Document of
The World Bank Group

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Report No: PAD803

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED GRANT

FROM THE GLOBAL ENVIRONMENT FACILITY TRUST FUND

IN THE AMOUNT OF US$16.88 MILLION

TO THE

UNITED MEXICAN STATES AND NACIONAL FINANCIERA, S.N.C., I.B.D.

FOR THE

# SUSTAINABLE ENERGY TECHNOLOGIES DEVELOPMENT PROJECT

January 28, 2015

Energy and Extractives Global Practice
Latin America and the Caribbean Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective January 8, 2015)

Currency Unit = Mexican Peso

US$1 = MX$14.63

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| ACE | Advanced Clean Energy |
| BANOBRAS | *Banco Nacional de Obras y Servicios Públicos* (National Bank for Works and Public Services) |
| CCEC | Collaborative clean energy commercialization |
| CDM | Clean Development Mechanism |
| CEMIE | *Centro Mexicano de Innovación en Energía* (Mexican Center of Energy Innovation) |
| CERIP | Clean Energy Regional Investment Plan |
| CFE | *Comisión Federal de Electricidad* (Federal Electricity Commission) |
| CNH | *Comisión Nacional de Hidrocarburos* (National Hydrocarbons Commission) |
| CONACyT | *Consejo Nacional de Ciencia y Tecnología* (National Science and Technology Council) |
| CPS | Country Partnership Strategy |
| CQS | Selection based on the consultant's qualifications |
| CRE | *Comisión Reguladora de Energía* (Energy Regulatory Commission) |
| CTCN | Climate Technology Center and Network |
| CV | Curriculum Vitae |
| DGIEE | *Director General de Información y Estudios Energéticos* |
| ENACC | *Estrategia Nacional de Cambio Climático* (National Climate Change Strategy) |
| ESMF | Environmental and Social Management Framework |
| FBS | Selection under fixed budget |
| FDI | Foreign direct investment |
| FIT | *Fondo Sectorial de Innovación Tecnológica* (Technology innovation fund) |
| FM | Financial Management |
| FOTEASE | *Fondo para la Transición Energética y el Aprovechamiento Sustentable de la Energía* (Energy Transition Fund) |
| FSE | *Fondo Sectorial CONACYT-SENER de Sustentabilidad Energética* (Sustainable Energy Fund) |
| GDP | Gross domestic product |
| GEF | Global Environment Facility |

| | |
|---|---|
| GHG | Greenhouse gas |
| GoM | Government of Mexico |
| GPN | General Procurement Notice |
| GUIRR | Government-University-Industry Research Roundtable |
| GW | Gigawatt |
| IBRD | International Bank for Reconstruction and Development |
| IC | Investment Committee |
| ICB | International competitive bidding |
| IDB | Inter-American Development Bank |
| IDC | Indefinite Delivery Contracts |
| IFC | International Finance Corporation |
| IMF | International Monetary Fund |
| IFR | Interim financial report |
| IMP | *Instituto Mexicano del Petróleo* (Mexican Petroleum Institute) |
| INADEM | *Instituto Nacional del Emprendedor* (The National Institute of the Entrepreneur) |
| INECC | *Instituto Nacional de Ecología y Cambio Climático* (National Institute for Ecology and Climate Change) |
| IP/IPR | Intellectual property/Intellectual property rights |
| IPP | Independent power producer |
| IT | Information Technology |
| LCS | Least-cost selection |
| M&E | Monitoring and evaluation |
| MRV | Monitoring, Reporting, and Verification |
| $MtCO_2E$ | Million Tons Carbon Dioxide Equivalent |
| MXN | Mexican Pesos |
| NAFIN | *Nacional Financiera, S.N.C., I.B.D* (National Financing Agency) |
| NCB | National competitive bidding |
| NGO | Nongovernmental organization |
| NRET | Non-conventional Renewable Energy Technology |
| OECD | Organisation for Economic Cooperation and Development |
| PDO | Project Development Objective |
| PECC | *Programa Especial de Cambio Climático* (Special Climate Change Program) |
| PEMEX | *Petróleos Mexicanos* (Mexican Petroleum) |
| PIU | Project Implementation Unit |
| POM | Project Operational Manual |
| PROFEPA | *Procuraduría Federal de Protección al Ambiente* (Federal Office of Environmental Protection) |
| QBS | Quality-based selection |
| QCBS | Quality- and cost-based selection |
| R&D | Research and development |
| RENIECyT | *Registro Nacional de Instituciones y Empresas Científicas y Tecnológicas* (National Registry of Science and Technology Institutions and Companies) |

| | |
|---|---|
| RICyT | *La Red de Indicadores de Ciencia y Tecnología* (network of science and technology indicators) |
| RIS3 | Research and Innovation Strategies for Smart Specialization |
| RNA | Regional needs assessment |
| S&T | Science and Technology |
| SE | *Secretaría de Economía* (Secretary of Economy) |
| SEMARNAT | *Secretaría de Medio Ambiente y Recursos Naturales* (Secretary of Environment and Natural Resources) |
| SENER | *Secretaría de Energía* (Secretary of Energy) |
| SEP | *Secretaría de Educación Pública* (Secretary of Public Education) |
| SEPA | *Sistema de Ejecución de Planes de Adquisiciones* (Procurement Plan Execution System) |
| SFP | *Secretaría de la Función Pública* (Secretary of Public Administration) |
| SHCP | *Secretaría de Hacienda y Crédito Público* (Secretary of Finance and Public Credit) |
| SMEs | Small and medium enterprises |
| SOE | Statement of expenses |
| SSS | Single source selection |
| TA | Technical Assistance |
| TTO | Technology Transfer Office |
| TWh | Terawatt-hour |
| UIDP | University-Industry Demonstration Partnership |
| UNFCCC | United Nations Framework Convention on Climate Change |

| | |
|---|---|
| Regional Vice President: | Jorge Familiar |
| Country Director: | Gerardo M. Corrochano |
| Senior Global Practice Director: | Anita Marangoly George |
| Practice Manager: | Malcolm Cosgrove-Davies |
| Task Team Leader: | Todd M. Johnson |

**MEXICO**
**Sustainable Energy Technologies Development Project**

**TABLE OF CONTENTS**

**Page**


**I. STRATEGIC CONTEXT ..... 1**

A. Country Context ..... 1

B. Sectoral and Institutional Context ..... 3

C. Higher Level Objectives to which the Project Contributes ..... 5

**II. PROJECT DEVELOPMENT OBJECTIVE ..... 5**

A. PDO ..... 5

B. Project beneficiaries ..... 5

C. PDO Level Results Indicators ..... 6

**III. PROJECT DESCRIPTION ..... 6**

A. Project Components ..... 6

B. Project Financing ..... 8

C. Lessons Learned and Reflected in Project Design ..... 8

**IV. IMPLEMENTATION ..... 9**

A. Institutional and Implementation Arrangements ..... 9

D. Results Monitoring and Evaluation ..... 10

B. Sustainability ..... 10

**V. KEY RISKS AND MITIGATION MEASURES ..... 11**

A. Risk Ratings Summary Table ..... 11

B. Overall Risk Rating Explanation ..... 12

**VI. APPRAISAL SUMMARY ..... 12**

A. Economic and Financial Analysis ..... 12

B. Technical ..... 13

C. Financial Management ..... 13

D. Procurement ..... 14

E. Social ..... 14

F. Environment ..... 14

G. World Bank Grievance ..... 15

**Annex 1. Results Framework and Monitoring.....16**

**Annex 2: Detailed Project Description.....19**

**Annex 3: Implementation Arrangements.....27**

**Annex 4: Operational Risk Assessment Framework (ORAF).....40**

**Annex 5: Implementation Support Plan.....43**

A. Strategy and Approach for Implementation Support..... 43

**annex 6: Estimated GHG Emissions Reduction.....45**

**Annex 7: Evolution of World Bank Group's Engagement with Mexico on Clean Energy, Innovation, and Knowledge Services .....49**

**PAD DATA SHEET**

*Mexico*

*Sustainable Energy Technologies Development Project (P145618)*

**PROJECT APPRAISAL DOCUMENT**

*LATIN AMERICA AND CARIBBEAN*

Report No.: PAD803

| **Basic Information** | | | |
|---|---|---|---|
| Project ID<br>P145618 | EA Category<br>B - Partial Assessment | | Team Leader<br>Todd M. Johnson |
| Lending Instrument<br>Investment Project Financing | Fragile and/or Capacity Constraints [ ]<br>Financial Intermediaries [ ]<br>Series of Projects [ ] | | |
| Project Implementation Start Date<br>June 2, 2015 | Project Implementation End Date<br>December 31, 2019 | | |
| Expected Effectiveness Date<br>June 2, 2015 | Expected Closing Date<br>December 31, 2019 | | |
| Joint IFC<br>No | | | GEF Focal Area<br>Climate change |
| Practice Manager/Manager<br>Malcolm Cosgrove-Davies | Senior Global Practice Director<br>Anita Marangoly George | Country Director<br>Gerardo M. Corrochano | Regional Vice President<br>Jorge Familiar |

| | | | |
|---|---|---|---|
| Borrower: The United Mexican States and *Nacional Financiera,* S.N.C., I.B.D. (NAFIN) | | | |
| Responsible Agency: Secretary of Energy (*Secretaría de Energía [SENER]*) | | | |
| Contact: | Carlos Roberto Ortiz Gómez | Title: | *Director General de Investigación, Desarrollo Tecnológico y Formación de Recursos Humanos* |
| Telephone No.: | (52-55) 5000-6047 | Email: | crortiz@energia.gob.mx |

| **Project Financing Data(in USD Million)** | | | | | |
|---|---|---|---|---|---|
| [ ] | Loan | [ ] | IDA Grant | [ ] | Guarantee |
| [ ] | Credit | [ X ] | Grant | [ ] | Other |

| | | | |
|---|---|---|---|
| Total Project Cost: | 110.73 | Total Bank Financing: | 0.00 |
| Financing Gap: | 0.00 | | |

| **Financing Source** | **Amount (USD million)** |
|---|---|
| Borrower | 92.00 |
| Private sector enterprises | 1.85 |
| Global Environment Facility (GEF) | 16.88 |
| Total | 110.73 |

**Expected Disbursements (in USD Million)**

| Fiscal Year | 2015 | 2016 | 2017 | 2018 | 2019 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Annual | 1 | 4 | 4 | 4 | 3.88 | | | | | |
| Cumulative | 1 | 5 | 9 | 13 | 16.88 | | | | | |

## Institutional Data

**Practice Area/Cross Cutting Solution Area**

Energy & Extractives

**Cross Cutting Areas**

[ X ] Climate Change
[ ] Fragile, Conflict & Violence
[ ] Gender
[ ] Jobs
[ ] Public Private Partnership

**Sectors/Climate Change**

Sector (Maximum 5 and total % must equal 100)

| Major Sector | Sector | % | Adaptation Co-benefits % | Mitigation Co-benefits % |
|---|---|---|---|---|
| Finance | Other non-bank financial intermediaries | 30 | | 30 |
| Energy and mining | General energy sector | 70 | | 70 |
| Total | | 100 | | |

☐ I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this Project.

**Themes**

Theme (Maximum 5 and total % must equal 100)

| Major theme | Theme | % |
|---|---|---|
| Financial and private sector development | Other Financial Sector Development | 30 |

| | | |
|---|---|---|
| Environment and natural resources management | Climate change | 70 |
| Total | | 100 |

**Global Environmental Objective(s)**

The objectives of the Project are to improve the institutional capacity of advanced clean energy technology institutions (both public and private) in the territory of the recipient and to foster the commercialization of advanced clean energy technologies by providing financial incentives to the private sector, which together are expected to lead to GHG emissions reduction in the future.

**Components**

| **Component Name** | **Cost (USD Millions)** |
|---|---|
| Regional Needs Assessments) | 4.58 |
| Incentive to the Private Sector for the Commercialization of Advanced Clean Energy Technologies. | 11.50 |
| Project Management | 0.80 |

## Compliance

**Policy**

| | | |
|---|---|---|
| Does the Project depart from the CAS in content or in other significant respects? | Yes [ ] | No [ X ] |
| Does the Project require any waivers of Bank policies? | Yes [ ] | No [ X ] |
| Have these been approved by Bank management? | Yes [ ] | No [X] |
| Is approval for any policy waiver sought from the Board? | Yes [ ] | No [ X ] |
| Does the Project meet the Regional criteria for readiness for implementation? | Yes [ X ] | No [ ] |

| **Safeguard Policies Triggered by the Project** | **Yes** | **No** |
|---|---|---|
| Environmental Assessment OP/BP 4.01 | **X** | |
| Natural Habitats OP/BP 4.04 | | **X** |
| Forests OP/BP 4.36 | | **X** |
| Pest Management OP 4.09 | | **X** |
| Physical Cultural Resources OP/BP 4.11 | | **X** |
| Indigenous Peoples OP/BP 4.10 | | **X** |
| Involuntary Resettlement OP/BP 4.12 | | **X** |
| Safety of Dams OP/BP 4.37 | | **X** |
| Projects on International Waterways OP/BP 7.50 | | **X** |
| Projects in Disputed Areas OP/BP 7.60 | | **X** |

**Legal Covenants**

| Name | Recurrent | Due Date | Frequency |
|---|---|---|---|
| Section I. A. 2. | No | Three months after Effectiveness | Once |

**Description of Covenant**
The recipient, through the SENER-UREP, shall, no later than three months after the effective date, appoint the financial management specialist, the procurement management specialist, and the technical specialists referred to in the Project Operational Manual (POM), with terms of reference acceptable to the World Bank.

| Name | Recurrent | Due Date | Frequency |
|---|---|---|---|
| Section I. D. 1. | No | Prior to implementation | Once |

**Description of Covenant**
For the purposes of carrying out any given Project under Component 2.1. of the Project, the recipient shall make available a subgrant to the relevant eligible beneficiary under an agreement (the 'Subgrant Agreement'), to be entered into between the recipient, through SENER, National Bank for Works and Public Services (*Banco Nacional de Obras y Servicios Públicos* [BANOBRAS]) (acting as trustee of the Energy Transition Fund (*Fondo para la Transición Energética y el Aprovechamiento Sustentable de la Energía* [FOTEASE]), and the eligible beneficiary, on terms and conditions satisfactory to the World Bank and further detailed in the POM.

**Conditions**

| Source Of Fund | Name | Type |
|---|---|---|
| GEF | *Contrato de Apoyo Financiero no Reembolsable* | Effectiveness |

**Description of Condition**
The *Mandato* agreement [contract between the recipient, NAFIN and SENER] has been duly executed by the parties thereto. Grant Agreement, Article V 5.01 (b)

| | | |
|---|---|---|
| GEF | Withdrawal Conditions | Retroactive financing |

No payments shall be made for payments made prior to the date of [the Grant Agreement], except that withdrawals up to an aggregate amount not to exceed $3,000,000 equivalent may be made for payments made prior to this date but on or after January 1, 2015, but in no case more than one (1) year before the date of this Agreement, for Eligible Expenditures under the Project. Grant Agreement, Section IV. B 1 (a)

| | | |
|---|---|---|
| GEF | Withdrawal conditions | Withdrawal conditions |

No withdrawals for payments under Categories (2) and (3) unless the Investment Committee has been established, within SENER, with functions and responsibilities acceptable to the World Bank. Grant Agreement, Section IV. B 1 (b)

## Team Composition

**Bank Staff**

| Name | Title | Specialization | Unit |
|---|---|---|---|
| Francisco Rodriguez | Procurement Specialist | Procurement | GGODR |
| Jose Luis Calderon Bartheneuf | Consultant | Environment | GENDR |
| Elena Segura | Counsel | Counsel | LEGEN |
| Ravi Gupta | Consultant | Innovation | GEEDR |
| Bartley Higgins | E T Consultant | Energy | GEEDR |
| Todd M. Johnson | Lead Energy Specialist | Team lead | GEEDR |
| Victor Manuel Ordonez Conde | Senior Finance Officer | Finance | CTRLN |
| Francisco Rodriguez | Senior Procurement Specialist | Procurement specialist | GGODR |
| Juan Carlos Serrano-Machorro | Senior Financial Management Specialist | Financial management | GGODR |
| Alonso Zarzar Casis | Senior Social Scientist | Social safeguards | GSURR |

**Non-Bank Staff**

| Name | Title | City |
|---|---|---|
| | | |

**Locations**

| Country | First Administrative Division | Location | Planned | Actual | Comments |
|---|---|---|---|---|---|
| | | | | | |

# I. STRATEGIC CONTEXT

## A. COUNTRY CONTEXT

1. **Prudent economic policies in Mexico over the past two decades have contributed to the progressive attainment of macroeconomic stability.** After the 2008-2009 global financial crisis, Mexico's economy rebounded quickly, reaching an average growth rate of 4.4 percent between 2010 and 2012. Despite weathering these recent crises, Mexico's long-term economic growth has been somewhat below expectations, limiting a rise in average living standards and more rapid progress on poverty reduction. In Mexico, GNI per capita[1] was approximately 39 percent of the level observed in high income OECD countries, the same proportion observed two decades ago, signaling a lack of progress in economic convergence. Over the past three decades annual GDP growth averaged 2.4 percent, and only 0.8 percent per capita. Moreover, Mexico has faced difficulties reducing poverty. The monetary (income) measure of poverty, for which long term trends are available in Mexico, shows that poverty has not changed significantly in the last decade, and has actually slightly increased from 50.0 in 2002 to 52.3 percent in 2012.[2] Growth decomposition exercises point to insufficient average productivity growth as the main cause of the less than satisfactory growth performance. An underdeveloped financial system, labor market rigidities, high informality, scarce skilled labor, regulatory barriers for doing business, and weak innovation and limited market competition in key input sectors such as telecommunications and energy are often cited as constraints to productivity growth.

