



OFFICIAL USE ONLY

R2018-0045/1

GEF/R2018-0002/1

March 13, 2018

**Closing Date: Thursday, March 30, 2018
at 6 p.m.**

FROM: Vice President and Corporate Secretary

Mexico - Energy Efficiency in Public Facilities Project (PRESEMEH)

Additional Financing and Restructuring

Project Paper

Attached is the Project Paper regarding a proposed additional loan and restructuring and an additional GEF grant to Mexico for the Energy Efficiency in Public Facilities Project (PRESEMEH) (R2018-0045 [GEF/R2018-0002]), which is being processed on an absence-of-objection basis.

Distribution:

Executive Directors and Alternates

President

Bank Group Senior Management

Vice Presidents, Bank, IFC and MIGA

Directors and Department Heads, Bank, IFC and MIGA

This document has a restricted distribution and may be used by recipients only in the performance of their official duties. Its contents may not otherwise be disclosed without World Bank Group authorization.

Document of
The World Bank

FOR OFFICIAL USE ONLY

Report No: PAD2674

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT PAPER

ON A

PROPOSED ADDITIONAL LOAN AND RESTRUCTURING

IN THE AMOUNT OF US\$50 MILLION

AND

A PROPOSED ADDITIONAL GRANT

FROM THE GLOBAL ENVIRONMENT FACILITY (GEF)

IN THE AMOUNT OF US\$5.79 MILLION

TO THE

UNITED MEXICAN STATES

FOR AN

ADDITIONAL FINANCING FOR ENERGY EFFICIENCY IN PUBLIC FACILITIES PROJECT –
PRESEMEH

March 8, 2018

Energy & Extractives Global Practice
Latin America And Caribbean Region

This document has a restricted distribution and may be used by recipients only in the performance of their official duties. Its contents may not otherwise be disclosed without World Bank authorization.

CURRENCY EQUIVALENTS

(Exchange Rate Effective Dec 3, 2017)

Currency Unit = Mexican Pesos

18.28 = US\$1

FISCAL YEAR

January 1 - December 31

Regional Vice President: Jorge Familiar

Acting Country Director: Jutta Ursula Kern

Senior Global Practice Director: Riccardo Puliti

Practice Manager: Antonio Alexandre Rodrigues Barbalho

Task Team Leader(s): Janina Franco / Martina Bosi

ABBREVIATIONS AND ACRONYMS

A/C	Air conditioning
AEFCM	Federal Authority for Educational Services in Mexico City (<i>Autoridad Educativa Federal en la Ciudad de México</i>)
AF	Additional Financing
AFD	French Development Agency (<i>Agence Française de Développement</i>)
AIA	Activity Initiation Agreement
ASF	Supreme Audit Institution (<i>Auditoría Superior de la Federación</i>)
BANOBRAS	National Bank for Public Works and Services (<i>Banco Nacional de Obras y Servicios Públicos</i>)
CCINS	Coordinating Commission of National Institutes of Health (<i>Comisión Coordinadora de Institutos Nacionales de Salud</i>)
CFE	Federal Electricity Commission (<i>Comisión Federal de Electricidad</i>)
CIEN	National Education Infrastructure Certificates (<i>Certificados de Infraestructura Educativa Nacional</i>)
CO ₂	Carbon dioxide
CONUEE	National Commission for the Efficient Use of Energy (<i>Comisión Nacional para el Uso Eficiente de la Energía</i>)
CURB	Climate Action for Urban Sustainability
DGESE	General Directorate of Energy Efficiency and Sustainable Energy (<i>Dirección General de Eficiencia y Sustentabilidad Energética</i>)
DGETI	General Directorate for Industrial Technology Education (<i>Dirección General de Educación Tecnológica Industrial</i>)
EE	Energy Efficiency
EIRR	Economic internal rate of return
ENCC	National Climate Change Strategy (<i>Estrategia Nacional de Cambio Climático</i>)
ENE	National Energy Strategy (<i>Estrategia Nacional de Energía</i>)
EnMS	Energy Management Systems
ESA	Energy Services Agreements
ESCO	Energy Services Company
ESMAP	Energy Sector Management Assistance Programme
ESMF	Environmental and Social Monitoring Framework
Fac.	Facilities
FIDE	Electric Power Savings Trust Fund (<i>Fideicomiso para el Ahorro de Energía Eléctrica</i>)
FIRR	Financial internal rate of return
FM	Financial Management
FOTEASE	Energy Transition and Sustainable Energy Use Fund (<i>Fondo para la Transición Energética y el Aprovechamiento Sustentable de la Energía</i>)
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gases
GoM	Government of Mexico
GRS	Grievance Redress Service
GWh	Gigawatt/hour
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
IBRD	International Bank for Reconstruction and Development

IFR	Interim financial report
IMF	International Monetary Fund
IMSS	Mexican Social Security Institute (<i>Instituto Mexicano del Seguro Social</i>)
INEGI	National Institute of Statistics and Geography (<i>Instituto Nacional de Estadística y Geografía</i>)
INIFED	National Institute of Physical Infrastructure for Education (<i>Instituto Nacional de la Infraestructura Física Educativa</i>)
IPF	Investment Project Financing
IRR	Internal rate of return
kWh	Kilowatt/hour
LED	Light-emitting diode
LN	Loan
M&E	Monitoring and evaluation
MB	Municipal building
MEDEC	Low-Carbon Development for Mexico (<i>México estudio sobre la disminución de emisiones de carbono</i>)
MTR	Mid-term review
MWh	Megawatt-hour
NAFIN	National Development Bank (<i>Nacional Financiera, S.N.C., I.B.D.</i>)
NAMA	Nationally Appropriate Mitigation Action
NDC	Nationally Determined Contribution
NOM	National Mexican Standard (<i>Norma Oficial Mexicana</i>)
NPV	Net present value
O&M	Operation and Maintenance
OIC	Internal Control Unit (<i>Órgano Interno de Control</i>)
OM	Operational Manual
OOA	Water and waste water utilities (<i>organismos operadores de agua</i>)
OP	Operational policy
PAD	Project Appraisal Document
PDO	Project Development Objective
PF	Public facilities
PMR	Partnership for Market Readiness
PPSD	Project Procurement Strategy for Development
PRESEM	Municipal Energy Efficiency Project (<i>Proyecto de Eficiencia y Sustentabilidad Energética Municipal</i>)
PRESEMEH	Energy Efficiency in Public Facilities Project (PRESEMEH)
PRONASE	National Program for the Sustainable Use of Energy (<i>Programa Nacional para el Aprovechamiento Sustentable de la Energía</i>)
PV	Photovoltaic
SEMARNAT	Secretariat of the Environment and Natural Resources (<i>Secretaría de Medio Ambiente y Recursos Naturales</i>)
SENER	Secretariat of Energy (<i>Secretaría de Energía</i>)
SEP	Secretariat of Public Education (<i>Secretaría de Educación Pública</i>)
SFP	Secretariat of Public Administration (<i>Secretaría de la Función Pública</i>)
SGOF	Financial Operations Subdirectoriate (<i>Subgerencia de Operación Financiera</i>)
SHCP	Secretariat of Finance and Public Credit (<i>Secretaría de Hacienda y Crédito Público</i>)
SL	Street lighting
SOE	Statement of expenditures

SSA	Secretariat of Health (<i>Secretaría de Salud</i>)
STEM	Science, technology, engineering, and math
STPS	Secretariat of Labor and Social Welfare (<i>Secretaría del Trabajo y Previsión Social</i>)
tCO ₂ eq	Tons of carbon dioxide equivalent
TESOFE	Treasury of the Federation (<i>Tesorería de la Federación</i>)
TF	Trust fund
ToRs	Terms of reference
TRACE	Tool for Rapid Assessment of City Energy
UAEM	University of the State of Mexico (<i>Universidad Autónoma del Estado de México</i>)
UREP- PRESEMEH	Responsible Project Implementing Unit for the PRESEMEH (<i>Unidad Responsable Ejecutora del Proyecto PRESEMEH</i>)
VAT	Value-added tax
WB	World Bank



BASIC INFORMATION – PARENT (Mexico Municipal Energy Efficiency Project - P149872)

Country Mexico	Product Line IBRD/IDA	Team Leader(s) Janina Andrea Franco Salazar		
Project ID P149872	Financing Instrument Investment Project Financing	Resp CC GEE04 (9262)	Req CC LCC1C (447)	Practice Area (Lead) Energy & Extractives

Implementing Agency: Secretaría de Energía (SENER)

Is this a regionally tagged project? No				
[] Situations of Urgent Need or Capacity Constraints [] Financial Intermediaries [] Series of Projects	Bank/IFC Collaboration No			
Approval Date 08-Mar-2016	Closing Date 31-Oct-2021	Original Environmental Assessment Category Partial Assessment (B)	Current EA Category Partial Assessment (B)	

Development Objective(s)

The objective of the project is to promote the efficient use of energy in the Borrower's municipalities by carrying out energy efficiency investments in selected municipal sectors and contribute to strengthening the enabling environment.

Ratings (from Parent ISR)

	Implementation	Latest ISR
--	-----------------------	-------------------



	11-Jun-2016	13-Dec-2016	16-Jun-2017	21-Dec-2017
Progress towards achievement of PDO	S	S	S	S
Overall Implementation Progress (IP)	S	S	MS	MS
Overall Safeguards Rating	S	S	S	S
Overall Risk	S	S	S	S

BASIC INFORMATION – ADDITIONAL FINANCING (Additional Financing for Energy Efficiency in Public Facilities Project (PRESEMEH) - P165585)

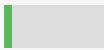

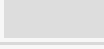
Project ID P165585	Project Name Additional Financing for Energy Efficiency in Public Facilities Project (PRESEMEH)	Additional Financing Type Restructuring, Scale Up	Urgent Need or Capacity Constraints No
Financing instrument Investment Project Financing	Product line IBRD/IDA	Approval Date 30-Mar-2018	
Projected Date of Full Disbursement 28-Feb-2022	Bank/IFC Collaboration No		
Is this a regionally tagged project? No			

- Situations of Urgent Need or Capacity Constraints
- Financial Intermediaries
- Series of Projects

PROJECT FINANCING DATA – PARENT (Mexico Municipal Energy Efficiency Project - P149872)



Disbursement Summary (from Parent ISR)

Source of Funds	Net Commitments	Total Disbursed	Remaining Balance	Disbursed
IBRD	100.00	1.28	98.72	 1.3 %
IDA				 %
Grants				 %

PROJECT FINANCING DATA – ADDITIONAL FINANCING (Additional Financing for Energy Efficiency in Public Facilities Project (PRESEMEH) - P165585)

FINANCING DATA (US\$, Millions)

SUMMARY

Total Project Cost	55.79
Total Financing	55.79
Financing Gap	0.00

DETAILS

International Bank for Reconstruction and Development (IBRD)	50.00
Trust Funds	5.79
Global Environment Facility (GEF)	5.79

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

Yes No

Does the project require any other Policy waiver(s)?

Yes No



INSTITUTIONAL DATA

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

Gender Tag

Does the project plan to undertake any of the following?

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF

Yes

b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment

Yes

c. Include Indicators in results framework to monitor outcomes from actions identified in (b)

Yes

PROJECT TEAM

Bank Staff

Name	Role	Specialization	Unit
Janina Andrea Franco Salazar	Team Leader (ADM Responsible)	Senior Energy Specialist	GEE04
Martina Bosi	Team Leader	Senior Energy Economist	GEEES
Gabriel Penalosa	Procurement Specialist (ADM Responsible)	Senior Procurement Specialist	GGOPL
Luis Barajas Gonzalez	Financial Management Specialist	Financial Management Specialist	GGOLF
Andrea Maria Castro	Team Member	Operations Analyst	GEE04



Astudillo			
Name	Title	Organization	Location
Arelija Jacive Lopez Castaneda	Social Safeguards Specialist	Social Development Specialist	GSU04
Cesar Adrian Arreola Croda	Team Member	Energy Analyst	GEE04
Daniel Alvaro Diez	Team Member	Operations Analyst	GEE04
Diacono Raul Vera Hernandez	Environmental Safeguards Specialist	Environmental Safeguard Specialist	GEN04
Dorothee Georg	Team Member	Gender Specialist	GSU04
Francisco Rodriguez	Team Member	Senior Procurement Specialist	GGOPL
Gabriela Grinsteins	Counsel	Counsel	LEGLE
Iris Del Valle Oliveros	Team Member	Program Assistant	GEE04
Jasneet Singh	Team Member	Lead Energy Specialist	GEE03
Nancy Montes de Oca	Team Member	Program Assistant	LCC1C
Extended Team			
Name	Title	Organization	Location



MEXICO

ADDITIONAL FINANCING FOR ENERGY EFFICIENCY IN PUBLIC FACILITIES PROJECT (PRESEMEH)

TABLE OF CONTENTS

I. BACKGROUND AND RATIONALE FOR ADDITIONAL FINANCING	7
II. DESCRIPTION OF ADDITIONAL FINANCING	11
III. KEY RISKS	17
IV. APPRAISAL SUMMARY	17
V. WORLD BANK GRIEVANCE REDRESS	20
VI. SUMMARY TABLE OF CHANGES	ERROR! BOOKMARK NOT DEFINED.
VII. DETAILED CHANGE(S)	ERROR! BOOKMARK NOT DEFINED.
VIII. RESULTS FRAMEWORK AND MONITORING	27
ANNEX 1: DETAILED ADDITIONAL FINANCE DESCRIPTION.....	33
ANNEX 2: ECONOMIC AND FINANCIAL ANALYSES.....	50



I. BACKGROUND AND RATIONALE FOR ADDITIONAL FINANCING

1. **The Government of Mexico through the Secretariat of Energy (SENER) has requested the World Bank’s (WB) support to scale-up the development impact of the Municipal Energy Efficiency Project (PRESEM, P149872)¹ through an Additional Financing (AF) for Energy Efficiency in Public Facilities Project (PRESEMEH, P165585).** The AF would leverage the experience gained with the development and implementation of the parent Project’s innovative operational and financing scheme for EE investments in the public sector by expanding its reach beyond municipal street lighting (SL), municipal buildings (MB) and waste water utilities (OOA) to two important public sectors with a high energy consumption and high potential for EE: health and education. The AF would lead to benefits for the Mexican authorities, by rationalizing expenditures without compromising the service quality, through lower operating costs of participating public schools and hospitals. In addition, the AF would include a Global Environment Facility (GEF) grant for the capitalization of a municipal energy efficiency (EE) contingency facility to help to partially cover the non-payment risks associated with Mexican municipalities and OOAs.

2. **The US\$100 million original loan under the parent Project is putting in place and piloting an innovative operational and financing mechanism for EE in municipal facilities, which would address key barriers; provide a boost to the EE market; generate needed budgetary relief to public entities; enhance the quality of energy services; and contribute to meeting greenhouse gas (GHG) mitigation goals.** The parent Project’s development objective (PDO) is to promote the efficient use of energy in the Borrower’s municipalities by carrying out EE investments in selected municipal sectors and contribute to strengthening the enabling environment. The parent Project mechanism, consists essentially of an EE fund operated by the Electric Power Savings Trust Fund (*Fideicomiso para el Ahorro de Energía Eléctrica*, FIDE), acting as a national Energy Services Company – ESCO –with Energy Services Agreements (ESAs),² by which beneficiaries receive the benefit of the EE investment without paying the up-front cost and then pay the energy service with the energy savings through the electricity bill. The model is helping tackle some of the key systemic barriers³ affecting the EE market, including efforts to leverage private sector involvement in the context of public facilities that face hurdles such as the ability to retain energy savings in the federal public entities’ budget for the subsequent years.⁴ The ESAs would also strongly rely on private sector energy auditors, ESCOs, manufacturers, and equipment installers.

3. **The parent Project⁵ is providing a framework that is fostering competitive processes that can mobilize the private sector to deliver EE investments into a complex subnational public sector at lower cost.** Ten municipal EE subprojects are currently under preparation under the parent Project’s Component 2 (Municipal EE investments). An important milestone was reached in December 2017 with the successful completion of a bidding process –which attracted competitive bids from seven firms – and the contract

¹ PRESEM was approved by the WB’s Board of Directors on March 8, 2016 and became effective on September 23, 2016.

² The ESAs are tri-partite and signed by SENER, FIDE and the beneficiary of the EE investment.

³ Systemic barriers include lack of information and awareness, low technical/implementation capacity, misaligned incentives, restrictive budgets/procedures, and lack of access to financing for EE investments and budget constraints.

⁴ It is expected the parent Project model would help overcome this hurdle, as the investment repayment is included in the electricity bill. Under AF subcomponent 1b, studies to tackle this barrier for private sector entry would be performed.

⁵ Most project ratings are currently rated as “Satisfactory” (including “Progress towards achievement of PDO,” “Overall Safeguards” and “Overall Risk”), while “Overall Implementation Progress” is rated as “Moderately Satisfactory.”



allocation for the first municipal EE subproject (a SL subproject for the municipality of Leon). The tendering process resulted in a significantly lower final cost (43 percent) than originally estimated based on list prices, revealing the potential for greater value for money for Mexican authorities' EE investments.

4. **As is the case for municipal services, there is a significant EE potential in public health and education facilities that can also generate important co-benefits.** Public expenditures in the two sectors represent 8.6 percent of gross domestic product (GDP). Energy savings potential of about 22 to 26 percent could be achieved in schools and of about 29 percent for hospitals.⁶ In addition to generating budgetary benefits, the associated climate co-benefits in GHG emission reductions would also contribute to achieving Mexico's Nationally Determined Contribution (NDC). Furthermore, improving EE in schools and hospitals can help improve comfort levels for patients, staff and students, expand services provided and create a demonstration effect on the viability of these investments. Safety benefits (especially relevant for girls and women) can also be linked to improved lighting enabled by EE investments. In the case of schools, the EE investments can be associated with educational benefits when EE projects are linked to education programs to raise awareness and increase understanding and knowledge of clean energy and EE.

5. **The proposed AF for Energy Efficiency in Public Facilities Project (PRESEMEH, P165585) would support activities that scale-up the impact of the parent Project's operational and financial mechanism by providing: (i) a US\$50 million AF loan to finance EE investments in public facilities (schools and hospitals); and (ii) a GEF-grant to capitalize a US\$5.79 million municipal EE contingency facility to partially cover the non-payment risks associated with Mexican municipalities and municipal water utilities.** Building on the ESA framework, the AF seeks to support a more aggregated approach enabling the bundling of several schools or hospitals under a single ESA, facilitating and accelerating deployment in the expected 350 schools and 15 hospitals. All school and hospital subprojects, whether bundled or not, would need to comply with the same eligibility criteria in terms of energy savings potential and economic rate of return (EIRR), set forth for the parent Project. A set of pre-established criteria would guide the selection individual schools and hospitals (see Annex 1). The parent Project has already developed agreement templates and institutional arrangements to work with different municipalities and water utilities, which can be adapted to public health and education institutions (and speed up implementation). New entities brought under the scope of the AF loan would include the Secretariat of Public Education (*Secretaría de Educación Pública, SEP*) in the public education sector; and the Secretariat of Health (*Secretaría de Salud, SSA*⁷) and Mexican Social Security Institute (*Instituto Mexicano del Seguro Social, IMSS*⁸) in the public health sector. Efforts to support the early development of a project pipeline to contribute to the rapid implementation are already underway with the Energy Sector Management Assistance Programme (ESMAP). In addition, the AF has the potential

⁶ Figures come from EE studies commissioned by SENER in 2015. Assessments carried out by FIDE, as well as others, have confirmed the existence of this significant EE potential.

