

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

BOLIVIA

ELECTRICITY INFRASTRUCTURE EXPANSION PROGRAM

(BO-L1190)

LOAN PROPOSAL

This document was prepared by the project team consisting of: Sergio Ballón, Project Team Leader (ENE/CBO); Arturo Alarcón, Alternate Project Team Leader (ENE/CBR); Emilio Sawada (ENE/CUR); Virginia Snyder, Wilkferg Vanegas, Juan Cardenas, Stephanie Suber, Cecilia Seminario, and Raul Jimenez (INE/ENE); Veronica Tejerina (SCL/GDI); Claudio Alatorre (CSD/CCS); Shirley Foronda and Patricia Toriz (FMP/CBO); Javier Jimenez (LEG/SGO); Robert Langstroth (VPS/ESG); María Castro (VPS/ESG); and Adriana Inchauste (CAN/CBO).

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ABBREVIATIONS

| | |
|-----------------|---|
| AE | Autoridad de Fiscalización y Control Social de Electricidad [Authority for Oversight and Social Control of Electricity] |
| CO ₂ | Carbon dioxide |
| CRE | Rural Electrification Cooperative |
| CRF | Corporate Results Framework |
| ENDE | National Electricity Company |
| ESIS | Environmental and Social Impact Study |
| ESMP | Environmental and Social Management Plan |
| ESMR | Environmental and Social Management Report |
| GWh | Gigawatt hour |
| ICAS | Institutional Capacity Assessment System |
| INE | National Statistics Institute |
| kW | Kilowatts |
| LED | Light-emitting diode |
| MEN | Ministry of Energies |
| MW | Megawatt |
| NPSV | Net present social value |
| PDES | National Economic and Social Development Plan 2016-2020 |
| PEVD | Electricity Program for Living with Dignity |
| Programa P | Active Paternity Program |
| SA | Sistemas Aislados [Off-grid or “isolated” systems] |
| SIN | Sistema Interconectado Nacional [National power grid] |
| SIRR | Social internal rate of return |
| VMEEA | Office of the Deputy Minister for Electricity and Alternative Energy |

PROJECT SUMMARY

BOLIVIA

ELECTRICITY INFRASTRUCTURE EXPANSION PROGRAM

(BO-L1190)

| Financial Terms and Conditions | | | |
|--|--|--|-----------------------------|
| Borrower: | Source | Amount (US\$) | % |
| Plurinational State of Bolivia | IDB (Regular OC): | 66,300,000 | 85 |
| | IDB (Concessional OC): | 11,700,000 | 15 |
| Executing agencies: | Total: | 78,000,000 | 100 |
| Ministry of Energies (MEN), through the Electricity Program for Living with Dignity (PEVD) and the National Electricity Company (ENDE) | | | |
| | Regular OC (FFF) ^(a) | Concessional OC | |
| Amortization period: | 24 years | 40 years | |
| Disbursement period: | 5 years | | |
| Grace period: | 6.5 years | 40 years | |
| Interest rate: | LIBOR-based | 0.25% | |
| Weighted average life (WAL): | 15.25 years | N/A | |
| Currency of approval: | U.S. dollars | | |
| Project at a Glance | | | |
| Project objective/description: The general objective of this operation is to support the sustainability of Bolivia’s energy matrix for promoting the reduction of CO2 emissions through the development of electricity infrastructure that allows integration of the off-grid systems into the national grid, and the promotion of efficient electricity use. The specific objectives of the program are: (i) to reduce the consumption of diesel fuel in the off-grid system of San Ignacio de Velasco by connecting it to the national grid, and (ii) to reduce the consumption of electricity in the public lighting systems of the municipios of Oruro and Potosí through energy efficiency measures. | | | |
| Special contractual conditions precedent to the first loan disbursement for each component: (i) each executing agency has designated its respective coordinator for the execution of program activities in the component for which it is responsible (paragraph 3.4); and (ii) the respective program Operating Regulations have been approved by each executing agency and are in force (Component 1 Operating Regulations and Component 2 Operating Regulations), including the Environmental and Social Management Plans (ESMP) for each component, in terms previously agreed with the Bank (paragraph 3.9). | | | |
| Special contractual conditions for execution: (i) prior to the award of competitive bidding processes for goods and services to replace lighting fixtures in the beneficiary municipios, the PEVD will present evidence that an intergovernmental agreement has been signed and is in force between the MEN and the corresponding municipal governments, establishing the responsibilities of each party for program execution, including the maintenance of the works and equipment, as well as the procedures for final disposal of the waste (paragraph 3.5); and (ii) see other conditions in Annex B of the Environmental and Social Management Report (ESMR) . | | | |
| Exceptions to Bank policies: None. | | | |
| Strategic Alignment | | | |
| Challenges: ^(c) | SI <input checked="" type="checkbox"/> | PI <input checked="" type="checkbox"/> | EI <input type="checkbox"/> |
| Crosscutting themes: ^(d) | GD <input checked="" type="checkbox"/> | CC <input checked="" type="checkbox"/> | IC <input 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 and interest rate conversions. The Bank will take operational and risk management considerations, prevailing market conditions, and the loan's level of concessionality into account when reviewing such requests, in accordance with applicable Bank policies.

^(b) The credit fee and inspection and supervision fee will be established periodically by the Board of Executive Directors as part of its review of the Bank's lending charges, in accordance with applicable policies.

^(c) SI (Social Inclusion and Equality); PI (Productivity and Innovation); and EI (Economic Integration).

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

I. PROJECT DESCRIPTION AND RESULTS MONITORING

A. Background, problem addressed, and rationale

- 1.1 **The Bolivian power sector.** The electric power system consists of the National Interconnected System or national grid (SIN) and the off-grid or “isolated” systems. The SIN has in excess of 6,800 km of transmission lines that deliver service to more than 2.2 million customers. There are also 15 isolated systems that are not connected to the national grid, serving 151,000 customers. These off-grid systems are located in the departments of Santa Cruz, Beni, Pando, and Tarija. The largest ones are Bermejo, Cobija, Guayaramerín, Riberalta, San Matías, Concepción, Camiri, Roboré, San Ignacio de Velasco, and Asunción de Guarayos.
- 1.2 Electricity coverage nationwide, through the national grid and the isolated systems, is estimated at 91%, and 77% for the rural areas,¹ meaning that of the country’s 11.3 million inhabitants, nearly 1.2 million have no access to electricity. Since 2010, the Bank has been actively supporting rural electrification programs, through loan and grant operations (paragraph 1.27).
- 1.3 As of December 2016, the installed generating capacity of Bolivia was 2,162 MW (91.6% SIN and 9.4% off-grid) and power output was 9,403.3 GWh. Of this output, 20% was generated from renewable energy sources² and 80% from fossil fuels.³ Of the total thermal energy generated in the SIN, 97.7% was based on natural gas, 1.4% on diesel, and a 0.9% on biomass. In the off-grid systems, 80.59% was generated from diesel, 17% from biomass, 0.89% from photovoltaic devices, and 0.66% from hydropower. In the off-grid systems, diesel consumption amounted to 45 million liters, and natural gas consumption was 5.085 billion cubic feet. The diesel used for generation in the off-grid systems is imported, representing a cost to the country of more than US\$57 million.⁴
- 1.4 Between 2010 and 2016, electricity demand⁵ grew at an average rate of 6% a year in the SIN and the off-grid systems. By 2025, total energy demand in the country is forecast to reach 20,000 GWh.⁶ Projected growth in demand nationwide poses the need for measures to promote more efficient energy use, as well as the need to expand generating capacity. In the specific case of the off-grid systems, there is also a need to plan for the increase of generating capacity, and/or to analyze alternatives for their interconnection to the national grid, by expanding the transmission system.

¹ Source: Office of the Deputy Minister for Electricity and Alternative Energies (VMEEA).

² Statistics Yearbook (2016), Authority for Oversight Social Control of Electricity (AE).

³ Source: AE.

⁴ The diesel used for power generation in the off-grid systems is subsidized and delivered at a price of US\$0.15 per liter, while the cost of importing that fuel is about US\$1.27 per liter. In 2016, the value of diesel subsidies exceeded US\$50.1 million.

⁵ The residential sector accounted for the greatest power consumption (42%) in the SIN, followed by the industrial sector (25%), general use (21%), public lighting (6%), mining (4%), and other uses (2%).

⁶ The Energy Path of Latin America and the Caribbean (2018), IDB.

- 1.5 Bolivia's carbon dioxide (CO₂) emissions amounted to 22 million tons.⁷ The power sector accounted for 4.2 million tons⁸ (20%), of which 92% originated in the national grid and 8% in the off-grid systems.
- 1.6 **The Santa Ignacio de Velasco off-grid system.** This off-grid system is located in the Department of Santa Cruz. Its installed generating capacity is 8.2 MW (10.6% of total installed capacity of the off-grid systems), with annual generation of 23.4 GWh, and an annual average growth rate of 6.4%. The system serves 10,720 customers.⁹ Diesel consumption for power generation was 5.62 million liters¹⁰ and its CO₂ emissions amounted to 16,450 tons per year. The projected demand for this off-grid system shows that, if it is not connected to the national grid, its diesel consumption will double by 2021. The generation and distribution of electricity is the responsibility of the Rural Electrification Cooperative (CRE). The average rate charged for electricity is US\$0.0994/kWh.¹¹
- 1.7 **Energy efficiency.** In 2008, the National Energy Efficiency Program was created (Supreme Decree 29466). Its implementation was entrusted to the former Ministry of Hydrocarbons and Energy (now the Ministry of Energies (MEN)), which was to develop projects and activities for efficient energy use. In this context, energy efficiency programs were developed to replace of 9 million incandescent bulbs with compact fluorescent bulbs in 1.3 million households, thus reducing consumption by 200 GWh¹² and cutting peak demand by 100 MW between 2008 and 2011 in the residential sector.¹³ Nevertheless, these were one-time actions that were not repeated, due to the lack of a regulatory framework and incentives to foster their sustainability. At present, the Inter-American Development Bank is supporting the MEN in preparing an energy efficiency policy.¹⁴
- 1.8 Public lighting of avenues, streets, and parks represents 6% of total electricity demand. It constitutes a key aspect of citizen security, urban mobility, and thriving commerce in cities. Public lighting is operated and maintained by the autonomous municipal governments, using their own funds. The cost of energy consumed for public lighting is covered by a charge included in the electricity bill to customers.¹⁵ The current public lighting system uses antiquated light fixtures, primarily

⁷ Energy Statistics Yearbook (2017), Latin American Energy Organization.