2. **To avoid becoming stuck in the 'middle-income trap',[3] Mexico needs to shift its economic activity toward higher value-added activities by improving productivity through innovation and the adaptation of technology.** Research has shown that a substantial share of differences in economic productivity over time and between countries are explained by technological progress or innovation broadly defined.[4] Technological progress can occur by acquiring or adapting knowledge from abroad or by developing new knowledge domestically. Despite this research has shown that Mexico has shown a preference for imported technology, which has limited technology diffusion and transfer in Mexico. Specifically, the study found that high technology industries do not invest significantly more in research and development than low-technology industries and as such do not contribute to the dissemination of knowledge and technology. Overall, Mexico has a low rate of productivity growth and Mexico's science, technology, and innovation system lags behind that of other OECD countries; the ratio of R&D expenditures to GDP is the second lowest in the OECD. [5]

[1] US$16,110 (PPP) in international purchasing power parity terms.
[2] CONEVAL, 2012.
[3] The idea of the 'middle income trap' is that when a country graduates to middle-income status through a rise in incomes (and wages), it loses the ability to compete on the basis of cost competitiveness alone. In order to compete with other middle-income and rich countries, the country must innovate and increase human capital or risk growth stagnation. For a recent survey, see World Bank Group. 2013; http://hdl.handle.net/10986/16045
[4] World Bank Group. 2013, "Mexico Reform Agenda for Inclusive and Sustainable Growth," from Romer 1990 and Aghion and Howitt, 2007. Source: http://hdl.handle.net/10986/16302
[5] OECD Reviews of Innovation Policy: Mexico. October 2009; and OECD Reviews of Innovation Policy: Knowledge-Based Start-Ups in Mexico, April 2013.

3. **Implementation of an ambitious structural reform agenda introduced by the current administration has the potential to raise productivity and unleash growth in the medium term.** One of the priority areas for innovation is clean energy. In recent years, the Government of Mexico (GoM) has made strong commitments to reduce its GHG emissions and production of electricity from renewables.[6] Mexico has established a 'low-carbon' development program based on the principles that it is in its interests and that of the international community to reduce emissions and that doing so can spur economic growth, contribute to sustainable development, and provide other ancillary benefits such as stimulating the development of new technologies and improving productivity.[7]

4. **In order to achieve its productivity and climate change mitigation goals, Mexico needs to expand the development and commercialization of advanced clean energy (ACE) technologies.** While Mexico has significant research capabilities and the potential to expand ACE technologies, enterprise activity in the sector is limited. Government intervention in this sector is particularly important due to two market failures: (a) the environmental costs of polluting technologies are not internalized, which reduces the demand for clean alternatives and (b) private investors are unable to determine the proper level of investment in new technologies due to lack of awareness, uncertainty of risks and rewards, and the incentive to piggy-back on early adopters.[8]

5. **Public policy to support technology transfer[9] has centered on two approaches.** 'Technology-push' approaches include funding for human capital formation and basic and applied R&D; regulations to create a research- and innovation-conducive intellectual property rights (IPR) regime; the creation of appropriate incentives to commercialize technology; measures to deepen relationships between academia and the productive sector; and financing for prototype development and patent protection. 'Demand-pull' emphasizes the use of instruments to increase the demand for lower-emission technologies, such as taxes on polluting fuels or emissions, or more direct approaches such as renewable energy portfolio standards, adoption subsidies, or direct public sector investments.[10]

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[6] Mexico is committed to reduce GHG emissions by 30 percent by 2020, and to produce 35 percent of electricity from clean sources by 2024. These commitments were included in the Renewable Energy and Energy Transition Law (*Ley Para el Aprovechamiento de Energías Limpias y el Financiamiento de la Transición Energética*), and re-affirmed in Copenhagen in December 2010. Mexico has also recently adopted a carbon tax. The policy includes a tax of 70.68 pesos (US$5.41) per ton of carbon dioxide emitted by petrol, natural gas, propane, butane, aviation fuel, diesel, heating oil, coke, and coal. Source: http://bit.ly/18dJNyH. Mexico also launched the first carbon offset exchange in Latin America in 2013. Source: http://bit.ly/IhHfD1.

[7] A number of studies have been conducted on low-carbon development in Mexico. The World Bank Group study "Low-carbon Development for Mexico" in 2010 established the baseline for several World Bank Group low-carbon operations.

[8] Intergovernmental Panel on Climate Change (IPCC). 2007. *Climate Change 2007: Mitigation of Climate Change.* Source: http://bit.ly/TZjz9.

[9] 'Technology transfer' as it is used here and elsewhere in scientific literature means the commercialization of applied research by the productive sector. In the climate change arena, technology transfer often refers to the transfer of technologies across international borders. According to the GEF, technology transfer is "a broad set of processes covering the flows of know-how, experience, and equipment for mitigating and adapting to climate change among different stakeholders such as governments, private sector entities, financial institutions, nongovernmental organizations (NGOs) and research/education institutions." Additionally, see http://bit.ly/1hjtOCj.

[10] IPCC 2007.

6. **Financing technology transfer is a particularly acute challenge in Mexico and worldwide.** Pure (basic) research is globally recognized as a public good and is funded primarily by the public sector in most countries, while mature and commercial products and processes are typically funded by the private sector. However, both public and private financing for technology transfer is insufficient. The result is that many promising ideas are stranded in the 'valley-of-death,' that is, the period between when a new product is launched and when it becomes profitable. For the private sector, the risks of investing in firms at early stages are often too high. On the public sector side, government agencies are generally not well-equipped to evaluate new technologies or incentivized to invest in risk assets.

## B. Sectoral and Institutional Context

7. **Over the past decade, Mexico has taken important steps to build its national innovation system and to support the creation of new technology-based firms.** The strategy has been implemented by several government agencies including the National Science and Technology Council (*Consejo Nacional de Ciencia y Tecnología* [CONACyT]), the Secretary of Economy (*Secretaría de Economía* [SE]), the Secretary of Public Education (*Secretaría de Educación Pública* [SEP]), and NAFIN. The strategy has included investments throughout the innovation value chain, including in (a) human capital and education; (b) basic and applied R&D; (c) collaboration and connectivity between academia and the productive sector; (d) training, mentoring, and incubation services for technology start-ups; and (e) seed and venture capital. Although Mexico has made remarkable progress in developing its national innovation system, its innovation capacity lags behind other middle-income countries.[11]

8. **The innovation deficit is the most evident in the energy sector**, where lack of technology and innovation capacity has been one of the reasons for declining oil and gas production and where nearly all clean energy technologies are developed abroad and imported. Given these challenges, Mexico is developing a national innovation strategy for the energy sector with *Secretaría de Energía* (SENER) assuming a leading role. For clean energy technologies, SENER currently channels public support for applied R&D through the Sustainable Energy Fund (*Fondo Sectorial CONACYT-SENER de Sustentabilidad Energética* [FSE]).

9. **The FSE was created by the GoM in 2007 and is financed through a special royalty levied on petroleum and natural gas production in Mexico.**[12] At the end of 2012, the FSE had assets of US$204 million. With its overall objective to promote the development of clean energy technologies in Mexico, the FSE is operated by SENER in collaboration with CONACyT. During the period 2009–2011, the FSE sought to achieve this objective by providing grants for applied research to higher education institutions and research centers that meet certain eligibility criteria.[13] While SENER recognizes the importance of involving the private sector in the development of clean energy technologies, restrictions on the use of funds by private companies or individuals

[11] World Economic Forum. Source: http://bit.ly/15WC6sT. Indicators for technology-based innovation, including investments in R&D and the number of patents filed, show that Mexico faces an innovation shortfall.

[12] The law establishes that the royalty, of 0.65 percent of all sales, shall be transferred in the following manner: 15 percent to the Mexican Petroleum Institute *(Instituto Mexicano del Petróleo* [IMP]); 65 percent to a new Hydrocarbons Fund (*Fondo Sectorial CONACYT-SENER de Hidrocarburos*); and 20 percent to the FSE.

[13] To be eligible, a research institution must be an active member of the *Registro Nacional de Instituciones y Empresas Científicas y Tecnológicas* (RENIECyT).

have prevented a broad private sector response to incentives offered by SENER. Private enterprises have been allowed to submit proposals to the FSE jointly with academic institutions, but they have not been able to receive grant proceeds from the FSE and must contribute at least 30 percent of the total Project costs.

10. **During the period 2009–2011, the FSE launched calls for proposals (*convocatoria)* to support applied research and technology development.** A total of 48 proposals received funding, for a total of US$28 million in support. The supply of qualified proposals to the FSE has been much lower than available resources in the fund. In addition, while collaboration between academia and the private sector has been a stated goal of the FSE, only 6 of the 48 Projects that were approved were collaborative. The restrictions within the FSE for funding the private sector may limit the ability of the public sector to stimulate greater private sector involvement in the energy sector in Mexico, which is an important policy objective of the GoM.

11. **As a way of stimulating the clean energy industry in Mexico and utilizing the unused FSE resources, a call for proposals was launched in 2012 to set up the Mexican Centers of Energy Innovation (*Centros Mexicanos de Innovación en Energía* [CEMIEs]).** CEMIEs are virtual collaboration centers which aim to coordinate R&D efforts by public and private entities related to clean energy technologies to accelerate their diffusion in Mexico. CEMIEs for geothermal, wind, and solar energy have been established, and new centers for biomass and tidal energy are also expected to be launched in the future.

12. **To overcome its innovation deficit in the clean energy sector, Mexico must address both demand- and supply-side challenges.** On the supply side, there is insufficient/inadequate human capital in science and technology (S&T) disciplines linked to clean energy; weak incentives and risk aversion among researchers to pursue entrepreneurship and commercialize their research; excessive public sector focus of the government's current innovation strategy for clean energy; underdeveloped TA services for S&T based entrepreneurs; and limited public/private financing for early-stage investment (prototyping and piloting). On the demand side, the market for ACE technologies has been constrained by the dominance of state-owned enterprises in both the electric power and hydrocarbons sectors and weak industry demand for innovations coming from Mexican research and academic institutions. Among the most important challenges for clean energy development that Mexico faces is the lack of academia-industry collaboration. Mexico's energy sector and innovation contexts are discussed in more detail in annex 6 and 8, respectively.

13. **The Bank is seeking to advance the commercialization of clean energy technologies in Mexico through this proposed Project.** The Bank brings global knowledge of clean energy markets and sector policies, experience with technology innovation programs globally and in Mexico, and a comparative advantage in designing and managing climate change funds. The proposed Project will contribute to overcoming the barriers to ACE technology development by supporting a nationwide needs and capacity assessment and by piloting an ACE grant program to encourage private sector involvement and academia-industry collaboration in clean energy development. If successful, the latter program may enable SENER to work more closely with the private sector in the future on ACE technology innovation.

### C. HIGHER LEVEL OBJECTIVES TO WHICH THE PROJECT CONTRIBUTES

14. **The proposed Project is closely aligned with the World Bank Group's Country Partnership Strategy (CPS) for FY14–19**, discussed by the Board of Executive Directors on December 12, 2013, which focuses on four strategic pillars. The relevant pillars to which the proposed Project will contribute include Pillar I: Unleashing Productivity by, among other things, facilitating access to finance and enhancing the competitiveness of the private sector and Pillar IV: Promoting Green and Inclusive Growth, including scaling up renewable energy. The proposed Project seeks to advance both objectives by facilitating access to finance and enhancing competitiveness among firms in the clean energy sector. The development of clean energy technologies by the private sector is critical for achieving green and inclusive growth. The Global Environment Facility (GEF) has indicated that it will increasingly provide support for 'market demonstration and commercialization of innovative, emerging technologies.'[14]

15. **The proposed Project would support efforts to reduce extreme poverty and boost shared prosperity.** Renewable energy technologies directly benefit the poorest in Mexico by providing clean and modern energy services at an affordable cost. In addition, good 'green' jobs associated with the renewable energy industry, such as installation of solar panels, operations and maintenance, and local sales, offer good wages and cannot be exported. At a higher level, Mexico must improve its productivity to sustain its economic growth, and this requires a broad-based program of technology innovation across the country. The adoption of clean energy technologies can increase the competitiveness of industry and the commercial sector, which is needed to sustain GDP growth, increase foreign investment, and create jobs. The reduction of GHG emissions that will come about from the commercialization of energy efficiency and renewable energy technologies will lower the risk of climate change impacts, which have been shown to disproportionately affect the poor globally and in Mexico. The GEF also recognizes that innovation in low-carbon technologies is critical to achieve global GHG emissions reduction and to promote green and inclusive growth.

## II. PROJECT DEVELOPMENT OBJECTIVE

### A. PDO

16. **The objectives of the Project** are to improve the institutional capacity of ACE technology institutions (both public and private) in the territory of the recipient and to foster the commercialization of ACE technologies by providing financial incentives to the private sector, which together are expected to lead to GHG emissions reduction in the future.

### B. PROJECT BENEFICIARIES

17. **The direct beneficiaries will be private entrepreneurs, technology developers and innovators, small and medium enterprises (SMEs), clean energy businesses, and faculty and researchers at Mexican universities and public sector research centers.** The estimated number of grantees and the duration of the program is outlined in the Results Framework in annex 1. The

[14] GEF Climate Change Strategy Document. Source: http://bit.ly/1izWirM

list of applicants is expected to include a subset of those that have applied to the FSE, plus private technology developers and entrepreneurs who are ineligible to directly apply to the FSE.

### C. PDO LEVEL RESULTS INDICATORS

18. **The results indicators at the PDO level** are (a) the number of Clean Energy Regional Investment Plans (CERIPS) that are designed and initiated with stakeholders to advance the commercialization of ACE technologies in Mexican states; (b) the amount of additional funding from public and private sources that is available to the private sector to develop and commercialize ACE technologies by the end of the Project; and (c) the estimated future quantity of GHG emissions that will be avoided by subgrants funded by the ACE program (based on an agreed-upon methodology and supplemented with real data collected during the Project; see annex 7).

## III. PROJECT DESCRIPTION

### A. PROJECT COMPONENTS

**Component 1. Regional Needs Assessments (RNAs) (Funding: GEF US$4.58 million; SENER US$90 million for Technical Assistance and capacity building)**.

19. The objectives of Component 1 are to (a) conduct RNAs to assess the capacity of academic and research institutions, private enterprises, and subnational government entities across Mexico to develop and commercialize ACE technologies; (b) prepare the CERIPs that aim to boost institutional capabilities to produce clean energy technologies in order to broaden the currently concentrated energy R&D market in Mexico; and (c) identify promising initiatives that can be considered for financial support by the ACE program (Component 2) or the FSE.

20. For each region of Mexico,[15] specialized consultants will (a) survey and map the resources and capacities (human, technical, infrastructure, and financial) of Mexican universities, research institutions, and clean energy enterprises; (b) identify the ACE technology needs of private sector enterprises in strategic sectors; (c) identify each region's comparative advantage in S&T sectors and in the clean energy value chain; (d) review the capacities of subnational government entities to implement policy and regulation conducive to the dissemination of clean energy technologies; (e) assess existing regional and national financing sources; and (f) identify financial, regulatory, and policy barriers.

21. The key output of the RNAs will be a set of CERIPs that will identify the investments and strategic actions (curriculum changes, the creation of new incentives, and policy reforms) recommended and agreed upon to have strong potential over the medium term to boost human capital in S&T and entrepreneurial (finance, business administration, and strategy) disciplines critical to commercialize ACE technologies.