⁷ The SSA is the governing body at the public health policy level and oversees the country's public health system. It is responsible for the social protection part of the country's health system and is also the operator, through the Coordinating Commission of National Institutes of Health (*Comisión Coordinadora de Institutos Nacionales de Salud, CCINS*) of 28 mostly specialized (Level 3) hospitals.

⁸ IMSS is a federal entity affiliated to the SSA, attending to Mexicans in salaried private (formal) employment and their families (about 50 percent of the population). Its budget represents about 45 percent of Mexico's total annual federal allocation for healthcare expenditures.



to leverage funds from the French Development Agency (*Agence Française de Développement, AFD*), early after effectiveness, to further broaden the reach of the operation.⁹ Further details can be found in Annex 1.

6. **The SEP-managed schools are well-suited for the operational and financing mechanism established under the parent Project**, given: (i) SEP’s centralized payment system for its schools’ electricity consumption; and (ii) the absence of unmanaged outstanding debt with the electric utility. In addition, SEP authorities have expressed interest in also using the opportunity offered through the proposed AF loan to do a more integrated EE upgrade project where the investments would generate EE improvements, as well as contribute to increased safety and security in the facilities. In addition, for each education facility considered for an EE investment under the parent Project, a structural assessment would be required¹⁰ – as eligibility criteria – to ensure that the investments are undertaken in structurally sound facilities. This would also contribute to the GoM’s efforts to increase compliance with earthquake resilience building codes and assure greater sustainability of the investments. The AF would also seek to build upon the ongoing support the WB is providing to SEP on school infrastructure resilience, due to the recent September earthquake.

7. **In the health sector, the AF proposes to focus on larger public health facilities (Levels 2 and 3)¹¹ given their greater energy consumption, higher energy bills and greater potential for EE.** It would include IMSS managed public health facilities, and a subset of SSA hospitals given their relevance for the country. The IMSS-managed hospitals are deemed well suited for the parent Project operational and financing mechanism, given: (i) the large size of most of its nearly 300 Level 2 and 3 hospitals; (ii) its large electricity bill (about US\$2.16 million per month); (iii) an attractive EE potential;¹² (iv) the existence of a centralized electricity payment system with the Federal Electricity Commission (*Comisión Federal de Electricidad, CFE*); and (v) no debt with the utility. The SSA hospitals, would be included through individual ESAs signed with the hospital’s administration, given its: (i) large energy consumption and EE potential; and (ii) service provision to the most vulnerable population (i.e., without insurance). As in the case of schools, a hospital’s satisfactory structural safety assessment would be an eligibility condition for EE investments under the PRESEMEH.

8. **The main technical requirements to expanding the parent Project mechanism to other public sectors, such as schools and hospitals are:** (i) energy consumption and evidence of economic EE potential; and (ii) regular payment of energy bills and/or acceptable plan to repay any debt to CFE (financial discipline). A portion of the EE investment is covered by the beneficiary’s energy service payments and the other, through a direct financial support (from the AF loan), as is the case for municipal EE investment. As has been the experience elsewhere, direct financial support, especially at the beginning of a new EE program, effectively helps secure buy-in and participation, move faster to implementation and generate experience and confidence that can translate into greater participation and market information to help sustain EE activities. The direct support would decrease over time.

⁹ The WB and AFD teams collaborated during the AF’s preparation. Due to uncertainty on the timing/outcome of AFD’s financing agreement, the GoM decided to proceed with the IBRD loan and grant independently, while it is still considering AFD’s support.

¹⁰ The structural assessment could be performed where it is not available.

¹¹ Level 2 includes general hospitals with emergency, hospitalization and basic medical specialties; and Level 3 includes hospitals of high specializations and facilities that perform medical training and research. Individually, these last two levels also serve larger shares of the population.

¹² As EE potential in hospitals can also be found within the use of fossil fuels (mostly used for steam generation), this option would also be considered if it could be integrated within the parent Project’s ESA scheme.



9. **The AF also leverages GEF funds to capitalize a contingency facility to mitigate the higher non-payment risk of municipal entities and build confidence, especially by the private sector, in the parent Project mechanism and EE investments.** The contingency facility would help ensure the achievement of the parent Project's expected energy savings and global GHG benefits associated with EE investments in municipal facilities. The 2016 parent Project Appraisal Document (PAD, Report No. PAD1193) mentions the possibility of using GEF System for Transport Allocation of Resources (STAR) resources for the capitalization of such contingency facility.¹³ However, due to the different processing times of the GEF-STAR project cycle and the parent Project, it was not possible to prepare a blended operation.¹⁴ Processing of the GEF grant together with the AF loan resources as a single Additional Financing operation helps minimize transaction costs, while allowing faster preparation and simplified processing procedures.

10. **The GEF-supported contingency facility would help establish confidence in the operational and financial mechanism with municipal facilities, and enable its continuous operation.** It would do so by: (i) smoothing out potential interruptions of repayment cash flow caused by complete or partial non-payments; (ii) helping inform a better assessment of the actual non-payment risks associated with agreements with municipal authorities; and (iii) demonstrating a functional risk mitigation mechanism, which could, in the future, help attract commercial financing for EE investments in public facilities through ESAs. It would be triggered only after the protocol established to recuperate payments has been followed and still not resolved the situation.

11. **The proposed AF would directly benefit the participating entities and those using the facilities.** These would include national institutions (SENER, FIDE, CFE and the National Commission for the Efficient Use of Energy, CONUEE), municipal entities (municipalities and OOAs, including their citizens), education and health sector institutions (SEP, SSA and IMSS), along with the staff, students and patients from the schools and hospitals where subprojects would be implemented. The benefits associated with the EE investments would include efficient and lower energy use, reduced energy costs, creation of public budget space (to potentially fund other priorities), and improved quality of targeted energy services as well as comfort and safety, along with climate co-benefits¹⁵ (i.e., an estimated 810 thousand tons of carbon dioxide equivalent, tCO₂eq).

12. **The proposed scaling up is aligned with the World Bank Group's (WBG) Mexico Country Partnership Strategy (CPS) for FY14-19 (Report No. 80800), discussed by the Board of Executive Directors on December 12, 2013.** The AF would support Pillar I, 'Unleashing Productivity', by promoting enhanced public sector services and facilitating access to finance, and Pillar IV, 'Promoting Green and Inclusive Growth,' by supporting the efficient use of energy and natural resources in two key public sectors. The AF also supports the Bank's twin goals of ending extreme poverty and promoting shared prosperity, by helping

¹³ See PRESEM PAD (Report No. PAD1193), page 7, paragraph 24.

¹⁴ On March 1st, 2016, the Bank received a letter from Mexico's Secretariat of Finance and Public Credit (*Secretaría de Hacienda y Crédito Público*, SHCP) endorsing a GEF-financed operation to support the creation of a contingency facility under the parent Project (confirmed on March 3, 2017). The Decision Meeting for the GEF-financed contingency facility took place on July 25, 2016. The GEF Council approved the operation in May 2017, just two months after the GoM requested support for EE in health and education.

¹⁵ The team will explore with the counterpart the possibility to integrate activities and measures supporting the 2016 Kigali Agreement (an Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer) that aims to reduce the emissions of hydrofluorocarbons (HFCs) – potent GHGs, primarily used in air conditioning, as well as refrigeration and foam insulation.



modernize public schools and hospitals while enabling governments to redirect the budgetary savings associated with saved energy to other priorities, including social and economic development programs.

13. **All activities to be supported by the AF loan would offer mitigation co-benefits, as per the methodology of the Joint Multilateral Development Bank (MDB) Methodology for Tracking Climate Finance.** The AF’s activities fall within the MDB List of Eligible Mitigation Activities (specifically under sections “9.1: Support to national, regional or local policy, through technical assistance or policy lending” and “3.2: Energy efficiency improvements in existing commercial, public and residential buildings”).

14. **The AF is aligned the WB’s corporate commitments with regard to closing gender gaps and mainstreaming citizen engagement.** One of the key gender gaps in EE is that women tend to be less informed and less aware of the benefits of its measures.¹⁶ Women also suffer from poorer access to science, technology, engineering, and math (STEM) jobs.¹⁷ In addition, evidence shows that improved street lighting, including lighting outside public buildings, can contribute in reducing gender-based violence. The proposed AF identified and integrated specific actions for gender mainstreaming and women’s and men’s empowerment in the Project. The AF would support security with EE investments in the health and education sectors, through better lighting in schools, which can be beneficial for girls and women.¹⁸ As mentioned above, the EE investments are associated with multiple benefits (including costs, budgetary, quality of energy services, comfort and safety). In addition, under the new subcomponent 3(a), the Project would support education and awareness raising activities that would link EE projects with school curricula and initiatives, such as “Women in STEM” (*Mujeres en STEM*) that seek to mentor young women in high schools and increase their interest in the science and engineering fields. The project would also support communication and engagement actions, including those tailored specifically for women. In addition, gender-sensitive citizen engagement would also be sought to promote social cohesion by ensuring equal opportunities to women and men to participate in local, national or sector-wide capacity building activities, education, and knowledge events regarding the efficient use of energy. In terms of monitoring and addressing sex-disaggregated data gaps, SENER would ensure monitoring of the activities with a quantitative citizen engagement indicator and gender-disaggregated indicators.

II. DESCRIPTION OF ADDITIONAL FINANCING

A. Change in PDO

15. The parent Project PDO is to promote the efficient use of energy in the Borrower’s municipalities by carrying out energy efficiency investments in selected municipal sectors and contribute to strengthening the enabling environment. A clarification is proposed to the PDO by adding “eligible public facilities” and replacing “municipal sectors” with “public sectors” so that it reads as: “to promote the efficient use of

¹⁶ Rebosio Calderon, Michelle P.; Georgieva, Sophia V. 2015. *Toward gender-informed energy subsidy reforms: findings from qualitative studies in Europe and Central Asia (English)*. Washington, D.C. World Bank Group. <http://documents.worldbank.org/curated/en/834451468189851792/Toward-gender-informed-energy-subsidy-reforms-findings-from-qualitative-studies-in-Europe-and-Central-Asia>

¹⁷ UNESCO (2017). *Cracking the code: Girls’ and women’s education in science, technology, engineering and mathematics (STEM)*. Paris: UNESCO. <http://unesdoc.unesco.org/images/0025/002534/253479E.pdf>

¹⁸ SEP authorities noted that this aspect of security and lowering incidence of violence in schools by improving lighting of spaces was an important benefit, especially for girls who, in many cases, are the victims of violence in schools.



energy in the Borrower's municipalities *and other eligible public facilities* by carrying out EE investments in selected *public* sectors and *to* contribute to strengthening the enabling environment.”

B. Restructuring of the Parent Project

16. **For the proposed AF, an amended loan agreement, a new loan agreement, as well as a new grant agreement would be signed with the United Mexican States, duly represented by the Secretariat of Finance and Public Credit (*Secretaría de Hacienda y Crédito Público, SHCP*).** The amended loan agreement, new loan agreement and new grant agreement would retain the current closing date (October 31, 2021). No change would be made to the overall design and implementation arrangements, although new institutional agreements would be included to incorporate health and education sectors and to create the contingency facility for municipalities, following the parent Project's already developed processes and legal agreements.

17. **The processing of this project paper would restructure the parent project¹⁹ as follows:**

a. **Creation of “Component 3: Public Facility Energy Efficiency Investments”, with two subcomponents:**

(i) Subcomponent 3(a) (Total US\$4.5 million (IBRD: US\$3.5 million, GoM: US\$1.0 million) for policy development and institutional strengthening for EE in public schools and hospitals aims to: (a) carry out capacity building activities for EE at eligible public facilities; (b) support the development of policy, and monitoring, reporting and verification procedures; and (c) carry out targeted energy and science education activities mainly for girls; and

(ii) Subcomponent 3(b) (Total US\$66.2 million: IBRD: US\$46.38 million, GoM: US\$2.18 million, and US\$17.64 million from the beneficiaries through energy service payment via the electricity bill) for investments in schools and hospitals.²⁰ This new subcomponent would support cost-effective EE investments in public education and health sectors facilities, and include EE audits, photovoltaic (PV) systems assessments, structural assessments, feasibility studies, bidding documentation, and procurement of goods and works. Subprojects' eligibility and selection criteria, implementation arrangements and overall activities to be financed would follow those under the parent Project, including those being restructured under this same paper (Annex 1);

b. **Creation of “Component 4 – Municipal Energy Efficiency Contingency Facility,” (total of US\$6.08 million, of which US\$5.79 GEF and US\$0.29 SENER).**²¹ The contingency facility would be capitalized with GEF resources and its management costs would be covered by SENER. The contingency facility applies to Component 2 of the parent Project and would partially cover the risk of default (partial and total non-payment) from eligible municipalities and water utilities having signed ESAs for EE investments in municipal SL, OOAs and MBs. The facility would be

¹⁹ The parent Project currently consists of: Component 1 – “Policy development and institutional strengthening” (aimed at municipal entities); and Component 2 – “Municipal EE investments.”

²⁰ The public health and education institutions would contribute through the energy service payments established in the ESAs. Their exact contribution would depend on the level of direct support, which is expected to be revised (and lowered) at the Mid-Term Review (MTR).

²¹ Excluding the Bank's US\$0.55 million agency fee.



managed by FIDE's Financial Operations Sub-directorate, with support from SENER and CFE. Specific arrangements are described below and in Annex 1;

- c. **Modification of subprojects' eligibility criteria and the amount of direct financial support, based on the experience and lessons learned from the parent's project implementation.** The minimum investment cost threshold for each subproject would now be set at US\$200,000 (compared to the previous limit of US\$1 million) as municipal buildings pilot projects have shown that potential energy savings²² are less than planned due to lower than originally expected energy consumption. In addition, the maximum direct financial support would be set at up to 70 percent, consistent for all types of subprojects (under both Components 2 and 3). In its initial phase, the direct support towards the EE investments would help build confidence and secure buy-in from municipal and national authorities who typically lack experience with managing energy consumption and with EE investments, and who are unfamiliar with the project's mechanism.²³ The level of direct support would be reassessed at Mid-Term Review (MTR), with the aim of lowering over time to increase sustainability and replicability;²⁴ and
- d. **Update the results framework based on the proposed changes and the increased scope of the operation.** The PDO indicators would include: projected lifetime energy savings and GHG ERs, number of ESAs signed, and framework to scale up EE in municipal sectors in the country, and a new intermediate level indicator for EE subprojects in public facilities (for public schools and hospitals) would be added. All energy savings and direct ERs would be estimated over a 20-year lifetime for schools, hospitals, as well as MBs; while a 10-year lifetime would still be used for OOAs and 8 years for SLs. Indirect GHG benefits (tCO₂eq), calculated according to the GEF methodology, would be reported to GEF. An updated results framework is included as Annex 1. In addition, the parent project's name, *Municipal Energy Efficiency Project – PRESEM*, is being amended as part of the AF to *Energy Efficiency in Public Facilities Project – PRESEMEH*.

18. **The PDO level indicators now would be:**

- a. Projected lifetime energy savings (MWh) - (Core) – target changed;
- b. Number of Energy Services Agreements (ESAs) signed – target changed;
- c. Projected lifetime GHG emission reductions – (tCO₂) (Tons/year) – new; and
- d. Framework to scale up municipal EE in the country – unchanged.

19. **The new or updated intermediate level indicators include:**

- a. Public facilities interventions (number) – new;
- b. Subprojects designed (number) – target changed;
- c. Street lighting interventions (number) – target changed;
- d. Municipal building interventions (number) – target changed; and

²² Due to no cooling or heating involved, and few hours of operation. Going forward, EE investments in MB would seek to focus in areas where there is greater energy consumption.

²³ Often, the ESAs need State Congress approval, which if led by an opposing political party, increases the political risks and thus municipalities are preferring to complete the subproject under one municipal period.

²⁴ PRESEM PAD (Report No. PAD1193, p. 31): "the amount of direct support would vary by subproject and the criteria would be re-assessed by the SENER and the Bank during the project's MTR, based on implementation results."



- e. Design of energy management systems (EnMS) for municipal street lighting, water and wastewater, municipal buildings, *schools, and hospitals* (number) – changed.²⁵

20. **No closing date extension is deemed necessary to accommodate the proposed AF.** As the AF operation does not entail a change in risk and relies on the use of already implemented and tested mechanisms (including ESAs), all subprojects and activities could be accommodated within the parent Project’s existing timeframe. The fact that the health and education counterparts are strongly committed to the project, do not have any outstanding debts to CFE, and that SENER (as well as FIDE and CFE) has gained experienced and lessons learned from the parent Project’s implementation would contribute to avoid delays in PRESEMEH’S implementation. In addition, SEP and IMSS’s centralized electricity bill paying systems would also facilitate deployment and smooth processing. Finally, the technical assistance support expected to be provided by ESMAP funds to prepare a pipeline of subprojects before project launch would also contribute to a steady execution.

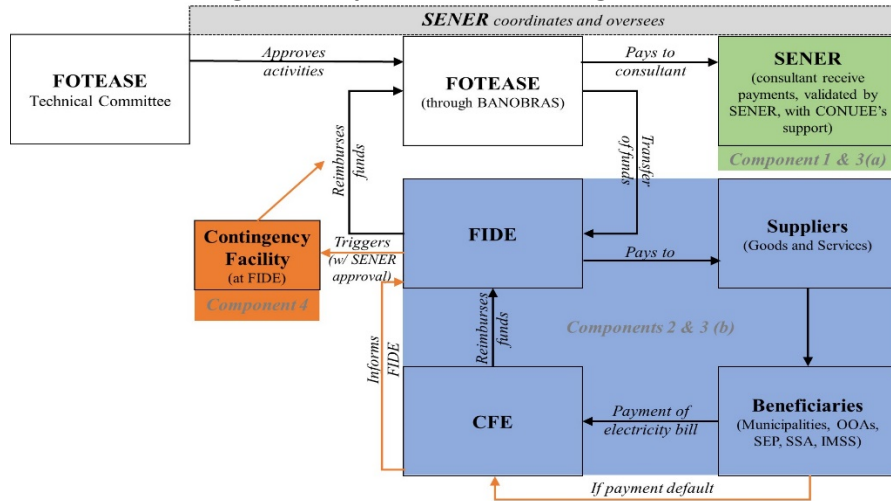
21. **Institutional arrangements remain the same.** Overall coordination and implementation of new subcomponents 3(b) (Investments in Schools and Hospitals) and Component 4 (Municipal EE Contingency Facility) would be under the responsibility of SENER and operated by FIDE, while subcomponent 3(a) would be under the responsibility of SENER. Within SENER, the General Directorate of Energy Efficiency and Sustainability (*Dirección General de Eficiencia y Sustentabilidad Energética, DGESE*) would be responsible for project implementation, and would be supported by the Responsible Project Implementing Unit for the PRESEMEH (*Unidad Responsable Ejecutora del Proyecto PRESEMEH, UREP-PRESEMEH*).²⁶ SENER would rely on UREP’s experience with Bank-financed projects, and its core team of qualified staff to handle all procurement and Financial Management (FM) issues. UREP has sufficient technical, financial, procurement and safeguards capacity to also service the AF. SENER would also lead the implementation of activities under the new subcomponent 3(a) (in collaboration with CONUEE) and would prepare, launch and supervise the selection processes to develop the corresponding tasks. SENER would ensure that appropriate project implementation arrangements are in place and that all activities being developed, including those by FIDE, are done in accordance with project design and Bank procedures. Overall implementation arrangements are shown in Figure 1.

