1. Project Data

Summary project data			
GEF project ID		3142	
GEF Agency project ID		PIMS 2201	
GEF Replenishment Phase		GEF-4	
Lead GEF Agency (include all for joint projects)		UNDP	
Project name		Small grid connected photovoltaic systems	
Country/Countries		Mexico	
Region		Latin America	
Focal area		Climate Change	
Operational Program or Strategic Priorities/Objectives		OP-7	
Executing agencies involved		Instituto de Investigaciones Eléctricas (IIE)	
NGOs/CBOs involvement		Consultation	
Private sector involvement		Beneficiaries	
CEO Endorsement (FSP) /Approval date (MSP)		01-May-2007	
Effectiveness date / project start		07-July-2007	
Expected date of project completion (at start)		07-July-2010	
Actual date of project completion		31-Dec-2012	
Project Financing			
		At Endorsement (US $M)	**At Completion (US $M)**
Project Preparation Grant	GEF funding		
	Co-financing		
GEF Project Grant		1.00	1.00
Co-financing	IA/EA own	0.00	0.00
	Government	0.80	4.165
	Other*	0.20	0.828
Total GEF funding		1.00	1.00
Total Co-financing		1.00	4.993
Total project funding (GEF grant(s) + co-financing)		2.00	5.993
Terminal evaluation/review information			
TE completion date		31-Mar-2013	
TE submission date		12/1/2013	
Author of TE		Agostinho Miguel Garcia	
TER completion date			
TER prepared by		Pallavi Nuka	
TER peer review by (if GEF EO review)		Joshua Schneck	

*Includes contributions mobilized for the project from other multilateral agencies, bilateral development, cooperation agencies, NGOs, the private sector, and beneficiaries.

2. Summary of Project Ratings

Criteria	Final PIR	IA Terminal Evaluation	IA Evaluation Office Review	GEF EO Review
Project Outcomes	S	S	S	S
Sustainability of Outcomes	NA	MU	ML	ML
M&E Design	NA	n/a	MS	MS
M&E Implementation	NA	HS	MS	MS
Quality of Implementation	S	S	S	S
Quality of Execution	NA	HS	S	S
Quality of the Terminal Evaluation Report	NA		MS	MS

3. Project Objectives

3.1 Global Environmental Objectives of the project:

Based on information in the Project Brief, the GEO of the project is to reduce fossil fuel consumption (mainly in diesel and gas turbines) in electricity production and reduce demand for greater power generation capacity, leading to lower emissions of GHGs. Summer temperatures in Mexico summer create a very high demand for electricity which the existing power infrastructure cannot meet. In order to avoid expanding generating capacity to meet peak needs, this project will shave peak demand through use of distributed photo-voltaic (PV) systems. The PV system will export excess power to the grid further reducing consumption of fossil fuels, and decreasing GHG emissions.

3.2 Development Objectives of the project:

The project's development objective is to "demonstrate the technical, operational and, ultimately, economic feasibility of grid-connected PV systems as a means to reduce or soften the summer peak electrical demand in northern Mexico (pg. 13, ProDoc)." The project sought to reduce key market, capacity, and institutional barriers to the full-scale development of the national market of on-grid photovoltaic systems. The project targeted residential and commercial sectors in regions with high consumption differences between base and peak demand, and it was designed to support the grid where there was limited supply capacity.

The Project Document defines the expected outcomes of the project as:

1. Grid connected PV systems are demonstrated as a viable technical and commercial electricity supply option in the northern Mexican context.

2. Technical capacity for the design, operation, and maintenance of on grid PV systems and related components is incorporated in national institutions.

3. Project results influence national renewable energy policy and contribute to global PV market development efforts.

3.3 Were there any **changes** in the Global Environmental Objectives, Development Objectives, or other activities during implementation?

No changes in objectives were noted in the terminal evaluation report, but the project did move from being regionally focused in Mexicali to being more national.

4. GEF EO assessment of Outcomes and Sustainability

Please refer to the GEF Terminal Evaluation Review Guidelines for detail on the criteria for ratings.

