Small Grid-connected Photovoltaic Systems
Final project evaluation

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1 Executive summary

The Project "Small grid connected photovoltaic systems" was a medium size project implemented throughout almost 5 years (2007 – 2012). During this course of time an approximate $ 5.9 millions USD were invested to achieve the goals of the project, of which GEF has contributed in cash with $ 1 million USD under the Climate Change Mitigation Strategy.

The objective of this evaluation is to analyze objectively the implementation of the projects and the successes, results and achieved impacts. This evaluation established the relevance, execution and success of the project, including the sustainability of the results, compiled and has analyzed the specific lessons learned as well as best practices regarding the selected strategies and the institutional arrangements, which may be relevant for other similar projects in the country or other countries around the world.

The project intended to establish the basic conditions to facilitate the introduction in large scale of on-grid photovoltaic systems in Mexico with a double goal: a) reduce the peaks of demand in regions with significant differences between the demand during peak hours and non-peak hours, as a result of the use of coolers or air-conditioners and b) support the grid where the peak availability is limited by installed capacity.

The expected result of the project was to eliminate the main hurdles to the development of a substantial market for on-grid connected photovoltaic systems in Mexico and build capacities on the national level to support its sustained and long term commercial development. It is expected that the removal of the hurdles will pave the way for the development in large scale of on-grid photovoltaic systems under future programs, which would also result in a reduction of CO2 peak emissions by exchanging the source of power generation from fossil fuels to photovoltaic systems.

The project document (ProDoc) was approved and signed in July 2007. The implementation of the project was planned originally for a period of 3 years, but it was eventually extended due to different reasons, which are explained in this report. The operational conclusion of the project was in December 2012.

The project planned to achieve the following results:

- Result 1: To prove technical and economical feasibility of on-grid solar PV systems, to reduce and smooth demand peaks during the summer in Northern Mexico and on-grid PV systems as a reliable technical and commercial option to supply electricity in Northern Mexico.
- Result 2: National Institutions with technical skills in the design, maintenance and operation of on-grid PV systems.
- Result 3: The Project contributes to the national RE policy and to the development of the local and international PV market.

In the table below an overview of the details of the project is given:

Name of the Project	Small grid connected photovoltaic systems			
Number of the project FMAM:	PIMS 2201		*Planned amount (US $)*	*Real amount (US $)*
Project ID UNDP:	00056987	Financing FMAM:	1'000,000	1'000,000
Country	Mexico	Others:	200,000	828,000
Region	Latin America	Government:	800,000	4'165,000
Focal area:	Climate change	UNDP:		
Operational Program:	OP-7	Total co-financing:	1'000,000	4'993,000
Strategic priority	CC-6 (Support development of new, low GHG emitting energy technology)	Total cost of the project:	2'000,000	5'993,000
Executing agency	Instituto de Investigaciones Eléctricas	Signing date ProDoc (start of the project):	07/07/2007	
Type of Project	Medium size project	Closing date of the project:	Proposed: 07/07/2010	Real: 31/12/2012

The progress and success of the activities and components of the project have been revised through the tracking tools (TT) used by UNDP Mexico and the IIE during the execution of the project. The TT include the review of the project implementation reports (PIR), the trimester reports (TR) and the Annual operation plan (AOP). The consistency of the data and comments registered in these tools are the proof of the ownership of the project and therefore the acceptance of the commitments agreed upon.

The period of the Project, originally for 36 months, was extended due to the reasons not imputable to IIE or UNDP. The latter was informed on time during the trimester and annual reports as well as during the meetings of the Steering Committee of the project. One of the main reasons for the considerable delay was to the search to find a suitable partner to install a photovoltaic system with at least 150 KWp.

As part of the strategy of the Project ownership goals were established for the promotion and dissemination among the main stakeholders of the project. Through the networking capacity of IIE and the interest of the participants as well as the support of several stakeholders as AMPER, CRE and some universities, a total of almost 1100 persons attended the several workshops, training courses, congress, events organized and/or supported by the project.

The Project has received a substantial support in local co-financing of roughly $ 4.9 million USD. This amount in conjunction with the several alliances and partnerships allowed IIE to consolidate a strategy to capacitate technologically and to strengthen local capacities to face the future needs of human capital as well as of energy development.

In the table below an overview of the main qualifications given in this evaluation are presented:

Evaluated aspects	
Concept, design and strategy	**S**
Evaluation of coherent and logic	**S**
Institutional arrangements	**HS**
Financing and execution schedule	**AS**
Ownership from the local governments and alignment of the projects with national priorities and/or country plans	**HS**
Stakeholders participation and dissemination of the information	**S**
Evaluation of the mechanisms or strategies to foster the use of best practices	**MS**
Evaluation of the established alliances and partnerships	**HS**
Replication of the project	**HS**
Monitoring and evaluation	**HS**
Financial planning	**HS**
Execution and implementation	**S**
Sustainability of the project	**L**

HS – highly satisfied; S- satisfied; MS – moderately satisfied; L - Likely

2 Project final evaluation

The Final Evaluation (FE) is a requirement for projects funded by the GEF and is mandated by the UNDP regulations. This evaluation was carried out according to the guidelines, rules and procedures of the UNDP and the GEF.

The overall objective of this Final Evaluation is to objectively analyze the project implementation and the accomplishments, results, and impacts achieved. This evaluation will establish the relevance, performance, and success of the project including the sustainability of the results, and it will collect and analyze specific lessons and best practices regarding the strategies used and the implementation arrangements, which may be relevant to other similar projects in the country and in other countries around the world.

The key issues analyzed in this evaluation include:

- Institutionality - skill of the executing agency and project stakeholders in achieving the objectives
- Empowerment – empowerment of key agencies of the project and their findings
- Local setting – the project is aligned with the development of the country and its energy priorities
- Relevance of the strategy and logical framework and their relationship with the operational and current action plan - how the project has been implemented and monitored

The methodology used in this evaluation is based on:

- Preparation and review of the work plan approved by the UNDP
- Collection of the project documentation
- Analysis of the project documentation with primary focus on:
    - Reports produced
    - Symposiums organized
    - Workshops organized
    - Certification programs offered
    - Monitoring of projects
- Evaluation of PV projects connected to the grid
- Evaluation of project impacts - environmental, social and sustainable
- Evaluation of the institutional capacity and governance of the project
- Evaluation of the human and financial management of the project
- Evaluation of the use of human, technical and financial resources of the project
- Evaluation of compliance with regulations and project reports - whether they comply with the UNDP and GEF rules
- Evaluation of the performance and achievements
- Produce a report with the whole evaluation
- Evaluation report draft based on GEF methodology
- Final report with the observations and comments received

To obtain project information and documents we had the support of the Project Coordination Unit, UNDP Mexico, as well as the Electrical Research Institute (IIE, for its acronym in Spanish), which is the project-executing agency. Also, relevant information was obtained for analysis of the project through a series of interviews with the following stakeholders:

- Dr. Jorge Huacuz, Manager of Non-Conventional Energy of the Electrical Research Institute (IIE).

- Mr. Jaime Agredano, Leader and Project Coordinator and member of the IIE.
- Ms. Alejandra Lugo, Project Manager and member of the Coordination Unit.
- Mr. Enrique Guzman Lara, Adjunct General Manager of Renewable Electricity and Energy, Energy Regulatory Commission (CRE for its acronym in Spanish).
- Mr. Salvador Villalon Espinoza, Baja California Distribution Management of the Federal Electricity Commission (CFE for its acronym in Spanish), which is the federal government agency responsible for generating, transmitting, and distributing electricity in Mexico.
- Mr. Julio Valle, CEO of Sustainability, Undersecretary of Energy Planning and Technological Development of the Secretary of Energy (SENER for its acronym in Spanish), which is the institution responsible for establishing policies related to energy in the country. The Undersecretary of Energy Planning and Technological Development is responsible for the formulation and implementation of the Special Programme for the Use of Renewable Energies.
- Mr. Jonathan Ryan, Coordinator of the support unit for GEF projects, Undersecretary of Planning and Environmental Policy, Secretary of Environment and Natural Resources (SEMARNAT[1] for its acronym in Spanish).
- Prof. Verania Chao Rebolledo, Director of Sustainable Development Programmes of the UNDP in Mexico.
- Mr. Raúl I. Alfaro-Pelico, Regional Technical Advisor; Energy, Infrastructure, Transport & Technology of UNDP in Panama.
- Mr. Carlos Flores, CEO Conermex, member of the Mexican Association of Renewable Energy Suppliers (AMPER for its acronym in Spanish) and participant member in the project inception workshop.
- Ms. Martha Mireya Ruiz Amelio, UAMI Professor-Researcher in charge of the PV system established in a university building.
- Ms. Maria del Pilar Hernández Limonchi, Academic Director of the Polytechnic University of Morelos, who was in charge of the PV system installed in an area near the administration building.
- Mr. Omar Ricalde, Energy Laboratory from the Engineering Faculty of the University of Yucatan (UADY), coordinator of the certification program taught at UADY.
- Mr. Alfredo Salinas, Assistant Director for Research and Technological Development of the Higher Technological Institute of Lerdo, Durango, where the certification program was taught.
- Mr. Marco Vilchis Ceron, Environmental Laboratory Coordinator at the Autonomous University of Baja California, where a graduate course and the 2nd. International Colloquium in PV systems were taught.
- Mr. Bensi Levy, Owner, and Soledad Hernandez, manager of the company Green Corner, where the first three-phase PV system was connected to the grid.
- Mr. David Muñoz Andrade, Director of the State Energy Commission of the State Government of Baja California, which requested the teaching of the first training course in PV systems for technicians.
- Mr. Ricardo Salcido, Director of the company Persal of Mexicali, BC, which won the bid for support from the GEF-UNDP-IIE project for the installation of a 150 kW PV system for purposes of self-sufficiency, which was cancelled.
- Dr. Gema A. Mercado Sánchez, Director of the Zacatecan Council of Science and Technology (COZCYT for its acronym in Spanish) of the Government of the State of Zacatecas, which hosted the First International Colloquium on PV Systems, and hosted the 1st. Workshop on Financing Mechanisms in PV Systems, was the host of the 2nd.

- [1] This is the institution that supports the GEF focal point in Mexico (the Ministry of Finance and Public Credit, SHCP for its acronym in Spanish) in the review and technical monitoring of the initiatives.

PV Systems Certification Program in late 2011 and was endorsed by the GEF-UNDP-IIE for the installation of a 180 kWp photovoltaic plant, of which the project provided 80 kWp.

- Mr. Sergio Armando Ruiz Fragoso, Alternative Energy Manager of the Alcione Group, SA de CV, and a student of the certification program in PV systems taught at UADY. Alcione has installed a PV system with capacity of 15 kWp in the state of Morelos, in addition to being the first to be funded by the FIDE by 70%.

The interviews were supplemented by inspections and field visits to various system installations like the Electrical Research Institute (IIE) in Cuernavaca, the PV system installed at the Polytechnic University of Morelos, the PV system installed by Alcione at its headquarters in Cuernavaca, the PV system installed at the Metropolitan Autonomous University of Iztapalapa in Mexico City, and the PV system installed in the city of Zacatecas.

The interviews were conducted as directed by the UNDP and GEF:

- Anonymity and confidentiality.- the evaluation observed the right of the people to provide information ensuring their anonymity and confidentiality.

The final report includes the GEF indications:

- Relevance. The extent to which the activity is appropriate for development priorities and national and local organizational policies, including changes over time.
- Effectiveness. The extent to which a goal has been achieved or is likely to do so.
- Efficiency. The extent to which results have been delivered with most inexpensive resources possible, also called cost effectiveness or efficacy.
- Results. The positive and the negative, the planned and the unforeseen, changes and effects produced by a development intervention. In GEF terms, results include direct project outcomes, short and medium-term results, and longest-term impact including global environmental benefits, replication effects, and other local effects.
- Sustainability. The likely ability of an intervention to continue to deliver benefits for an extended period of time after its completion. The projects need to be environmentally, financially, and socially sustainable.

This document is organized according to the phases of the project:

- The concept/design and strategy and its coherence and logic
- Institutional arrangements
- Financing and project completion time
- The ownership by local governments and coherence of the project with the national priorities and/or with state plans
- Participation of stakeholders and dissemination of information
- Replicability
- Mechanisms or strategies to encourage replication of best practices
- Established alliances and synergies
- Approaches on implementation
- Monitoring and evaluation
- Financial planning
- The methods for execution and implementation
- Effectiveness and efficiency, two indicators
- Results achieved by the project to date
- The sustainability of the project

It begins by presenting the initial design of the project, its objectives and findings and then makes the evaluation of the project based on these data and concludes with some recommendations.

3 The project and its context of development

The project began on July 7, 2007 with the signing of the contract, and its three-year duration was extended by conditions beyond the control of the IIE and UNDP to December 31, 2012. Within these conditions, one that stands out was the long process of getting a partner for the installation of a grid-connected photovoltaic system of at least 150 kWp.

These extensions were made keeping with UNDP regulations and have been endorsed by the Project Steering Committee. The logical framework of the project presents the following structure:

LOGICAL FRAMEWORK MATRIX				
PROJECT STRATEGY	**VERIFIABLE OBJECTIVES INDICATORS**			
OBJECTIVE				
	INDICATOR	**TARGET VALUE**	**VERIFICATION METHOD**	**ASSUMPTIONS AND RISKS**
PROJECT OBJECTIVE: To demonstrate the technical, operational, and ultimately economic feasibility of the grid-connected photovoltaic systems as means to reduce and smooth out the electrical demand peaks during the summer in northern Mexico	Support regulatory framework and promotion schemes developed for grid-connected photovoltaic systems	Implementation and adoption of legal frameworks and promotion programs	Changes to the regulatory framework that allow the interconnection of photovoltaic systems to the grid	Financing institutions committed to promote schemes and financing options for PV development PV information and information systems effectively implemented by users and potential investors Continuation of market distortions that overshadow the benefits of PV systems
	Marketing plans that stimulate user interest are developed and implemented	Purchasing mechanisms available to potential users that include financing possibilities	Number of systems installed	
	Technical capacity of local users on operation of grid-connected photovoltaic systems	Institution, technicians, and users have participated in training programs and are applying the knowledge received in the installation, operation, and maintenance of grid-connected photovoltaic systems	Number of trained people and companies involved in the grid-connected photovoltaic systems market	
	Cost of installed kW of grid-connected photovoltaic systems in northern Mexico	A cost in $/W is determined and the cost trajectories for the next three years are projected	Project documentation	
	Total electricity generated from the grid-connected photovoltaic systems (thus displacing the conventional methods of electricity generation)l	220MWh/year	Project documentation	
	Photovoltaic information updated and disseminated to institutions, users and investors to encourage and promote the installation of grid-connected photovoltaic systems	Information of grid-connected photovoltaic systems widely available and used	Manuals and guides available and information generated in promotion and training events	

RESULT 1: Grid-connected photovoltaic systems are presented as an option to provide electricity, technically and commercially feasible, in northern Mexico	PV systems selling models	Availability of systems purchase plans	Compilation of marketing strategies used by companies and organizations	The financial mechanisms do not promote enough the demand needed for the expansion of the project Technological failures or poor performance
	Systems purchased through mechanisms developed by marketing and installing companies	Photovoltaic market developed	Sales statistics provided by the companies	
	Systems connected to the grid and operating	Grid-connected PV systems reducing electric demand	Operating reports of monitored systems and of site visits	
	Technical study concerning the penetration of grid-connected PV systems	Determining the technical limits of penetration of PV systems in the distribution grid	Report	

PRODUCTS TO ACHIEVE RESULT 1:

1. Sales mechanisms and market integration models for the development of grid-connected PV systems are developed.
2. Installation record of grid-connected PV systems made during the term of the project.
3. 150 kW PV system installed in a commercial building connected to the grid and operating in northern Mexico.
4. Analysis of the technical and financial feasibility of the grid-connected systems developed for different scenarios.