⁸ Source for conversion of units: [U.S. Energy Information Administration](#).

⁹ CRE and AE.

¹⁰ The subsidized price of diesel for power generation in the off-grid systems is US\$1.13 per liter. For the San Ignacio de Velasco off-grid system the State spent US\$2.2 million in 2016. If the off-grid system is not connected to the national grid this value will double by 2021. See the [Economic evaluation of component 1](#).

¹¹ Statistical Yearbook 2016, AE.

¹² Represents approximately 80,000 tons of CO₂ emissions.

¹³ *Energy Efficiency in Latin America and the Caribbean: Situation and Outlook* (2009), ECLAC, OLADE and GTZ.

¹⁴ With nonreimbursable technical-cooperation funds (ATN/OC-16595-BO) to support preparation of the program to strengthen the electricity sector (BO-L1189). This operation considers the formulation of a national energy efficiency policy and a strategy for implementing it. Similarly, the Bolivian Institute for Standardization and Quality is currently developing standards for public lighting.

¹⁵ According to the regulations governing public power supply, the distribution utilities must include energy consumption rates for public lighting in their bills, separate from the total amount of electricity consumption. When the net balance between the cost of the service and the revenues collected is negative, the deficit will be covered by the municipal government.

high-pressure sodium vapor lamps. In comparison with more modern technologies such as light-emitting diodes (LED), these older lamps consume 50% more energy, their maintenance costs are up to 50% higher, and they have a shorter useful life. The introduction of energy efficiency measures in public lighting offers an opportunity to reduce the consumption of energy and the spending associated with it.

- 1.9 In 2017, the Office of the Deputy Minister for Electricity and Alternative Energy (VMEEA), with the support of the Ministry of Economy and Finance (MEF), performed an analysis to determine the potential of the country's municipios to take on debt to promote energy efficiency projects in the area of public lighting. As a result of that analysis, it was determined that the municipios of Oruro and Potosí have the capacity to finance energy efficiency projects.
- a. **Oruro** has a population of 264,943.¹⁶ Its power supply comes from the national grid. Municipal spending on electricity amounts to US\$4.8 million a year. Public lighting accounts for 85% of this amount, followed by water supply pumping systems (5%), educational institutions (3%), health centers (2%), and other infrastructure such as markets, traffic lights, and municipal offices (5%). Oruro has 30,839 public lighting fixtures, drawing 5,670 kW and consuming approximately 2,041 MWh/month. They operate on average for 12 hours a day. The existing fixtures are primarily high-pressure sodium vapor lamps. Energy consumption plus operating and maintenance costs of the public lighting system of Oruro were US\$4.1 million in 2016; revenues from public lighting charges were US\$1.7 million (41%), generating a deficit of US\$2.4 million.¹⁷
 - b. **Potosí** is the capital of the Department of Potosí and has a population of about 190,000.¹⁸ Its power supply comes from the national power grid. Municipal expenditure on electricity for public lighting amounts to US\$1.9 million a year. Potosí has 12,103 public lighting fixtures drawing 1,881 kW. Existing fixtures are primarily of the high-pressure sodium vapor type.
- 1.10 **Institutional framework of the power sector.** The most important actors in the sector are: (i) the Ministry of Energies (MEN),¹⁹ the body that sets policies for the sector; (ii) the Authority for Oversight and Social Control of Electricity (AE), the decentralized body that regulates the sector; (iii) the Office of the Deputy Minister for Electricity and Alternative Energy (VMEEA), the standard setting body that is responsible for establishing guidelines to increase the coverage of electricity service and promote energy efficiency programs through an operating branch known as the Electricity Program for Living with Dignity (PEVD);²⁰ the National Load Dispatch Committee (CNDC), responsible for planning and operation of the national grid, and

¹⁶ National Population and Housing Census, 2012.

¹⁷ Technical evaluation of Component 2 of the program.

¹⁸ National Population and Housing Census, 2012.

¹⁹ The MEN was created by Supreme Decree 3058 of 22 January 2017.

²⁰ Created on 9 July 2008 by Supreme Decree 29635.

(v) the National Electricity Company (ENDE),²¹ a public enterprise with its own equity and capital that has the authority to participate in the generation, transmission, and distribution segments and, through its 11 subsidiaries, in the off-grid systems.²² Private firms, cooperatives, and partly state-owned enterprises are also involved in generation and distribution.

- 1.11 With respect to the electricity sector's infrastructure, Law 1604 provides for the separation of generation, transmission, and distribution activities, for which private firms, partly state-owned enterprises, and ENDE are responsible. The CNDC handles the operational coordination of the national grid. The generators charge fees based on power, reserve, and energy. Sales of electricity can be arranged through contracts or via the spot market, where transactions are conducted on the basis of marginal costs which are defined every 15 minutes. The transmission and distribution sectors are structured as natural monopolies, regulated by the AE, with participation by public, private, and cooperative enterprises.
- 1.12 **Rates.** In the national grid, generators provide service competitively on the basis of marginal cost, and charge fees based on power, reserve, and energy. Transmission firms charge a toll which covers the costs of investment, operation, and maintenance, plus a regulated profit margin. Distribution rates for each concession area (urban and rural) are set by the AE every four years, in line with the Regulation of Prices and Rates (Supreme Decree 26094), and they cover the costs of investment, operation, and maintenance, with the right to earn a certain profit. In 2016, the average price nationwide was US\$0.0958/kWh. There is also the "Dignity Rate," which offers a 25% discount to low-consumption users (70 kWh), financed by cross-subsidies within the sector, with no requirement for external transfers.
- 1.13 Under existing rules governing the off-grid systems, utility firms and/or cooperatives may be vertically integrated and may perform the tasks of generation and distribution. In the case of the vertically integrated off-grid systems, the operator must be registered with the AE, and the rates are defined in a manner similar to that established for distribution firms (covering all costs of the off-grid system). In the off-grid systems, the main generating and distribution utilities are ENDE, through its Cobija subsidiary, the CRE which operates in the rural area of the Department of Santa Cruz, the Riberalta Electricity Cooperative which operates in Riberalta, and the Guayamerin Electric Services Cooperative in Guayamerin, the Electric Services Enterprise of Tarija, which operates in Bermejo and Entre Rios in the Department of Tarija, and ENDE Guaracachi S.A. which operates in San Matías in the Department of Santa Cruz. The off-grid systems have a subsidy for the diesel fuel used in

²¹ ENDE was a public enterprise from its founding in 1963 until the mid-1990s, when it was divided into three enterprises (generation, transmission, and distribution), and was capitalized by private firms. As of 2006, and as a result of the constitutional reform of 2009, the Government of Bolivia decided to reinforce the State's presence in the sector: in that year ENDE was declared a strategic public enterprise. Between 2009 and 2012, ENDE recovered ownership of the enterprises that had previously constituted ENDE and had been capitalized in the 1990s.

²² Generation: ENDE Andina, ENDE Corani, ENDE Valle Hermoso, ENDE Guaracachi, Rio Eléctrico. Transmission: ENDE Transmisión. Distribution: Delapaz, ELFEC, ENDE del Beni, ENDE de Oruro, ENDE Servicios y Construcciones.

generation, which is provided by the government at below-market price. The difference between the purchase price and the delivery price is covered by the State.

- 1.14 **Main challenges facing the power sector.** The main challenges are: (i) to ensure the universal, secure, reliable, and sustainable supply of electricity to meet the growing demand for electric energy; (ii) to interconnect the off-grid systems with the national grid in order to improve the reliability and sustainability of service and reduce fossil fuel dependency and CO₂ emissions in power generation; (iii) to diversify the electricity matrix in a sustainable manner; and (iv) to reduce consumption of electricity through the introduction of energy efficiency measures.
- 1.15 **Proposed intervention.** The Plurinational State of Bolivia has requested financing from the IDB for a program that includes: (i) interconnection of the San Ignacio de Velasco off-grid system with the national grid through a transmission line²³ to: (a) reduce diesel consumption and CO₂ emissions in power generation in that off-grid system, (b) facilitate future interconnection of the San Matías off-grid system with the SIN, via this line, and (c) allow for future expansion of coverage through extension of the distribution networks from this off-grid system; and (ii) implementation of energy efficiency measures in public lighting by replacing conventional fixtures with efficient LED-type lamps, especially in the municipios of Oruro and Potosí, as a way of reducing power consumption for public lighting.
- 1.16 In addition, investments in public lighting in Oruro and Potosí will be supplemented with an “Active Paternity Program” (*Programa P*), which will seek to reduce domestic violence against women and girls (paragraph 1.18).
- 1.17 **Effectiveness of the proposed intervention.** Investments in electricity systems can have a substantial positive impact on economic performance and on the population’s quality of life: (i) the interconnection of isolated systems is cost-effective in comparison to the costs of installing new generating stations in remote areas, as they yield benefits by reducing the need for new generating capacity, which in many cases will entail using fossil fuels with their attendant CO₂ emissions.^{24,25} The interconnection of power systems also yields benefits by reducing operating and fuel costs for power generation, as well as the costs of upgrading the transmission systems;²⁶ (ii) projects for improving energy efficiency in public lighting through the switch to more efficient fixtures generate a financial return, as their costs can be recouped in three to seven years from the savings on electricity expenses.²⁷

²³ This off-grid system was selected due to its size and proximity to the SIN, making its interconnection viable.

