

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

**MEXICO**

**ENERGY EFFICIENCY PROJECT IN FEDERAL GOVERNMENT OFFICE  
BUILDINGS**

**(ME-L1267)**

**LOAN PROPOSAL**

This document was prepared by the project team consisting of: José Antonio Urteaga, Project Team Leader (ENE/CME); Roberto Aiello, Alternate Project Team Leader; Sylvia Larrea, Rodrigo Aragón, Wilkferg Vanegas, Stephanie Suber, and Cecilia Seminario (INE/ENE); Gmelina Ramírez (CSD/CCS); Germán Zappani and Ariel Enrique Rodríguez (VPC/FMP); Juan Carlos Pérez-Segnini (LEG/SGO); Tatiana Virviescas (CID/CME); and Roberto Leal (VPS/ESG).

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## ABBREVIATIONS

AWP	Annual work plan
CFE	Comisión Federal de Electricidad [Federal Electricity Commission]
CONUEE	Comisión Nacional de Uso Eficiente de la Energía [National Commission on Efficient Energy Usage]
ESMP	Environmental and social management plan
ETE	Estrategia de Transición para Promover el Uso de Tecnologías y Combustibles más Limpios [Transitional Strategy to Promote the Use of Cleaner Technologies and Fuels]
FGEDs	Federal government entities and dependencies
FGOBs	Federal government office buildings
FIDE	Fideicomiso para el Ahorro de Energía Eléctrica [Trust Fund for Electrical Energy Savings]
FOTEASE	Fondo para la Transición Energética y el Aprovechamiento Sustentable de la Energía [Fund for the Energy Transition and Sustainable Energy Usage]
GWh	Gigawatt-hours
LED	Light-emitting diode
LTE	Ley de Transición Energética [Energy Transition Act]
MtCO <sub>2</sub> e	Million tons of carbon dioxide equivalent
MW	Megawatts
NAFIN	Nacional Financiera, SNC, IBD
PPMR	Project performance monitoring report
PRESEM	Proyecto de Eficiencia y Sostenibilidad Energética en Municipios [Municipal Energy Efficiency and Sustainability Project]
PRODESEN	Programa de Desarrollo del Sistema Eléctrico Nacional [National Electricity System Development Program]
PRONASE	Programa Nacional para el Aprovechamiento Sustentable de la Energía [National Program for Sustainable Energy Usage]
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales [Department of the Environment and Natural Resources]
SENER	Secretaría de Energía [Department of Energy]
SFP	Secretaría de la Función Pública [Civil Service Department]
SHCP	Secretaría de Hacienda y Crédito Público [Department of Treasury and Public Credit]

## PROJECT SUMMARY

### MEXICO ENERGY EFFICIENCY PROJECT IN FEDERAL GOVERNMENT OFFICE BUILDINGS (ME-L1267)

Financial Terms and Conditions				
<b>Borrower:</b> United Mexican States			Flexible Financing Facility <sup>(a)</sup>	
			<b>Amortization period:</b>	Bullet payment October 2032
<b>Executing agency:</b> Department of Energy (SENER)			<b>Disbursement period:</b>	4 years
			<b>Grace period:</b>	Bullet payment October 2032 <sup>(b)</sup>
			<b>Interest rate:</b>	LIBOR-based
Source	Amount (US\$)	%	<b>Credit fee:</b>	(c)
IDB (Ordinary Capital)	30 million	100%	<b>Inspection and supervision fee:</b>	(c)
			<b>Weighted average life (WAL):</b>	14.62 years
<b>Total</b>	30 million	100%	<b>Currency of approval:</b>	U.S. dollars from the Ordinary Capital
Project at a Glance				
<b>Project objective/description:</b> The general objective is to save energy and economic resources at federal government office buildings (FGOBs), in order to contribute to reduced greenhouse gas emissions and demonstrate the viability of these savings so that implementation can be expanded to other public buildings. The specific objectives are (i) to implement energy efficiency measures at FGOBs, and (ii) to strengthen the energy efficiency-related institutional capacities of federal government entities and dependencies.				
<b>Special contractual conditions precedent to the first disbursement:</b> (i) signature of the mandate and project execution contract between the borrower, the executing agency, and Nacional Financiera (NAFIN) as the borrower's financial agent; (ii) approval and entry into force of the <a href="#">project Operations Manual</a> agreed upon with the Bank; (iii) signature of a collaboration agreement between SENER and the Trust Fund for Electrical Energy Savings (FIDE), enabling FIDE to act as the project's operating unit (see paragraph 3.11). See also the environmental and social contractual conditions included in Annex B of the project <a href="#">environmental and social management report</a> .				
<b>Special contractual conditions for execution:</b> None.				
<b>Exceptions to Bank policies:</b> None.				
Strategic Alignment				
<b>Challenges:</b> <sup>(d)</sup>	SI <input type="checkbox"/>	PI <input checked="" type="checkbox"/>	EI <input type="checkbox"/>	
<b>Crosscutting themes:</b> <sup>(e)</sup>	GD <input checked="" type="checkbox"/>	CC <input checked="" type="checkbox"/>	IC <input type="checkbox"/>	

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

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

<sup>(c)</sup> The credit fee and the 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 relevant policies.

<sup>(d)</sup> SI (Social Inclusion and Equality); PI (Productivity and Innovation); and EI (Economic Integration).

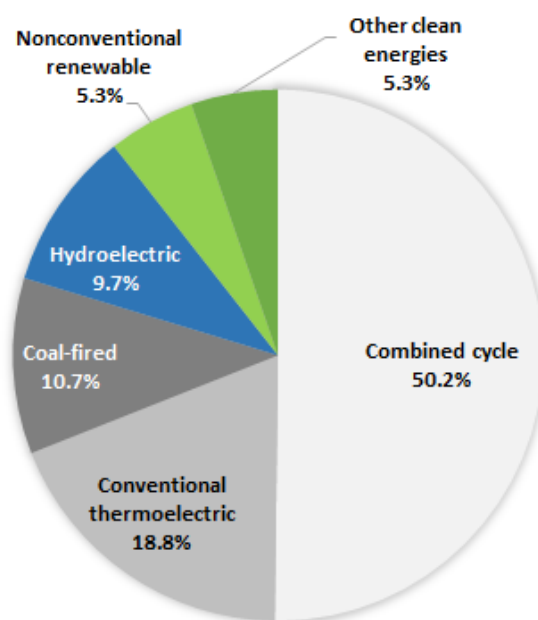
<sup>(e)</sup> GD (Gender Equality and Diversity); CC (Climate Change and Environmental Sustainability); and IC (Institutional Capacity and Rule of Law).

## I. DESCRIPTION AND RESULTS MONITORING

### A. Background, problem to be addressed, and rationale

- 1.1 Mexico consumed 7.2% more energy in 2016 than the previous year, while its energy production fell 6.6%. This put Mexico's energy independence index<sup>1</sup> at 0.84 in 2016<sup>2</sup>—i.e., the country produced 15.6% less energy than it consumed.
- 1.2 This was the result of a 33% drop in the production of both oil (2004-2016) and natural gas (2009-2016). Meanwhile, electricity consumption at year-end 2016 was 298,792 GWh after growing at an annual 2.6% from 2010 to 2016, while installed capacity and generation rose 2.9% and 2.4% over the same period, respectively, to 73,510 megawatts (MW) and 319,364 GWh. Fossil fuels accounted for 71.7% of installed capacity and 79.7% of generation (see Figure 1), principally natural gas.

Figure 1. Electric power generation by technology, 2016



Source: National Electricity System Development Program (PRODESEN) 2017-2031.  
Includes nuclear electric generation and efficient cogeneration.

- 1.3 Due to heavy dependence on fossil fuels, Mexico's electricity subsector accounted for 19% of total greenhouse gas emissions in 2013, i.e., 133 million tons of carbon dioxide equivalent (MtCO<sub>2</sub>e).<sup>3</sup>
- 1.4 In this setting of eroding energy security due to insufficient and declining production of oil and natural gas, increasing electricity consumption, fossil fuel-based electricity

<sup>1</sup> This index is used internationally to measure, in a general sense, the extent to which a country can cover its energy consumption through production; a country that scores above 1.0 is considered energy-independent.

<sup>2</sup> Department of Energy (SENER). Balance Nacional de Energía 2016 [National Energy Report 2016].

<sup>3</sup> Department of the Environment and Natural Resources (SEMARNAT), national greenhouse gas inventory.

generation, low share of renewable energies, and significant greenhouse gas emissions in the electricity subsector, Mexico approved an energy reform package in 2013 and passed new laws in 2014 and 2015 to modernize and attract investment in its hydrocarbon and electricity subsectors, as well as to diversify its energy matrix and promote investment in energy efficiency.

