



## 1. Project Data

<b>Project ID</b> P066426	<b>Project Name</b> MX Hybrid Solar Thermal (Agua Prieta)	
<b>Country</b> Mexico	<b>Practice Area(Lead)</b> Energy & Extractives	
<b>L/C/TF Number(s)</b> TF-23346,TF-57033	<b>Closing Date (Original)</b> 31-Oct-2009	<b>Total Project Cost (USD)</b> 49,350,000.00
<b>Bank Approval Date</b> 05-Oct-2006	<b>Closing Date (Actual)</b> 31-May-2016	
	<b>IBRD/IDA (USD)</b>	<b>Grants (USD)</b>
Original Commitment	49,395,000.00	49,395,000.00
Revised Commitment	46,387,017.87	46,387,017.87
Actual	46,387,017.87	46,387,017.87

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## 2. Project Objectives and Components

### a. Objectives

The objective of the project was to demonstrate and encourage replication of solar combined cycle system power generation technology in the Recipient's territory to contribute to the reduction of global greenhouse gas emissions. (Grant Agreement, November 22, 2006, page 16).

Global Environment Objective (GEO). The global benefits associated with the project include: i) demonstrate the operational viability and value added of integrating a solar field with a large conventional thermal facility (integrated solar combined cycle system [ISCCS] using solar parabolic trough technology); ii) contribute to reduce the long-term costs of the technology; and iii) reduce global greenhouse gas (GHG) emissions (PAD, 2006, page 5).



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

No

**c. Will a split evaluation be undertaken?**

No

**d. Components**

Component 1: Design and construction of a 31 megawatt (MW) (peak) solar field. (Appraisal US\$52.29 million; Actual US\$52.25 million). A large field of single-axis tracking parabolic trough solar collectors.

Component 2: Design and construction of a 480 MW (net) gas based thermal plant. (Appraisal US\$296.30 million; Actual US\$473.10 million). A power plant based on a standard configuration that included two industrial frame combustion turbines, each associated with a heat recovery steam generator (HRSG), and a steam turbine.

At the third bidding in 2010, the sizes of the solar field and the gas-based thermal plant were reduced to a 14-MW solar field and a 394-MW thermal plant, respectively. The Global Environment Facility (GEF) grant-financed the solar field development and approved this reduced size of solar field in 2008.

Since the preparation of the project in 2005, the power industry was significantly impacted by an increase in the costs of equipment. The lack of response to the first two biddings launched by the Federal Electricity Commission (Comisión Federal de Electricidad, CFE) in 2006 and 2007, respectively, led the utility to reduce the requested capacity of the solar field, from 31 MW to the 12-15 MW range, to ensure that the GEF resources could still be used to finance this component. (Project Paper, June 11, 2013).

The grant agreement was amended to reduce the size of solar field in June 2013 (Amendment to the Grant Agreement, June 12, 2013, page 2). The Bank project team clarified to IEG that the reason for the delayed amendment of the GEF Grant Agreement was because the amendment required the final size of the solar field. However, the final size of the solar field could be known only when the process was at an advanced stage.

**e. Comments on Project Cost, Financing, Borrower Contribution, and Dates**

Project Cost

Total project cost at appraisal was US\$348.59 million. The actual total project cost was US\$525.35 million excluding taxes. This 150 percent increase of the actual project cost was due to a 160 percent increase of the cost of the thermal plant component 2. As of May 2017, the solar thermal plant had not yet been fully commissioned. Final costs could still increase further (ICR, page 8).

Financing

The Global Environment Facility (GEF) approved a US\$49.35 million grant to finance only the solar field component 1. Actual financing was US\$46.39 million. Despite the cost escalation which may have been eligible for GEF funding, about US\$3 million, or 6 percent of the GEF grant proceeds, were cancelled due



to the delayed contract amendment.

#### Borrower Contribution

The borrower contribution at appraisal was US\$299.23 million and the actual contribution was US\$502.41 million. The Federal Electricity Commission (Comisión Federal de Electricidad, CFE) financed all overrun costs for the turbines, the solar field, and the combined cycle plant.

