



## 1. Project Data

Project ID  
P077717

Project Name  
MX GEF LargeScale RE Dev (La Venta 3)

Country  
Mexico

Practice Area(Lead)  
Energy & Extractives

L/C/TF Number(s)  
TF-56781

Closing Date (Original)  
30-Jun-2014

Total Project Cost (USD)  
150,350,000.00

Bank Approval Date  
29-Jun-2006

Closing Date (Actual)  
30-Apr-2016

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	25,000,000.00	25,000,000.00
Revised Commitment	24,633,101.30	24,633,101.30
Actual	24,633,101.30	24,633,101.30

Sector(s)  
Other Non-bank Financial Institutions(25%):Central Government (Central Agencies)(15%):Renewable Energy Biomass(15%):Renewable Energy Geothermal(15%):Renewable Energy Solar(15%):Renewable Energy Wind(15%)

Theme(s)  
Technology diffusion(33%):Environmental policies and institutions(17%):Infrastructure services for private sector development(17%):Climate change(17%):Regulation and competition policy(16%)

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## 2. Project Objectives and Components

### a. Objectives

According to the Global Environment Facility (GEF) Grant Agreement (GA) dated October 5, 2006 (Schedule 1, page 7): The Project Development Objectives (PDO) were to reduce greenhouse gas (GHG) emissions and remove barriers to the development of renewable energy technologies and markets in Mexico by: (i) developing initial experiences in commercially-based grid-connected renewable energy applications as a result of supporting the construction of a wind farm; and (ii) building the institutional capacity to value, acquire, and manage such resources on a replicable basis.



In an Amendment to the GA dated June 12, 2013 when the project was restructured, the project objectives were amended as follows: “To assist the Recipient in developing initial experience in commercially-based grid-connected renewable energy applications by supporting construction of an approximately 101 MW IPP wind farm, while building institutional capacity to value, acquire, and manage such resources on a replicable basis.” This is essentially the same wording as the second half of the original objective in the GA, but with more specificity on the scale of the wind farm and the involvement of an Independent Power Producer (IPP).

In line with IEG guidelines, this ICR Review assessment is based on the original PDO in the GA, noting that the amended re-statement of the objective is fully consistent in substance with the GA’s original statement. While reducing greenhouse gases (GHG) and removing barriers to renewable energy development were not repeated in the amended aversion, these constitute the project’s higher-level objectives because GEF funding under its Operational Program No. 6 is tied to the achievement of these goals. For the purposes of this ICR Review, these are the final outcomes under this free-standing GEF project that does not have any associated IBRD loan financing. The construction of a wind farm and the building of institutional capacity are activities or intermediate instruments intended to help achieve those two higher-level objectives, and are not project objectives in themselves.

- b. Were the project objectives/key associated outcome targets revised during implementation?

No

- c. Components

Component 1: Financial Mechanism (Appraisal estimate US\$20.4 million; Actual US\$20.37 million)

This component was intended to create a financial mechanism to stimulate cost reduction and organizational learning, by providing GEF grant-financed energy production incentives on an output-based aid basis, amounting to 1.1 US cents per kilowatt-hour (kWh) for the first five years of generation. This would be applied in conjunction with the competitive solicitation--for a 101-megawatt (MW) La Venta III independent power producer (IPP) wind farm project--conducted by the Federal Electricity Commission (CFE, *Comisión Federal de Electricidad*, one of the project’s two major implementing agencies).

Component 2: Technical Assistance (TA) (Appraisal estimate US\$3.9 million; Actual US\$ 3.41 million)

This component aimed to support: (a) least-cost determination; (b) integration of renewable energy in the CFE’ system operations; (c) project and business development; (d) tradeable permits; (e) TA to assess Mexico’s wind potential; (f) a long-term wind development plan; and (g) a strategic environmental assessment. The last two activities were to be conducted in the south of the Isthmus of Tehuantepec, State of Oaxaca.

Component 3: Project Management (Appraisal Estimate US\$0.7 million; Actual US\$0.85 million)

This component aimed to strengthen the capacity of the Ministry of Energy (*Secretaría de Energía*, SENER, the second implementing agency) by providing a project manager, a procurement assistant, renewable energy experts, and specialized consultants for social and environmental assessments, as well as monitoring and evaluation.

- d. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project Cost

The total project cost was estimated by the Project Appraisal Document (PAD, page 64) at US\$25 million. The actual total project cost was US\$24.63 million or 98.5 percent of the appraisal estimate (ICR, page 26). A small, undisbursed amount from US\$ appreciation was cancelled.

Financing

The total actual project cost of US\$24.63 million was financed by GEF.

Borrower Contribution

At appraisal, the borrower contribution was estimated at US\$ 5 million, while the actual contribution was US\$ 10.2 million or slightly over twice the appraisal estimate. The government contribution covered staff costs for the project’s two major implementing agencies SENER and CFE and the costs of oceanographic measurement instruments.



Dates and Restructuring

This project was approved by the World Bank Board on June 29, 2006 with the original closing date of June 30, 2014. This project had three Level II project restructurings and one closing date extension by 22 months to a revised closing date of April 30, 2016 to compensate the implementation delays. The rest of the restructurings of the project did not change the project objectives and were related to administrative and implementation adjustments (see table below).