- 1.5 Mexico passed the Energy Transition Act (known by its Spanish-language acronym, LTE) in late 2015 to regulate the sustainable use of energy, including requirements related to clean energies and energy efficiency, as well as reduced greenhouse gas emissions in the electricity subsector.
- 1.6 The LTE views energy efficiency as a key part of meeting its objectives. Articles 11 and 12 of the law state that the National Program for Sustainable Energy Usage (PRONASE) will set energy efficiency targets and identify projects and actions to meet them.
- 1.7 In December 2016, the Transitional Strategy to Promote the Use of Cleaner Technologies and Fuels (ETE) was announced as a tool for implementing the LTE. The ETE includes the following targets: (i) a 25% share of clean energies in electric power generation by 2018,<sup>4</sup> 35% by 2024, and 50% by 2050; and (ii) an average annual 2.9% reduction in final energy consumption between 2016 and 2050. Another objective of the ETE is to contribute toward the aspirational targets for reduced greenhouse gas emissions set in the General Climate Change Act: a 30% reduction by 2020, and 50% by 2050, compared to the emissions in 2000.
- 1.8 Electricity consumption in the public sector—including for public lighting and pumping drinking water and wastewater<sup>5</sup>—was 9,717 GWh in 2016 and accounted for 3.3% of Mexico's total electricity consumption. This equated to an expenditure of US\$1.329 billion,<sup>6</sup> a figure that has been increasing due to rising electricity prices (see Figure 2). This consumption level is also the reason for the 4.45 MtCO<sub>2</sub>e in annual emissions.<sup>7</sup>

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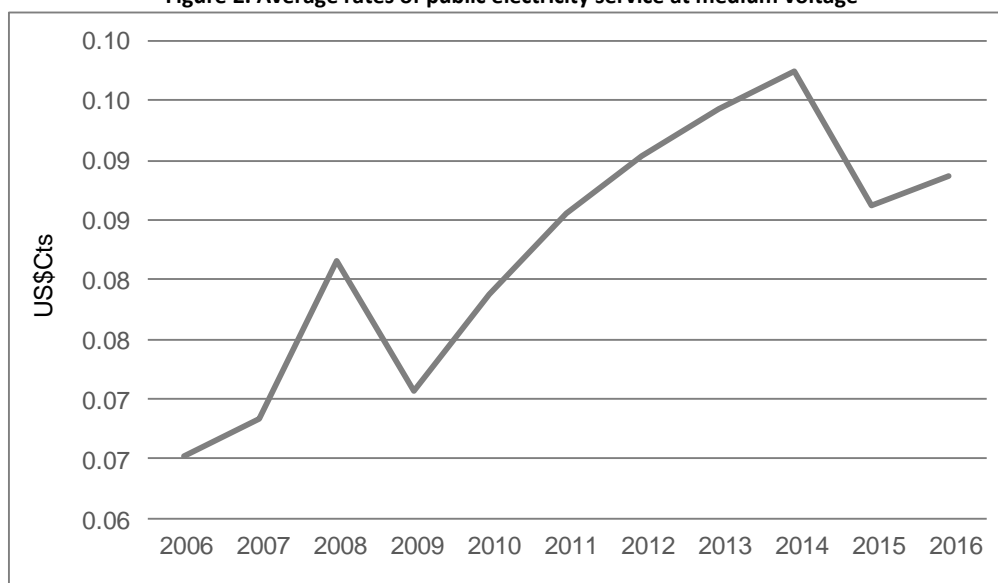
<sup>4</sup> According to information as of the first half of 2017, clean energy represents a 20.8% share of total generation. If the power generated by the awarded projects in the long-term power auctions, set to enter operation by 2018, is taken into account, the share of clean energy will be 22.4%, considering the scheduled date of entry into operation.

<sup>5</sup> Specific energy-efficiency programs have been designed for public lighting and pumping water.

<sup>6</sup> Based on an exchange rate of 18.5 Mexican pesos to the U.S. dollar.

<sup>7</sup> SEMARNAT, National Emissions Registry calculator, version 5.0.

Figure 2. Average rates of public electricity service at medium voltage



- 1.9 According to the National Commission on Efficient Energy Usage (CONUEE), Mexico's federal government owns 2,258 office buildings that consume some 355 GWh of electricity per year.
- 1.10 CONUEE began to implement mechanisms to promote energy efficiency at federal government facilities in 2008 and has been implementing the federal government energy efficiency program since 2012. This program aims to establish a process of ongoing improvement for increased energy efficiency in buildings, vehicular fleets, and industrial facilities of federal government entities and dependencies (FGEDs). Thus far, however, the results have been marginal due to the lack of a financing arrangement to expand the program's scope, according to the federal government's energy savings reports released by CONUEE for 2015 and 2016.<sup>8</sup>
- 1.11 This is the background for the Energy Efficiency Project in Federal Government Office Buildings, which will contribute to the efficient use of public resources and reduced greenhouse gas emissions through implementation of best practices and technological innovation, as well as through tools to manage, audit, and monitor consumption and energy efficiency. The project's outcomes will demonstrate the viability of these savings so that implementation can be expanded to other public buildings.<sup>9</sup>
- 1.12 **Problem to be addressed.** More than two decades ago, the National Commission for Energy Savings established, for the first time, requirements for facility inventories and energy consumption reports in FGED buildings. This has led to the identification of ways to improve energy efficiency, in addition to building a significant historical database on energy consumption in Mexico's government buildings.

<sup>8</sup> CONUEE. [Federal government report 2015](#) and [federal government report 2016](#).

<sup>9</sup> "Public buildings" refers to facilities of the federal government, as well as state and municipal government buildings, used for a variety of purposes.



- 1.13 Due to limited capacity for investment in energy efficiency, however, FGEDs have only been able to set targets aimed at improving operations or limiting the replacement of equipment, an approach that has failed to achieve the expected impact in terms of reducing costs and consumption.
- 1.14 In coordination with the Department of Energy (SENER) and CONUEE, the Bank conducted a study in 2017 to evaluate the potential and proposed financial/administrative strategies for implementing energy efficiency measures at federal government office buildings (FGOBs).<sup>10</sup>
- 1.15 The study found that (i) the bulk of electricity consumption at FGOBs is for air conditioning (41.3%) and lighting (26.6%), which combine for 67.9% of total electricity consumption at the 2,258 buildings owned by the federal government; and (ii) the remaining consumption is for computer hardware and copying machines (20%), electrical motors (5.3%), and other loads (6.8%).
- 1.16 The study leads to the conclusion that the potential for savings is high because most lighting equipment is technologically obsolete and air conditioning equipment at FGEDs is more than 15 years old. An estimated 32.4% of current energy consumption could be saved by replacing lighting and air conditioning equipment with highly energy-efficient technology.
- 1.17 The study also found that 66% of the lighting equipment consists of T-8 linear fluorescent bulbs, which are 35% less energy-efficient than light-emitting diode (LED) bulbs. The 11-year useful life of LED bulbs—compared to 4.3 years for T-8 bulbs—would lengthen the replacement period by a factor of 1.5 and thereby generate economic savings. Existing air conditioning equipment, consisting mostly of chillers and multisplit and minisplit equipment, is 40% less energy-efficient than the new high-efficiency equipment.
- 1.18 **Rationale.** The Government of Mexico is committed to improving energy efficiency at FGOBs in order to achieve economic savings and help reduce greenhouse gas emissions, as called for in the ETE.
- 1.19 Replacing 75% of all lighting and air conditioning equipment at FGOBs will require an estimated US\$30 million investment,<sup>11</sup> which will allow for savings of 115 GWh per year in electricity consumption and US\$10.45 million in annual electric bills. This equates to a simple payback period of approximately four years.
- 1.20 **Evidence.** Countries of the International Energy Agency posted a 5% increase in energy efficiency in nonresidential buildings between 2005 and 2015. This constitutes significant progress considering that these countries cut their electricity consumption per square meter by 28% in the period 1990-2013.<sup>12</sup> These savings were achieved by replacing high-consumption equipment mainly for heating, air

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<sup>10</sup> [Study report.](#)

<sup>11</sup> The US\$30 million investment includes US\$0.6 million for the change in the electricity rate at FGOBs that are currently provided service at low voltage but, due to their level of electricity demand and consumption, can switch to medium or high voltage. With a marginal investment, this switch could save these FGOBs money on their electric bills.

<sup>12</sup> Source: International Energy Agency. [Energy Efficiency Potential in Buildings.](#)

conditioning, and lighting, as well as building insulation, in accordance with the most stringent energy-efficiency standards for such equipment and insulation.<sup>13</sup>

- 1.21 A pilot project titled Energy Efficiency in Public Buildings in El Salvador, which focused on replacing lighting and air conditioning equipment and electric motors, led to savings of 584 megawatt-hours and US\$125,000 per year. The simple payback period was 2.65 years.<sup>14</sup>
- 1.22 In the article, “Energy Efficiency Economics and Policy,” Kenneth Gillingham et al. identify the main barriers to program implementation as (i) market barriers, such as high up-front costs of highly efficient technologies; (ii) insufficient information on potential savings and returns on investments in energy efficiency; (iii) risk aversion or the status quo effect; and (iv) lack of innovation.<sup>15</sup>
- 1.23 This operation has been designed with a focus on overcoming barriers related to financing and return on investment, which are common to this type of action and are related to the high cost of technology and aversion to risk. The aforementioned study demonstrated that the project is technically and financially viable. Savings will be monitored and audited using an innovative implementation mechanism, including the development and implementation of a system for tracking electricity consumption and savings at FGEDs.
- 1.24 In preparation the operation, special emphasis was put on avoiding the “rebound effect” resulting from the replacement of high-consumption equipment with efficient technologies, which can lead to overconsumption of energy due to lower levels of expenditure.<sup>16</sup> The aforementioned authors state that even with a significant rebound effect, the gains in users’ well-being should be taken into account and, therefore, the baseline for energy efficiency programs should ensure quality energy service.
- 1.25 In view of the foregoing paragraph, this operation includes development of a system for monitoring and auditing energy savings while also calling for a baseline that will ensure quality energy service.
- 1.26 **Institutions in the energy sector.** The institutions responsible for developing the roadmap to meet the energy efficiency targets are the Department of Energy (SENER) and the National Commission on Efficient Energy Usage (CONUEE).
- 1.27 SENER sets and guides public policy and planning in the sector and is responsible for (i) approving and publishing the ETE; (ii) preparing the Energy Transition Program; (iii) preparing and publishing the PRONASE; (iv) satisfying the established requirements and coordinating execution of these instruments, specifically the attainment of energy efficiency targets; (v) identifying and promoting, with support from CONUEE, areas of opportunity and energy efficiency programs by end-user sectors; (vi) coordinating the facilities and trust funds established by the federal government to support sustainable energy usage; (vii) identifying international best practices in terms of energy transition programs and projects and, where applicable,

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<sup>13</sup> Source: International Energy Agency. [Energy Efficiency Market Report](#).