#### Dates

The project was approved on October 5, 2006. The original effectiveness date was July 9, 2007 (ICR, page 10). The effectiveness date was extended three times. The pending condition for effectiveness was the purchase of the land where the project would be implemented. Per local regulations, this pending condition could only be processed once the project bidding was completed and successful. The pending condition was eventually waived by the World Bank. The GEF grant was declared effective on July 1, 2008 after more than 1.5 years since the date of the project approval.

The project had total seven level-two restructurings. Of the seven level-two restructurings, six of them were closing date extensions. The original project closing date was October 31, 2009. Cumulatively, the project closing date was extended by a total of six years and seven months. The project's final closing date was May 31, 2016. Hence, the original three-year project became nearly a 10-year project. On June 28, 2013 (ICR, vi), the project was restructured to amend the grant agreement to reduce the size of the solar plant and the target values of the outcome and results indicators. Signatures of the Amendment to the Grant Agreement were completed earlier than the restructuring date of June 28, 2013. It was signed by authorities of the Bank and the Borrower on June 12, 13, 18 and 24, 2013, respectively. The GEF had already approved the plant size reduction in 2008. The reduced size was used for the third bidding in 2010. The main reason for the total seven project restructurings were delays related to (a) the effectiveness condition of acquisition of land for the solar field (which was later waived to reach effectiveness), (b) unsuccessful bidding processes, and (c) construction of the plant.

### **3. Relevance of Objectives & Design**

#### **a. Relevance of Objectives**

##### Relevance to Mexico

At appraisal, the project development objective (PDO) was relevant to Mexico. Mexico was the ninth largest greenhouse gas (GHG) emitter in the world. The main sources of emissions (excluding land use-related emissions) were fossil-fuel combustion for energy generation and industrial processes. Despite Mexico's high renewable energy potential, the country had only approximately 3 percent of installed capacity based on wind, solar, small hydro, or geothermal. The Mexican government's energy sector program established the increased use of renewable energy resources as a sector priority and defined several strategic actions. Mexico had been developing policies and measures to increase the market share of renewable energy. The Mexican Constitution mandates least-cost procurement of electricity generation sources. The Renewable Energy Law in 2008 provided a framework for defining 'least-cost' sources through a variety of methods and



perspectives.

In the final years of the project, the PDO remained relevant to Mexico. The climate change strategy in 2013 highlighted the use of clean and renewable energies for a low-emission development. The Energy Transition Law 2015 set minimum targets for clean energy in the Mexican energy matrix (25 percent by 2018, 30 percent by 2021, and 35 percent by 2024).

#### Relevance to the World Bank

At appraisal, the PDO was consistent with the World Bank Mexico Country Partnership Strategy (CPS) for 2005-2008. The CPS acknowledged the threat of climate change and the need “to support on-going programs to address the problems of GHG emissions and promote the introduction of clean energy technologies” (pages 21-22, 44). In the final years of the project, the PDO remained relevant to the CPS for 2014–2018, particularly to theme 4 promoting green and inclusive growth.

### **Rating**

Substantial

#### **b. Relevance of Design**

The project’s inputs, which consist of solar collectors and a combined cycle power plant, are directly linked to achieving the PDO of demonstrating solar power generation technology. There are institutional and financial factors that intervene between those input activities and the achievement of PDO outcomes, namely, the replication of solar power generation technology and the reduction of GHG emissions. The PDO statement specified the two project components as the means to contribute to the reduction of GHG emissions. There are institutional and financial factors that intervene between those input activities and the achievement of PDO outcomes, namely, the replication of solar power generation technology and the reduction of GHG emissions.

The project implementation period of three years was unrealistic because the typical construction period for the natural gas-based thermal plant and the solar field components tend to last from six to nine years. Furthermore, the project’s scope of encouraging replication would be only possible with the project’s successful implementation and disseminations of the lessons learned.