²⁴ Economic Evaluation of Transmission Interconnection in a Restructured Market (2004). California Energy Commission.

²⁵ Interconnecting off-grid systems to the national grid has succeeded in reducing thermoelectric generation in the off-grid systems, which is based primarily on diesel (emissions factor: 953 g CO₂/kWh), replacing it with generation in the SIN, based on natural gas and renewable energy, with a lower emissions factor (414 g CO₂/kWh). Generation in the off-grid systems was cut from a peak of 850 GWh/year in 2009 to 650 GWh/year in 2016. As an example, the interconnection of the Trinidad-Moxos off-grid system in 2010 reduced diesel-based thermal generation by 50 GWh/year, lowering annual CO₂ emissions by an estimated 30,000 tons. Similarly, the interconnection of the La Tablada, Yacuiba, and Villamontes off-grid system (Department of Tarija) in 2014 eliminated 35 GWh/year of thermal generation, cutting CO₂ emissions by 19,000 tons per year.

²⁶ Multi-dimensional Issues in International Electric Power Grid Interconnections (2005). United Nations.

²⁷ Energy Efficiency in Public Lighting, Technical Note (2017), IDB.

- 1.18 **Gender.** A program for upgrading public lighting produces great benefits for the community, and especially for women and children, by offering safer spaces to escape the sexual or physical violence to which they may be subject.²⁸ Bolivia has a very high incidence of physical or sexual violence against women, with 50.3% of women 15 years and older having suffered physical violence and 34% sexual violence at the hands of their partners.²⁹ In Potosí, 57.8% of women have experienced sexual violence and 77.6% physical violence at the hands of their partners at some point in their lives, and in Oruro the figures are 29.7% and 54.5%, respectively. In the public sphere, 22.9% of women have suffered physical violence and 32.1% sexual violence. Violence and the fear of violence reduce women's freedom of movement and hence their access to education, work, recreation, and essential services.³⁰ The gender-targeted measures proposed for the project take into account both public and private spaces for addressing the issues of security and violence. In public spaces the project will help to reduce risk factors for violence through public lighting, and in private spaces it will promote equitable relationships in the home and help prevent violence against women and children. This activity will be conducted through the "*Programa P*" with the families of workers who will be employed for component 2 of this program. *Programa P*³¹ is a socioeducational program targeting parents aiming to strengthen their competencies in child rearing and thus build positive, close relationships between them and their children. It promotes active participation by men in the care of their children and in domestic chores, as well as equitable relations in the household and the prevention of violence against women and children. *Programa P* considers fathers as allies or potential allies in gender equity. Awareness-raising activities will target fathers and mothers to improve the treatment and care of their children and to ensure the equitable sharing of household chores, as well as encouraging equitable relationships in the home, and preventing violence against women and children. In 2016, this program was implemented in the city of El Alto, as a pilot project sponsored by the IDB Department of Gender and Diversity and, with the agreement of the municipios of

²⁸ Public lighting enhances the sense of community and personal safety in public spaces, especially for women. Atkins, Stephen; Husain, Sohail; and Storey, Angele: *The Influence of Street Lighting on Crime and Fear of Crime*.

²⁹ Encuesta Violencia Contra Las Mujeres [Survey on Violence against Women] (2016). National Statistics Institute (INE) of Bolivia. *Violence Against Women in Latin America and the Caribbean: A Comparative Analysis of Population-based Data from 12 Countries* (2012). Pan-American Health Organization.

³⁰ Participation in physical activities can help build life skills, confidence, and body awareness, and can create social networks with a positive impact on girls' lives. Sports participation by girls and women can result in positive changes in gender norms and help them move into public spaces. *Empowering Girls and Women through Sport and Physical Activity: Women Win*.

³¹ For the *Programa P* implemented in El Alto, the evaluation is being prepared and outcomes are expected to include a reduction in the rates of violence against children, by both men and women and greater participation by women in household decision-making.

Potosí and Oruro, it has been decided to conduct this training with 500 families of workers.³²

- 1.19 **Beneficiaries.** The Los Troncos-San Ignacio transmission line will benefit approximately 80,000³³ residents in the area of influence of the San Ignacio de Velasco off-grid system, by providing them with an electricity service that is more environmentally sustainable and produces lower CO₂ emissions at the local level.
- 1.20 The investments in public lighting will benefit the 264,943 inhabitants of Oruro and the 190,000 people of Potosí by offering them better-quality lighting in public spaces and lower CO₂ emissions due to the lower electricity consumption in public lighting. The investments in new, more efficient lighting fixtures will also benefit the municipal governments by cutting maintenance and operating costs (paragraph 1.9).
- 1.21 The Los Troncos-San Ignacio transmission line will also benefit the country as a whole, by reducing the subsidy for generating power from diesel fuel in the off-grid systems.
- 1.22 **Country strategy in the sector.** The principles and guidelines for the country's long-term economic and social development are set forth in the "Patriotic Agenda 2025" and its 13 pillars, which gave rise to the 2016-2020 National Economic and Social Development Plan (PDES) approved in 2016.
- 1.23 The 2016-2020 PDES adopts the following lines of action for the electricity sector: (i) energy sovereignty, through the secure, continuous, and reliable supply of electricity; (ii) universal energy access, through the sustainable increase in the coverage of basic electricity service for the population; (iii) energy efficiency and increased shares of renewable energy and nonconventional renewable energy; and (iv) energy integration through the export of surplus electricity. It also promotes the strengthening of institutions and enterprises in the sector.
- 1.24 The Government of Bolivia has proposed the following targets for meeting increased demand, reducing CO₂ emissions, and achieving universal access to electricity: (i) by 2025, achieve full universal coverage: reaching this target will require the development of an electrification plan and investments amounting to some US\$2 billion; and (ii) change the energy matrix to 2020, by adding 1,858 MW³⁴ of renewable and nonconventional renewable energy to the country's generating base (over 1,000 MW is currently under construction). In addition a national energy efficiency policy and strategy will be developed to reduce energy consumption and CO₂ emissions.
- 1.25 In line with the aforementioned approach and with a view to enhancing electricity service and reducing diesel consumption, the Government of Bolivia, through the 2025 Electricity Plan of the Plurinational State of Bolivia, intends to connect the

³² To strengthen gender activities, a plan will be implemented in 2018, with funding from technical cooperation operation RG-T2972, to promote productive activities addressing gender issues in San Ignacio de Velasco. The plan will start with a diagnostic assessment of the potential productive uses of electricity. Subsequently, from among the productive activities identified, those that have the potential to integrate a gender component will be analyzed, and specific actions will be designed for these activities. This action is aligned with the activities to be pursued under loan 3725/BL-BO, which includes a plan to promote productive activities.

³³ INE.

³⁴ PDES.

following off-grid systems to the national grid: Norte Amazónico, Ituba, Yacuma, and Itenez (to the northern area); San Ignacio de Velasco, Misiones, San Matías, Germán Busch, Chiquitos, Charagua, Valles Cruceños, and Cordillera (to the eastern area); Monteagudo, Chaco, Entre Ríos, Tarija, and Bermejo (to the southern area). In the off-grid systems that cannot be connected to the national grid, the plan is to make greater use of renewable energy, an effort that the Bank has been supporting through the Program for Rural Electrification with Renewable Energy (GRT/NV-14258-BO).

- 1.26 Through the Intended Nationally Determined Contribution by the Plurinational State of Bolivia under the 2015 Paris Climate Accord, the country's commitments also include: (i) increasing the share of renewable energy to 79% by 2030, compared to 39% in 2010; (ii) increasing the share of alternative energy and other energies (steam and gas combined cycle) from 2% in 2010 to 9% in 2030 in the electrical system as a whole, which will entail an increase of 1,228 MW by 2030 compared to the 31 MW in 2010, and (iii) reducing unmet basic needs for electricity coverage from 14.6% in 2010 to 3% by 2025.³⁵
- 1.27 **Knowledge of the sector.** The IDB has broad knowledge of the electricity sector and is a strategic partner for Bolivia. In recent years, it has financed more than US\$374 million in investments, including in hydroelectric generation, solar photovoltaic installations, transmission lines and distribution, rural electrification, and preinvestment studies, as described below.

Energy Operations Financed by the IDB in Bolivia

| Project and year of approval | Amounts in US\$ millions | Execution status | Executing agency |
|--|-------------------------------------|----------------------------|------------------|
| Misicuni Renewable Energy Hydroelectric Project (2238/BL-BO) – 2009 | 101 (IDB) and 13.1 (counterpart) | Executed 100% disbursed | ENDE |
| Rural Electrification Program (2460/BL-BO) – 2010 | 60 (IDB) and 200,000 (counterpart) | Executed 100% disbursed | VMEEA and ENDE |
| Cochabamba – La Paz Electric Power Transmission Line (2654/BL-BO) – 2011 | 78 (IDB) and 4.76 (counterpart) | Executed 100% disbursed | ENDE |
| Program for Rural Electrification with Renewable Energy (GRT/NV-14258-BO) – 2013 | 5.5 (Nordic Development Fund grant) | 63.8% | VMEEA |
| Program to Support Preinvestment for Development (3534/BL-BO) – 2015 | 30 (IDB) | 5% | VIPFE |
| Rural Electrification Program II (3725/BL-BO) – 2016 | 100 (IDB) | In start-up phase | VMEEA and ENDE |

- 1.28 **Lessons learned for the design of this operation.** The design of this operation took into account lessons learned from other IDB-financed programs in the country and the region. In particular, aspects relating to the execution and coordination mechanisms were analyzed in accordance with the prevailing legal framework, highlighting the following: (i) experience with the procurement modalities used for

³⁵ [Intended Nationally Determined Contribution by the Plurinational State of Bolivia.](#)

executing projects 2654/BL-BO,³⁶ 2238/BL-BO, and 2460/BL-BO (Component II), which showed that procurement of materials by the executing agency and international competitive bidding by segments for the construction works led to a more cost-effective outcome; (ii) for projects to enhance energy efficiency by replacing lighting fixtures, international experience suggests that it is important to make the supplier of the fixtures responsible for their installation and final disposal, in accordance with IDB environmental requirements, and to provide a minimum guarantee of five years;³⁷ (iii) the responsibilities of the municipal governments and the execution unit should include coordinated on-the-ground verification of progress in the execution of activities, in order to guarantee proper quantification of outcome targets; (iv) financing should be arranged in close collaboration with the executing agencies; (v) bidding documents should be prepared in advance; (vi) executing agencies should be trained in the Bank's procurement and monitoring procedures; (vii) the technical specifications should be clear and include the concept of resilient infrastructure; and (viii) there should be ongoing monitoring of environmental and social management.