22. The follow-up investments identified by the CERIPs will be financed by SENER through

[15] The United Mexican States will be divided into 10 sub-regions based on geographic proximity and consultants will perform the assessment on one or more sub-regions. A market study will be carried out to determine the most efficient allocation of contracts to firms.

their US$90 million parallel financing contribution. SENER will try to leverage its CERIP investments by seeking co-financing from other government stakeholders (local and state governments, other federal agencies). The CERIPs are intended to bring these entities together toward implementing a coherent state-level and national strategy that can advance clean energy technology development and commercialization. The RNAs will begin in 2015 and be completed within a year, after which implementation of the CERIPs would take place from 2016 to 2019.

**Component 2. Incentives to the Private Sector for the Commercialization of ACE Technologies (Funding: GEF US$11.50 million; Private sector enterprises US$1.85 million).**

23. ***Component 2.1. ACE Subgrants Program (Funding: GEF US$10.50 million; private sector enterprises: US$1.85 million).*** The objective of Component 2 is to move promising innovative clean energy technologies in Mexico toward commercialization by providing subgrants and TA through the ACE program. The ACE program will pilot a new approach to promote sustainable energy technology development by giving a leading role to private sector actors. If successful, this approach could increase SENER's support for private sector led initiatives, an approach which is consistent with the energy transition underway in Mexico.

24. The ACE program will provide subgrants to private sector enterprises for (a) proof-of-concept stage development of ACE technologies and (b) collaborative clean energy commercialization (CCEC) targeting industry-academia collaboration for ACE technologies. In both cases, the subgrants will target those ACE technologies with strong commercialization potential and will not be provided to academic and research institutions which have other sources of support including the FSE. All applicants will be required to contribute 15 percent of the total subproject cost as matching co-financing. The terms, eligibility criteria, maximum subgrant size, application procedures, procurement rules and processes, monitoring criteria, and other features of both the proof-of-concept and the CCEC subgrant are included in the POM. Where possible, the ACE program will look for ways to leverage its investment.

25. Component 2.1 seeks to fill a void in the current public and private financing landscape for early-stage technology commercialization in Mexico and to incentivize industry-academia collaboration in technology development through a pilot subgrant program. The ACE program will focus on specific technology areas for development where there is both regional demand and a comparative advantage for Mexico. Among the technical areas that are a priority for Mexico are energy efficiency, geothermal, wind, biomass, and solar energy technologies. Over time, the technology focus will be further narrowed and refined by the results of the analysis carried out in Component 1, and promising ideas will be recommended for participation in the ACE program.

26. Grantees will be selected by an Investment Committee (IC) chaired by SENER and composed of individuals with strong expertise in early-stage technology commercialization, venture capital, applied research, ACE technologies, and concept-to-market strategy. The IC is expected to meet on a biannual basis to vote on grant awards. Applicants not accepted for a matching grant will receive detailed feedback and may be recommended for TA if the IC believes this could accelerate ACE technology commercialization. Following the implementation of the ACE program subgrants, the IC members will be allowed to finance sub-grant recipients after the implementation period is over. Such investments will be open to any financier, and rules to guard against a real or perceived conflict of interest are detailed in the POM.

27. ***Component 2.2. Technical Assistance*** **(Funding GEF: US$1 million).** Winning subproject proposals from Component 2.1 will receive 'on-boarding' TA as part of their overall grant package and as a condition of their award. The TA will cover topics such as business plans, intellectual property (IP) protection and monetization, marketing strategies, access to finance, and safeguards. In addition, the IC will have the authority to allocate small (less than US$10,000) TA awards to proposals which are short-listed but do not receive a matching grant from the ACE program (Component 2.1). Such TA will be awarded where it is believed that such assistance alone could advance the commercialization of ACE technologies. TA recipients will be required to co-finance 10 percent of the costs of the TA award.

**Component 3: Project Management (Funding: GEF US$0.80 million: SENER US$2 million).**

28. The proposed Project will use and strengthen the existing project implementation unit, SENER-UREP, within SENER to coordinate and manage the proposed Project. The additional workload of the proposed Project is expected to require the addition of four new team members: a procurement specialist, a financial management specialist, and two project managers, one for Component 1 and another for Component 2. Additional support for screening grant applications under Component 2 will be provided by SENER personnel or subcontractors. SENER has agreed to provide an equivalent of US$2 million in cash or in-kind support for project management.

## B. PROJECT FINANCING

29. A summary of proposed Project costs by component and source including GEF funding and government co-financing is presented below. Component 1: SENER will provide parallel financing of US$90 million for implementation of the CERIPs. Component 2: about $1.85 million in private sector funding will be leveraged through required matching grant co-financing from grant recipients. Component 3: SENER will provide $2 million of cash and in-kind support to ensure effective project management. The instrument will be Investment Project Financing.

**Table 1. Project Cost and Financing**

| Project Component | Project Cost (US$ million) | Co-Financing (US$ million) | GEF Financing (US$ million) | % GEF Financing |
|---|---|---|---|---|
| Component 1 | 94.58 | 90.00 | 4.58 | 5 |
| Component 2 | 13.35 | 1.85 | 11.50 | 86 |
| Component 3 | 2.80 | 2.00 | 0.80 | 29 |
| **Total Costs** | **110.73** | **93.85** | **16.88** | 15 |

## C. LESSONS LEARNED AND REFLECTED IN PROJECT DESIGN

30. **The proposed Project builds upon lessons learned from past Bank Group operations in Mexico related to higher education, innovation, energy, the environment, and entrepreneurship.** The proposed Project also builds on the lessons learned from a number of ongoing and planned Bank Group engagements in Bulgaria, Croatia, Russia, Former Yugoslav Republic of Macedonia, Serbia, Ethiopia, Vietnam, India, and Mexico. Some key lessons learned are listed:

- The need to strike a balance between the broader needs of technology development and the absorptive capacity of the targeted local firms and research institutions, with the realization that the transformative potential of a project of such limited scope is unlikely to be high;
- Monitoring and evaluation (M&E) activities must be designed to provide continuous feedback to the design and implementation of the funding mechanism (ACE program for this proposed Project). This will help mitigate the risk of design errors, allowing the fund to incorporate necessary technical changes or funding reallocations. For example, periodic beneficiary surveys will track the results and performance of subgrants in real time to allow for any necessary course corrections;
- Specific international lessons on the design of innovation grant funds have been applied. These include the need for an IC consisting of qualified individuals with a proven track record of identifying businesses with commercial potential; the need to ensure independent decision making in the allocation of grant awards; the need to provide TA in parallel with the innovation grant to ensure that recipients are able to absorb and deploy the funds effectively; and the need for recipient co-financing to ensure that they assume some of the risk.

31. **In recent years, other projects in Mexico with similar features to the proposed operation (projects in the energy sector with subgrants and with GEF support) have experienced challenges that have led to significant implementation delays.** This proposed Project has been designed to avoid or minimize such problems. The reasons for the delays in other projects have included complex implementation arrangements with agencies not familiar with project implementation; output-based disbursement rules where GEF funds do not disburse until infrastructure is constructed and operating; and construction of large-scale new technologies with significant co-financing requirements and regulatory restrictions on procuring technologies with higher capital costs than the baseline. The proposed Project will avoid many of the procurement delays since there will be minimal infrastructure investments associated with the matching grant competition, packages for key contracts have been prepared, and subproject award criteria for the ACE program competition is detailed in the POM.

# IV. IMPLEMENTATION

## A. INSTITUTIONAL AND IMPLEMENTATION ARRANGEMENTS

32. **Overall arrangements.** The recipient of the grant will be the United Mexican States through its Secretary of Finance and Public Credit. The implementing agency for the proposed Project will be SENER, who will execute and oversee all three components of the proposed Project. SENER is currently implementing other World Bank projects and is highly experienced with Bank procedures. A POM which describes the rules and procedures governing the proposed Project has been prepared by SENER and is acceptable to the Bank as of October 14, 2014. NAFIN will be responsible for financial management and the use of GEF grant resources by SENER. More details on proposed implementation arrangements are provided in annex 3.

33. **Project Implementation Unit (PIU)**. Activities under the proposed Project will be managed by a project manager housed within the existing SENER-UREP which manages other Bank Group and GEF projects. The project manager will report directly to the Under-Secretary for

Planning and the Energy Transition. New staff will be hired by the SENER-UREP to handle the additional workload created by the proposed Project, particularly in the areas of financial management and procurement. SENER will provide additional support to the SENER-UREP through subcontractors and SENER staff.

34. **Flow of funds.** Activities under Component 1 will mostly finance consultancies and workshops which will be paid directly from the Energy Transition Fund (*Fondo para la Transición Energética y el Aprovechamiento Sustentable de la Energía* [FOTEASE]), to beneficiaries. Component 2 will entail more complexity as the ACE program will imply financing of subprojects whose beneficiaries will be clean energy technology entrepreneurs. In both cases, beneficiaries will be paid from the FOTEASE within SENER, which will be reimbursed by NAFIN with GEF resources following the review and approval of statements of expenses. (See annex 3 for additional details on the flow of funds).

35. **Investment Committee.** The committee consists of five individuals with experience in early-stage risk investment, go-to-market strategy, and clean energy technologies. SENER will propose the membership of the IC to the Bank but reserves the right to make its own decisions on the composition. The IC will be responsible for evaluating and selecting subproject proposals to receive TA and grants under Component 2 based on criteria described in the POM. The IC will be in place before the call for proposals for the ACE Fund competition is announced and the selection of the IC will be a condition of disbursement for Component 2.

### D. Results Monitoring and Evaluation

36. **The M&E capabilities of SENER-UREP were appraised and deemed adequate.** SENER-UREP is currently performing M&E satisfactorily for several existing Bank projects. Specifically, the Bank will meet with the SENER-UREP at least every six months to review implementation progress. On such occasions, the SENER-UREP will present an update on the implementation status of all components. SENER will inform the Bank of any proposed changes to the investment policy. SENER will prepare consolidated semiannual unaudited project interim financial reports (IFRs) which will be presented 45 days after the end of each semester. In addition, SENER will prepare annual audited project financial statements, which will be audited by an independent audit firm selected by the SFP in accordance with the audit terms of reference and memorandum of understanding agreed between the Bank and SFP.

37. **SENER will also conduct annual evaluations of the ACE program.** SENER will closely monitor the performance of ACE program recipients and will solicit feedback from all applicants to ensure that continuous improvement of the ACE program is achieved. The minutes of biannual IC meetings will also be available to the Bank upon request. SENER will also prepare a final Project report, which will include, among other things, a quantitative assessment of outcomes achieved, analysis of achievements and difficulties encountered, compliance with safeguards, and lessons learned.

### B. Sustainability

38. **The proposed Project's financial sustainability is expected to be moderate to high.** For project implementation, SENER has committed US$90 million in parallel financing for the

CERIPs and will contribute US$2 million toward project management. Component 2 is expected to draw in nearly US$2 million in co-financing from the private sector as a requirement of the matching grant program.

39. **Because GEF grant funds are limited, an important objective of the proposed Project is to sustain support for the ACE program after the closure of the proposed Project by finding other sources of resources from the public or private sector.** Positive demonstration effects from the program, combined with an active policy dialogue, are expected to help catalyze support for the ACE program post-GEF. One mechanism that has been used by other innovation funding programs is to charge a fee to grantees that is paid back upon successful commercialization of a technology. A second potential source of funding is the private sector, perhaps through output-specific competitions and to share the results of the ACE program pilot through an active dissemination program. The third potential source of funding is one or more government agencies which invest in and assume management of the ACE program. Government agencies (NAFIN, The National Institute of the Entrepreneur *(Instituto Nacional del Emprendedor* [INADEM]*)* and CONACyT) have been experimenting with public support mechanisms for innovation and early-stage financing for the last decade and have targeted renewable energy and clean technologies as a strategically important sector for the future of Mexico's economy. During implementation, the proposed Project will enlist the support of senior officials in SENER to pursue follow-up financing for the ACE program and urge the removal of restrictions on the FSE to provide resources to the private sector.

# V. KEY RISKS AND MITIGATION MEASURES

## A. RISK RATINGS SUMMARY TABLE

| **Risk Category** | **Rating** |
|---|---|
| Stakeholder Risk | Substantial |
| Implementing Agency Risk | Moderate |
| - Capacity | Moderate |
| - Governance | Moderate |
| Project Risk | Substantial |
| - Design | Substantial |
| - Social and Environmental | Moderate |
| - Program and Donor | Moderate |
| - Delivery Monitoring and Sustainability | Moderate |
| Overall Implementation Risk | Substantial |

### B. Overall Risk Rating Explanation

40. **Overall implementation risk is assessed as Substantial.** The greatest source of risk is the transfer of funds to a large number of entities to be carried out under the ACE program. The financial and administrative capacity of beneficiaries may be weak, which could cause implementation delays. To mitigate this risk, external accountants will be hired to support financial management in those cases where SENER determines that beneficiaries lack the required capacity. In addition, SENER is a relatively new entity and the Project is one of the first grant programs they will administered that is focused specifically on the private sector. However, the proposed project management unit in SENER is already very experienced in management of Bank processes. Additional staff with relevant experience in investment and energy with a private sector focus will be hired, ensuring that project management is adequate.

## VI. APPRAISAL SUMMARY

### A. Economic and Financial Analysis

41. **To increase the rate of economic growth, Mexico must shift its economic activity toward higher value-added activities by improving productivity through innovation and adaptation of technology.** With this in mind, the GoM has put and is putting in place a number of policies and programs to promote technology innovation, including in the clean energy technology field. Despite this, implementing effective innovation programs remains a major challenge for all countries. The Bank's value added for the proposed initiative is to help ensure that the best global experiences in the areas of technology innovation and clean technology development are applied in Mexico.

42. **Under Component 1 of the proposed Project, US$4.58 million will be spent to support the first nationwide assessment of capacities to develop and commercialize ACE technologies.** Based on this evaluation, SENER (through the FSE), will make follow-up investments in human and institutional capacity building of over US$90 million in the short term, and multiples of that are expected over the medium and long term from federal, state, and private sector contributions. Such investments in the clean energy field will contribute to Mexico's plan to increase R&D funding to boost technology development and innovation toward levels found in other middle-income countries. Given that the social rate of return to public investment in R&D capacity for middle-income countries such as Mexico has been estimated at 55 percent,[16] it can be shown that Component 1 will have a net positive economic impact.

43. **Component 2 will provide much-needed capital and TA to SMEs, increasing the likelihood that new ACE technologies will achieve commercial success.** An economic analysis, including the reduction of GHG emissions, for Component 2 has been carried out and is presented in Annex 6 along with the assumptions. Overall, it has been estimated that for a US$10.5 million

[16] OECD Reviews of Innovation Policy: Mexico. October 2009; and OECD Reviews of Innovation Policy: Knowledge-Based Start-Ups in Mexico, April 2013.

investment in the ACE program by the proposed Project, there will be a total of US$62 million private investment in profitable technology development firms, taking into account co-financing, a leverage ratio of 50:1, and a conservative success rate for technology development of 10 percent. In addition, using the same assumptions and methodology, the proposed Project is expected to reduce GHG emissions by 2.4 million tons of $CO_2$, ($MtCO_2e$) which at a social cost of carbon of US$21 per ton of $CO_2$,[17] yields benefits of more than US$50 million. In addition to this ex ante analysis, the Project will rigorously monitor the financial performance of subgrant recipients in an effort to calculate the economic and financial benefits that can be attributed to the subgrant.

44. **Technology innovation is recognized worldwide as an area for which public support is required. In the case of clean energy technologies, pollution externalities provide an additional case for public intervention.** Component 1 responds to a recognized failure in the market for innovation services and assets. Market demand for innovation is constrained due to externalities, coordination challenges, and information asymmetries. Moreover, demand for ACE innovation specifically is insufficient because (a) the environmental costs of polluting technologies are not internalized, which reduces the demand for clean alternatives and (b) private investors are unable to determine the proper level of investment in new technologies due to lack of awareness, uncertainty over risks and rewards, and the incentive to free-ride on early adopters. This suggests an important role for public sector resources to correct this market failure, and to spur private and individual action. Under Component 2 of the proposed Project, the private sector in Mexico does not supply sufficient risk capital to early-stage firms. If capital constraints are lifted, it will increase the likelihood that some proportion of these firms will achieve commercial success, and produce products and services that can provide social and economic benefits, such as jobs, knowledge capital, innovation, and GHG emissions reduction.

