizing, and publishing transactional and operational information on the sector	The natural gas market manager has stabilized operations and is generating market indicators	Fulfilled (third quarter, 2018)
	Efficient electricity demand management		
	Development of technical, legal, economic and financial, planning, and information instruments for the Program for Rational and Efficient Energy Use (PROURE) for 2016-2021, which includes:	Update of the regulatory framework to provide access to tax incentives for energy efficiency projects	Fulfilled (third quarter, 2018)

Objectives	Commitments, Programmatic loan I	Commitments, Programmatic loan II	Fulfillment status ¹
	Adoption of an indicative action plan for development of the PROURE, with its associated funding		
	Preparation of the manual for formulating and implementing efficient energy demand management plans in public entities	Approval of a public policy to promote the inclusion of criteria for efficient energy use within the lifecycle of buildings	Fulfilled (second quarter, 2018)
	Adoption of the consumer labeling and information system on energy efficiency	Design of tools (dissemination, training) for an effective implementation of an energy-efficiency labeling mechanism for appliances	Fulfilled (fourth quarter, 2018)
		Preparation of studies to implement the second stage of the energy-efficiency labeling system for light vehicles and boilers. Issuance of regulation for the street lighting service, which establishes mandatory energy-efficiency improvements for service delivery	Fulfilled (fourth quarter, 2018)
	Publication of the road map for implementing smart grids that will produce energy savings	Issuance of regulation establishing mechanisms to implement advanced metering infrastructure for electricity	Fulfilled (first quarter, 2018)
	Adoption of provisions for implementing demand response mechanisms	Preparation of a study assessing the regulatory criteria for implementation of advance metering infrastructure to facilitate energy-efficiency mechanisms, demand-response mechanisms, and time-based pricing models	Fulfilled (third quarter, 2018)
	Design of mechanisms for voluntary disconnection as a way of making the SIN more reliable	Issuance of regulation establishing mechanisms for voluntary disconnection by major consumers as a way of making the SIN more reliable	Fulfilled (third quarter, 2018)
	Functioning of the wholesale energy market		
	Publication of diagnostic studies, analyses, and proposals for modifying the functioning of the Colombian wholesale energy market	Publication of the 2019 CREG Regulatory Agenda (which contains the regulatory projects of highest priority), including regulations for implementing the recommendations for reform of the wholesale energy market	Fulfilled (fourth quarter, 2018)
		Establishment of the conditions to increase the energy supply in the wholesale energy market, through: <ul style="list-style-type: none"> • Invitations to bid to assign energy obligations with the reliability charge. • Regulation establishing the requirements that marketers need to fulfill for their prices to be recognized in the electricity rate. 	Fulfilled (second quarter, 2018) Fulfilled (third quarter, 2018)
		Adoption of the 2017-2031 Generation and Transmission Expansion Plan	Fulfilled (third quarter, 2018)

Objectives	Commitments, Programmatic loan I	Commitments, Programmatic loan II	Fulfillment status ¹
	Gender and diversity		
		Approval of a sector public policy that includes a gender focus in the mining and energy sector	Fulfilled (third quarter, 2018)
Component III. Promoting access to energy in the ZNIs through NCRE			
Promote access to energy in the ZNIs through the use of NCRE.	Regulations to Law 1715 of 2014 on the use of NCRE in the ZNIs: Regulated registry of generation projects using NCRE connectable to the grid and in the ZNIs	Creation and implementation of registry of generation projects using NCRE connectable to the grid and in the ZNIs	Fulfilled (third quarter, 2018)
	Adoption of policy guidelines for expanding power service coverage in the SIN and in the ZNIs using NCRE	Development of mechanisms to expand electricity coverage to users that can be connected to the grid	Fulfilled (first quarter, 2018)
		Structure the first public-private partnership for the ZNIs	Fulfilled (fourth quarter, 2018)
		Adoption of the guidelines for the 2018-2031 National Rural Electrification Plan aimed at universal electricity service delivery nationwide by 2031, with a particular emphasis on stabilization areas	Fulfilled (third quarter, 2018)

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

PROPOSED RESOLUTION DE-___/19

Colombia. Loan ____/OC-CO to the Republic of Colombia
National Program to Ensure a Sustainable and
Efficient Energy Supply, Phase 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 Colombia, as borrower, for the purpose of granting it a financing to cooperate in the execution of the National Program to Ensure a Sustainable and Efficient Energy Supply, Phase II. Such financing will be for the amount of up to US\$600,000,000 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 ____ 2019)