- 1.29 **Strategic alignment.** The program is aligned with the IDB Country Strategy with Bolivia (2016-2020) (document GN-2843) with respect to the strategic objective of improving the delivery of quality public goods and services, and in particular through instruments to support planning and operation. The program is included in the update of Annex III of the 2018 Operational Program Report (document GN-2915-2). The program is consistent with the Update to the Institutional Strategy 2010-2020 (document AB-3008) and is aligned with the development challenges of (i) productivity and innovation in implementing modern and more efficient technologies for public lighting in the municipios of Potosí and Oruro, and (ii) social inclusion and equality, by providing residents of San Ignacio de Velasco with reliable energy supply that will allow for future expansion of electricity coverage through the extension of networks. The program is aligned with the crosscutting areas of (i) gender equality and diversity, by helping to reduce the risk factors for insecurity caused by violence in public spaces by means of public lighting, and promoting training geared to preventing gender-based violence and fostering equitable family relationships; and (ii) climate change and environmental sustainability, by reducing CO₂ emissions from diesel consumption in power generation for the off-grid systems, and lowering energy consumption in public lighting systems. In addition, the program is aligned with the Corporate Results Framework (CRF) 2016-2019 (document GN-2727-6) through indicators for reduction of emissions and power generation from renewable energy sources. The program is consistent with the Energy Sector Framework Document (document GN-2830-3) in the thematic areas of sustainability and energy security, by (i) reducing dependence on fossil fuels in the off-grid systems, (ii) cutting energy consumption through energy efficiency measures, and (iii) reinforcing the infrastructure of the national electricity system. The program is consistent with the Climate Change Sector Framework (document GN-2835-3), as the planned investments will lead to a reduction in greenhouse gas emissions. It is estimated that 21.29% of the operation's resources will be invested in climate change mitigation activities, according to the

³⁶ [Project Completion Report.](#)

³⁷ [Guía de Arreglos Institucionales para Programas de Eficiencia Energética \(2016\).](#) IDB.

[joint multilateral development bank methodology for tracking climate finance](#). These resources will contribute to the IDB Group's target of boosting financing for climate change-related projects to 30% of all operation approvals by the end of 2020.

- 1.30 The program is aligned with the priority areas of the IDB Infrastructure Strategy: Sustainable Infrastructure for Competitiveness and Inclusive Growth (document GN-2710-5), through actions that promote a more rational use of energy infrastructure through energy efficiency, and the interconnection of infrastructure to more reliable and efficient systems.
- 1.31 The program is consistent with the objectives of the Public Utilities Policy (document GN-2716-6). According to the [analysis of compliance](#) with document GN-2716-6, the program fulfills the conditions of financial sustainability and economic evaluation. The works covered by this operation will contribute to the sustainability of electricity systems in the municipio of San Ignacio de Velasco by reducing spending on diesel for power generation, and spending on public lighting in the municipios of Oruro and Potosí, through the implementation of energy efficiency measures (paragraph 2.2).

B. Objectives, components, and cost

- 1.32 **Objective.** The general objective of this operation is to support the sustainability of Bolivia's energy matrix for promoting the reduction of CO₂ emissions through the development of electricity infrastructure that allows integration of the off-grid systems into the national grid, and the promotion of efficient electricity use. The specific objectives of the program are: (i) to reduce the consumption of diesel fuel in the off-grid system of San Ignacio de Velasco by connecting it to the national grid, and (ii) to reduce the consumption of electricity in the public lighting systems of the municipios of Oruro and Potosí through energy efficiency measures. To achieve these objectives, the program includes the following components.
- 1.33 **Component 1. Los Troncos-San Ignacio transmission line (US\$53.3 million).** This component is intended to integrate the off-grid system of San Ignacio de Velasco into the national grid so as to: (i) eliminate the use of diesel for power generation in that off-grid system; (ii) optimize operation of the electricity system of San Ignacio de Velasco and improve the quality of service in the area; (iii) extend the transmission network in the future to connect the off-grid system of San Matías, located 300 km from San Ignacio de Velasco. This component will provide financing for: (i) construction of the 230 kV transmission line from San Ignacio de Velasco to Los Troncos, with a length of 238 km; (ii) works and equipment for the San Ignacio power substation; and (iii) works and equipment for construction of the outlet bay for the Los Troncos power substation (see [Technical analysis of component 1](#)).
- 1.34 **Component 2. Energy efficiency in public lighting (US\$16.5 million).** This component will finance the replacement of more than 35,000 conventional light fixtures with energy efficient lamps in the public lighting systems for avenues, streets, and parks of the cities of Oruro and Potosí. This replacement will produce: (i) energy and economic savings, contributing thereby to reduced CO₂ emissions as well as demonstrating its viability for extension to other municipios; (ii) improved visibility, safety, and environmental conditions in urban settings in comparison with other technologies, and (iii) strengthened institutional capacities for energy efficiency on the part of municipal governments and the institutions receiving

investments under the program (see [Technical analysis of component 2](#)). This component will finance the purchase and installation of new LED lamps, the correction of lampposts and extension arms, the implementation of a plan for final disposal of the replaced lamps, and training for the families of 500 workers in preventing violence and promoting equitable gender relations through “Programa P.”

- 1.35 **Project management and administration (US\$8.2 million).** This heading covers financing for (i) administrative costs, (ii) supervision and contingencies, and (iii) evaluation, monitoring, and auditing, for each component as appropriate.
- 1.36 The costs associated with program activities are shown in Table 1 below and are detailed in the [Multiyear Execution Plan](#).

Table 1. Total Program Cost (in US\$)

| Components | Total |
|---|-------------------|
| Component 1. Los Troncos-San Ignacio transmission line | 53,280,000 |
| Los Troncos-San Ignacio transmission line ³⁸ | 38,080,000 |
| Outlet bay for Los Troncos substation | 4,200,000 |
| San Ignacio de Velasco substation | 8,200,000 |
| Social management (compensation) | 2,800,000 |
| Component 2. Energy efficiency in public lighting | 16,480,000 |
| LED lamps installed in Oruro | 13,800,000 |
| LED lamps installed in Potosí | 2,480,000 |
| Training for 500 workers' families ³⁹ | 200,000 |
| Social management and administration (Component 1) | 5,940,000 |
| Execution unit | 660,000 |
| Supervision and contingencies | 5,000,000 |
| Audit and evaluation | 280,000 |
| Administration (Component 2) | 2,300,000 |
| Execution unit | 480,000 |
| Supervision and contingencies | 1,620,000 |
| Audit and evaluation | 200,000 |
| Total | 78,000,000 |

C. Key results indicators

- 1.37 In terms of impact, the program is expected to reduce CO₂ emissions in power generation by a cumulative total of approximately 146,000 tons by 2024. The outcomes are presented in the following table.

³⁸ Includes design costs.

³⁹ The design of *Programa P* will be financed with cooperation funds from the Government of Sweden.

Table 2. Expected Outcomes and Indicators

| Impact | Indicators |
|---|---|
| Reduced CO ₂ emissions in power generation. | CO ₂ emissions (tons) in San Ignacio. |
| | CO ₂ emissions (tons) in Potosí. |
| | CO ₂ emissions (tons) in Oruro. |
| Outcomes | Indicators |
| Increased power transmission capacity in the zone served by the Los Troncos-San Ignacio line. | Los Troncos-San Ignacio transmission line capacity. |
| Savings in diesel subsidies for power generation. | Annual diesel subsidies in San Ignacio de Velasco. |
| Reduced consumption of diesel. | Annual diesel consumption in the municipio of San Ignacio de Velasco. |
| Reduced total electricity consumption in public lighting. | Total annual electricity consumption for public lighting in Oruro. |
| | Total annual electricity consumption for public lighting in Potosí. |
| Stronger municipal capacities for implementing energy efficiency measures. | Municipios strengthened in the operation and management of LED lamps for public lighting. |
| Increased perception of safety in public spaces due to public lighting, and in private spaces of workers' families. | Beneficiaries of the program who use public spaces. |
| | Women and girl beneficiaries of the program who make regular use of public spaces. |
| | Beneficiaries of the program adopting practices to reduce domestic violence. |
| | Women and girl beneficiaries of the program adopting practices to reduce domestic violence. |

II. FINANCING STRUCTURE AND MAIN RISKS

A. Financing instruments

- 2.1 **Financing structure.** The program is structured as a specific investment loan. It will be financed from the Bank's Regular Ordinary Capital and Concessional Ordinary Capital. The funds will be disbursed over five years, in accordance with the disbursement schedule in Table 3, and as detailed in the [Multiyear Execution Plan](#).