## B. TECHNICAL

45. **The proposed Project was designed based on international best practices in terms of technology innovation and clean energy development.** Component 1 is intended to identify and strengthen institutional capabilities for commercializing clean energy technologies. In addition, Component 2 was designed to overcome current restrictions in the use of public R&D monies by SENER for the development of clean energy technologies and to promote academia-industry collaboration. A grant competition was judged to be the best mechanism to attract promising commercial clean energy technologies and encourage collaboration. Component 2 has been designed with an exhaustive review of TA and financing mechanisms used by governments around the world to stimulate the growth of knowledge-based enterprises.

## C. FINANCIAL MANAGEMENT

46. **Implementation arrangements will be similar to those used in a number of other projects financed by the Bank for which the implementing agency is SENER** (one loan and two related grants and one stand-alone GEF grant) as (a) it will use FOTEASE as the financing mechanism and (b) all financial management (FM) functions will be carried out by the same

[17] The US Environmental Protection Agency (EPA) has used a value of US$21 per ton of $CO_2$ as the social cost of carbon, which was based on a range of estimates at different discount rates in a report done by an Interagency Working Group on the Social Cost of Carbon (2013). The US EPA has recently raised the social cost of capital to US$37 per ton of $CO_2$. http://1.usa.gov/1mmEzoN

administrative unit within SENER used for the other projects. This unit has suitable experience; however, one additional FM specialist will be hired in order to accommodate the proposed Project's incremental work load. NAFIN will act as the financial agent and will primarily manage Project disbursements.

## D. PROCUREMENT

47. **The proposed Project will use and strengthen the existing SENER-UREP to manage the proposed Project.** Through the management of other Bank Group and GEF projects, the SENER-UREP has acquired sound capacity in implementing Bank Group procurement procedures. Incremental project management costs to the SENER-UREP will be funded from grant proceeds. The SENER-UREP will be responsible for overall project coordination, monitoring activities, the fiduciary functions (procurement, disbursement, and accounting, and reporting

48. **Procurement will be carried out in accordance with the Bank Group's Guidelines**: Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Group Borrowers, dated January 2011 and revised in July 2014, Guidelines: Selection and Employment of Consultants by World Bank Group Borrowers, dated January 2011 and revised in July 2014, and the provisions stipulated in the legal agreement. A full assessment of SENER's capacity to implement procurement under the Bank Group's Procurement Guidelines was conducted in January 2014. SENER is familiar with the Bank Group's procurement procedures, standard bidding documents, performance of prior and post reviews, and preparation of procurement plans. Notwithstanding the above, the assessment identified a few factors which may pose risks at project implementation such as (a) a lack of experience in management of technology innovation projects with the participation of the private sector; (b) the potential risk of misuse of funds by beneficiaries; and (c) uncertainty on the efficiency and effectiveness in the application of procurement procedures and control mechanisms to reduce the risks of deviations, ineligibility of contracts, and fraud and corruption practices. A detailed list of potential procurement risks is provided in Annex 3.

## E. SOCIAL

49. **The proposed Project does not trigger any social safeguards policies.** During project preparation, it was determined that it is very unlikely that indigenous peoples will seek benefits from the proposed Project in ways that would merit specific outreach approaches or design adjustments to accommodate the needs of these communities. Moreover, it was determined that the type of subgrants to be financed would not infringe on the rights of indigenous peoples, including territorial and intellectual property rights, nor would cause any impact covered under the Involuntary Resettlement Policy. Applicants to the ACE program will be required to answer a series of questions regarding potential social impacts and mitigation measures (see Environment section).

## F. ENVIRONMENT

50. **The proposed Project has triggered the Environmental Assessment policy (OP/BP 4.01) and received a Category B rating.** The proposed Project has developed an Environmental and Social Management Framework (ESMF) (disclosed March 1, 2014) to conduct screening of

potential subprojects for their environmental impacts and categorize them according to the World Bank's Environmental Risk categories. No category A subprojects will be supported by this operation. Subgrants will not have any impacts on forests, natural habitats and physical cultural resources, nor will they require any use of pesticides. Subprojects deemed to have a potential environmental impact (Category B) will need to provide evidence throughout implementation of compliance with all necessary environmental permits and certifications. These environmental requirements will be identified during the initial screening process, which will be incorporated into the subproject selection process.

51. **An ESMF has been prepared by SENER and is included in the POM.** In practice, the ESMF will be a screening tool to help subproject applicants prepare their proposals to the ACE Fund and to allow key personnel in the SENER-UREP to be able to review subprojects for their eligibility and to manage potential environment and social impacts. The Bank will provide training on the proper application of safeguards practices for the proposed Project, to key personnel within SENER, the SENER-UREP, and the IC. This will require that such personnel fulfill the following objectives: i) screen potential subprojects for environmental and social risks and impacts; ii) ensure that subgrant recipients carry out environmental and social assessment for their respective subprojects; iii) verify that subprojects comply with local laws and Bank safeguards policies.

## G. WORLD BANK GRIEVANCE

60. **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 World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org."

# ANNEX 1. RESULTS FRAMEWORK AND MONITORING

**Country: Mexico**

**Project Name: Sustainable Energy Technologies Development (P145618)**

**Results Framework**

**Global Environmental Objectives**

PDO Statement

The objectives of the Project are to improve the institutional capacity of ACE technology institutions (both public and private) in the territory of the recipient and to foster the commercialization of ACE technologies by providing financial incentives to the private sector, which together are expected to lead to GHG emissions reduction in the future.

**Global Environmental Objective Indicators**

| Indicator | Core | Unit of Measure | Baseline | Cumulative Target Values | | | | | Frequency | Data Source/ Methodology | Responsibility for Data Collection |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Year 1 | Year 2 | Year 3 | Year 4 | End Target | | | |
| Future emission reductions from ACE technologies supported by the proposed Project | ☐ | Million metric tons $CO_2$ | 0 | 0 | 0.8 | 1.6 | 2.4 | 2.4 | At the end of the Project | The methodology to estimate emissions reduction is described in annex 7 | |
| CERIPs designed and initiated | ☐ | Number | 0 | 0 | 10 | 20 | 32 | 32 | Annual | SENER | SENER |
| Private capital mobilized | ☐ | US$, million | 0 | 0 | 0 | 3 | 6 | 6 | Annual | SENER | SENER |

| Intermediate Results Indicators | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator Name** | **Core** | **Unit of Measure** | **Baseline** | **Cumulative Target Values** | | | | | **Frequency** | **Data Source/ Methodology** | **Responsibility for Data Collection** |
| | | | | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **End Target** | | | |
| Number of investment opportunities identified in Component 1 that receive funding through the FSE | ☐ | Number | | 0 | 10 | 20 | 32 | 32 | Annual | SENER | SENER |
| Number of ACE program recipients identified from Component 1 | ☐ | Number | | 0 | 2 | 4 | 6 | 6 | Annual | SENER | SENER |
| Number of recipients of TA | ☐ | Number | | 0 | 8 | 16 | 24 | 24 | Annual | SENER | SENER |
| Number of patents for ACE technologies | ☐ | Number | | 0 | 1 | 2 | 3 | 3 | Annual | SENER | SENER |
| Number of CCEC grants awarded | ☐ | Number | | 0 | 4 | 8 | 12 | 12 | Annual | SENER | SENER |
| Number of prototypes completed | ☐ | Number | | 0 | 4 | 8 | 12 | 12 | Annual | SENER | SENER |
| Number of female participants | ☐ | Number | | 0 | 1 | 3 | 5 | 5 | Annual | SENER | SENER |

| Definition and Explanation of Indicators | |
|---|---|
| **Indicator Name** | **Explanation of Indicators** |
| Future emission reductions from ACE technologies supported by the proposed Project | GHG emissions reduction for the proposed Project will be estimated during and at the end of the proposed Project based on the methodology outlined in annex 7 and supplemented by data collected on subgrant commercial performance. The emissions reduction would be associated with the proposed Project awarded grants under the ACE program and correspond to the expected future reductions from the development of successful ACE technologies over their lifetime. |
| CERIPs designed and initiated | The CERIPs will be one of the main outputs of the RNAs and will define the specific areas of investment for SENER and the federal government, local and state governments, and other investors in ACE technologies. The indicator will be the number of CERIPs that are prepared and implemented in Mexico as a result of the proposed Project. |
| Private capital mobilized | The objective of the ACE program is to provide financial support to private sector participants in parallel to the support that is provided to academic and research institutes under the FSE. To sustain such support, financial resources are needed from public or private sources to replace the limited GEF resources that will be exhausted during the proposed Project. Through dedicated activities by the proposed Project, the intention is to raise resources for the ACE program or for programs or funds with similar objectives. |
| Number of investment opportunities identified in Component 1 that receive funding through the FSE | Component 1 will identify promising investments for the FSE Fund that will improve the institutional capacity of ACE technology institutions in Mexico in order to foster the commercialization of ACE technologies. This indicator will measure the number of investments that were identified through Component 1 of the proposed Project. |
| Number of ACE program recipients identified from Component 1 | To increase the pipeline (both in quantity of proposals and breadth of institutions), Component 1 will help identify promising applicants to the ACE program (Component 2.1). The number of ACE program recipients that were identified through the RNAs or became aware of the ACE program through Component 1 will be counted. |
| Number of recipients of TA | The total number of TA recipients will be measured. This will include TA received by successful proposals to the ACE Fund as well as TA awarded to short-listed firms based on the decision of the IC. |
| Number of patents for ACE technologies | All proposals to the ACE Fund will be potential candidates to apply for patents for their technologies. The total number of patents that are produced from ACE program applicants will be measured and reported. |
| Number of CCEC grants awarded | One of the categories of ACE program awards will be proposals that are jointly made between academic and research institutes and the productive sector. The total number of collaborative proposals awarded funding under the ACE program will be reported. |
| Number of prototypes completed | The second type of matching grant awards under the ACE program will be to produce proof-of-concept or prototype technologies. This indicator will count the number of prototypes produced among winning grant recipients. |
| Number of female participants | Among all applicants to the ACE program, the number of female participants will be counted. The number of female participants in short-listed and winning proposals will be measured. |

# ANNEX 2: DETAILED PROJECT DESCRIPTION

## COUNTRY: MEXICO

### Sustainable Energy Technologies Development Project (P145618)

1. The objectives of the Project are to improve the institutional capacity of ACE technology institutions (both public and private) in the territory of the recipient and to foster the commercialization of ACE technologies by providing financial incentives to the private sector, which together are expected to lead to GHG emissions reduction in the future.

2. The proposed Project will seek to achieve this objective through two complementary components: (a) a TA capacity assessment activity which aims to assess and improve the capacity and means of public and private stakeholders to identify, develop, and commercialize ACE technologies that lead to GHG reductions and (b) a pilot early-stage financing program (the ACE program) that will promote the commercialization of innovative clean energy technologies in Mexico by providing grants and TA through competitive processes. Both activities will be conducted simultaneously and have separate funding windows. Component 1 will be prepared in parallel with Component 2, but results from Component 1 will further support Component 2.

3. The proposed Project supports three of the five components of the overall strategy to promote ACE in Mexico, which is led by SENER (Figure 3). As discussed in the strategic context, SENER is currently supporting, through the FSE, advanced R&D for ACE technologies, and CEMIEs. Together, these initiatives aim to improve research outcomes and enhance research and development initiatives for key renewable energy technologies. The proposed Project will support three additional pillars of the overall strategy. Under Component 1, the proposed Project supports institutional strengthening of academic and research institutions, private enterprises, and subnational government entities across Mexico and under Component 2, the increased use of ACE technologies by the private sector, and the commercialization of innovative ACE technologies by Mexican enterprises. In all cases, the Bank support is targeting areas of the ACE technology value chain where the FSE cannot invest resources. The FSE cannot fund consulting activities but requires outside advice to complete the RNAs under Component 1. Component 2 creates a window for funding private sector led initiatives, which are highly restricted under the FSE. More details on the proposed Project components follow below. The initiatives launched under the proposed Project will help to create a more holistic strategy which brings together stakeholders from the private and public sector, both nationally and at the local level, that will lead to the increased commercialization of clean energy technologies.

**Figure 1. ACE Strategy in Mexico**


*Source:* World Bank

**Component 1. Regional Needs Assessments (RNA).** (Funding: GEF US$4.58 million; SENER: US$90 million)

4. The objective of this component is to (a) conduct RNAs to assess the capacity of academic and research institutions, private enterprises, and subnational government entities across Mexico; (b) prepare CERIPs that will aim to boost institutional capabilities; and (c) identify promising clean energy initiatives that could be considered for financial support by the ACE program or the FSE. Together, these initiatives aim to assess and improve the capacity and means of public and private stakeholders to identify, develop, and commercialize ACE technologies that lead to GHG reductions.

5. The RNA will be a highly participatory exercise seeking the input of students, researchers, local government institutions, the private sector, and consumer representatives. An RNA will be prepared for each state in Mexico. Consultants will work on a regional basis.[18] Indicative regional groupings are provided in Figure 4. For each state, specialized consultants will (a) survey and map the resources and capacities (human, technical, infrastructure, and financial) of Mexican universities, research institutions, and clean energy enterprises; (b) identify the ACE technology needs of enterprises in strategic sectors; (c) identify each region's comparative advantage in S&T sectors and in the clean energy value chain; (d) review the capacities of subnational government entities to implement sound policy and regulation conducive to the dissemination of clean energy technologies; (e) assess existing regional and national financing sources; and (f) assess financial, regulatory, and policy barriers. Consultants will also seek to identify where there are opportunities for states to collaborate to leverage shared comparative advantage to achieve the desired outcomes.

6. For this component, the consultants will draw from the concept of 'smart specialization' or Research and Innovation Strategies for Smart Specialization (RIS3) currently being advanced by the European Commission. Briefly, the objective of the RIS3 approach is to maximize the knowledge-based development potential of a region, regardless of whether it is strong or weak, high-tech or low-tech, by focusing on each region's comparative advantage. This approach allows stakeholders to justify the use of limited public resources to support ACE technology

[18] The United Mexican States will be divided into ten regions based on geographic proximity and consultants will perform the assessment on one or more regions. A market study will be carried out to determine the most efficient allocation of contracts to firms.

commercialization and deployment.

7. The key output of the RNAs will be the CERIPs. Each CERIP will (a) identify the investments and strategic actions (curriculum changes, the creation of new incentives, and policy reforms) recommended and agreed to have strong potential over the medium term to boost human capital in S&T and entrepreneurial (finance, business administration, and strategy) disciplines critical to commercialize ACE technologies; (b) identify ACE investments, advanced research activities, and other initiatives that could be undertaken by the FSE to reduce GHG emissions; and (c) create a potential pipeline for the ACE program, described below under Component 2. Investments identified by a CERIP may include the establishment of chairs in universities in relevant scientific fields; support for centers of excellence for specific clean energy technologies; joint research initiatives with industry; and the purchase of scientific equipment for laboratory upgrades. To create the proposed Project pipeline for the FSE and ACE program, the consultants will compile an exhaustive database and capacity assessment of clean energy enterprises and assess the ACE technology needs of private enterprises in other sectors across all of Mexico. They will also raise awareness about the ACE program and the FSE to all stakeholders contacted in the preparation of the RNAs. Investment in CERIPs will begin during the proposed Project implementation period and continue after the proposed Project closes.

8. SENER will seek to leverage resources from other stakeholders (state governments, CONACyT, the Ministry of Education, the Ministry of Economy, and private sector enterprises) and coordinate with other initiatives. This will include coordinating with the Inter-American Development Bank (IDB) project 'Climate technology transfer mechanisms and networks in Latin America and the Caribbean' and with the National Institute for Ecology and Climate Change (*Instituto Nacional de Ecología y Cambio Climático* [INECC]), the Mexican representative to the Climate Technology Center and Network (CTCN) of the United Nations Framework Convention on Climate Change (UNFCCC).[19] The CERIPs are intended to bring stakeholders together toward implementing a coherent strategy that can advance clean energy technology commercialization in Mexico, which can reduce GHG emissions. To varying degrees, the state governments and other subnational entities in Mexico are interested in promoting clean energy technologies, green growth, and low carbon initiatives and have resources that they can commit to initiatives. However, due to the highly centralized nature of the energy sector bureaucracy in Mexico, few states have the capacity to implement sound policies and investments. The CERIPs can therefore improve the efficiency of policy implementation and help to avoid overlapping initiatives, leading to improved outcomes. Coordination with the CTCN of the UNFCCC can help Mexico meet its technology needs from abroad, as identified by the RNAs.