Restructuring Dates	Key Changes
June 11, 2013	Harmonized project objectives in the GA and PAD. Changed the procedures of paying the IPP.
May 12, 2014	Reduced the targets for power generation and GHG indicators as the actual wind farm capacity factor (30 percent) was lower than estimated (42 percent). Extended the closing date by 22 months. Reallocated US\$2 million of funds for consultants' services and training (funded by other sources) to the purchase of wind profile and oceanographic meters and software licenses.
March 21, 2015	Increased the IPP tariff subsidy from US cents 1.1/kWh to US cents 3.9/kWh to accommodate the construction delay and the lower annual wind power generation than forecasted at appraisal.

### 3. Relevance of Objectives & Design

a. Relevance of Objectives

Government Strategy

At the time of appraisal, the project objectives were relevant to the Mexican Government's strategy including the National Climate Change Strategy in 2007, which, *inter alia*, promoted renewable energy, GHG emissions reduction, and financial incentives for investments in sustainable energy projects. Mexico aimed to establish a sustainable renewable energy IPP market with CFE, by developing the contractual and tariff linkages and integrated them with grid planning while the self-generation market was still emerging. At the project closing, the project's objectives remained relevant. The climate change strategy updated in 2013 highlighted the use of clean and renewable energies to lead towards a low-emissions development. The energy sector reform in 2013 unbundled and opened the power sector for competition; auctions for clean power generation were conducted to integrate the private sector more into the grids.

Bank Strategy

At the time of appraisal, project objectives were relevant to the World Bank Mexico Country Partnership Strategy (CPS) for FY2005-2008 as this project was among the instruments to achieve the one of the CPS's four pillars to promote environmental sustainability. At the project close, the project objectives remained relevant to the CPS for FY2014-19, which supported renewable energy and climate change under Theme 4 Promoting Green and Inclusive Growth. Mexico is highly vulnerable to climate change, exacerbating the country's development challenges. World Bank studies estimated that climate change could slow down the pace of poverty reduction by 2.4 percent by 2030, leaving an extra 2.9 million people still in poverty.

Rating

Substantial

b. Relevance of Design

The key causal links within the result framework were clear and convincing. The project's theory of change centered on the use of output-based IPP tariff subsidies to reduce the tariff barrier that hindered the development of commercial large-scale renewable energy, specifically wind energy. This subsidy was essential for Mexico to demonstrate its large renewable energy potential by attracting an established international private company to invest in a commercial grid-connected wind energy development. The IPP's wind power generation, with the subsidy rewarded based on power output, was expected to contribute to project's higher-level objective of reducing GHG emissions by replacing fossil fired power that emits GHG. The project's TA on various renewable energy studies, planning, business development and technical and management capacity building addressed the need for a strengthened institutional capacity to enable, manage and replicate such operations. In turn, the strengthened institutional capacity and the demonstration of an operational wind IPP were expected to contribute to the removal of barriers to the development of renewable energy technology and markets in Mexico.



The program approach was prudent, i.e., to design the project initially in two phases of US\$25 million and US\$45 million, and the choice of the lending instrument as standalone investment, given the uncertainties of (i) investor response to develop Mexico's wind energy and (ii) the speed and the extent of ongoing energy sector reform.

Rating  
Substantial

## 4. Achievement of Objectives (Efficacy)

### Objective 1

Objective  
To reduce greenhouse gas emissions

#### Rationale

The project substantially achieved its objective of reducing GHG emissions by introducing the first wind power IPP in the CFE grid, thereby avoiding GHG emissions from alternative fossil fuel-fired power plants.

#### Outputs

A competitively selected IPP constructed a 100-MW wind power plant selling power to the CFE with the output-based tariff subsidy. The total tariff support was US\$20.4 million at US cents 3.9 per kWh instead of the originally planned 1.1 US cents per kWh. The disbursement of the subsidy was completed by project closing as intended. The subsidy rate was increased due to delays in the plant's start-up operations, i.e., on October 2012, which was about two years after expected date; moreover, the actual power generation was at a capacity factor of 30 percent, or lower than the original estimate of 42 percent. The power generation in 2015 was 287.8 GWh, which was 72 percent of the original target of 367.9 GWh, or 106 percent of the revised target of 270.3 GWh per year. Generation on the prior years of 2013 and 2014 were 94 percent and 105 percent of the revised target, respectively.