²⁵ Consistent with the broader scope of the AF, this indicator would also cover health and education sectors.

²⁶UREP-PRESEMEH is a spinoff of the UREP created to support Bank-financed projects.



Figure 1. Implementation Arrangements



22. “Subcomponent 3(b) – Investments in Schools and Hospitals” and “Component 4 – Municipal Energy Efficiency Contingency Facility” would be operated by FIDE, in collaboration with CFE and oversight from SENER. The AF would channel the IBRD loan, GEF grant and counterpart funds through the Energy Transition and Sustainable Energy Use Fund (*Fondo para la Transición Energética y el Aprovechamiento Sustentable de la Energía*, FOTEASE).²⁷ FIDE’s capacity has been proven through the implementation of the Bank-financed Efficient Lighting and Appliances Project (IBRD P106424 and GEF P120654), the parent Project, and its own projects.²⁸ The Bank has provided capacity building in WB procurement and FM guidelines to FIDE/SENER and would organize workshops during implementation, focusing on the preparation of bidding documents, evaluation of economic and financial proposals and FM. A new public facilities (PF) SENER-FIDE Operator Collaboration Agreement as well as two new PF FIDE-CFE Implementation Agreements (one for schools and one for hospitals) would be prepared to enable implementation of subcomponent 3(b). FIDE’s and CFE’s incremental costs (as a percentage of investment costs) to support the implementation of Subcomponent 3(b) would remain unchanged from those already established in the parent Project, totaling 10.93 percent of investment costs.²⁹ FIDE’s incremental costs for technical work would be partially covered by the IBRD loan (see Annex 1 for further details).

23. Regarding Component 4, the contingency facility would be operated by FIDE’s financial division, Financial Operations Subdirectorato (*Subgerencia de Operación Financiera, SGOF*), which is separate and independent from the operational division responsible for EE investments. The existing SENER-FIDE Collaboration Agreement would be amended to incorporate tasks under Component 4. To ensure a clear separation between its two roles, FIDE would manage the contingency facility’s resources under a new account to be opened in a commercial bank (BANORTE) until the end of the Project.³⁰ The GEF resources

²⁷ Further details as well as a chart depicting flow of funds can be found in Annex 1.

²⁸ FIDE has more than 10 years of experience implementing EE projects with industries, buildings, households and municipalities.

²⁹ Total incremental costs would amount to 10.93 percent of investments total costs: FIDE’s would represent 9.7 percent of the investment, and CFE’s would be 1.20 percent. These costs would represent 2.25 percent of the beneficiary’s estimated energy service payment obligation.

³⁰ BANORTE would follow the WB’s external audit, fraud and anti-corruption guidelines and policies, which would be included in the bank account agreement.



would be disbursed in a single tranche to FIDE through the FOTEASE for purposes of capitalizing the contingency facility. All the facilities’ procedures would be included in the grant agreement to be signed between the United Mexican States, through SHCP, and the Bank. All procedures are developed in a new Operations Manual (OM) that would be annexed to PRESEMEH’s OM. Any funds remaining in the contingency facility by project closing would be transferred to FOTEASE to settle any balances and/or to finance additional EE projects. FIDE’s incremental costs for managing the contingency facility would be fully covered by SENER.

C. Change to Components, Costs and Disbursement Estimates

24. The creation of the new Components 3 and 4, and the changes in eligibility and support criteria, would increase the size of the overall operation, as shown below (Table 1).

Table 1. Change to Components and Costs

Current Component Name	Proposed Component Name	Current Cost (US\$M)	Proposed Cost (US\$M)	IBRD	GoM	Beneficiaries	GEF	Action
1. Policy Development and Institutional Strengthening	1. Policy Development and Institutional Strengthening	7.00	7.00	6.00	1.00	0.00	0.00	Unchanged
2. Municipal Energy Efficiency Investments	2. Municipal Energy Efficiency Investments	148.75	133.82	93.75	4.82	35.25	0.00	Revised
-	3. Public Facility Energy Efficiency Investments	-	70.70	49.88	3.18	17.64	0.00	New
	3(a) Policy development and institutional strengthening for Schools and Hospitals		4.50	3.50	1.00	0.00	0.00	
	3(b) Investments in Schools and Hospitals		66.20	46.38	2.18	17.64	0.00	
	4. Municipal Energy Efficiency Contingency Facility	-	6.08	0.00	0.29	0.00	5.79	New
Fees		0.25	0.93	0.38	0.00	0.00	0.55	Revised
Total		156.00	218.53	150.00	9.29	52.90	6.34	

The disbursement estimates (Table 2) include actual disbursements in FY17 and those expected for both the existing and AF loan, as well as the GEF grant.

Table 2. Disbursements Estimates (including all sources of Financing)

Fiscal Year	YR0	YR1	YR2	YR3	YR4	YR5	YR6
Annual	0.00	0.34	4.50	37.00	50.00	45.00	12.66
Cumulative	0.00	0.34	5.34	42.34	92.34	137.34	150.00



III. KEY RISKS

25. **Although no significant additional risks are expected by the proposed AF, the overall project risk would remain Substantial, as the Project would continue to work with subnational entities.** Key risks include:

- **Technical Design** associated with relying on an innovative mechanism. Significant efforts have been dedicated to working the technical issues dealing with an innovative model, including working with the local and federal entities to build the necessary foundation and understanding of the operational and financial model with the existing and new sector entities. Through this work, FIDE has gained extensive experience in the model and working at the subnational level, and has more experience working at the federal level. A robust pipeline and lessons learned have been integrated into the Project's procedures.
- **Fiduciary Risk** includes: (i) risk of non-payment from municipal entities; and (ii) fiduciary risk associated with the need to coordinate with subnational entities that have little or no experience with Bank-financed operations and EE interventions. The GEF-financed contingency facility would mitigate the non-payment risk from municipal entities. The inclusion of new sectors would not modify previous project risk assessments, as (i) implementation arrangements would rely on the mechanisms created and tested by the parent Project; (ii) activities would still be led and implemented by SENER and FIDE; and (iii) the two new public sectors have lower non-payment risks than municipalities and OOAs. Indeed, these entities are reliable CFE clients: IMSS does not have any debt with CFE, while SEP always settles any outstanding amount within six months.³¹ In addition, each specific ESA signed among the beneficiary, the Secretariat of Energy (SENER), and the Electric Power Savings Trust Fund (FIDE), contains specific financial management provisions.

IV. APPRAISAL SUMMARY

A. Economic and Financial Analysis

26. **The new activities proposed would have a clear development impact and generate economic and financial benefits at the local and national levels.** The Bank's support provides strong value-add to Mexico's overall EE agenda by mobilizing additional resources. These include the parent Project's US\$100 million IBRD loan, the additional IBRD loan (US\$50 million), the GEF grant (US\$5.79 million), and counterpart funding in part unleashed due to the Bank's facilitation of innovative financing mechanisms for EE. The economic and financial analyses consider only Components 2 and subcomponent 3(b),³² which account for 93 percent of IBRD financing. Results of the analysis are presented in Table 3.

27. **The parent Project original economic and financial analysis has been supplemented by additional analyses to reflect the AF's subcomponent 3(b) focused on schools and hospitals.** As the current project

³¹ SEP has an agreement with CFE on how to proceed if a payment is due.

³² The assessment of economic benefits associated with Component 2 and subcomponent 3(b) are likely to be underestimated, given the analytical constraints associated with benefits that cannot be measured in monetary terms (e.g., improved comfort, learning environment and safety, to mention a few) and/or where information is not readily available.



paper also involves the restructuring of the parent Project, expected results of SL, MB and OOA subprojects have also been updated. The changes to the parent Project subprojects do not affect overall outcomes and conclusions of the original analyses.

28. **Expected direct ERs for each subproject type** – over their respective lifetimes³³ – measured in tCO₂eq are also included in Table 3, together with the overall results of the economic and financial assessment. The full financial and economic analysis is in Annex 2.

Table 3. Economic and Financial Appraisal Summary

Subproject type	# of sub projects	Without direct support		With direct support				Direct GHG ERs (tCO ₂ eq)
		EIRR (%)	Total cost (US\$ M)	Direct support* (%)	Financial NPV (US\$ M)	FIRR (%)	Payback (yrs.)	
Street lighting	16	8	70	70	52	48	2.10	222,000
Water utilities	8	18	29	70	37	62	1.68	230,000
Municipal buildings	8	8	3	70	1	34	3.07	20,000
Schools (350 fac.)	4	10	25	70	20	30	3.52	125,000
Hospitals (15 fac.)	6	13	25	70	30	45	2.34	213,000
TOTAL	42 (397 fac.)	11	152	70	\$142	47	2.19	810,000

*Uses the maximum possible direct financial support; calculations with a lower direct support are included in Annex 2.

Note: NPV = Net present value; EIRR= Economic internal rate of return; FIRR = Financial internal rate of return; fac. = number of facilities

B. Technical

29. **The Project would rely on the utilization of known and proven technologies and methodologies that do not present challenging construction or operational situations.** Subprojects would be implemented in accordance with internationally and accepted technical standards with support from the Bank and other experts as needed. Technologies, technical parameters, key design features and estimated costs for each component have been proposed by FIDE, SENER, and discussed with SEP for schools, and SSA/IMSS in the case of hospitals. Decisions to pursue EE investment in schools and hospitals would include confirmation of their structural soundness (if no recent structural assessment is available, project funds would be used to conduct such assessment). Preparation of the technical specifications, evaluation of the bidding processes, contractual negotiations and supervision would be done by FIDE as operator of subcomponent 3(b) with oversight from SENER and supported, as necessary, by the Bank. At the same time, GEF support to capitalize a contingency facility under Component 4 would reduce non-payment risk, and help ensure FOTEASE receives committed energy service payment amounts so it can support planned subprojects.

30. **SENER has developed the capacities necessary to coordinate and supervise the project activities, as proven by the ongoing implementation of parent Project and previous operations.** FIDE has a track record of its capacity to procure and install technologies similar to those to be used in schools and hospitals, as well as those currently being considered under the parent Project. FIDE has in-depth knowledge of specifications, procurement, installation, FM and operation and maintenance (O&M). FIDE has also gained

³³ For this analysis, the economic life of each subproject type is: 8 years for SLs, 10 years for OOAs, and 20 years for MBs, schools and hospitals. Further details can be found in the GHG ERs assessment, which is part of the project files.



relevant experience with the utilization of contingency facility mechanism in other projects (including the Efficient Lighting and Appliances operation). Although no key technical challenges are foreseen, support from experts (from the Bank and elsewhere) would be sought as needed.

31. **The use of existing operational and financing mechanisms would facilitate preparation and implementation.** The proposed restructuring would also facilitate the preparation of subprojects by modifying eligibility criteria based on lessons learned from the preparation of the first pipeline of subprojects, and internalizing insights from practical experience to develop more realistic estimations of the average size of subprojects, as well as to implement an enhanced ex-ante screening of proposed subprojects.

C. Financial Management

32. **The Fiduciary Risk for the project remains Substantial.** As described under the risk section, although no significant additional risk factors are expected to arise by incorporating Components 3 (Public Facility Energy Efficiency Investments) and 4 (Municipal Energy Efficiency Contingency Facility) to the Project, the initial risks factors remain with no significant changes (e.g. non-payment risk from municipal entities, technical design risk associated with relying on an innovative mechanism, and the fiduciary risk associated with the need to coordinate with subnational entities that had little or no experience with Bank-financed operations and EE interventions). EE investments in schools and hospitals would be subject to the same institutional and FM mechanisms in place for Component 2 (Municipal Energy Efficiency Investments). The AF activities are incremental; they are new activities that do not overlap with the parent Project loan.

33. **Although FIDE has previous experience implementing Bank-financed projects and more specifically EE investments, adequate internal controls and procedures to manage the contingency facility would be put in place for managing GEF funds to ensure their proper application.** FIDE would follow strict guarantee, and recovery policies and procedures agreed with the WB, described in detail in the Project's OM. As part of the FM arrangements, financial statements would report on the application of GEF funds, which would also be subject to monitoring and validation on behalf of SENER, and included in the scope of the Project's audit. Specific activities aimed at strengthening FIDE's internal controls, particularly targeted to enhance its internal informatic system for the control and management of payments from EE investments and management of the contingency facility, are also considered within the Project's scope.

34. **Financial reporting arrangements will ensure that total project investment from all financing sources are incorporated in the project's financial reports and audited financial statements.** The project's financial statements would thus incorporate and report funds from the parent project, AF and GEF Grant funds, as well as counterpart funds from both parent project and AF.

D. Procurement

35. **Component 3 would be covered by the World Bank (WB) Procurement Regulations for Investment Project Financing (IPF) (dated July 2016 and revised November 2017), while the other components under the Project would continue being covered by the WB Guidelines for Procurement of Goods, Works, and Non-Consulting Services (dated January 2011 and revised July 2014).** In order to strengthen capacity, training on the WB's Procurement Regulations would be provided to the National Development Bank (*Nacional Financiera, S.N.C., I.B.D.*, NAFIN), SENER and FIDE during the first quarter of 2018.



E. Social and Environmental (including Safeguards)

36. The Category B Environmental Assessment rating of the Project remains unchanged, as the Project is unlikely to result in significant negative impacts. The safeguards triggered under the initial loan are still applicable, including: OP 4.01 Environmental Assessment, OP 4.11 Physical and Cultural Resources, and OP 7.50 Projects on International Waterways. The Physical Cultural Resources policy (OP/BP 4.11) continues to be triggered because the Project could potentially involve the financing of investments in historical PFs. No new environmental safeguards policies (Protected Areas, Pest Management, Forests or Natural Habitats) are triggered. The Project is designed to generate positive environmental impacts through the mitigation of emissions and thus a contribution to the combat to climate change and benefits for the Mexican population. The Environmental and Social Monitoring Framework (ESMF), prepared by the Borrower for the parent Project to meet the OP 4.01 standards, has been updated to reflect the AF. A final version was publicly disclosed³⁴ by the client at SENER’s website and the WB’s external website on December 8, 2017.

37. The proposed AF does not trigger any of the social safeguards policies. OP 4.10 (Indigenous Peoples) is not triggered as all subprojects are carried out in urban municipalities. OP 4.12 (Involuntary Resettlement) is not triggered as subprojects are carried out on already existing infrastructure.

V. WORLD BANK GRIEVANCE REDRESS

38. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB’s Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB’s independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the WB’s attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the WB’s corporate GRS, please visit <http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

VI. SUMMARY TABLE OF CHANGES

	Changed	Not Changed
Change in Project's Development Objectives	✓	
Change in Results Framework	✓	

³⁴ <http://documents.worldbank.org/curated/en/278581512756205073/pdf/SFG3845-EA-SPANISH-P165585-Box405316B-PUBLIC-Disclosed-12-8-2017.pdf>
<https://www.gob.mx/sener/documentos/actualizacion-del-marco-de-gestion-ambiental-y-social-mgas-del-proyecto-de-eficiencia-y-sustentabilidad-energetica-en-municipios-presem>



Change in Components and Cost	✓	
Change in Procurement	✓	
Change in Implementing Agency		✓
Change in Loan Closing Date(s)		✓
Cancellations Proposed		✓
Reallocation between Disbursement Categories		✓
Change in Disbursements Arrangements		✓
Change in Safeguard Policies Triggered		✓
Change of EA category		✓
Change in Legal Covenants		✓
Change in Institutional Arrangements		✓
Change in Financial Management		✓
Change in APA Reliance		✓
Change in Implementation Schedule		✓
Other Change(s)		✓

VII. DETAILED CHANGE(S)

PROJECT DEVELOPMENT OBJECTIVE

Current PDO

The objective of the project is to promote the efficient use of energy in the Borrower's municipalities by carrying out energy efficiency investments in selected municipal sectors and contribute to strengthening the enabling environment.

Proposed New PDO

The objective is to promote the efficient use of energy in the Borrower’s municipalities and other eligible public facilities by carrying out energy efficiency investments in selected public sectors and to contribute to strengthening the enabling environment.



RESULTS FRAMEWORK

Project Development Objective Indicators

Projected lifetime energy savings Unit of Measure: Megawatt hour(MWh) Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	1,735,000.00	Revised
Date	01-Feb-2016	18-Dec-2017	31-Oct-2021	
Number of ESAs signed (Number) Unit of Measure: Number Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	2.00	40.00	Revised
Date	01-Feb-2016	18-Dec-2017	31-Oct-2021	
Projected Lifetime GHG emission reductions (tCO2) Unit of Measure: Tones/year Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	810,000.00	New
Date	16-Jan-2018	16-Jan-2018	31-Oct-2022	

Intermediate Indicators

Projected lifetime GHG emission reductions (tCO2eq) (Tons/year) Unit of Measure: Number Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	463,405.00	Marked for Deletion
Date	01-Feb-2016	18-Dec-2017	31-Oct-2021	
Sub-projects designed (number) Unit of Measure: Number				



Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	4.00	44.00	Revised
Date	01-Feb-2016	18-Dec-2017	31-Oct-2021	
Street light interventions (number) Unit of Measure: Number Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	1.00	16.00	Revised
Date	01-Feb-2016	18-Dec-2017	31-Oct-2021	
Municipal building interventions (number) Unit of Measure: Number Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	8.00	Revised
Date	01-Feb-2016	18-Dec-2017	31-Oct-2021	
Public facility interventions (number) Unit of Measure: Number Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	8.00	New
Date	07-Feb-2018	16-Jan-2018	31-Oct-2022	
Capacity-building, outreach and women in STEM activities implemented (number) Unit of Measure: Number Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	4.00	30.00	Revised
Date	01-Feb-2016	18-Dec-2017	31-Oct-2021	
Design of energy management systems (EnMS) for street lighting, water and wastewater, municipal buildings, and public facilities (number) Unit of Measure: Number Indicator Type: Custom				



	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	5.00	Revised
Date	01-Feb-2016	18-Dec-2017	31-Oct-2021	
Participants in consultation activities during project implementation (number)				
Unit of Measure: Number				
Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	65.00	1,000.00	No Change
Date	01-Feb-2016	18-Dec-2017	31-Oct-2021	
Participants in consultation activities during project implementation - female				
Unit of Measure: Number				
Indicator Type: Custom Breakdown				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	20.00	400.00	Revised
Date	01-Feb-2016	18-Dec-2017	31-Oct-2021	

COMPONENTS

Current Component Name	Current Cost (US\$, millions)	Action	Proposed Component Name	Proposed Cost (US\$, millions)
Policy development and institutional strengthening	7.00	No Change	Policy development and institutional strengthening	7.00
Municipal energy efficiency investments	148.75	Revised	Municipal energy efficiency investments	133.82
	0.00	New	Public Facility Energy Efficiency Investments	70.70
	0.00	New	Municipal Energy Efficiency Contingency Facility	6.08
TOTAL	155.75			217.60



Expected Disbursements (in US\$, millions)

Fiscal Year	2016	2017	2018	2019	2020	2021	2022
Annual	0.00	0.34	4.50	37.00	50.00	45.00	12.66
Cumulative	0.00	0.34	4.84	41.84	91.84	136.84	149.50

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Latest ISR Rating	Current Rating
Political and Governance	● Moderate	● Moderate
Macroeconomic	● Moderate	● Moderate
Sector Strategies and Policies	● Low	● Low
Technical Design of Project or Program	● Substantial	● Substantial
Institutional Capacity for Implementation and Sustainability	● Moderate	● Moderate
Fiduciary	● Substantial	● Substantial
Environment and Social	● Low	● Low
Stakeholders	● Low	● Low
Other	● Low	● Low
Overall	● Substantial	● Substantial

LEGAL COVENANTS – Additional Financing for Energy Efficiency in Public Facilities Project (PRESEMEH) (P165585)

Sections and Description

Loan Agreement: Public Facility CFE Implementation Agreement
The Borrower, through SENER’s obligation to cause the Operator to, not later than ninety (90) days after the Effective Date of the Additional Financing Loan Agreement, enter into the PF CFE Implementation Agreement with CFE, under terms and conditions acceptable to the Bank and set forth in the POM.