Relevance can receive either a Satisfactory or Unsatisfactory rating. For Effectiveness and Cost efficiency, a six point rating scale is used (Highly Satisfactory to Highly Unsatisfactory), or Unable to Assess. Sustainability ratings are assessed on a four-point scale: Likely=no or negligible risk; Moderately Likely=low risk; Moderately Unlikely=substantial risks; Unlikely=high risk. In assessing a Sustainability rating please note if, and to what degree, sustainability of project outcomes is threatened by financial, sociopolitical, institutional/governance, or environmental factors.

Please justify ratings in the space below each box.

4.1 **Relevance**	Rating: **Satisfactory**

The project was consistent with the Energy and Environment Sector programs outlined in Mexico's National Development Plan. This plan recognizes climate change impacts as a key concerns for public policy. The project also supported the aims of the national Energy Program (2001-06), which highlighted the importance of renewable sources and energy efficiency in reducing dependence on fossil fuels. Project outcomes also contribute to Mexico's strategy for achieving Millennium Development Goals. A 2005 Report from the President's Office for Public Policy articulates the national context for MDG 7 "Ensure Environmental Sustainability," in terms of three guiding issues: biodiversity protection, rational use of energy resources –including non-conventional sources and energy intensity coefficients- and the well-being of the populace.

The project is fully consistent with GEF's Climate Change focal area strategic objective 6: Support deployment of new, low GHG emitting technologies. The project objectives were also aligned with GEF OP7: Reducing the Long-term Costs of Low Greenhouse Gas-emitting Energy Technologies.

4.2 **Effectiveness**	Rating: **Satisfactory**

The TE report finds that the project successfully achieved its expected outcomes and objectives, and exceeded targets on some indicators of performance such as PV energy generation and public outreach. Based on evidence presented in the TE report and the final PIR, the project has effectively demonstrated that on-grid solar PV systems for residential and small-scale commercial use are viable technologies to address the problem of peak electricity demand. The project has developed new tools for monitoring the performance of on-grid solar PV systems, promoted regulatory and institutional changes in favor of this technology, and significantly improved the level of information and awareness about solar PV systems in Mexico.

Based on information in the TE report, by project closure, the total electricity generated from grid-connected PV systems (in place of fossil fuel-based electricity generation) far exceeded expectations at the start of the project. Total PV generation through project financing was 9564 MWh/year at closure, compared to the 220MWh/year targeted by the project in the appraisal document. According to the final PIR, based on the number of PV connection applications approved by the national utility CFE during the first half of 2011, the number of PV Grid Connected Systems (PVGCS) is still growing. The final PIR also notes that response times for the contracting and installation of systems has been decreasing, indicating that the sector itself is growing to accommodate the increased demand.

In terms of technical capacity, the TE report notes that the project trained 75 users and institutionalized the technical courses in PV systems through the IIE Graduate Center. Course participants appear to be applying skills learnt through the training. A few proposals for PV systems have been submitted by course participants. An on-line version of the diploma course was piloted and presents a potential avenue for mainstreaming PV technical training.

According to the TE report, the project also worked with the Energy Regulatory Commission and the national utility through forums and workshops to develop a more comprehensive regulatory framework to promote the cost-effectiveness of grid-connected systems.

To disseminate information and raise awareness, the project organized several national forums (workshops, training courses, congresses) to reach out stakeholders in government, private sector, NGOs, and academia. The TE report mentions that the project webpage has become a reference site for people who want to learn what is happening in Mexico regarding PV grid-connected systems. More than 900 downloads of the User Guide for Small Scale PV Grid Connected Systems have been registered (pg. 13).

4.3 **Efficiency**	Rating: **Satisfactory**

The project closed 18-months later than expected will full disbursal of the GEF grant amount. The 18-month project extension was granted to give the project time to work with regulators and financial institutions to develop financial instruments to facilitate investments in grid-connected photovoltaic systems. According to the TE report, financial management of the project was "above average for the skills, experience, and knowledge of the executing agency on the PV subject (pg. 36)." Based on information in the TE report, the GEF grant and more than US$ 3 million in co-financing leveraged through national institutions was managed efficiently and used to invest in solar PV systems.

