



PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: Medium-sized Project

THE GEF TRUST FUND

Submission Date: 06/10/2010

PART I: PROJECT IDENTIFICATION

GEF PROJECT ID¹: P121878 PROJECT DURATION: 48 months

GEF AGENCY PROJECT ID:

COUNTRY(IES): Kiribati

PROJECT TITLE: Grid Connected Solar PV Central Station Project

GEF AGENCY(IES): World Bank,

OTHER EXECUTING PARTNER(S): Public Utilities Board (PUB)

GEF FOCAL AREA (S)²: Climate Change

GEF-4 STRATEGIC PROGRAM(S): CC SP-3

NAME OF PARENT PROGRAM/UMBRELLA PROJECT (if applicable): GPAS, REGIONAL PROGRAM

INDICATIVE CALENDAR*	
Milestones	Expected Dates mm/dd/yyyy
Work Program (for FSP)	
CEO Endorsement/Approval	Dec 2010
Agency Approval Date	Jan 2011
Implementation Start	Feb 2011
Mid-term Evaluation (if planned)	
Project Closing Date	Jan 2015

* See guidelines for definition of milestones.

A. PROJECT FRAMEWORK

Project Objective: The project objective is to contribute to reducing Kiribati's dependence on imported petroleum for power generation in order to improve energy security and to reduce the GHG emissions from diesel fuel use for grid electricity supply in Kiribati. The specific objective of the proposed MSP is to serve as a catalyst for the substitution of the diesel based electricity generation for the South Tarawa grid by grid-connected solar PV supply of electricity.

Project Components	Indicate whether Investment, TA, or STA ^b	Expected Outcomes	Expected Outputs	Indicative GEF Financing ^a		Indicative Co-Financing ^a		Total (\$) c = a + b
				(\$ a)	%	(\$ b)	%	
1. 500 kWp solar PV	Investment	244,000 l/yr diesel substitution	928,000 kWh/yr clean energy 50,000 tons CO2 mitigated over 20 year lifetime of investment	810,000	34	1,550,000	66	2,360,000
2. Design & supervision support	TA	Improved design and implementation quality	Consultant reports	50,000	40	75,000	60	125,000
3. Medium term least cost plan for staged renewable energy and energy efficiency grid investment	TA	Improved understanding on least cost investment opportunities	study report	50,000	33	100,000	67	150,000
4. Operations Manual for off-grid program - KESC	TA	Improved quality of operations	report	0	0	75,000	100	75,000
5. Project mgt				90,000	47	100,000	53	190,000

¹ Project ID number will be assigned by GEFSEC.

² Select only those focal areas from which GEF financing is requested.

Total project costs		1,000,000	34	1,900,000	66	2,900,000
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^a List the \$ by project components. The percentage is the share of GEF and Co-financing respectively of the total amount for the component.

^b TA = Technical Assistance; STA = Scientific & Technical Analysis.

B. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE and by NAME (in parenthesis) if available, (\$)

Sources of Co-financing	Type of Co-financing	Project
Project Government Contribution	In-kind	50,000
GEF Agency(ies)	Grant	
Bilateral Aid Agency(ies)	Grant	1,850,000
Multilateral Agency(ies)	(select)	
Private Sector	(select)	
NGO	(select)	
Others	(select)	
Total Co-financing		B1,900,000

C. INDICATIVE FINANCING PLAN SUMMARY FOR THE PROJECT (\$)

	Previous Project Preparation Amount (a) ³	Project (b)	Total c = a + b	Agency Fee
GEF financing		A1,000,000	1,000,000	100,000
Co-financing		B1,900,000	1,900,000	
Total		2,900,000	2,900,000	100,000

D. GEF RESOURCES REQUESTED BY AGENCY (IES), FOCAL AREA(S) AND COUNTRY(IES)¹

GEF Agency	Focal Area	Country Name/ Global	(in \$)		
			Project (a)	Agency Fee (b) ²	Total c=a+b
(select)	(select)				

¹ No need to provide information for this table if it is a single focal area, single country and single GEF Agency project.

² Relates to the project and any previous project preparation funding that have been provided and for which no Agency fee has been requested from Trustee.

PART II: PROJECT JUSTIFICATION

A. STATE THE ISSUE, HOW THE PROJECT SEEKS TO ADDRESS IT, AND THE EXPECTED GLOBAL ENVIRONMENTAL BENEFITS TO BE DELIVERED:

The Issue and context - The proposed project responds to a systemic issue in the electricity sector with significant economy-wide implications for Kiribati; whose economy is marked by an overarching near-total dependency on one energy source, oil. About half of the imported oil (Automotive Diesel Oil or ADO), is used for electricity generation for the main electricity grid system on Tarawa atoll, and operated by the Public Utilities Board (PUB). Of the estimated national population of 110,000, about 42,000 live in the service area of the PUB, of which over 95% are connected to this grid system. The remaining population is scattered and widely dispersed across the other 19 inhabited atolls.