9. The GoM will aim to complete the implementation of CERIPs during the proposed Project implementation period. It is anticipated that preparation of the RNAs begin in 2015 and implementation of the CERIPs from 2016 to 2018. Thereafter, the proposed Project will hire consultants to perform an ex post analysis of the RNAs and the CERIPs. The consultants will

[19] The mission of the CTCN is to stimulate technology cooperation and to enhance the development and transfer of technologies and to assist developing country parties at their request, consistent with their respective capabilities and national circumstances and priorities. This is undertaken to build or strengthen their capacity to identify technology needs and to facilitate the preparation and implementation of technology proposed Projects and strategies that support action on mitigation and adaptation. See: http://bit.ly/1uWy0cB

prepare a report for SENER and the Bank which will contain, among other things (a) a benchmarking exercise to assess the relative performance of states and other entities in implementation of the CERIPs; (b) an assessment of the amount of other resources (private, local government, and other federal agencies) leveraged by the proposed Project; and (c) a detailed accounting of the number of initiatives and subprojects identified for support by the ACE program and the FSE that applied for and/or received support. It must be noted that the type of investments that the CERIPs will identify require longer-term investments and commitment to a comprehensive strategy to support the success of Mexico's energy transformation.

**Component 2. Incentives to the Private Sector for the Commercialization of ACE Technologies.** (Funding: GEF US$11.50 million; private sector US$1.85 million)

10. The objective of Component 2 is to move promising innovative clean energy technologies in Mexico toward commercialization by providing grants and TA through a grant competitive program administered by SENER. The ACE program will pilot a new approach to promote sustainable energy technology development by giving a leading role to private sector actors. If successful, this approach could increase SENER's support for private sector led initiatives, an approach which is consistent with the energy transition underway in Mexico.

11. Component 2 seeks to fill a void in the current public and private financing landscape for early-stage technology commercialization and to incentivize industry-academia collaboration in technology development through a pilot grant program (Table 2). While the ECONOMÍA-CONACyT (Secretariat of Economy) technology innovation fund (*Fondo Sectorial de Innovación Tecnológica*, [FIT]) has a strong track record funding innovation, the fund's support is highly diffuse, has relatively high co-financing requirements, and does not provide mandatory TA. The FSE also has extensive experience and resources but cannot support private enterprises and does not provide TA. The proposed ACE program will address some of the gaps in the public sector early-stage financing landscape and boost the supply of resources so that more eligible firms can receive support. The energy enterprise sector in Mexico is already underdeveloped compared to other strategic sectors. Moreover, for the reasons outlined in paragraph 3, the clean energy sector requires additional public support.

**Table 2. Market Position of ACE program**

| Fund | FIT | FSE | ACE |
|---|---|---|---|
| **Type** | Grant facility for innovation | Grant facility for applied research related to innovation | Grant program |
| **Private sector eligible?** | Yes | No* | Yes |
| **Provides TA?** | No | No | Yes |
| **Target market** | SMEs | Primarily supports accredited researchers | SMEs and mature firms collaborating with researchers |
| **Years active** | 2002–present | 2009–present | 2014–2018 |
| **Total annual grants (MXN, million)** | 100 | 121 | 46 |
| **Range of grant/investment size (MXN, million)** | 1–5 | 0.5–30 | 1–25 |

| | | | |
|---|---|---|---|
| **Co-financing** | 50–90% | 0% | 10–15% |
| **Sectors** | Over 25 sectors, including renewable energy | Renewable energy, energy efficiency, clean transport, fuels | Renewable energy, energy efficiency |

*Note:* *See footnote 12.

12. **ACE Subgrant Program.** The ACE program will sponsor an annual call for proposals inviting qualified entities to compete to receive a proof-of-concept or CCEC. The resources for each grant type will be earmarked notionally at US$5.25 million each, with the objective of flexible resource allocation among instruments based on demand and applicant qualifications. The objective of both instruments is to support innovative clean energy technologies, with strong potential for commercialization.

13. The ACE program will seek to support the customization or adaptation of established technologies to the Mexican context and not technologies which are totally new to the world. In addition, the fund will focus on specific technology areas for development where there is both regional demand and a comparative advantage for Mexico. For example, among the technical areas that are a priority for Mexico are energy efficiency, geothermal, wind, and solar energy technologies. The technology focus will be further narrowed and refined by the results of the analysis carried out in Component 1.

14. **Proof-of-concept grants.** The objective of proof-of-concept grants is to support activities in the proof-of-concept and prototyping stage. A proof-of-concept grant is designed to help stimulate entrepreneurship and to incentivize researchers to incorporate and take risks for stimulating innovation and technology transfer. The ACE proof-of-concept grant will be open to incorporated firms with majority Mexican ownership. A cap will be placed on the size of the firm to ensure that the program targets SMEs, start-ups, and academic spinoffs. The range of the grant will be MXN 1–6.6 million (~US$75,000–500,000), and the grant duration will be 12–24 months. The average grant is expected to be US$150,000.

15. **CCEC grants.** The objective of the CCEC grant is to provide an incentive to stimulate academia-industry collaboration. As noted above, the lack of such collaboration is viewed as a key barrier to technology transfer in Mexico. The CCEC grant will target firms that wish to develop an innovative product or process in collaboration with researchers from a Mexican university or research institution. No restrictions on the size of the firm will be created. However, the firm must have majority Mexican ownership. Applicant consortia may also include researchers from foreign academic institutions to encourage knowledge spillovers from abroad, provided that the Mexican university researcher has a leading role in the collaboration. The range of the grant is expected to be MXN 2–25 million (~US$150,000–2,000,000), and the grant duration will be 12–24 months. The average grant is expected to be US$500,000.

16. **Investment Committee.** Decisions on grant and TA awards will be made by five individuals forming an IC. The members of the IC will be selected by SENER with advice from the Bank. The proposed Project will look for individuals with strong expertise in, among other things, early-stage technology commercialization, venture capital, applied research, ACE technologies, and concept-to-market strategy. Eligibility will not be limited to Mexican nationals or even current residents in Mexico, as IC members with international experience will bring strong added value to the process of selection and to the grant recipients.

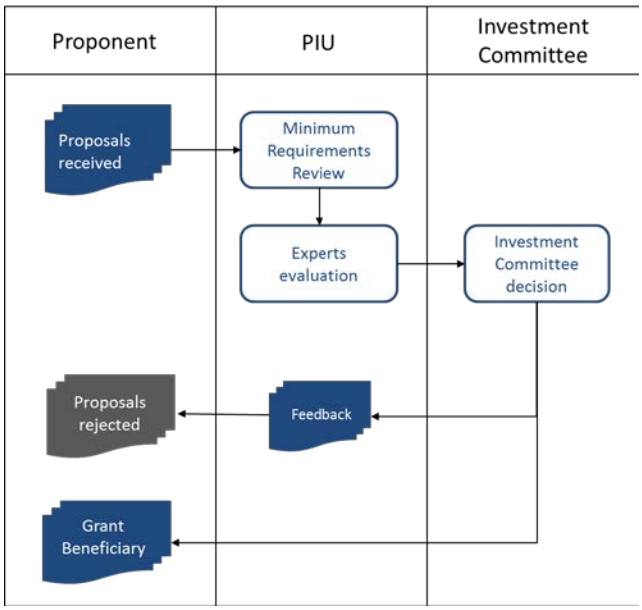
17. **Co-financing**. To ensure that grant applicants have a financial stake in the outcome, they will be required to contribute a minimum of 15 percent of total subgrant costs for proof-of-concept and CCEC grants, respectively.

18. **Application procedures.** In order to be considered for a grant, applicants must submit an online application. The application will include, among other things, an applicant statement; detailed business plan; subproject budget; procurement plan; evidence of eligibility; curriculum vitae (CVs) of key personnel; financial documentation; affirmation that the proposed Project does not include any of the prohibited activities detailed in the ESMF; and proof of co-financing. The grants will only fund eligible expenditures that will be detailed in the POM. Grants will not be allowed to fund academic or research institutions or the salaries of their personnel.

19. **Proposal selection.** Proposals to the ACE program will be first screened to ensure that they meet minimum requirements and do not fund any activities that are excluded for environmental or social reasons. Thereafter, the proposals will be reviewed for technical and commercial management by specialists in renewable energy, energy efficiency, and business. The proposed Project will leverage the support of specialists who currently perform that role for the FSE. These specialists will recommend the most promising proposals or short list them, to the IC. Proposals which are not selected to advance past this stage will receive feedback from the peer reviewers and an explanation for why they were not selected.

20. Subsequently, IC members will conduct a detailed review of the short-listed proposals. The IC's review will consider, among other things, the proposal's technical merits; potential to achieve commercial viability; and its potential to achieve GHG reductions. In certain cases, a site visit may also be undertaken. The IC will meet on a semiannual basis to vote on grant awards. Again, applicants not accepted for a grant will receive detailed feedback. In addition, they may receive advice on other resources available in the private and public sector which may be of further assistance (Figure 5).

**Figure 2. ACE Program Application Review Process**



*Source*: SENER

21. **Follow-up investment**. Since there are large funding gaps in Mexico for early-stage financing, grant recipients who successfully implement their subproject will still face challenges securing additional financing. For the proposed Project to have an impact on ACE technology deployment that can contribute to GHG reductions, the ACE program will make every effort to help successful grant recipients with identifying follow-up investment. This can be achieved in a number of ways: (a) Grant recipients will not be barred from applying for future grants, although they must be competitively selected for eligible subprojects; (b) IC members (representing the private and commercial finance sectors) will be allowed to invest in firms but only after the applicant has completed grant implementation and (c) the ACE program will provide 'match making' assistance to connect entrepreneurs with other financiers.

22. Permitting IC members to invest in firms that are awarded grants could raise some conflict of interest concerns. To mitigate this risk, IC members will be required to recuse themselves from participating in decisions on applicants with whom they have any business or personal ties. Moreover, individual IC members cannot decide the outcome of any particular grant application since a majority of three IC members must agree to award a matching grant or TA. Finally, IC members will only be allowed to invest after the grant cycle is complete. At the same time, the benefits of allowing follow-up investment by IC members are clear. Since the fund's success will be measured, in part, by the number of firms which achieve commercial success, it is in the interests of the proposed Project to increase the likelihood that grant recipients receive sustainable financing. For most beneficiaries, the grant alone will not fully meet their financing needs, and risk financing for early-stage ventures in Mexico is scarce. Since at least some IC members will be active venture capitalists themselves, by getting to know the grant recipients, it is more likely that they will invest in successful subprojects that demonstrate strong commercial potential after they complete grant implementation. This further helps to achieve the PDO by providing financing to the private sector for ACE technology commercialization.

23. **Component 2.1. ACE subgrants program** (Funding: GEF US$10.50 million; private sector US$1.85 million). The ACE program will provide grants for both proof-of-concept and CCEC. In some cases, access to grant funding may be contingent on completing a TA activity. Detailed information on the terms, eligibility criteria, maximum grant size, application procedures, monitoring criteria, and other features of both the proof-of-concept and the CCEC grant are recorded in the draft POM. The POM will be a 'living document' updated as needed to refine, among other things, processes, procedures, and co-financing thresholds.

24. **Component 2.2. Technical Assistance** (Funding GEF: US$1 million). Winning proposals will receive TA as part of their overall grant package. The TA will be an on-boarding program designed to build capacity of the grant recipients. It will be provided by a firm that is competitively selected. The TA will cover topics which include, among other things, business plans, procurement plan, IP protection and monetization, marketing strategy, access to finance, safeguards, and other services available to entrepreneurs in Mexico.

25. The ACE program will select the TA service providers on a competitive basis. Further details are provided in annex 3. The ACE program will regularly monitor the results obtained by

TA service providers to hold them accountable. The proposed Project will also aim to use existing entrepreneurial support services in Mexico (INADEM, Technology Transfer Offices [TTOs], and business incubators). The Bank has held preliminary discussions with INADEM and CONACyT seeking to identify how best to partner on this initiative.

26. **Disbursement of ACE subgrants to beneficiaries.** Disbursement from the ACE program to the beneficiary will occur in semiannual tranches. Subgrant disbursement will follow the subproject budget and the implementation schedule agreed in advance by both parties, although some deviations within a reasonable range will be allowed. To receive the next disbursement, subgrant beneficiaries will be required to provide supporting documentation of procurement and payment transactions during the previous subgrant implementation period, official financial statements to the fund, a semiannual progress report, and evidence of the availability of required co-financing for the following quarter. This approach builds on lessons learned from other S&T grant programs in Mexico as well as abroad. This requirement will help minimize the risk of fraud or frivolous use of limited resources.

27. **Implementation.** During subgrant implementation, the IC will continue to actively monitor the progress achieved by the subgrant beneficiary. At the conclusion of the grant implementation period, beneficiaries will be required to submit an official financial audit to SENER on terms that are acceptable to SENER, the Bank, and the GoM.

**Component 3. Project Management.** (Funding: GEF US$0.80 million; SENER US$2 million)

28. The proposed Project will use and strengthen the existing SENER-UREP to coordinate and manage the proposed Project. Four additional team members will be added: a procurement specialist, a financial management specialist, and two project managers, one for Component 1 and another for Component 2. Additional support for screening grant applications under Component 2 will be provided by SENER personnel or subcontractors.

# ANNEX 3: IMPLEMENTATION ARRANGEMENTS

## COUNTRY: MEXICO

## Sustainable Energy Technologies Development Project (P145618)

### A. PROJECT INSTITUTIONAL AND IMPLEMENTATION ARRANGEMENTS

**Project Administration Mechanisms**

1. **Overall arrangements.** The recipient of the grant will be the United Mexican States through its Secretary of Finance and Public Credit.

2. The FOTEASE is responsible for promoting the adoption and greater utilization of renewable energy and the promotion of energy efficiency in Mexico and, as such, it acts as the financing mechanism for subprojects by transferring subgrant funds to eligible beneficiaries under the instructions of SENER.

3. SENER is the entity responsible for implementing the proposed Project. SENER, together with the Bank, has designed a governance and Project implementation structure for the proposed Project with assignment of responsibilities for financial management, procurement, awarding subgrants under Component 2, and supervising subgrant implementation. The key Project entities within SENER are listed:

i. ***Director General de Información y Estudios Energéticos*** **(DGIEE)**: The DGIEE is responsible for overall administration of the proposed Project, proposed Project design/conception, reporting to and requesting funds from the FOTEASE, and liaising with the Bank.

ii. **SENER-UREP**. The SENER-UREP is responsible for reviewing and scoring grant proposals; recommending grants for funding to the investment committee; and supervising grants under implementation (review of procurement plans, financial reporting, and project reporting). Existing SENER-UREP personnel will provide cross-support to the proposed Project. In addition, the SENER-UREP will hire one financial management specialist, one procurement specialist, a project manager for Component 1, and a project manager for component 2. At least eight external technical experts will provide support to the SENER-UREP for proposal peer review.

iii. **Investment Committee**. The IC meets periodically to review the grant recommendations of the SENER-UREP and endorses/rejects their recommendations. Members are not paid. The IC consists of five individuals: the DGIEE, another SENER representative, and three outside experts with experience in early-stage risk investment, go-to-market strategy, and clean energy technologies. SENER will propose the membership of the IC to the Bank but reserves the right to make its own decisions on the composition.

4. NAFIN is the financial agent for the proposed Project and, as such, is responsible for participating in the design of the proposed Project to ensure compatibility with Mexican law;

reviewing the financial reporting prepared by the SENER-UREP; submitting disbursement requests to the Bank; and transferring disbursements to the national treasury.

5. Jointly, SENER, FTE, and NAFIN perform similar functions to a financial intermediary insofar as they establish appropriate risk mitigation measures to ensure prudent use of the grant funds in line with proposed Project design, Bank rules, and Mexican law.

6. The implementation arrangements described above and the disbursement process below are relatively complex, given the multiplicity of agencies engaged in the proposed Project. This structure may cause implementation delays and coordination challenges. However, the implementation arrangements cannot be further simplified owing to mandatory regulations and restrictions in the Mexican public sector for the implementation of Bank-financed projects. The proposed Project aims to mitigate this risk through clear assignment of roles, responsibilities, and accountability at each step in the process. Moreover, all agencies and actors have significant experience implementing Bank Group projects. While the proposed Project does not have an entity formally designated as a financial intermediary for purposes of paragraph 3.13 of the Bank Group's Procurement Guidelines, the institutions, actors and entities which will administer the proposed Project jointly perform all of the functions of a financial intermediary. As such, use of acceptable commercial practices is justified.

## B. Financial Management, Disbursements, and Procurement

### Financial Management

7. Activities under Component 1 will finance consultancies which will be paid directly from the FOTEASE. Thus, the flow of funds will be rather simple. However, Component 2 will entail more complexity as it will imply financing many subprojects whose beneficiaries may have low or nonexistent administrative capacity, since most will be SMEs. Main mitigating factors include the following: (a) beneficiaries will open and maintain commercial bank accounts that will be used only for this proposed Project and (b) an accounting firm acceptable to the Bank will be hired for preparing the accounting records of subprojects, carrying out monthly reconciliations of banking accounts and accounting records, and making sure that the expenditures are eligible and adequately supported. In addition, the POM will include specific criteria for selecting these beneficiaries and for ensuring that the financial resources granted to them are used following sound financial management practices, and that the resources are used for the purposes intended.