The TE report does not estimate the amount of GHG emissions avoided, but does note "emissions avoided by the use of PV systems have been accounted based on international recommendations methods. The amount has exceeded all expectations of the quantity of PV systems installed during the project period (pg. 36)."

4.4 **Sustainability**	Rating: **Moderately Likely**

Financial (L): The project has leveraged significant co-financing and government interest in installing PV systems. The number of PV systems commissioned and approved was increasing the last year of the project. According to the TE report, the national Trust for Electric Energy Saving, and least two banks are offering products for the residential and commercial market to help finance investments in PV systems. There are also funders interested in funding larger projects.

Institutional (ML): Based on the information in the TE report, the Energy Regulatory Commission and Federal Electricity Commission have adopted a regulatory framework that supports investments in grid-connected PV systems. However, the TE report suggests that further regulatory strengthening is neccessary as well as some restructuring of the electricty production sector to allow more suppliers, 'independent generators' to enter the market. The executing agency, the Electrical Research Institute (IIE), will maintain responsibility for promoting and supporting innovation through applied research to increase the competitiveness of the PV technologies. The IIE has institutionalized the 2-yr PV system courses for technicians through its Graduate Center and it is working to develop a certification system for the PV components and installations.

Socio-political (ML): The project has generated a high level of public awareness and stakeholder buy-in through trainings, a website, and other dissemination activities. The TE report notes that agencies at the state government level (Yucatan and Zapateca) have expressed interest in the project and are commissioning solar PV installations. There was limited private sector participation in the project through business associations and the business section of the National Solar Energy Association. The TE report suggests next steps include development of public-private partnerships to scale-up and mainstream solar PV installations.

Environmental (L): No environmental risks were noted in the TE report. However, a possible environmental risk could arise in future when considering the eventual failure and disposal of the PV components. The full 20-25 year life-cycle of the PV systems and long-term options for appropriate disposal or recycling were not considered in project design or implementation.

5. Processes and factors affecting attainment of project outcomes

5.1 Co-financing. To what extent was the reported co-financing essential to the achievement of GEF objectives? If there was a difference in the level of expected co-financing and actual co-financing, then what were the reasons for it? Did the extent of materialization of co-financing affect project's outcomes and/or sustainability? If so, in what ways and through what causal linkages?

According to the final PIR and the TE report, the Project leveraged substantial local co-financing of roughly US$4.9 M. This was raised through partnerships with the Federal Electricity Commission (CFE), the private sector, the Gov't of Mexico, and the Mexicali State Government. The flow of co-financing allowed IIE, the executing agency, to invest in in significantly more PV capacity than expected, and it enhanced local technical capacity to sustain project outcomes.

5.2 Project extensions and/or delays. If there were delays in project implementation and completion, then what were the reasons for it? Did the delay affect the project's outcomes and/or sustainability? If so, in what ways and through what causal linkages?

Based on information in the TE report, the project was extended by 18-months due to various challenges in finding a partner to provide financial support for the installation of a residential or commercial grid-connected photovoltaic system (PV system) with a capacity of at least 150 kWp. The headquarters of the first company that was interested was destroyed in an earthquake, and other potential partners took their time in deciding whether or not to participate. The extension permitted the project to install this relatively large system and monitor it's performance to demonstrate the viability of grid-connected PV systems.

5.3 Country ownership. Assess the extent to which country ownership has affected project outcomes and sustainability? Describe the ways in which it affected outcomes and sustainability, highlighting the causal links:

Based on information in the TE report, the project has benefitted from strong country ownership and the federal and state government levels. The executing agency is a national institute and various national agencies including the Federal Electricity Commission (CFE) and the Energy Regulatory Commission (CRE) have been strong project advocates and co-financing partners. National government support for the project was critical in developing the regulatory framework for grid-connected solar PV systems. The state governments (initially Mexicali, and later Baja California, Zacatecas, Queretaro, Yucatan, Quintana Roo, and Durango) were supporters of the project and participated in funding installation of PV systems.