#### Outcomes

Achieved GHG reduction of 177,594.45 tons of CO<sub>2</sub>e in 2015 or 72 percent of the original target of 247,000 tons per year and 106 percent of the revised target of 167,000 tons per year. Since commissioning, the project had avoided 659,634 ton CO<sub>2</sub>e (October 2012 to July 2016). This estimated reduction was based on the Approved Consolidated Methodology (ACM) 0002 Grid-connected electricity generation from renewable sources of the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change. This ACM0002 methodology assumed in the baseline scenario (counterfactual), electricity provided to the grid by more-GHG-intensive means and in the project scenario the displacement of electricity provided to the grid by more-GHG-intensive means by installation of a new renewable power plant or the retrofit, replacement or capacity addition of an existing renewable power plant. A 0.617 ton CO<sub>2</sub>e/MWh of the emission factor was used to arrive at the GHG emission reduction achievement and CFE calculated this emission factor at project restructuring in May 2014 using the ACM0002 methodology. During the project period, most of the power generation growth was led by natural gas which also replaced oil. The CFE's calculated emission factor was comparable to average emission factors in 2014 Natural gas 0.553 ton CO<sub>2</sub>/MWh, Distillate oil (Number [No]. 2) 0.744 ton CO<sub>2</sub>/MWh, and Residual oil (No. 6) 0.798 ton CO<sub>2</sub>/MWh reported by United States Energy Information Administration.

Rating  
Substantial

### Objective 2

Objective  
To remove barriers to the development of renewable energy technologies and markets in Mexico



**Rationale**

The project substantially achieved its objective of removing barriers to the development of renewable energy technologies and markets in Mexico by introducing an IPP to sell wind power to the CFE. The project also contributed significantly to the energy mix as defined in Mexico's energy strategy (see Section 3 on Relevance of Objectives) by comprising 72 percent of Mexico's total installed wind capacity in 2015.

**Outputs**

A competitively selected IPP constructed a 100-MW wind power plant selling power to the CFE with the output-based tariff subsidy. A planning and dispatch model was installed and used in CFE to incorporate intermittent sources. CFE implemented dispatch tools to incorporate renewables. However, following the energy sector reform initiated in 2013, CFE is no longer in charge of dispatch. Instead, an Independent Operator System (National Center for Energy Control, *Centro Nacional de Control de Energía*, or CENACE) became responsible for the dispatch after the energy reform of 2013.

A Strategic Environmental and Social Assessment (SESA) for scaling up wind power was completed and disseminated. Using SESA for scale-up of wind energy in Oaxaca region had not been decided as the recommendations and findings of SESA must be adapted to the new regulatory framework for the energy sector after the reform of 2013-2014.

Energy Regulatory Commission (*Comisión Reguladora de Energía*, CRE) published in May 2012 the General Rules for permit holders using renewable energy to be granted the interconnection to the National Grid.

Institutional capacity was built to issue and manage tenders for additional wind farms and other renewable energy resources.

**Outcomes**

The total installed renewable capacity increased considerably, by commissioning the 101 MW La Venta III wind farm in October 2012, compared to the baseline of 2 MW of wind power. La Venta III increased electricity supplied to national system from renewable energy sources by 287.8 Gigawatt-hour per year (GWh/yr) in 2015 or 106 percent of the revised target of 270.3 GWh/yr (more than enough to supply over 140,000 households) from the baseline of 7.36 GWh/yr. Since commissioning, the project has supplied 1,069 GWh (October 2012 to July 2016) to the national system.

Subsequently, CFE was able to add more wind power IPP plants (Oaxaca I-IV) under the Clean Development Mechanism (CDM).

Rating  
 Substantial

**5. Efficiency**

**Economic Analysis**

GEF requires cost-effectiveness analysis in GEF projects (GEF/C.25/11, April 29, 2005). For renewable energy, this project was consistent with the GEF approach that relying more on the private sector and a performance-based subsidy would demonstrate greater cost-effectiveness, compared to an up-front, capital-cost subsidy to a plant that would be procured on an engineering procurement contract (EPC) basis and run by the government-owned utility. GEF also assesses cost-effectiveness per unit cost. In this project, the cost effectiveness of the GEF subsidy amounting to US\$20 million calculated over a project life of 20 years was US\$ 4.1/CO2 ton at appraisal, which was lower than the actual US\$ 6.1/CO2 ton at project closing due to the lower than expected annual power generation. Furthermore, the competitive bidding process of IPP selection contributed to cost-effectiveness. The cost of electricity production at La Venta III, at an estimated EUR 66 to EUR 91 per MWh (at 5 percent and 10 percent discount rates, respectively) was considerably lower than for mature, grid-connected renewable energy in the European Union (EU).

An *ex ante* analysis, covering 20 years, compared the investment and operating costs of a model 100-MW wind farm with its value to the integrated grid system, as defined by the marginal avoided energy. Project costs were estimated to be US\$131 million. An *ex post* analysis used basically the same methodology of the *ex-ante* analysis with some revisions as summarized in the table below.

The power plant costs were higher at the *ex post* partly due to the costs of construction material increase experienced around the project period. Energy value was higher (more than 1.7 times) but the capacity factor was lower at *ex-post* analysis than those at *ex ante* analyses. NPV was incomparable especially because the discount rate used in the *ex ante* analysis was not reported in the PAD. However, following the new World Bank guidance to use 5 percent discount rate for project economic analyses, the *ex post* analysis showed a positive NPV at 5 discount rate and both EIRRs at *ex-ante* and *ex-post* were more than 5 percent.