<sup>14</sup> Jan van den Akker. United Nations Development Programme, Global Environment Facility. [Energy Efficiency in Public Buildings](#).

<sup>15</sup> Gillingham, K., R. G. Newell, and K. Palmer. “[Energy Efficiency Economics and Policy](#).”

<sup>16</sup> Gillingham, K., D. Rapson, and G. Wagner. “[The Rebound Effect and Energy Efficiency Policy](#).”

- promoting their implementation in Mexico; and (viii) identifying sources of financing to implement efficiency programs.
- 1.28 CONUEE is a decentralized administrative agency of SENER whose objective is to promote energy efficiency and serve as a technical unit to support sustainable energy usage. Its responsibilities include (i) coordinating the federal government's energy efficiency program; (ii) providing advisory support to FGEDs on sustainable energy usage;<sup>17</sup> (iii) issuing administrative provisions for FGEDs; and (iv) carrying out the actions established in the PRONASE.
- 1.29 **Energy-efficiency financing mechanisms.** Two primary mechanisms are in place to support public policy on energy efficiency: (i) the Fund for the Energy Transition and Sustainable Energy Usage (FOTEASE);<sup>18</sup> and (ii) the Trust Fund for Electrical Energy Savings (FIDE).
- 1.30 Formed in 2009, FOTEASE is one of Mexico's main instruments for providing reimbursable and nonreimbursable support, including loan guarantees for projects aimed at complying with the ETE and meeting targets for renewable energy and energy efficiency. It is a public trust fund created by the Department of Treasury and Public Credit (SHCP). Structurally, FOTEASE consists of (i) the SHCP, as grantor; (ii) SENER, as beneficiary; and (iii) Banco Nacional de Obras y Servicios Públicos [National Bank for Public Works and Services], as trustee. The assets in FOTEASE consist of proceeds from the original SHCP contribution and subsequent contributions from SENER's budget, public and private donations, and revenues from investment of its liquid assets. The original trust document states that FOTEASE may not conduct its own procurement activity; SENER is therefore supported by FIDE as the operating unit for specific projects.
- 1.31 FIDE is a private, nonprofit trust fund created in 1990 to introduce and promote savings and efficient use of electricity through (i) technical assistance; (ii) certification of equipment and materials that ensure high energy-efficiency standards; (iii) financing of projects for the adoption energy efficiency technologies and reduction of greenhouse gas emissions; and (iv) dissemination of a culture of energy savings and efficient energy usage.
- 1.32 SENER, acting through FOTEASE and supported by FIDE as the operating unit, has implemented multiple energy-efficiency programs, including (i) Replacement of Home Appliances (2009-2012); (ii) Sustainable Lighting (2011-2012); (iii) Replacement of Incandescent Bulbs with Compact Fluorescent Bulbs (2015-2017); and (iv) Business Ecolending (in implementation since 2013). Currently, the Municipal Energy Efficiency and Sustainability Program is being conducted with a loan from the International Bank for Reconstruction and Development, through FOTEASE which is also contributing a counterpart component, under the coordination of SENER as executing agency, and with

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<sup>17</sup> The federal government entities are as follows: the legislative and judicial branches, the Office of the President of the Republic, federal agencies, administrative departments, the Office of the Attorney General, decentralized entities, enterprises in which the State owns a majority share, and trust funds for which the grantor is the federal government. The federal government dependencies are as follows: decentralized agencies, companies in which the State owns a share, national lending institutions, national insurance and bond institutions, and public trust funds.

<sup>18</sup> Public administration contract.

support from FIDE as the operating unit. On the basis of these experiences, a detailed list of the activities for this operation has been prepared with realistic timelines, which will allow the project to be executed on schedule.

- 1.33 FIDE also implemented the following programs before the creation of FOTEASE: (i) Replacement of Incandescent Bulbs with Compact Fluorescent Bulbs (1996-2012); and (ii) Market Development and Incentives. FIDE carried out these programs with the proceeds of an IDB loan and counterpart funding from the Federal Electricity Commission, which served as executing agency, while FIDE served as the operating unit.
- 1.34 FIDE also has extensive experience in the financing of energy efficiency projects in commercial and service facilities and has financed the implementation of more than 900 projects in office buildings, hotels, commercial establishments, and schools, where it has replaced lighting and air conditioning equipment.
- 1.35 **The Mexican government's strategy.** As part of the energy reform package, the LTE, the ETE, and PRONASE were published in 2015 and 2016. These measures were designed to, inter alia, promote an electricity sector with lower greenhouse gas emissions on the basis of a greater share of renewable energies and greater energy efficiency as reflected in lower energy intensity of final consumption (see paragraph 1.7).
- 1.36 Meeting energy efficiency targets is key to achieving Mexico's objectives, in accordance with (i) the General Climate Change Act, which calls for a 30% reduction in emissions by 2020 compared to the baseline<sup>19</sup> and a 50% reduction by 2050 compared to emissions in 2000;<sup>20</sup> and (ii) the nationally determined contribution under the 2015 Paris Climate Accord, which calls for a 22% reduction in greenhouse gas emissions, on an unconditioned basis, by 2030 compared to the baseline.<sup>21</sup>
- 1.37 **Proposal.** In order to advance toward compliance with energy efficiency targets, and thereby contribute to energy security and a reduction in greenhouse gas emissions, the Mexican government is planning actions to achieve greater energy efficiency in 1,350 FGOBs belonging to at least 95 FGEDs.<sup>22</sup>
- 1.38 On the basis of the foregoing paragraph, the Mexican government asked the Bank to structure a financing package for an energy efficiency project in federal government office buildings as a pilot/demonstration initiative, with the aim of then expanding it to public buildings nationwide. The project will focus on replacing high-consumption lighting systems and air conditioning equipment with highly efficient technologies. The main value-added of the Bank's technical support in this operation is FIDE's involvement in a public-sector project, as well as the design of a cumulative platform for actions in groups of FGOBs.

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<sup>19</sup> Emissions in 2020 (baseline) are estimated at 792 MtCO<sub>2</sub>e.

<sup>20</sup> Chamber of Deputies, LXIII Legislature. [General Climate Change Act](#).

<sup>21</sup> Emissions in 2030 (baseline) are estimated at 973 MtCO<sub>2</sub>e.

<sup>22</sup> FGEDs are public institutions directly subordinate to the Mexican president, including (i) dependencies: federal agencies, the Office of the Attorney General, the Presidential Legal Advisory Council; (ii) entities: companies in which the State owns a share, national lending, insurance, and bond institutions, and federal government trust funds. These FGEDs include facilities such as hospitals and schools, but this operation only includes FGOBs.

- 1.39 The project's activities will ensure that the energy services provided, both lighting and air conditioning, are in compliance with the relevant Mexican Official Standards. As a result, the baseline for determining the target savings will not necessarily be current consumption levels, but rather, depending on each building, the consumption levels set in the relevant norms or standards<sup>23</sup> for illumination levels and temperature inside the buildings.
- 1.40 **The IDB's experience and lessons learned.** The following recent loan operations are related to energy efficiency in Mexico: (i) Capital Markets Solution for Energy Efficiency Financing (operation 3252/OC-ME), and (ii) Óptima Energía Energy Efficient Roadway Lighting (operation 3519/CA-ME). Both of these operations are financed by IDB Invest (formerly the Inter-American Investment Corporation) and are aimed at replacing high-consumption technologies with highly energy-efficient equipment through energy service providers. A feature of these two operations that was used in designing this program is the development of a cumulative platform of individual projects to simplify the operation as a whole, in addition to the approach of replacing inefficient technologies with equipment that consumes less energy.
- 1.41 The following technical cooperation operations are now under way: (i) Support to Agricultural Trust Funds (FIRA) for the Design of an Energy Efficiency Financing Strategy for the Food Processing Sectors (operations [ATN/TC-14513-ME](#), [ATN/TC-14889-ME](#), and [GRT/TC-14861-ME](#)), aimed at financing the implementation of energy efficiency measures in agroindustrial enterprises; (ii) Energy Efficiency in Cities: Program for Emerging and Sustainable Cities (operation [ATN/FG-16075-ME](#)), which evaluates potential savings, measures to be implemented, and the necessary investments to increase energy efficiency in buildings and for public lighting in the cities of Tapachula (state of Chiapas) and Xalapa (state of Veracruz); and (iii) Institutional Strengthening for Implementation of the Energy Reform (operations [ATN/OC-15797-ME](#) and [ATN/OC-15798-ME](#)), which serves as the basis for the aforementioned study (see paragraph 1.22). These operations are part of the reason why the preparation of detailed plans is included in this project. These detailed plans will specify potential savings, the measures and investments to be implemented, and logistics for program operation before contracting suppliers of efficient technologies and associated installation services.
- 1.42 The Energy Management and Efficiency Programme (loan [3877/OC-JA](#)) is now in execution in Jamaica. Like this operation, its first component includes the procurement and installation of efficient technologies; replacement of obsolete, inefficient lighting and air conditioning equipment in public buildings; and proper handling of replaced equipment and associated waste. Like this operation, the measures in that program were based on a prior assessment of potential savings, needed investments and associated returns, and also include training for operational and maintenance personnel at the targeted facilities. Unlike the Jamaican program, which focuses primarily on hospitals and schools, the focus of this operation is FGOBs. The main lesson from the Jamaican program used in preparing this operation was the importance of targeting the preparation and

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<sup>23</sup> The applicable Mexican Official Standard for lighting is 025-STPF-2008: Condiciones de Iluminación en Centros de Trabajo [Workplace Lighting Conditions].

implementation of detailed plans toward energy-intensive areas with greater potential for saving electricity.