OBJECTIVE	INDICATOR	TARGET VALUE	VERIFICATION METHOD	ASSUMPTIONS AND RISKS
RESULT 2: Technical capacity for the design, operation, and maintenance of grid-connected PV systems and related components are incorporated into national institutions	Technical specification for the developed and internalized interconnection	National institutions supplied with technical capacity	Technical specification published and in use	Trained technicians leaving CFE Lack of interest in the generation schemes of grid-connected PV systems
	CFE personnel and companies in the same industry participating and in training	CFE personnel and of installation companies able to operate grid-connected PV systems	Course registration list, number of participants	

PRODUCTS TO ACHIEVE RESULT 2:

1. Technical guidelines and specifications developed for the interconnection of PV systems to the local grid
2. A training program on grid-connected PV systems is developed and implemented by the CFE

RESULT 3: The results of the project influence the national policy on renewable energy and contribute to global and local efforts in PV market development	Increased knowledge of the potential benefits of grid-connected PV systems	Public awareness of the benefits of grid-connected PV systems	Minutes of meetings, internal reports	Collapse of the PV industry Lack of user acceptance
	Incremental participation of suppliers in promotion activities	Suppliers able to promote the benefits of the PV industry	Promotional brochures and relation of web pages from domestic companies related to grid-connected PV systems	

	Distribution of relevant information	Information exchange systems operating	Distribution lists and visitor statistics of the project website	
	Energy variable included in the national MDG report	MDG goals on energy reported and performed	Minutes, reports, published strategies	

PRODUCTS TO ACHIEVE RESULT 3:

1. Modifications, adjustments and/or additions to the legal framework and regulations based on the project results are published
2. Local suppliers knowledgeable, skilled and aware of the market potential for grid-connected PV systems
3. Project experiences are shared with national stakeholders and other similar initiatives around the world
4. Systematization of information on grid-connected PV systems in the context of Mexico's strategy for Goal 7 of the Millennium Development Goals

The project stakeholders have been:

- **United Nations Development Programme in Mexico** (UNDP).
- **Global Environment Facility** (GEF).
- **Ministry of Finance and Public Credit** (SHCP for its acronym in Spanish) - Institution where the GEF Operational Focal Point is in Mexico.
- **Secretary of Environment and Natural Resources** (SEMARNAT) - Institution that acts as GEF Technical Focal Point in Mexico and provides technical advice on initiatives to SHCP.
- **Secretary of Energy** (SENER) - Institution responsible for setting policies related to energy in the country. The Undersecretary of Energy Planning and Technological Development is responsible for the formulation and implementation of the Special Programme for the Development of Renewable Energies.
- **Federal Electricity Commission** (CFE) - The federal government agency responsible for generating, transmitting, and distributing electricity in Mexico. The Unit of New Sources of Energy is responsible for formulating and proposing projects relating to the utilization of non-conventional energy sources.
- **Energy Regulatory Commission** (CRE) - It has the mission to regulate in a transparent, fair, and efficient way the industries of gas, refined oil, hydrocarbons and electricity derivatives thus generating certainty that encourages productive investment promoting healthy competition and adequate coverage, and tending to the reliability, quality, and security of the supply and provision of services at competitive prices for the benefit of users.
- **Electrical Research Institute** (IIE) - Federal government agency responsible for promoting and supporting innovation through applied research and technology development with high added value to increase the competitiveness of the electricity industry and other industries with similar needs.
- **Mexican Association of Renewable Energy Suppliers** (Amper) - Mexican non-profit civil association whose objectives are to promote and expand the use of renewable energy in Mexico. It has 64 members, some of whom have experience in the installation of grid-connected PV systems.

- **Metropolitan Autonomous University in Iztapalapa** (UAM-I) - UAM academic unit of scientific research strategically located in the east area of the Federal District. Offering 26 academic majors and 27 graduate programs (specialties, masters, and doctorates), the Iztapalapa unit is the one with the highest demand for undergraduate admissions in the area. The first course in grid-connected PV systems was conducted in this institution with the participation of 25 people. It has a 60 kWp PV system installed since 2009.
- **Polytechnic University of the state of Morelos** (UPMOR) - Academic institution in the state of Morelos that received technical support to implement a 6.5 kWp grid-connected PV system.
- **Autonomous University of Yucatán** (UADY) - Official sector institution where a certification course took place on grid-connected PV systems in May 2010, with the participation of 35 people.
- **Higher Technological Institute of Lerdo** (ITSL) - Official sector institution where a certification course took place on grid-connected PV systems in February 2009, with the participation of 20 people.
- **Autonomous University of Baja California** (UABC) - Academic institution. In 2008, in conjunction with the State Energy Commission (EEC for its acronym in Spanish) they were the venue for the Third Course on PV Systems with the participation of 28 engineers. Again in 2009, in conjunction with the EEC, they were the headquarters of the 2nd PV Systems International Symposium, which was attended by 163 people.
- **The Green Corner restaurant** - Vegetarian restaurant located in Mexico City. In 2005, the first PV system with a capacity of 30 kWp was installed there. For several years, the IIE monitored its operation.
- **State Energy Commission of the State of Baja California** (CEE-BC) - responsible for the sustainable use of local energy resources, impacting positively on the quality of life of Baja California residents and the competitiveness of the state. In 2006, in conjunction with the CFE and with IIE support, 220 PV systems of 1kWp each were installed in the same number of houses in the Housing Unit Valle de las Misiones in the city of Mexicali, B.C. In 2008, together with the Autonomous University of Baja California (UABC) they hosted the Third Certification Course in PV systems with the participation of 28 engineers. In 2009, together with the UABC they were the venue of the 2nd PV Systems International Symposium, attended by 163 people. In 2010, they requested from the project the first training course for technicians, with the assistance of 18 people.
- **Secretary of Sustainable Development of the state of Querétaro** (SEDESU-Qro) - Responsible for promoting sustainable development of the state in question. With this secretariat, the Third International Symposium of Grid-connected PV Systems took place in November 2010 with the participation of 218 people. Discussions were conducted to see the possibility of giving support from the GEF-UNDP-IIE project to develop the project for the installation of a grid-connected PV system at the International Airport of the City of Queretaro that did not materialize.
- **Zacatecan Council of Science and Technology** (COZCYT) - Public agency decentralized from the State Public Administration. Its primary objective is to promote and coordinate the planning and development of science and technology in the state of Zacatecas, driving the highest participation in society. In 2007, the First International Symposium on PV systems took place in its facilities with the participation of 68 people. In April 2008, it hosted the 1st Workshop on PV System Financing Mechanisms attended by 84 people. In August 2008, it was the venue for the 2nd Course on PV Systems attended by 33 participants. In late 2011, its participation as shareholder was consolidated to receive support from the GEF-UNDP-IIE project for the installation of a 180 kWp photovoltaic plant, of which the project provided 80 kWp; the Zacatecas Government contributed the remaining 100 kWp. This plant will supply its own

facilities in addition to those of the State System for Integral Family Development (SEDIF for its acronym in Spanish), the State Center for victim assistance (CAVIZ), and La Encantada Park.

- **Persal Industrial Group S.A. de C.V.** - Manufacturing company located in the city of Mexicali. Company that won the bid (first partner) to receive support from the GEF-UNDP-IIE project for the installation of a 150 kW PV system for the purpose of self-sufficiency, which was cancelled.
- **Alcione Group S.A. de C.V** - Distributor of electrical equipment and renewable energy services. In March 2011 it installed a 15-kWp capacity PV system in the state of Morelos, in addition to being the first to be funded by the FIDE by 70%.

Activities carried out during the development of the project are presented in Table 1, highlighting the following:

- Three International Symposiums on PV Systems: Zacatecas (2007), Mexicali (2009), and Queretaro (2010) with the attendance of 487 participants, and which served as medium for the dissemination of information on PV technology and the creation of a space to discuss problems and barriers faced during the implementation of the PV systems.
- One PV Forum Mexico (2011), with the attendance of 210 participants and the purpose of promoting the connection between the major stakeholders interested in national development of photovoltaic technology, with the intention of analyzing the opportunities it offers and the existing barriers for mass application, as well as open a crack to know their progress, challenges, and opportunities.
- Three workshops that addressed the issue on Financing Mechanisms (2008), Roadmap of the PV Industry in Mexico (2010) and for CFE Queretaro (2012), with the attendance of 118 participants.
- Five courses on PV systems: UAMI (2007), UABC (2008), Zacatecas (2008), Lerdo (2009), and Merida (2010), with the attendance of 141 participants, in addition to the development of an online graduate course (2012).
- Institutionalization of PV technical courses taught at the IIE through its Graduate Center: One in 2010, two in 2011, one in 2012, and one in 2013; in addition to one in CEE-Mexicali (2010) and another in CFE-Hermosillo (2012), with a total attendance of 109 participants. To support these efforts, four teams for PV training were developed named Profesol.
- PV system monitoring: Green Corner (2008), La Paz (2009), CERTE (2010), UAMI (2010), and Tijuana (2010).
- Six PV systems financed by the FIDE.
- Grid-connected Photovoltaic Systems User Guide, Small Scale Applications, of which two runs of 1500 copies each were made in the years 2010 and 2011. In addition, it is posted on the project site for download and there have been more than 900 downloads.
- Project website at http://www.iie.org.mx/proyectofotovoltaico/index.php with 1,000,067 visitors by the end of 2012.
- 9 kWp installed in 2010 in the CERTE in Juchitan supported by the GEF/UNDP/IIE project with the purchase of two inverters and the web box for remote monitoring. With this, CERTE became the first center to generate wind and photovoltaic power connected to the grid. The IIE will study the behavior of these systems under different climatic conditions than the north of Mexico. Both the wind project and the PV are financed with funds from GEF and the Government of Mexico, so it is expected to set a nationwide precedent of the development of such systems.

- 180 kWp installed in Zacatecas in 2012, of which the GEF/UNDP/IIE project contributed 80 kWp. Its objectives, among others, are to promote the use of this technology for self-sufficiency purposes and its technical feasibility as part of an integrated system connected to the Mexican electric grid. As a result of this, to seek and publicize the benefits generated in the local electrical system capacity, measuring the impact on user consumption, mitigation of CO2 equivalent emissions, and also getting system operational information that allows to keep on developing the standards and regulations that help the secure and orderly dissemination of these kinds of applications in other parts of the country.
- Nearly 4 MW of PV systems installed in Mexico up to 2012.

Description	Indicator	Base line	Level at 2007	Level at 2008	Level at 2009	Level at 2010	Level at 2011	Level at 2012
Demonstrate the technical, operational, and ultimately economical feasibility of the grid-connected PV systems as means to reduce and smooth out electrical demand peaks during the summer in northern Mexico	Regulatory framework of support and promotion schemes developed for grid-connected photovoltaic systems	Accelerated depreciation - 100% in the first year; 30% tax credit. Since 2007, the connection to the grid of up to 30 kWp is possible	PV system interconnection contract model		Mexico's Congress issued the Law of Use of Renewable Energy and Financing of Energy Transition. 3 billion pesos fund. The project is discussing the law with the PV community in Mexico.	CRE published the new interconnection model with the 500 kWp limit and at medium voltage	CFE has bidirectional counters available in all its offices. CFE announced that the response time for a PV system contract is five days	Review of the prosolar program for 2012-2013 with a focus on DAC users
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project on said findings		- Impact on FV: tremendous - Impact of the project: indirect by IIE efforts during the approval of the GEF/UNDP project		- Impact on PV: Important - Impact of the project: government stakeholders already with some technical information	- Impact on PV: Tremendous - Impact of the project: 80%	- Impact on PV: Very important - Impact of the project: 80%	- Impact on PV: Important - Impact of the project: 20%
	Marketing plans that stimulate user interest are developed and implemented	0 financing		11 funds for the development of RE projects	Invitations to development banks in Mexico and private banks for symposiums and workshops	NAFIN offered to lead the promotion of financing mechanisms for PV systems. The FIDE has a funding mechanism for PV systems. First PV system financed by FIDE (Trust for electrical energy saving). Walmart Mexico installed another 200 KW system through the GTres Financing Services company. Chrysler Mexico announced that it commissioned a 400 KW system in Saltillo, Coahuila.	One FIDE funding to the ALCIONE Group system in Cuernavaca. FIPATERM will start funding PV systems in the Baja California region - 5 years with 12% interest	FIDE funded six systems for up to 50% of the cost. Banorte announced its interest in having a line of credit for PV systems.
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in			- Impact on PV: Very important	- Impact on PV: Important	- Impact on PV: Very important	- Impact on PV: Very important	- Impact on PV: Very important

	said findings			- Impact of the project: information obtained in the Financing Mechanisms Workshop	- Impact of the project: 100%	- Impact of the project: Very high for the FIDE	- Impact of the project: 100%	- Impact of the project: 50%
	Technical capacity of local users on operation of grid-connected photovoltaic systems	0 users trained		25 participants in the 1st Certification Program in PV Systems IIE-UAMI. 25 participants in the 2nd Certification Program in PV Systems IIE-COZCYT. 30 participants in the 3rd Certification Program in PV Systems, Mexicali IIE-UABC.	30 participants in the 4th Certification Program in PV Systems in Ciudad de Lerdo de Tejada, Durango	IIE-UADY 5th Certification Program in PV Systems in Merida with 35 participants and 14 companies. Over 50% of small businesses. Three CFE engineers.	55 users trained in the three IIE courses. There is an advanced course in PV systems offered by the IIE Graduate Center. The next certification program will be held at the Polytechnic University of Victoria, Tamaulipas.	75 users trained in three IIE courses. Institutionalizatio n of the technical courses in PV systems through the IIE Graduate Center. Four Profesol sets were built for PV training.
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in said findings			- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%
	Cost of installed kW of grid-connected photovoltaic systems in northern Mexico	Without methodology		Cost of installation in Mexicali = USD $8/Wp	Cost in Mexicali USD $8/Wp. The offer for the Walmart PV system was of USD $7.6/Wp	USD $6 /Wp	USD $4.5 /Wp	USD $3.5 - 4.0/Wp
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in said findings			- Impact on PV: Important - Impact of the project: 0%	- Impact on PV: Important - Impact of the project: 20%	- Impact on PV: Important - Impact of the project: 20%	- Impact on PV: Very important - Impact of the project: 20%	- Impact on PV: Very important - Impact of the project: 20%
	Total electricity generated from grid-connected PV	300 Kw		13 MWh/year - IIE bought 10 KW of PV panels for	420 MWh/year	1522 MWh/year 400 kWp in Chrysler, Coahuila.	5068 MWh/year. Total capacity in Mexico is of 3945	9564 MWh/year. 1 MW of CFE. RFP of 5 MW for

	systems (thus displacing the conventional methods of electricity generation)l			the CERTE for self-spply		12 KWp in CFE Morelia. 30 kWp in the office of the General Director of CFE in Mexico City. 1 MW for a technology park in Aguascalientes.	kW.	Mexicali
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in said findings			- Impact on PV: Important - Impact of the project: 80%	- Impact on PV: Important - Impact of the project: 20%	- Impact on PV: Important - Impact of the project: 40%	- Impact on PV: Very important - Impact of the project: 30%	- Impact on PV: Very important - Impact of the project: 30%
	Photovoltaic information updated and disseminated to institutions, users, and investors to boost and promote the installation of grid-connected PV systems	0 accesibility to manuals and guides		33% of the project website is developed		70% of the website is operational. The PV system inspection and diagnostic guide is also under review. The first edition of the small PV systems guide is completed. Copies distributed at the 3rd International PV System Symposium, COP 16 in Cancun, to CFE, CRE, CONUEE, CONAVI, SE, INFONAVIT, ANES, for the members of CYTED and all energy commissions of all states in the country. The Environment office of the Federal District has sent a letter congratulating the project.		There was a second printing of the User's Guide with 1,500 copies and it was again distributed at the request of the Secretary of the Energy Commission of the Congress to the commission. The User's Guide is online and it was downloaded 980 times.

	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in said findings			- Impact on PV: Slight - Impact of the project: 100%		- Impact on PV: Important - Impact of the project: 100%		- Impact on PV: Important - Impact of the project: 100%
Grid-connected photovoltaic systems are shown as an option for providing technically and commercially feasible electricity in northern Mexico	PV systems selling models	40% interest bank loans available		Funds: FONCICYT, CONACYT, Sener-Conacyt Funds, CONAVY, SAGARPA (2), FIRCO, Senacisa-Sagarpa, World Bank. G·TR3S (mexican fund) financed the Wal-mart PV system	SENER: Program for rural electrification. Bancomex: Support for CDM certification of projects for funding	The government allocated USD 52 million for the Law on Use of Renewable Energy and the Energy Transition Funding. USD 22.5 millions will be used to finance up to 30% of the cost of RE systems until the end of 2010	CFE granted 374 contracts of grid connection	The IIE has participated in the development of the energy calculator for GIZ PV systems for SENER
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in said findings			- Impact on PV: Important - Impact of the project: 10%	- Impact on PV: Important - Impact of the project: 50%	- Impact on PV: Important - Impact of the project: 30%	- Impact on PV: Very important - Impact of the project: 80%	- Impact on PV: Important - Impact of the project: 100%
	Systems purchased through mechanisms developed by marketing and installation companies	0 kW	0 kW	0 kW		0		[in January of 2013 the Solartec company implemented a sales mechanism]
	Systems connected to the grid and operating	Green Corner Restaurant: 30 kW; Private residence in San Miguel de Allende: 2 kW		Las Palmas residential 6.5 kW; Mexicali, residential: 220 kW	172 kWp in Aguascalientes. Cuernavaca Residential 2kW. Hospital in Queretaro 20kW. Tijuana Residential 3 kW. Office in Leon, Guanajuato 11 kW.	2 kWp in a building in Acapulco. 200 kWp at a Walmart in La Paz. 30 kWp in the Technological Museum in Mexico City. 70 kWp in Veracruz. 60 kWp in UAMI in Mexico City. 6.5 kWp in UPMOR in Cuernavaca. 411.84 kWp in the	3.9 MW of capacity installed. 1 MW in Acapulco, 130 kW in the Moon Palace Hotel in Cancun (COP 16). 7.2 kW Real Ibiza Playa del Carmen, Quintana Roo. 15 kW Alcione Group, Cuernavaca. 2 kW Electrical	RFP for 80 kW funded by the GEF/UNDP/IIE project. RFP for 100 kWp funded by the state of Zacatecas. 180 kWp were installed in the CECODIC of Zacatecas.