Economic Analysis	Ex ante	Ex post
Cost Effectiveness of GEF Subsidy (20 years)	US\$ 4.1/CO2 ton	US\$ 6.1/CO2 ton



Wind Power Project Costs	US\$ 131 million	US\$184 million
A fixed operation and maintenance (O&M) cost	US\$ 12 per kilowatt (kW)	None
Variable O&M cost	US\$ 0.001 per kW-hour (kWh)	20 percent of the energy payments by CFE
Net present value (NPV)	Negative US\$ 26.89 million (no discount rate reported in the PAD)	US\$ 23.47 million at 5 percent discount rate
Energy value (oil price equivalent)	US\$ 46 per barrel	US\$80 per barrel with increase of minimum 5 percent a year
Capacity Factor	40 percent	32 percent
Economic internal rate of return (EIRR)	8.83 percent	6.22 percent; with CO2 emissions savings (US\$ 10 per ton of CO2e) 7.05 percent.

**Financial Analysis**

An *ex ante* analysis of the project income was derived from two sources: electricity payments over the project's lifetime (20 years), and GEF subsidy payments (a total of about US\$ 20.4 million) over the first five years. It was assumed that capacity payments for the plant were bundled with energy payments. Financial outflows were operating expenses, royalty payments for land use, insurance costs, and taxes. The analysis used accelerated depreciation provisions in the Mexican tax system. The analysis presumed a standard limited recourse financing arrangement at 30 percent equity and 70 percent debt financing. For the debt portion of the financing plan, a structure of two loans was assumed: 60 percent of the debt was financed at 10 percent for 15 years and the remaining 40 percent was financed at 8 percent for 8 years. Debt service coverage ratios were required to be maintained at over 1.2 during the loan term. The results showed a positive NPV for discount rates of up to 19 percent. The project's return on equity (ROE) was about 18 percent.

An *ex post* analysis used the same methodology of the *ex-ante* analysis with some updates (e.g., O&M costs, tax, subsidy payment, energy payment, royalty payment, etc.). The *ex-ante* analysis assumed investment costs of the project were completely financed through the company's own resource. The project had a positive NPV for discount rates of up to 17 percent. The project's ROE was about 15 percent, slightly lower than the originally estimated ROE of 18 percent. A financial rate of return (FIRR) was not calculated at the time of appraisal - but applying original assumptions, an original FIRR would have been 19.49 percent while the *ex post* analysis resulted in a FIRR of 17.75 percent. Without the subsidy, a FIRR was only 9 percent and thus the GEF tariff subsidy was a key contributor to the IPP's financial viability. Table below summarizes differences between *ex ante* and *ex post* analyses, showing that the ROE, NPV and FIRR did not change significantly. The slight deviation could be explained through the significantly higher investment costs for the company, though balanced by the higher energy payments received from CFE.

Financial Analysis	<i>Ex ante</i>	<i>Ex post</i>
Financing	30 percent equity and 70 percent debt	Company's own resource
ROE	18 percent	15 percent
NPV	Positive NPV for discount rates of up to 19 percent	Positive NPV for discount rates of up to 17 percent.
FIRR	19.49 percent	17.75 percent

**Administrative Efficiency**

Board approval of the project was on June 29, 2006. The GEF grant became effective on April 18, 2007. The project's closing date was extended by 22 months with three restructurings. An increased subsidy rate per kWh was required in order to disburse fully by the closing date.

The Bank team clarified the disbursement delay of this project and all other projects in Mexico was mainly due to the Government of Mexico's (GOM's) financing procedures. The implementing agency needed to use first Government funds allocated for project activities and ask the GOM for disbursement from the project funds (i.e., GEF grant). Also, the fund allocation was allowed per calendar year without revolving funding mechanisms. Thus, if the activity delayed, another funding request needed to be made. This caused implementation delay. However, 2008 Law for the Use of Renewable Energy (LAERFTE) allowed multiple year revolving mechanism, which mitigated the implementation delay. Furthermore, Bank did not identify the absorptive capacity of SENER of the TA funding, the time required for SENER to assume full ownership of the funding, and the administrative budget limits within SENER. This constrained the transfer of GEF funds between the Ministry of Finance and Public Credit (*Secretaría de Hacienda y Crédito Público*, SHCP) and SENER, leading to further delays in implementation.

While there were some disbursement and implementation delays, the project's efficiency is rated **substantial** overall, in light of the project's positive economic and financial performance.

Efficiency Rating  
Substantial



a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	8.83	0 <input checked="" type="checkbox"/> Not Applicable
ICR Estimate	✓	6.22	0 <input checked="" type="checkbox"/> Not Applicable

\* Refers to percent of total project cost for which ERR/FRR was calculated.

## 6. Outcome

The relevance of the project's objectives is **substantial**, given their close alignment with Government and Bank strategies and priorities at the time of appraisal and at present. The relevance of the project's design--notably its sound results framework--is also **substantial**. The efficacy of the objective of reducing GHG is **substantial**, having reduced GHG emissions at levels that exceeded the project's revised targets. The relevance of the objective of removing barriers to the development of renewable energy technologies and markets in Mexico is also **substantial**, given the incremental electricity supplies from the project that has also exceeded the revised targets. Efficiency is also **substantial**, given the positive NPV and EIRR levels achieved at a 5 percent discount rate. On this basis, the overall project outcome rating is **satisfactory**.