Loan Agreement: Public Facility Activity Initiation Agreement (PF AIA)
The Borrower’s obligation, through SENER to, upon the acceptance of any given Public Facility Energy Efficiency Subproject, enter into an agreement with the Eligible Public Facility under terms and conditions acceptable to the Bank and set forth in the POM.

Loan Agreement: Public Facility Energy Service Agreement (PF ESA)
The Borrower’s obligation, through SENER, to, immediately upon the approval of a Public Facility Energy Efficiency Subproject as set forth in the POM, enter into an agreement with the Operator and the Eligible Public Facility under



terms and conditions acceptable to the Bank and set forth in the POM.

Grant Agreement: CFE Implementation Agreement

The Borrower, through SENER’s obligation to cause the Operator to maintain the CFE Implementation agreement under terms and conditions acceptable to the Bank.

Loan Agreement: Activity Initiation Agreement (AIA)

The Borrower’s obligation, through SENER to, upon the acceptance of any given Municipal Energy Efficiency Subproject, enter into an agreement with the eligible beneficiary under terms and conditions acceptable to the Bank and set forth in the POM.

Loan Agreement: Energy Service Agreement (ESA)

The Borrower’s obligation, through SENER, to, immediately upon the approval of a Municipal Energy Efficiency Subproject as set forth in the POM, enter into an agreement with the Operator and the Eligible Public Facility under terms and conditions acceptable to the Bank and set forth in the POM.

Loan and Grant Agreement: SENER-UREP

The Borrower’s obligation, through SENER, to, no later than sixty (60) days after the Effective Date, establish and maintain, throughout Project implementation, a unit (SENER-UREP) with functions, responsibilities, and competent specialists with qualifications, capabilities, experience and functions, all satisfactory to the Bank and set forth in the POM.

Conditions

Type	Description
Effectiveness	<p>Contrato de Mandato for LA</p> <p>The Contrato de Mandato for the LA has been duly executed by the parties thereto.</p>
Effectiveness	<p>Contrato de Mandato for GA</p> <p>The Contrato de Mandato for the GA has been duly executed by the parties thereto.</p>
Effectiveness	<p>Public Facilities Operator Collaboration Agreement for LA</p> <p>The PF Operator Collaboration Agreement between SENER and FIDE has been duly executed by the parties thereto.</p>
Effectiveness	<p>Operator Collaboration Agreement for GA</p> <p>The Operator Collaboration Agreement between SENER and FIDE has been duly amended by the parties thereto.</p>
Effectiveness	<p>Additional Financing Agreement for GA</p> <p>The Additional Financing Agreement has been signed and delivered by all the parties to such agreement, and all conditions precedent to its effectiveness have been fulfilled.</p>



VIII. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY : Mexico

Additional Financing for Energy Efficiency in Public Facilities Project (PRESEMEH)

Project Development Objectives

The objective is to promote the efficient use of energy in the Borrower’s municipalities and other eligible public facilities by carrying out energy efficiency investments in selected public sectors and to contribute to strengthening the enabling environment.

Project Development Objective Indicators

Action	Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source / Methodology	Responsibility for Data Collection
Revised	Name: Projected lifetime energy savings		Megawatt hour(MWh)	0.00	1,735,000.00	Biannually	SENER, FIDE, FOTEASE progress reports	SENER, FIDE
Description: This indicator projects lifetime energy savings directly attributable to the project, converted to MWh. The baseline value is expected to be zero.								
Revised	Name: Number of ESAs signed (Number)		Number	0.00	40.00	Biannual	SENER, FIDE, FOTEASE progress reports	SENER, FIDE
Description: This means the number of agreements to be signed with municipalities, water utilities, SEP, IMSS and SSA to implement a subprojects								
No Change	Name: Framework to		Text	No framewor	Framework accepted by	Biannual	SENER, FIDE, FOTEASE	SENER, FIDE



	scale up municipal energy efficiency in the country			k	the SENER		progress reports	
--	---	--	--	---	-----------	--	------------------	--

Description: This is a framework, to be accepted by SENER, under which plans to scale-up energy efficiency in the country are made and sought.

New	Name: Projected Lifetime GHG emission reductions (tCO2)		Tones/year	0.00	810,000.00	Biannual	SENER, FIDE and FOTEASE progress reports	SENER and FIDE
-----	--	--	------------	------	------------	----------	--	----------------

Description:

This indicator measures lifetime GHG emission reductions directly attributable to the project, converted to tCO2. The baseline value is expected to be zero. It registers all projected lifetime emission reduction at the time when the subproject is implemented.

Intermediate Results Indicators

Action	Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source / Methodology	Responsibility for Data Collection
No Change	Name: Default rate of municipalities (% average rate of non-payment over total outstanding loan balance)		Percentage	0.00	10.00	Biannual	SENER, FIDE, FOTEASE progress reports	SENER, FIDE

Description: This indicator measures the aggregate default rate of municipalities and water utilities in which an energy efficiency investment is being implemented. The default rate will be estimated by dividing actual repayment by beneficiaries against aggregate repayment obligations established through ESA's in any given year. The baseline value for this indicator will be zero.

Revised	Name: Sub-projects		Number	0.00	44.00	Biannual	SENER, FIDE, FOTEASE progress	SENER, FIDE
---------	---------------------------	--	--------	------	-------	----------	-------------------------------	-------------



	designed (number)						reports	
Description: This indicator measures how many subprojects were prepared, including those that were not financed by the Project. The baseline is expected to be zero.								
Revised	Name: Street light interventions (number)		Number	0.00	16.00	Biannual	SENER, FIDE, FOTEASE progress reports	SENER, FIDE
Description: This indicator measures how many street lighting interventions are financed by the Project. The baseline is expected to be zero.								
No Change	Name: Water and wastewater interventions (number)		Number	0.00	8.00	Biannual	SENER, FIDE, FOTEASE progress reports	SENER, FIDE
Description: This indicator measures how many water and wastewater interventions are financed by the Project. The baseline is expected to be zero.								
Revised	Name: Municipal building interventions (number)		Number	0.00	8.00	Biannual	SENER, FIDE, FOTEASE progress reports	SENER, FIDE
Description: This indicator measures how many municipal buildings interventions are financed by the Project. The baseline is expected to be zero.								
New	Name: Public facility interventions (number)		Number	0.00	8.00	Biannual	SENER, FIDE, and FOTEASE progress reports	SENER and FIDE
Description: This indicator measures how many subprojects (stand-alone or bundled) in public schools and hospitals are financed by the project. The baseline is expected to be zero.								
Revised	Name: Capacity-building, outreach and women in STEM		Number	0.00	30.00	Biannual	SENER, FIDE, FOTEASE progress reports	SENER, FIDE



	activities implemented (number)							
Description: This indicator measures how many capacity building, outreach and training activities are financed by the Project. The baseline should be zero.								
Revised	Name: Design of energy management systems (EnMS) for street lighting, water and wastewater, municipal buildings, and public facilities (number)		Number	0.00	5.00	Biannual	SENER, FIDE, FOTEASE progress reports	SENER, FIDE
Description: This indicator measures how many energy management systems are designed. The baseline should be zero.								
No Change	Name: Participants in consultation activities during project implementation (number)		Number	0.00	1,000.00	Biannual	SENER, FIDE, FOTEASE progress reports	SENER, FIDE
Revised	Participants in consultation activities during project implementation - female		Number	0.00	400.00	Biannual	SENER, FIDE, FOTEASE progress reports	SENER, FIDE
Description: This indicator measures the level of community engagement in project implementation.								

**Target Values****Project Development Objective Indicators**

Action	Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	YR6	End Target
Revised	Projected lifetime energy savings	0.00		35,000.00	500,000.00	1,130,000.00	1,560,000.00	1,735,000.00	1,735,000.00
Revised	Number of ESAs signed (Number)	0.00	0.00	6.00	16.00	31.00	40.00	0.00	40.00
No Change	Framework to scale up municipal energy efficiency in the country	No framework	-	-	Finalization of terms of reference for preparation of analysis	-	Presentation of framework and discussions	-	Framework accepted by the SENER
New	Projected Lifetime GHG emission reductions (tCO2)	0.00		15,000.00	225,000.00	510,000.00	720,000.00	810,000.00	810,000.00

Intermediate Results Indicators

Action	Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	YR6	End Target
No Change	Default rate of municipalities (% average rate of non-payment over total outstanding loan balance)	0.00	0.00	15.00	15.00	10.00	10.00		10.00
Revised	Sub-projects designed (number)	0.00	0.00	6.00	18.00	34.00	44.00	0.00	44.00



Revised	Street light interventions (number)	0.00	0.00	0.00	1.00	6.00	14.00	16.00	16.00
No Change	Water and wastewater interventions (number)	0.00	0.00	0.00	2.00	4.00	2.00	0.00	8.00
Revised	Municipal building interventions (number)	0.00	0.00	0.00	1.00	4.00	8.00	0.00	8.00
New	Public facility interventions (number)	0.00			2.00	5.00	8.00	10.00	8.00
Revised	Capacity-building, outreach and women in STEM activities implemented (number)	0.00	5.00	10.00	20.00	25.00	30.00	0.00	30.00
Revised	Design of energy management systems (EnMS) for street lighting, water and wastewater, municipal buildings, and public facilities (number)	0.00	0.00	0.00	0.00	2.00	4.00	5.00	5.00
No Change	Participants in consultation activities during project implementation (number)	0.00	200.00	400.00	600.00	800.00	1,000.00	0.00	1,000.00
Revised	Participants in consultation activities during project implementation - female	0.00	50.00	100.00	200.00	300.00	400.00		400.00



Annex 1: Detailed Additional Finance Description

1. SENER has requested the Bank’s support to expand and enhance the development impact, and mitigate non-payment risks of the parent Project through an Additional Financing for Energy Efficiency in Public Facilities Project (PRESEMEH, P165585). The AF loan resources would leverage the experience gained with the development and implementation of the parent project’s innovative operational and financing scheme for EE investments in the public sector by expanding its reach beyond municipal SL, MB and OOA to two important public sectors with a high energy consumption and high potential for EE: health and education. The Project would lead to benefits for the Mexican authorities, by rationalizing expenditures without compromising the service quality, through lower operating costs of participating public schools and hospitals. The AF GEF grant for the capitalization of a Municipal Energy Efficiency Contingency Facility would create and fund a mechanism that would help to partially cover the non-payment risks associated with Mexican municipalities and OOAs.

2. The parent Project’s development objective (PDO) is to promote the efficient use of energy in the Borrower’s municipalities by carrying out energy efficiency investments in selected municipal sectors and contribute to strengthening the enabling environment. The parent project’s PDO would be expanded to adequately capture the enhanced scope of the project. No change would be made to the overall design, and additional implementation arrangements, although interinstitutional agreements would be included to incorporate health and education sectors and to create the contingency facility for municipalities, following the parents Project’s already developed processes and legal agreements.

3. Concurrently, this project paper also serves as a restructuring to:

- a. Clarify the PDO to better reflect its enhanced scope by adding “eligible public facilities” and replacing “municipal sectors” with “public” to now read as “to promote the efficient use of energy in the Borrower’s municipalities *and other eligible public facilities* by carrying out EE investments in selected *public* sectors and *to* contribute to strengthening the enabling environment;”
- b. Create “Component 3 – Public Facility Energy Efficiency Investments”, consisting of two subcomponents:

“Subcomponent 3(a) Policy Development and Institutional Strengthening for School and Hospitals,” to strengthen capacities and the enabling environment for EE at Eligible Public Facilities through, *inter alia*: (i) the carrying out of capacity building activities for EE at Eligible Public Facilities; (ii) supporting the development of policy and of monitoring, reporting and verification procedures; and (iii) the carrying out of targeted energy and science education activities mainly for girls;

“Subcomponent 3(b) – Investments in public schools and hospitals,” for carrying out Public Facility Energy Efficiency Subprojects, consisting of:

investments on *inter alia*: (i) acquisition and installation of lighting fixtures and wiring, including the installation of management and control systems; and (ii) acquisition and installation of, among others, electrical wiring, lighting, A/C, windows, insulation, white roofs, solar water heaters, and PV systems, all in



Eligible Public Facilities; and preparing feasibility studies, including detailed energy audits and designs, structural safety assessment and bidding documents, for the Public Facility Energy Efficiency Subprojects (covering the EE investments financed by the AF loan resources);

- c. Create “Component 4 – Municipal Energy Efficiency Contingency Facility” which would include the GEF funded contingency facility to partially cover the risk of default by eligible municipalities or eligible water operators under their respective ESAs; or (b) as set forth in the OM and if applicable, further support the carrying out of Municipal Energy Efficiency Subprojects;
 - d. Modification of subprojects’ eligibility criteria and the amount of direct financial support, based on the experience and lessons learned from parent project’s implementation. The minimum investment cost threshold for each subproject would now be set at US\$200,000 (compared to the previous limit of US\$1 million) as municipal buildings pilot projects have shown that potential energy savings³⁵ are less than planned due to lower than originally expected energy consumption. In addition, the maximum direct financial support would be set at up to 70 percent, consistent for all types of subprojects (under both Components 2 and 3). In its initial phase, the direct support towards the EE investments would help build confidence and secure buy-in from municipal and national authorities who typically lack experience with managing energy consumption and with EE investments, and who are unfamiliar with the project’s mechanism.³⁶ The level of direct support would be reassessed at MTR, with the aim of lowering over time to increase sustainability and replicability;³⁷ and;
 - e. Update the description of project activities to be supported under Component 1, as well as the results framework based on the proposed changes and the increased scope of the operation. The “projected lifetime GHG emission reductions” indicator will now be a PDO indicator, and a new intermediate level indicator for EE subprojects in public facilities (for public schools and hospitals) would be added. In addition, the parent project’s name, *Municipal Energy Efficiency Project – PRESEM*, is being amended as part of the AF to *Energy Efficiency in Public Facilities Project – PRESEMEH*.
4. Details on the new activities considered under the AF, the addition of “**Component 3 - Public Facility Energy Efficiency Investments**” and “**Component 4 - Municipal Energy Efficiency Contingency Facility**” are presented below.

³⁵ Due to no cooling or heating involved, and few hours of operation. Going forward, EE investments in MB would seek to focus in areas where there is greater energy consumption.

³⁶ Often, the ESAs need State Congress approval, which if led by an opposing political party, increases the political risks and thus municipalities are preferring to complete the subproject under one municipal period.

³⁷ PRESEM PAD (Report No. PAD1193) (p. 31), “the amount of direct support would vary by subproject and the criteria would be re-assessed by the SENER and the Bank during the project’s Mid-term Review, based on implementation results.”



Component 3 – Public Facility Energy Efficiency Investments

Subcomponent 3(a): Policy Development and Institutional Strengthening for Schools and Hospitals

5. This subcomponent (total US\$4.5 million, of which US\$3.5 million IBRD and US\$1 million SENER) would include the following: (i) the carrying out of capacity building activities for EE at eligible PFs; (ii) supporting the development of policy and of monitoring, reporting and verification procedures; and (iii) the carrying out of targeted energy and science education activities mainly for girls. It would support the following activities:

- (i) The carrying out of capacity building activities for EE at Eligible Public Facilities, including:
 - a. EE awareness-raising and education in schools and hospitals:
 - *Communication, dissemination and outreach strategies and activities* to raise awareness of energy efficient behavior and the potential and value of implementing EE measures in schools. Activities to be financed would include: communication activities with and for the education sector; multimedia items adapted for students and schools' as well as hospital staff; education materials for education institutions; and dissemination of lessons learned, good practices, and relevant experiences.
 - b. Capacity building and training in hospitals and large schools:
 - *EE diagnostics and baseline analyses*, to assess energy use and identify energy saving priority areas in large schools and hospitals. This activity can provide input for education programs, as well as help build a pipeline of priority subprojects to support national scale deployment of the operation; and
 - *Capacity-building activities*, including EE capacity-building programs for hospitals and schools' energy managers, independent energy auditors, and entities' staff – including CONUEE, SEP, SSA, IMSS, among others, as well as other key players, to enable the continuous management and deployment of the program (and beyond the project's lifetime).
- (ii) Supporting the development of policy and of monitoring, reporting and verification procedures:
 - c. Sector-wide policy support:
 - *Study to assess options to scale-up activities piloted under this operation with a view to transition to a more commercial, sustainable program for national-scale deployment*; and
 - d. *Preparation of other relevant outputs* such as: manuals, analyses, and handbooks on EE measures in schools and hospitals; Project monitoring, evaluation and management:
 - *Monitoring of energy performance and measurement, verification, and reporting frameworks* for covered sectors. This task would include the preparation of relevant markets' studies that can help build the case for the development or enhancement of standards and norms;
 - *Impact assessment and evaluation studies*. Activities to be financed would include baseline generation for impact assessment and analysis of project progress, and MTR evaluation analysis and ex-post assessments, including impact evaluation;



- *Enhancement of FIDE’s internal informatic systems.* Activities to be financed would include the strengthening FIDE’s internal control and management of payments from EE investments, including the management of the contingency facility; and
- *Project management activities,* including subproject supervision and travels; equipment; safeguards-related processes and documents; and other operational activities defined in the project’s updated OM.