6. Assessment of project's Monitoring and Evaluation system

Ratings are assessed on a six point scale: Highly Satisfactory=no shortcomings in this M&E component; Satisfactory=minor shortcomings in this M&E component; Moderately Satisfactory=moderate shortcomings in this M&E component; Moderately Unsatisfactory=significant shortcomings in this M&E component; Unsatisfactory=major shortcomings in this M&E component; Highly Unsatisfactory=there were no project M&E systems.

Please justify ratings in the space below each box.

6.1 **M&E Design at entry**	Rating: **Moderately Satisfactory**

The project's M&E plan at entry (pg. 22, Project Document) focused largely on monitoring PV system performance and does not consider regular monitoring of project implementation. The M&E plan did include provisions for a final report, dissemination of lessons learned, and an independent terminal evaluation. The project budget did

include a line for M&E, but it's not clear if this referred to monitoring of project implementation or performance of the PV systems.

The ProDoc's logical framework was well elaborated with indicators for objectives and outcomes, targets, means of verification, and consideration of assumptions and risks. Most indicators were SMART, but for a few, it's not clear how (or why) the targets were established without any estimate of market size and potential demand. The TE report takes issue with one of the targets in particular, noting that to develop a functioning market, a target of 120 KW per year installed in a market of 100 million people is not ambitious (pg. 7).

6.2 **M&E Implementation**	Rating: **Moderately Satisfactory**

Based on information in the TE report, project M&E did take place. Project implementation was monitored through UNDP tracking tools (TT) used by UNDP Mexico and the IIE. The TTs included the review of the project implementation reports (PIR), the trimester reports (TR) and the Annual operation plan (AOP). The TE report could not verify the timeliness of reporting, but confirms that the appropriate number of PIRs were submitted. According to the TE report, the quality of reporting could have been better. "There are reports that are under review, but then, there is no information on whether they were completed or not. The number of reports is good, but sometimes the information is repetitive. The timeliness of the reports could not be verified, but there are no reports outside of the expected dates (pg. 34)." There is no information on whether M&E data was used for adaptive management.

7. Assessment of project implementation and execution

Quality of Implementation includes the quality of project design, as well as the quality of supervision and assistance provided by implementing agency(s) to execution agencies throughout project implementation. Quality of Execution covers the effectiveness of the executing agency(s) in performing its roles and responsibilities. In both instances, the focus is upon factors that are largely within the control of the respective implementing and executing agency(s). A six point rating scale is used (Highly Satisfactory to Highly Unsatisfactory), or Unable to Assess.

Please justify ratings in the space below each box.

7.1 **Quality of Project Implementation**	Rating: **Satisfactory**

The implementing agency was UNDP, led by UNDP-Mexico.

According to the TE report, the project design was largely satisfactory. The TE report does mention minor shortcomings in project design such as the failure to consider a drop in energy prices, no analysis of the demand structure, no consideration of lessons learned from past projects, and the lack of a clearly defined communications strategy.

The choice of IIE as the executing agency was appropriate given its status as a nationally funded institute with, according to the TE report, decades of experience in the renewable energy sector.

Oversight and supervision by UNDP was adequate. UNDP provided appropriate support and input on procurement and financial management. UNDP arranged for financial audits of the project, reviewed PIRs, and as part of the Project Steering Committee, helped the project shift from a regional to a national focus. The TE report notes that financial audits showed that the project was well managed. UNDP also granted an extension to the project to permit it to find a partner for installation of a large PV system.

7.2 **Quality of Project Execution**	Rating: **Satisfactory**

The executing agency for the project was IIE, the national agency responsible for promoting and supporting innovation in renewable energy. Based on information in the TE report, IIE managed the project effectively. IIE conducted all training in partnership with academia and private sector companies. It was also able to leverage funding from national and state governments to finance installation additional PV capacity (compared to what was targeted). IIE also worked constructively with industry regulators to develop the frameworks for grid-connected PV systems. IIE was able to adapt implementation in the face of challenges in finding a partner for the large PV system, and seek out other partners. Based on the TE report, project reporting and communication with UNDP was well managed and UNDP was informed in a timely manner of the need for an extension.