						Chrysler plant in Saltillo. 12 kWp in the CFE office in Morelia. 9 kWp in CERTE in Juchitan with financial support from the project. 21.6 kWp in a public park in Puebla. 1000 kWp in a technological park in Aguascalientes. 17 kWp in a greenhouse in Merida.	Power Research Institute, Cuernavaca.	
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in said findings			- Impact on PV: Important - Impact of the project: 0%	- Impact on PV: Important - Impact of the project: 10%	- Impact on PV: Important - Impact of the project: 30%	- Impact on PV: Important - Impact of the project: 30%	- Impact on PV: Important - Impact of the project: 100%
	Technical study concerning the penetration of grid-connected PV systems	0 monitoring		Monitoring of Green Corner. Information on the project website.	Monitoring of Green Corner. Monitoring of a residential system in La Paz, Baja California.	Monitoring of the CERTE system. Data analysis of the UAMI. Data analysis of two PV systems in Tijuana.	A 1 kW inverter developed by the IIE was tested.	180 kWp installed in Zacatecas with monitoring. Monitoring of the IIE 2 KW PV system. Monitoring of the system in La Paz (it increased from 6.5 to 10 kW). Monitoring of 8.5 kW in the CERTE continued.
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in said findings			- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%
Technical skills for the design, operation, and maintenance of grid-connected PV systems and	Technical specification for interconnection developed and internalized	0 interconnection guides		Interconnection Guide: preliminary study to determine the capacity of Mexicali's grid		A guide for small PV applications and another for PV system inspection are under review.	The user guide for grid-interconnected PV systems, Small Scale Applications is	90 user guides downloaded. Infrastructure development to evaluate 500 kWp plants that will be

related components are incorporated into national institutions				for the interconnection of PV Systems. Collaborates with the FIDE: Design of the FIDE legend for marketing of solar panels in Mexico, national specifications for interconnection to the solar system grid, FIDE Certification for technical consultants. CFE published its technical specification CFE G1100-04 for PV systems			complete. The first edition was 1,500 copies. The guide was distributed among government agencies, the business community, and state energy commissions	useful for the new project "Medium-sized PV Systems" to be presented to SEMARNAT for inclusion in the GEF 2012 portfolio
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in said findings			- Impact on PV: Important - Impact of the project: 100%		- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Very important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%
	CFE staff and companies in the industry participating in training	0 courses and 0 people trained		Course for CFE engineers: "Instalation, operation and maintenance of PV systems in Mexico"	4th PV Systems Course in Lerdo de Tejada, Durango with 30 participants	The online version of the PV systems course is under construction. The UADY is developing a master's degree in RE. The OLADE is interested in taking the courses to the regional level. The 3rd PV Systems International Symposium took place in Queretaro and was attended by 218 people from 21 states, 126	Three CFE engineers participated in the PV Systems course at the IIE in Cuernavaca. The PV Forum Mexico 2011 had the presence of 210 people with 66% of the PV sector, 12% of CFE, 14% from academia, 5% federal agencies, and 3% from other sectors. 22 lectures, two	CFE Queretaro's Management requested a workshop in which 12 engineers participated. Two CFE engineers attended a PV Systems course in IIE in Cuernavaca. 25 CFE engineers of the Transformation and Transmission Department

						institutions, 41 schools, 139 entrepreneurs, one commercial bank, and 14 CFE engineers. Four companies presented their products and services	plenary lectures, a panel discussion and an Industrial Exhibition with four companies	participated in a technical course on PV Systems in Hermosillo
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in said findings			- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%
Project results influence the national renewable energy policy and contribute to global efforts and local PV market development	Increased knowledge on the potential benefits of grid-connected PV systems	0	150 participants from 16 institutions at the 1st International Symposium on PV Systems in Zacatecas		Proposal submitted to the CRE to change PV System limits from 30 kWp to 500 kWp.	The Workshop on the Technology Roadmap of the PV Industry in Mexico had the presence of 19 experts from the federal government, business, academia, ANES, and IIE.	-> 80% increase in PV Systems contracts granted by the CFE. From 204 in 2010 they rose to 374 in 2011.	604 grid interconnection contracts granted by the CFE. Installed capacity of 3.5 MW. The project website registered 165,000 page views and the PV systems user guide has been downloaded 981 times.
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in said findings		- Impact on PV: Important - Impact of the project: 100%		- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 50%	- Impact on PV: Important - Impact of the project: 30%
	Incremental participation of suppliers in promotion activities	0 promotional materials		Workshop on "Financing Mechanisms" with the participation of 13 suppliers	The 2nd International Symposium on PV Systems held in Mexicali with 163 participants from 100 institutions representing the business sector, governments, universities, and research institutes; and	The 3rd International Symposium on PV Systems held in Queretaro attended by 218 people from 21 states and 126 institutions: 41 schools, 139 entrepreneurs, one commercial bank,		

					an Industrial Exhibition attended by four companies that presented their products.	14 engineers from CFE and 13 from government. In addition, four companies will present their products and services.		
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in said findings			- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%	- Impact on PV: Important - Impact of the project: 100%		
	Relevant information distributed	0 disseminated information		Qcell Co. announced an investment of USD 3,500 million in Mexico. Baja California announced the construction of a 70 MW PV system project. CMIC Workshop. CIGRE Workshop. 2nd National Energy Savings Expo.	QCells delayed its plans. The Baja project was postponed. The PV systems in Valle de las Misiones was presented at the XIX International Congress of Energy Saving in Guadalajara. Presentation of the GEF/UNDP/IIE project at the VII National Meeting in AMPER, in "The Global Challenge" workshop in San Miguel de Allende, Guanajuato, at the Solar Power International - 2008 in San Diego California, USA, and at the CIGRE Seminar 2010.	Videoconference course on PV systems with the participation of officials from power companies from Caribbean and African English-speaking countries. At the opening ceremony of the system in UAMI public thanks were given to the GEF/UNDP/IIE project. The PV system in Puebla was conducted by graduate students. The presentation of the GEF/ PNUD/IIE project in the la "RE Round Table" at the National Conference on Climate Change organized by the Special Climate Change Committee of Congress with support from the	The project coordinator is in the technical group supporting SENER in the implementation of a pilot project for users of the DAC rate. The project's technical group is sharing experiences. It is also participating in the Review Committee of PV systems national standards.	Participation in the meeting to prepare the POA on PV systems from the CRE. The project coordinator was trained in Spain in acceptance testing for PV systems. This knowledge will be used in testing the 180 kWp project in Zacatecas.

						UNDP country office. "PV penetration limits in the Baja California distribution range" conference during the CIGRE 2010 edition in Irapuato. Participation in the workshop "Infrastructures, public services, and the environment" in Puebla with a presentation on the role of the PV systems in municipal services and activities. Presentation of the topic "Penetration of PV in the electric grid". Presence at the Amper annual meeting in Mexico City.		
	A summary is made of the impact of the findings in the PV market and the degree of impact of the GEF/UNDP project in said findings			- Impact on PV: Important - Impact of the project: 20%	- Impact on PV: Important - Impact of the project: 50%	- Impact on PV: Important - Impact of the project: 75%	- Impact on PV: Important - Impacto del proyecto: 100%	- Impact on PV: Important - Impacto del proyecto: 100%
	Energy variable included in the national MDG report							

Table 1. – Project descritpion with all the results.

4 Formulation, implementation, and results

4.1 Formulation of the project

To address the problem of "Demonstrating the technical, operational, and ultimately economic feasibility in the grid-connected PV systems as a means to reduce and smooth out electrical demand peaks during the summer in northern Mexico", the Electrical Research Institute (IIE), through the project, has been the main driverin this matter because of its technical involvement and also because of its research in Renewable Energy in Mexico, as well as its long history of collaboration with research institutes on Renewable Energy at an international level, specifically on photovoltaic solar energy. Its knowledge of the Mexican reality in terms of generation peaks associated with consumption of air conditioning equipment in the summer in regions of high solar radiation, led to the consideration of possibly demonstrating the feasibility of grid-connected photovoltaic systems, reducing the energy consumption of the electricity grid while competing in cost for that production.

Likewise, for said proposal we also considered the importance of achieving the reduction of greenhouse gas emissions and accomplishing social and economic benefits for families with financial difficulties so that they could have electricity during the peak hours of summer and some comfort in periods of intense heat, while generating new business for Mexican companies in the PV industry.

Other stakeholders contacted and consulted for the problem definition of this project have been the SEMARNAT (Secretary of Environment and Natural Resources), SENER (Ministry of Energy), the SHCP (Ministry of Finance and Public Credit), CRE (Energy Regulatory Commission), the Federal Electricity Commission (CFE), and the UNDP (United Nations Development Programme). SHCP, SEMARNAT, and SENER have given their political support and validated the issue for Mexico, as well as shown interest in having more information to move forward with regulation and legislation on the subject. From the implementation point of view, the CRE and CFE expressed interest in learning about the subject to be technically prepared to take care of the requests for connection of photovoltaic systems to the grid. Finally, the UNDP watched this project from a point of view very aligned with the goals of sustainable development and as an opportunity to further develop a form of renewable energy that was incipient in Mexico.

4.1.1 Conceptualization, design, and strategy

The project strategy has rewarded:

- Training people involved in the area of energy so that they know the issue, with a focus on CFE staff and installation and equipment supply companies
- Inform financial institutions of the technology's cost and potential
- Inform and technically train state agencies that are obliged to legislate in matter of Renewable Energies, with special focus on the CFE and the CRE
- Resolve technical issues and provide reports on the results
- Inform the user about the cost, potential of the technology, and the regulation on grid-interconnected PV systems
- Produce background information on the whole theme of grid-connected PV systems and disseminate it as best as possible
- Organize seminars, workshops, forums, and courses to disseminate information on grid-connected PV systems

- Provide technical support for the pilot projects and monitor the systems, disseminating the gathered information
- Look for the opportunity to financially support a medium-scale PV project in Mexico as a national showcase

In their analysis, the project stakeholders have identified the existing threats and their underlying causes, and the proposed solutions were defined with the participation of the most involved stakeholders in the design phase: UNDP, GEF-UNDP, and the IIE. Table 2 presents the comments of the evaluation.

Threats
- Continuation of market distortions that overshadow the benefits of PV systems
- Financial mechanisms do not promote enough the demand needed for the expansion of the project
- Technological flaws or poor performance
- Lack of interest in the generation schemes of grid-connected PV systems
- Collapse of the PV industry
- Lack of user acceptance
Solutions
- Financing institutions committed to promoting schemes and financing options for PV development
- Information on PV and information systems effectively implemented by users and potential investors
- CFE technicians trained
Evaluation comments
They are adequate, but the project never considered during its design that the market could lower prices as it ultimately did. So, just as the "Collapse of the PV industry" was included, the PV growth scenarios and their impact on the project objectives and activities could have also been studied.

Table 2. - Threats and project solutions and evaluation comments.

Evaluation of the conceptualization, design, and strategy	
The strategy is adjusted to the objectives and to address identified threats and risks. All items mentioned were within the scope of the project, but there was not a defined communication strategy to disseminate information to users or publish the project findings. The industrial theme and the costs in the PV matter at an international level were not addressed in the conceptualization/design.	**S**

Tabla 3. - Evaluation of project conceptualization, design, and strategy

The project design did not change during the project, but the implementation of the design adapted through the evolution of the same.

4.1.2 Evaluation of coherence and logic

To evaluate the coherence and logic of the formulation of the project, a comparative analysis was made of the results proposed in the logical framework matrix shown in Table 4 with the outlined implementation strategy.

Proposed Results
Implementation and adoption of legal frameworks and promotion programs
Purchasing mechanisms available to potential users that include financing possibilities
Institutions, technicians, and users have participated in training programs and are applying the knowledge received in the installation, operation, and maintenance of grid-connected PV systems
A cost in $/W is determined and cost trajectories for the following three years are projected
220MWh/year electricity generation
Information on grid-connected PV systems widely available and used
Available plans for systems purchase
Developed photovoltaic market
Grid-connected PV systems reducing electricity demand
Determination of the technical limits of penetration of PV systems in the distribution grid
National institutions equipped with technical skills
Staff from CFE and installation companies able to operate the grid-connected PV systems
Public awareness of the benefits of grid-connected PV systems
Suppliers able to promote the benefits of PV technology
Information exchange systems operating
MDG on energy reported and done (abandoned during the project)

Tabla 4. - Proposed results

Based on this summary, a clear focus is evident on all sectors of society and it is a comprehensive development of the sector of PV systems connected to the grid in Mexico, and it is left with a target value of 220 MWh/year resulting in 120 KW of installed capacity (considering five hours daily average in Mexico of actual hours of production of electricity or 1825 kWh/KW per year). It is not coherent and logic that to develop a sector of economic activity, a target of 120 KW per year is suggested. Values of internal and external market would have to be estimated to get a sense of the size of the existing market and the market to develop. It would not be possible to interest businesses, governments, financial institutions, equipment suppliers, engineering and consulting companies and universities with 120 KW per year. It is not the intention to minimize the project achievements: in Mexico, it was not possible to connect PV systems to the grid and after the project's efforts it became possible.

Evaluation of coherence and logic	
The goal of having about 120 KW installed per year in a market of 100 million people does not seem very ambitious for developing the project logic of generating an attractive sized business opportunity to interest companies, businesses, governments, financial institutions, equipment suppliers, engineering and consulting firms, and universities to start an area of future potential in the country. A further analysis of market opportunities was expected from the project that could support the development of a PV system market in Mexico and determine a capacity per year that could support the project logic.	**S**

Table 5. - Evaluation of the consistence and logic of the project

The experience from other relevant initiatives in the world was not incorporated directly into the formulation of the project, but indirectly for the deep knowledge of the subject by the Electrical Research Institute, who for many years has been at the forefront of research and discussion of this reality with its European and North American counterparts, such as CYTED.

4.1.3 Institutional arrangements

The institutional arrangements of the project had the following main objectives:

- To train CFE and CRE staff on the photovoltaic subject and its connection to the grid.
- To sensitize the SENER and the three levels of government about the importance of grid-connected PV systems.
- To form partnerships with institutions of the Solar and Renewable Energy sector to disseminate information to all interested parties on the benefits of grid-connected PV systems.

Evaluation of the institutional arrangements	
The institutional arrangements to achieve the mentioned main objectives agree on a 100%.	**AS**

Table 6. - Evaluation of the institutional arrangements of the project

4.1.4 Financing and completion time

The project was developed for more than five years, although its planned initial term was for three years with a budget of USD $2 million, being 50% from the GEF/UNDP and 50% from Mexico's government and the Geo Company.

It is clear that the project had to be postponed in order to have a significant PV system installed in Mexico. It is interesting to note that the reason was not because the VP prices were high above the current but, first, because of an earthquake that damaged the Persal company building (which was the winning company of the Manifestation of Interest) and later because of the lack of decision from the Queretaro government to install a PV system at that city's airport. Over time, PV prices fell and the cofinancing of the GEF/UNDP project became larger so the Zacatecas government became interested in partnering with the project to get a PV system, achieving its installation in 2012. It is important to note that the decline in PV prices allowed exceeding the initial expectation of PV system size possible to co-finance.

The CERTE system was benefited from a partial support from the GEF/UNDP and became the first center with wind and solar systems connected to the grid.

Financing and completion time	
The project has had financial audits that have evaluated positively the performance of the project in its budget and associated fees. In completion time, the original target was not met, but as it has been mentioned, it was in order to achieve the objectives and not for purposes directly involved with the project that they were not achieved promptly.	**AS**

Table 7. - Evaluation of funding and project completion time

4.1.5 Ownership of local governments and coherence of the project with national priorities and/or state plans

The project's objectives are fully and perfectly in the line of action of the SEMARNAT and SENER, as well as all government agencies that are committed to climate change plans. In terms of policy objectives, a more active lobby could not be achieved because of the limitations in its competence field by the implementing agency.

In regional and local government terms, the weight of the project has been -from the start- more focused on northern Mexico, especially in the Mexicali region, but quickly it has shifted to the whole country. This objective was set by the project in its minutes from the Steering Committee meetings. At the end, the topic is of interest to all users of electricity in the country.

The CRE and CFE have understood the importance of PV and Renewable Energies in general for the Mexican energy market, and just before the beginning of the project there were regulations already and an interconnection contract for power of up to 30 kWp. During the project there were developments closely aligned with the project objectives and influenced by them:

- CFE issued the CFE Technical Specification G0108-04 for Interconnection to the Low Voltage Electrical Grid of Grid-connected Photovoltaic Systems of up to 30 KW capacity (2008)
- Law for the Use of Renewable Energies and Energy Transition Financing (2009)
- CRE published the new interconnection contract model with limit of 500 kWp and medium voltage (2010)
- Prosolar Program review (2012)

The Conference of the Parties of the United Nations Framework Convention on Climate Change COP 16, in Cancun, has also been vital in showing Mexico's efforts to keep increasing PV systems in the country.

In terms of the states and watching the developments before and during the project, there were many interested states in PV such as Baja California, Zacatecas, Queretaro and others that joined in, like Yucatan, Quintana Roo, Durango, and the neighboring states of Baja California that have similar climatic conditions.