(iii) The carrying out of targeted energy and science education activities mainly for girls.

e. Education programs integrating clean energy and EE:

- Development/expansion of school curriculum integrating clean energy and EE, including practical training and demonstration projects in high schools and technical colleges; and
- Dedicated efforts to target and integrate girls/women through initiatives such as “Women in STEM” (“*Mujeres en STEM*”) which seek to mentor young women in high schools and increase their interest in the science and engineering fields.

6. All activities under this subcomponent would be led and executed by the SENER with substantial technical support from CONUEE (SENER’s technical EE arm), given its experience working with schools and hospitals on EE policy, capacity building, and energy certification and management systems.

Subcomponent 3(b) – Energy Efficiency Investments in Schools and Hospitals

7. This subcomponent (total of US\$66.20 million, of which US\$46.38 million IBRD, US\$2.18 million SENER, and US\$17.64 million from the beneficiaries through energy service payments via the electricity bill) would support cost-effective EE investments in schools and hospitals. Activities under this subcomponent would be operated by the FIDE, with support from the CFE and SENER.

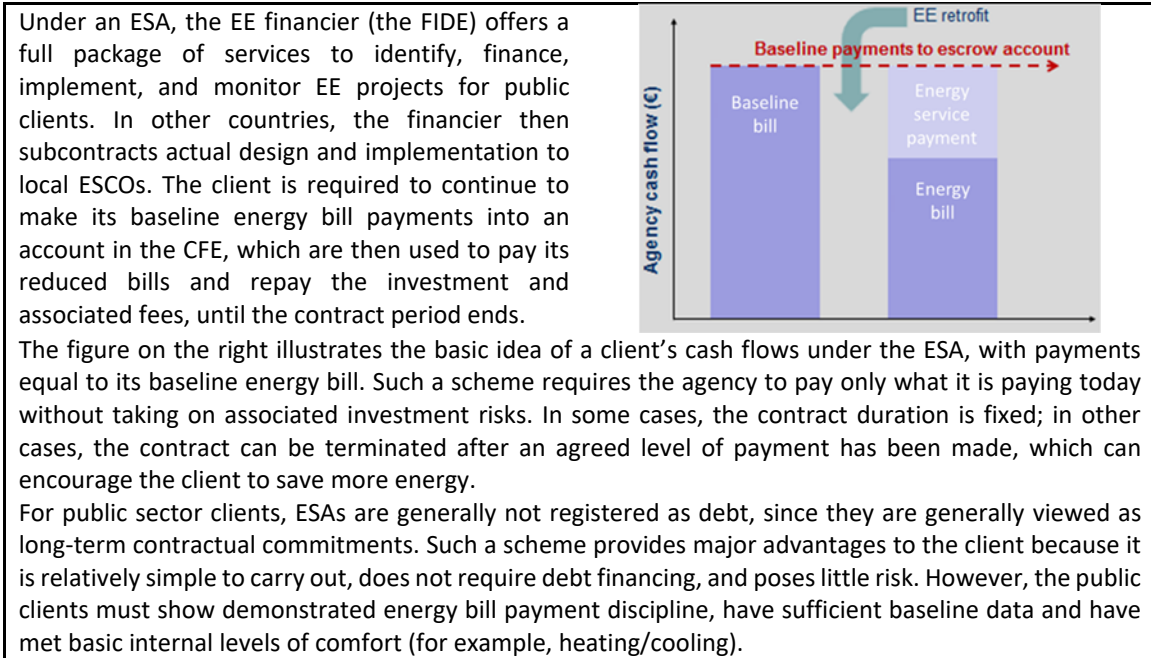
8. Under this subcomponent, the parent Project’s innovative operational and financing mechanism developed initially to support EE investments in municipal sectors (i.e., SL, MB, and OOA) would be adapted and extended to reach the facilities in 2 key public sectors: education and health, where the existence of untapped economic EE potential – due to several market and implementation barriers – has been confirmed by different sources. The use of ESAs allows beneficiaries to receive the benefit of the EE investment without paying the up-front cost – a key barrier in both municipalities and in health and education ministries – and then pay the energy service with the energy savings through the electricity bill. This reduces transaction costs and facilitates participation of municipalities and ministries. If this system, which involves various stakeholders, can be made to work seamlessly and each stakeholder is comfortable with its role, then a case can be made that this mechanism has the potential to transition to a sustainable model for supporting EE in public facilities at scale throughout the country. If successful, this model can help change perceptions, address barriers and build confidence in EE as a sound economic investment for the private sector. With the experience, lessons, proof of concept and increased awareness of EE potential and benefits, the aim is to set the stage and support the elaboration of a sustainable market solution for national scale deployment.

9. An advantage of the proposed mechanism is that it would not place an undue burden on the beneficiary with which the ESA would be signed, as it would continue paying the usual amount for its electricity bill (and not require additional budget) and the implementation would be outsourced to a



competent entity (FIDE). In addition, ESAs are typically viewed as a long-term contract obligation, similar to utility payments, and thus, the beneficiary would not incur debt, nor need an increase in public entities’ budget allocations. The ESA can be made with flexible contract duration in the event the energy savings are a bit higher or lower than expected. Figure A.3.2 illustrates the ESA concept in further detail.

Figure A.2.1: The Energy Services Agreements (ESA) Mechanism



10. It is expected that these activities would demonstrate the value of EE investments as a means of reducing energy consumption and carbon dioxide (CO₂), and lowering schools’ and hospitals’ energy expenditures while maintaining or enhancing quality of service. In the case of schools, the project would also bring lighting levels up to comply with the relevant Mexican labor and safety norms.³⁸ If such upgrade results in greater energy consumption compared to current energy use (although lower than if the upgrade did not take into account EE) in some schools, education authorities would be requested to authorize the increased energy consumption associated with greater lighting service levels and thus higher energy service payments over time. On an aggregated basis, however, the bundling of EE investments in schools would be such that energy savings overall (for the entire bundle of subprojects under one ESA) would comply with the project’s energy savings requirements of at least 20 percent – and SEP would still benefit from overall reduction in its centralized electricity bill.

11. Although the operation’s pilots would be targeting EE in public sector facilities, this would be done with participation of the private sector. The implementation of the ESAs fundamentally relies on private

³⁸ Enhancing lighting levels in schools would contribute to providing a better learning environment, as well as help contribute to a safer environment within the school. This has been raised by SEP’s *Oficial Mayor* as an important benefit from the project. The project would ensure lighting is brought in line with the standard on lighting conditions in work environments set by the Secretariat of Labor and Social Welfare (*Secretaría del Trabajo y Previsión Social, STPS*) in its lighting conditions in workplaces National Mexican Standard (*Norma Oficial Mexicana – NOM-025-STPS-2008-condiciones de iluminación en los centros de trabajo*), which aims to provide a safe and healthy environment in the accomplishment of the tasks of workers.



sector participation during project implementation, including the participation of energy auditors, private ESCOs, manufacturers, and equipment installers.

12. The mechanism works in such a way that the beneficiary does not have to incur debt or secure additional capital budget to cover the upfront investment costs. SENER – through FOTEASE – would cover the upfront financing of the EE investments in schools and hospitals. Effectively, the investments costs for each subproject would be covered by: (i) direct support through the IBRD loan (the portion of investment cost that the beneficiary entity would not have to repay through the ESAs);³⁹ and (ii) the beneficiaries' payment of energy services (amounting to the other portion of the investment cost) through the electricity bill. The entities eligible for EE investments under Component 3 would be public health or education sector facilities administered by SEP, SSA and IMMS, where electricity payments are centralized, or large hospitals (under SSA's responsibility) that comply with the eligibility and selection criteria (see para. 17).

13. An aggregated approach would be pursued, whereby in the same bidding processes, goods, installation and works for several public facilities (of health or education) would be bundled to achieve economies of scale and lower transaction costs, as well as to speed up implementation. The presence of centralized payments for the electricity consumption of SEP-managed schools, as well as IMSS hospitals (and some SSA hospitals) would facilitate such an aggregated approach enabling larger subprojects for each ESA. All subprojects, whether bundled or not, would still need to meet the same criteria in terms of minimum energy savings potential and EIRR established under the parent project (i.e., same as for subprojects in municipalities and OOAs). In addition, a set of steps and criteria would guide the selection of individual schools and hospitals.

14. Activities to be financed under subcomponent 3(b) include, among others:

- (i) Carrying out Public Facility Energy Efficiency Subprojects, consisting of investments on *inter alia*:
 - Acquisition and installation of lighting fixtures and wiring, including the installation of management and control systems; and
 - Acquisition and installation of, among others, electrical wiring, lighting, A/C, windows, insulation, white roofs, solar water heaters, and PV systems, all in Eligible Public Facilities
- (ii) Preparing feasibility studies, including detailed energy audits and designs, structural safety assessment and bidding documents, for the Public Facility Energy Efficiency Subprojects.

15. The specific technologies that could be included in the subprojects, but are not limited to, the following:

- a. Schools: lighting systems (including dimmers), A/C systems, PV systems, cool roofs, heat pumps, and; and electrical wiring.
- b. Hospitals: lighting systems (including controls), A/C systems, steam generation systems, PV systems, solar water heaters, heat pumps and co-generation, and insulation.

³⁹ The funds associated with the loan(s) part of the project (IBRD funds) would not be returned to the FOTEASE, whereas any counterpart funds (i.e., the payment of energy services) would be returned.



16. Subcomponent 3(b) would be driven through a managed process between SENER and SEP, SSA or IMSS. It would rely on SENER's coordination capabilities and FIDE's expertise to agree with SEP, SSA or IMSS on facilities to be incorporated into the project under a bundled approach, as long as each ESA (aggregated subprojects) meets the eligibility criteria (detailed below). SEP, SSA and IMSS would be the beneficiaries of the energy service provision from FIDE. To this end, FIDE would coordinate with the federal entities the definition of the executive project, bidding documentation, and during implementation of the works. In the case of institutions with centralized electricity payments, individual interventions would be bundled to achieve parent Project's eligibility criteria; large facilities could be treated as individual subprojects as long as they meet these criteria as well.

17. Selection criteria to participate in the project is described in the updated project's OM and include:

a. General:

- i. Provision of (or facilitating access to) required data and information (e.g. electricity bills) and identified EE potential in the subsectors covered and discussed in Annex 2;
- ii. Demonstrated financial discipline and no current payment deficits or agreed repayment schemes with the CFE and/or the FIDE; and
- iii. A letter of intent from the head of the beneficiary institution and a commitment to secure any approval (if applicable).

b. Schools:

- i. Levels: "*básica*" (primary and secondary education), "*media superior*" (high schools), and "*superior*" (technical colleges);
- ii. Current status: Facilities with inefficient lighting technologies, where no modernization or retrofitting has taken place in the last 10 years, and whose structural soundness has been confirmed;
- iii. Function/Use: Public education facilities used extensively, with priority to those with 2 or more daily school shifts; and
- iv. Other: The parent project's criteria would be met at the aggregate level in the case of bundles of education facilities.

c. Hospitals:

- i. Levels: Second and Third level facilities;
- ii. Current status: Hospitals with inefficient lighting, heating/cooling, water heating technologies and where no modernization or retrofitting significantly affecting lighting, cooling and/or heating has taken place in the last 10 years, and whose structural soundness has been confirmed;
- iii. Function/Use: Public health facilities with a high consumption of energy for A/C equipment and other uses; and
- iv. Other: The parent project's criteria would be met at the aggregate level in the case of bundles of health facilities.

18. To be financeable, prepared subprojects⁴⁰ would need to demonstrate acceptable levels of economic efficiency and energy savings, consistent with the parent project, as defined here:

⁴⁰ In the case of bundles of projects, the criteria would be assessed at the level of the bundle (as is the case for MBs subprojects under the parent Project).



- a. At least 20 percent energy savings;
- b. EIRR of at least 7 percent (calculated excluding any direct support); and
- c. Minimum subproject cost of US\$200,000.

19. A non-reimbursable direct support would be provided to cover a portion of the subproject investment cost. This direct support would help secure the interest and participation of targeted entities in the ESAs – which are new and unfamiliar to all entities, limit the payback period, reduce the risk of political changes in administration affecting beneficiaries’ commitment to the payment of energy services through the ESA and to cover some essential, but not energy saving-generating improvements, such as improved service levels to meet national norms (as in the case of lighting in schools) and electric cable replacements. The direct support would be set at a maximum level of up to 70 percent (of total investment cost), consistent for all types of subprojects (including those under the parent project), and would be lowered over time to allow for greater sustainability and replicability. In fact, the amount of direct support could vary by subproject and the criteria would be re-assessed by the SENER and the Bank during the project’s MTR, based on implementation results and with a view to reducing it and to transition to a more commercial, sustainable program. The investment criteria are based on the results of economic and financial analysis of typical subprojects and of investments supported by the FIDE and would apply to the selection of all subprojects, unless otherwise agreed by the Bank.

20. The first pipeline of subprojects is being prepared with technical assistance funds already secured from ESMAP, which would support detailed energy audits and assess related improvements to ensure the sustainability of EE investments (e.g. electric wiring). The ESMAP funds would also be used to perform structural assessments of schools and hospitals where necessary to ensure the sustainability of the EE investments. Data and information collected from this exercise would also serve to update and refine assessment of overall energy savings potential from public schools and hospitals. The results would help subsequent rapid implementation of the loan by providing essential input for to the preparation of the executive subproject designs and bidding documentation, so they can be ready in mid-2018.

21. CFE would support project execution by metering (and thus recognizing and validating) any energy savings accrued from the implementation of EE investments. The utility would also help recover the contributions (i.e., energy service payments) from beneficiaries (as per ESAs) through the electricity bills and transfer those resources to FIDE. The latter would subsequently transfer the funds received from CFE to FOTEASE which would reinvest them in EE interventions. The “incremental costs” of FIDE and CFE would remain consistent with those already established under the parent Project; i.e., 10.52 percent of total subproject investment costs, broken down as follows: 9.7 percent of the investment cost in the case of FIDE and approximately 1.44 percent for CFE (representing 2.25 percent of the beneficiary’s energy service payment obligation, plus the costs of SLs census performed for Component 2). These incremental costs would be partially covered by the loan and partially by counterparty funds. FIDE’s incremental costs related to technical work needed for defining and preparing the subprojects. Further details on these incremental costs can be found on the table below.



Table A.2.1: FIDE’s and CFE’s Incremental Costs for the Project⁴¹

	Stages of subproject	Activity	Amount (US\$ M)	% (of subproject costs)	Source of financing
FIDE	Preparation	Feasibility analysis/executive subproject	3.53	2.00%	IBRD loans
	Evaluation	Bill analysis and census	1.85	1.05%	IBRD loans
		Analysis of energy balance			
		Analysis of alternatives for energy savings			
		Definition of energy indices			
		Verification of estimates of consumption and savings potential			
		Finalization of technical analysis			
	Monitoring, verification and reporting	Technical specifications and bidding documents	3.10	1.76%	IBRD loans
		Measurement of energy results			
		Analysis of changes in the baseline			
	Technical monitoring of implementation	Reports/recommendations	3.26	1.85%	IBRD loans
		Works and authorization of payment			
	Administration fees	Technical verification of installation of equipment	5.36	3.04%	Counterpart (SENER)
		Selection process			
		Procurement process			
Service fees (lighting, water, and so on.)					
IT development					
Formalization of contract					
FIDE Total			17.10	9.70%	
CFE	Monitoring of payment	1.19	2.25% of beneficiary's repayment obligation	Counterpart (SENER)	
	Supervision visit				
	User registration and control				
	Billing process				
	Delivery of receipts, account statements and collection				
Transfer of recovered resources	0.25	MX\$ 25.00 + value-added tax (VAT)	IBRD loans		
Public lighting census update					
CFE Total			1.44	0.82%	

22. Interinstitutional arrangements for the implementation of subcomponent 3(b) replicate those of the parent Project and include the following:

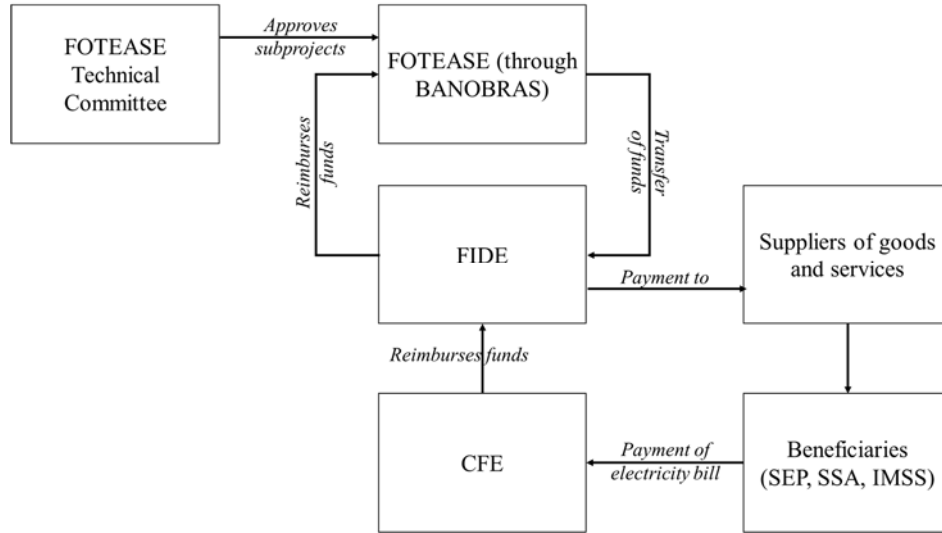
- a. A collaboration agreement between SENER and FIDE for the execution of subcomponent 3(b): *the PF Operator Collaboration Agreement*;
- b. Two implementation agreements between the FIDE and the CFE (one for schools and another one for hospitals) to define parties’ obligations related to subcomponent 3(b), including CFE’s activities during subprojects’ preparation and implementation: *PF FIDE-CFE Implementation Agreements*;
- c. An AIA among SENER, FIDE, and beneficiaries (Federal Secretariats, or agencies with centralized energy payment systems, or, in some cases, administrations of large facilities), to start the evaluation and preparation of subprojects; and

⁴¹ Assuming a 100 percent success rate.



- d. An ESA among SENER, FIDE and the beneficiary institution to execute agreed subprojects. Detail on the ESA is provided below.

Figure A.2.2. Operational and Financial Mechanism for Financing EE Investments



Component 4 – Municipal Energy Efficiency Contingency Facility

23. The proposed “Component 4 - Municipal Energy Efficiency Contingency Facility” would rely on the existing operational and financial capabilities established under the parent Project, and would only apply to the municipal EE investments (i.e., SL, MB and OOA). Overall coordination and project implementation would still be the responsibility of SENER, through the DGESE, and would be supported by the UREP-PRESEMEH. SENER would rely on the UREP’s experience with Bank-financed projects to handle all procurement and FM issues. SENER would ensure that appropriate project implementation arrangements are in place and that all activities being developed by other stakeholders – mainly FIDE – are done in accordance with project design and Bank procedures.