- 1.43 The Bank has published a series of energy efficiency handbooks. Specifically, the publication “Arreglos institucionales para programas de eficiencia energética” [Institutional arrangements for energy efficiency programs]<sup>24</sup> was very helpful in designing this project, especially in terms of institutional arrangements for designing and implementing energy efficiency programs.
- 1.44 **The Bank’s country strategy.** The operation is aligned with the priority area of climate change in the Bank’s country strategy with Mexico 2013-2018 (document GN-2749), given its contribution to reducing greenhouse gas emissions as a result of energy efficiency actions. The country strategy also identifies the energy sector as a dialogue area.
- 1.45 **Strategic alignment.** The project is consistent with the Update to the Institutional Strategy 2010-2020 (document AB-3008) and aligned with the development challenge of productivity and innovation: first, by helping to achieve lower operating costs at FGEDs as a result of greater energy efficiency through a 32.4% reduction in electricity consumption at FGOBs; second, through economic savings stemming from energy efficiency by reducing electricity bills by 33.5% at FGOBs; and third, through the institutional strengthening of at least 95 FGEDs. It will also help to (i) develop local consulting firms specializing in energy efficiency, creating more opportunities for them to expand into other energy-intensive sectors, such as the industrial, trade, and service sectors; (ii) promote the manufacture, sale, and installation of highly energy-efficient equipment, especially lighting and air conditioning equipment; (iii) spur the development of enterprises that manage the waste generated when lighting equipment is replaced, which are at an very early stage of development in Mexico, as there are only two companies approved by the environmental authorities to provide recycling services or handle fluorescent light bulbs;<sup>25</sup> and (iv) strengthen enterprises that recycle materials and handle waste from air conditioning equipment. The project is also aligned with the crosscutting themes of (i) gender equality and diversity, as its training activities will contribute to providing women with greater access to positions involving coordination of activities for selection, procurement, and maintenance of equipment and facilities;<sup>26</sup> among the personnel responsible for material resources at FGEDs, as well as for energy consumption at state and municipal governments, women are expected to make up 30% of those who receive in-person training, as well as 30% of those receiving online training; and (ii) climate change and environmental sustainability, as it will improve energy efficiency at FGOBs and achieve 32.4% reduction in greenhouse gas emissions by the end of the project by implementing energy efficiency measures. The project also contributes to the Corporate Results Framework 2016-2019 (document GN-2727-6) by reducing greenhouse gas emissions by

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<sup>24</sup> See [La Guía D: Arreglos institucionales para programas de energía eléctrica](#). [Guide D: Institutional arrangements for energy efficiency programs]. Energy Efficiency Series, IDB.

<sup>25</sup> SEMARNAT. [Empresas autorizadas para el manejo de residuos peligrosos](#) [Companies authorized to handle hazardous waste].

<sup>26</sup> Women constitute only 22% of the personnel responsible for facility operation and maintenance at federal agencies.



32.4% and benefitting 95 government agencies with projects to strengthen their technological and management tools for improved public service delivery.

- 1.46 In accordance with the multilateral development banks' joint [methodologies](#) for tracking climate finance, 100% of the operation's resources will be invested in climate-change mitigation activities. These resources contribute to the IDB Group's goal of increasing the financing of climate change related projects to 30% of total approvals by year-end 2020. The project is also aligned with the Corporate Results Framework 2016-2019 (document GN-2727-6) through the indicators for reduced greenhouse gas emissions.
- 1.47 The project is consistent with the Energy Sector Framework Document (document GN-2830-3) in terms of energy sustainability and energy security, as it will promote actions aimed at using energy more efficiently, thereby contributing to greater sustainability and availability of energy. The project is also consistent with the Climate Change Sector Framework Document (document GN-2835-3), as its activities will lead to a reduction of greenhouse gas emissions.
- 1.48 The project is aligned with the priority areas of the IDB Infrastructure Strategy: Sustainable Infrastructure for Competitiveness and Inclusive Growth (document GN-2710-5) through reforms to promote the rational use of energy infrastructure through energy efficiency.

## **B. Objectives, components, and cost**

- 1.49 **Objectives.** The general objective is to save energy and economic resources at federal government office buildings (FGOBs), in order to contribute to reduced greenhouse gas emissions and demonstrate the viability of these savings so that implementation can be expanded to other public buildings. The specific objectives are (i) to implement energy efficiency measures at FGOBs, and (ii) to strengthen the energy efficiency-related institutional capacities of federal government entities and dependencies (FGEDs). The project has components, for which FIDE will serve as the operating unit.
- 1.50 **Component I: Investment in high-efficiency equipment (US\$27 million).** This component will support investments (with a demonstration effect) to replace high-consumption equipment with highly energy-efficient equipment at FGEDs. Support will be provided under this component to (i) develop detailed plans, consistent with the project Operations Manual;<sup>27</sup> (ii) implement the detailed plans by replacing high-consumption lighting and air conditioning equipment with highly efficient technologies. The study conducted by the Bank estimated that, in accordance with the budget for this operation, investments will be carried out at 1,350 FGOBs over a period of four years.
- 1.51 **Component II: Institution-strengthening and implementation support (US\$3 million).** This component will support capacity-building at FGEDs to assess and quantify the existing potential for savings; to select, procure, operate, and maintain energy-consuming equipment; and to develop proposals for improving energy efficiency. Specifically, support will be provided for (i) development and

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<sup>27</sup> Preparation of the detailed plans will include energy-related diagnostic assessments of lighting and air conditioning at FGOBs, calculation of the investments necessary for implementation, specifications for the equipment to be installed, logistics for implementation of the detailed plans, and associated timelines.

implementation of a system for monitoring energy consumption and savings at FGEDs, which will be used by CONUEE to help identify consumption levels in excess of the ranges established for each area and type of equipment; (ii) design of a capacity-building and institutional strengthening strategy for energy efficiency at FGEDs, to perform the necessary maintenance to achieve energy savings through energy efficiency measures, as well as to identify, evaluate, and propose new energy efficiency measures; (iii) capacity-building for the operation, control, and maintenance of high-efficiency equipment to be installed under the project, to ensure that the equipment is operated properly, and the expected savings achieved; and (iv) activities to support project management. The expenditures associated with these activities are given in Table 2.

**Table 2. Total program cost (US\$)**

Investment categories	IDB (US\$)
<b>Component I. Investment in high-efficiency equipment</b>	<b>27,000,000</b>
Development of detailed plans	1,575,000
Procurement and installation of high-efficiency equipment, and removal and management of retired equipment and associated waste	25,425,000
<b>Component II. Institution-strengthening and implementation support</b>	<b>3,000,000</b>
Development and implementation of a system to monitor energy consumption and savings at federal government entities and dependencies	1,900,000
Development of training strategy	200,000
Implementation of capacity-building program	650,000
Activities to support project management	250,000
<b>Total</b>	<b>30,000,000</b>

- 1.52 **Gender dimension.** The objective of establishing and promoting a culture of inclusion will be taken into account in designing a training and institutional strengthening strategy. In view of the current gender imbalance related to a lack of women in positions of responsibility for facility management (see paragraph 1.45), heavy emphasis will be put on raising awareness of the importance of gender and the benefits of a more diverse workplace. Mentoring programs will also be promoted, as will women's participation in training related to energy efficiency and management of material resources at FGEDs, with women constituting at least 30% of those receiving training.

### **C. Key results indicators**

- 1.53 **Expected outcomes.** The Results Matrix lists the impact and outcome indicators associated with the project objectives. The expected outcomes are as follows: (i) energy savings of 103.5 GWh per year, equivalent to 29.2% of consumption at



FGOBs owned by the federal government; (ii) reduction of greenhouse gas emissions by 46,953 tCO<sub>2</sub>e per year; and (iii) economic savings of US\$9.4 million per year, as of the fourth year of the project. However, savings will begin to be achieved in the project's first year and increase as buildings are added to the project. Once the project has been implemented, annual energy savings on electricity will be approximately 29.7% of the current total budget.<sup>28</sup>

## II. FINANCING STRUCTURE AND MAIN RISKS

### A. Financing instruments

- 2.1 The project will be financed with a US\$30 million specific investment loan to the United Mexican States from the Bank's Ordinary Capital under the Flexible Financing Facility (document FN-655-1).
- 2.2 In view of annual availability of FOTEASE's budgeted resources and the expected response from FGEDs, a four-year disbursement period was established, running from the effective date of the loan contract, in accordance with the cost table and disbursement schedule reflected in Tables 2 and 3 and in the [multiyear execution plan](#). A four-year execution period for this project is justified by the number of federal government office buildings (FGOBs) set to benefit, the number of consulting firms capable of preparing the detailed plans, and experience with other energy efficiency programs in Mexico.