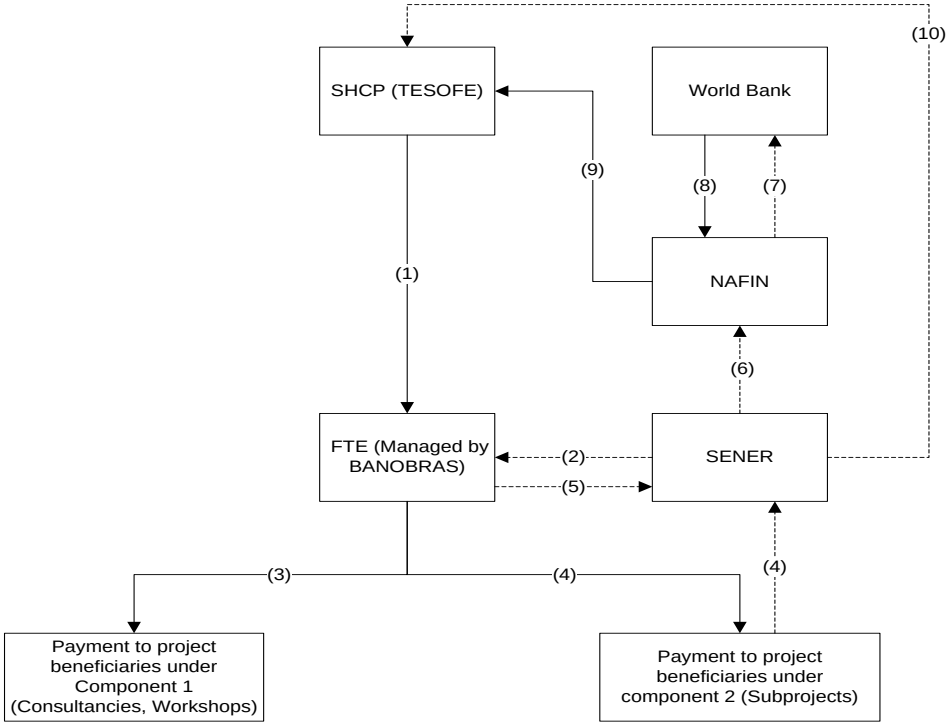
### Financial Reporting

8. SENER will prepare consolidated semiannual unaudited project IFRs which will be presented 45 days after the end of each semester and the annual audited project financial statements, which will be audited by an independent audit firm selected by SFP in accordance with the audit terms of reference and memorandum of understanding agreed between the Bank and SFP.

### Disbursements

9. The flow of funds process is described in Figure 6. Dotted lines represent flow of information whereas solid lines represent flow of funds.

**Figure 3. Flow of Funds Process**




Note:

1. Each year, SENER requests to the congress the approval of a budget allocation for the FOTEASE, the objective of which is to finance and incentivize projects related to the sustainable use of energy. Once this budget is approved, SENER will request the FOTEASE for allocation of a certain amount of funds for this particular project, which will function as a revolving fund during the life of the grant.
2. SENER will instruct BANOBRAS as fiduciary agent of the FTE, the payment to Project beneficiaries.
3. BANOBRAS, acting as the trustee of the FOTEASE, will pay directly to beneficiaries under Component 1, mostly related to the performance of consultancies and workshops.
4. BANOBRAS, acting as the trustee of the FOTEASE, will transfer resources to beneficiaries under Component 2 (for example, higher education institutions, research centers, productive sector, and local governments), which will implement subprojects and will report periodically the use of resources to SENER.
5. The FOTEASE will periodically report the use of funds to SENER. With this information along with the reports provided by beneficiaries under Component 2 as noted in the previous point, the administrative unit within SENER will prepare accounting records and the related project financial information, namely IFRs, annual financial reports, and disbursement requests.
6. SENER will submit the project financial information to NAFIN for financial reporting and for requesting the reimbursement of resources to the FOTEASE.
7. NAFIN will present to the Bank the project financial information as required in the grant agreement.
8. The Bank will reimburse funds to a commercial bank account opened by NAFIN.
9. NAFIN will transfer the resources to SHCP.
10. SENER will request SHCP for reimbursement of funds to the FOTEASE, via SENER.
11. SENER will reimburse funds to the FOTEASE.

## Procurement

10. The SENER-UREP will be responsible for overall project management and coordination for this and other Bank Group projects implemented by SENER. The procurement tasks will be carried out by procurement specialists. The specialists have accumulated experience in a number

of projects with the use of procurement procedures in Bank-financed projects. On the basis of the capacity assessment and a proposed projection of the expected work load conducted in SENER, it was agreed that SENER will hire another procurement specialist to carry out procurement under this proposed Project. The SENER-UREP will manage procurement for the implementation of the Components 1, 2.1, 2.2 and 3. Under Component 2.1, grant awardees will carry out procurement for the execution of their subgrants with procedures acceptable to the Bank to be described in the POM. Based on the performance in Bank- financed Projects currently under implementation, SENER's internal mechanisms in place for procurement planning, monitoring and control are considered acceptable to the Bank.

11. The proposed Project will include two main categories of expenditures that will be procured according to Bank Group procurement rules. The first will be goods, non-consulting services, and consulting services under Components 1 and 2. The second category of expenditures will be matching grants that will be awarded under a national competition organized by SENER according to eligibility and selection criteria to be outlined in the POM. The matching grants will be funded by the ACE program that will be established under SENER and operated in a similar manner to the FSE but with the provision that funds can be used directly by the private sector, unlike the FSE. The SENER-UREP will hire one additional procurement specialist to handle procurement under the proposed Project and will draw upon the procurement expertise that exists in SENER for managing three other GEF projects that are under implementation.

12. **Procurement of works**. The proposed Project will not finance works contracts.

13. **Procurement under Components 1, 2.1, 2.2, and 3**. Goods and non-consulting services for the implementation of these components by SENER will be procured using Bank procurement methods and harmonized documents agreed by the IDB, Hacienda, and the Bank. Goods costing less than US$100,000 will be procured through Price Comparison (Shopping) procedures, as described in paragraph 3.5 of the Procurement Guidelines; national competitive bidding (NCB) procedures will be applied for contracts costing less than US$6 million, and international competitive bidding (ICB) procedures for goods with estimated values equal to US$6 million or more.

14. **Procurement of consultant services under Components 1, 2.2, and 3**. Consultant services will be procured in accordance with the Guidelines: Selection and Employment of Consultants by World Bank Group Borrowers, published in January 2011 and the arrangements agreed in the procurement plan. Contracts for hiring of firms with estimated values of US$350,000 or more will be procured giving consideration to quality and cost, and the procedures set forth for the quality- and cost-based selection (QCBS) method in the guidelines will apply. Contracts with estimated values less than US$350,000 will be procured using QCBS; quality-based selection (QBS) procedures; selection based on the consultant's qualifications (CQS); least-cost selection (LCS) procedures; selection under fixed budget (FBS) procedures; and single source selection (SSS) procedures. Consultant services by firms will include capacity assessments of subnational entities, academic institutions, and private enterprises; design and preparation of regional investment plans; identification of clean energy initiatives at the regional level; TA services to selected beneficiaries for implementation of subgrants, among other things, mentoring and legal advisory; technology transfer; IP support; and clean energy commercialization.

15. **Short list comprised entirely of national consultants**. The short list of consultant firms for contracts estimated to cost up to US$1 million equivalent may entirely comprise national consultants, in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

16. **Individual consultants**. The proposed Project will finance consultant services by individuals. Contracts will be procured using the selection procedures described in paragraphs 5.2 and 5.3 of the Consultant Guidelines. Individual consultants will be selected on the basis of their relevant experience and qualification for the intended assignment. Contractual assignments by individuals meeting the conditions described in paragraph 5.6 of the Consultant Guidelines may be hired using non-competitive procedures, with the prior agreement of the Bank.

17. **Procurement under Component 2 (Subgrant initiatives)**. The proposed Project will finance goods, equipment, and TA services under this component to be procured by grantees for activities such as proof-of-concept and prototyping activities.

18. **Technical assistance under Component 2.2**. SENER will procure consultant services by firms and individuals for the provision of TA in an array of areas of expertise which will be made available to the beneficiaries for design and implementation of their subgrants. The agency will run competitive selection processes using Bank consultant procedures. Consultant firms or individual consultants will be selected following QCBS and contracted under Indefinite Delivery Contracts (IDCs) or Price Agreement as described in paragraph 4.5 of the Consultant Guidelines. Since TA would be demand driven and the extent and timing of delivery cannot be defined in advance, contracts would be awarded on the basis of both a pre-agreed fee rate and on standard conditions of contracts and payments made on the basis of time actually rendered. Services will be delivered 'on call' to enable quick and continuous access.

19. **Provisions under Component 2.1 (ACE fund grants)**. The Bank team met with well-established entrepreneur associations (Mexican Chamber of Commerce and Mexican Chamber of Consultants); national and international enterprises from the energy and IT sectors (Vestas and Google); and the CONACyT with a view to learn about methods and practices applied for procurement and selection of consultants by the private sector in Mexico and assess their acceptability in the proposed Project. Local procurement practices applied by the local energy and business community for procurement of goods and non-consulting services are considered appropriate and based on requests for quotations and price comparison, as per procedures and practices described in paragraph 3.5 of the Bank's Procurement Guidelines. Despite some differences identified in procedures such as negotiation when prices quoted by suppliers clearly departs from the market prices or the beneficiary cost database; when the obtainment of three quotations is not possible because of unavailability of goods and services by suppliers within delivery time; or when out of all available suppliers in the market only one or two meet goods specifications and/or functional and operations requirements, the procedures were considered acceptable.

20. For the partial financing of subgrants by private sector enterprises, goods and non-consulting services estimated to cost less than US$350,000 will be procured through commercial practices procedures that were found acceptable to the Bank.

21. All procurement and selection processes will be documented and carried out through

competition. Award under non-competitive procedures or use of criteria other than lowest price must be technically justified and documented accordingly. The organizational arrangements of the grantees to conduct procurement will take into consideration the need for economy, efficiency, and transparency of the procurement processes, as well as timing and quality of goods and consultant services. Awardees will ensure that the financing is used only for intended purposes. No contract will be financed with a firm which is not eligible under Bank financing with the grant proceeds.

22. Commercial practices procedures and conditions for use and eligibility of funds will be described in the POM and will overall consist of the obtainment of three qualified quotations or more for procurement of goods and non-consulting services from known or unknown qualified suppliers. Quotations will be considered as qualified if, after a review of technical specifications and other requirements specified in the letter of invitations, they have been objectively determined to meet such specifications and requirements. Quotations from international suppliers should be sought when the obtainment of quotes or the availability of suppliers in the local market is not possible. During implementation of subgrants, whenever there arises any circumstance involving reduced competition (for example, less than three quotes), the beneficiaries must submit a request for no objection along with a technical justification and supporting documentation acceptable to both SENER and the Bank. Consistent with the practices in the private sector, under certain conditions, contracts for procurement of goods and non-consulting services may be awarded under criteria other than lowest price. However, such criteria shall be explicitly indicated in the bidding documents or requests for quotations.

23. A commercial practice threshold of US$350,000 for procurement of goods and non-consulting services will be assigned. However, if there is a need to procure large single goods and complex items with estimated values of US$350,000 or more, per contract, consideration will be given to the use of open competitive bidding such as ICB or NCB to be agreed with the Bank. To this end, SENER will submit for Bank review and approval, not later than the appraisal mission, a standardized document for abbreviated competitive bidding under subgrants for procurement of goods and non-consulting services based on the Bank's standard ICB document. Both the content and procedures of this document will be simplified to the needs and capacity of the beneficiaries. A similar consideration will be given to large and complex consulting assignments by firms costing more than US$300,000 per contract, in which case, QCBS procedures, as described in Section II of the Consultant Guidelines, will be followed. Contracts costing less than US$300,000 will not use QCBS procedures but procedures similar to the CQS. Individual consultants will be selected on the basis of their qualifications and experience and will follow competitive procedures as described in paragraphs 5.3 and 5.4 of the Consultant Guidelines. Contracts with estimated value of US$100,000 or more will be subject to Bank prior review. The Bank may reserve the right to carry out a review of any of the above contracts at any time before the proposed Project closing date. For commercial practices, contracts by firms meeting the conditions set forth in paragraphs 3.8 and 3.9 of the Consultant Guidelines and in paragraph 3.7 of the Procurement Guidelines, with estimated cost of US$20,000 or more, may be awarded using noncompetitive procedures, with a Bank ex ante no objection. Contracts less than US$20,000 will be subject to post review. When service continuity for downstream work is foreseen, the terms of reference and the request for proposal shall outline that option.

24. Procurement processes conducted by subgrant beneficiaries (under Bank post review

condition) will be subject to a single-point ex ante review by the SENER-UREP at the end of each process. Before contract award the SENER-UREP will review the whole process and, if the applied procedures comply with the arrangements agreed for commercial practices, it will issue a clearance to the process. Otherwise, it will state to the beneficiary the reasons for such rejection, including whether failure to meet such procedures can be rectified or a new competitive process started or whether or not the contract so awarded or proposed for award will be eligible under the subgrant agreement. These arrangements will reduce the risks of deviations, misuse of funds, and misprocurement and will clear the path toward the eligibility of contracts and continued participation in subgrants, up to procurement. At the time of submitting statements of expenses (SOEs), each beneficiary will attach the supporting procurement documentation already cleared by the SENER-UREP.

25. **Procurement Planning**. SENER has submitted a procurement plan for the first 18 months of proposed Project implementation, which provide the basis for the procurement methods and prior review thresholds. It will be used as the official management tool for planning, monitoring, and control and will be available in the proposed Project's database (with SENER and NAFIN and on the Bank Group's external website). In the case of subgrant initiatives expected to be selected under Component 2.1, because of the demand-driven implementation of this component, the plan will incorporate only the total grant amount expected to be awarded at the beginning of each year of proposed Project implementation. Subgrant proposals to be submitted to the IC for consideration and approval must include a procurement plan indicating the estimated value of each item or activity to be procured and consulting services envisaged in the implementation of the subgrant along with an expected flow of funds program for the first three months. Upon agreement, each plan will be used as a road map for the grantee to execute the subgrant and SENER to monitor and control and oversight. To the extent that beneficiaries are selected and subgrant agreements under Component 2 are entered into, the SENER-UREP will update the Matching Grants section in the Procurement Plan to record real data of each contract (for example, beneficiary, signing date, grant amount, and expected completion date). The plan will be updated at least annually or as required, in agreement with the Bank, so as to reflect actual implementation needs and improvements of the institutional capacity.

26. **Details of procurement arrangements involving International Competition and Direct Contracting.**

27. a) **Goods and Non-Consulting Services**

**Table 3. List of Contract Packages to be Procured Following ICB and Direct Contracting Procedures**

| Component PAD | Description | Procurement Method | Estimated Cost (US$) | P-Q | Domestic Preference | Review by Bank ( Yes / No) |
|---|---|---|---|---|---|---|
| | None | | | | | |

28. **Consulting Services**

**Table 4. Consulting Assignments with Short List of International Firms and Sole Source Awards**

| Component PAD | Description | Procurement Method | Estimated Cost (US$) | Review by Bank ( Yes / No) |
|---|---|---|---|---|
| 1 | Needs Assessments (10 in total) | QCBS | 300,000 each | Yes |

29. **Date of procurement notice**. The recipient, through SENER, will advertise a General Procurement Notice (GPN) immediately after the proposed Project enters into effectiveness but it does not exceed 30 days following the date aforementioned.

30. **Thresholds for prior review and procurement methods**. Procurement and consultant award decisions subject to prior review by the Bank, as stated in Appendix 1 to the Procurement Guidelines and Consultant Guidelines, are described in Table 6.