Table 3. Disbursement Schedule (US\$ thousands)

| Source | Amount (US\$ thousands) | 2019 | 2020 | 2021 | 2022 | 2023 |
|--------------|-------------------------|--------------|---------------|---------------|---------------|------------|
| IDB | 78,000 | 9,152 | 33,968 | 24,005 | 10,715 | 160 |
| % | 100 | 12 | 44 | 31 | 14 | 0.2 |
| Total | 78,000 | 9,152 | 33,968 | 24,005 | 10,715 | 160 |

B. Viability and sustainability

2.2 To determine the program's viability and sustainability, each component was subjected to technical and economic evaluations for the investments considered. The main outcomes of the analysis of the sample are as follows:

2.3 **Economic evaluation.** An ex ante cost-benefit economic evaluation was performed for each of the components. In the [Economic evaluation of component 1](#) the following benefits were considered: (i) reduced diesel consumption, as the San Ignacio de Velasco off-grid system will now draw power from the national grid. It is estimated that over the first 10 years of project implementation total diesel consumption will be reduced by 144.6 million liters; (ii) energy not supplied, with cumulative benefits for the first 10 years amounting to US\$1.4 million; and (iii) annual reductions of 16,450 tons of CO₂ emissions by avoiding diesel consumption in power generation. The outcomes show that the investments will earn a high return.

Table 4. Summary of Outcomes of the Economic Evaluation

| Indicator | Value |
|---|------------|
| Net Present Social Value (NPSV) (US\$) | 45,808,614 |
| Social Internal Rate of Return (SIRR) (%) | 21.60 |

2.4 The [Economic evaluation of component 2](#) analyzed the benefits for the municipal governments benefiting from the program. For Potosí, the benefits considered were: (i) an annual reduction of 1,069 tons of CO₂, and (ii) a deferred investment benefit due to the replacement of lamp fixtures, which will allow the necessary installed capacity to be reduced from 1,889 kW to 1,300.7 kW. For the municipio of Oruro, the analysis considered (i) the savings produced by replacing lamp fixtures, thereby reducing directly the subsidy that the municipal government of Oruro pays for covering the deficit, (ii) an annual reduction of 4,805 tons of CO₂, and (iii) a deferred investment benefit due to the replacement of lamp fixtures, which will allow the installed capacity needed to be reduced from 5,670 kW to 3,013 kW. The results show that the investments will yield high returns.

Table 5. Summary of Outcomes of the Economic Evaluation

| City/Indicator | Oruro | Potosí |
|----------------|-----------|-----------|
| NPSV (US\$) | 5,531,655 | 1,333,232 |
| SIRR (%) | 23.43 | 27.92 |

2.5 **Technical viability.** To define the routing of the Los Troncos-San Ignacio transmission line, an [analysis of alternatives](#) was performed, with a view to (i) reducing the number of properties or communities affected; (ii) reducing environmental impacts, and (iii) identifying technical aspects and costs related to project implementation. Once the alternative was selected, [basic engineering technical studies](#) were conducted to determine the technical characteristics of the line, and to confirm that the routing selected was viable from the technical and socioenvironmental viewpoints.

- 2.6 For Component 2, a [technical analysis](#) was conducted for the public lighting systems of Oruro and Potosí with simulations using DIALux software, with different types of lamps and technologies, such as high-pressure sodium vapor, metal halide, and LED lamps. In total, 11 different cases were modeled, seven for Oruro and four for Potosí. As a result, it was determined that LED⁴⁰ lamps were the most energy-efficient technology, as they require less installed capacity per unit of area, and they consume less energy, on average, per unit of illuminance delivered.
- 2.7 **Institutional viability for project execution.** An institutional capacity analysis was performed to assess ENDE and the MEN through the PEVD, as the execution units for components 1 and 2, respectively. The outcomes obtained in the results and risks matrix of the analysis show that ENDE and PEVD have achieved a satisfactory level of development in terms of their technical and professional institutional capacity to organize, execute, and control with a low level of risk, suggesting that the entities will need to adopt only minimal measures to strengthen their systems for administration of goods and services and financial administration.
- 2.8 The municipios of Oruro and Potosí will be supervising the replacement of lighting fixtures, and they have the technical and financial capacity to perform this function.

C. Environmental and social risks

- 2.9 With respect to the transmission line and substation component: two alternative routes for the line were analyzed to reduce impacts (see the [Environmental and Social Management Report \(ESMR\)](#)). The design selected by ENDE avoids: (i) physical resettlements; and (ii) crossing indigenous lands. In addition, towers with a useful height of 42 to 47 m will be deployed to allow the transmission line to pass above the canopy of the Chiquitano forest, thus avoiding the need to clear a right-of-way that would divide the forest. However, the transmission line will pass through communal lands of communities of indigenous descent that have retained their traditional forms of organization. For this reason, the principles of the Indigenous Peoples Policy (Operational Policy OP-765) have been applied to minimize adverse impacts and a prior informed consultation was carried out. The impacts are limited since: (i) the ownership rights of these lands remain under the existing communal structure; (ii) the use of the land is limited (on average 100 m² per tower and 2.5 towers per linear kilometer); (iii) compensation is paid for the land occupied by the base of the towers, for any improvements required, and for the right-of-way; (iv) payment is made for impact to production during construction; (v) after construction, they may continue with livestock and agricultural activities subject to certain security restrictions on the right-of-way (deep excavations, use of explosives, and building are prohibited); and (vi) a community relations plan is established to keep the community informed during the construction process and mechanisms are in place for managing and resolving complaints.
- 2.10 The benefits and impacts of the project and the proposed mitigation and compensation measures were provided for consideration by the communities during the two consultation processes, using a protocol previously agreed to by them, based on good faith consultations and previous informed decisions. In this regard

⁴⁰ During preparation of the technical analysis, it was confirmed that there are LED lamp suppliers in the country, which will facilitate the replacement of the fixtures upon completion of their useful life and warranty period.

there is a record of the results of the consultation, the main concerns and responses, and the agreements signed with the communities. The consultation process will be updated prior to the bidding process for the works in order to corroborate/adjust agreements, following the agreed upon protocol (See the [ESMR](#))

- 2.11 With respect to the component for energy efficiency in public lighting, there will be no direct impact on the environment or on beneficiary communities beyond the short-lived activities associated with replacing the old lamp fixtures. The process includes plans for solid waste of hazardous materials disposal.
- 2.12 The operation has no significant potential to exacerbate the risk of natural disasters. Good construction and design practices will be applied: for example, the towers will be placed well away from river floodplains, and there will be fire protection during construction and maintenance in the dry season.

D. Fiduciary risks

- 2.13 The MEN and ENDE have experience in managing IDB-financed projects. The performance of both institutions in the fiduciary and financial management of projects has been generally satisfactory. However, recognizing that both executing agencies have a large number of projects in their respective portfolios, and considering the limited availability of fiduciary and financial specialists who have experience with multilateral financial organizations, there is a risk, rated medium, of possible delays in procurement and financial management processes due to the additional workload that this new program will entail. Planned mitigation measures include: (i) the hiring of financial management and procurement personnel in the MEN and ENDE execution units, and (ii) training for personnel of both executing agencies in procurement and financial management according to IDB standards.

E. Other project risks

- 2.14 The program risk analysis identified, as a medium development risk, the challenge of achieving the target for the number of families trained under Component 2's *Programa P*. As a mitigating measure, invitations will be extended to a greater number of families than that established as a target in the program's Results Matrix.

III. IMPLEMENTATION AND MANAGEMENT PLAN

A. Summary of implementation arrangements

- 3.1 The program will have two executing agencies. Component 1 will be executed by ENDE, and Component 2 by the MEN, through the PEVD. Both have broad knowledge and experience in executing projects financed by the IDB and other multilateral agencies. ENDE and PEVD will establish the respective execution units, as detailed below.
- 3.2 **Component 1 (ENDE).** The proposed team will be the same team formed for component 2 of the Rural Electrification Program II (loan 3725/BL-BO), comprising a project coordinator, three technicians, a procurement specialist, a procurement support officer, a financial specialist, an attorney, an environmental and social specialist, a monitoring and control specialist, and an administrative specialist.

- 3.3 **Component 2 (PEVD).** It is proposed that the execution unit for Component 2 of this program may include staff from the Program for Rural Electrification with Renewable Energy (GRT/NV-14258-BO), as follows: a program coordinator, two technicians, a procurement specialist, a financial specialist, an accountant, an attorney, an environmental and social specialist, and a planning, monitoring, and control specialist. In addition, the municipal governments will appoint a technical public lighting professional for supervision. Through the VMEEA, the MEN will appoint an energy efficiency specialist for coordination and monitoring of activities performed by the PEVD under this component.
- 3.4 **As a special contractual condition precedent to the first loan disbursement for each component, each executing agency will have designated its respective coordinator for the execution of the program activities in the component for which it is responsible.** This condition is essential to ensure that the borrower will be prepared to initiate program execution under the terms agreed with the IDB.
- 3.5 As a special contractual condition for execution, prior to the award of competitive bidding processes for goods and services to replace lighting fixtures in the beneficiary municipios, the PEVD will present evidence that an intergovernmental agreement has been signed and is in force between the MEN and the corresponding municipal government, establishing the responsibilities of each party for program execution, including the maintenance of the works and equipment as well as the procedures for the final disposal of the waste. This condition is essential for the effective execution of the program. In addition to defining the responsibilities of the parties, these agreements will include considerations for the inspection and final delivery of the lighting fixtures, as well as the mechanisms for coordination between the municipal governments and the PEVD.
- 3.6 The execution units will be responsible for implementing and supervising their respective components of the program, defining and improving the [annual work plans \(AWP\)](#), and for providing the Bank with the information needed for monitoring and evaluation of program outcomes.
- 3.7 **Procurement management.** For the contracting of works and the procurement of goods and consulting services financed by the Bank, the Policies for the Procurement of Works and Goods Financed by the IDB (document GN-2349-9) and the Policies for the Selection and Contracting of Consultants Financed by the IDB (document GN-2350-9) will apply. The supervision method will be a combination of ex post and ex ante, as established in the [Procurement Plan](#). The procurement items will be included in the procurement plans approved by the Bank for each component, and respect the methods and thresholds established therein. A procurement plan will be agreed for the first 24 months of execution, and it will be monitored, executed, and updated using tools agreed with the Bank. Execution unit staff may be contracted directly, in continuation of the services provided in operations previously financed by the Bank and executed by ENDE and the VMEEA, following a positive assessment of their performance in accordance with document GN-2350-9.
- 3.8 **Financial management.** ENDE and PEVD, through their respective execution units, will be responsible for financial management and will submit audited financial statements for the IDB loan within 120 days after the close of each fiscal year. The last such report will be submitted within 120 days following the date of the last disbursement. The execution units will contract external audit services on the basis

of terms of reference previously approved by the Bank. Disbursements will be made according to the financial plan, and in line with the provisions of the Financial Management Guidelines for IDB-financed Projects (document OP-273-6) and its updates.