Table 3. Disbursement schedule (US\$)

Year 1	Year 2	Year 3	Year 4	Total
3,990,663	6,011,955	9,713,402	10,283,980	30,000,000

### B. Environmental and social safeguard risks

- 2.3 In accordance with the Environment and Safeguards Compliance Policy (Operational Policy OP-703), the project has been classified as category "B," which relates to operations that may cause mainly localized, short-term negative environmental impacts, including associated social impacts, for which mitigation measures are available. The project is expected to have a net-positive environmental and social impact on the quality of life of Mexico's residents and on greenhouse gas emissions in the electricity sector as a result of energy efficiency solutions. However, the replacement of lighting and air conditioning equipment will produce a significant amount of waste, some of which may be deemed hazardous, which will be confirmed during the due diligence phase.
- 2.4 The operation has potentially negative environmental impacts that are mitigable, localized, and not scalable. There is a medium-level risk related to the destruction and environmental management of lighting and air conditioning equipment and associated waste, which will be mitigated because the companies supplying and installing the efficient equipment will also be responsible for destroying and environmentally managing the replaced equipment and associated waste, through

<sup>28</sup> Each project has a four-year payback period. The equipment to be installed has a useful life of at least 10 years.

companies duly approved by the environmental authorities and in accordance with established procedures. An environmental management plan is in place, and specialized companies are available. All impacts will be monitored and mitigated with the measures included in the [environmental and social management plan \(ESMP\)](#). The energy efficiency solutions to be financed are expected to generate energy savings and reduce greenhouse gas emissions in Mexico's electricity sector. The [environmental and social analysis](#) was performed, and an ESMP was prepared that incorporates a waste management plan for proper handling and disposal of special and hazardous urban solid waste associated with the project. A significant public consultation gathering was held with the project's key stakeholders at CONUEE's facilities in Mexico City on 2 August 2017, and the associated report was produced.

- 2.5 The preliminary environmental and social analysis of the operation was released online, on the Bank's and CONUEE's websites, prior to the analysis mission. The final version of the environmental and social analysis, which incorporates the recommendations from the public consultation and includes the ESMP and waste management plan, will be posted on the websites of the Bank and the executing agency before the meeting of the Operations Policy Committee.

**C. Other key risks and issues**

- 2.6 The possibility of low demand for project resources among FGEDs was identified as a high-level risk. To mitigate this risk, CONUEE will issue administrative orders to promote the participation of FGEDs. Under the training strategy, FGED participation will be promoted through courses and events, as well as the working groups, committees, and subcommittees of the federal government's energy efficiency program, in which FGEDs are involved.
- 2.7 The possibility of a lack of project sustainability or continuity following a change of administration was identified as a medium-level risk. To mitigate this risk, work will be done with the transition team to raise awareness of the importance of the project by presenting results showing the program's viability and benefits.
- 2.8 The potential for delays in executing the project has been identified as a medium-level risk. To mitigate this risk, the program includes preparation of detailed plans to help specify actions and logistics for implementation.
- 2.9 **Sustainability.** To ensure that the project is operationally sustainable, a program is included as part of Component II to train FGED personnel for the operation, control, and maintenance of the high-efficiency equipment to be installed. In addition, the bidding documents will establish that bidders should be able to provide technical assistance and replacement parts in the country. Also as part of the project, a system for tracking energy consumption at FGEDs will be developed and implemented both at CONUEE, to monitor the energy performance of federal public buildings, and at the highest-consuming FGEDs. This system will make it possible to identify and correct electricity consumption levels in excess of established ranges in view of the energy efficiency measures that have been implemented. Lastly, the sustainability of the energy efficiency measures, as a result of the installation of high-efficiency lighting and air conditioning equipment, is ensured because this equipment will have to be replaced at the end of its useful life with equipment meeting the Mexican Official Standards for energy efficiency.

#### **D. Economic and technical viability**

- 2.10 **Economic viability.** The project's economic evaluation found that the benefits of project implementation have a net present value of US\$9,098,624, mainly as a consequence of economic savings on electricity bills from more energy efficient lighting and air conditioning and, to a lesser extent, reduced greenhouse gas emissions. Based on the project's investments and benefits, the projected internal rate of return is 14.76%.
- 2.11 **Technical viability.** In preparing the operation, a study was done to evaluate the potential and financial/administrative strategy for implementing energy efficiency measures at FGOBs. The study looked at the following: (i) analysis of electricity consumption by end-use; (ii) identification and evaluation of primary areas of opportunity related to energy efficiency; (iii) estimation of potential for energy and economic savings; (iv) estimation of investments necessary to implement the energy efficiency measures in question; (v) evaluation of financial/administrative mechanisms to implement the energy efficiency project at FGOBs; and (vi) development of a proposal for project operation. The extensive experience in implementing this type of program and reaping its benefits strengthens its viability.
- 2.12 From a technical standpoint, the study (i) quantified the importance of electricity consumption by lighting equipment (26.6% of total consumption) and air conditioning equipment (41.3%) of total consumption at FGOBs; (ii) calculated, based on equipment age, that 11.3% of total consumption for lighting and 21.1% of total consumption for air conditioning could be saved if equipment is replaced by high-efficiency equipment, and that the potential savings from replacing lighting and air conditioning equipment is 115 GWh, or 32.4% of total consumption at FGOBs; and (iii) calculated the economic savings on lighting at US\$3.93 million, and on air conditioning at US\$5.92 million, equating to a combined 33.8% savings on electricity bills at FGOBs.<sup>29</sup>
- 2.13 The proposed administrative arrangement for project implementation has been tested on energy efficiency programs in other sectors, which helps to ensure that the arrangement is viable.

### **III. IMPLEMENTATION AND MANAGEMENT PLAN**

#### **A. Summary of implementation arrangements**

- 3.1 **Institutional and implementation considerations.** The borrower will be the United Mexican States, acting through the Department of Treasury and Public Credit (SHCP). The Department of Energy (SENER) will be the project executing agency and will coordinate the different institutions involved. The loan proceeds will be channeled through the Fund for the Energy Transition and Sustainable Energy Usage (FOTEASE) in the form of transfers to the project operating unit.
- 3.2 SENER, acting through the Office of Energy Efficiency and Sustainability and supported by the Trust Fund for Electrical Energy Savings (FIDE) and the National Commission on Efficient Energy Usage (CONUEE), will be responsible for project

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<sup>29</sup> The savings on electricity bills include US\$600,000 due to the rate differential associated with switching from low voltage to medium and high voltage.

execution, administration, budgeting, monitoring, and evaluation on the basis of the following documents: (i) [procurement plan](#), (ii) [annual work plan \(AWP\)](#), (iii) Results Matrix, (iv) multiyear execution plan, and (v) project performance monitoring report (PPMR).

- 3.3 SENER will sign a collaboration agreement with FIDE, which will be the project operating unit, including the following activities: (i) bidding process and selection of service providers, equipment, and installation; (ii) accounting and financial recordkeeping on investments; and (iii) monitoring and evaluation of activities and progress reporting on the detailed plans project. These three items fall under project Component I. Under Component II, FIDE will conduct the capacity-building activity for the operation, control, and maintenance of the high-efficiency equipment to be installed under the project.<sup>30</sup>
- 3.4 SENER, with CONUEE's support as technical coordinator, will conduct activities such as (i) determining the terms of reference for preparing the detailed plans; (ii) determining and providing specifications for equipment to be installed in implementing the detailed plans; (iii) recording and monitoring energy and economic savings through the tracking system to be developed as part of Component II; (iv) managing participation of FGEDs; (v) designing, coordinating, and monitoring the capacity-building program at FGEDs; and (vi) disseminating the project outcomes. The project flowchart is provided in [optional electronic link 6](#).
- 3.5 **Project and resource authorization.** The project's budget and operating regulations are authorized by the FOTEASE technical committee as the basis for allocation of the project resources. These resources are transferred to FIDE, which, under the framework agreement signed with SENER, will be the project operating unit, responsible for executing the authorized budget in accordance with the approved operating regulations.
- 3.6 **FGED acceptance to participate in the project.** CONUEE issues the administrative orders and eligibility criteria for FGEDs to participate in the project and will issue the call for interested FGEDs to confirm their participation in the project.
- 3.7 **Preparation, approval, and validation of detailed plans.** FIDE, in coordination with CONUEE, will (i) select and engage consulting firms to prepare the detailed plans in accordance with the terms of reference agreed upon with CONUEE;<sup>31</sup> and (ii) validate the detailed plans and submit them to participating FGEDs for

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<sup>30</sup> FIDE's operating expenditures will be covered the SENER.

<sup>31</sup> The objective of the detailed plans is to generate information on the group of FGOBs, so that the bidding process can be conducted for selection and contracting of the suppliers of lighting and air conditioning equipment, as well as services for removal and final disposal of inefficient equipment and associated waste, installation of efficient equipment, and getting the equipment up and running. The detailed plans include (i) performance of energy assessments, to calculate the potential energy and economic savings and the investments necessary to implement the energy efficiency measures in question; (ii) specification of the efficient equipment to be installed, including make-and-model options available in the marketplace, and costs based on purchase volume; (iii) detailed information on operations necessary for removal and final disposal of retired equipment and associated waste, in accordance with applicable environmental regulations; and (iv) logistics and costs of the operations involved in implementing the energy efficiency projects, associated with the uses of FGOBs and their work programs, and the dates and times for the specified operations.

consideration and acceptance, as applicable, to implement the detailed plans at their facilities.