The ownership of the project by local government has not happened, but the appropriation of some of the goals has been complete, such as training at universities and PV system installations.

Assessment of local government ownership and coherence of the project with national priorities and/or state plans	
The issue has been fully in line with national and regional policies. The empowerment and ownership of government actors of the project has not happened, since they looked at it more like an IIE project, but they were always present supporting, participating, and benefiting from the project's products and activities. Given the relevance of the project, they acknowledged the importance of the GEF/UNDP being involved in it, as the political decision was 100% influenced by this fact. It is remarkable that now the governments are interested in doing more and continue with the policies for PV systems because they were very satisfied with the results of the first ones.	**AS**

Table 8. - Assessment of local government ownership and coherence of the project with national priorities and/or state plans

4.1.6 Stakeholder participation and dissemination of information

The stakeholder participation has been uneven. The stakeholders who have participated in the project inception workshop, in project design, and in development and discussion meetings of the Prodoc have very different project knowledge than the stakeholders who have not been so involved in these stages. There were stakeholders detected who did not even know the project itself and looked at it like a simple agreement with the IIE to support the subject of PV systems. For many of these, contact with the IIE has been provided by external people or by personal knowledge. Examples are the UPMOR, UMA-I, Green Corner, Baja California, but they do not know the project in detail, who is involved, and who is financing it.

Local stakeholders have actively participated in the project activities such as seminars, workshops and courses just like the government agencies associated with the project. This enabled the creation of public awareness of the benefits of grid-connected PV systems. The project has succeeded in disseminating the information by technical people associated or interested in the sector, people from academia and government agencies with responsibility and impact on the sector, and provider associations. However, the use and availability of the information on installed PV systems was limited.

The project website was hosted on a server of the IIE itself and up to December 2012 reported more than 1,000,000 visits. As a lesson learned, it can be mentioned that the inclusion of social networking could contribute to wider coverage.

Evaluation of stakeholder participation and dissemination of information	
The participation of stakeholders has been positive and has benefited from the connections between institutions, although some stakeholders did not know the project. The mechanisms of dissemination of project information were promotional materials, mainly distributed at the symposiums, workshops, courses; and information available on the website. In the events that took place, national and international experts were convened to serve as speakers or instructors. Moreover, the call for participants brought together actors from many areas of interest, such as: business, academic, financial, research, and government.	**S**

Table 9. - Evaluation of stakeholder participation and dissemination of project information

4.1.7 Replicability of the project

The project began for the northern region of Mexico because of technical characteristics of greater impact of PV systems in local reality, but during its execution it changed and became a national scale project with developed activities from north to south with impacts throughout the country. The project has smoothly replicated the initial plan all across the country and everything that has been applied to the country is fully replicable in other countries in the region; and can be considered as a basic project for the creation of national training and dissemination of technical information to the sectors involved allowing us to prepare society for a new technology.

Evaluation of replicability	
The replicability of the project has been a reality in itself for having been applied at the national level and not just in the north of Mexico, so it is entirely replicable in other countries. A communication strategy, a focus on technical training, content development for all sectors for courses, workshops and seminars should be included, and ensure that the sector heads take ownership of the project.	**HS**

Table 10. - Evaluating the replicability of the project

4.1.8 Lessons learned

In terms of lessons learned, there was no effort to do so formally, but in interviews it became clear that in the design of future projects, the following should be considered:

- Influence on policies and laws
- Ownership of the project by the sector heads
- Communication of the project, its activities and information
- Methods for developing financing mechanisms

The project had side effects and at sites where there were activities they will remain as poles of dissemination of project outputs and of influence in the PV system matter, such as:

- Countries from Central and South America are very interested in replicating the project with UNEP and OLADE
- Neighboring states where events were developed have an interest in replicating projects, such as in the north with Baja California and in the South with Yucatan
- Universities are visited by many people and businesses to look at the PV systems - UAMI and UP-MOR
- Projects share technical information of monitoring for investment decisions - UAMI

Evaluation of the mechanisms or strategies to encourage replication of best practices	
Despite having little focus on the dissemination of good practices and lessons learned, the project has managed to have a very large impact by the stakeholders involved in the project.	**MS**

Table 11. - Evaluation of the mechanisms or strategies to encourage replication of the project's best practices

4.1.9 Alliances and synergies established

The project worked with the resources provided by the GEF through the UNDP and IIE, but the private sector contributions are mentioned, such as UAM-I, COZCYT, CFE, Government of Mexicali, AMPER, and all universities and research centers involved in the project events for logistical and coordination support.

There were no formally established alliances or synergies in the project, and the private sector remained largely oblivious to the project. However, the private sector was involved through the participation of business associations like AMPER and the business section of the National Solar Energy Association (ANES for its acronym in Spanish). All stakeholders in the universities and public sector were involved in supporting the project.

Evaluation of alliances and synergies established	
Formally, there are agreements for technical support from the IIE and all entities involved were on hand to support the project.	**HS**

Table 12. - Evaluation of project alliances and synergies established

4.2 Project Implementation

This section provides an evaluation of the implementation of the project starting with the issue of the approaches on the implementation:

Evaluation on implementation approaches		
Strategy used for project implementation	Limited by the issue of communication and information dissemination	**S**
Use of the logical framework as a management / handling tool	The logical framework has been the "tool" for project management	**HS**
Changes made in response to setting changes	The project has adapted to the setting changes	**HS**
Changes made because of feedback from internal monitoring and evaluation processes	Project meetings have been the source of all changes, always evaluating the project development	**HS**
How significant changes in the program base line of the project have affected its implementation and progress	All changes have been in line with the project performance. Governmental changes remain unforeseen always.	**HS**
Ability to adapt to various setting changes occurring during the start-up period and how these were reflected in the Annual Work Plan	The start-up period has been slow, but the project has fully adapted to setting changes like the publication of the interconnection contract model	**HS**
Ability to adapt to changes in institutional arrangements or coordination to improve the implementation and effectiveness of the project	Capacity limited by institutional settings of the main stakeholders and by the difficulties in Mexico when there are changes in government	**S**
How operational and/or work relations have contributed among the institutions involved in the project and others for the implementation and objectives of the project	Working relations have been good. The IIE handled all contents and organized events. The logistics and local coordination were handled by the local stakeholders.	**HS**
The capabilities associated with the project and their impact on project development and performance	Capabilities were mostly technical and incipient in the financial, business development, social or political ones and had an impact on project performance	**S**
Impact generated by changing views of the various directors and coordinators that the project has had	Impact has been nil. The project has decided to streamline the project management structure merging the technical implementation with the project management	**HS**
Addressing social aspects of basis and scope	Training has been one of the main and most important points of project activities	**HS**
Local, government, and community participation in project activities	All activities have had total involvement from social and government stakeholders	**HS**
The use and establishment in the project of electronic information technologies to support implementation, participation, and monitoring	The Microsoft Office tools have been used in a simple way	**S**
Dissemination of information about the project	In the website topic, diffusion has been somewhat limited because it was built on the IIE server, but the million visitors mean that much was achieved this way	**S**

Table 13. - Evaluation of the approaches on the implementation of the project

4.2.10 Monitoring and evaluation

On the topic of project monitoring and evaluation the POA, procurement plans, and meeting minutes are the means to measure the effectiveness, efficiency, and achievement of results on an annual basis during the implementation phase. The UNDP made the project evaluation in a positive way and was in line with the project needs. The best example is the duration of the project, which was postponed until the Zacatecas system was installed, considered a key project goal.

Self-assessment by the project has not happened in a formal way, but all stakeholders present in the annual meetings proved to be very critical of the project development enabling the adaptation of activities and project implementation. Since at the last part of the project its coordinator resigned, the technical implementation and management of the project was performed by the same person. Therefore, self-assessment is inherent to the fact that the person managing is also the one implementing.

Indicators for the monitoring and evaluation strategy are presented in Table 14 and the results in Table 1 allow the evaluation.

Monitoring and evaluation strategy – Indicators
Regulatory framework of support and promotion schemes developed for grid-connected PV systems
Marketing plans that stimulate user interest are developed and implemented
Technical skills of local users on operation of grid-connected PV systems
Cost of installed kW of grid-connected photovoltaic systems in the north of Mexico
Total electricity generated from grid-connected PV systems (thus displacing conventional methods of electricity generation)
Photovoltaic information updated and disseminated to institutions, users, and investors to develop and promote the installation of grid-connected PV systems
PV system selling models
Systems purchased through mechanisms developed by marketing and installation companies
Systems connected to the grid and operating
Technical study concerning the penetration of PV systems in the grid
Technical specification for developed and internalized interconnection
CFE staff and companies in the industry participating in training
Increased knowledge of the potential benefits of grid-connected PV systems
Incremental participation of suppliers in promotional activities
Relevant information distributed
Energy variable included in the national MDG report (abandoned during the project)

Table 14. - Indicators for the monitoring and evaluation strategy

Assessment of monitoring and evaluation processes	
Monitoring has followed all logical framework indicators and in terms of self-assessment it's implied by the structure of the project management and implementation. The evaluation was made against the indicators, and the progress of the project is very positive with the exception of indicators of financial mechanisms and systems purchased through mechanisms developed by marketing and installation companies. The project, through the monitoring and evaluation system, understood the problem and agreed that the means were limited to change this situation, choosing to focus on the other goals.	**HS**

Table 15. - Evaluation of monitoring and evaluation of the project

4.2.11 Financial Planning

On the subject of financial planning, the actual project costs for objective, results, and activities are based on the project reports. Financial management, including disbursements, are reflected in the project information and approved by the UNDP.
The project began with a first disbursement, below expectations, that changed in the next two years, being higher in some objectives than expected. The project clearly met the financial planning.

Resultado	Histórico							Presupuesto Acumulado Total del Proyecto
	2007	2008	2009	2010	2011	2012	2013	
Resultado 1: **Sistemas Fotovoltaicos conectados a red son demostrados como opción para proveer electricidad técnica y comercialmente viable en el contexto del norte de México**								
Presupuesto Prodoc	355	242	18	0	0			**615**
Presupuesto AWP en Atlas	6	73	50	37	254	241		655
Presupuesto Ejecutado	8	72	47	37	254			**418**
Delivery Rate	132%	98%	94%	100%	100%	**0%**	**0%**	**68%**
Resultado 2: **Capacidad técnica para el diseño, operación y mantenimiento de sistemas FV conectados a red y componentes relacionados están incorporados a las instituciones nacionales**								
Presupuesto Prodoc	54	36	12	0	0			**102**
Presupuesto AWP en Atlas	11	10	15	16	23	18		94
Presupuesto Ejecutado	0	11	9	16	23			**60**
Delivery Rate	0%	109%	61%	100%	100%	**0%**	**0%**	**58%**
Resultado 3: **Los resultados del proyecto influyen en la política nacional de energía renovable y contribuye a los esfuerzos mundiales y locales del desarrollo del mercado FV**								
Presupuesto Prodoc	36	52	45	0	0			**133**
Presupuesto AWP en Atlas	5	3	7	2	2	0,4		20
Presupuesto Ejecutado	0	3	8	2	2			**16**
Delivery Rate	0%	109%	119%	100%	100%	**0%**	**0%**	**12%**
Resultado 4: **Evaluación & monitoreo**								
Presupuesto Prodoc	11	23	16	0	0			**50**
Presupuesto AWP en Atlas	5	0	0	0	0	37		42
Presupuesto Ejecutado	0	0	0	0	0			**0**
Delivery Rate	0%	100%	0%	0%	0%	**0%**	**0%**	**0%**
Resultado 5: **Gerencia del proyecto**								
Presupuesto Prodoc	40,5	29,5	30	0	0			**100**
Presupuesto AWP en Atlas	9	42	38	53	55	15		212
Presupuesto Ejecutado	7	42	39	53	55			**196**
Delivery Rate	79%	100%	103%	100%	100%	**0%**	**0%**	**196%**
Gran Total								
Presupuesto Total ProDoc	**497**	**383**	**121**	**0**	**0**	**0**	**0**	**1000**
Presupuesto Total AWP en Atlas	36	128	110	109	334	311	0	1028
Presupuesto Total Ejecutado	**15**	**128**	**104**	**109**	**334**	**0**	**0**	**690**
Delivery Rate	**42%**	**100%**	**94%**	**100%**	**100%**	**0%**	**0%**	**67%**

Tabla 2. - Valores en miles de USD para los fondos GEF

Total	2007	2008	2009	2010	2011	2012	Cumulative budget
Total Prodoc							1000
GEO	70	70	60				200
CFE	200	100	100				400
CFE-kind	70	60	70				200
IIE-kind	90	60	50				200
Total	430	290	280				1000
Total Implemented							4981
Private sector							0
GOM			526	709			1235
UAM-I					400		400
COZCYT						428	428

IIE-CFE-Mexicali Gov.		1760					1760
IIE-sort		170					170
IIE	100	200	200	200	200	100	1000
Total		2130	726	909	600	529	4894

GOM – Government of Mexico. There is no detail on PIRs, only a total.
Private sector - There is no detail on PIRs, only a total.
Table 17. - Amounts in thousands of USD for the cofinancing.

The project has been financially audited with a positive result in terms of expenses and payments. The cost-effectiveness of the results is positive for all it has managed to do in the project period. All co-financing is consistent with GEF budgets. It should be mentioned that the GEO contribution was not made.

There were no barriers or contextual changes reported that affected the co-financing commitments. There has not been an analysis of the potential for co-financing based on investments and/or existing programs and those to be made. It is unclear whether there would be other ways to co-finance the project, but there are contributions from the government and the private sector well above the one funded directly by the GEF/UNDP.

Evaluation of financial planning	
The first year below expectations, but in the following two the situation clearly reversed, exceeding expectations in terms of disbursements. The co-financing amounts are of an important sum, and private sector participation with funding to remove barriers and allow extending the effect of the project are very positive.	**HS**

Table 18. - Evaluation of financial planning of the project

4.2.12 Methods of execution and implementation

In the methods for execution and implementation we emphasized that the project has not produced much information on the evaluation of recruited consultants or on national members involved in the project, but recruitment has followed the GEF/UNDP rules with pre-defined criteria.

Since the project leader also performed the coordinator tasks there are no evaluations, as we have already mentioned, of his tasks and activities. All revenues and inputs were made with the focus of achieving the project objectives approved by the Steering Committee. This was recorded in the meeting minutes, which are very detailed, thus providing the opportunity to follow the problems that occurred in the project.

Given that the periods of annual reports (PIR) cover from July of one year to June of the following year, it favors for some results to be repeated. 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.

Administration costs versus other costs mentioned are very different and when compared seem low, but the administration costs are in line with what was expected.

The promulgation of legislation and budgetary provisions had no impact on the implementation and sustainability of the project.

The evaluation is presented in Table 19.

Evaluation of methods of execution and implementation	
Effectiveness of the UNDP counterpart - The Electrical Research Institute	**HS**
Effectiveness of the participation of the Project Coordination Unit in the selection	**HS**
Effectiveness of the participation of the Coordination Unit in the selection, recruitment, and appointment of experts	**S**
Effectiveness of the participation of the Coordination Unit in the selection, recruitment, and appointment of consultants	**S**
Effectiveness of the participation of the Coordination Unit in the selection, recruitment, and appointment of national members of the counterpart staff	**MS**
Effectiveness of the participation of the Coordination Unit in the definition of tasks and responsibilities	**HS**
The quantity, quality, and timeliness of income (inputs) for the project in relation to the execution responsibilities	**S**
The quality and timeliness of contributions from the UNDP and the government to provide resources to the project and the extent to which this has affected the implementation of the project	**S**
Administration costs of the project	**HS**

Table 19. - Evaluation of methods of project execution and implementation

4.3 Results

In this section an analysis is made of the results achieved by the project to date and it evaluates project indicators versus the findings listed in Table 1. It starts with the project indicators and their effectiveness and efficiency in Table 20 and then, the assessment of the results up to the project date in Table 21.

Description	Indicator	Effectiveness and efficiency
Demonstrate the technical, operational, and ultimately economic feasibility of the grid-connected PV systems, as means to reduce and smooth out electrical demand peaks during the summer in northern Mexico	Supportive regulatory framework and promotion schemes developed for grid-connected PV systems	**S**
	Marketing plans that stimulate user interest are developed and implemented	Outside the scope
	Technical skill of local users on operation of grid-connected PV systems	**HS**
	Cost of installed kW of grid-connected photovoltaic systems in northern Mexico	Outside the scope
	Total electricity generated from grid-connected PV systems (thus displacing conventional methods of electricity generation)	Outside the scope
	Photovoltaic information updated and disseminated to institutions, users, and investors to develop and promote the installation of grid-connected PV systems	**HS**
Grid-connected photovoltaic systems are shown as an	PV systems selling models	Outside the scope
	Systems purchased through mechanisms developed by marketing and installation companies	Outside the scope

option for providing technically and commercially feasible electricity in northern Mexico		
	Systems connected to the grid and operating	**S**
	Technical study concerning the penetration of PV systems on the grid	**HS**
Technical capacity for the design, operation, and maintenance of grid-connected PV systems, and related components are incorporated into national institutions	Technical specification for interconnection developed and internalized	**S**
	CFE staff and companies in the industry participating in training	**HS**
Project results influence the national policy on renewable energy and contribute to global and local efforts on PV market development	Increased knowledge of the potential benefits of grid-connected PV systems	**HS**
	Incremental participation of suppliers in promotional activities	**HS**
	Relevant information distributed	**HS**
	Energy variable included in MDG national report	Outside the scope

Table 20. - Evaluation of the effectiveness and efficiency of project indicators

The project has had a longer duration than expected, but duly backed and explained. The overall project communication has been limited, as was already mentioned, but in the approach sectors, communication and dissemination have been excellent.