- a. Outcome Rating  
 Satisfactory

## 7. Rationale for Risk to Development Outcome Rating

The renewable energy technologies and systems used in the project are well known. Subsidies were fully disbursed and the financial returns were positive. Government commitment and institutional support are strong. However, significant social and/or political unrest is possible in the project area, which is one of Mexico's poorest regional areas. So far the potential for social conflict has been adeptly handled by the IPP operator and closely monitored by the Bank. The potential for high levels of bird and bat mortality have not materialized because of careful monitoring of bird migration patterns in this region of the country. Careful attention was given to monitoring this potential safeguard concern on a year-round basis from the outset and the collaboration between the IPP operator and GOM's institutions has been very close. Natural disasters exposure was mitigated by commitments from the IPP and turbine supplier relating to the design of the foundations and turbines in order to mitigate risks from extreme weather and seismic events. Secondary impacts of deforestation emerged because land owners used their project payment for their agricultural land expansion, which contradicts the GEF's operational guidelines for applying the incremental cost principle, which stipulates that the attainment of a global environmental benefit (GEB) shall not undermine or result in the loss of another GEB.

- a. Risk to Development Outcome Rating  
 Modest

## 8. Assessment of Bank Performance

- a. Quality-at-Entry

The Bank's strategic relevance and approach were sound by (i) focusing on a core incentive, i.e., tariff support, to help overcome the barriers to realize Mexico's renewable energy potential and improve the investment climate for renewable energy development and (ii) taking advantage of the GOM's emerging energy policy initiatives. As a result, the World Bank was able to make effective use of a GEF grant, using only a modest funding amount, to attract private investment to support the development of the country's wind energy potential.

Another strategic choice of the Bank was supporting the private sector (i.e., IPP) integration in the power system at the time dominated by the



CFE grids. At the time of the project preparation in 2006, the likely self-supply deal included up to 900 MW of other wind farms by up to 7 different private sponsors. The self-supply contract tariffs were cheaper than electricity tariffs contracted with CFE. However, the Bank perceived a sustainability risk of the self-supply arrangement due to various reasons such as regulations, transaction costs, CFE's loss of consumers to provide cross subsidies, etc. The self-supply wind power grew to 2.22 GW (72 percent) and IPPs was only 612 MW (20 percent) of total wind capacity of 3 GW in Mexico in 2015. Until the opening of the wholesale electricity market in 2016, the self-supply agreements remained the most viable scheme for development of wind energy projects in Mexico.

The Bank undertook a detailed background analysis of Mexico's energy sector. Technical aspects were based on a range of engineering studies by CFE but the plant's capacity factor was overestimated, which resulted in the revisions of the associated target values and an increase in tariff support per kWh to complete GEF disbursement by the project closing. The revised capacity factor was in line with that of other plants in the area, which were all built and operated by the private sector. Financial and economic aspects were in general well prepared but the risk of wind turbine and other equipment cost increases and the wind market dynamics should have been incorporated in line with the global trends in costs, which contributed to the second bidding and delayed implementation.

Poverty, gender and social development analyses were not included in the PAD, which noted that the project site had not been specified until the bid award. However, a manual to comply with the Bank's social safeguards policies had been created. Environmental aspects focused on potential collisions of birds and bats with the wind turbines, which were identified as modest risks. Measures to mitigate risks included, for example, wind power operational adjustments, stakeholder consultations, regional and strategic environmental assessments (REA and SEA). Fiduciary aspects were adequate. Policy and institutional aspects were well assessed in general but the Bank did not identify and manage the complicated funding administration mechanisms in the Government.

The overall project implementation arrangements were sound, which included four government entities. The institutional arrangements balanced effectively two government entities--SHCP and Nacional Financiera (NAFIN)--which were experienced with World Bank operations, with two sector entities, CFE and SENER, which were essential for the implementation of the project but which lacked prior experience with Bank- or GEF-financed operations. The risk of SENER's lack of project management capacity was identified and rated as modest in the PAD, but the mitigation measures were insufficient, which contributed to the delay in TA and project management implementation. Monitoring and evaluation (M&E) arrangements were comprehensive but should have been better organized and streamlined; they should have also ensured the collection of baselines, setting of targets, and more adequate measurement of some global environmental objective (GEO) indicators. Despite some minor shortcomings, Bank quality at entry is satisfactory overall.

#### Quality-at-Entry Rating Satisfactory

#### b. Quality of supervision

The focus of World Bank supervision during the early years was in supporting the bidding process for the first IPP wind plant, the project's main component. The overall bidding process took almost three years because the first bidding procedure did not result in any responsive bid. Despite the lengthy bidding process, World Bank supervision teams made regular visits to Mexico to support CFE and the GOM to help ensure that the bidding process was successful. Task teams were staffed with the needed expertise and skills at this stage of implementation.