8. Lessons and recommendations

8.1 Briefly describe the key lessons, good practices, or approaches mentioned in the terminal evaluation report that could have application for other GEF projects.

Achievement of the objective and results of the project: External influences have to be measured and followed separately for a clear understanding of direct project achievements.

Sustainability of project benefits: Workshops and frequent visits to public entities involved in the matter especially when there are political changes, and preferably, have more than one person involved in each entity, but do not compromise the personal relationship.

Innovation: The promotion of the project website through social networking tools, search engines, international forums, specialty magazines (physical and online) and do interviews to publicize the project.

Catalytic and replication effect: Achieve the same not only in Mexico but also in other parts of the world. To have a replicable project, there needs to be a design with replicability as the objective. It is not clear that the replicability of the project was present in its design.

Monitoring and evaluation: Project metrics need to be clearer and, if possible, quantitative. Avoid having many qualitative metrics.

8.2 Briefly describe the recommendations given in the terminal evaluation.

1. To have an impact on the regulatory framework and national policy an institutional arrangement must be found, which includes entities with that responsibility. The IIE could not do it because these are outside its competence.

2. Administrative barriers by the GEF/UNDP also remained as one of the factors that affected the delay of the project, but at the same time, the evolution of PV prices globally caused the project implementation to occur in the best way. It should be noted that if prices had not dropped, the project area would have been largely restricted to the northwest of the country because of the solar radiation and the use of air conditioners there, as well as for the electricity rates in the hottest weather peaks.

3. To support the replicability of the project the recommendations are:

- Analyze the PV business development and the requirements to have an industry of local content or not
- Incorporate studies for PV policy development in other countries
- Incorporate some external capacity to Mexico experienced in other markets, both in politics and in the PV market development
- Incorporate worldwide PV system pricing studies and understand the differences

- Have in the project team several dimensions of experience: political, legal, economic, financial, technical, of technology/product development, business development and project management, through consultants
- Try to have some flexible budgets at UNDP/GEF for small and medium-cost projects to get approvals more easily

9. Quality of the Terminal Evaluation Report

A six point rating scale is used for each sub-criteria and overall rating of the terminal evaluation report (Highly Satisfactory to Highly Unsatisfactory)

Criteria	GEF EO comments	Rating
To what extent does the report contain an assessment of relevant outcomes and impacts of the project and the achievement of the objectives?	The TE report evaluates project results along a set of indicators for each outcome, but finds that many indicators are beyond the scope of the evaluation. Moreover, it's not clear how the indicators are tied to project outcomes. The way the assessment is organized makes it difficult to say whether broader project outcomes and objectives were achieved.	**MS**
To what extent is the report internally consistent, the evidence presented complete and convincing, and ratings well substantiated?	The report is internally consistent, but weaker on evidence. More information and evidence to support the ratings for results indicators would benefit the report. The report often makes claims about project performance and results without providing evidence to support the claims. Evidence on project activities and outputs is presented in the report, but the evidence needs to be more clearly tied to the claims and vice-versa.	**MU**
To what extent does the report properly assess project sustainability and/or project exit strategy?	The report contains a detailed assessment of sustainability along various risk dimensions. Again the evidence needs to be more clearly tied to the ratings on sustainability.	**MS**
To what extent are the lessons learned supported by the evidence presented and are they comprehensive?	Lessons learned are rather vague, and again, it's not clear where they come from. They are comprehensive only in the sense that they try to touch on all aspects of the project.	**MU**
Does the report include the actual project costs (total and per activity) and actual co-financing used?	Total projects costs (total and by component) are presented, but in the Spanish version of the budget. Some simple translation is need here and clearer presentation of the tables. Actual co-financing numbers are presented.	**MS**
Assess the quality of the report's evaluation of project M&E systems:	The report contains an assessment of M&E implementation. This is somewhat incomprehensible due to poor translation. Comments on the design of M&E are scattered throughout the report.	**MU**
Overall TE Rating		**MS**

TE Quality = (.3*(4+3)) + (.1*(4+3+4+3)) = 3.5 = MS

10. Note any additional sources of information used in the preparation of the terminal evaluation report (excluding PIRs, TEs, and PADs).