The level of the project's technical performance is above average for the skills, experience, and knowledge of the executing agency on the PV subject.

In terms of training, the project has been excellent in preparing CFE and CRE staff and other project stakeholders on the subject of PV systems and thus contribute in making better decisions with knowledge on the subject; even being able to go deeper on related topics. The 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.

Additional evaluation of the results achieved by the project to date	
Evaluation of compliance of the project built vs. project design	**HS**
An evaluation of efforts to communicate the results of the project, generated press coverage	**MS**
An assessment of how the project was helpful in meeting the partners' institutional goals	**HS**

Capacity building and institutional strengthening of the counterparties	**HS**
Project's technical performance level	**HS**
Avoided emissions from PV capacity installed in the country during the term of the project	**HS**

Table 21. - Additional evaluation of the results achieved by the project to date

4.3.13 Project sustainability

In terms of project sustainability there is no clear sign for the implementation of a sustainability strategy, nor is it believed to be necessary for a project of this nature, which focuses on training and dissemination of technical information. PV systems can be considered clean technology, and depending on the installation site, in two to four years they can produce the energy that was needed for their production, remaining for about 20 years as a source of zero emissions.

The installation of smaller systems was made on roofs or in small areas on the floor with no environmental impacts, but it is a subject where stakeholders interviewed did not show great knowledge. Regarding Mexican regulation, there do not seem to be particular regulations in environmental terms for small PV systems.

In financial terms, we talk about long-term and very sustainable investments for in the PV systems the investment is made on a system containing energy that will supply it throughout the project, with some support, but very little compared to the initial investment. In Mexico, the market is based on savings rather than a premium (FiT) as in Europe. This development model of Mexico is very sustainable financially, but can increase the energy consumption of the high domestic consumption rate (DAC) rooms because of the low cost of the PV systems. The same thing happened in the U.S.

In social terms, the project has been perfect for training and participation of the staff of many companies, academic institutions, state personnel and others who can develop business and create jobs, courses in universities to train young people, and knowledge in the public sector to make informed decisions.

The integration of the project in relevant entities was successful, as already mentioned, with some gaps in areas where because of government changes in public entities they have not kept the project results. The ownership of the project has been limited, but the appropriation of some of the project objectives by the stakeholders has been very strong. It is clear that the PV subject is better handled and with more knowledge now than before the completion of the courses, workshops, and seminars.

Regarding the extent to which the project benefits will continue, within or outside its control after its implementation is completed, it is clear that the current situation in PV matters in Mexico is very positive. Latin America has three internationally relevant markets: Chile, Brazil, and Mexico. It is important to note that the market will grow much more, and the basis for small systems has been released.

The sustainability analysis is based on the following four dimensions, which are rated with the categories described in the footnote [2]:

[2] Probable (P): There are no risks affecting this dimension of sustainability
Moderately probable (MP): There are moderate risks that could affect this dimension of sustainability
Moderately Unlikely (MU): There are significant risks that affect this dimension of sustainability
Unlikely (U): There are severe risks that affect this dimension of sustainability

Evaluation of project sustainability	
Financial Resources	
Is there some financial risk that could affect the sustainability of the initiative?	**MU**
What is the probability that there are no financial resources to sustain the project outcomes after GEF support has ended?	**P**
Socio-Political	
Are there any social or political risks that may jeopardize the continuity of the project outcomes?	**MP**
Is there some risk that the stakeholders' appropriation is insufficient to ensure the continuation of project benefits and outcomes?	**MP**
Are key project stakeholders interested in the continuation of the project benefits?	**MP**
Has awareness been achieved in the public and the stakeholders so that they continue to support the project's objective in the long term?	**MP**
Institutional framework and governance	
Do the institutional framework and governance present any risk for the continuation of the project benefits?	**MP**
Environmental	
Is there any environmental risk or activities in the project area that can reduce the future flow of the project environmental benefits?	**P**

Table 22. - Evaluation of project sustainability

4.4 Contribution to improve the skills of national/local staff

Institutional arrangements and modalities for the implementation of the project have basically been the resources from the Electrical Research Institute, the UNDP, CFE, CRE and local stakeholders where courses, workshops, and symposiums were held. The public stakeholders SENER, SHCP, SEMARNAT, CFE, and CRE were stunned by the project outcomes. Training and technical support in the PV system field have been excellent and greatly appreciated by all public and private interviewees.

4.5 Special topics of the project

Special topics to be considered in this project are:

- The duration of the project
- Clarification of the scope of the project, the importance of the products reached, and the need to continue working on this issue
- Identify the role of GEF focal points in the process

The duration of the project has already been discussed, as well as its justification, which was completely beyond the control of the IIE or the UNDP.

The PV subject started in Mexico and now we have a growing market in the country. The small systems are left with a very clear objective which is to lower electricity rates paid by users to avoid getting into the DAC (high consumption rates) by domestic users.

All the electricity generation market in Mexico through PV systems is yet to be developed but there is still much to be done on the issue of regulatory framework as done for the wind sector. It is necessary to find a way to implement a market of "independent generators" (IPP - Independent Power Producers) and not just of EPC companies for some public bidding for PV installations in the MW.

Training of the public, private, and academic sectors has been the first step, but we must seek PV opportunities for electricity generation promoting PPP (Public Private Partnerships).

The GEF focal points in the process have been more formal and with little impact on the project. The Secretary of Finance and Public Credit (SHCP) has institutional support from SEMARNAT and technical support by the IIE and both stakeholders have been essential in this project. The Ministry of Foreign Affairs (SRE for its acronym in Spanish) has delegated the project activities in the other states. SEMARNAT and SENER have been very pleased with the project and the content developed, supporting all the efforts made with the project budget.

5 Conclusions and final comments

Table 23 presents the conclusions and final comments.

Final comments or syntheses on the relevance, effectiveness, efficiency, outcome, and sustainability of the project
The project has been highly relevant to capacity building in the public, private, and academic sectors in the PV field and in launching an entire market of opportunities in this sector. In the matter of regulatory framework, it is now possible in Mexico to connect a PV system to the grid for domestic, industrial, and commercial users. The training of the public sector responsible for the legislation has been greatly benefited by the courses, workshops, symposiums, and the reports developed, with emphasis on the User Guide for small-scale PV systems. On the issue of PV system financing, it is now possible to do it with the FIDE including home users, and at least two banks are offering financial products for the market. There are also funders interested in funding larger projects. The project effectiveness and efficiency has been good, with some results not achieved directly by the project but motivated by a significant decline in international prices of PV modules. Consequently, the project outcomes were almost all reached with very few exceptions. The sustainability of the project is very positive with some areas for improvement, such as project ownership and involvement by the public stakeholders.
Concluding remarks about achieving results and the project objective:
The project achieved 100% of its objectives, as mentioned earlier, not only directly because of the project but also because of the development of the PV system topic that has dropped in price tremendously since 2010, after the peak in the Italian market, because of the decrease of ability of the German market and the collapse of markets such as the Spanish. Project results are very good. Deeper reports were expected and not just the information of the presentations at workshops and conferences. The dissemination of the results through the Internet could have been greater.
Corrective actions for the design, implementation, monitoring, and evaluation of the project - Specific recommendations

The UNDP/GEF needs to have in the project team, people with skills and experience in several areas of importance for the projects - political, legal, economic, financial, technical, of technology/product development, business development, and project management - so that the design is not restricted in some of these areas. For the design it is important to have as a risk not only the collapse of the market, but the increase at a larger scale than expected and adapt the project. Monitoring needs to be stricter and with clear metrics: MWh is not a good metric for PV systems. Reports must be more pragmatic and not repeat information.
Follow-up actions to reinforce the initial benefits of the project
The issue of PV systems must be reinforced in the public sector and in entities directly involved. The political changes in Mexico - national, regional, and local - have very large impacts on the entities. Workshops are needed to present the activities performed, the outcomes, and have new partners trained and informed on new templates.
Proposals for future directions to strengthen the achievement of the main objectives
A regulatory framework for independent power producers and for consumers to sign contracts with other power companies, preferably not only in the electricity sector. National and regional incorporation of goals in the implementation of renewable energy for power generation with positive impacts for Mexico and the world, without having to compromise national budgets. A sole public stakeholder for the issue of Renewables and preferably not the CFE, for obvious interest in the subject. Analyze the CFE business and understand how their monopoly position does not limit the possibility of having independent power producers and focus the analysis on the issue of transmission and distribution.
Institutional strengthening
Institutional training has occurred and should continue now by universities, the IIE, and also by private sector stakeholders properly trained. Since 2010, the IIE has institutionalized the PV system courses for technicians through its Graduate Center, offering two courses a year, and it will continue with this task. On the issue of the certification of the systems and their components there is work to be done, so that quality of the systems is not compromised. On the issue of the certification of installers and professionals, there is an effort that has to be made by public entities to understand the importance of technical qualification of the people in the PV sector.
Treatment of the energy sector in its globality and not confined to the electric sector
In the PV case we barely speak of the electric sector and we have a focus on interconnected systems rather than on the isolated ones, where Mexico already has a relevant market.

Table 23. - Summary of final comments

6 Recommendations and lessons learned

In the evaluation it has not been possible to identify other ways of project implementation, but it is emphasized that 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.

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.

The recommendations made for the replicability of the project or for similar projects 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
- Incorporate studies of PV manufacturing capacity and understand if there are opportunities for local manufacturing development
- Design training projects with this clear objective
- Incorporate more national public and private institutions for impact on national and local policies
- 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

On the subject of lessons learned by the project team, it was done in some of the PIRs, but not in a systematic way. This section analyzes the subject on the consultant's side based on interviews and analysis of project data.

Aspects of the project	**Consultant assessment**	
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.	**S**
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.	**S**
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.	**S**
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.	**S**
Monitoring and evaluation	Project metrics need to be clearer and, if possible, quantitative. Avoid having many qualitative metrics.	**S**

Table 24. - Consultant assessment of the aspects of the project

Following the requirements of the GEF evaluation, the responses to specific questions from the evaluation are presented below:

Is there anything worth mentioning that is special or critical that we learned during the implementation of the project this year that is important to share with other projects, so that they can avoid this error or use this opportunity?
- Complete institutional arrangements and with entities that cover the entire scope of project implementation - Having a team with all the necessary skills and experience in project implementation and not compromise some aspects - Publicize the project on the Internet through all available means and not be limited to use institutional servers - The risk of a situation evolution in a faster way than expected
What would you do differently if the project started again?
- The design of the project with a focus on training and workshops for key sectors - Inclusion of consultants in some specialties - Production of more reports for various issues related to PV in Mexico
How does this project contribute to technology transfer?
People were trained in the PV issue allowing the progress for industrial development and development of this technology in the country, but it has not been a project goal.
How has the project contributed to technology transfer?
By training people.
To what extent has this UNDP/GEF project been relevant for the national and local efforts of reducing poverty / Democratic Governance / strengthening capacities for crisis prevention and recovery / gender equality and empowerment of women? Please explain.
On the issue of poverty reduction it is important to mention that the project has contributed so that, for example, in Mexicali the social neighborhoods have electricity in the supply peaks where they are more expensive. Still, the issue of PV for poverty reduction has not been the objective of the project, but has been the subject of interest of the Mexicali Government for the PV systems. In democratic governance the project has not had direct results, but the possibility of generating electricity is always a good way to contribute to governance and some Mexican states are taking it more seriously. In strengthening capacities for crisis prevention and recovery, the project had no impact, but the PV has a clear positive impact on the issue. On gender equality and empowerment of women, there has not been an effort made in this field.
Has the project generated global environmental benefits and contributed to the achievement of national priorities for environmental management and sustainable development?
The PV systems always have good environmental outcomes: clean energy without greenhouse gas emissions. The impact is local and global. In terms of national priorities for environmental management and sustainable development, the PV systems and all projects with Renewables are aligned with them. The project has had a good impact and SEMARNAT is very pleased with its achievements.

Table 25. - Responses to specific questions from the evaluation of the project

7 Appendix I - Terms of reference of the evaluation

A. BACKGROUND

UNDP/GEF monitoring and evaluation (M&E) policy

The UNDP/GEF project monitoring and evaluation (M&E) policy has four objectives:

i. Monitor and evaluate results and impacts;
ii. Provide a basis for decision-making and implementation of necessary amendments and improvements;
iii. Promote responsibility in the use of resources;
iv. Document, provide feedback, and disseminate lessons learned.

To ensure the effectiveness of the M&E of projects, a set of tools is used which are applicable continuously over the life of the project, e.g., periodic monitoring of indicators, mid-term reviews, audit reports, and final evaluations.

Project Objectives: The project support document (Prodoc) 00056987 called "Small grid-connected photovoltaic systems" was signed in July 2007 by the Electrical Research Institute (IIE), the UNDP Resident Representative, and the Director General of the Technical and Scientific Cooperation of the Ministry of Foreign Affairs, with the following budget contributions:

- Government of Mexico in kind US $ 800,000
- UNDP-GEF US $ 1,000,000
- Other Contributions in kind US $ 200,000
- Total US $ 2,000,000

The project began operations on August 28, 2007, estimating a duration of three years. However, according to the substantive review in November 2011, the duration of the project was extended to March 2012, due to multiple setbacks related to long response times and/or administrative difficulties with official procedures for finding a partner to provide financial support for the GEF/UNDP/IIE project for the installation of a residential or commercial grid-connected photovoltaic system (PV system) with the purpose of monitoring and evaluation.

The proposed project aims to establish the basic conditions to facilitate the large-scale introduction of grid-connected photovoltaic systems in the Mexican market, with a dual purpose: a) to reduce or minimize the electrical demand peaks in regions with high consumption differences between base and peak hours at the demand rate of electricity, resulting of intensive use of chillers and air conditioners, and b) to support the grid where supply peaks are limited by the capacity.

The expected project outcome is the elimination of the main barriers that inhibit the development of a substantial market for the use of grid-connected PV systems in Mexico, and to build the needed capacities at the national level so that the large-scale commercial development can be supported and sustained in the long term. It is expected that the removal of barriers will result in the large-scale development of grid-connected photovoltaic systems on future programs, resulting in reduced CO2 peak emissions through the partial change of electricity production from fossil fuels to photovoltaic systems.

B. OBJECTIVES OF THE EVALUATION

The Final Evaluation (FE) is a requirement for UNDP and GEF projects and, therefore, it is initiated by the UNDP Country Office in Mexico. This evaluation will be conducted according to the guidelines, rules, and procedures of the UNDP and the GEF.

The overall objective of this Final Evaluation is to objectively analyze the project implementation and achievements, results, and impacts achieved. This evaluation will establish the relevance, performance, and success of the project, including the sustainability of the results and will collect and analyze specific lessons and best practices regarding the strategies used and the implementation arrangements, which may be relevant to other projects in the nation and in other countries.

The main actors of this evaluation are:

- **Ministry of Finance and Public Credit (SHCP)**. Institution where the GEF Operational Focal Point is.

- **Ministry of Environment and Natural Resources (SEMARNAT)**. Institution where the GEF Technical Focal Point.

- **Ministry of Energy (SENER)**. Institution responsible for setting policies related to energy in the country. The Undersecretary of Energy Planning and Technological Development is responsible for the formulation and implementation of the Special Programme for the Application of Renewable Energies.

- **Federal Electricity Commission (CFE)**. Federal government agency responsible for generating, transmitting, and distributing electricity in Mexico. The Unit of New Energy Sources is responsible for formulating and proposing projects relating to the utilization of non-conventional energy sources.

- **Energy Regulatory Commission (CRE)**. Has the mission to regulate in a transparent, fair, and efficient way the industries of gas, refined products, and oil and electricity derivatives, generating certainty that encourages productive investment, promoting healthy competition, encouraging adequate coverage and considering the reliability, quality, and security in the supply and provision of services at competitive prices for the benefit of the users.

- **Electrical Research Institute (IIE)**. Federal government agency responsible for promoting and supporting innovation through applied research and technology development with high added value to increase the competitiveness of the electricity industry and other industries with similar needs.

- **AMPER (Mexican Association of Renewable Energy Providers)**. Non-profit Mexican civil association whose objectives are to promote and spread the use of renewable energies in Mexico. It has 64 members, some of whom have experience in the installation of grid-connected photovoltaic systems and have participated in some of the five training courses offered by the GEF/UNDP/IIE project in the three international conferences and in the PV System Forum taught in Mexico.