The Tarawa grid system is supplied by two diesel generating stations with a combined installed capacity of 5.45 MW. On a typical weekday, the peak load is about 3.7 MW, with load exceeding 3 MW during a broad daytime shoulder period between 9 am and 5 pm. By contrast, during the secondary evening peak hours of 7pm to 9 pm, load is just under 3 MW. On a typical weekend, the peak is around 2.7MW. The PUB's generation cost is estimated to be about US\$ 0.32/kWh, at a delivered fuel cost of US\$ 0.97/liter.

³ Include project preparation funds that were previously approved but exclude PPGs that are awaiting for approval.

The electricity grid system's operational performance coupled with the high cost of diesel generation adds up to the high cost of service for electricity to households and businesses, even with administered fuel prices. The Government confronted by poor financial performance of the electricity sector, has so far "managed" the situation by a combination of substantial direct budget subsidy transfers to the sector as well as significant amounts of indirect and non-transparent subsidies in the form of loan guarantees (contingent liabilities) implicit in intra-Public Enterprise transactions of the PUB. Recent data show that the PUB accounts for around half the direct subsidy currently shown in the Government budget. The resultant impact is high and unsustainable fiscal deficits.

Restoring fiscal sustainability of the national budget within the medium-term is a top national priority. Key policy responses to achieve this goal broadly include reforming the loss making public enterprises (PEs) – the PUB ranking among the largest - and making them accountable for efficient performance; reducing direct and indirect subsidies to PEs; setting tariffs to reflect cost-of-service associated with good performance. Quite possibly the most important implementation action for this policy agenda is lowering the ADO dependence in the electricity grid system, by implementing lower cost alternatives. However, financing and capacity limitations have so far led to limited planning effort in this regard, and PUB and GOK are caught in a Catch-22 situation – continued hemorrhage of expenditures on diesel limiting planning and investments in the lower-cost alternatives. Furthermore, Kiribati is unique even among Pacific Island countries for its remoteness and very low level of skilled capacity in the country. The challenge is to help to simultaneously strengthen the capacity at an appropriate pace in a staged, step-by-step approach which will extend beyond the proposed initial project.

How the project seeks to address the issue – The proposed project which will be the first World Bank engagement in Kiribati's energy sector is guided by the following strategic principles underlying the project design: (i) be simple enough to be successfully implemented given the capacity constraints; (ii) have an early positive impact in the electricity sector; and (iii) set in motion the beginnings of a systematic process and ongoing dialogue over the medium term, for achieving a shift from the business-as-usual ad hoc approach, towards a well sequenced, strategic and operational "roadmap" approach for joint Government and partner engagement in the electricity sector which will drive a systematic and staged process of strengthened institutional and technical capacity in country and enhanced financial sustainability of the sector.

The strategy underlying the project design is the strengthening PUB over the longer term, as the central implementation pillar of the grid electricity network system with a project structure wherein PUB is the owner and operator of the solar power station, and maintenance services for the solar PV power station are provided by the private sector for the first several years. Attracting good quality IPP / BOT sponsor/investor for a relatively small project in such a remote and logistically-challenging location, especially for first-of-a-kind project in Kiribati is not likely. Furthermore, KSEC, the public entity responsible for the off-grid solar PV program, does not have the capacity or experience in the utility business, to be considered as the owner and/or operator of a grid-connected PV plant. KSEC has a highly decentralized structure, reflecting the widely scattered locations of customers across numerous remote atolls; serviced with a minimally trained "village technician" on each remote atoll responsible for monthly bill collections and routinely check and service the home sized solar PV system as needed. By contrast, PUB has an established and demonstrated track record and adequate organizational capacity behind it for operating and routine maintenance of the two diesel power stations and the grid system, while providing retail electricity service. The incentives for the PUB to operate the solar PV power station are direct and very strong and this development will be closely watched by the Government as well. From a financial perspective, the O&M costs of the solar PV power station will be minimal while also offsetting the corresponding amount of diesel generation that is contributing to the fiscal hemorrhaging of the sector finances and triggering a direct fiscal burden on the GOK. This driver provides a strong incentive to the PUB and GOK to not only sustain the project structure but over a period of time to implement the medium term expansion plan/roadmap to be developed as well; as this will help to further lower operating costs and in that process start building the foundations for improved sector efficiency and performance over the course of the medium term.