- 3.8 **Consolidated procurement and execution of energy efficiency projects.** Based on the validated and accepted detailed plans, and in accordance with the Bank's procurement policies, FIDE will conduct the bidding process for selection and contracting of the suppliers of lighting and air conditioning equipment, including services for removal and final disposal of obsolete equipment, installation of high-efficiency equipment, and getting the equipment up and running. This process will be consolidated for each group of FGOBs participating in the project.
- 3.9 **Validation of implementation of detailed plans.** FIDE, in coordination with CONUEE, will validate proper implementation and energy efficiency projects and will submit them to the FGEDs for consideration and acceptance.
- 3.10 **Operation and maintenance.** The FGEDs will be responsible for operating and maintaining the efficient equipment installed at FGOBs in accordance with the manufacturers' instructions.
- 3.11 **Special contractual conditions precedent to the first disbursement: (i) signature of the mandate and project execution contract between the borrower, the executing agency, and Nacional Financiera (NAFIN) as the borrower's financial agent;** this condition is included at the express request of the Government of Mexico as a mechanism for the SHCP to outsource the functions of monitoring project execution to a national development bank; **(ii) approval and entry into force of the project Operations Manual agreed upon with the Bank;** the project Operations Manual is a key instrument governing project execution and supervision, and needs to be in place prior to the first disbursement as an implementation process agreed upon by the parties, since the project execution arrangements involve multiple institutions; and **(iii) signature of a collaboration agreement between SENER and FIDE, enabling FIDE to act as the project's operating unit;** since FIDE is a key part of the project execution structure, the borrower has asked for this agreement to be signed prior to the first disbursement. These conditions are necessary to ensure effective execution of the project and minimize the risk of delays in approving and implementing the project Operations Manual and in FIDE assuming its role as operating unit.
- 3.12 **Operations Manual.** Project execution will be governed by the program Operations Manual, which will be consistent with FOTEASE's regulations. During execution, the Operations Manual may be amended with the Bank's written no objection. The Operations Manual will incorporate all procedures to be used during the project and will include a financial section with the terms and conditions of the lending facility to be used in Component I, and the arrangement for technical coordination among SENER, CONUEE, and FIDE, as well as with the FGEDs that, as project beneficiaries, will receive the newly installed efficient equipment at no cost to them. The Operations Manual will include (i) a detailed execution arrangement for Component I, including (a) beneficiary selection and prioritization criteria; (b) technical criteria for the equipment to be removed and installed; and (c) criteria and obligations for use of the lending facility; (ii) institutional and operational roles and responsibilities of the entities in question; (iii) intervention strategy; (iv) policies and procedures for the selection and contracting of works, goods, and services, including those for the technical operator; (v) policies and

procedures for administrative and financial management; (vi) procedures for monitoring and supervision; (vii) flow of information among SENER, CONUEE, and FIDE for preparation of reports; and (viii) measures, actions, and procedures as part of the ESMP and waste management plan, which will constitute an annex to the Operations Manual.

- 3.13 **Procurement.** Procurement processes will be conducted in accordance with the Bank's policies set forth in documents GN-2349-9 and GN-2350-9. No exception to these policies is foreseen.
- 3.14 **Audits.** During the loan disbursement period, SENER will deliver the project's audited annual financial statements to the Bank within 180 days after the close of the fiscal period. The audit will be performed by independent auditors acceptable to the Bank. The scope and related considerations will be governed by the Financial Management Guidelines for IDB-financed Projects (document OP-273-6) and the Guidelines for Financial Statements and External Audits. The costs of the audit will be financed with project resources. The audit firm will be engaged by SENER.

**B. Summary of arrangements for monitoring results**

- 3.15 **Monitoring and evaluation.** The monitoring arrangements will include administrative missions, six-monthly status reports, (external) annual audits, a midterm evaluation, and a final evaluation. SENER, acting through the Office of Energy Efficiency and Sustainability and supported by FIDE and CONUEE, will be responsible for overall monitoring of the project based on the [monitoring and evaluation plan](#), tracking the following output indicators: (i) detailed plans prepared, (ii) detailed plans implemented, (iii) development and implementation of a system for tracking energy consumption and savings at FGOBs, (iv) design of a training and institutional strengthening strategy, (v) in-person courses held, (vi) persons trained, (vii) online courses available, and (viii) persons trained through online courses. SENER will also be responsible for administrative and budgetary monitoring and control of the project based on the following documents: AWP, Results Matrix, multiyear execution plan, procurement plan, and PPMR.
- 3.16 **Retroactive financing.** The Bank may provide up to US\$6 million (20% of the proposed loan amount) in retroactive financing, chargeable against the loan proceeds, for eligible expenditures incurred by the executing agency prior to the loan approval date, provided that requirements substantially similar to those set forth in the loan contract have been met. Such expenditures must have been incurred on or after 6 July 2017 (project profile approval date), but under no circumstances will expenditures be included if incurred more than 18 months prior to the loan approval date.
- 3.17 SENER, in coordination with CONUEE and FIDE and with their support, will prepare six-monthly status reports on execution that include (i) progress on physical and financial execution of project components; (ii) project activities in accordance with the AWP and Results Matrix; (iii) analysis, progress, and evaluation of impact and outcome indicators in accordance with the Results Matrix; (iv) relevant considerations in accordance with the risk matrix; (v) implementation of the ESMP and waste management plans; (vi) review and update of the multiyear execution plan, procurement plan, and AWP; and (vii) lessons learned and strategy to improve execution.

- 3.18 **Midterm and final evaluations.** The midterm evaluation will be conducted when 50% of the project resources have been disbursed, or at month 24 of execution, whichever occurs first, and will include (i) progress toward expected outcomes and objectives met; (ii) contractual obligations satisfied; (iii) recommendations for meeting proposed targets and achieving sustainability of investments, (iv) progress in institutional development; (v) analysis of project strategy and relevance for the situation at hand; and (vi) analysis of operational and administrative arrangements used and recommendations for their optimization. The midterm evaluation will provide guidance to SENER for any necessary strategic or operational adjustments.
- 3.19 The final evaluation will be conducted within 90 days after the date of the last disbursement, and the final report will be delivered within 30 days after the final justification of the Bank's disbursements and counterpart funding. This evaluation will address (i) fulfillment of objectives and the degree to which the Results Matrix targets have been met, (ii) performance of the executing agency, (iii) factors affecting implementation, (iv) outputs of the Bank's results framework, and (v) recommendations for future operations. This evaluation will emphasize analysis of the project experience as a source of information on lessons learned for possible implementation of subsequent phases of the project, and for other resources in similar mechanisms to promote energy efficiency and renewable energy in Mexico.
- 3.20 **Ex post evaluation.** SENER will conduct an ex post review to determine whether the benefits attained were sufficient to recover the investment, considering the planned costs and costs incurred, as well as the benefits attained through the project.

Development Effectiveness Matrix		
Summary		
I. Corporate and Country Priorities		
1. IDB Development Objectives	Yes	
Development Challenges & Cross-cutting Themes	-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)* -Government agencies benefited by projects that strengthen technological and managerial tools to improve public service delivery (#)*	
2. Country Development Objectives	Yes	
Country Strategy Results Matrix	EBP 2013-2018 (GN-2749).	The energy sector is identified as an area of dialogue in the EBP with Mexico 2013-2018 (GN-2749), given that the energy reform opens up opportunities to strengthen the sector with investments that generate a decrease in the country's energy costs, improving your productivity.
Country Program Results Matrix	The operation is scheduled for CPD 2018 (ME-O0002).	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)		Energy is identified as a dialogue area in the CS
II. Development Outcomes - Evaluability		Evaluable
3. Evidence-based Assessment & Solution	8.5	
3.1 Program Diagnosis	3.0	
3.2 Proposed Interventions or Solutions	3.6	
3.3 Results Matrix Quality	1.9	
4. Ex ante Economic Analysis	7.0	
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	0.0	
4.5 Consistency with results matrix	0.0	
5. Monitoring and Evaluation	7.0	
5.1 Monitoring Mechanisms	1.1	
5.2 Evaluation Plan	6.0	
III. Risks & Mitigation Monitoring Matrix		
Overall risks rate = magnitude of risks*likelihood	Medium	
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: Budget, Treasury, Accounting and Reporting, External Control, Internal Audit.  Procurement: Information System, Price Comparison, Contracting Individual Consultant, National Public Bidding.
Non-Fiduciary		
The IDB's involvement promotes additional improvements of the intended beneficiaries and/or public sector entity in the following dimensions		
Additional (to project preparation) technical assistance was provided to the public sector entity prior to approval to increase the likelihood of success of the project		

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

The general objective is to achieve energy and economic savings in Office Buildings of the Federal Public Administration (EOAPF), which contribute to reduce emissions of Greenhouse Gases (GHG). The specific objectives are: (i) implement Energy Efficiency (EE) measures in EOAPF; and (ii) strengthen the institutional capacities in EE matters of the Dependencies and Entities of the Federal Public Administration. The program is expected to improve the EE of 1,350 EOAPF.

The diagnosis frames the problem and its causes and presents technically justified solutions. Evidence is presented of the effectiveness of similar interventions in other contexts, where although there is some impact of implementing EE solutions, the predicted savings based on engineering models differ widely from those experienced in reality.