Following contract signing in October 2012, World Bank supervision missions focused on environmental and social safeguards. A close and effective working relationship was established with CFE and the IPP, which enabled a year round monitoring of bird and bat migratory patterns to help reduce mortality levels due to collisions with the wind towers. The supervision of the social safeguards was also effective. A continuous dialogue was established between (a) landowners (*ejidatarios*) affected by wind plant construction; (b) local community leaders; (c) IPP field managers; and (d) CFE regional staff, which helped minimize land compensation disputes and build up local ownership of the benefits of the wind power plant. In a region known for decades of social conflict, this was a significant achievement.

Over the 10-year period, more than 20 World Bank supervision missions were undertaken. Fiduciary and safeguards specialists in the World Bank Mexico country office provided continuity and additional support for the World Bank supervision effort.

Disbursements did not begin in any significant amount until 2013. The very low disbursement levels during the first 6-7 years reflected (a) the lengthy bidding process for the IPP; (b) the specific design of the project which linked disbursements to a tariff support subsidy and which could not begin until the IPP was operational; (c) implementation delays in the TA component; and (iii) the GOM's complicated funding administrative mechanisms as discussed in section 5 above. Despite these delays, the intensive supervision effort of the final 2-3 years enabled all the GEF funds to be fully used in line with the original development objective. The Bank team also ensured the studies under the TA would be used for upcoming legislation after the grant closing.

The Bank's candor and quality of performance reporting was adequate. Overall, there were 21 Implementation Status and Results Reports (ISRs) completed during project implementation. The GEO and implementation progress (IP) ratings were mostly rated Moderately Satisfactory within the 21 ISRs. The major reasons of Moderately Unsatisfactory ratings in some of the ISRs were due to the failure of the first bidding in May 2009 and implementation delays. The GEO and IP rating were rated Satisfactory in the final ISR since most of the funds were either disbursed or committed, and the project was on track to meet all of its targets.



Quality of Supervision Rating  
Satisfactory

Overall Bank Performance Rating  
Satisfactory

## 9. Assessment of Borrower Performance

### a. Government Performance

The GA was signed with the GOM. SHCP was the official recipient of the GEF grant while NAFIN acted as the financial agent for the project. SENER was responsible for energy policy and planning in the sector and for implementation of the TA and project management components of the GEF grant as well as for M&E of the overall project.

The GOM's strong commitment to the project objective was maintained throughout the implementation period. A measure of the GOM's commitment over this period was the speeded up energy sector reform, which involved a series of renewable energy promotion measures (e.g., renewable and clean energy auctions, clean energy certificates, etc.). The GOM provided an enabling environment including supportive sectoral, and institutional policies, legislation, and regulatory reforms.

The GOM's readiness for implementation, implementation arrangements and capacity, and appointment of key staff were adequate in general. The GOM, through SHCP and NAFIN, was constructive in finding solutions to internal administrative problems either impeding implementation of the TA components or needing streamlining during implementation. The GOM supported ensuring compliance with the environmental and social safeguards requirements of the project, through the involvement of government institutions such as Institute of Ecology (Instituto de Ecología A.C., INECOL).

The GOM provided more than twice the amount of the counterpart funding estimated at the appraisal and ensured the compliance with all covenants. Regarding coordination with donors/ partners/stakeholders, SHCP assigned specific area for specific partners. SENER coordinates with partners but previously CFE was the coordinator.

Government Performance Rating  
Satisfactory

### b. Implementing Agency Performance

The main responsibilities for implementation were as follows: (a) Component 1, Financial Mechanism: CFE, in coordination with SENER; (b) Component 2, TA: SENER for contracting services; and (c) Component 3, Project Management: SENER for project monitoring and evaluation (M&E), and reporting responsibilities under the project. Both agencies demonstrated their commitment to achieving development objectives.

The international bidding process for the La Venta III wind farm began in January 2007 but had to be re-launched in July 2008 because of the lack of a responsive bid. Despite the extended duration of the bidding process, CFE managed the process proficiently and flexibly, recognizing that high demand for wind turbines in international markets at the time limited the number of bidders.

During plant construction, CFE prioritized safeguards issues, including resolving a number of conflicts between small landowners and the IPP operator with regard to the payment of benefits to local communities. CFE's prior experience with similar issues during the construction of the La Venta II Plant helped resolve potential social conflicts and update the Indigenous Peoples Plan. This experience helped provide a framework for social safeguards for future wind energy developments in this region.

The implementation of the smaller TA and project management capacity-building activities started slowly due to (a) the complicated GOM's funding administrative mechanisms; (b) the inexperience of SENER with World Bank operations; (c) the priority given to tariff subsidy support; (d) the rapid sector reform, which made some of the originally planned policy and regulatory related activities unnecessary; and (e) necessary changes to support emerging technical, environmental and social needs. Once these constraints were overcome, SENER completed a series of studies and activities, which contributed to further renewable energy development.

Implementing Agency Performance Rating  
Satisfactory



Overall Borrower Performance Rating

Satisfactory

## 10. M&E Design, Implementation, & Utilization

### a. M&E Design

While the indicators reflected project objectives, the list of 19 intermediate outcome indicators was long, comprised of a mix of inputs, processes, and outputs presented with the same level of significance. These intermediate indicators may have been useful in tracking progress and meeting the Bank policy requirements (e.g., safeguards) but they were not all fully focused on the result chains. Hence, the M&E system could have been better streamlined, structured and organized.