The results framework on page 32 of the PAD had one intermediate outcome “The operational viability of solar thermal power generation is demonstrated in Mexico.” This intermediate outcome was almost the same as the first PDO outcome “demonstrate the operation of an ISCCS in Mexico”. Hence, the demonstration of ISCCS (or solar thermal power generation) had no causal chain between the PDO outcome and the intermediate outcome. The second outcome on GHG reduction was adequate. The third outcome “reduction of long-term costs of ISCCS technology” was overambitious because of the following reasons. This project had only one ISCCS. It was not clear how only one ISCCS could influence the cost reduction. There are other factors that could contribute to this third outcome, such as technological changes, economies of scale and



scope in the market, changes in costs of equipment and material, learning effects on logistics, management, etc. Furthermore, such a reduction of long-term costs of ISCCS technology would not be achievable within the original three-year project period.

**Rating**  
Modest

#### 4. Achievement of Objectives (Efficacy)

##### **Objective 1**

###### **Objective**

To demonstrate and encourage replication of solar combined cycle system power generation technology in the Recipient's territory to contribute to the reduction of global greenhouse gas emissions.

###### **Rationale**

At the project's level-2 restructuring on June 28, 2013, the target values of PDO and intermediate outcome indicators were reduced. The reduced target values could still achieve the PDO. Therefore, a split rating of the project outcome (section 6) has not been carried out.

As of May 29, 2017, the solar field had been completed and physically connected to the thermal plant but had not supplied any steam to the thermal component. The CFE estimated that the solar field would start supplying steam for the thermal component by mid-2017. As of May 29, 2017, the steam from the solar field had not displaced any steam from fossil-fuel sources. Therefore, the project outputs and outcomes were the following.

###### Outputs

- Annual electricity generation (gigawatt-hour, GWh) from the ISCCS plant remained as the baseline of zero by the project closing date on May 31, 2016. In October 2016, the thermal power plant was commissioned. This thermal power plant produced 1,167 GWh of electricity, or 40 percent of the revised target of 2,935 GWh or 32 percent of the original target of 3,700 GWh. The reported value covered five months of operation for the thermal power plant only. As of May 29, 2017, the solar field had not supplied any steam to the thermal component.
- Annual contribution of solar electricity (GWh) remained as the baseline of zero, against the original target of 70 GWh and the revised target of 31 GWh.

###### Outcomes

- Reduction of annual CO<sub>2</sub> emission remained as the baseline of zero against the original target of 15,500 CO<sub>2</sub> ton and the revised target of 11,833 CO<sub>2</sub> ton.
- Annual average efficiency of solar input to electric output (percent) could not be measured because the



solar field has not yet been operational as of May 29, 2017. The target was 12 percent. The baseline was zero.

- The ISCCS was not commissioned by the project closing date on May 31, 2017. Thus, the ISCCS technology was not demonstrated by the project closing date.
- There was no evidence that this project had encouraged the replication of the ISCCS. The ISCCS has a high replicability potential in Mexico (50 percent of the power generation is natural gas combined cycle-based). Yet, a subsequent operation had not been discussed with CFE at the time of ICR preparation. It will take a few years after the project is fully commissioned to assess the potential replication of the ISCCS in Mexico.

**Rating**  
Modest

## 5. Efficiency

### Economic analysis

#### Ex-Ante

The ex-ante economic analysis covered 100 percent of the total project cost. The main benefits were: (a) the production of electricity; and (b) the reduction of GHG emissions. The costs comprised: (a) investment in the solar thermal plant; (b) operation and maintenance (O&M) costs; and (c) fuel costs. The economic internal rate of return (EIRR) was 14.4 percent and the net present value (NPV) was US\$49.61million at a 12 percent discount rate. It estimated an annual abatement of 15,600 tons of CO<sub>2</sub>, or 391,270 tons of CO<sub>2</sub> over the 25 years of the project.

Gas-fueled combined cycle plants dominated the CFE's least cost expansion plan. Nevertheless, this project implied a variation in the least-cost plan by adding a solar component that increases capital investments and operation and maintenance costs, while increasing the overall efficiency of the plant and thus reducing fuel costs. The GEF grant was expected to help achieve sustainable development consistent with the least cost objective.