**Table 5. Procurement and Consultant Awards Subject to Prior Review**

| Expenditure Category/Agency | Method | Thresholds (US$, thousand) | Prior review by the Bank |
|---|---|---|---|
| **Components 1, 2.1, and 3** | | | |
| Goods and Non-Consulting Services | ICB | =>6,000 | All |
| | NCB | 100<=Contract<6,000 | First 2 contracts |
| | Price Comparison (Shopping) | <100 | First 2 contracts |
| | Direct Contracting | Any value | All |
| Consultant Services - Firms | QCBS | =>350 | All |
| | QCBS, QBS, LCS, CQS, FBS. | <350<br><200 | First 2 contracts of each method |
| | SSS | Any value | All |
| Consultant Services - Individuals | 3 CVs | =>100 | All |
| | 3 CVs* | <100 | First 2 contracts and contracts above US$20. Terms of reference only and post review thereafter. |
| | SSS | Any value | All |
| **Component 2 (Matching Grants)** | | | |
| Goods and Non-Consulting Services | Simplified Competitive Bidding (*Licitacion Pública Abreviada*)** | =>350 | First 2 contracts (SENER thereafter) |
| | Commercial Practices | <=350 | First 2 contracts of each beneficiary irrespective of value. (SENER thereafter).<br>Post review of a sample of contracts |
| | Direct Contracting | Any value | All contracts above US$20 |
| | QCBS | = >300 | All |

| | | | |
|---|---|---|---|
| Consultant Services - Firms | CQS | <300 | First 2 contracts (SENER thereafter). Bank post review of a sample of contracts |
| | SSS | Any value | Contracts with estimated value above US$20. Post review of a sample of contracts costing less than US$20. |
| Consultant Services - Individuals | 3 CVs | =>100 | All |
| | 3 CVs | <100 | First 2 contracts regardless of value. Post review / audit of a sample of contracts |
| | SS | Any value | Contracts with estimated value above US$20. Post review of a sample of contracts costing less than US$20. |

*Note:* * Evaluation Committee members may be selected through comparison of CVs on the basis of a pre-agreed fee and a period of time (for example, 1 year).

** Procedures for procurement of large single or complex goods and non-consulting services with estimated values equal or above US$350,000, per contract will follow simplified competitive procedures which are detailed in the Project standardized document.

31. **Bank supervision and post review frequency**. The Bank will conduct post review missions once a year and, at least, two annual supervision missions. Based on the findings of the procurement ex post review of contracts awarded during the first year of project implementation, the Bank may agree to change the thresholds to make them consistent with procurement performance and capacity. Consistent with the Substantial risk rating assigned, the post review of procurement contracts will consider a sample not less than 1 in 10 contracts. SENER will hire independent audit services for the performance of annual procurement audits on a selected sample of contracts awarded in all of the proposed Project components. The consultant will be made available not later than three months after completion of the first year of project implementation and throughout project implementation thereafter.

32. **Availability of assessment documentation and dissemination**. Detailed procurement documentation relevant to this capacity assessment will be maintained in the Bank Project files. Once agreed with the recipient, through SENER, the detailed 18-month Procurement Plan, will be published on the Bank Group website in accordance with the Bank policies in the Procurement Guidelines.

33. **Project Operational Manual**. The POM details the procurement methods and procedures that will govern proposed Project procurement. It describes institutional and internal procurement procedures and arrangements; the composition of the IC, and the procedures for the selection and hiring of its members; the coordination procedures between SENER and NAFIN; the composition of the evaluation committees for procurement of goods and consulting services under the Sub-Components 1, 2.1, and 3; and time frames for approvals.

34. For the implementation of the grant-based Sub-Component 2.2, The POM describes the basic principles and acceptable procedures applicable to the grant; the eligibility and evaluation

criteria for the selection of sub-grants; eligible and non-eligible expenses; the procurement procedures to be used by awardees; the list of firms debarred by the Bank WBG impeded from participating in Bank-financed or Bank-administered projects; and the provisions of fraud and corruption in procurement. The principles noted above also include a mandatory provision that beneficiaries will not award contracts to their parent companies, nor to subsidiary or affiliates companies. The POM sets forth the responsibilities of SENER as implementing agency, the administrative procedures and mechanisms whereby BANOBRAS, as intermediary financial agency and through the FOTEASE, will process payments to the beneficiaries, and the fiduciary role of NAFIN.

35. The POM establishes the procedures for reviewing and approving procurement plans for acquisition of goods, non-consulting services, and consulting services included in sub-grant proposals; the supervision and oversight arrangements under each sub-grant so as to ensure compliance with the agreed procurement methods; and record maintenance requirements for post review and audits. SENER (or its designated entity) should satisfy itself with the reasonableness of the price of contracts awarded by the beneficiaries, if necessary, through the hiring of an independent consultant. Overall procurement risks are detailed in Table 7.

**Table 6. Risk Mitigation Plan**

| Risk | Mitigation Action | Responsible Entity | Time Frame |
|---|---|---|---|
| 1. Country procurement framework not fully consistent with Bank Group procurement policies. | - The implementing agency will adopt Bank Group Procurement Guidelines; harmonized procurement documents agreed with IADB and the Secretariat of Public Function; and other documents acceptable to the Bank.<br>- For the use of the Commercial Practices method, broad guidelines and detailed procedures and conditions for its use for the SENER-UREP staff and awardees will be included in the POM. | SENER | Accepted |
| 2. Contracts awarded by beneficiaries deviate from those agreed in the procurement arrangements and may thus become ineligible. | - SENER's staff will perform single-point ex ante reviews for each procurement transaction before award at the end of each process. The SENER-UREP will verify that the procedures applied met the ones agreed upon and were not misused, and the contracts awarded by beneficiaries, when requests for reimbursement of funds are submitted. This arrangement will reduce the risks of deviations from agreed procedures, misuse of funds, and misprocurement.<br>- Bank anti-corruption policies will be incorporated in subgrant agreements, including remedial actions and sanctions to beneficiaries. | SENER | At the implementation of first subgrant agreement |

| Risk | Mitigation Action | Responsible Entity | Time Frame |
|---|---|---|---|
| 3. The SENER-UREP has procurement staff with accumulated experience in Bank-financed projects but the agency might be overwhelmed due to additional workload. | - SENER will hire a procurement specialist to increase additional procurement resources and capacity. | SENER | Not later than Project effectiveness |
| 4. SENER's lack of experience in projects with participation of private sector entrepreneurs and use of commercial practices to procure goods and consulting services. | - The POM will include an annex with broad guidelines and detailed procedures for the use of commercial practices.<br>- The Bank supervision team will provide training and assistance to the SENER-UREP staff to reduce the risk of management of procurement.<br>- The Bank team will perform supervision missions and random ex post reviews of contracts awarded with those procedures at a very early stage of the first one or two subgrant implementations | SENER<br><br>The World Bank<br><br>The World Bank | -Accepted October 14, 2014<br><br>- By Project effectiveness<br><br>- Early stage of subgrant implementation |
| 5. Limited capacity to prepare and manage procurement plans. Plans are not used as a project management tool for planning, control, and monitoring. | - A proposed Project procurement plan for at least the first 18 months will be submitted and updated at least once a year for Components 1, 2.2, and 3.<br><br>- A specific procurement plan to be submitted by potential beneficiaries under Component 2.1 for the implementation of each selected subgrant will be agreed upon between the SENER-UREP and each beneficiary. | SENER | - Accepted October 14, 2014 |
| 6. Procurement fiduciary roles of SENER and NAFIN and coordination processes are not well-defined, are complex and cumbersome, and cause delays. | - Each agency's role will complement the others. SENER will be primarily responsible for monitoring, oversight, and ex ante reviews of procurement review functions at the bidding/selection cycle. The agency will carry out single-point ex ante reviews of processes carried out by selected beneficiaries. NAFIN will perform a final procurement review on an ex post basis at the moment of receiving the SOEs for request of disbursement on the basis of the supporting procurement documentation attached to SOEs.<br><br>-The Operations Manual will describe the administrative procedures which will regulate the interaction between the agencies and their respective roles in the procurement processes and in the overall procurement cycle. | SENER/ NAFIN<br><br>SENER | - Throughout proposed Project lifetime<br><br>- Accepted October 14, 2014 |

## A. ENVIRONMENTAL AND SOCIAL, INCLUDING SAFEGUARDS

36. **Background.** In Mexico, the Environmental and Natural Resources Secretariat (*Secretaría de Medio Ambiente y Recursos Naturales* [SEMARNAT]), the National Water Commission (*Comisión Nacional de Agua* [CONAGUA]), the National Forest Commission (*Comisión Nacional Forestal* [CONAFOR]), the Natural Protected Areas Commission (*Comisión Nacional de Areas Naturales Protegidas* [CONANP]) and the Federal Environmental Protection Attorney Office (*Procuraduría Federal de Protección al Ambiente* [PROFEPA]), among others, are all federal-level institutions that have the responsibility for guaranteeing the adequate application of Mexican law regarding environmental impact and pollution control.

37. Concerning environmental legislation, Mexico has accumulated a great number of laws, regulations, and statutes that cover a wide range of environmental management. Among these, the General Ecological Balance and Environmental Protection Law will regulate the expected subprojects to be supported by this proposed Project.

38. Since 1986 the General Ecological Equilibrium and Environmental Protection Law has established a mandatory environmental impact assessment for every proposed Project, whether privately or publicly financed. The procedure is detailed and explained in the rulebook for the law concerning environmental impact and its correlation with the existing regulations, and the guidelines for the development of environmental impact assessment carried out in Mexico are consistent with Bank Group operational directives for environmental assessment (OP/BP 4.01 - Environmental Assessment).

39. The monitoring of the prerequisites on environmental impact resolutions is guaranteed by PROFEPA which depends directly upon SEMARNAT and enforces the environmental legislation for which it has specialized offices in every state. PROFEPA is a 20-year-old organization with noble goals and effective management, but with limited resources for operation.

40. **Project location and salient physical characteristics**. The proposed Project will feature a competitive grant program (the ACE Fund) eligible to qualified Mexican applicants. At this point it is not known where such technology developers and entrepreneurs will be located. The size of the grants (varied, but on average less than US$500,000 and any individual grant no more than US$2 million) will limit the physical impacts of the prototype technologies. No subgrants will be financed that could adversely affect indigenous peoples, natural habitats, physical cultural resources, and forests or that could cause involuntary resettlement as per OP 4.12 - Involuntary Resettlement.

41. The SENER-UREP has some capacity to manage social and environmental safeguards issues, as it is currently implementing a large number of infrastructure-intensive projects in the energy sector, such as solar farms for remote communities, as well as wind farms. The Bank will provide training to key personnel at SENER, the SENER-UREP, and on the IC in the proper application of the safeguards instrument for the proposed Project. Additional environmental and/or social consultants will be hired as needed for the proposed Project, if found to be acceptable to the Bank. Personnel will be required to fulfill the following objectives:

- screen potential subprojects for environmental and social risks and impacts;
- ensure that sub-borrowers carry out an environmental and social assessment for their respective subproject;
- verify that subprojects comply with local laws and with the Bank safeguards policies.

42. The proposed Project has received an Environmental Assesment Category B. The proposed Project has developed an ESMF to conduct screening of potential subprojects for their environmental impacts and categorize them according to Bank criteria (B or C proposed Projects). No category A subprojects will be supported by this operation. Subprojects deemed to have a potential environmental impact (Category B) will need to provide evidence throughout their implementation of compliance with all necessary environmental permits and certifications. These environmental requirements will be identified during the initial screening process, which will be incorporated into the proposed Project selection process.

43. An ESMF has been prepared by SENER and is included in the POM. The ESMF has been disclosed by the Bank and by SENER in August 2014. In practice, the ESMF will be a screening tool to help subproject applicants prepare their proposals to the ACE fund and to allow key personnel in SENER and the SENER-UREP to be able to review proposed subprojects for their eligibility and to manage potential environment and social impacts.

44. **Social**. The proposed Project will not finance any subgrants where indigenous peoples are present. Subgrants to be financed will be technologies related to energy efficiency and renewable energy. Given the high-technology nature of subgrants it is unlikely that indigenous people's IP will be used without their consent or knowledge. Rather, the IP is expected to derive from R&D activities in, among other things, the life sciences, industrial and mechanical engineering, thermodynamics, and geology. In addition, subgrants will not be financed in the territories of indigenous peoples. As such, the risk that subgrants financed by the ACE fund infringe upon the territorial and IPR of indigenous peoples is expected to be minimal.

45. Moreover, it is not very likely that members of indigenous communities, or cooperative organizations, will seek to benefit from the proposed Project by preparing proposals for the ACE fund. subgrants will be selected for support that produces innovation in the ACE technology sector. As such, it is highly unlikely that indigenous communities will benefit directly from subgrants in ways that would merit specific outreach approaches or design adjustments to accommodate the needs of these communities.

# ANNEX 4: OPERATIONAL RISK ASSESSMENT FRAMEWORK (ORAF)

**Sustainable Energy Technologies Development (P145618)**

## Risks

| Project Stakeholder Risks | | | | | | |
|---|---|---|---|---|---|---|
| **Stakeholder Risk** | Rating | Substantial | | | | |
| Risk Description:<br>Since there are multiple stakeholders involved in the proposed Project, there is a coordination and reputational risk. Also, given that the proposed Project will work with private companies, and given the historical aversion against private sector involvement in the energy sector in Mexico, there is a risk of negative public perceptions. | **Risk Management:**<br>The team has carried out extensive consultations with a broad group of stakeholders in government, finance, the research community, and in the enterprise sector and received substantive inputs from all sides. Training and grant programs funded by the proposed Project are expected to have positive economic effects with social and environmental benefits. The team will develop a communications strategy in parallel with SENER to provide objective information about the goals and expected outcomes of the proposed Project. | | | | | |
| | Resp: Both | Status: | Stage: | Recurrent: | Due Date: | Frequency: |
| **Implementing Agency Risks (including Fiduciary Risks)** | | | | | | |
| **Capacity** | Rating | Moderate | | | | |
| Risk Description:<br>The proposed Project is complex from an operational perspective, specifically Component 2 as it entails transfer of funds to a number of entities that will be selected during the life of the proposed Project but | **Risk Management:**<br>SENER has an administrative unit which has experience working with the Bank and will be strengthened with additional staff. As an additional mitigating factor, the POM will include specific criteria for selecting beneficiaries and for excluding certain subprojects under Component 2, with the aim of ensuring that the financial resources granted to them would be managed under sound financial management practices, and the resources used for the exclusive purposes intended. For the funds granted under component 2, the beneficiaries will be requested to open a bank account that will be used | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| whose financial and administrative capacity may be weak. | only for this proposed Project and hire an accounting firm acceptable to the Bank for preparing the accounting records of subprojects, carrying out monthly reconciliations of banking accounts and accounting records, and making sure that the expenditures are eligible and adequately supported. | | | | | |
| | Resp: Both | Status: In Progress | Stage: Both | Recurrent: | Due Date: | Frequency: |
| **Governance** | Rating | Moderate | | | | |
| Risk Description:<br>A leadership change in SENER may affect the pace of proposed Project implementation. Political interference in the selection of awards for TA and or grants may steer grant proceeds inappropriately. | **Risk Management:**<br>Proposed Project implementation will be institutionalized within SENER and has strong government commitment at all levels. The Bank will be able to mitigate political interference in award selection by approving the appointments to the IC and through objective selection criteria. | | | | | |
| | Resp: Both | Status: In Progress | Stage: Both | Recurrent: | Due Date: | Frequency: |
| Project Risks | | | | | | |
| **Design** | Rating | Substantial | | | | |
| Risk Description:<br>The proposed Project entails a complicated process of flow of funds and information between a number of entities including SENER, NAFIN, BANOBRAS, the FOTEASE, and a number of private sector beneficiaries under Component 2. | **Risk Management:**<br>The proposed Project will extensively use country systems which include well-defined and controlled payment and information mechanisms already in use by the FOTEASE which is controlled by SENER under specific terms of reference. Other mitigating measures include the proposed Project annual audit based on specific terms of reference, and periodic FM supervision. | | | | | |
| | Resp: Both | Status: In Progress | Stage: Both | Recurrent: | Due Date: | Frequency: |
| **Social and Environmental** | Rating | Low | | | | |
| Risk Description:<br>Subprojects to be funded will be small-scale and have prototype installations with restrictions on environmentally risky technologies and therefore are not expected | **Risk Management:**<br>Screening of all subprojects for environment and social impacts under Component 2 will be required for all grant applicants. Equipment purchased under the proposed Project would need to meet appropriate environmental, health, and safety requirements. The proposed Project supports monitoring of gender elements in the monitoring framework by tracking the number of females that support the implementation of subprojects (Component 2). | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| to result in significant adverse environmental impacts. | Resp: | Status: | Stage: | Recurrent: | Due Date: | Frequency : |

| | | |
|---|---|---|
| **Program and Donor** | Rating | Moderate |
| Risk Description:<br>The proposed Project may overlap with other donor initiatives or, on the contrary, may be implemented in isolation from other government initiatives, which will reduce the benefits from proposed Project synergies. | **Risk Management:**<br>The operation builds on current initiatives of the GoM, and more specifically SENER and CONACyT. The team has met with the International Finance Corporation (IFC), which is preparing a new financial instrument for early-stage companies, and will seek to coordinate with other donors who are involved in clean technology innovation. | |

| Resp: | Status: | Stage: | Recurrent: | Due Date: | Frequency : |
|---|---|---|---|---|---|
| | | | | | |

| | | |
|---|---|---|
| **Delivery Monitoring and Sustainability** | Rating | Moderate |
| Risk Description:<br>The capacity of SENER to carry out the M&E functions for the proposed Project is adequate. The sustainability of the operation is dependent on the long-term commitment of the government toward low emissions technologies and will depend on achieving positive results from the proposed Project. | **Risk Management:**<br>During preparation, the team has reviewed SENER's capacity to monitor the proposed Project and during appraisal the team will review the M&E plan to ensure that staffing and technical capacities are sufficient.<br>The GoM and specifically SENER's commitment to Bank proposed Project implementation has been strong and is credible, and on this basis the risk of a retrenchment is low. | |

| Resp: | Status: | Stage: | Recurrent: | Due Date: | Frequency : |
|---|---|---|---|---|---|
| | | | | | |

Overall Risk

| | |
|---|---|
| **Substantial** | **Overall Risk:** **Substantial** |

Risk Description:
Overall implementation risk rating of this proposed Project is Substantial. Although the Bank Group has a good client relationship with SENER, with a number of proposed Projects under implementation, there have been significant delays in other GEF proposed Projects in the energy sector and proposed Projects with subgrants. In addition, this will be one of the first grant programs administered by SENER that is focused specifically on the private sector. The risk that there will be insufficient interest in the ACE program is viewed as moderate, given that demand by the private sector is significant because of insufficient supply of finance for ACE enterprises and given the private sector restrictions of the FSE.