Preliminary assessment of available technical options and supply chains indicates that grid-connected PV is the most suitable option to reduce oil dependency and grid generation costs. Under current conditions and conservative assumptions about the future, there appears to be strong justification for growing investment in grid-connected renewables, reaching about 20-25% of the generation requirements. The initial approximately 500 kW catalytic

investment (actual size will be determined in the feasibility study taking into account grid and demand characteristics) takes care of the financing constraints, weak supply chain, and limited capacity. The TA component builds on the experience and sets the stage for future expansion in a least-cost manner without reliance on GEF finance. The technical assistance will also examine whether other no-carbon generation options can further reduce diesel dependence of the growing grid. In addition the project will help strengthen institutional and technical capabilities of the PUB to plan and implement such a least-cost plan.

Project objective: The project objective is to contribute to reducing Kiribati's dependence on imported petroleum for power generation in order to improve energy security and to reduce the GHG emissions from diesel fuel use for grid electricity supply in Kiribati. The specific objective of the proposed MSP is to serve as a catalyst for the substitution of the diesel based electricity generation for the South Tarawa grid by grid-connected solar PV supply of electricity.

Project Components: Investment – Up to 500 kWp (kilowatt peak capacity) of grid-connected solar PV without storage, to kick-start a staged implementation strategy over the medium-term. The solar PV array will be installed and managed at a single central power station location with associated inverters to enable grid in-feed at the station. Depending on engineering, economic and market conditions, the feasibility study to be undertaken during preparation will determine the initial sizing and key specifications of the power station, taking into account load shape characteristics and operational and system reliability considerations that may arise from injecting the power into the S. Tarawa grid system, as well as any design considerations arising on account of the maritime environment within which the equipment must function reliably. . For procurement purposes, it is intended to include with the supply and install contract for the solar PV installation, an operations and maintenance (O&M) provision clause to cover the entire project duration, while PUB gains experience in O&M and builds its capacity to initiate and manage future investments

Technical assistance:

1. Implementation Consultant to assist PUB, including: technical evaluation of contractor bids received for construction of central solar power station, supervision of contractor through commissioning and plant's operational integration including monitoring systems, selection of consultants for other technical assistance studies.
2. Preparation of 10 year development and implementation plan for PUB grid system, including: updated demand and generation requirements forecast taking into account readily implementable efficiency improvements such as network and commercial loss reduction; least cost sequence of renewable energy supply options (including additional grid connected solar PV (central and distributed), and blending of coconut oil for diesel fuel substitution, if technically feasible and economically competitive, to meet demand and reduce dependence on diesel for power generation; network upgrades / expansion (if any) to meet forecast demand, implement loss reduction program, and safety considerations.
3. Technical assistance for improving the financial viability of PUB and the sector with the scope to be detailed during further preparation.
4. Other technical assistance to be identified during further preparation, such as, external training for PUB staff if necessary in the context of the solar power station operations and maintenance, capacity building appropriate to ensure compliance with Bank safeguards framework applicable to the project, as well as financial management.
5. Preparation of Operating manual for the Kiribati Solar Energy Corporation (KESC) Expected global environmental benefits: Investment proposed under the project is expected to yield about 500-600 tons per year, or cumulative 10 to 12 thousand tons CO₂ emission reductions from diesel fuel substitution. Investments expected to be catalyzed via the technical assistance provided under the project and, more importantly, the financial savings to the PUB as a result of the initial investment under the project, are estimated to expand the CO₂ reductions to additional 1,000 to 3,000 tons per year. Relative to the projected grid power sector CO₂ emissions growth, this incremental saving is estimated to be about 30 to 50% of the incremental growth. A particularly important part of this operating manual will involve the low-following characteristics of the solar plant to ensure that its use leads to improved load management and maximized CO₂ emission reductions.