#### Ex-Post

An ex-post economic analysis was prepared using the same methodology as the ex-ante analysis. It showed a negative NPV, US\$-38.3 million at a discount rate of 12 percent and an EIRR of 10.7 percent. At a discount rate of 6 percent following the World Bank's new guidance in 2016, the NPV was US\$ 227.0 million. The



analysis used avoided cost of power generation of other options (page 22, ICR). The table 3.1 in page 33 in the ICR used the term “sales revenue”, which are priced at the avoided cost of power generation of other options. No GHG emission abatement was estimated.

Financial Analysis

Ex-Ante

In ex-ante financial analysis, the project income included: electricity payments over the project’s lifetime (25 years), and a GEF grant payment. Financial outflows were operating expenses, including fuel costs and taxes. It also accounted for depreciation provisions. The financial internal rate of return (FIRR) was 22 percent. The NPV was US\$204.49 million at 12 percent discount rate.

Ex-Post

An updated ex-post financial analysis showed the FIRR as 6.1 percent, and a negative NPV of US\$-228.8 million at 12 percent discount rate. At 6 percent discount rate, the NPV was US\$ 4.1 million.

Administrative Efficiency

This project’s administrative efficiency is low. The original three-year project had its closing date extended six times. Consequently, this project became nearly a 10-year project. Seven project restructurings incurred administration costs. Yet, by the project closing date, the ISCCS was not operational and was therefore unable to demonstrate and encourage replication of ISCCS and contribute to the reduction of GHG emissions. Furthermore, the Bank agreed to continue to informally support the ISCCS until it is fully commissioned after the project closing date.

**Efficiency Rating**

Negligible

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	✓	14.40	100.00 <input type="checkbox"/> Not Applicable
ICR Estimate	✓	10.70	100.00 <input type="checkbox"/> Not Applicable

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





## 6. Outcome

The relevance of the project objectives was substantial. The relevance of the project's design was modest. Project efficacy was modest and its efficiency was negligible. Despite significant cost increases accompanied by the scaling-down of technical design and capacity, the solar facility was not yet commissioned by the project's closing date and thus did not deliver any of the targeted benefits.

### a. Outcome Rating

Unsatisfactory

## 7. Rationale for Risk to Development Outcome Rating

By May 2017, the solar field was not yet operational. This delay indicates a major risk for the ISCCS plant to remain operating as a stand-alone project. The CFE confirmed its commitment to eventually interconnect the solar field to the combined cycle power plant. However, during project implementation, the CFE repeatedly failed to maintain its previous commitments to the plant's commissioning date. Therefore, there remains a substantial risk to achieving the PDO as long as the ISCCS remains non-operational. The Government and the World Bank have been monitoring the CFE's progress on the final steps of the solar field construction and its interconnection with the combined cycle. However, budgetary constraints with the CFE have caused additional delays.

### a. Risk to Development Outcome Rating

Substantial

## 8. Assessment of Bank Performance

### a. Quality-at-Entry

#### 1. Quality-at-Entry

During the long project preparation, the World Bank fully addressed many challenges and made adjustments across several project designs. The project preparation from concept review in 1999 to project effectiveness in 2008 took about 9 years.

The following are main challenges that caused the Bank's long preparation time. The originally envisaged independent power producers (IPPs) model needed to be changed to a "finance-build-transfer" model (known as Obra Publica Financiada or OPF). The reason for the change was the Mexican legal constraint for





launching a bidding process that offers a grant, where the grant has not been secured. However, the GEF endorsement could not be provided before the launch of the bidding process. Under the OPF scheme, the GEF endorsement could be provided before the bidding starts considering that the project design had been already specified in the bidding document and the owner and operator of the plant was known to be CFE, a company with strong technical capacities and solid reputation. The other challenges included (a) federal administration changes, (b) CFE's two deferrals of the construction of the ISCCS plant due to reduced power demand forecast, (c) coordination of the procurement procedures of CFE and the World Bank, and (d) coordination of the bidding processes and the GEF grant.