- **UAM (Metropolitan Autonomous University - Iztapalapa)**. UAM academic unit of scientific research. Strategically located in the east area of the Federal District, offering 26 academic majors and 27 graduate programs (specialties, masters, and doctorates), the Iztapalapa unit is positioned as the highest demand unit for undergraduate admissions in the

area. The first course in grid-connected photovoltaic systems was conducted in this institution with the participation of 25 people. Since 2009, it has a 60 kWp SPVI installed.

- **UPMOR (Polytechnic University of the State of Morelos)**. Academic institution from the state of Morelos that received support to implement a 6.5 kWp grid-connected PV system.

- **UADY (Autonomous University of Yucatan)**. Official sector institution that gave a course on grid-connected PV systems in May 2010.

- **ITSL (Higher Technologic Institute of Lerdo)**. Official sector institution that gave a course on grid-connected PV systems in February 2009.

- **UABC (Universidad Autonoma de Baja California)**. Academic institution. In 2008, in conjunction with the State Energy Commission (CEE) it hosted the Third Course in PV Systems taught by the GEF/UNDP/IIE project with the participation of 28 engineers. Again, in 2009, in conjunction with the CEE they were the hosts of the 2nd PV Systems International Symposium, attended by 163 people.

- **The Green Corner Restaurant**. It is a vegetarian restaurant located in Mexico City. In 2005, the first PV system was installed there, with a capacity of 30 kWp. For several years, the IIE monitored its operation.

- **State Energy Commission of the State of Baja California (CEE-BC)**. It is responsible for the sustainably use of local energy resources, impacting positively in the quality of life of Baja California residents and the competitiveness of the state. In 2006, in conjunction with the CFE and with IIE support, there were 220 PV systems installed of 1 kWp each in the same number of houses in the Housing Unit of Valle de las Misiones in the city of Mexicali, B.C. In 2008, together with the Autonomous University of Baja California (UABC) it hosted the Third Course in PV Systems taught by the GEF/UNDP/IIE project, with the participation of 28 engineers. In 2009, together with the UABC they were the hosts of the 2nd PV System International Symposium, attended by 163 people. In 2010, they asked the project for the first training course for technicians, with the attendance of 18 people.

- **Sustainable Development Secretariat of the State of Querétaro**. It is responsible for promoting sustainable development of the state in question. With this secretariat the Third International Symposium on grid-connected PV systems was held in November 2010, with the participation of 218 people. Discussions were conducted to see the possibility of giving the support of the GEF/UNDP/IIE project to develop the plan for the installation of a grid connected PV system at the international airport in the city of Queretaro, which did not happen.

Zacatecan Council of Science and Technology (COZCYT). It is a public agency decentralized from the State Public Administration. Its primary objective is to promote and coordinate the planning and development of science and technology in the state of Zacatecas, driving the highest participation in society. In 2007, in its facilities, the First International Symposium on PV Systems was held with the participation of 68 people. In April 2008, it hosted the 1st Workshop for PV Systems Financing Mechanisms with the attendance of 84 people. In August 2008, it hosted the 2nd Course in PV Systems attended by 33 participants. In late 2011, its participation as shareholder was consolidated to receive support by the GEF/UNDP/IIE project for the installation of a 180 kWp photovoltaic plant, of which the project will provide 80 kWp, and the remaining 100 kWp will be provided by the Government of Zacatecas. This plant will supply its own facilities in addition to the

State System ones for the Integral Development of the Family (SEDIF), the State Center for victim assistance (CAVIZ), and the La Encantada Park.

- **Persal Industrial Group, S.A. de C.V.** Manufacturing company located in the city of Mexicali. Company that won the bid (first partner) to receive support from the GEF/UNDP/IIE project for the installation of a 150 kWp PV system for purposes of self-sufficiency, which was later canceled.

- **Alcione Group S.A. de C.V.** Distributor of electrical and renewable energy services. In March 2011, it installed a PV System with capacity of 15 kWp in the state of Morelos, in addition to being the first to be funded by the FIDE by 70%.

C. PRODUCTS EXPECTED FROM THE EVALUATION

1.	Creation of a work plan and a set of questions approved by the IIE and the UNDP to conduct interviews to the indicated actors.
2.	Document review and interviews to document the progress of the project against what was established in the PRODOC in accordance with the GEF evaluation guidelines.
3.	Responsibilities in the evaluation: • Assess the project design, design compliance in project implementation and its progress toward the established goals. • Evaluate technically and economically the project outcomes. • Assess issues of sustainability, ownership, monitoring and evaluation, efficiency, achievement of impact, financial sustainability, and institutional capacity, among others. • Evaluate the implementation skills of the various instances of the project, reviewing carefully the ability to carry out their specific responsibilities. • Evaluate how the various bodies interrelate, always maintaining a clear definition of the roles and specific functions. • Compile and edit the assessment team's inputs and jointly prepare final reports. • Assess institutional and governance aspects of the project. • Assess the management arrangements of human and financial aspects. • Assess the accountability in the use of project resources. • Evaluate compliance with the rules and procedures of the administrative and financial system and project reports, verifying that they comply with the financial rules and regulations of the UNDP and GEF. • In addition it can provide input relevant to the evaluation of performance and achievement. • Collect basic documentation, prepare meetings, identify key individuals, and help with planning and logistics, among others.
4.	Oral presentation of project findings to relevant stakeholders at a project meeting, executive PPT presentation on key findings and preliminary draft evaluation report based on the GEF methodology.
5.	Final report integrating the observations and comments made to the draft version by the IIE, UNDP and UNDP/GEF.

For the evaluation, the project will provide support to set up the interviews with key players, arrange field visits, and ensure logistics and travel expenses for the evaluation team. In addition, there will be an opening meeting with the UNDP and the project staff to discuss the details of the evaluation.

The deadline for submission of each final draft of the evaluation report to the UNDP (National Office and Regional Unit) and government counterparts of the project shall not exceed four weeks after completion of the evaluation mission. A period of three weeks will be given to review the draft and submit comments to the consultant. After this period, the evaluation will have two weeks to incorporate those changes and information it considers relevant without compromising the objective and independent character of the evaluation. In case any discrepancies should arise between the comments and the results of the evaluation and the parties mentioned above, these can be explained in an annex attached to the final report.

The table below lists the interventions of the evaluation team during the consultancy. The work team and the Project Management Unit shall agree on the exact dates.

	ACTIVITIES	PRODUCTS	Percentage and/or date
1.	Preparation stage for the mission, which will include a review of all relevant documentation provided; Preparation for fieldwork (four days, including travel time): - Get the project documentation and other material that has project information (PIRs, TPR reports, midterm evaluation and other assessments, etc.) - Become familiar with the country's general development situation (through the review of the CCA, UNDAF, and other country reports) - Prepare the mission in detail, including methodology, in cooperation with UNDP-CO and the project team - Have a teleconference with the UNDP-GEF Regional Advisor	Work plan and set of questions to be approved by the UNDP and the IIE	Four days after signing of contract 20% of the contract Last week of October 2012
	(ii) The stage of field visit and interviews with counterparts and beneficiaries in situ, including the UNDP; Mission: (10 days) - Meeting with the UNDP-CO team - Meetings with relevant national stakeholders - Joint review of all available project material, with a focus on project results and outputs - Visit to the project site - Observation and review of completed and ongoing activities (capacity building, awareness/education, demonstration activities for sustainable use, community development, etc.) - Interviews with beneficiaries and key stakeholders, including representatives of the local authority, environmental local authority, communities, etc.	Oral presentation of findings to the project's relevant stakeholders at a project meeting, executive PPT presentation on key findings, and preliminary draft evaluation report based on the GEF methodology	40% payment Second week of November 2012
2.	(iii) Presentation of findings and observations to the project stakeholders for their discussion		
3.	(iv) The drafting stage of the evaluation report, including presentation of the report in draft form for comments and feedback, and Draft Report (6 days): This must be delivered no later than two weeks after the completion of the assignment. - Final interviews/validation with the UNDP-CO, the UNDP/GEF/RCU, and the project team - Project draft in the appropriate format		

	- Telephone review of the final conclusions with the UNDP-CO and the RCU Regional Technical Advisor - Presentation in PPT before the project board with key observations		
	(v) Submission of the Final Evaluation Report. Final Report (3 days) - Final submission of the Evaluation Report approved by the UNDP and IIE Delivery of the revised report (5 days): - Complete the Final Report and submit for comment. The parties shall deliver comments within four days.	Final report integrating the observations and comments made to the draft by the IIE, the UNDP and UNDP/GEF.	40% of the total contract Third week of November

3. EXPERIENCE AND QUALIFICATION REQUIREMENTS

I) ***Academic Degrees:*** BA in any area related to the environment, energy efficiency. Master's desirable in related issues.

II) Years of experience: 3-5 years experience in evaluation of projects and programs of international cooperation, in conservation of renewable energies, and/or energy efficiency. See the required competencies below.

The profile necessary for conducting this assessment must comply with a wide range of skills and knowledge, analytical experience and in the evaluation of projects, technical skills related to renewable energy, environmental issues, and the linking of all of this with the public policy cycle of the energy/environmental sector. The consultant should also have knowledge on the GEF strategies and policies.

Required Profile

- The consultant should be qualified in engineering, science; with minimum a post-graduate or master's degree in disciplines related to energy and the environment, project planning and/or management.
- Have ample experience (at least 4-5 years) on issues related to energy.
- 3-5 years experience on international cooperation mechanisms and frameworks for promotion of renewable energy sources.
- Have ample experience (at least 3-5 years) in administration, management, and reporting of projects similar in subject matter, scope, and complexity.
- Knowledge and experience in the evaluation of GEF projects (two years). Knowledge of UNDP and/or GEF financial rules and regulations.
- The consultant should have analytical experience and of project evaluation; should master the logical framework methodology and have knowledge of adaptive management of projects.
- Minimum 3-5 years experience in supervision/coordination/management of infrastructure and development projects, and ability to coordinate activities involving government institutions, local governments and institutions, multilateral development agencies, NGOs, and professional subcontractors/consultants.
- Should master the logical framework methodology and have knowledge of government, private, and non-governmental organizations relating to the renewable energy sector.
- Fluency in Spanish and English (oral and written).

As part of its technical proposal, he/she must include his/her curriculum vitae demonstrating the elements previously mentioned. If after the selection process there is a change of team member, this must be requested in writing to the Selection Committee including the appropriate curriculum, which must cover at least the same skills and experience of the person he/she is replacing.

The Committee reserves the right to accept or reject this application and the team leader consultant must find a suitable replacement that meets the profile, without altering the schedule and without additional cost to the project or its members. If this situation is not settled at the time, the Committee will dictate the procedure to follow and the sanctions to be applied.

Annex 1

1. Contents of the evaluation report

The evaluation report shall contain the sections described in the evaluation report format detailed in section 7 of these terms of reference.

The Evaluation Report should be submitted electronically to the UNDP Country Office (CO), to the UNDP-GEF Regional Coordination Unit (RCU), and to the project team no later than two weeks after completion of the assignment. The parties will review the document and deliver observations and/or comments to the project team by no later than one month after the report was submitted. The consultant(s) will consider the comments for inclusion in a final report that must be submitted no later than one week after the comments were delivered.

In case there are any discrepancies between the impressions and findings of the consultant(s) and the parties mentioned above there should be an annex included at the end of the document explaining these discrepancies.

D. EVALUATION METHODOLOGY

The evaluation will be conducted in a participatory manner, since the primary purpose of the evaluation is to improve the projects. Therefore, all participants must understand and identify completely with the evaluation reports.

The evaluation will begin with a review of the basic documentation key to the project, being the main written sources of information for the evaluation the ones described in Annex 2.

Interviews with everyone involved should also be considered, including key personnel who has collaborated and/or participated at some point in the project development and implementation. Field visits must be carried out to directly observe the project activities.

It is recommended that the consultant present the proposed methodology for conducting the evaluation, which will be previously discussed to create a balance between the written information, the interviews, and the field visits.

Any change in the methodology to be adopted must be in line with international principles, norms, and standards for professionals adopted by the Evaluation Group of the United Nations, and must be supported by the UNDP Country Office and its Regional Centre before being implemented.

(i) ***Document review****:* The list of documents to review is included in Appendix 1. All documents will be provided to the consultant team by the UNDP Country Office and the project team. The UNDP Country Office and the project team will prepare a note for each document

describing its relative importance and the key sections where the consultant should pay special attention.

The consultant should refer to all relevant sources of information that include, among others: The UNDP and GEF evaluation policy, the project document, minutes and decisions from the steering committee, project budget, operating and work plans, progress reports, PIRs, project files, UNDP guidelines documents, national legislation relevant to the project, and any other material that may be useful. The project coordinator will also provide a report with the project's key lessons and achievements.

(ii) ***Interviews*****:** the consultant will conduct interviews with the following institutions and individuals, as a minimum:

- Dr. Jorge Huacuz, Non-Conventional Energy Manager, IIE
- Mr. Jaime Agredano, Project Coordinator, IIE
- Ms. Alejandra Lugo, Project Manager
- Officer appointed by the Electricity Direction of the Energy Regulatory Commission.
- Officer appointed by the Sener Undersecretary of Energy Planning and Technological Development.
- Mr. Jorge González Morales, President of the Mexican Association of Renewable Energy Suppliers (AMPER).
- Ms. Martha Mireya Ruíz Amelio, UAMI Professor/Researcher in charge of the PV system installed there.
- Officer appointed by the Polytechnic University of Morelos.
- Dr. José Loria Arcila, Director of the Faculty of Engineering at UADY.
- Mr. Alfredo Salinas, Higher Technologic Institute of Lerdo, Durango.
- Mr. Marco Vilchis Cerón, Autonomous University of Baja California.
- Officer appointed by the Ministry of Sustainable Development of the State of Querétaro.
- Mr. Bensi Levy, Green Corner Restaurant Owner in Mexico City, or his designee.
- Mr. David Muñoz, Director of the Government State Energy Commission of the State of Baja California.
- Mr. Julio Riezco, COO of Sol-Therm, Persal Group, Mexicali, B.C.
- Dr. Gema A. Mercado Sánchez, Director of the Zacatecan Council of Science and Technology (COZCYT).
- Mr. Sergio Ruíz Fragoso, Manager of Alternative Energy of the ALCIONE Group, S.A. de C.V. and student of the PV Systems Certification Program taught at UADY.
- Ms. Claudia Grayeb Bayata, GEF Operational Focal Point in Mexico.
- Mr. Roberto Cabral, GEF Technical Focal Point in Mexico.
- Prof. Verania Chao Rebolledo, Director of the Sustainable Development Programme of the UNDP in Mexico.

(iii) ***Field visits***: Field visits to the following places must be made:

- Electrical Research Institute (IIE), Cuernavaca, Morelos.

(iv) ***Semi-structured interviews:*** The consultant should develop a process to conduct semi-structured interviews to ensure that all topics are covered.

Group discussions (focus groups) with the beneficiaries of the project will take place when necessary.

(v) ***Questionnaires***: A set of key questions must be presented for review and approval by the IIE and the UNDP prior to conducting he interviews.

(vii) ***Participatory techniques and another approach to collect and analyze data***. If necessary, a methodological proposal to gather information must be submitted to be approved by the IIE and the UNDP prior to conducting the interviews.