- 3.9 **Program Operating Regulations.** Program execution will be governed by the provisions contained in the program [Operating Regulations](#) for Component 1 and the [Operating Regulations](#) for Component 2, previously agreed with the Bank. The Operating Regulations will incorporate the procedures for execution of each and may be amended with the Bank's written no objection. The Operating Regulations will include: (i) the detailed execution mechanisms and the institutional and operational roles and responsibilities; (ii) technical and socioeconomic criteria for the works to be financed; (iii) rules and procedures for the selection and contracting of works, goods, and services; (iv) a strategy for the sustainability of the investments, payment mechanisms for electricity service, maintenance responsibilities, and selection criteria for facilities managers; (v) standards and procedures for administrative and financial management; (vi) procedures for follow-up and monitoring, and (vii) environmental guidelines and ESMPs for each component, which will form an annex to the Operating Regulations. **As a special contractual condition precedent to the first loan disbursement, each executing agency will have approved and placed in effect the respective Operating Regulations ([Operating Regulations for Component 1](#) and [Operating Regulations for Component 2](#)), including the ESMPs for each component, in terms previously agreed with the Bank.** The Operating Regulations are necessary for guaranteeing proper execution of the program.

B. Summary of arrangements for monitoring results

- 3.10 **Monitoring and evaluation.** There is a [Monitoring and Evaluation Plan](#) in place for the program. The monitoring structure will include (i) the [procurement plan](#), (ii) the [MEP](#) and the [AWP](#), (iii) annual verification of compliance with the targets established in Annex II, and (iv) semiannual reports containing: (a) activities performed during the period, progress with execution, problems encountered, and how they were resolved; (b) evaluation of the results matrix, procurement plan, annual work plan and risk matrix, and (c) analysis of the Bank's Project Monitoring Report, which will assess compliance with the targets for the indicators of outputs and outcomes in the Results Matrix.
- 3.11 The Monitoring and Evaluation Plan includes mechanisms for verifying compliance with the targets agreed in the Results Matrix. The IDB will prepare an ex post evaluation, the methodology of which will be similar to the ex ante economic evaluation, along with a Project Completion Report at the end of the operation.
- 3.12 The execution units will be responsible for selecting and contracting independent consulting services to prepare (i) a midterm evaluation, once 50% of project resources have been disbursed and justified, or at month 24 of execution, whichever occurs first; and (ii) a final evaluation that will begin no later than 90 days prior to the date of the last disbursement, with a report to be submitted no later than 30 days after the final justification of disbursements under the loan.

| Development Effectiveness Matrix | | |
|--|---|--|
| Summary | | BO-L1190 |
| I. Corporate and Country Priorities | | |
| 1. IDB Development Objectives | Yes | |
| Development Challenges & Cross-cutting Themes | -Social Inclusion and Equality -Productivity and Innovation -Gender Equality and Diversity -Climate Change and Environmental Sustainability | |
| Country Development Results Indicators | -Reduction of emissions with support of IDBG financing (annual million tons CO2 e)* -Electricity transmission and distribution lines installed or upgraded (km)* | |
| 2. Country Development Objectives | Yes | |
| Country Strategy Results Matrix | GN-2843 | Strategic objective of improving the provision of public goods and services, particularly through supportive instruments for planning and operation. |
| Country Program Results Matrix | GN-2915-2 | The intervention is included in the 2018 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 | | 10.0 |
| 4.1 Program has an ERR/NPV, or key outcomes identified for CEA | | 3.0 |
| 4.2 Identified and Quantified Benefits and Costs | | 3.0 |
| 4.3 Reasonable Assumptions | | 1.0 |
| 4.4 Sensitivity Analysis | | 2.0 |
| 4.5 Consistency with results matrix | | 1.0 |
| 5. Monitoring and Evaluation | | 8.5 |
| 5.1 Monitoring Mechanisms | | 2.5 |
| 5.2 Evaluation Plan | | 6.0 |
| III. Risks & Mitigation Monitoring Matrix | | |
| Overall risks rate = magnitude of risks*likelihood | | Low |
| Identified risks have been rated for magnitude and likelihood | | Yes |
| Mitigation measures have been identified for major risks | | Yes |
| Mitigation measures have indicators for tracking their implementation | | Yes |
| Environmental & social risk classification | | B |
| IV. IDB's Role - Additionality | | |
| The project relies on the use of country systems | | |
| Fiduciary (VPC/FMP Criteria) | Yes | Financial Management: Accounting and Reporting. |
| Non-Fiduciary | Yes | Environmental Assessment National System. |
| The IDB's involvement promotes additional improvements of the intended beneficiaries and/or public sector entity in the following dimensions: | | |
| Additional (to project preparation) technical assistance was provided to the public sector entity prior to approval to increase the likelihood of success of the project | | |

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

Evaluability Assessment Note:

The program is motivated by the high dependency of Bolivia's electricity sector on fossil fuels, which generates high economic costs as well as high levels of carbon dioxide emissions in the face of ever growing demand for electricity. The program's objective is then to support the sustainability of the country's energy matrix and to lower CO2 emissions by interconnecting one of the country's isolated systems with the national integrated system, as well as the implementing energy efficient public lighting in two select municipalities. The program combines these efforts with a focus on security in public spaces from physical and sexual violence by implementing gender-focused activities in these two municipalities.

The documentation is well-structured. The diagnostic identifies the causes of carbon dioxide emissions and links the proposed solution to these issues. However, the program description lacks adequate empirical evidence to justify its internal validity. The results matrix (RM) reflects the objectives of the program and establishes a clear vertical logic, including impact indicators that can capture the program's overall effect on CO2 emissions. The RM includes SMART indicators at the impact, outcome and output level, with their respective baseline values and targets and the means to gather information.

The economic analysis presents two cost-benefit analyses that considers the intervention's expected benefits on reduced diesel consumption, improved system reliability, delayed investment due to the substitution of bulbs for public lighting, as well as reduced CO2 emissions, and compares them to the program's recurrent and non-recurrent costs. In general, the benefits are based on a good understanding of the theory of change, and overall assumptions appear reasonable and appropriate. A sensitivity analysis contemplates key parameters and various break-even points.

The monitoring and evaluation plan presents all outputs and associated costs. The evaluation plan proposes an ex-post cost-benefit analysis that will utilize the same methodology applied for the ex-ante economic analysis. Though this methodology appears feasible and allows to measure the efficiency of the program, it does not allow attribution of program impact.

The risk matrix identifies eight risks; four are classified as Low, and four as Medium. All of them seem reasonable and include appropriate mitigating actions and compliance indicators.

RESULTS MATRIX

| | |
|-------------------|--|
| Objectives | The objective of this operation is to support the sustainability of Bolivia's energy matrix for promoting the reduction of CO ₂ emissions through the development of electricity infrastructure that allows integration of the off-grid systems into the national grid, and the promotion of efficient electricity use. The specific objectives of the program are: (i) to reduce the consumption of diesel fuel in the off-grid system of San Ignacio de Velasco by connecting it to the national grid, and (ii) to reduce the consumption of electricity in the public lighting systems of the municipios of Oruro and Potosí through energy efficiency measures. |
|-------------------|--|

| Impact | Indicators | Unit | Baseline 2017 | Final target 2024 | Means of verification |
|---|--|---------------------|---------------|-------------------|--|
| Reduction of CO ₂ emissions in power generation. | CO ₂ emissions (tons) in San Ignacio. | CO ₂ ton | 46,474 | 20,189 | Annual statistical reports of the AE on power generation. The baseline represents projected CO ₂ emissions for 2024 without the project. |
| | CO ₂ emissions (tons) in Potosí. | CO ₂ ton | 2,083.7 | 1,014.7 | Annual statistical reports of the AE on power generation. The baseline represents projected CO ₂ emissions for 2024 without the project. |
| | CO ₂ emissions (tons) in Oruro. | CO ₂ ton | 10,900 | 6,095 | Annual statistical reports of the AE on power generation. The baseline represents projected CO ₂ emissions for 2024 without the project. |

FIDUCIARY AGREEMENTS AND REQUIREMENTS

Country: Plurinational State of Bolivia
Project: Electricity Infrastructure Expansion Program (BO-L1190)
Executing agency: Ministry of Energy (MEN) and National Electricity Company (ENDE)
Prepared by: Shirley Foronda, Patricia Toriz (FMP/CBO)

I. EXECUTIVE SUMMARY

- 1.1 Program execution will be handled by two executing agencies: (i) the MEN,¹ through the execution unit established within the PEVD, which falls under the VMEEA, and (ii) ENDE, through an execution unit² created exclusively for handling IDB-financed operations.
- 1.2 An Institutional Capacity Assessment was conducted both for the execution unit and for ENDE, the results of which found that both agencies have a satisfactory degree of institutional development in their systems for planning and organization, execution and control, reflecting a low risk for program execution.
- 1.3 Financial management will be handled through the National Public Management System (SIGEP), for the component executed by the MEN, and through the ENDESIS system for the component executed by ENDE. In terms of the financial reports required by the Bank, the MEN, through the execution unit, will use the IDB Project Administration System (SIAP-BID), while ENDE will use its own system. The Single Treasury Account System (CUT) will also be used: it is national in scope and manages both local and foreign currency. For the processing of disbursements, the executing agencies will use the Bank's electronic disbursement system, with which they can prepare, approve, and submit disbursement requests.
- 1.4 Procurement will be managed using both the standard Bank procurement documents and the documents agreed with the Office of the Deputy Minister of Public Investment and External Financing (VIPFE), which are available through the State Procurement System (SICOES³).
- 1.5 Advertising for international competitive bidding and the selection of international consultants (announcements, requests for expressions of interest, clarifying circulars, amendments, and results of the processes) will be done through the

¹ The execution unit is currently handling two IDB-financed programs: (i) the Program for Rural Electrification with Renewable Energy (GRT/INV-14258-BO) and (ii) the Rural Electrification Program II (3725-BL-BO).