The World Bank project team at the project's appraisal appropriately identified six risks but the identified risks were not properly assessed. Rating the overall risk as moderate was optimistic (PAD, page 15).[1] . Two of the six identified risks were related to bidding failures. A bid had failed already in 2002 before project approval. During project implementation, calls for bids failed twice. Changes in the procurement strategy contributed to a successful third bid. One of the six identified risks was governmental and ministerial changes. This risk did not materialize during the ISCCS plant construction. The other three risks were operation-related. The ISCCS was not operational as of May 2017. Thus, the other operation-related risks could not be assessed. The appraisal did not identify the critical risk to the performance of contractors. The contractor to provide the gas and steam turbines failed to meet the contract requirements. This critical failure caused the suspension of works, increased costs, and significantly delayed the project implementation.

[1] The ICR incorrectly noted that the risk at appraisal as substantial (page 12).

### **Quality-at-Entry Rating**

Moderately Satisfactory

#### **b. Quality of supervision**

World Bank supervision missions were held regularly and staffed with appropriate skills. The locally based last task team leader (TTL), and the fiduciary and environmental specialists closely supervised and responded on time to the Mexican counterparts to coordinate changes to the project design and the procurement strategy. The supervision during the early years was focused on supporting the bidding process for the solar field plant. During the last two years, the supervision team focused on the modifications of the solar field contract caused by the suspension of works during 2013 and 2014 and the interconnection with the combined cycle component. The World Bank sponsored the CFE's technical staff to visit ISCCS plants in Morocco and Spain. The visits helped change designs to improve operational efficiency.

Despite the intense supervision, a mid-term review (MTR) only took place until October 2013, seven years after approval and five years after effectiveness. The originally planned date of mid-term review was June 11, 2007 (PAD, page 80). The project underwent seven restructurings. Despite all its efforts, the Bank's support could not succeed in helping the CFE to operationalize the solar fields and meet the PDO by the project closing date.

### **Quality of Supervision Rating**

Moderately Unsatisfactory



## **Overall Bank Performance Rating**

Moderately Unsatisfactory

## **9. Assessment of Borrower Performance**

### **a. Government Performance**

The government's commitment to the development objective was maintained throughout preparation, implementation and beyond the GEF grant closing date. The Government of Mexico (GoM) showed strong political and financial support to the project. The congress approved the proposed project in the federal expenditures program for 2006. The GoM negotiated with the World Bank to informally extend the World Bank's technical and fiduciary support beyond the grant's closing date to successfully commission the ISCCS. This project did not have covenants.

### **Government Performance Rating**

Moderately Satisfactory

### **b. Implementing Agency Performance**

#### **1. Implementing Agency Performance**

The CFE was the implementing agency responsible for the management of the international bidding process for the ISCCS plant.

During project preparation over six years, the CFE demonstrated its commitment to the PDO. Given the delays and inconsistencies between Bank's and Mexico's procurement policies, the CFE changed its bidding process to accommodate Bank's requirements as much as possible. The CFE's high level management visited the World Bank in Washington DC on several occasions to overcome obstacles to project implementation. As the GEF's endorsement was unavailable before launching an IPP process, the CFE changed the project's modality to an OPF. The CFE agreed to finance the cost of the land for the solar field given that it was not eligible for the GEF grant. Finally, the CFE launched the bidding process as an ISCCS before the GEF endorsement.

Implementation of the solar field was satisfactory until works had to stop due to the delay in the provision of the turbines. Consequently, the CFE team was engaged in difficult disputes and negotiations with all three contractors to be able to complete the project.

The CFE had to focus much of its attention to the technical aspects and the repeated delays in commissioning the solar field. Consequently, CFE's administration of the contract deteriorated, causing delays and errors in the preparation of financial and technical reports and in processing the construction contract modifications. This affected the quality of project implementation.

On April 22, 2016, the CFE informed the World Bank of even further delay in the ISCCS plant



commissioning date. However, because of CFE's repeated failures in maintaining previous commitments, the GoM and World Bank agreed to informally maintain World Bank technical and fiduciary support for CFE until the ISCCS plant was fully commissioned, instead of extending the closing date for the seventh time. The substantial delay in the implementation of the thermal plant increased ISCCS costs and required the CFE to incorporate numerous modifications to its construction contract. Despite the significant support of the World Bank, the CFE failed to submit on time all supporting evidence for a final amendment. Consequently, the GEF grant was not fully disbursed. About US\$3 million of the GEF grant proceeds were cancelled.