24. FIDE would execute and manage – as ‘Operator’ – the contingency facility established through a GEF grant under Component 4, for which the existing SENER-FIDE Operator Collaboration Agreement would be amended to incorporate the tasks under Component 4.⁴² FIDE’s capacity has been proven through the implementation of: (i) the parent Project, (ii) the IBRD and GEF-financed Efficient Lighting and Appliances Project (IBRD P106424 and GEF P120654), that included a guarantee facility for US\$35 million, of which US\$5 million came from GEF); and (iii) its own projects. The entity has more than 10 years of experience implementing EE projects with municipalities, although it had previously disengaged itself due to the municipalities’ lack of financing capacity. The Bank has provided capacity building to FIDE on its procurement and FM guidelines, and would organize capacity building activities during implementation, focusing on the creation and management of the contingency facility.

⁴² FIDE subscribed the PRESEM collaboration agreement with SENER on August 15, 2016. FIDE and SENER are currently working on – and have already prepared –the amendment to include the new activities discussed in this paper.



25. The contingency facility would backstop the default of municipalities or OOAs benefiting from the implementation of EE investments (under the parent project). Once the GEF grant becomes effective, the resources would be incorporated to the budget approved annually by the Congress. The SENER-FIDE Operator Collaboration Agreement would be amended to establish that FIDE would keep and manage the contingency facility resources under a new account to be opened in a commercial bank (BANORTE) until the end of the Project. GEF resources would be channeled to FIDE through the FOTEASE. All the contingency facility's procedures would be included in the OM that would be annexed to the project's OM and in the Grant Agreement to be signed between the United Mexican States, through SHCP, and the WB.

26. The "default event" that would trigger the activation of the contingency facility would be when municipalities or OOAs fail to make their agreed energy service payment under the ESA for a period of 6 continuous months (either total or partial amount of 6 monthly or 3 bimonthly electricity billing cycles, depending upon the type of contract signed with CFE). SENER would verify compliance with the established protocol to recuperate energy payments from beneficiaries and approve the triggering of the contingency facility. FIDE has had experience with three other contingency facilities that covered between 15 and 10 percent of the total investments – percentages that were based on risk assessments, although 10 percent and 5 percent of the investments used the facility. Based on these risk assessments and experiences, a 15 percent coverage from the GEF contingency facility for total expected energy service payments from municipal entities was deemed appropriate.

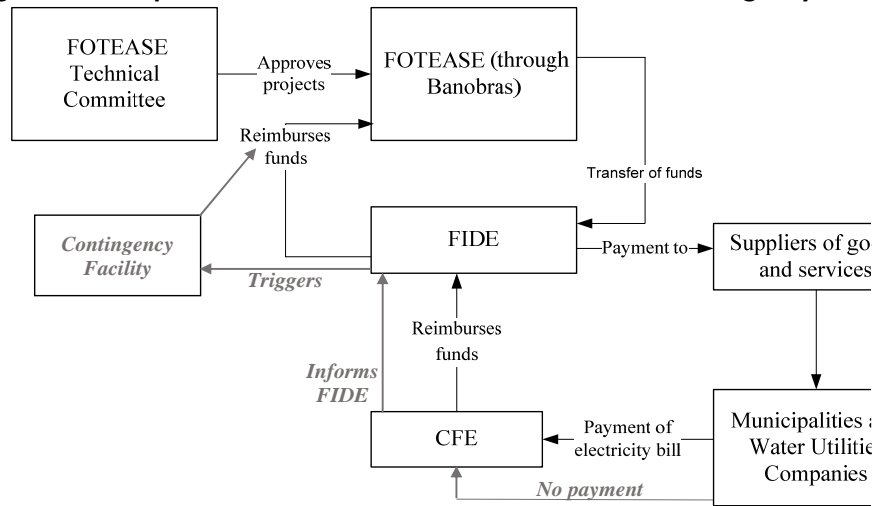
27. The contingency facility would work as follows (Figure A.2.2):⁴³
- a. Every week, FIDE would continue requesting to CFE to transfer the energy service payments from municipalities and OOAs paid through the electricity bill to the FIDE;
 - b. CFE would transfer the resources and report to FIDE whether a beneficiary did or did not pay full amount of the committed energy service payments under its ESA (signed among the beneficiary, SENER and FIDE);
 - c. In the case of a total or partial default, FIDE would start "administrative procedures" as soon as it is informed of breach with the ESA terms. FIDE would contact the beneficiary and insist by different means that it pay its contractual obligation. In cases where the municipality or OOA does not pay for its electricity consumption as well, CFE would also follow-up with that beneficiary;
 - d. If, after a period of six months, the beneficiary still has not paid back its energy service payments, FIDE would request SENER to trigger the contingency facility;
 - e. Once SENER confirms that procedures to obtain the missing energy service payment have been followed and confirms the default, FIDE would trigger the contingency facility and start "prejudicial proceedings." The contingency facility would cover all due energy service payments (for 6 continuous monthly or 3 bimonthly electricity bills), up to a limit of 5 percent of the total resources available in the facility. If the beneficiaries continue to default on their agreed energy service payments, the contingency facility would continue covering these as long as the total due energy service payments do not exceed the same 5 percent limit;
 - f. FIDE would send the resources paid by the contingency facility back to FOTEASE, following the normal mechanism. If a beneficiary ends up making its energy service payments after the triggering of the facility, those resources would be kept in the facility; and

⁴³ Further details in Figures A.3.3 and A.3.6 below.



- g. Any funds remaining in the contingency facility at project closing would be transferred to FOTEASE to settle any balances (starting first with the oldest due energy service payments) and/or to finance additional EE projects.

Figure A.2.3. Operational and Financial Mechanism with Contingency Facility



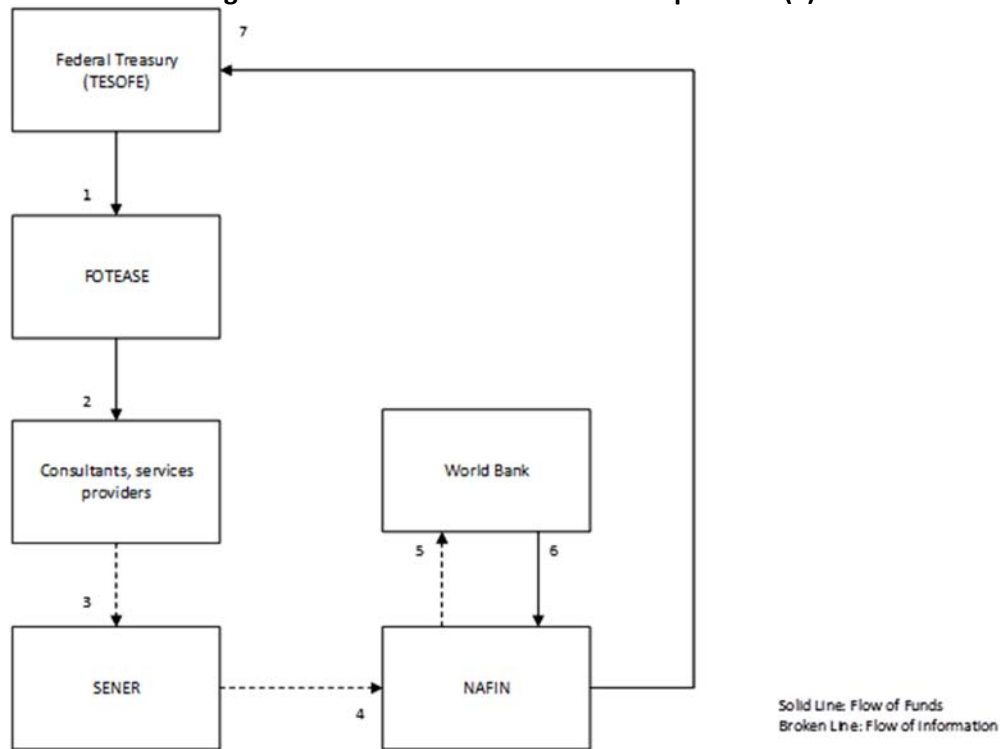
28. The contingency facility would be supervised by SENER as mentioned above. This new instrument would be operated by FIDE’s financial division, through its SGOF, which is separate from the operational division dealing with beneficiaries. This would seek to ensure that it remains in FIDE’s interest to actively pursue beneficiaries in default to pay back, as an increased default rate would negatively affect the whole operation of the program, reducing FIDE’s roles, activities and income. The operation, processes, results and financial position of the contingency facility would be reviewed during the Project’s MTR.

29. General procedures would be included in the grant agreement to be signed between the United Mexican States, through SHCP, and the Bank. Further procedures would be developed in a new OM that would be annexed to PRESEMEH’s OM. Any remaining funds from the contingency facility would be utilized to further finance EE investments in municipalities and OOA by SENER/FOTEASE. Rules for using such resources are further defined in the facility’s OM. Further details are included in Figures below.



Description of Flow of Funds

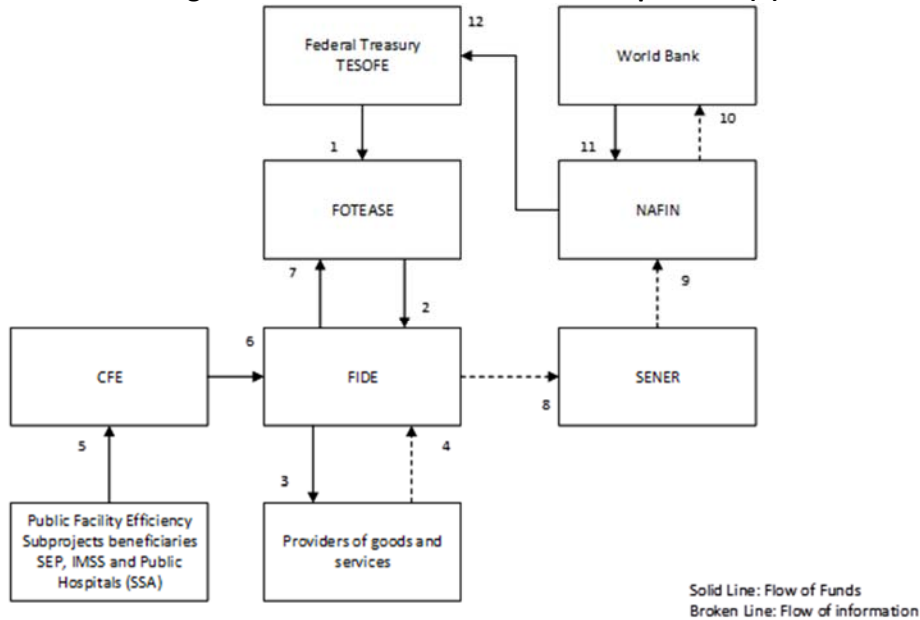
Figure A.2.4. Flow of funds for Subcomponent 3(a)



1. Based on the budget approved annually by the Congress, TESOFE transfers allocated budget to FOTEASE.
2. The FOTEASE makes payments to consultants, service providers.
3. Consultants, services providers submit support documentation to SENER.
4. SENER prepares and submits to NAFIN support documentation and requests disbursement.
5. NAFIN reviews disbursement request and support documentation, and submits the disbursement application to the WB.
6. The WB disburses loan proceeds to NAFIN.
7. NAFIN reimburses loan proceeds to TESOFE.



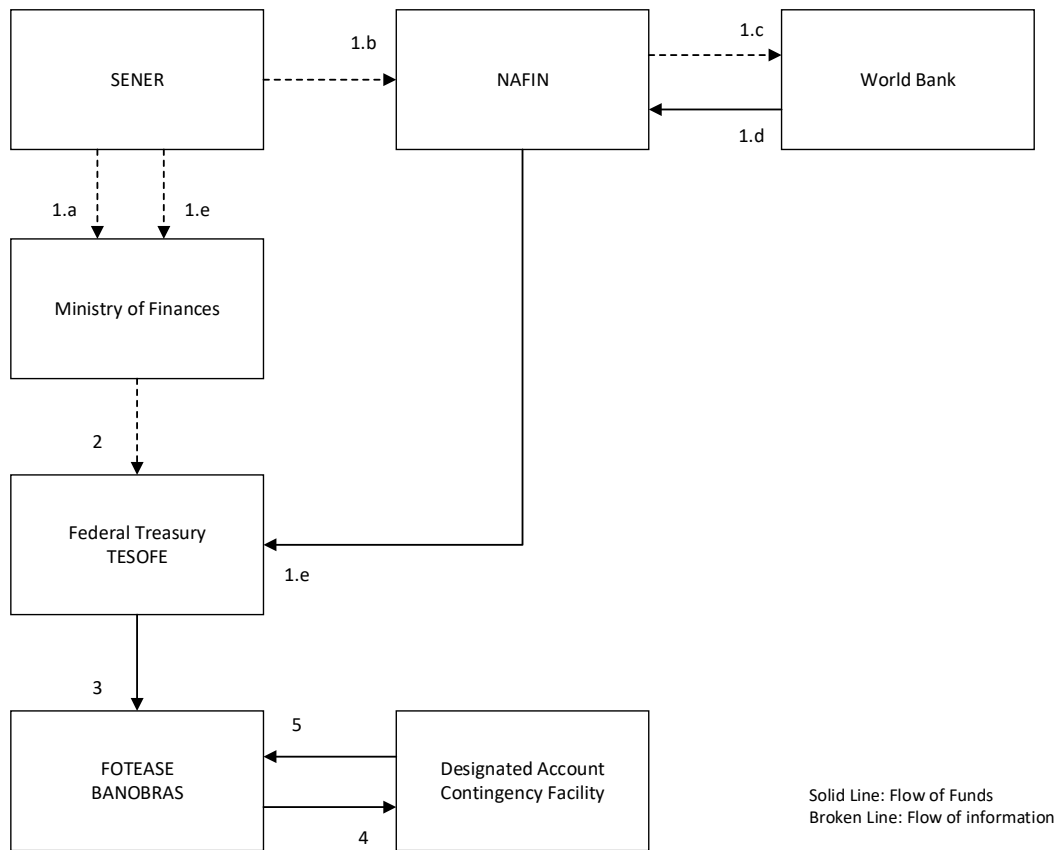
Figure A.2.5. Flow of funds for Subcomponent 3(b)



1. Based on the budget approved annually by the Congress, TESOFE transfers allocated budget to FOTEASE.
2. FOTEASE transfers funds to FIDE for implementing public building interventions.
3. Under provisions of the PF SENER-FIDE Collaboration Agreement, FIDE would carry out all procurement processes to implement Public Facility Efficiency Subprojects and make payments to goods and services providers.
4. Goods and services providers would submit support documentation to FIDE.
5. Beneficiaries would pay their usual energy bill to CFE, which would include a separate line identifying re-payment for the EE investments.
6. Under the provisions of the CFE Implementation Agreement, CFE would retain and transfer to FIDE the energy savings, billed and collected from the beneficiaries.
7. FIDE would transfer the funds received from CFE to the FOTEASE, billed and collected by CFE from the beneficiaries.
8. FIDE would provide the following information and documentation to SENER:
 - a. Support documentation from payments made to providers of goods and services (for payments made under number 3 above).
 - b. Report on the progress of payments received to credit beneficiaries' EE investments (from energy savings billed and collected from CFE, and transferred to FIDE under number 6 above).
9. SENER would prepare and submit to NAFIN support documentation for eligible expenses, requesting disbursement of loan (AF) proceeds.
10. NAFIN reviews disbursement request and support documentation, and submits the disbursement application to the WB.
11. The WB disburses loan proceeds (AF) to NAFIN.
12. NAFIN reimburses loan proceeds to TESOFE.



Figure A.2.6. Flow of funds for Component 4



1. Following federal budgetary regulations:
 - a. SENER requests to the Ministry of Finances additional budget from its approved annual allocation.
 - b. SENER requests NAFIN disbursement of grant proceeds.
 - c. Upon request from SENER, NAFIN submits disbursement application to the World Bank.
 - d. The World Bank disburses grant proceeds to NAFIN.
 - e. NAFIN transfers disbursed funds to the Federal Treasury (TESOFE). In parallel, SENER notifies SHCP that funds have been disbursed to TESOFE.
2. The Ministry of Finances approves additional budget allocation to SENER (grant proceeds are incorporated in federal budget cycle).
3. Upon approval for additional budget allocation (grant), the Federal Treasury (TESOFE) transfers funds to FOTEASE (through the '*Banco Nacional de Obras y Servicios Públicos SNC*', or BANOBRAS acting as trustee of the FOTEASE).
4. FOTEASE (through BANOBRAS) transfers funds to the Designated Account opened and managed by FIDE, to capitalize the contingency facility.
5. Upon non-payment events occur and following guarantee policies and procedures agreed with the World Bank, FIDE makes application of grant proceeds. Funds are transferred by FIDE to FOTEASE (BANOBRAS) to cover payment defaults by municipalities.



Note: Total GEF Grant funds will be disbursed through one single disbursement application, to capitalize contingency fund.

For payment defaults, FIDE will follow guarantee recovery procedures as agreed with the World Bank. Proceeds recovered will be reported to SENER and the World Bank and reinstated in the contingency facility.

Upon closing of the Project, remaining proceeds in the contingency facility will be transferred to the FOTEASE (BANOBAS), to be applied for other EE investment projects, as agreed with the World Bank and provisioned in the Grant Agreement.

30. **Although no significant additional risks are expected by the proposed AF, the overall project risk would be kept at Substantial, as many risks remain from working with subnational entities.** The parent project’s original risk rating of Substantial was largely due to (i) risk of non-payment from municipal entities; (ii) the technical design risk associated with relying on an innovative mechanism; and (iii) the fiduciary risk associated with the need to coordinate with subnational entities that have little or no experience with Bank-financed operations and EE interventions. Including new sectors would not modify previous project risk assessments, as: (i) implementation arrangements would rely on the mechanisms created and tested by the parent project; (ii) activities would still be led and implemented by SENER and FIDE; and (iii) the two new public sectors have lower non-payment risks than municipalities and municipal water utilities. Indeed, both health and education entities are reliable CFE clients: IMSS does not have any debt with CFE (and even tries to pay consumption in advance), while SEP always settles any outstanding amount within six months.⁴⁴ The AF and the parent project would be covered by two different WB procurement policies, with the former covered by the new WB Procurement Regulations (adopted in July 2016), while the latter would remain covered by the previous WB Procurement Guidelines.

Table A.2.2. Disbursement Arrangements

Disbursement method	The following disbursement methods may be used under the loan (AF) and GEF Grant: Reimbursement (AF). GEF Grant funds to be disbursed through a single disbursement application to capitalize contingency fund (Component 4).
Supporting documentation	Statements of expenditures (SOEs) ⁴⁵ , Invoices and Receipts. For advance to capitalize the Contingency Facility fund under Component 4, records evidencing the eligible expenditure would be deemed necessary.
Retroactive expenditures (for Component 3 only)	Eligible payments must meet the following conditions: Period to be confirmed (at appraisal). That do not exceed 20 percent of the loan amount. The retroactive expenditures would be subject to the same systems, controls and eligibility filters described above. Those expenditures would also be subject to the regular project external audit (see below).