The results matrix has vertical logic. Not all indicators are SMART or have a baseline and well-justified goals. The economic analysis is based on the estimation of predicted energy savings and the valorization of the reduction of carbon dioxide. The evaluation proposal is an ex-post cost-benefit analysis.



## RESULTS MATRIX

<b>Project objective:</b>	The general objective is to save energy and economic resources at federal government office buildings (FGOBs), in order to contribute to reduced greenhouse gas emissions and demonstrate the viability of these savings so that implementation can be expanded to other public buildings. The specific objectives are (i) to implement energy efficiency measures at FGOBs, and (ii) to strengthen the energy efficiency-related institutional capacities of federal government entities and dependencies (FGEDs).
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### EXPECTED IMPACT

Indicators	Units	Baseline 2015 <sup>1</sup>	Year 4 target	Means of verification
Increase energy efficiency at FGOBs				
Average rate of electricity consumption by all FGOBs owned by the federal government  Calculation: Annual energy consumption multiplied by the surface area of FGOBs used exclusively as office space.	KWh/m <sup>2</sup>	57.02	42.8	Annual reports on energy savings in the federal government, prepared and posted by the National Commission for Efficient Energy Usage (CONUEE) to its website.  CONUEE report confirming total square meters of office space before and after the program.  Database with information on electricity bills (energy consumption) of FGOBs, which is available with baseline information and will be included as part of the FGEDs' system for monitoring energy consumption and savings.

### EXPECTED OUTCOMES

Indicators	Units	Baseline 2015	Year 4 target	Means of verification
<b>Outcome:</b> 32.4% reduction in electricity consumption				
Total consumption of electricity at FGOBs owned by the federal government  Calculation: Annual electricity consumption after program implementation, minus pre-program consumption.	GWh/year	355	251.5	Annual reports on energy savings in the federal government, prepared and posted by CONUEE to its website.

<sup>1</sup> The 2015 baseline is used because it is the last year for which data is available. To avoid counting any savings from 2016 and 2017 that might have been achieved without program intervention, the baseline is for the year in which the detailed plans were implemented, meaning that only those savings resulting from the program will be counted.

Indicators	Units	Baseline 2015	Year 4 target	Means of verification
<b>Outcome:</b> 32.4% reduction in greenhouse gas emissions				
Greenhouse gas emissions generated by electricity consumption at FGOBs owned by the federal government, using an emissions factor of 0.45 tCO <sub>2</sub> e/MWh <sup>2</sup> from the national electricity system  Calculation: Attained electricity savings multiplied by the emissions rate of the national electricity system.	tCO <sub>2</sub> /year	161,255	114,302	Annual reports on energy savings in the federal government, prepared and posted by CONUEE to its website.  Database with information on electricity bills (energy consumption) of FGOBs, which is available with baseline information and will be included as part of the FGEDs' system for monitoring energy consumption and savings.  Greenhouse gas emissions factor of the national electricity system published by the National Institute on Climate Change and Ecology.
<b>Outcome:</b> 33.5% reduction in electricity bills at FGOBs				
Total economic savings stemming from energy efficiency measures and from reduced electricity bills <sup>3</sup>  Calculation: Product of electricity savings times the corresponding rate, plus the product of consumption at FGOBs that switched electricity rates times the current rate for medium or high voltage.	Million pesos/year (millions)	566.0	392.1	Annual reports on energy savings in the federal government, published and posted by CONUEE to its website.  Database with information on electricity bills (energy consumption) of FGOBs, which is available with baseline information and will be included as part of the FGEDs' system for monitoring energy consumption and savings.
<b>Outcome:</b> Institutional strengthening of at least 95 FGEDs				
Number of agencies and entities with institutional capacity for energy efficiency, including trained personnel and access to the system for monitoring electricity consumption and savings.	Number	0	95	The program's six-monthly status reports prepared by the Trust Fund for Electrical Energy Savings (FIDE) and CONUEE.

<sup>2</sup> Source: Database of the Department of the Environment and Natural Resources. [Emissions calculator for the National Emissions Registry](#).

<sup>3</sup> The switch from the rate for low voltage to the rate for medium or high voltage does not entail any savings of electricity, but it does entail a reduction in electricity bills since the rates for medium and high voltage are lower than the rates for low voltage.

## OUTPUTS

Outputs	Unit of measure	Targets					Means of verification
		Year 1	Year 2	Year 3	Year 4	Final target	
Component I. Investment in high-efficiency equipment							
1.1 Detailed plans prepared	Number	108	160	310	108	686	Six-monthly status reports prepared by FIDE and CONUEE.
1.2 FGOBs with detailed plans implemented	Number	76	280	378	616	1,350	
Component II. Institution-strengthening and implementation support							
2.1 Development and implementation of a system for monitoring electricity consumption and savings at FGOBs	Systems		1			1	System manual and system-generated reports.
2.2 Design of strategy for training and institutional strengthening in energy efficiency	Strategies	1				1	Strategy document.
2.3 Training of personnel responsible for material resources at FGEDs and of those responsible for energy consumption in state and municipal governments	In-person courses held	13	18	17	22	70	Report on events held and six-monthly status reports prepared by FIDE and CONUEE.
	Persons trained <sup>4</sup>	100	400	400	400	1,300	
	Online courses available	2				2	
	Persons trained through online courses <sup>5</sup>	150	400	650	850	2,050	
	Program promotion events held	6	8	8	8	30	
	Event attendees	1,000	1,350	1,350	1,350	5,050	

<sup>4</sup> At least 30% of those trained will be women.

<sup>5</sup> At least 30% of those trained will be women.

## **FIDUCIARY AGREEMENTS AND REQUIREMENTS**

**Country:** United Mexican States  
**Project number:** ME-L1267  
**Name:** Energy Efficiency Project in Federal Government Office Buildings  
**Executing agency:** Department of Energy (SENER)

### **I. EXECUTIVE SUMMARY**

- 1.1 The Bank will support the Department of Energy (SENER) in implementing energy efficiency measures focused primarily on replacing energy-intensive lighting systems and air conditioning equipment in federal government office buildings (FGOBs) with high-efficiency technologies, to achieve results with a demonstration effect in terms of energy and economic savings.
- 1.2 To do so, SENER will make use of the mechanisms of the National Commission on Efficient Energy Usage (CONUEE), which will act as the project's technical lead, selecting the technologies and the beneficiary FGOBs.

### **II. FIDUCIARY CONTEXT OF THE EXECUTING AGENCY**

- 2.1 SENER will be the executing agency. A coordination agreement will be signed with the Trust Fund for Electrical Energy Savings (FIDE) for the project Component I activities. FIDE will be responsible for all operational aspects of execution, which will primarily include procurement, contract management, payments, and financial management for the project. CONUEE, as part of SENER, will be responsible for the technical aspects of the project, selecting the technologies, their specifications, and the FGOBs.
- 2.2 Nacional Financiera (NAFIN) will serve as SENER's financial agent.
- 2.3 FIDE has extensive experience in the operation of programs conducted by SENER through the Fund for the Energy Transition and Sustainable Energy Usage (FOTEASE). These programs include (i) Replacement of Home Appliances (2009-2012), with 1.7 million refrigerators and 201,000 air conditioning units replaced. This program, coordinated by SENER, was implemented through a line for discounting credit instruments extended by NAFIN to FIDE, with a cash guarantee furnished by FOTEASE and loan recovery through the electricity bill payments to the Federal Electricity Commission (CFE); (ii) Sustainable Lighting (2011-2012), with 45.8 million incandescent light bulbs replaced with compact fluorescent bulbs in cities; (iii) Replacement of Incandescent Bulbs with Compact Fluorescent Bulbs, with 32 million incandescent bulbs replaced with compact fluorescent bulbs in rural areas. These programs were executed with resources from FOTEASE, both for

- procurement of compact fluorescent bulbs to replace the incandescent bulbs and for program operation, which was carried out by FIDE; (iv) Business Ecolending, with financing for replacement of equipment benefiting more than 18,000 micro, small, and medium-sized enterprises, using the same execution mechanism as for the Replacement of Home Appliances program. Before FOTEASE was created, FIDE also implemented the following programs: (v) Replacement of Compact Fluorescent Light Bulbs (1996-2012), with 12.7 million bulbs replaced; and (vi) Market Development and Incentives, with a Bank loan to CFE with FIDE serving as the implementing agency; in 1998-2003 the market for electric motors was transformed and incentives were provided for the sale of more than 200,000 high-efficiency motors, 1.35 million efficient linear light bulbs and ballasts, and 17,000 efficient compressors.
- 2.4 SENER is currently the executing agency for the Municipal Energy Efficiency and Sustainability Project (PRESEM), which is being carried out with the proceeds of a World Bank loan and counterpart funding from FOTEASE.
  - 2.5 The objective of PROSEM is to develop and test sustainable operational and financial mechanisms for energy efficiency investments in municipios.
  - 2.6 The participating institutions are the same as for the proposed project, except for the addition of CONUEE. The implementation mechanism is also very similar; specifically, FIDE is serving as the operating unit for PRESEM under an agreement with SENER, the executing agency.

### **III. FIDUCIARY RISK EVALUATION AND MITIGATION ACTIONS**

- 3.1 The procedures for coordination between SENER-FOTEASE and FIDE were evaluated using questionnaires and interviews. The control and monitoring mechanisms of SENER-FOTEASE, as project executing agency, were also reviewed. In addition, CONUEE's technical coordination capacity and systems for supporting project activities were evaluated.
- 3.2 FIDE's institutional capacity was assessed using the Bank's Institutional Capacity Assessment System (ICAS). This assessment included the following systems: (i) organizational and legal structure; (ii) personnel management; (iii) programming of operations, procurement, and asset management; (iv) financial administration; (v) supervision of operations; (vi) internal and external control; and (vii) monitoring of outcomes and other determining factors in institutional sustainability.
- 3.3 The assessments found that the entities participating in project execution have a satisfactory level of development of fiduciary and technical systems, so the risk associated with the project activities is low.