The difficulties faced by CFE for the provision of the turbines were unexpected. The PAD (page 17) noted "the experience, capacity and organization of CFE is more than adequate to carry out highly complex procurement procedures, such as that required for the Project." Yet, when the difficulties materialized, the CFE remained firmly committed to the project. The CFE financed a substantial amount of the additional costs caused by the delay in the provision of the turbines.

### **Implementing Agency Performance Rating**

Unsatisfactory

### **Overall Borrower Performance Rating**

Moderately Unsatisfactory

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

### **a. M&E Design**

Monitoring and evaluation (M&E) in the PAD (page 33) largely reflected the PDO. There were no indicators to measure the PDO "to encourage replication." The M&E period in the PAD (page 33) was five years but the original GEF grant project period was only three years. No explanation was available for this inconsistency. Data were to be continuously monitored and collected by the CFE. However, no suitable indicators were included to monitor project progress because all indicators could be measured only after the ISCCS was commissioned.

### **b. M&E Implementation**

The solar field was not operational by the project closing date. None of the indicators could be measured during project implementation because the solar facility was not operational by the project closing date. The thermal plant started operation six months after the project closing date. The power generation data from thermal plant was only collected and reported in the ICR. The indicators for assessing PDO achievement could be only measured after the ISCCS commissioning. Hence, the supervision team could not monitor the project implementation progress, adequately manage project risks or bring unforeseen circumstances (such as the delay in the acquisition of the turbines) to management attention.



### c. M&E Utilization

M&E was not utilized because all indicators remained at zero baseline values during the project implementation. The indicators were not measured because the facility was not operational.

### M&E Quality Rating

Negligible

## 11. Other Issues

### a. Safeguards

#### Environmental safeguards

Under the Bank's Operational Policy (OP/BP 4.01) on "Environmental Assessment" screening and classification, the project was assigned a Category B. The potential environmental impact was considered very small and was confined to the project site. Appropriate mitigation measures were identified and included in the environmental management plan. The project carried out an environmental impact assessment and obtained the required resolution from the Secretaría de Medio Ambiente y Recursos Naturales (Mexican Ministry of Environment; SEMARNAT). The Bank team informed IEG that the environmental safeguards policy was complied with.

#### Social safeguards

The project was not expected to have any significant social impacts and did not trigger any social safeguards policies. The project was included in the municipal development plan. Hence, it was not expected to create any conflict with other future development plans and/or land uses. The CFE held a public consultation in 2006. The participants welcomed the project, according to the ICR (page 17). During project implementation, the CFE annually contributed to the social municipal programs of Agua Prieta and has been paying for municipal services. The project employed about 800 temporary workers during construction.

### b. Fiduciary Compliance

#### 1. Fiduciary Compliance

#### Financial Management

During most of the implementation period, the financial management (FM) performance remained mostly moderately satisfactory. In 2016, toward the end of the implementation period, the FM performance was rated



moderately unsatisfactory. This rating was mainly because of the delayed appointment of the independent auditor for the last two audits. The FM reports were not always submitted to the World Bank in time. The reports occasionally had minor inconsistencies. The Bank project team informed IEG that the audit report for the period ending on December 31, 2011 was qualified. This qualified opinion resulted from the auditor's conclusion that CFE had not properly disclosed information on budget execution for 2011. This non-disclosure of budget information was not considered to have a relevant impact on the reported use of grant funds figures, nor did it imply any disbursed expense eligibility issue. This was the first audit conducted for the project and covered the period from the project signing on November 22, 2006 through December 31, 2011. All other audit reports were unqualified.

### Procurement

The Bank's procurement policies and the Mexican legislation were not aligned. The GoM was not willing to make adjustments. Given previous positive experiences and the solid track record of CFE, the Bank authorized, on an exceptional basis, the use of international bidding practices under Mexican law and CFE procedures for the implementation of the project.