8 Appendix II - Schedule and itinerary

Activities	Schedule	Final dates
Teleconference with the UNDP		12.03.2012
Signing of the contract		12.14.2012
Ellaboration of the work plan	One day after signing the contract	12.11.2012
Receipt of documents		12.05.2012 12.12.2012 12.08.2012 01.15.2013 01.17.2013 01.24.2013 02.07.2013
Set of questions	+3 days	12.11.2012
Mission to Mexico	10 days Cuernavaca Mexico City Zacatecas	 01.8-01.11 2013 01.14-01.18 2013 01.29.2013
Draft report	+6 days	01.27.2013
IIE review	+5 days	01.31.2013
UNDP review		02.05.2013
Review meeting		02.06.2013
New draft report		02.20.2013
Interview with Mr. Raul Alfaro from UNDP Panama		03.06.2013
IIE/UNDP review		03.13.2013
Final Draft Report	+3 days	03.18.2013

Itinerary of visits and interviews:

Stakeholders	**Date**	**Location**	**Visit / Telehone**
UNDP in Panama			
Raúl I. Alfaro-Pelico, Regional Technical Advisor; Energy, Infrastructure, Transport & Technology	03.06.2013	Panama	Skype
UNDP in Mexico Prof. Verania Chao Rebolledo, Director of the Sustainable Development Programme in UNDP Mexico	01.18 (11.30)	Mexico City	Visit
Secretary of Environment and Natural Resources (SEMARNAT) Mr. Jonathan Ryan Mr. Roberto Cabral	01.14 (10.00)	Mexico City	Visit
Ministry of Energy (SENER) Mr. Julio Valle Pereña	01.28 (17.00)	Mexico City	Visit

Federal Electricity Commission (CFE) Mr. Salvador Villalón Espinoza, Head of Office / Commercial Area – Mexicali	01.15 (16.00)	Mexicali	Telephone
Energy Regulatory Commission (CRE) Mr. Enrique Guzmán Lara	01.15 (10.00)	Mexico City	Visit
Electrical Research Institute (IIE) Dr. Jorge Huacuz, Non-Conventional Energy Manager, IIE Mr. Jaime Agredano, Project Coordinator, IIE Ms. Alejandra Lugo, Project Manager	01.11 01.08 01.09	Cuernavaca Cuernavaca Cuernavaca	Visit Visit Visit
AMPER (Mexican Association of Renewable Energy Suppliers) Mr. Jorge González Morales/ President of the Mexican Association of Renewable Energy Suppliers (AMPER) Mr. Carlos Flores, Conermex CEO (AMPER member), system installer in Zacatecas	01.15 (12.00)	Mexico City	Visit
UAMI (Metropolitan Autonomous University, Iztapalapa) Ms. Martha Mireya Ruíz Amelio, UAMI Professor/Researcher in charge of PV system installed on site	01.17 (10.00)	Mexico City	Visit
UPMOR (Politechnic University of the state of Morelos) Ms. María del Pilar Hernández Limonchi Director of Material Resources, Heritage, and General Services	01.09	Cuernavaca	Visit
UADY (Autonomous University of Yucatan) Mr. Lifter Omar Ricalde Cab Energy Laboratory Dr. José Loria Arcila/ Director of the Engineering Faculty of UADY	01.16 (10.30)	Merida	Telephone
ITSL (Higher Technological Institute of Lerdo) Mr. Alfredo Salinas/ Higher Technological Institute of Lerdo, Durango	01.10 (15.00-15.30)	Durango	Telephone
UABC (Autonomous University of Baja California) Mr. Marco Vilchis Cerón, Autonomous University of Baja California	01.10 (10.00)	Mexicali	Telephone
The Green Corner Restaurant Ms. Soledad Hernández Mr. Bensi Levy, Restaurant Owner Green Corner Restaurant	01.16 (9.00)	Mexico City	Visit
State Energy Commission of the state of Baja California (CEE-BC) Mr. David Muñoz, Director of the State Energy Commission of the state of Baja California	01.16 (12.00)	Mexicali	Telephone

Zacatecan Council of Science and Technology (COZCYT) Dr. Gema A. Mercado Sánchez, Director of the Zacatecan Council of Science and Technology (COZCYT)	01.29	Zacatecas	Visit
Persal Industrial Group S.A. de C.V Mr. Ricardo Salcido, Director of the Persal Company Mr. Julio Riezco, COO of Sol-Therm, Persal Group, Mexicali, B.C.	01.18 (14.30)	Mexicali	Telephone
Alcione Group S.A. de C.V. Mr. Sergio Ruíz Fragoso, Alternative Energy Manager	01.10.2011	Cuernavaca	Visit

9 Appendix III - List of people interviewed

- Dr. Jorge Huacuz, Department Manager of Non-Conventional Energies of the Electrical Research Institute (IIE)
- Mr. Jaime Agredano, Project Coordinator and part of the IIE
- Ms. Alejandra Lugo, Project Manager and part of the Coordination Unit of the GEF/UNDP/IIE project
- Mr. Enrique Guzmán Lara, Deputy Director General of Electricity and Renewable Energy, Energy Regulatory Commission
- Mr. Salvador Villalón Espinoza, Baja California Distribution Management of the Federal Electricity Commission, which is the federal government agency responsible for generating, transmitting, and distributing electricity in Mexico
- Mr. Julio Valle Pereña, Undersecretary of Energy Planning and Technological Development of the Sener
- Mr. Jonathan Ryan, Unit Coordinator of the GEF/UNDP/Secretary of Environment and Natural Resources (SEMARNAT) which is the institution that supports the GEF Focal Point in Mexico (the Ministry of Finance and Public Credit - SHCP)
- Prof. Verania Chao Rebolledo, Director of the Sustainable Development Programme of the UNDP in Mexico
- Mr. Raúl I. Alfaro-Pelico, Regional Technical Advisor; Energy, Infrastructure, Transport & Technology of the UNDP in Panama
- Mr. Carlos Flores, CEO Conermex, member of the Mexican Association of Renewable Energy Suppliers (AMPER) and participant member in the project inception workshop
- Ms. Martha Mireya Ruíz Amelio, UAMI Professor/Researcher in charge of the PV system installed there
- Ms. María del Pilar Hernández Limonchi, Academic Director of the Polytechnic University of Morelos, who was in charge of the PV system installed there
- Mr. Omar Ricalde Cab, Energy Laboratory, Faculty of Engineering, University of Yucatan (UADY), coordinator of the certification program taught at UADY
- Mr. Alfredo Salinas, Assistant Director for Research and Technological Development of the Higher Technological Institute of Lerdo, Durango, where a course was taught
- Mr. Marco Vilchis Cerón, Environmental Laboratory Coordinator at the Autonomous University of Baja California, who hosted a course and the 2nd. International Colloquium on PV Systems
- Mr. Bensi Levy, owner, and Ms. Soledad Hernandez, manager of the Green Corner Company, where the first three-phase PV system was connected to the grid
- Mr. David Muñoz Andrade, Director of the State Energy Commission of the State Government of Baja California, which requested the teaching of the first training course on PV systems for technicians
- Mr. Ricardo Salcido, Director of the company Persal Mexicali BC, which won the bid to receive support from the GEF/UNDP/IIE project for the installation of a 150 kW PV system for purposes of self-sufficiency, which was canceled
- Dr. Gema A. Mercado Sánchez, Director of the Zacatecan Council of Science and Technology (COZCYT) of the Government of the state of Zacatecas, which hosted the First International Colloquium on PV Systems, the First PV System Financing Mechanisms Workshop, the 2nd PV System Certification Program in late 2011, and was endorsed by the GEF/UNDP/IIE project for the installation of a 180 kWp photovoltaic plant, of which the project provided 80 kWp

- Mr. Sergio Armando Ruiz Fragoso, Alternative Energy Manager at Alcione Group, SA de CV, and student of the Certification Program in PV Systems taught at the UADY. Alcione has installed a 15 kWp PV system in the state of Morelos, in addition to being the first to be funded by the FIDE by 70%

10 Appendix IV - Summary of field visits

Cuernavaca

We visited the Electrical Research Institute (IIE), the Polytechnic University of the state of Morelos (UPMOR), and the Alcione Company in Cuernavaca on January 8-11, 2013. In the IIE, people from the project team were interviewed, and documentation and a project report were shared. In the UPMOR, we visited the PV system and talked to the person responsible for the project. In Alcione, we interviewed the manager who participated in a course of the project and who is actively developing the PV business at his company.

Mexico City

We visited the office of the United Nations Development Programme (UNDP), the Metropolitan Autonomous University of Itzapalapa (UAM-I), the Green Corner Restaurant, the Secretary of Environment and Natural Resources (SEMARNAT), the Energy Regulatory Commission (CRE), and the Mexican Association of Renewable Energy Suppliers (Amper) for the period of January 14-18, 2013. The UNDP was the basis for a better understanding of the project from a more formal point of view and from its implementation. The visit to the UAM-I was to see the PV system and we talked with the person responsible. At the Green Corner Restaurant we talked with the owner and the manager regarding their PV system and the experience of being the first tri-phase system interconnected in Mexico. At the SEMARNAT, the project's Mexican context was understood and its impact on the government's environmental policies. The CRE shared the positive impacts of the project on the training of its staff to better understand the PV issue. The AMPER said the project's impact was favorable in Mexico and how it has been a very good "turning point", besides being a means to "glue" everyone involved through workshops and seminars that have been very positive for the development of a climate of confidence among PV market players in Mexico.

Zacatecas

Departure at 7.58 from Mexico City on an Aeromexico flight to Zacatecas. Arrived in the city of Zacatecas at 10.30 at La Encantada Park, where the COZCYT is located. Mr. Jaime Agredano of IIE was also present and gave the introduction of the project and of the evaluator's task. Then we proceeded to visit the 180 kWp PV system that has been partly funded by the UNDP/GEF - 80 kWp. The system is divided into three parts, with a total of two parts installed in prepared terraces in front of the COZCYT with a south tilt 100 kWp and 80 kWp making a covering in the parking installed on a metal structure not entirely to the south.

Then there was the interview with Dr. Gema Mercado, who was accompanied by Dr. Agustín Muñoz and the responsible person for maintaining the PV system, to discuss the results of the UNDP/GEF project and the PV project installed in the Council and all the project events that took place in the city of Zacatecas.

Other

The stakeholders from Lerdo, Merida, Mexicali, and Queretaro were interviewed by telephone with the support of the IIE and the UNDP.
The interview with the UNDP RTA was done by skype.

11 Appendix V - List of documents reviewed

The reviewed documents and reports were:

- User Guide SFVI Small Scale-V1-electronic version. Pdf
- Home Workshop Report. Doc
- Presentacion_Proyecto _GEF_PNUD_IIE.pdf
- Undp - POSTER_SISTEMAS_FOTOVOLTAICO.pdf
- http://www.iie.org.mx/proyectofotovoltaico/index.php
- Matrix of questions with comments. Xls
- Study of the penetration of grid-connected PV systems in Mexicali
- Economic impact analysis of the grid-connected PV system with different users
- Audit report of project 00056987 "Home system of photovoltaic cells connected to the grid of Mexicali". Audit for the period from July 1, 2007 to December 31, 2011.

PIR
- GEF-UNDP-IIE PV Project PIR 2008(final).doc
- PIMS 2201_MEX-PV-CC-LAC Rev RTA_IF Final 30 2010.xls
- PIMS 2201_UNDP_GEF_ST_2011_V07_CCMitigation Revised 30 Sept.xls
- PIMS 2201_UNDP_GEF_ST_2012_V08_CCMitigationJAD.xls
- PIR_2009 Final_2201_PV.xls

QPR
- QPR July-Sept 07 (2).doc
- QPR Oct-Dec 07.doc
- QPR Jan-March 08 PV project.doc
- QPR April-June 08 PV project.doc
- QPR July-Sept 08 PV project.doc
- QPR Oct-Dec 08 PV project.doc
- QPR Jan-March 09 PV project.doc
- QPR april-june 09 PV project(1).doc
- QPR jul-sep 09 PV projec.doc
- QPR oct-dec 09 PV projec.doc
- QOR Jan-march10 PV projec-1.doc
- QOR apr-june10 PV project.doc
- QOR Jul-Sep 10 PV project.doc
- QOR oct-dec 10 PV project.doc
- QOR jan-march2011.doc
- QOR apr-jun2011.doc
- QOR jul-sep2011.doc
- QOR oct-dec2011.doc
- QOR jan-march 2012.doc
- QOR apr-jun 2012.doc
- QOR jul-sep2012.doc

Combined Delivery Report (CDR)
- CDR 2007
- CDR 2008
- CDR 2009
- CDR 2010
- CDR 2011
- CDR 2012

12 Appendix VI - Questionnaires used and summary of results

There were general issues for all stakeholders and some specific for each one.

General

Do you know the objectives of the project "Small Grid-connected PV Systems"? Could you mention them please? Are you satisfied with the project and its activities versus the objectives?

Do you believe the project "Small Grid-connected PV Systems" has been a factor in the support from the regulatory framework in Mexico on the installation of grid-connected PV systems? Can you give examples?

Do you believe the project "Small Grid-connected PV Systems" has helped to reduce demand on the grid in the supply peak? Can you give examples?

Do you believe the project "Small Grid-connected PV Systems" has contributed to the existence of financing means in Mexico for the installation of grid-connected PV systems? Can you give examples? Can you give examples of banks or financial institutions that offer specific funding or some type of financing for grid-connected photovoltaic systems?

Do you believe the project "Small Grid-connected PV Systems" has contributed to there being a better understanding in Mexico of the solar photovoltaic issue and of the grid-connected photovoltaic installations? Can you give examples?

Do you believe the project "Small Grid-connected PV Systems" has spread in Mexico the background information of all subjects mentioned - regulation, access to funding, technical knowledge, and system cost? Can you give examples?

Do you believe the project "Small Grid-connected PV Systems" has created tools for training in Mexico on photovoltaic systems - technology, design, operation, and maintenance? Can you give examples? How many people in your organization have been trained and how do they rate it?

Do you believe the project "Small Grid-connected PV Systems" has produced reports, books, manuals, conferences and other events on the subject? Can you give examples? Have you participated in any? In how many? In which ones?

Do you believe the project "Small Grid-connected PV Systems" has monitored grid-connected photovoltaic projects by supplying the information obtained - system efficiency versus design, losses, I-V curves, system errors? Can you give examples?

Do you believe the project "Small Grid-connected PV Systems" has contributed so that photovoltaic market prices in Mexico fall and photovoltaic installations connected to the grid are cheaper? Can you give examples?

Do you believe the project "Small Grid-connected PV Systems" has contributed to the development of the photovoltaic market in Mexico? What about the development of the international market? Can you give examples?

Specific - UNDP

As director of the UNDP in Mexico, how would you define the effectiveness of the project "Small Grid-connected PV Systems"? Did it achieve its goals? In what percentage?

Do you believe the project "Small Grid-connected PV Systems" has used the budget of USD 1 million rationally? Could there have been more done with the budget? Would you make suggestions or changes?
Do you believe the project "Small Grid-connected PV Systems" has been adapted to the problems of Mexico and its development priorities? To what extent?

Do you believe the project "Small Grid-connected PV Systems" can be replicated? Could you give some examples?

Do you believe the project "Small Grid-connected PV Systems" has been implemented in a sustainable way? Environmentally? Socially? Financially?

Specific - SEMARNAT

As a member of the GEF Technical Focal Point in Mexico, how would you define the effectiveness of the project "Small Grid-connected PV Systems"? Did it achieve its goals? In what percentage?

Do you believe the project "Small Grid-connected PV Systems" has used the budget of USD 1 million rationally? Could there have been more done with the budget? Would you make suggestions or changes?
Do you believe the project "Small Grid-connected PV Systems" has been adapted to the problems of Mexico and its development priorities? To what extent?
Do you believe the project "Small Grid-connected PV Systems" can be replicated? Could you give some examples?

Do you believe the project "Small Grid-connected PV Systems" has been implemented in a sustainable way? Environmentally? Socially? Financially?

Specific – SENER

Has the "Small Grid-connected PV Systems" project achieved its objectives? What degree of importance would you give this project for the development of grid-connected photovoltaic systems in Mexico?

In SENER's understanding, is the project budget appropriate for its goals? What is your opinion of the project cost versus the results?
In SENER's understanding, is the project in line with the country's energy policy? And with the policy's priorities for the use of renewable energies?
Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific – CFE

Has the "Small Grid-connected PV Systems" project achieved its objectives? What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?
In CFE's understanding, is the project budget appropriate for its goals? What is your opinion of the project cost versus the results?
In CFE's understanding, is the project in line with the country's energy policy? And with the policy's priorities for the use of non-conventional energies?
Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific – CRE

Has the "Small Grid-connected PV Systems" project achieved its objectives? What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?

In CRE's understanding, is the project budget appropriate for its goals? What is your opinion of the project cost versus the results?

In CRE's understanding, has the project had an impact in the regulation of PV electricity connected to the grid? Can you give examples of the impact?

Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific – IIE

Has the "Small Grid-connected PV Systems" project achieved its objectives? What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?

In IIE's understanding, is the project budget appropriate for its goals? What is your opinion of the project cost versus the results?

Has the project achieved all of its objectives in the same degree? Can it be discriminated?

Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific – AMPER

Has the "Small Grid-connected PV Systems" project achieved its objectives? What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?

In AMPER's understanding, is the project budget appropriate for its goals? What is your opinion of the project cost versus the results?

Can the impact on the private and public sector of the grid-connected PV systems in Mexico be quantified? Has this project been important for that impact?

Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific – UAM-I

What is the level of impact of the project "Small Grid-connected PV Systems" on UAMI? And for the students? And in Mexico? Has it achieved its objectives? What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?

Without the UNDP's financial support, would the UAMI have a grid-connected PV system installed? To what extent has the UNDP support been important?

Has the project produced significant tools to provide training on grid-connected PV systems for UAMI? Was UAMI involved in the ellaboration of reports, manuals, and events of this project?

Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific - UPMOR

What is the level of impact of the project "Small Grid-connected PV Systems" in UPMOR? And for the students? And in Mexico? Has it achieved its objectives? What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?

Without the UNDP's financial support, would the UPMOR have a grid-connected PV system installed? To what extent has the UNDP support been important?

Has the project produced significant tools to provide training on grid-connected PV systems for UPMOR? Was UPMOR involved in the ellaboration of reports, manuals, and events of this project?
Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific - UADY

What is the level of impact of the project "Small Grid-connected PV Systems" on UADY? And for the students? And in Mexico? Has it achieved its objectives? What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?
Has the course on grid-connected PV systems had an impact on students at UADY? Was there student interest in the PV subject? After this certification course, have there been contents developed at UADY for training on PV?

Has the project produced significant tools to provide training on grid-connected PV systems for UADY? Was UADY involved in the preparation of reports, manuals, and events of this project?
Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific - ITSL

What is the level of impact of the project "Small Grid-connected PV Systems" on ITSL? And for the students? And in Mexico? Has it achieved its objectives? What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?
Has the course on grid-connected PV systems had an impact on students at ITSL? Was there student interest in the PV subject? After this certification course, have there been contents developed at ITSL for training on PV?