⁴⁵ All SOE supporting documentation, subproject documentation and files would be available for review by the external auditors and WB staff at all times during project implementation, until at least the later of: (i) one year after the WB has received the audited Financial Statements covering the period during which the last withdrawal from the Loan Account was made; and (ii) two years after the Closing Date. The Borrower shall enable the WB’s representatives to examine such records.



Table A.2.3. Disbursements per Expenditure Category Additional Loan

<u>Category</u>	<u>Amount of the Loan Allocated (expressed in US\$)</u>	<u>Percentage of Expenditures to be Financed (Inclusive of Taxes)</u>
(1) Goods, works, consultants’ services, non-consulting services, Capacity Building and Project Incremental Costs for Parts 3(a), and 3 (b) of the Project	48,875,000	100%
(2) Front-end fee	125,000	Amount payable pursuant to Section 2.03 of the Loan Agreement in accordance with Section 2.07 (b) of the General Conditions
(3) Interest Rate Cap or Interest Rate Collar premium	0	Amount de pursuant to Section 4.05 (c) of the General Conditions
TOTAL AMOUNT	50,000,000	

Table A.2.4. Disbursements per Expenditure Category Additional Grant

<u>Category</u>	<u>Amount of the Grant Allocated (expressed in US\$)</u>	<u>Percentage of Expenditures to be Financed (Inclusive of Taxes)</u>
(1) Contingency Facility for Part 4 of the Project	5,790,000	100%
TOTAL AMOUNT	5,790,000	



Annex 2: Economic and Financial Analyses

1. The new activities proposed would have a clear development impact and generate economic benefits from the beginning and would result in sizeable economic and financial benefits at both the local and national levels. These activities would help expand the scope of the operation to new sectors, scale-up the project by lowering the risks taken by FOTEASE and help establish a mechanism that can help build confidence on the implementation of municipal EE measures in public facilities through ESAs and the establishment of a revolving fund. The GEF-supported facility would also have a spillover effect by mitigating non-payment risk of municipal entities.
2. IBRD's support provides strong value added to Mexico's overall EE agenda, by mobilizing additional resources. These include the original US\$100 IPF loan, the new AF for EE in Public Facilities and the Capitalization of a Contingency Facility (loan and GEF grant respectively), and the counterpart funding in part unleashed due to the Bank's facilitation of innovative financing mechanisms for EE. In addition, the policy support provided under PRESEM's Component 1 and new subcomponent 3(a) could also help mobilize private investors, which could in the future participate in the project by offering commercial financing for ESAs.
3. The project would continue supporting public entities through policy development and institutional strengthening, including municipalities, schools and hospitals – Component 1 and subcomponent 3(a) –, municipal EE investments (Component 2), EE investments in schools and hospitals – subcomponent 3(b) –, and a new contingency facility for municipalities and OOAs (Component 4). The economic and financial analyses only consider Components 2 and subcomponent 3(b).⁴⁶ Together, the two components included account for 93 percent of IBRD financing.
4. Initial estimates indicate that public sector facilities have high EE potential due to outdated and high energy-consuming equipment. The economic benefits comprise of saved energy, associated reductions in carbon emissions, and cost savings due to a reduction in expenditures on O&M for SLs. Other economic benefits that are not monetized in this analysis include better capacity to design/implement EE programs or the collateral benefit of access to better quality public services. For example, the analysis does not consider improved safety that may accrue because of improved lighting (either in streets or schools), nor does it consider the demonstration effect EE measures may have in public buildings, whether town halls, hospitals or schools. In addition, as energy consumption is an important cost for government agencies – and competes for resources with other demands for public resources-, reducing energy expenditures would create fiscal space to allow municipalities, schools and hospitals (as well as relevant line ministries and agencies) to redirect saved resources towards other priorities.
5. The economic and financial analysis of EE subprojects (cost-benefit analysis) was done for each subsector. In the case of the investments supported by the original project (SL, MB, and OOA), the analyses are being updated to take into account the new eligibility and direct support criteria. In the case of schools and hospitals, new analyses were undertaken following the same logic of the parent project; i.e. drawing

⁴⁶ The assessment of benefits associated with Components 2 and subcomponent 3(b) are likely to be underestimated, given the analytical constraints associated with benefits that cannot be measured in monetary terms (e.g., improved comfort, learning environment and safety, to mention a few) and/or where information is not readily available.



on the results of energy audits and/or similar projects implemented in Mexico and which could constitute a typical subproject under the AF. Expected direct ERs for each subproject type – over their respective lifetimes⁴⁷ measured in tCO₂eq, are included in Table A.6.12 (based on GEF methodologies).

6. The economic analysis uses cost estimates for investment and O&M⁴⁸ based on similar projects. Costs are adjusted to reflect economic values, excluding taxes and subsidies. Benefits are estimated based on savings to users. The main (quantified) economic benefits from EE investments is the economic value of the saved energy, the associated reductions in carbon emissions, as well as savings in O&M expenditures in the case of public lighting. The main economic costs are the capital investments. Based on the analysis performed, all subprojects are economically viable.

7. The main financial benefit of the EE investments, as assessed for the original PRESEM investments, is the reduction in the energy bills. The financial costs of EE investments are the capital investments. Direct financial support would ensure that subprojects' payback periods are within one mayoral term (for SLs, OOAs and MBs) or within five years (for schools and hospitals). The analysis shows that all subprojects are viable according to this definition once the proposed direct support is considered.

A. Updated results for SLs, OOAs and MBs

8. Overall the economic and financial analyses for these three municipal sectors undertaken under the parent project remain valid. This paper only updated expected subprojects' results based on the new eligibility and direct support criteria, as well as lessons learned through implementation (such as the smaller size of subprojects). In addition, expected results for these sectors now would consider indirect climate benefits linked to the parent project that would be reported to GEF (this issue is discussed later in the Annex). Furthermore, ERs are now being estimated over a 20 years' lifetime for MBs, 10 years for OOAs and still over an 8 years' lifetime for SLs.⁴⁹ Further details on updated expected results are presented in Table A.5.16. Further details by technology are presented below.

Public Street Lighting

9. The assumptions made for SL subprojects remain unchanged. A typical 20,000 light-points subproject was used for the original PAD Report No. PAD1193 analysis. Based on the lessons learned from the first subprojects prepared under the PRESEM, it is now expected the average size of subprojects would include roughly 10,000 light-points. The original analysis considered a direct support of 70 percent, which remains valid. As the only changes to these subprojects would be in the smaller size of the average subproject, the replication effects (which are discussed below for the overall project) and expected results would now be reduced accordingly, as shown in Table A.5.1.

⁴⁷ For this analysis, the economic life of each subproject type is as follows: 8 years for SLs, 10 years for OOAs, and 20 years for MBs, schools and hospitals. Further details can be found in the GHG ERs assessment, which is part of the project files.

⁴⁸ O&M savings apply to the SL sector only, as savings in O&M are difficult to quantify for buildings (municipal, schools or hospitals) and water and wastewater sector.

⁴⁹ As pumps and A/C equipment have a lifetime of at least 10 years, PV systems' lifetime can reach 20 years and street lights have a lifetime of approximately 8 years.



Table A.5.1. Expected Results for Typical SL Subproject

Key assumptions	unit	Street Lighting				
		Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)	Base case (w/ 50% subsidy)	Investment costs +20% and energy savings -20% (w/ support)
Current energy use	kWh / year	8,784,000	8,784,000	8,784,000	8,784,000	8,784,000
Price of electricity - (average price)	US\$ / kWh	0.18	0.18	0.18	0.18	0.18
Social cost of carbon	US\$ / tCO2e	30.0	30	30	30.0	30
Direct support	%	0%	70%	0%	50%	70%
Period of analysis	years	8	8	8	8	8
Discount rate (net of inflation)	%	6%	6%	6%	6%	6%
Summary of results						
Total project investment	US\$	5,049,300	5,049,300	4,352,845	5,049,300	6,059,160
Total project revenues (savings)	US\$	6,435,846	6,435,846	6,037,747	6,435,846	5,148,677
Cost of support	US\$	na	3,534,510	na	2,524,650	4,241,412
Energy savings	%	44%	44%	44%	44%	35%
Energy savings	kWh	30,842,389	30,842,389	30,842,389	30,842,389	24,673,911
Emission reductions	tCO2e	13,879	13,879	13,879	13,879	11,103
NPV	US\$	-92,951	3,241,492	314,906	2,288,794	2,021,575
IRR	%	6%	48%	8%	26%	30%
Payback period	years	7.0	2.1	5.8	3.5	3.1

Water Utilities

10. As in the case of SL subprojects, the overall assumptions made for investments with OOAs remain valid. The same types of subprojects are being considered, and the features originally considered for the analyses are still valid. The change to the maximum direct financial support (i.e., up to 70 percent) would not have an impact on subprojects’ results, but would improve financial conditions and thus make it more attractive for OOAs. Given the change in subprojects’ lifetime, updated overall results are shown in Table A.5.2.

Table A.5.2. Expected Results for Typical OOA Subproject

Key assumptions	unit	Water Utilities				
		Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)	Base case (w/ 50% subsidy)	Investment costs +20% and energy savings -20% (w/ support)
Current energy use	kWh / year	30,750,000	30,750,000	30,750,000	30,750,000	30,750,000
Price of electricity - (average price)	US\$ / kWh	0.11	0.11	0.11	0.11	0.11
Social cost of carbon	US\$ / tCO2e	30.0	30	30	30.0	30
Direct support	%	0%	70%	0%	50%	70%
Period of analysis	years	10	10	10	10	10
Discount rate (net of inflation)	%	6%	6%	6%	6%	6%
Summary of results						
Total project investment	US\$	4,176,000	4,176,000	3,600,000	102,313	102,313
Total project revenues (savings)	US\$	8,537,534	8,537,534	8,094,920	134,424	107,539
Cost of support	US\$	na	2,923,200	na	51,157	71,619
Energy savings	%	21%	21%	21%	21%	17%
Energy savings	kWh	64,036,875	64,036,875	64,036,875	64,036,875	51,229,500
Emission reductions	tCO2e	28,817	28,817	28,817	28,817	23,053
NPV	US\$	1,904,992	4,662,728	2,224,463	3,874,803	3,257,427
IRR	%	15%	62%	18%	37%	41%
Payback period	years	5.6	1.7	4.4	2.8	2.5



Municipal Buildings

11. Overall conclusions made for municipal buildings’ investments also remain unchanged, but parameters have been updated based on lessons learned during parent project implementation. Pilot projects have shown that power consumption in municipal buildings can be considerably lower than that expected prior to implementation, the size of a typical subproject (which would include a bundle of buildings) would be one third of what was originally planned. The pilots were undertaken in MBs with lower saving than expected, due to lower operations hours and no AC consumption. Furthermore, changing the direct support to a maximum of up to 70 percent would not have an impact on subprojects’ results; but it would improve financial assessment for municipalities, and enable the integration of solar PVs (involving higher investment costs) in more projects, something both national and sub-national counterparts are very keen to include. Considering the changes to subprojects’ lifetime and considering insights from implementation, updated overall results are shown in Table A.5.3.

Table A.5.3. Expected Results for Typical MBs Subproject

Key assumptions	unit	Municipal Buildings				
		Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)	Base case (w/ 50% subsidy)	Investment costs +20% and energy savings -20% (w/ support)
Current energy use	kWh / year	859,005	859,005	859,005	859,005	859,005
Price of electricity - (average price)	US\$ / kWh	0.10	0.10	0.10	0.10	0.10
Social cost of carbon	US\$ / tCO _{2e}	30.0	30	30	30.0	30
Direct support	%	0%	70%	0%	50%	70%
Period of analysis	years	20	20	20	20	20
Discount rate (net of inflation)	%	6%	6%	6%	6%	6%
Summary of results						
Total project investment	US\$	412,825	412,825	355,884	230,231	230,231
Total project revenues (savings)	US\$	708,946	708,946	619,403	443,346	354,677
Cost of support	US\$	na	288,978	na	115,115	161,161
Energy savings	%	38%	38%	38%	38%	30%
Energy savings	kWh	5,557,762	5,557,762	5,557,762	5,557,762	4,446,210
Emission reductions	tCO _{2e}	2,501	2,501	2,501	2,501	2,001
NPV	US\$	17,997	290,617	38,247	212,725	185,759
IRR	%	15%	34%	8%	19%	22%
Payback period	years	10.2	3.1	8.0	5.1	4.6

B. Economic and Financial Analysis for Schools and Hospitals

12. The economic and financial analyses for the new targeted sectors (schools and hospitals) are based on assumptions similar to those used under the parent project. The following assumptions apply to all subprojects under both sub-sectors.

- The foreign exchange rate is \$18.28 MX\$ per US\$;
- All costs and revenues, as well as the discount rate, are net of inflation;
- The social cost of carbon is US\$30 per tCO_{2eq} reduced by the project.⁵⁰ The cost of carbon is included in the economic analysis but is not considered in the financial analysis, given that the monetization of ERs from this project is not currently envisioned;

⁵⁰ Based on 2014 WB guidance note:

http://globalpractices.worldbank.org/climate/_layouts/15/WopiFrame2.aspx?sourcedoc=/climate/Documents/carbon%20pricing%20guidance%20note%20-%202015%202015.docx&action=default.



- The financial analysis is inclusive of taxes and direct support; the economic analysis is exclusive of taxes or direct support;
- The price of electricity varies by subproject type (fluctuates between US\$0.12-18 per kWh);⁵¹
- The discount rate is assumed to be 6 percent, which is used to represent the economic opportunity cost of capital in Mexico and is aligned to the original PRESEM values;⁵²
- Project incremental costs (these are the administrative costs charged by FIDE and CFE for their activities – see Table A.3.1 for further details) are not included as these are charged by FIDE and CFE to SENER;
- The assessment period is 20 years for all types of subprojects, except for those that would not include PV systems;
- VAT is 16% (only considered for the financial analysis);
- Annual inflation is estimated at 3%, based on past performance data from the National Institute of Statistics and Geography (*Instituto Nacional de Estadística y Geografía*, INEGI) and forecasts from the International Monetary Fund (IMF); and
- The power grid emissions factor is 0.45 per kg/kWh, as published by the Secretariat of the Environment and Natural Resources (*Secretaría de Medio Ambiente y Recursos Naturales*, SEMARNAT) and consistent with what has been originally used in the PRESEM analysis).

13. Additional assumptions for certain sectors and interventions include:

- A/C equipment would only be replaced in warm weather regions;
- The lifetime by technology would be: 8 years for lighting; 10 years for A/C; and 20 years for PV;
- The default direct support level is set at the maximum level, i.e., 70 percent (for the financial analysis only). An alternative scenario with a lower direct support level (i.e. 50 percent) is also assessed; and
- EE investments for thermal energy use is only considered for some hospitals (not in schools).

14. The analyses conclude that all subprojects are economically viable. Regarding financial viability, the project seeks to ensure that the subprojects' payback periods are done within five years. This relatively short payback period is achieved with the direct financial support. The analysis shows that all subprojects are viable according to this definition once the proposed direct support is considered.

Schools

15. The analysis is based on six types of school where subprojects would be implemented, which are: (i) elementary schools in mild weather regions; (ii) elementary schools in mild weather regions (no PV would be installed); (iii) high schools in mild weather regions; (iv) technical high schools in warm weather regions; (v) technical colleges in mild weather regions; and (vi) technical colleges in warm weather regions.

16. The assessments carried out for these facilities considered the following additional assumptions:

⁵¹ Based on the different tariffs applicable in Mexico.

⁵² Based on the 10-year Mexican bond yield as of June 2015:

<http://www.tradingeconomics.com/mexico/government-bond-yield>.



- All schools would benefit from improved lighting systems; lighting represents 60 percent of the electricity bill in mild weather regions and 30 percent in warm areas; EE potential associated with lighting system is conservatively set at 30 percent;
- PV systems would be installed in most schools which could replace up to 20 percent of total electricity consumption currently purchased from the utility; half the targeted basic schools in Mexico City would be excluded from this measure (given their insufficient surface);
- Subprojects in warm regions would include the modernization of A/C equipment;
- A/C accounts for 50 percent of the electricity bill in warm areas and these systems’ efficiency could be improved by 35 percent;
- Current lighting levels would be improved to meet national standards. It is assumed that meeting such norms would increase electricity consumption from lighting by 25 percent. The economic analyses have been adjusted for this safety as well as comfort/education environment improvement; and
- Electrical installations would be replaced in all schools; the cost of such intervention would be 50 percent of the cost of lighting investment costs. This would not bring energy savings per se, but would contribute to the sustainability of the investments and safety.

Main findings- base case

17. A summary of the aggregate financial and economic analysis for all schools can be found in table A.5.4. Table A.5.5 show the results for each subproject type.