Four out of the total six project closing date extension were due to the unsuccessful bidding processes. This project was approved on October 5, 2006. However, the first two bidding processes in 2006 and 2008 were unsuccessful. The main reasons were the low budgets even after the GoM raised the budgetary allocations. Due to these unsuccessful biddings, the following changes were made for the third bidding. The sizes of solar field and thermal plant were reduced. The CFE split the bidding into three coordinated bidding packages: (i) the construction of a combined cycle power plant and its integration with the solar field (financed by the CFE), (ii) the provision of the gas and steam turbines (financed by the CFE), and (iii) the construction of the solar field (financed by the GEF grant). The CFE agreed to use the Bank's standard bidding documents for the solar contract. The first two contracts (financed entirely by the CFE) followed national procedures.

Splitting the bid into three packages was intended to better distribute the risks among the various participants (Restructuring Paper 2010) and reduce the financial costs for the contractors. The new strategy was successful and made it possible to award the contracts and implement the project. However, since all three contracts were interdependent, it could have eventually increased the management costs of the three contracts. As the result of this split, the Bank's fiduciary responsibility became only for the GEF grant-financed solar contract. Hence, there was a missed opportunity for the Bank to provide fiduciary support to the other two turbines and thermal plant contracts. In other words, the turbine delivery problem could have been eventually avoided or mitigated. Yet, it is uncertain if just one contract for the full project could have been awarded, considering the unsuccessful previous bidding processes.

The turbines' contractual problem delayed project implementation by almost two years and increased costs of both the solar field and the combined cycle plant. The contractor for provision of the turbines failed to meet the contract requirements. The contractor was an intermediary rather than a turbine manufacturer. The CFE canceled the contract and retendered the bidding process. The works in the solar field were suspended temporarily during April 2013-August 2014. The solar field's works could not be carried out until the combined cycle was completed and connected to the thermal plant.



This delay forced the CEF to enter contractual disputes with all three contractors. The Bank team strongly supported the entire re-negotiation process. The Bank team’s advice on the reasonableness of the additional costs claimed by the solar field contractor resulted in significant savings for the CFE.

**c. Unintended impacts (Positive or Negative)**

Not applicable.

**d. Other**

Not applicable.

**12. Ratings**

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Unsatisfactory	Unsatisfactory	---
Risk to Development Outcome	Substantial	Substantial	---
Bank Performance	Moderately Unsatisfactory	Moderately Unsatisfactory	---
Borrower Performance	Moderately Unsatisfactory	Moderately Unsatisfactory	---
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 are summarized from the ICR’s lessons learned.

**1 . Additional time may be required for projects with innovative technology** (ICR, page 28, paragraph 132). Such projects cannot be treated as conventional infrastructure projects. Additional time for completing these types of projects could be needed to handle all the complications that may be encountered along the way, even for sophisticated client countries like Mexico. Specialized staff may need to spend a significant amount of time dealing with revision of procurement-related matters.

**2 . Capacity-building may be required for modular projects** (ICR, page 28, paragraph 133; and page 29, paragraph 137). Technical assistance can be provided to build capacity in procurement and implementation of



modular projects, including those components that are not financed by the World Bank. Under a project with several contracts, the Bank and the Borrower need to agree on the level of fiduciary supervision by the Bank to be applied not only to the Bank-financed contract, but to the totality of the contracts involved.

**3 . Simultaneous learning from the similar demonstration projects could help mitigate the high risks associated with demonstration projects** (ICR, pages 28-29, paragraph 136). Demonstration projects carry very high implementation risks. Lessons learned must be incorporated at every stage of the project. The GEF's portfolio approach supported the simultaneous implementation of four similar demonstration projects around the world, which allowed just-in-time learning.

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

No

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

The ICR is very well researched, analytical, candid and evidence-based. It included broader information on the CSP technology beyond this project. It was focused on assessing the project's achievement of the development objective. It researched the long history of the project to allow the comprehensive understanding of the project's performance and achievements.

##### **a. Quality of ICR Rating** Substantial