### **IV. CONSIDERATIONS FOR THE SPECIAL PROVISIONS OF THE LOAN CONTRACT**

- 4.1 The exchange rate for accountability reporting will be the rate in effect on the last business day of the month before the respective payments are made.
- 4.2 SENER, acting through NAFIN, will deliver audited financial statements on an annual basis during the execution period within 180 days after the close of the fiscal period, as well as an audited financial statement within 180 days after the

last disbursement. These financial statements will be audited by Bank-eligible auditing firms in accordance with terms of reference agreed upon with the Civil Service Department (SFP) and the Bank.

## **V. AGREEMENTS AND REQUIREMENTS FOR PROCUREMENT EXECUTION**

- 5.1 All procurement processes, regardless of type, will be conducted by FIDE in accordance with the Policies for the Procurement of Goods and Works Financed by the Inter-American Development Bank (document GN-2349-9) and the Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank (document GN-2350-9), both of 2011. If these policies are amended, the latest version may be adopted, if the executing agency so agrees in writing.
- 5.2 **Procurement of works, goods, and nonconsulting services.** Procurement of works, goods, and nonconsulting services under the project subject to international competitive bidding (ICB) and bidding processes subject to national competitive bidding (NCB) will be conducted using the bid documents agreed upon between the SFP and the Bank, available at [www.funcionpublica.gob.mx](http://www.funcionpublica.gob.mx).
- 5.3 The project's sector specialist is responsible for reviewing the technical specifications for procurement processes during the preparation of selection processes.
- A. Selection and contracting of consultants**
- 5.4 **Contracts for consulting services with firms.** Contracts for consulting services with firms will be procured using the standard request for proposals agreed upon between the Bank and the SFP, available at [www.funcionpublica.gob.mx](http://www.funcionpublica.gob.mx). Procurement notices for consulting contracts over US\$200,000 will be published internationally (UNDB Online). The short list for contracts under US\$500,000 may comprise solely national firms.
- 5.5 **Selection of individual consultants.** Contracts for consulting services with individual consultants will be procured in view of their qualifications to perform the work, based on comparison of qualifications of at least three candidates. These procurement processes will use the model contract for individual consultants agreed upon between the SFP and the Bank, which may be found at [www.funcionpublica.gob.mx](http://www.funcionpublica.gob.mx). The project's sector specialist is responsible for reviewing the terms of reference for procurement of consulting services.
- 5.6 **Use of country procurement system.** In February 2013, the Bank's Board of Executive Directors agreed to the increased use of Mexico's public procurement system (adoption of Mexico's public procurement system) in accordance with the update to the country strategy (document GN-2595-3).<sup>1</sup> This system may be used

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<sup>1</sup> The procurement system of Mexico's federal government will be used on all contracts up to the Bank's ICB thresholds for procurement of works (nominally US\$15 million) and for procurement of goods and services (nominally US\$3 million). The Bank's policies set forth in documents GN-2349-9 and GN-2350-9 will apply to any contracts in amounts above these thresholds. Use of the procurement system does not apply to the following: (i) consulting contracts, (ii) PEMEX contracts, (iii) contracts in accordance with state and municipal laws and regulations, and (iv) single-source selection between public entities (interadministrative contracts). The federal system's provisions related to exclusion of foreign nationals and degree of national integration do not apply either.

once the corresponding implementation agreement is signed with the Government of Mexico.

Procurement thresholds (US\$)							
Works			Goods <sup>2</sup>			Consulting services	
ICB	NCB	Shopping	ICB	NCB	Shopping	International publicity for consulting services	Short list 100% national
> 15,000,000	< 15,000,000 and > 500,000	< 500,000	≥ 3,000,000	< 3,000,000 ≥ 100,000	< 100,000	> 200,000	< 500,000

## B. Main procurements

5.7 No complex procurement processes are expected.

5.8 For Component I, the following types of procurement processes will be used:

- a. Consulting services for preparation of detailed plans entailing performance of energy-related diagnostic assessments at FGOBs, economic evaluation of investments to be carried out, specification of equipment to be installed to replace energy-inefficient equipment, and any other activities such as isolation of electrical circuits at FGOBs, switching electricity service rates, and others.
- b. Implementation of the detailed plans, including the procurement of efficient equipment, primarily for air conditioning equipment, which may entail any of the following types: chillers, package, or minisplit air conditioning equipment; and lighting equipment, primarily light-emitting diode (LED) bulbs. This activity also includes the services to install the new equipment and remove the energy-inefficient equipment, as well as for the environmentally specified handling of associated waste.

5.9 The following types of procurement processes will be used for Component II:

- a. Consulting services for development and implementation of a system for monitoring and controlling electricity consumption, including monitoring of implementation of energy efficiency measures at FGOBs.
- b. Consulting services for design of an institutional and training strategy for energy efficiency at federal government entities and dependencies (FGEDs).
- c. Training services for personnel at FGEDs, as well as state government agencies and entities.
- d. Consulting services for activities to support project management.

5.10 **Procurement supervision and procurement plan.** Because the institutional assessment revealed a low level of risk, ex post reviews will be used for procurement processes unless the procurement plan calls for ex ante reviews in specific cases. If necessary, the Bank may provide training, guidance, and support for procurement processes. The procurement plan may be reviewed and updated at any time.

<sup>2</sup> Includes nonconsulting services.

- 5.11 **Procurement records and files.** Files will be available for any procurement review that the Bank deems appropriate.
- 5.12 **Retroactive financing.** The Bank may provide up to US\$6 million (20% of the proposed loan amount) in retroactive financing, chargeable against the loan proceeds, for eligible expenditures incurred by the executing agency prior to the loan approval date, provided that requirements substantially similar to those set forth in the loan contract have been met. Such expenditures must have been incurred on or after 6 July 2017 (project profile approval date), but under no circumstances will expenditures be included if incurred more than 18 months prior to the loan approval date.

## **VI. FINANCIAL MANAGEMENT AGREEMENTS AND REQUIREMENTS**

### **A. Programming and budget**

- 6.1 Because all projects of the Mexican government, including those financed by international organizations, are part of the budgets authorized for agencies and entities, each public institution is required to maintain integrated control in this area. For SENER-FOTEASE, this control is carried out through the SIAF budgeting and accounting system that SENER has established nationwide.
- 6.2 The executing agency's duties, programs, and projects are part of its annual budget of expenditures. The budget authorized for the executing agencies is based on an annual programming and budgeting exercise. Programming, budgeting, expenditure control, accounting, and reporting on the basis of financial information are governed by a variety of requirements issued primarily by the SHCP, which ensures consistency in requirements for recordkeeping and use of established systems.

### **B. Accounting and information systems**

- 6.3 SENER uses the Integrated Financial Administration System (SIAF) for budgetary and accounting control. The Department of Treasury and Public Credit (SHCP) has implemented the Budget Accounting System (SICOP), which is the mandatory comprehensive system for all federal government agencies for processing budgetary, payment, and accounting transactions, thus consolidating requirements for financial record-keeping and control. SIAF and SICOP are institutional systems aligned with the SHCP's system, and transactions are processed internally.

### **C. Disbursements and cash flow**

- 6.4 FIDE will request advances of funds from SENER-FOTEASE for activities in accordance with its financial needs for a projected period of up to six months. FIDE will render accounts to SENER-FOTEASE on the use of these resources and may request subsequent advances after 80% of the previous advance has been justified.
- 6.5 SENER-FOTEASE may request reimbursement from the Bank for each disbursement made to FIDE at the time of the disbursement.
- 6.6 In view of the low level of risk, ex post reviews by the Bank are recommended for expenditures incurred by FIDE.



**D. Internal control and internal audit**

- 6.7 SENER has an internal control unit headed by an individual who is appointed by the SFP and is responsible for inspecting, monitoring, and implementing the Good Governance Agenda on the basis of transparency, accountability, and strict compliance with laws and regulations in adherence to the SFP's requirements and all other applicable provisions. Implementation, control, and evaluation of federal public spending is in accordance with the federal budget of expenditures and the Federal Budget and Treasury Responsibility Act and its associated regulations.

**E. External control and reports**

- 6.8 **Auditing.** SENER will submit audited financial statements each year within 180 days after the end of each fiscal period. The auditing firm will be designated by the SFP with the Bank's no objection. The audit work will be reviewed in accordance with the terms of reference agreed upon between the Bank, SENER, and the SFP. The external audits may be financed with loan proceeds and counterpart resources.

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

PROPOSED RESOLUTION DE-\_\_\_/18

Mexico. Loan \_\_\_\_/OC-ME to the United Mexican States  
Energy Efficiency Project in Federal Government  
Office Buildings

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 United Mexican States, as borrower, for the purpose of granting it a financing to cooperate in the execution of the Energy Efficiency Project in Federal Government Office Buildings. Such financing will be for the amount of up to US\$30,000,000 from the resources of the Bank's Ordinary Capital, and will be subject to the Financial Terms and Conditions and the Special Contractual Conditions of the Project Summary of the Loan Proposal.

(Adopted on \_\_ \_\_\_\_\_ 2018)