Table A.5.4. Aggregate economic and financial analysis for schools

Subproject type	# of subprojects	No direct support		With direct support				Direct GHG ERs (tCO ₂ eq)	Indirect GHG ERs (tCO ₂ eq)
		EIRR (%)	Total cost (US\$ M)	Direct support (%)	Financial NPV (US\$ M)	FIRR (%)	Payback (yrs.)		
Schools	4 (350 fac.)	10	25,446,070	70	19,674,017	30	3.52	125,234	375,702



Table A.5.5: Summary of analyzes results for schools

Key assumptions	unit	Elementary school in mild weather region			Technical high school in mild weather region			Technical college in mild weather region		
		Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)	Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)	Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)
Buildings' size	m2	700	700	700	4,000	4,000	4,000	10,000	10,000	10,000
Current energy use	kWh / year	61,388	61,388	70,597	181,091	181,091	208,255	407,500	407,500	468,625
Price of electricity - (average price)	US\$ / kWh	0.18	0.18	0.18	0.12	0.12	0.12	0.18	0.18	0.18
Social cost of carbon	US\$ / tCO2e	30.0	30	30	30.0	30	30	30.0	30	30
Direct support	%	0%	70%	0%	0%	70%	0%	0%	70%	0%
Period of analysis	years	20	20	20	20	20	20	20	20	20
Discount rate (net of inflation)	%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Summary of results										
Total project investment	US\$	34,683	34,683	29,900	102,313	102,313	88,201	230,231	230,231	198,475
Total project revenues (savings)	US\$	67,974	67,974	68,158	134,424	134,424	139,344	443,346	443,346	445,084
Cost of support	US\$	na	24,278	na	na	71,619	na	na	161,161	na
Energy savings	%	23%	23%	28%	23%	23%	28%	33%	33%	35%
Energy savings	kWh	273,547	273,547	347,213	806,942	806,942	1,024,251	1,815,818	1,815,818	2,304,818
Emission reductions	tCO2e	123	123	156	363	363	461	817	817	1,037
NPV	US\$	3,288	26,192	12,485	-25,314	42,251	-16	17,654	169,693	78,489
IRR	%	7%	30%	12%	3%	20%	6%	7%	30%	12%
Payback period	years	11.7	3.5	6.1	17.4	5.2	8.8	11.9	3.6	6.2
		Elementary school in mild weather region (no PV)			Technical high school in warm weather region			Technical college in warm weather region		
Key assumptions	unit	Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)	Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)	Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)
Buildings' size	m2	700	700	700	4,000	4,000	4,000	10,000	10,000	10,000
Current energy use	kWh / year	61,388	61,388	70,597	285,687	285,687	307,113	896,191	896,191	963,405
Price of electricity - (average price)	US\$ / kWh	0.18	0.18	0.18	0.11	0.11	0.11	0.12	0.12	0.12
Social cost of carbon	US\$ / tCO2e	30.0	30	30	30.0	30	30	30.0	30	30
Direct support	%	0%	70%	0%	0%	70%	0%	0%	70%	0%
Period of analysis	years	8	8	8	20	20	20	20	20	20
Discount rate (net of inflation)	%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Summary of results										
Total project investment	US\$	12,096	12,096	10,427	148,480	148,480	128,000	465,778	465,778	401,533
Total project revenues (savings)	US\$	5,859	5,859	19,956	247,459	247,459	232,116	843,413	843,413	784,291
Cost of support	US\$	na	8,467	na	na	103,936	na	na	326,044	na
Energy savings	%	6%	6%	18%	33%	33%	35%	33%	33%	35%
Energy savings	kWh	27,993	27,993	101,659	1,692,407	1,692,407	1,863,819	5,309,035	5,309,035	5,846,750
Emission reductions	tCO2e	13	13	46	762	762	839	2,389	2,389	2,631
NPV	US\$	-7,159	828	4,776	-846	97,206	19,640	35,120	342,709	95,574
IRR	%	-13%	12%	17%	6%	31%	8%	7%	33%	10%
Payback period	years	18.4	5.5	4.2	11.5	3.4	7.6	10.5	3.2	7.1



18. Overall EIRR (without direct support) for all schools is estimated to be 10 percent, while the FIRR (with direct support would reach 30 percent). Total grid-supplied electricity savings from the subprojects vary between 6 percent for elementary schools (with no PV systems) to 35 percent at technical high schools and colleges in warm weather regions. This significant difference is explained by the fact that the latter start off with a greater energy consumption base and have a larger EE untapped potential. As the only intervention in some elementary schools (in Mexico City) would be lighting (and consumption may even increase due to the current insufficient lighting service level provided) – and in some cases PV – the energy savings potential is limited. However, subprojects would still include these types of schools, given the value of the co-benefits provided by an improved lighting service. These schools (i.e., those that would involve improved EE as well as greater lighting service levels) would be bundled with other school types, and such ESA (bundle of subprojects) would still be overall within the operation’s parameters.

19. The economic analyses also show that subprojects’ EIRR would fluctuate between 6 to 17 percent, with paybacks of 4.3 to 8.8 years. EIRRs for all subprojects types are above the project’s criteria of 7 percent, reflecting again the significant untapped savings potential in the education sector. The EIRR also reflects the fact that the economic analyzes have been adjusted to consider safety and comfort improvement (and use as an adjusted consumption baseline).

20. The results of the financial analysis without any direct support show expected internal rates of return (IRRs) may even be negative or below 7 percent and intervention would result in considerable lower NPVs. These rather modest financial returns are a result of the increased lighting service levels – in addition to increased efficiency – (compared to the current situation) to be provided and the important cost of introducing PV systems in most facilities. The direct support would enable covering important sustainability measures (that go beyond energy savings) and achieve an acceptable payback period. The maximum direct support of up to 70 percent enables meeting a 5-year payback period by reducing the upfront capital expenditure costs associated with lighting, A/C and mostly PV technology. The cost of the direct support widely diverges from around \$US 6,000 (elementary schools) to over US\$ 325,000 (technical colleges) per facility and is explained by the significantly larger size and energy consumption in such facilities. Considering the direct support, NPV would dramatically increase and IRR would be above the 7 percent requirement (and could even go up to 33 percent).

Sensitivity Analysis

21. Sensitivity analyses were also conducted to understand the impact of a worst-case scenario (20 percent higher investment costs and 20 percent lower energy savings) and a 50 percent direct support level. The findings are shown in tables A.5.6.



Table A.5.6. Summary of sensitivity analyzes for schools

Key assumptions	unit	Elementary school in mild weather region		Technical high school in mild weather region		Technical college in mild weather region	
		Base case (w/ 50% subsidy)	Investment costs +20% and energy savings -20% (w/ support)	Base case (w/ 50% subsidy)	Investment costs +20% and energy savings -20% (w/ support)	Base case (w/ 50% subsidy)	Investment costs +20% and energy savings -20% (w/ support)
Buildings' size	m2	700	700	4,000	4,000	10,000	10,000
Current energy use	kWh / year	61,388	61,388	181,091	181,091	407,500	407,500
Price of electricity - (average price)	US\$ / kWh	0.18	0.18	0.12	0.12	0.18	0.18
Social cost of carbon	US\$ / tCO2e	30.0	30	30.0	30	30.0	30
Direct support	%	50%	70%	50%	70%	50%	70%
Period of analysis	years	20	20	20	20	20	20
Discount rate (net of inflation)	%	6%	6%	6%	6%	6%	6%
Summary of results							
Total project investment	US\$	34,683	41,620	102,313	102,313	230,231	230,231
Total project revenues (savings)	US\$	67,974	54,380	134,424	107,539	443,346	354,677
Cost of support	US\$	17,342	29,134	51,157	71,619	115,115	161,161
Energy savings	%	23%	18%	23%	18%	33%	26%
Energy savings	kWh	273,547	218,838	806,942	645,553	1,815,818	1,452,655
Emission reductions	tCO2e	123	98	363	290	817	654
NPV	US\$	19,648	17,027	22,947	22,219	126,253	109,690
IRR	%	18%	20%	11%	13%	18%	20%
Payback period	years	5.8	5.3	8.7	7.8	5.9	5.3
Elementary school in mild weather region (no PV)							
Technical high school in warm weather region							
Technical college in warm weather region							
Buildings' size	m2	700	700	4,000	4,000	10,000	10,000
Current energy use	kWh / year	61,388	61,388	285,687	285,687	896,191	896,191
Price of electricity - (average price)	US\$ / kWh	0.18	0.18	0.11	0.11	0.12	0.12
Social cost of carbon	US\$ / tCO2e	30.0	30	30.0	30	30.0	30
Direct support	%	50%	70%	50%	70%	50%	70%
Period of analysis	years	20	20	20	20	20	20
Discount rate (net of inflation)	%	6%	6%	6%	6%	6%	6%
Summary of results							
Total project investment	US\$	12,096	12,096	148,480	148,480	465,778	465,778
Total project revenues (savings)	US\$	5,859	4,687	247,459	197,967	843,413	674,730
Cost of support	US\$	6,048	8,467	74,240	103,936	232,889	326,044
Energy savings	%	6%	5%	33%	26%	33%	26%
Energy savings	kWh	27,993	22,395	1,692,407	1,353,926	5,309,035	4,247,228
Emission reductions	tCO2e	13	10	762	609	2,389	1,911
NPV	US\$	-1,454	-707	69,191	60,956	254,827	221,438
IRR	%	-1%	2%	17%	20%	19%	22%
Payback period	years	9.2	8.3	5.7	5.2	5.3	4.7



22. In the worst-case scenario, paybacks are between 4.7 to 8.3 years, and NPVs and IRRs also drop, though most subproject types would be within the operation’s criteria. This calls for ensuring that the bundles of facilities incorporate different school types that combined can ensure meeting project requirements. Overall, results are still positive and demonstrate the subprojects’ financial viability if an appropriate direct support level is set. The reduced direct support scenario shows that financial results would be worse (in terms of NPVs and IRRs), and that payback periods would go over or come close to the limits set by the project’s criteria.

Hospitals

23. Six types of hospitals were assessed, these are: (i) hospitals in mild weather regions; (ii) hospitals in warm weather regions; (iii) hospitals in mild weather regions (w/ thermal); (iv) hospitals in warm weather regions (w/ thermal); (v) hospitals in mild weather regions (w/ cogeneration); and (vi) hospitals in warm weather regions (w/ cogeneration).

24. The analyzes for these facilities considered the following additional assumptions:
- All hospitals would benefit from improved lighting systems; lighting represents 60 percent of the bill in mild weather regions and 30 percent in warm areas; the EE potential associated with lighting system is conservatively set at 30 percent;
 - Subprojects in warm regions would include the modernization of A/C equipment;
 - A/C accounts for 50 percent of the electricity bill in warm areas and systems’ efficiency could be improved by 35 percent;
 - Thermal EE measures are only considered for hospitals with large diesel consumption;
 - Cogeneration measures would only be implemented in hospitals with large electricity consumption, in regions where natural gas networks exist and could replace up to 40 percent of total consumption (larger cogeneration facilities would need to obtain a permit from the Energy Regulatory Commission, which could delay subprojects by several years); and
 - While PV measures would produce roughly 20 percent of total electricity consumption in schools it would be around 10 percent in hospitals (due to reduced space to install such systems).

Main findings- base case

25. A summary of the aggregate financial and economic analysis for hospitals can be found in table A.5.7. Table A.5.8 summarize results per subproject type.

Table A.5.7. Aggregate economic and financial analysis for hospitals

Subproject type	# of subprojects	No direct support		With direct support				Direct GHG ERs (tCO ₂ eq)	Indirect GHG ERs (tCO ₂ eq)
		EIRR (%)	Total cost (US\$ M)	Direct support (%)	Financial NPV (US\$ M)	FIRR (%)	Payback (yrs.)		
Hospitals	6 (15 fac.)	13	25,234,093	70	30,423,882	45	2.34	213,072	639,217



Table A.5.8: Summary of analyzes results for hospitals

Key assumptions	unit	Hospital in mild weather region			Hospital in mild weather region (w/ thermal)			Hospital in mild weather region (w/ cogeneration)		
		Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)	Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)	Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)
Buildings' size	m2	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Current energy use (power)	kWh / year	4,386,072	4,386,072	4,386,072	4,778,675	4,778,675	4,778,675	8,482,676	8,482,676	8,482,676
Current energy use (diesel)	l. / year	na	na	na	695,450	695,450	695,450	na	na	na
Price of electricity - (average price)	US\$ / kWh	0.09	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08
Price of diesel - (average price)	US\$ / l.	na	na	na	0.65	0.65	0.65	na	na	na
Social cost of carbon	US\$ / tCO2e	30	30	30	30	30	30	30	30	30
Direct support	%	0%	70%	0%	0%	70%	0%	0%	70%	0%
Period of analysis	years	20	20	20	20	20	20	20	20	20
Discount rate (net of inflation)	%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Summary of results										
Total project investment	US\$	1,238,333	1,238,333	1,067,529	2,042,690	2,042,690	1,760,940	2,934,113	2,934,113	2,529,408
Total project revenues (savings)	US\$	1,914,734	1,914,734	1,709,897	7,830,869	7,830,869	6,559,572	7,866,632	7,866,632	6,296,190
Cogeneration savings	US\$	na	na	na	na	na	na	3,254,652	3,254,652	3,254,652
Cost of support	US\$	na	866,833	na	na	1,429,883	na	na	2,053,879	na
Energy savings	%	20%	20%	20%	29%	29%	29%	28%	28%	28%
Energy savings (electricity)	kWh	16,053,023	16,053,023	16,053,023	17,489,949	17,489,949	17,489,949	42,582,773	42,582,773	42,582,773
Energy savings (diesel)	l.	na	na	na	4,589,967	4,589,967	4,589,967	na	na	na
Emission reductions	tCO2e	7,224	7,224	7,224	24,097	24,097	24,097	19,162	19,162	19,162
NPV	US\$	-34,728	783,039	53,924	2,326,294	3,871,518	2,105,412	1,525,275	3,615,493	1,261,982
IRR	%	6%	33%	7%	19%	94%	21%	12%	56%	13%
Payback period	years	10.2	3.0	7.9	3.7	1.1	2.9	6.3	1.9	5.1
Key assumptions	unit	Hospital in warm weather region			Hospital in warm weather region (w/ thermal)			Hospital in warm weather region (w/ cogeneration)		
		Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)	Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)	Financial analysis (w/o support)	Financial analysis (w/ support)	Economic analysis (no taxes, no support)
Buildings' size	m2	20,799	20,799	20,799	20,799	20,799	20,799	20,799	20,799	20,799
Current energy use (power)	kWh / year	8,664,115	8,664,115	8,664,115	6,057,864	6,057,864	6,057,864	8,360,153	8,360,153	8,360,153
Current energy use (diesel)	l. / year	na	na	na	281,650	281,650	281,650	na	na	na
Price of electricity - (average price)	US\$ / kWh	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Price of diesel - (average price)	US\$ / l.	na	na	na	0.63	0.63	0.63	na	na	na
Social cost of carbon	US\$ / tCO2e	30	30	30	30	30	30	30	30	30
Direct support	%	0%	70%	0%	0%	70%	0%	0%	70%	0%
Period of analysis	years	20	20	20	20	20	20	20	20	20
Discount rate (net of inflation)	%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Summary of results										
Total project investment	US\$	2,288,099	2,288,099	1,972,499	1,880,681	1,880,681	1,621,277	2,739,211	2,739,211	2,361,389
Total project revenues (savings)	US\$	4,212,144	4,212,144	3,787,667	5,221,601	5,221,601	4,513,257	8,559,075	8,559,075	6,906,222
Cogeneration savings	US\$	na	na	na	na	na	na	3,207,642	3,207,642	3,207,642
Cost of support	US\$	na	1,601,669	na	na	1,316,477	na	na	1,917,448	na
Energy savings	%	24%	24%	24%	27%	27%	27%	31%	31%	31%
Energy savings (electricity)	kWh	36,086,037	36,086,037	36,086,037	25,231,001	25,231,001	25,231,001	46,189,586	46,189,586	46,189,586
Energy savings (diesel)	l.	na	na	na	1,858,890	1,858,890	1,858,890	na	na	na
Emission reductions	tCO2e	16,239	16,239	16,239	17,926	17,926	17,926	20,785	20,785	20,785
NPV	US\$	353,758	1,864,766	498,542	1,177,914	2,499,364	1,156,468	2,142,690	4,101,995	1,811,615
IRR	%	8%	40%	10%	14%	60%	16%	15%	67%	17%
Payback period	years	8.7	2.6	6.7	5.8	1.7	4.5	5.2	1.6	4.3



26. Overall EIRR for all hospitals (excluding direct support) would reach 13 percent, while FIRR (including direct support) would be 45 percent. Energy savings, including electricity and fuel savings (when applicable), from the hospitals subprojects would range from 20 to 31 percent. Financial savings would even be higher when considering measures such as fuel switching – although these measures are only expected to be possible in few hospitals. These preliminary results show the significant untapped EE potential in the health sector. Energy savings opportunities could be higher than in schools due to the use of expensive and inefficient fuels (such as diesel). All subprojects would perform within the operation’s investment criteria and show that in addition to electricity-related measures, fossil-fuel-related measures (e.g. for steam generation) and cogeneration (when natural gas distribution networks were available) would also be considered.

27. The economic analyses also show that subprojects’ EIRR would fluctuate from 7 to 17 percent, with paybacks of 4.3 to 7.9 years, with the lower periods being for subprojects where thermal efficiency measures were included. EIRRs for all subprojects types are above the project’s criteria of 7 percent, reflecting significant untapped savings potential in the sector. As in the case of schools, and given the large co-benefits to be derived from EE interventions, activities in hospitals that might individually become short of meeting project criteria could still be considered when they can be bundled with other interventions, so that, together can meet the operation’s requirements. The EIRR also reflects the economic benefits associated to reducing CO₂ emissions, which dramatically increase when reducing high-GHG emitting fossil fuels consumption.

28. The results of the financial analysis without any direct support show expected IRRs of 6 to 9 percent and considerable lower NPVs. The lower returns largely reflect the cost of introducing PV systems in all facilities. Subprojects that include both electricity and thermal measures or cogeneration measures present higher results, as such technologies would generate savings

29. The relatively low financial returns highlight the value of providing direct support to improve EE and achieve a payback period within the five year-period considered acceptable for such investments by health authorities, and in line with multi-annual planning processes. The cost of the direct support could go from around \$US 0.8 million to over US\$ 2 million, with the range explained by the size and interventions in such facilities. Considering the direct support, NPV would dramatically increase and IRR would be above 30 percent in all cases.

Sensitivity Analysis

30. A sensitivity analysis for each subproject type was conducted to understand the impact of a worst-case scenario (20 percent higher investment costs and 20 percent lower savings) and a 50 percent direct support level. The findings are shown in table A.5.9.



31. In the worst-case scenario paybacks fluctuate between 2.4 to 4.6 years, still within the operation’s criteria for subproject investments (and the bundled approach mentioned before would help bring any interventions within the requirements). Even if NPVs, IRRs and savings would drop by 20 percent, results are positive and demonstrate the subprojects’ financial viability. The reduced direct support scenario shows that financial results would be worse (in terms of NPVs and IRRs) and that payback periods for subprojects in some cases would not be within the limits targeted by the project.

C. Direct and Indirect ERs Estimates

32. The operation would now report indirect ERs from the parent project municipal sectors to GEF. These indirect ERs would be estimated following a bottom-up approach, which involves multiplying direct ERs by a replication factor. A replication factor of 3 has been assumed for an influence period of 10 years in line with GEF guidance. Although subcomponent 3(b) activities (hospitals and schools) are not supported by GEF resources, a similar methodology was used to estimate ERs in these sectors (for reference only). Table A.5.10 shows expected direct and indirect ERs for the overall project.

Table A.5.10. Projected Direct and Indirect ERs

Subproject type	# of subprojects	Total direct ERs (tCO ₂ eq)	Total indirect ERs (tCO ₂ eq)	Total ERs (tCO ₂ eq)
Street lighting	16	222,065	666,196	888,261
Water pumping	8	230,533	691,598	922,131
Municipal buildings	8	20,008	60,024	80,032
Schools	4 (350fc.)	125,234	375,702	500,936
<i>Elementary school in mild weather region</i>	125	15,387	46,161	61,548
<i>Elementary school in mild weather region (no PV)</i>	125	1,575	4,724	6,298
<i>Technical high school in mild weather region</i>	25	9,078	27,234	36,312
<i>Technical high school in warm weather region</i>	25	19,040	57,119	76,158
<i>Technical college in mild weather region</i>	25	20,428	61,284	81,712
<i>Technical college in warm weather region</i>	25	59,727	179,180	238,907
Hospitals	6 (15fc.)	213,072	639,217	852,289
<i>Hospital in mild weather region</i>	5	36,119	108,358	144,477
<i>Hospital in warm weather region</i>	5	81,194	243,581	324,774
<i>Hospital in mild weather region (w/ thermal)</i>	2	48,194	144,582	192,776
<i>Hospital in warm weather region (w/ thermal)</i>	1	17,926	53,777	71,702
<i>Hospital in mild weather region (w/ cogeneration)</i>	1	13,971	41,913	55,884
<i>Hospital in warm weather region (w/ cogeneration)</i>	1	15,669	47,007	62,676
TOTAL	42	810,912	2,432,736	3,243,648