- B. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL/REGIONAL PRIORITIES/PLANS:** The proposed MSP is fully consistent with Kiribati's national priorities, policies, and plans. The Kiribati National Energy Plan (KNEP), May 2009, is the very first time that such a framework has been developed and adopted by the Government. The KNEP builds on the theme and vision of the Kiribati Development Plan (KDP 2008-2011): "enhancing economic growth for sustainable development", with emphasis on "available, accessible, reliable, affordable, clean and sustainable energy options". The Policy incorporates and is consistent with regional priorities and plans, including the Pacific Plan, Pacific Islands Energy Policy, Millennium Development Goals Declaration, the Mauritius Strategy, and the Kyoto protocol, and therefore this policy is also consistent with the regional and international agenda.
- C. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH [GEF STRATEGIES](#) AND STRATEGIC PROGRAMS:** The proposed project conforms to the Climate Change Focal Area Operational Program 6 – removing barriers to renewable energy, Strategic Long-term Objective 4 – to promote on-grid renewable energy – and Strategic Program 3 (for GEF-4) – Promoting market approaches to renewable energy. Specifically, this project will help break the vicious cycle of oil dependence on the grid, fiscal imbalances and financing limitations for lower-cost renewable energy options; and, by technical assistance in the crucial early-entry phase of grid-integration, setting the stage for scaling up grid PV or other market-ready technologies over the medium term.
- D. JUSTIFY THE TYPE OF FINANCING SUPPORT PROVIDED WITH THE GEF RESOURCES:** Given Kiribati's size and locational characteristics, it is difficult for other development partners to engage in grid-renewable promotion in a 'start up' phase in a way that combines both investments as well as technical assistance; and crucially supported on an ongoing basis during the course of project implementation in the process and interactions during supervision of the project implementation, between the implementing entity, the Government, and the Bank's operational task team. Thus, GEF is uniquely placed to address this "entry barrier" for external support, in particular via an MSP such as the one proposed here. This project could also lead to similar projects for grid-renewable integration in other island countries. Moreover, the European Union have traditionally focussed and continue to do so in their operational program on home sized solar PV systems in the Outer islands. The only other major Donor that been active in electricity grid sector on Tarawa is Japan. The Bank were informed by JICA that while Japan have in the past provided the diesel generators to PUB, at present support for the grid connected solar PV is not among the operational priorities of their assistance program for Kiribati.
- E. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES:** At this juncture there are no ongoing renewable energy generation projects within the service area of the grid system. The Government is also interested in piloting distributed solar PV supply for the grid system via installation of PV arrays mounted on structurally and otherwise suitable rooftops from among the larger Government office buildings. This interest is the subject of dialogue that is ongoing with a bi-lateral donor. Such an activity, should it materialize down the road, will be complementary to the proposed central station solar PV plant and fully consistent with the strategic driver underlying the proposed MSP mitigation project aimed at diesel fuel substitution on the grid system. Additionally, the medium term planning study under the TA component will shed light on how much of the additional solar PV capacity additions under the grid least cost plan should be central station based and distributed. Electrification outside the grid system in the outer islands is undertaken by the Kiribati Solar Electricity Corporation (KESC). The investment program of KESC - mostly solar home systems of varying sizes for households, community halls, social institutions, provided under a fee for service scheme - is being supported by grant financing from the European Commission (EC). However, KESC have requested Bank support for preparation of the operations manual so that they can benefit from interacting with the Bank during the course of supervision and the direct link to its accumulated knowledge base on solar PV program experience worldwide; starting with finalisation of TOR, shortlisting qualified consultants, review of consultant work in progress and finalisation thereof. The GEF-supported "Pacific Islands Greenhouse Gas Abatement through Renewable Energy Project" (PIGGAREP) built on the lessons from the earlier, completed GEF-supported "Pacific Islands Renewable Energy Project" (PIREP). The PIGGAREP project focused mainly on removal of the barriers in order to enable commercially viable RETs to be used in tourism facilities, educational, communication and health services, to provide employment to young people and to establish value added activities like handicraft making. It also aimed to improve the local access to financing for renewable energy projects. The barriers targeted by the PIGGAREP project were primarily those barriers identified as obstacles in facilitating small scale, off grid investments. In contrast, the primary focus of the proposed new project is grid-connected renewable

energy, and for which a different set of barriers are important. Both the PIREP and PIGGAREP projects provided technical assistance and capacity building relevant for both on-and off-grid renewable energy. Information and studies prepared under the PIREP and PIGGAREP project will be incorporated into the planning-related technical assistance in the proposed project.

F. DISCUSS THE VALUE-ADDED OF GEF INVOLVEMENT IN THE PROJECT DEMONSTRATED THROUGH INCREMENTAL REASONING : While Kiribati is generally aware of grid solar PV technology and for many years has operated an off-grid solar PV programme, there are significant institutional and technical capacity development needs at the local level that have to be addressed in order to achieve the desired objective of reducing diesel fuel use for electricity generation, with the consequent reduction in GHG emissions. At this juncture Kiribati needs assistance in undertaking the economic assessment and technology choice decisions because of (i) inexperience and technology performance risk/doubt; and (ii) inability to finance, in turn due to precarious financial condition of the sector finances and the resulting cross-indebtedness and dependency on subsidies to the sector.