Most of the indicators were measurable in terms of numbers, timing, and location but some required qualitative assessment. Most of the proposed data collection methods and analysis were appropriate but sampling methods and handling of comparators to understand attribution along the logical results chain were not explained in the PAD. SENER and CFE were largely responsible for data collection through the course of regular project activities, including input from consultant technical assistance activity reports. All baseline data, except the emission baseline data of CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub> and particulates, were available in the PAD.

### b. M&E Implementation

The planned baseline data collection for NO<sub>x</sub>, SO<sub>2</sub> and particulates were not carried out, no targets were set and no data were reported in the ICR without giving the reasons. Responsibility for results monitoring of tariff support to the IPP was shared between CFE and SENER. CFE collected most of the data, in particular generation data, which was the basis of payments made to the IPP. SENER prepared progress reports. The monitoring performance of these government agencies throughout the implementation period was adequate. The monitoring data was used at the time of the mid term review (MTR) to make adjustments to the target indicator values for electricity generation and emissions reductions to reflect the actual data from the wind plant during its first year of operation. The methodologies and experiences in the M&E system would be helpful for other wind power projects.

### c. M&E Utilization

M&E data was used to adjust the indicators to reflect the actual plant capacity factor, which was lower than the appraisal estimate; this, in turn, reduced the level of GHG reduction target. The M&E measured outcomes, inputs, outputs and process status and especially generation data, which was utilized to calculate the amount of payment to the IPP. The M&E did not impact subsequent interventions because Phase II became unnecessary.

M&E Quality Rating

Modest

## 11. Other Issues

### a. Safeguards

#### Environmental Safeguards

For environmental screening purposes, the project was rated category B. At appraisal, the project triggered the following safeguards polices: Environmental Assessment (OP/BP/GP 4.01), Natural Habitats (OP/BP 4.04) and Physical Cultural Resources (OP 4.11). Applicability depended on the specific location of the plant, which was not known at the time of preparation, before the outcome of the bidding process. All these three safeguards policies were all complied with, and these three safeguards policies and their overall ratings were satisfactory at the last ISR.

The main environmental impact expected as a result of the construction of La Venta III wind farm was the potential collision of birds and bats with the wind towers. Because the specific area of the Isthmus of Tehuantepec was already recognized as an important corridor for migratory birds, a number of consultative and procedural measures had been agreed during preparation to minimize the impacts on both



bird and bat populations.

Compliance with environmental safeguards was closely monitored throughout supervision. At the World Bank's request, monitoring of the wind plant's impact on bird and bat mortality was extended to include the entire year, not just the migratory seasons to include migratory and local species. INECOL was hired by the IPP to monitor the wind plant's mortality impacts until 2018. The bird and bat mortality was in line with data from other regions in the world. The safeguard rating was used effectively to help ensure the safeguard policy compliance. The methodology for updating estimates of bird and bat mortality incorporating the undercounting effect was a best practice, applicable in Oaxaca and other regions of Mexico. CFE prepared and implemented an Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) successfully. As discussed in section 7 above, one unintended secondary impact was deforestation, which in turn, had an adverse impact on nesting areas of local birds and also contradicts the GEF policy.

#### Social Safeguards

At appraisal, the project was applicable to social safeguard policy of Indigenous Peoples (OP 4.10) given the location of the wind plant in a region of Mexico with a high proportion of indigenous peoples. This social safeguards policy was complied with and satisfactory rating in the last ISR.

The social impacts of the investment in the wind energy plant were carefully monitored during supervision and exhibited many aspects of good practice. Even though the World Bank did not finance the construction of the plant, the IPP provided the World Bank team with regular updates on payments to landowners for land use and contributions to the municipality's social program, which were reviewed by the World Bank's social specialist. The social investment program undertaken by the IPP and the social approach adopted by the IPP involving a continuous consultation process with the affected landowners and municipal leaders, was exemplary. It set a standard to be followed by other companies developing wind energy in the Isthmus. IPP community relations personnel maintained close relations with the local small landowners by meeting with them several times per week and discussing their concerns. However, benefit sharing was found to be uneven. Some small landowners, who leased their land for the wind power plant, benefitted considerably while the neighboring communities did not benefit at all.

An Indigenous Peoples Plan was prepared and consulted locally in July 2012 to be in compliance with this safeguard requirement. The construction of a 10 kilometer (km) transmission link from La Venta III wind farm to the main transmission grid during implementation raised the possible triggering of the Involuntary Resettlement safeguard policy (OP/BP 4.12). However, following a field visit in February 2011, the World Bank concluded that it was not triggered because the transmission line involved the voluntary imposition of easements.