² The execution unit will devote itself exclusively to managing the two IDB-financed operations: 3725/BL-BO and this new operation, BO-L1190.

³ [SICOES](#). Set of bidding documents authorized by the Bank for procurement below the ICB thresholds.

United Nations Development Business portal; the SICOES website and/or national daily newspapers may also be used to publicize these and all other processes.

- 1.6 Based on compliance with the current implementation activities, the agreement for partial use of Bolivia's National Procurement System will also be applicable. That system adopts the Basic Standards of the Goods and Services Administration System (NB-SABS) for individual consultants and shopping. The loan contract will include provisions for the use of this subsystem.

II. THE EXECUTING AGENCY'S FIDUCIARY CONTEXT

- 2.1 Law 1178 on Government Administration and Oversight of 20 July 1990, known as the SAFCO Law, regulates administration and oversight systems for government resources and their relationship with national planning and public investment systems. It establishes subsystems for planning (operational programming, administrative organization, and budget), execution (treasury, public credit, integrated government accounting, personnel management, goods and services administration) and government oversight (internal and external control). This law is compulsory for both the MEN and ENDE. Although the fiduciary systems help to ensure transparent and comprehensive execution of public resources, there are still areas that need further strengthening.
- 2.2 **Goods and services administration (procurement).** Except as provided in paragraph 1.6, the use of the NB-SABS is not acceptable for contracts financed in whole or in part with Bank resources. Both entities, in accordance with paragraph 1.2, must have the fiduciary capacity to undertake the activities related to their component of execution (paragraph 1.6).
- 2.3 **Budget.** Bolivia has no multiyear budgeting system. As a result, the program's budget will be entered annually, recording resources, amendments, and internal and external transfers recurrently. The local counterpart in some cases is provided with some delay, due to the quarterly programming and the administrative processing involved in its approval.
- 2.4 **Government accounting.** Although SIGEP provides secure, reliable information on budget execution, the information it furnishes is in local currency only and does not match the program's investment categories. For this reason, a supplementary system will be used for the issuance of reports (SIAP-BID). Currently, the IDB is supporting an initiative of the Ministry of Economy and Public Finance (MEFP) to implement a project accounting module within SIGEP, and it is expected to enter production in the second half of 2018. This program is a candidate for use of the new SIGEP module.
- 2.5 ENDE has developed its own system (ENDESYS), which meets the specific information needs of the company as well as the Bank's requirements with respect to classification, accrual, and recording in two currencies, by investment category.
- 2.6 **Government oversight.** Government oversight falls to the Office of the Comptroller General. This office currently faces technical and staffing constraints for conducting ongoing and timely reviews of projects financed with funds from multilateral organizations.

III. FIDUCIARY RISK EVALUATION AND MITIGATION ACTIONS

- 3.1 The institutional capacity assessment revealed a low risk level for the execution unit of the MEN as well as for ENDE, due to their experience executing projects with external financing and their satisfactory performance in executing those projects.
- 3.2 Considering that both entities have a considerable number of projects in their portfolios, the inclusion of this program adds to this workload. For this reason, the Risk Mitigation Plan⁴ provides for the strengthening the execution units with technical and fiduciary personnel working exclusively in the procurement and finance areas, in order to minimize potential delays in the program's fiduciary management. Given the limited availability of fiduciary specialists with experience with IDB policies, specific training is planned for this new staff.
- 3.3 With respect to the project's financial management, the institutional capacity assessment found that during execution of the first phase of the Rural Electrification Program additional procedures were introduced for paying suppliers, beyond those defined in the program's Operating Regulations. This led to delays in execution and was damaging to the MEN's image in the eyes of suppliers. To avoid delays in execution, the authorities of each executing agency will have to accept the program Operating Regulations as the official instrument regulating the financial management of Bank resources.
- 3.4 In addition, it has been determined that SIGEP and the ENDE system (ENDESIS) will be used for the accounting of program transactions. Both systems allow for administering program funds, which are managed in the CUT through "passbooks." These systems provide an adequate basis for the external auditors to issue an opinion on the accounting records. However, the SIGEP does not create financial execution reports based on the loan's investment status (investment category, currency type, accounting basis, etc.). Thus, a supplementary system is required—in this case the SIAP-BID for the MEN execution unit—that allows for recording expenditures and creating reports in the format required by the Bank.

IV. CONSIDERATIONS FOR THE SPECIAL PROVISIONS OF THE CONTRACT

- 4.1 **Program Operating Regulations.** The program Operating Regulations for each executing agency will include its execution arrangements, information flows, and procedures, previously agreed with the Bank.
- 4.2 **Exchange rate agreed for accounting purposes.** Both the MEN execution unit and ENDE will use the exchange rate in force in Bolivia on the effective date proceeds are converted from foreign currency to local currency in the accounts of each executing agency.
- 4.3 **Financial statements and other audited reports.** Throughout the loan disbursement period, audited program financial statements will be submitted to the Bank within 120 days after the close of the executing agency's fiscal year. These statements will be duly audited by an independent audit firm acceptable to the Bank. The final report will be submitted to the Bank within 120 days following the

⁴ The Project Risk Management Matrix includes risk mitigation actions.

date stipulated for the last loan disbursement. Each executing agency will present separate audit reports. The contracting procedures, scope, and presentation of the audits will be governed by the revised version of the Financial Management Guidelines for IDB-financed Projects (document OP-273-6) and will be undertaken by each executing agency.

- 4.4 **Terms of reference and technical specifications.** The sector specialist, in his capacity as Project Team Leader, will preapprove for the executing agency the review of shortlist selection criteria, terms of reference, technical specifications, and qualification requirements for bidders or consultants to evaluate proposals, regardless of the procurement review modality (ex ante or ex post).

V. AGREEMENTS AND REQUIREMENTS FOR PROCUREMENT EXECUTION

- 5.1 **Procurement execution.** Procurement processes will be defined in the procurement plan approved by the Bank and carried out pursuant to the policies set forth in documents GN-2349-9 and GN-2350-9, for which no exceptions are planned. The agreement on the partial use of the country system referred to in paragraph 1.6 will also be applicable.
- 5.2 **Goods, works, and nonconsulting services.** The procedures for contracting works, goods, and nonconsulting services will use the standard documents, without any changes, considering the following:
- a. Procedures using international competitive bidding (ICB) will be executed using the current standard bidding documents issued by the Bank and available at the Bank's website.
 - b. Contracting procedures for amounts below the ICB threshold will use the national competitive bidding (NCB) documents agreed with the country and made available through SICOES.
 - c. In the case of simple works and off-the-shelf goods whose value is below the ICB threshold, these may, with prior Bank approval, be procured through shopping, using the documents agreed with the country and made available through SICOES.
 - d. Shopping procedures, which by their amount fall within the official thresholds established for the country, will apply the national rule under the agreement on partial use of the country procurement system, using the documents agreed with the country and made available through SICOES.
- 5.3 **Selection and contracting of consultants.** Procedures for the selection of consultants will use the standard documents with no changes, considering the following:
- a. Selection of consulting firms in international procedures. The standard request for proposals issued by the Bank and made available on the Bank's website will be used.
 - b. Shortlist of consulting firms. This may be comprised entirely of domestic firms⁵ in the case of processes that fall below the international shortlist threshold

⁵ This does not preclude participation of foreign companies.

established by the Bank for Bolivia, using the NCB documents agreed with the country and made available through SICOES.

- c. Selection of individual consultants. This will be governed by the national rule under the agreement on partial use of the country system, using the documents agreed with the country and made available through SICOES.
- 5.4 **Operating expenses.** Operating expenses are the recurrent expenses and maintenance costs incurred for the program's operation during its useful life. These expenses cover: office rent; utilities; radio, written, or televised communication; procurement notices; translations; bank fees; basic office supplies; photocopies; postage; fuel; etc. as agreed with the Bank. Operating expenses will be financed by the project as part of the annual budget approved by the Bank and are included in the annual program procurement plans. Recurrent expenses will be handled in accordance with the executing agency's administrative procedures referenced in the program Operating Regulations. The Bank may forego financing these expenditures if it determines that the principles of competition, efficiency, and economy were violated.
- 5.5 **Procurement planning.** The executing agency will publish the procurement plan in the Procurement Plan Execution System and will update it at least once a year, or as needed, with a forward horizon of 18 months. A procurement process may be launched provided it is included in the procurement plan previously approved by the Bank.
- 5.6 **Domestic preference.** Domestic preference is not envisaged in any procurement procedure.

Table 1. Threshold Amounts (US\$)

| ICB | | NCB* | | Shopping | | International shortlist | National shortlist |
|------------------------|----------------------|----------------------|-------------------|---------------|--------------|-------------------------|--------------------|
| Works | Goods | Works | Goods | Works | Goods | Consultants | Consultants |
| Greater than 3,000,000 | Greater than 200,000 | 250,000 to 3,000,000 | 50,000 to 200,000 | Up to 250,000 | Up to 50,000 | Greater than 200,000 | Up to 200,000 |

* Simple works and off-the-shelf goods whose value is under the NCB threshold may be procured using shopping.