Has the project produced significant tools to provide training on grid-connected PV systems for ITSL? Was ITSL involved in the preparation of reports, manuals, and events of this project?
Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific - UABC

What is the level of impact of the project "Small Grid-connected PV Systems" on UABC? And for the students? And in Mexico? Has it achieved its objectives? What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?

Has the course on grid-connected PV systems had an impact on students at UABC? Was there student interest in the PV subject? Has the international conference generated interest in the academic community and students at UABC? To what extent? After the certification course and the international conference, have there been contents developed at UABC for training on PV?

Has the project produced significant tools to provide training on grid-connected PV systems for UABC? Was UABC involved in the preparation of reports, manuals, and events of this project?

Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific – Green Corner

What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?

You have been one of the first to invest in grid-connected PV energy. Can you explain how you made your decision? Are you satisfied with the system?

Has Green Corner benefited in any way with this project? Has the monitoring system given you confidence in the design, operation, and maintenance?

Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific – CEE-BC

What is the level of impact of the project "Small Grid-connected PV Systems" on CEE-BC? Has it achieved its objectives? What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?

Has the course on grid-connected PV systems had an impact on CEE-BC? And in the state? What has been the importance? And of the International Colloquium? And the training course for technicians? Is CEE-BC pleased with the results of the course?

What has been the impact of the 220 PV systems in the state of Baja California? Has the UNDP project been instrumental in your decision-making to install the systems?

Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific - COZCYT

What is the level of impact of the project "Small Grid-connected PV Systems" on COZCYT? Has it achieved its objectives? What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?
Has the course on grid-connected PV systems had an impact on COZCYT? And in the state? How significant has it been? Has the workshop on funding mechanisms had any practical results in the state? And in Mexico? Has the certification course had an impact on COZCYT? And in the state?

Has the project partnership been instrumental in the decision to install 180 kWp? To what extent?
Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?

Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific - Persal
What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico?
Persal wanted to invest in grid-connected PV energy. Can you explain how you came to your decision? Was it only possible with support from the project?
What has happened to the project of installing a grid-connected PV system? Why did it not materialize? Did it happen afterwards or not yet?
Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?
Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Specific – Alcione
What degree of importance do you give this project for the development of grid-connected photovoltaic systems in Mexico? You being a student of the UADY course, how would you define the importance of the project for the training of cadres of the companies in Mexico?
Alcione invested in grid-connected PV energy. Can you explain how you came to your decision? How important is funding for your decision? Without funding, would you have done it? You being a student of the UADY course, how do you define the importance of the certification course for your activities at Alcione and the decision to install a grid-connected PV system?
Are you satisfied with the system? With its efficiency? Operation and maintenance? Are the design and operation in accordance with what was expected? Were the expectations achieved?
Can this project for northern Mexico be applied to other regions and Mexican states? To what extent do you consider this project replicable?
Has the project implementation followed the sustainability and environmental, social and financial rules? Can you give examples?

Appendix VI - Questionnaires used and summary of results

Questions	PNUD	PNUD	SEMARNAT	SENER	CFE	CRE	IIE - JAD	IIE - APL
You know the objectives of the project .... Are you satisfied ...	Yes, I know the whole project evolution. Very satisfied.	I understand. Design made in a different reality and context. It was a trigger, successful, catalytic.	The 3 of them. Satisfied. The project achieved its objectives and had a great impact on the contract model	Doesnt know all the objectives, just the overall of the project. Fully satisfied with the results.	Training and dissemination of renewables. Very satisfied.	I do know.Very satisfied	Yes. 90% satisfacción	Yes. 90% satisfacción
Has contributed to the regulatory framework in Mexico to support the installation of PV systems connected to the network?	The framework has been changed before starting the project. The IIE is not the proper channel, include SENER.	Yes, in its scale. Installed projects are good examples.	Feasible permits. The SFVI connection is possible. The CFE already starts thinking about MW production in a PV system.	CFE has imparted the IIE knowledge to allow the developing of the regulatory framework.	Yes. It allowed the regulatory framework to extended itself to medium scale.	Yes.It began in Mexicali and then it continued.	Yes, indirectly	Si, indirectamente
Has contributed to the reduction in network demand at peak supply?	Dont know	Not significantly	Very focused in the northern region. The project has reports on the subject.	Yes, but peak demands do not match irradiation in all regions.	Yes, and whenever additional equipment match for comfort - air conditioners.	I think it had an impact in the northwest part of the country, but not throughout the whole country	Yes, in the northwest region	Does not know
Media has Contributed to financing .. specific financial products	There were approaches to private banking and development banks. I dont know of specific financial products	CONAVI FONAVI, NAFIN and FIDE. The PV issues has has been introduced in the banks	Yes, Fide, Banobras. Project finance may be available for renewables	Enercity - residential level. Watercapital - systems. FIDE -> commercial sector and SMEs.	I do not know their own financial products.	I dont know. I saw no progress in financial products.	Yes, indirectly	Yes. Banorte, FIDE, HSBC in Mérida.

Have a better understanding ... in Mexico theme photovoltaic solar and photovoltaic installations connected to the network?	Symposia, workshops, courses, user manuals. More for technitians and academics	Muchos eventos sobre el FV. Académicos y CFE participaron con mucho interés. No se ha llegado a todos los sectores de la sociedad.	Zacatecas is the best example with co-funding from the government. Courses based on graduate diplomas	Yes, IIE workshops and publications (guides). More in a circle of technicians / suppliers, political decision makers and funders.	Staff training workshops - use, installation, maintenance. Three colloquia and symposia on FV in Mexicali and graduate courses.	Diffusion has been a very positive subject. It didnt involved all sectors of society	Yes, definitely	Yes, with impact on the whole society.
.. Mexico disseminated background information in all subjects mentioned - regulation, access to	There was very technical forums and general materials in the subjects	It was background information, as the IIE was the one who prepare it	Yes, technical and financial background	The IIE and the project has been a point of reference for all the society. It has allowed	It was background info . Publications, CFE contracts. The price fell 50%	The workshops and technical info has helped CFE to understand the	Yes Limitations on the web	Yes. All info on the web
... Has created tools for training in Mexico in photovoltaic system - technology, design, operation and maintenance? How many .. Training and how has it was valued?	Graduate courses, the pilot, the info on the website. I did not participate in any training	User Manual, folders with information	I attended graduate courses at Merida and the valuation has been very positive. The interest of the students has been remarkable.	The training has been very good. The knowledge contents have been replicated and disseminated . The contents of information and the IIE will be used in other forums.	The notes of the graduate courses. The User Guide is a tool that has helped a lot.	Technical Training has been crucial. CFE technical standards. 5 people from the CRE.	Yes, on demand	Yes, courses available at IIE
Do you believe that "Small PV systems connected to the network" has produced reports, books, manuals, conferences and other events on the subject? Can you give examples? You have participated? In how many? Which ones?	The user guide, graduate course notes. I participated in the workshop of Zacatecas and in the colloquias in Mexicali, Queretaro and Mexico City.	FV Forum 2011, 3 people UNDP (Panama, New York)	I have participated in the Steering Committee. I haven´t assited to workshops and conferences	The guide, workshops, seminars and diplomas. I know the web site	Reports, national manuals, I participated in the 2nd symposium, providing information on Mexicali´s savings PV system	I know very well the User Guide. I was in 3 conferences as a speaker. Other people from the CRE took the graduate courses	Yes, all in the web	Yes. One diploma course, one conference per year. 2 courses per year. Guide. Info on the web
Do you believe the project "Small PV systems connected to the network" has monitored photovoltaic solar projects connected to the network supplying the information obtained - versus system efficiency design, losses, curves IV, system errors? Can you give examples?	Yes they did. Green corner, UAM-I, Zacatecas, and IIE CERTE	Yeah, it has been monitored. it is recalled	The one from Hermosillo, for a home user.	I have no knowledge of the monitoring	Mexicali Monitoring System. The report is available	I do not know. I heard some information on events	Yes, Oaxaca	Yes. Mexicali, Green Corner, La Paz

Do you believe the project "Small PV systems connected to the network" has contributed to the development of photovoltaic solar market in Mexico? And for international market development? Can you give examples?	National -> yes, indirectly. Promoting technology, identifying barriers, technical training, project instrument connection and push the issue. International -> on the side of UNDP and GEF has had impacts on disclosure.	México yes. International because of the investment oportunities	Internacional I dont think so. National there is any demand	México. capacitación, difusión, desarrollar herramientas para los mecanismos financieros. internacional: IIE involucrado en asociaciones del Caribe y sur América -> pueden compartir las experiencias	Mexico. training, outreach, develop tools for financial mechanisms. International: IIE involved with Caribbean and South American associations -> can share experiences	Mexico safer, more interested people. International dont know.	Mexico: Yes, it has been reported in the PVPS. International: no	Mexico: Yes. International: does not know
Degree of impact	Effectiveness - 85%	80%	100% achievement besides from the expected impacts. Very good in the disbursement, fulfillment of objectives, current plans completed	98% of impact. 95% satisfaction	Satisfacción -> 95%. Importancia -> 100%	Training 100%, 100% in the regulation, 70% in funding. Impact of the project 80%	100%. Fundamental	90%, lacked the impact on politicians and politics
Relevance	Aligned to open the gap in Mexico in order to allow the use of PV	He did what had to be done. Intention to save to buy a vehicle to monitor projects	The goals are perfectly in the line of action of SEMARNAT and other secretaries who are committed to plans on impact and climate change	Its worth every penny.	The project is in line and agree with the objectives of CFE	Very relevant. IIE has helped the CFE to understand the relevance and progress was made for the connection contract.	Good budget, well done	Satisfactory in all

Effectiveness, efficiency	I think it was very efficient. We do more with less	I feel that yes. It takes time discussing clean energy matrix, but no concrete	The amount has been little but what was available and the confinements have been very good. I do not think that would be different	100% in line with government policies.	It fell short. should be a bigger budget, but it did achieved the project objectives	I do not know. I do not know the project budget	90%, except for the funding	Viability, training, legislation, financing
Replicability	Replicable with adjustments	It can be replicated at the federal level. Cushions the impact of disasters	Is replicable, without resorting to the GEF. Morelos, Veracruz, Yucatán are interested in doing something.	Completely replicable with small adjustments	Very replicable in other regions of the republic without any problem. Technical adjustments.	Yes, it can be replicated, but each state has its peculiarities	Yes, but with adaptations	Yes, with minimal adjustments
Sustainability	Yes. Environmental -> do not damage anything. Social -> there has been no damage to the society. financial -> we had more resources than the ones we use	Financial -> sustainable. Environmental -> land use for larger projects. communities -> it impacted the youth in terms of knowledge	Yes. Social I have no info. Environmental -> clean energy. Financial -> durable impacts	I have no background	Environmental -> clean energy. Social -> more jobs, training people. Financial -> wake up financial mechanisms and use of global funds	I do not know. Environmental -> clean energy, social -> Training	Yes. Auditing made	Yes. Auditing made

14 Annex VII Terminology Explained GEF

FINAL EVALUATION SCOPE AND GEF PROJECT SPECIFIC ISSUES TO BE COVERED

The scope of an EF depends on the project type, size, context, focal area and country. In all cases, the RU must properly examine and evaluate the perspectives of various stakeholders. In most cases, an EF will include field visits to verify the achievements of the project and interviews with key stakeholders at a national and local level where appropriate. It also discusses the use of GEF resources and co-financing in the broader context of the country.

It is generally expected that evaluations in the GEF explore the following five important criteria:

- **Relevance.** The extent to which the activity is appropriate for development priorities and national and local organizational policies, including changes over time.
- **Effectiveness.** The extent to which a goal has been achieved or is likely to do so.
- **Efficiency.** The extent to which results have been delivered with more economic resources possible; also called cost effectiveness or efficacy.
- **Results.** Positive and negative, planned and unforeseen, changes and effects produced by a development intervention. In GEF terms, results include direct project, short-and medium-term and longer-term impact including global environmental benefits, replication effects and other local effects.
- **Sustainability.** The likely ability of an intervention to continue to deliver benefits for an extended period of time after completion. The projects need to be environmentally, financially and socially sustainable.

The following should be covered in the report of EF:

Overview of the evaluation.
The final evaluation report will provide information on when the evaluation took place, the places visited, who was involved, the key questions, and the methodology used. More details are provided in the template of the Terms of Reference (TOR) in Annex I.

Evaluation of the results of the project.
The EFs evaluated at least achieving outputs and outcomes and provide measurements for results. This seeks to determine the extent to which the results of the project were achieved, or are expected to be achieved, and assess if the project has led to any other positive or negative result. While evaluating the results of a project the EFs seek to determine the extent of the achievements and shortcomings in achieving the objective of the project as stated in the project document and also indicate whether there were any changes and whether these changes were approved and achieved. If the project did not establish a baseline (initial conditions), the consultant in conjunction with the project team should seek to calculate the initial conditions (baseline) for the achievements and results can be properly established.

As in most GEF projects can be expected to achieve the results before the end of the project, the evaluation of the results of the project should be a priority. The results are the effect of short or medium term likely or achieved intervention products. Examples of results may include, but are not restricted to strengthening institutional capacities, higher public awareness (when driving behavior changes), and transformation of policy and market frameworks. For GEF Project 4 is required, and for GEF 3 projects recommended that consultants quantify project results using indicators and Tracking Tools (Tracking Tools) relevant.

To determine the level of achievement of project outcomes and objective, the following three criteria will be evaluated in the EF:

- **Relevance:** Were the project results consistent with the focal areas / operational program strategies and country priorities? Consultants must also measure the extent to which the results specified in the project document are actually outcomes and not outputs or inputs.
- **Effectiveness:** Are the results of the project in proportion to the expected results (as are described in the project document) and the problems that the project aimed to address (eg original project objectives or modified)? If the original or modified results are merely outputs / inputs, then to evaluate the consultants must measure whether there was any real result of the project, and if there was, then, if they are proportional with realistic expectations of these projects.
- **Efficiency:** Was the project cost effective? Was the project the least cost option? Is the implementation of the project was delayed, and if so, did that affect cost-effectiveness? When possible, the consultant should also compare the cost-time vs. results of the project with other similar projects.

The assessment of relevance, effectiveness and efficiency should be as objective as possible and include sufficient and convincing empirical evidence. Ideally the project monitoring system should deliver quantifiable information that leads to a robust assessment of the effectiveness and efficiency of the project. Because projects have different objectives, the evaluated results are not comparable and can not be accumulated. To monitor the strength of the portfolio, the results of the project will be classified as follows:

- **Highly Satisfactory (HS):** The project had no shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- **Satisfactory (S):** The project had minor shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- **Moderately Satisfactory (MS):** The project had moderate shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- **Moderately Unsatisfactory (MU):** The project had significant shortcomings in the achievement of its objectives, in terms of relevance, effectiveness and efficiency.
- **Unsatisfactory (U):** The project had major shortcomings in the achievement of its objectives, in terms of relevance, effectiveness and efficiency.
- **Highly Unsatisfactory (HU):** The project had severe shortcomings in the achievement of its objectives, in terms of relevance, effectiveness and efficiency.

The consultants will also assess positive and negative impacts current (or anticipated) or emerging long-term effects of the project. Given the long term nature of impacts, it may not be possible for consultants identify or fully assess the impacts. Anyway consultants indicate the steps taken to assess the project's impacts, especially impacts on local populations, local environment (eg increase in the number of individuals of a species in danger of extinction, improvement in water quality , increase in the amount of fish, reducing greenhouse gas emissions) and where possible indicate how the findings on impacts will be reported to the GEF in the future.

Evaluation of sustainability of project results

The EF evaluate, at least the "likelihood of sustainability of outcomes at project completion, and provide a rating for this." Sustainability assessment will give special attention to the analysis of risks likely to affect the persistence of the results of project. Sustainability assessment should also explain how other important contextual factors that are not outcomes of the project will affect sustainability. More details about the sustainability assessment are provided in Annex 2.

Role catalyst

The final evaluation will also describe any catalytic or replication effect of the project. If not identified any effect, the evaluation will describe the catalytic or replication actions that the project has made.

Assessment monitoring and evaluation systems

The EF will assess whether the project met the requirements of the project design Monitoring and Evaluation (M & E) and the implementation of M & E plan for the project. GEF projects must budget adequately for execution of the M & E plan, and provide adequate resources for the implementation of M & E plan It is also expected that project managers use the information generated by the M & E system during project implementation to improve and adapt the project. Due to the long duration of many GEF projects also encourages projects to include plans for long-term monitoring to measure outcomes (such as environmental results) after completion. It is expected that the report includes separate evaluations EF achievements and shortcomings of these two types of M & E systems

General considerations of the report

- ☐ Format: Times New Roman - 11; single spacing; automated table of contents, number of pages (centered below) suggest the use of graphics and photographs, where relevant
- ☐ Length: Maximum 50 pages in total, excluding annexes
- ☐ Delivery dates: First draft within a period not exceeding two weeks after completion of the assignment

Special Issues to consider

- ☐ Include reasons for the duration of the project itself was more extensive than originally contemplated.
- ☐ What are clear the scope of the project, the importance of the products made and the need to continue working on this issue.
- ☐ Report the role of GEF focal points in the process