# ANNEX 5: IMPLEMENTATION SUPPORT PLAN

## Sustainable Energy Technologies Development Project (P145618)

### A. STRATEGY AND APPROACH FOR IMPLEMENTATION SUPPORT

1. The strategy for Bank implementation support will focus especially on reviewing the outputs from Component 1 and participating in outreach efforts; and under Component 2, providing a high-level review of ACE program performance to ensure that risks are mitigated, and that M&E is effective, so that the overall proposed Project objective can be achieved. Overall, the Bank will aim to: (a) provide clear and timely guidance on technical aspects related to implementation of each activity; (b) ensure that the Bank fiduciary and safeguard procedures are followed; and (c) ensure that the proposed Project outputs and outcomes are tracked in a timely manner and that they inform project implementation throughout the life of the proposed Project.

2. In addition, the Bank will use implementation support missions to review ACE program performance, using both internal M&E indicators maintained by the SENER-UREP as well as participant feedback to determine whether any minor or substantial changes to the ACE program design are needed to maintain effectiveness. In addition, the Bank team will maintain continuous dialogue with SENER to look for ways that the ACE program can continue to thrive after the first three years of proposed Project implementation, that is, after GEF resources are exhausted.

3. Bank missions will make sure that the implementing counterparts are satisfactorily staffed with qualified technical, procurement, financial management, and safeguard specialists and that appropriate training in their respective fields of expertise is provided. This includes refresher training where required. Supervision missions are planned on a semiannual basis. However, if needed, more frequent field visits by the Bank team may be carried out.

4. The Bank will maintain regular contact with the proposed project managers of the SENER-UREP within SENER. It is hoped that the regular interaction between SENER and the Bank will help to identify implementation issues and resolve them quickly and effectively. Some key members of the Bank task team (procurement and financial management) will be staff based in the Bank Group's office in Mexico City. This will facilitate close interaction with all of the implementing entities of the proposed Project. Table 9 indicates the level of effort that will be needed from the Bank to implement the proposed Project.

### B. IMPLEMENTATION SUPPORT PLAN

**Table 7. The World Bank's Implementation Support Plan**

| Time | Focus | Skills Needed | Resource Estimate | Partner Role |
|---|---|---|---|---|
| First twelve months | Technical Review:<br>• Terms of reference for consultants under Component 1 | Procurement Specialist | | |

| Time | Focus | Skills Needed | Resource Estimate | Partner Role |
|---|---|---|---|---|
| | • Call for proposals under Components 2.1 and 2.2<br>• Review and approval of the members of the IC<br>• Approval of grant awards<br><br><u>Fiduciary Oversight:</u><br>• Financial management<br>• Procurement | Finance Specialist, Economist<br><br>FM Specialist<br>Procurement Specialist | | |
| 12–60 months | <u>Technical Review:</u><br>• Call for proposals under Components 2.1 and 2.2<br>• Review and approval of the members of the IC<br>• Approval of grant awards<br><br><u>Fiduciary Oversight:</u><br>• Financial management<br>• Procurement | FM Specialist<br>Procurement Specialist | | |

## Table 8. The World Bank's Level of Effort

| Skills Needed | Number of Staff Weeks Per Year | Number of Trips Per Year | Comments |
|---|---|---|---|
| Task team leader | 6 | 2 | Based in Washington, DC |
| Energy specialist | 6 | 0 | Based in Mexico City |
| Innovation and technology transfer expert | 2 | 1 | International consultant |
| Environmental specialist | 1 | 1 | Based in Mexico City |
| Procurement specialist | 6 | 0 | Based in Mexico City |
| FM specialist | 6 | 0 | Trips will be combined with other proposed Project support |

# ANNEX 6: ESTIMATED GHG EMISSIONS REDUCTION

1. The proposed Project involves a GEF grant of US$16.88 million, with US$4.58 million for Component 1 (institutional capacity building for clean energy technologies and fostering academia-industry partnerships), and US$11.50 million for Component 2 (grants and technical assistance for ACE technologies with strong commercial potential), and US$0.8 million for project management. These types of support for clean energy (Components 1 and 2)—technologies that contribute to increasing the amount of energy generated from renewable sources and increasing energy efficiency in various applications—are important elements for Mexico to succeed in meeting its climate change goals and clean energy objectives. These will also generate positive spillover in terms of direct and indirect economic benefits and GHG reductions.

2. The proposed Project will help clean technology innovations reach the stage of commercialization and create a pipeline of promising clean energy projects which will help shift the culture of academic innovation through examples. Through the successful commercialization of technical innovation and subsequent scaling of volume of production, clean technologies will undergo a 'learning curve' that engages a positive price-growth cycle whereby market growth provides learning, drives down costs, and reduces the price of successful clean technologies which makes them more attractive and in turn supports growth, further reducing price.[20] Moreover, if the proposed Project is successful, it will inform future SENER and Mexican government programs aimed at stimulating, fostering, generating, and diffusing greater clean energy technologies and applications. This will also help to stimulate Mexican and foreign direct investments in clean technology in Mexico.

3. Together, the grants allocated under Component 2 (up to US$2 million each but with expected average size of about US$440,000) are expected to generate financial and direct and indirect economic benefits. Given the inherent difficulty of picking winners and losers and the inherent risk associated with new technologies and start-ups (for example, in the U.S., the National Venture Capital Association estimates that three out of four start-ups fail), few, if any proposals supported with a grant will end up being market successes. Ultimately, the quantification of the proposed Project's overall direct benefits (including co-financing and leveraged investment emanating from the successfully commercialized clean energy technology)—and potentially more important post-project indirect benefits (through the assumed continuation of the fund after full disbursement of GEF funds)—will depend on the successful future adoption and diffusion of some of the specific clean energy proposals and technologies selected for support, which are very difficult to estimate, ex ante, with a high degree of rigor and accuracy. Nonetheless, at the outset, the team estimates that the total amount of investments leveraged by the allocation of grants in Component 2 will lead to about US$62 million, taking into account amounts of co-financing, a leverage ratio of 50:1, and a conservative success rate of 10 percent (Table 9).

**Table 9. Assumptions**

| **Assumptions** | | **Comments** |
|---|---|---|

[20] See, for example, IEA, 2000 "Experience Curves for Energy Technology Policy" (www.iea.org) and information by the (U.S.) National Venture Capital Association (http://www.nvca.org).

| | | |
|---|---|---|
| Amount of grants | 10,500,000 | |
| Amount allocated to renewable energy + co-financing | 4,830,000 | 40% of total amount of grants + 15% co-financing |
| Amount allocated to energy efficiency + co-financing | 7,245,000 | 60% of total amount of grants + 15% co-financing |
| Lifespan of each subproject investment | 8 years for energy efficiency and 20 years for renewable energy | Used for estimating GHG emissions from energy efficiency and renewable energy investments |
| Success rate | 10% | 1 in 10 subgrants will become a commercial success. Estimate by task team, based on empirical evidence on success rate at stage of pre-commercialization of technologies that will be targeted by the proposed Project. |
| Total amount of renewable energy investments (including leveraging and assumed success rate of 10%) | 24,150,000 | 50:1 in follow-up capital investment in the firm/technology |
| Total amount of energy efficiency investments (including leveraging and assumed success rate of 10%) | 36,225,000 | 50:1 in follow-up capital investment in the firm/technology |

**GHG reductions estimates**

4. The proposed Project will estimate the emission reductions caused by the dissemination of technologies that receive an investment through the ACE program. However, it is important to recognize that the proposed Project will also stimulate positive spillover GHG emission reductions, as successful partnerships leading to commercialization and diffusion of more clean technologies are fostered through the activities supported under Component 1. These positive spillover emission reductions are difficult to rigorously estimate with a reasonable level of certainty but could be significant.

5. The estimates of GHG reductions are based on calculations for renewable energy projects and for energy efficiency projects for which grants will be allocated. Both direct GHG reductions (emissions reduction directly generated and those leveraged by the subprojects funded by GEF grants during the proposed Project's supervised implementation period), and indirect GHG reductions (emissions reduction achieved after the completion of the proposed Project, but that are

generated by investments supported by the continuation of the proposed Project)[21] are estimated to provide an overall assessment of the estimated GHG benefits associated with the proposed Project.

6. The calculation methodology and some of the assumptions largely derive from those used in other GEF projects.[22] The emission factor is derived from the grid emission factors used for Clean Development Mechanism (CDM) projects in Mexico. The methodology to derive the emission factor is based on a 'combined margin' which is calculated based on (a) the emissions from the plants supplying the grid (the 'operating margin') and (b) the emissions associated with most recent plants built (the 'build margin'). The ratio of USD/MW for renewable energy is based on Mexican cost estimates while energy efficiency costs are based on IBRD estimates. As per Table 11, the proposed Project, through the grants allocated in Component 2, is estimated to lead to direct emission reductions in the order of 0.6 $MtCO_2e$, and indirect emission reductions on the order of 1.8 $MtCo_2e$, for a combined total of 2.4 $MtCO_2e$. In terms of cost-effectiveness, GEF funds allocated to the proposed Project, it is calculated that the proposed Projects' estimated GHG reductions are achieved at an overall cost of US$7.01 per ton of $CO_2$ equivalent.

21 GEF, Manual for Calculating GHG Benefits of GEF Proposed Projects: Energy Efficiency and Renewable Energy Proposed Projects (2008)

22 "Finance and Technology Transfer Centre for Climate Change (FIN-TeCC)", Proposed Project Document (2013), as well as the "Climate Technology Transfer Mechanisms and Networks in Latin America and the Caribbean", Proposed Project Identification Form (2011).

## Table 10. Assumptions for GHG Reductions under the Project

| GHG Reductions and energy savings from energy efficiency generated and triggered by the Project | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Total investment | levelised energy savings cost over 8 years* | Weighted grid emissions factor** | Total 8 year emissions reductions | Annual emissions reductions | annual energy saved | Replication factor* | indirect emission reductions (post-project) | TOTAL Emission reductions (direct and indirect) |
| | | (USD) | (USD/MWh) | (t CO2e/MWh) | (tonnes CO2e) | (tonnes CO2e) | (MWh) | | (tonnes CO2e) | (tonnes CO2e) |
| | | A | B | C | D=(A/B)XC | E=D/8 | F=A/(BX10) | G | H=D*G | I=D+H |
| Energy Efficiency | $ | 36,225,000 | 65 | 0.5309 | 295,875 | 36,984.33 | 55,731 | 3 | 887,624 | 1,183,499 |

*From EBRD GEF and Special Climate Change Fund project Document "Finance and Technology Transfer Centre for Climate Change" (2013)
**From Institute of Global Environment Studies (http://pub.iges.or.jp/modules/envirolib/view.php?docid=2136); Emission Factor is derived from the Clean Development Mechanism methodology to calculate the Combined Margin for grid-connected power generation

| GHG Reductions and power generated due to renewable energy measures generated and triggered by the Project | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total investment | Total cost per MW of installed capacity* | Hours per year at 30% load factor*** | MW installed capacity | electricity produced per year | Weighted grid emissions factor** | Annual emissions reductions | Total 20 year emissions reductions | Replication factor* | indirect emission reductions (post-project) | TOTAL Emission reductions (direct and indirect) |
| | | (USD) | (USD/MW) | Hours | MW | MWh | (t CO2e/MWh) | (tonnes CO2e) | (tonnes CO2e) | | | |
| | | A | B | C | D=A/B | E=DXC | F | G=F X E | H=G X 20 | I | J=H X I | K = J + H |
| Renewable Energy | $ | 24,150,000 | 2,200,000 | 2,628 | 10.98 | 28,848 | 0.5309 | 15,316 | 306,310.96 | 3 | 918,933 | 1,225,244 |

*From EBRD GEF and Special Climate Change Fund project Document "Finance and Technology Transfer Centre for Climate Change" (2013)
**From Institute of Global Environment Studies (http://pub.iges.or.jp/modules/envirolib/view.php?docid=2136); Emission Factor is
*** Assumed load factor is 30% for wind energy which is in line with IEA figures and the Refocus network - a global Renewable Energy Resource (www.renewableenergyfocus.com)

# ANNEX 7: EVOLUTION OF WORLD BANK GROUP'S ENGAGEMENT WITH MEXICO ON CLEAN ENERGY, INNOVATION, AND KNOWLEDGE SERVICES

| Foundations (Before 1999) | Early Support (1999–2006) | Strengthening (2007–2009) | Continuing (2010 onward) |
|---|---|---|---|
| **Financial Services** | | | |
| • Solid Waste Management Pilot Project (P007628, FY86)<br>• Urban Transport Project (P007615, FY87)<br>• High Efficiency Lighting Pilot Project (P007492, FY94) | • Renewable Energy for Agriculture Project (P060718, FY00)<br>• Methane Gas Capture and Use at a Landfill - Demonstration Project (P063463, FY01)<br>• Introduction to Climate-friendly Measures in Transport (P059161, FY03)<br>• Mexico: Waste Management and Carbon Offset Project (P088546, FY05)<br>• La Venta 3 - Large-Scale Renewable Energy Development (P077717, FY06) | • Hybrid Solar Thermal Power Plant (P066426, FY07)<br>• Mexico Wind Umbrella - La Venta 2 (P080104, FY07)<br>• Mexico Integrated Energy Services (P088996, FY08) | • Mexico Efficient Lighting and Appliances (P106424, FY10)<br>• Urban Transport Transformation Program (P107159, FY10)<br>• **MEXICO Sustainable Energy Technologies Development for Climate Change(FY15)** |
| **Knowledge Services** | | | |
| | • LAC Region Landfill Gas Initiative (P104757, FY06)<br>• Evaluation of Energy Efficiency Initiatives (P099734, FY06)<br>• Economic Assessment of Policy Interventions in the Water Sector (P096999, FY06) | • Mexico: Electricity Subsidy Study (P101346, FY08)<br>• Carbon Finance Assistance Program for Mexico (P104731, FY09)<br>• Low-carbon Study (MEDEC) (P108304, FY09)<br>• Mass Urban Transport - Federal Program (P110474, FY09) | • Mexico Renewable Energy Assistance Program (P117870, FY11)<br>• Global Gas Flaring Reduction Partnership (FY10 onward)<br>• Partnership for Market Readiness - Market Instruments for Climate Change Mitigation in Mexico (P129553, FY13 onward)<br>• Carbon Capture, Utilization and Storage Development in Mexico (P131200, FY13)<br>• Implementing TRACE TOOL in Pilot Cities in Latin America (P133060, FY13 onward)<br>• Greening Mexico's Electricity Generation by Internalizing Externalities<br>• Energy Policy Notes |
| **Convening and Coordination Services** | | | |
| | • Consolidation & Strengthening of the Mexican Office for Greenhouse Gas Mitigation (P060412, FY99) | • Preparation of the CTF Investment Plan (FY09) | • Energy-efficiency and Access Forum (FY11) |