## b. Fiduciary Compliance

### Financial Management

A Financial Management Assessment was undertaken before Board approval and the project financial management (FM) risk was rated as Modest. Even though neither CFE nor SENER had prior experience managing a World Bank project, their financial systems were considered acceptable. Also, NAFIN was able to provide implementation support and oversight based on its own extensive experience as a financial agent in World Bank financed projects. World Bank supervision of the project's FM aspects was satisfactory overall. The FM arrangements within SENER were closely supervised and the FM rating for most of the supervision period was Satisfactory. However, toward the end of project implementation, some of the concerns that had been raised in the 2014 external audit with regard to strengthening internal controls within SENER on the procurement had still not been addressed and the FM rating was downgraded to Moderately Satisfactory in the final ISR. The counterpart funding was satisfactory with twice the amount that expected at the appraisal. All covenants were complied with. The GEF trust fund grant were almost fully accounted for by project closure (98.5 percent). The ICR did not find corruption or misuse of funds associated with the project.

### Procurement

There were two main procurement activities under the project: (a) the selection of the IPP to construct the wind plant, which was undertaken using CFE international bidding procedures acceptable to the Bank (under paragraph 3.13(a) Procurement under Build Own Operate/Build Operate Transfer/Build Own Operate Transfer (BOO/BOT/BOOT), Concessions and Similar Private Sector Arrangements of "Guidelines for Procurement under IBRD Loans and IDA Credits" published by the World Bank in May 2004.); (b) the acquisition of wind measuring systems and other specialized equipment, specialized software, and studies and consultancy services, which were to be procured using either International Competitive Bidding (ICB) and National Competitive Bidding (NCB) procedures or in accordance with the World Bank's guidelines above.

The selection of the IPP required two bidding processes, the second of which resulted in the selection of a qualified and experienced international company. However, when the procedures followed by CFE were later reviewed by the World Bank's Operations Procurement Review Committee (OPRC), it was found that they were not fully in agreement with World Bank requirements and a waiver had to be granted in May 2009. The waiver was granted on the basis of several considerations, which included: (a) the reasonableness of the price offered; (b) the strong likelihood that a further rebidding would result in a higher price; and (c) the strategic importance of developing wind power for the energy. Overall, procurement issues were carefully supervised by the World Bank. As was the case for FM, the procurement supervision benefitted from the presence of specialists in the country office during the later years. The procurement rating was maintained as Moderately Satisfactory or



Satisfactory throughout implementation until the final few months when a procurement ex-post review, carried out in March 2016, showed some irregularities in the final few months of implementation, which included contracts still in process, some of which lacked a signed contract. As a result, the last ISR's procurement rating was downgraded to Moderately Satisfactory.

Disbursement

The ICR did not find any ineligible expenditures in the disbursements from the GEF trust fund.

c. Unintended impacts (Positive or Negative)  
 Not applicable.

d. Other  
 Not applicable.

## 12. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Satisfactory	---
Risk to Development Outcome	Negligible	Modest	Environmental, natural disasters and social risks would require more attention.
Bank Performance	Satisfactory	Satisfactory	---
Borrower Performance	Satisfactory	Satisfactory	---
Quality of ICR		Substantial	---

Note

When insufficient information is provided by the Bank for IEG to arrive at a clear rating, IEG will downgrade the relevant ratings as warranted beginning July 1, 2006.

The "Reason for Disagreement/Comments" column could cross-reference other sections of the ICR Review, as appropriate.

## 13. Lessons

The following lessons were drawn from those presented in the ICR:

**1. Benefits-sharing and their sustainable use are important for optimizing the benefits of wind power development.** Similar to other large infrastructure and mining projects, this project demonstrated the importance of fair benefit sharing among the local communities and how these benefits are used. Some small landowners, who leased their land for the wind power plant, benefitted considerably while the neighboring communities did not benefit at all. Some of these land owners caused deforestation as they used the increased income from the land lease for a rapid expansion of land for agriculture and cattle raising. When communicating with communities on the benefit sharing, raising awareness and education on sustainable livelihoods could help mitigate deforestation.

**2. Good safeguards practices can contribute to a favorable environment for investors.** The project was an example of best practices in World Bank's social and environmental safeguards and the strong collaboration among the Bank, IPP and CFE. The IPP's dedicated social responsibility work was demonstrated by their local presence and close responsiveness to the communities. The project not only met local requirements for avian mortality monitoring, but also promoted an enhanced protocol by expanding the monitoring periods to each season of the year for the purpose of accounting for the mortality of migratory and local species. The involvement of INECOL not only strengthened safeguard ownership but also added local, professional expertise.

**3. Flexibility is key to respond just in time to changing needs.** The GOM proceeded without significant external financial support to establish the needed tariff incentives, renewable energy law, and broader policy framework to encourage the development of Mexico's renewable energy potential. Since this reform process was rapid, some of the project's originally planned TA activities became unnecessary. The Bank team



revised the TA activities, which instead supported strengthening the technical and monitoring capacity of SENER.

#### **14. Assessment Recommended?**

No

#### **15. Comments on Quality of ICR**

The ICR is candid and focused on presenting valid, evidence-based analysis that is well keyed to the project's results framework. Although a bit long at 25 pages, it complies with the guidelines for ICR preparation. It would be helpful if the ICR explained why GEO indicators of NO<sub>x</sub>, SO<sub>x</sub> and particulates did not have baselines or targets and were not measured.

- a. Quality of ICR Rating  
Substantial