The proposed project will enable significant improvements in sector operational efficiency triggered by diesel fuel substitution; and thereby make a significant and positive impact up cause-effect chain: lowering grid system generation costs leading to an improved and more efficient cost structure, with resultant improved cash flows contributing to strengthened sector finances, and thereby reduced need for Government subsidies to the sector. Furthermore, and well beyond the grid connected solar PV installed capacity under this project, it is anticipated that project in effect will help strengthen the capacity of the PUB to mainstream and scale up efficient and cleaner generation technology additions needed to meet demand growth of the grid system in the years ahead; thereby facilitating the sector to move toward a more sustainable modus operandi. Concurrently, it will be easier under such conditions for GoK to reform the PUB and the tariff setting process to reflect cost of service, while also cleaning up the cross-debts. Additionally, the technical assistance component of the MSP will build a growth path for grid solar PV additions over the medium term, managed by PUB in a commercial manner. In other words, the MSP financing is the cost of jump starting this transition to lower carbon trajectory and on a sustainable basis; the planning technical assistance, together with the experience gained from the first grid-connected investment project and the TA aimed at improving the financial situation of the sector will set the stage for further investments in low carbon growth development of the energy sector (i.e. efficiency improvements and renewable energy).

G. INDICATE RISKS, INCLUDING CLIMATE CHANGE RISKS, THAT MIGHT PREVENT THE PROJECT OBJECTIVE(S) FROM BEING ACHIEVED, AND IF POSSIBLE INCLUDING RISK MITIGATION MEASURES THAT WILL BE TAKEN: A principal risk anticipated at this time is the volatility in solar PV module prices and to a lesser extent some volatility in the cost of related services (engineering, installation, commissioning). The module price risk is also managed by virtue of the fact that the GEF grant is expected to leverage other cofinancing together with the PRIF. While technology performance risk, on account of a potentially corrosive maritime environment may be an issue, this risk will be addressed in detail in the feasibility and design study to be undertaken during preparation. The feasibility study will factor as well, operating experience gained from addressing this risk in other island environments; such as with the 2 MWp solar PV central solar power station operating in Noumea, New Caledonia. Risk associated with operational performance sustainability on account of PUB's weak capacity at present will be addressed by a service contract with a private firm for O&M and related capacity building for PUB for the 3-4 year project duration. There are two conceivable climate change risks, neither predictable or plan able: (i) Increased occurrence of climate-related natural disasters which could lead to migration of people and businesses from Tarawa over the next 20 years, which in turn could reduce the electricity demand below today's levels; even so, the 500 kWp PV will contribute to lowering the generation costs. (ii) Natural changes in cloud and rainfall patterns may affect solar insolation levels all over the world, not just Kiribati.

H. DESCRIBE, IF POSSIBLE, THE EXPECTED COST-EFFECTIVENESS OF THE PROJECT:

Preliminary calculations show that on purely "asset cost" (capital plus operating) basis, grid solar PV is cost competitive with diesel. However, there are significant uncertainties because of the lack of prior experience with the technology in an operational context. The main contribution of GEF investment support is to reduce the performance risk for market-ready grid renewable technologies. This is best done by GEF bearing the incremental costs of the "start-up" phase.

I. JUSTIFY THE COMPARATIVE ADVANTAGE OF GEF AGENCY: The comparative advantage of the World Bank lies in effective sectoral and macro-economic policy dialogue combined with investment finance. In this particular case, the World Bank is well-placed to utilize GEF resources to contribute to the response to policy actions already agreed to with IMF and other development partners. World Bank has recently led the coordination of over ten development partners in partnership with Government of Tonga to produce the Tonga Energy Roadmap which lays out the way forward to an improved electricity sector through increased efficiency and increased share of renewable energy, supported by coordinated institutional, policy, legal and regulatory systems.

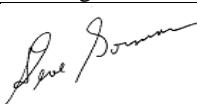
PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S):
 (Please attach the [country endorsement letter\(s\)](#) or [regional endorsement letter\(s\)](#) with this template).

NAME	POSITION	MINISTRY	DATE (Month, day, year)
Mrs. Tererei Abete-Reema	Director, Environment and Conservation Division	MINISTRY OF ENVIRONMENT, LANDS AND AGRICULTURAL DEVELOPMENT	09/14/2009

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for project identification and preparation.

Agency Coordinator, Agency name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Steve Gorman, Executive GEF Coordinator, World Bank		June 11, 2010	Jiang Ru	202-473-8677	jru@worldbank.org