Table 2. Main Procurement Planning

| Description | Selection method | Estimated amount (US\$) |
|---|------------------|-------------------------|
| Contracting of works | | |
| Construction of civil works and electromechanical assembly for the Los Troncos-San Ignacio transmission line (4 lots) | ICB | 15,232,000 |
| Construction of civil works, electromechanical assembly, and supply of outlet bay for the Los Troncos substation | ICB | 4,200,000 |
| Construction of civil works, electromechanical assembly and supply of the San Ignacio de Velasco substation | ICB | 8,200,000 |
| Goods | | |
| Procurement of goods for the Los Troncos-San Ignacio transmission line (4 lots) | ICB | 22,848,000 |
| Procurement and installation of 30,800 LED lamps in Oruro, lot 1, and 5,500 LED lamps in Cobija, lot 2 | ICB | 16,280,000 |
| Consulting firms | | |
| Two processes for financial auditing, components 1 and 2 | CQS | 300,000 |
| Two processes for midterm and final technical evaluation, components 1 and 2 | QCBS | 120,000 |
| Training services | CQS | 200,000 |

See [Procurement Plan](#) for the first 18 months.

- 5.7 **Procurement supervision.** The project will use the ex ante review method for all international processes and exceptions such as direct contracting, direct selection, and modalities outside the established thresholds.
- 5.8 **Ex post review.** An external audit firm will perform an ex post review of procurement processes at least once a year, as determined by the Bank.
- 5.9 **Reviews.** The Bank may make periodic visits to update the level of procurement management capacity and fiduciary risk associated with the operation's execution.
- 5.10 **Records and files.** Each executing agency will be responsible for establishing the necessary controls for the safekeeping and integrity of documents created, ex ante or ex post, by program execution. The Bank may at any time verify the standards used for the organization, control, and security of files.

VI. FINANCIAL MANAGEMENT

- 6.1 **Programming and budget.** The MEN execution unit and ENDE, in their capacity as executing agencies, will program and plan project activities based on the works approved in agreement with the Bank and reflected in the annual work plan (AWP), the multiyear execution plan (MEP) and the procurement plan. To this end, each executing agency will ensure that budget entries and amendments are made as needed for the project. The formulation, approval, execution, monitoring, and evaluation of both executing agencies' budgets will follow the guidelines set forth in the specific regulations of the MEN and ENDE budget systems.
- 6.2 **Accounting and information systems.** The MEN execution unit and ENDE are expected to manage their accounting and information systems independently. The MEN execution unit will use SIGEP, and ENDE will use ENDESIS. SIGEP integrates into a single record the different stages in accounting administration

processes: budget record (budget execution), equity record (assets, liabilities, equity, and balance), and treasury record (cash transfers). The accrual accounting method will be used, and International Accounting Standards and government standards will be applied in parallel, given that execution in SIGEP is governed by the latter. Additionally, for the MEN execution unit's accounting records of loan proceeds, the SIAP-BID will have to be used as a supplementary accounting record for issuing the reports required by the Bank, including disbursement requests. ENDE will use ENDESIS, which was already used in executing the Rural Electrification Program I. For bookkeeping purposes a chart of accounts will be prepared that identifies the expenditures by item, linking the investment categories with the respective budget lines and accounts.

- 6.3 The financial statements required for the program are: (i) statement of cash flow; (ii) statement of cumulative investments, explanatory notes; and (iii) statement by program management on proper use of program funds.
- 6.4 **Disbursements and cash flow.** The loan will be disbursed primarily through separate advances of funds for the MEN execution unit and ENDE, based on the operation's financial programming. The two executing agencies will coordinate beforehand to update the financial programming periodically. The loan proceeds will be deposited in the CUT at the Bolivian Central Bank and subsequently transferred to operating accounts in local currency (passbooks). The Bank may make a new advance only when at least 80% of the total advance previously disbursed has been justified. The payment reimbursement method may be used for recognizing the expenses incurred by the execution unit and ENDE, provided those expenses were incurred in accordance with procedures acceptable to the IDB. The use of the direct payment method is limited to exceptional cases and is subject to the Bank's prior consent.
- 6.5 **Internal controls and audits.** Both the MEN and ENDE have an internal control system that includes instruments for prior and subsequent control that are incorporated into each agency's organizational plan, regulations, and procedure manuals. Both agencies also have an internal audit unit reporting directly to their highest executive authority, charged with conducting independent evaluations to determine the extent of compliance and effectiveness of the management systems and internal control instruments at the agency. The internal audit reports resulting from this review contain recommendations to be implemented by the administration. This program is expected to be included in this kind of review, and the reports would be used in planning the external auditor's work. The Bank will, as a strategic activity within its purview, organize annual coordination meetings with the internal audit units of both executing agencies to identify project monitoring activities. The Bank will also invite the internal audit units to participate in the fiduciary workshops on the financial execution of projects.
- 6.6 **External control and reporting.** Inasmuch as the loan proceeds are managed independently, there will be a separate external audit for each executing agency. The external audit contract will be multiyear in order to: (i) avoid transactional costs; (ii) ensure continuity in the auditors' work; and (iii) allow for preliminary reviews at semiannual intervals.

- 6.7 **Financial supervision plan.** Financial supervision will be conducted ex post for the two executing agencies and will involve: (i) a comprehensive visit (procurement and finance) to the locations where loan proceeds have been invested; (ii) visits to verify implementation of the internal control recommendations made by the external auditor; and (iii) the project's annual external audit and desk review of the audit report.
- 6.8 **Execution mechanisms.** The execution units of the MEN and ENDE will be strengthened with additional staff in financial accounting management and procurement so they may undertake the additional fiduciary responsibilities of this operation. The corresponding program Operating Regulations will regulate, among other things, contracting of audits, financial management over execution of program loan proceeds, overall financial programming, and information flow between the executing agencies.

| Outcomes | Indicators | Unit | Baseline 2017 | Final target 2024 | Means of verification/observations |
|--|---|--------------------------|---------------|-------------------|---|
| Increased capacity of the Los Troncos-San Ignacio transmission line. | Capacity of the Los Troncos-San Ignacio transmission line. | MW | 0 | 50 | ENDE execution reports with information collected by the supervisory firms, based on progress reports for the works. |
| Savings in diesel subsidies for power generation. | Annual diesel subsidies in San Ignacio de Velasco | US\$ million/year | 14,902,600 | 0 | Annual statistical reports of the AE on the national grid and off-grid (isolated) systems. The baseline represents projected subsidies for 2024 without the project. |
| Reduced diesel consumption. | Annual diesel consumption in the Municipio of San Ignacio de Velasco. | Thousands of liters/year | 10,000 | 0 | Annual statistical reports of the AE on power generation and consumption of electricity. |
| Reduction in total electricity consumption in public lighting. ¹ | Total annual electricity consumption for public lighting in Oruro. | MWh/year | 26,000 | 11,600 | Annual statistical reports of the AE on power generation and consumption of electricity. |
| | Total annual electricity consumption for public lighting in Potosí. | MWh/year | 5,033 | 2,451 | Annual statistical reports of the AE on power generation and consumption of electricity. |
| Stronger municipal capacities to implement energy efficiency measures. | Municipios strengthened in the operation and maintenance of LED lamps for public lighting. | Municipios | 0 | 2 | The firms supplying the lamps will have to train the Municipios of Oruro and Potosí in their operation and maintenance. The development will be corroborated through the semiannual reports submitted by the execution unit under Component 2. |
| Increased perception of safety in public spaces due to lighting and in the private spaces of workers' families | Beneficiaries of the program making regular use of public spaces. | % | 0 | 20 | During the design of <i>Programa P</i> surveys will be prepared on perceptions of safety and family violence. ² Those surveys will follow a binary response methodology and will be conducted at the beginning and the end of program execution. |
| | Women and girl beneficiaries of the program making regular use of public spaces. | % | 0 | 20 | |
| | Beneficiaries of the program adopting practices to reduce domestic violence. | % | 0 | 50 | |
| | Women and girl beneficiaries of the program adopting practices to reduce domestic violence. | % | 0 | 50 | |

¹ The baseline is calculated on the basis of the technical analysis of the component.

² The baseline will be determined via surveys conducted at the beginning of program execution.

| Outputs | Unit | Baseline 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | Final target | Means of verification/ observations |
|--|-----------------------|------------------|------|------|-------|--------|------|-----------------|--|
| Component 1: Los Troncos-San Ignacio transmission line | | | | | | | | | |
| Km of transmission line built and carrying power. | km | 0 | 0 | 0 | 0 | 238 | 0 | 238 | Project Monitoring Report (PMR). |
| Outlet bay of the Los Troncos substation built. | Outlet bay | 0 | 0 | 0 | 0 | 1 | 0 | 1 | |
| San Ignacio de Velasco substation built. | Substation | 0 | 0 | 0 | 0 | 1 | 0 | 1 | |
| Component 2: Energy efficiency in public lighting | | | | | | | | | |
| LED lamps installed in Oruro. | Lamps | 0 | 0 | 0 | 0 | 30,800 | 0 | 30,800 | PMR which includes training reports with number of persons trained and workshops held. |
| LED lamps installed in Potosí. | Lamps | 0 | 0 | 0 | 7,574 | 0 | 0 | 7,574 | |
| Workers' families trained. | Families ³ | 0 | 0 | 0 | 500 | 0 | 0 | 500 | |

³ Comprising trained mothers and fathers.

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

PROPOSED RESOLUTION DE-___/18

Bolivia. Loan ____/BL-BO to the Plurinational State of Bolivia
Electricity Infrastructure Expansion Program

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 Plurinational State of Bolivia, as borrower, for the purpose of granting it a financing to cooperate in the execution of the Electricity Infrastructure Expansion Program. Such financing will be chargeable to the Bank's Ordinary Capital (OC) resources in the following manner: (i) up to the amount of US\$11,700,000, subject to concessional financial terms and conditions ("Concessional OC"); and (ii) up to the amount of US\$66,300,000, subject to financial terms and conditions applicable to loan operations financed from the Bank's regular program of OC resources ("Regular OC"), as indicated in the Project Summary of the Loan Proposal, and subject to the Special Contractual Conditions of said Project Summary.

(Adopted on ____ 2018)