



**REQUEST FOR CEO ENDORSEMENT/APPROVAL**  
**PROJECT TYPE: Medium-sized Project**  
**THE GEF TRUST FUND**

**Submission Date:** 04/15/2012

**PART I: PROJECT INFORMATION**

**GEFSEC PROJECT ID:**

**GEF AGENCY PROJECT ID:** P121878

**COUNTRY(IES):** Kiribati

**PROJECT TITLE:** Grid Connected Solar PV Project

**GEF AGENCY(IES):** World Bank,

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

**GEF FOCAL AREA(s):** Climate Change

**GEF-4 STRATEGIC PROGRAM(s):** CC SP3

Expected Calendar (mm/dd/yy)	
Milestones	Dates
Work Program (for FSPs only)	
Agency Approval date	11/29/2012
Implementation Start	07/01/13
Mid-term Evaluation (if planned)	
Project Closing Date	12/31/2016

**NAME OF PARENT PROGRAM/UMBRELLA PROJECT: GPAS, REGIONAL PROGRAM**

**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 <sup>2</sup>	Expected Outcomes	Expected Outputs	GEF Financing <sup>1</sup>		Co-Financing <sup>1</sup>		Total (\$) c=a+b
				(\$) a	%	(\$) b	%	
1. 516 kW grid connected solar PV (including civil works, structures and spares)	Investment	230,000 l/yr diesel substitution  Savings in fuel costs \$290K/yr	850,000 kWh/yr clean energy  15,300 tons of CO2 mitigated over 20 years	860,000	25	2,540,000	75	3,400,000
2. Maintenance program and capacity building	TA			50,000	32	105,000	68	155,000
3. Project management				90,000	25	275,000	75	365,000
<b>Total Project Costs</b>				A1,000,000		B2,920,000		3,920,000

<sup>1</sup> List the \$ by project components. The percentage is the share of GEF and Co-financing respectively of the total amount for the component.

<sup>2</sup> TA = Technical Assistance; STA = Scientific & Technical Analysis.

## B. SOURCES OF CONFIRMED CO-FINANCING FOR THE PROJECT

<i>Name of Co-financier (source)</i>	<i>Classification</i>	<i>Type</i>	<i>Project</i>	<i>%*</i>
AusAID through PRIF	Bilat. Agency	Grant	2,920,000	100%
<b>Total Co-financing</b>			2,920,000	100%

\* Percentage of each co-financier's contribution at CEO endorsement to total co-financing

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

	<i>Project Preparation a</i>	<i>Project b</i>	<i>Total c = a + b</i>	<i>Agency Fee</i>	<i>For comparison: GEF and Co-financing at PIF*</i>
GEF financing		A1,000,000	1,000,000	100,000	1,000,000
Co-financing	200,000	B2,920,000	3,120,000		1,900,000
<b>Total</b>	200,000	3,920,000	4,120,000		2,900,000

\* NOTE – PIF FINANCING RELATED TO THE PROJECT ONLY AND DID NOT INCLUDE PROJECT PREPARATION AMOUNTS.

## D. GEF RESOURCES REQUESTED BY AGENCY(IES), FOCAL AREA(S) AND COUNTRY(IES)<sup>1</sup>

<i>GEF Agency</i>	<i>Focal Area</i>	<i>Country Name/ Global</i>	<i>(in \$)</i>		
			<i>Project (a)</i>	<i>Agency Fee (b)<sup>2</sup></i>	<i>Total c=a+b</i>
World Bank	Climate Change	Kiribati	1,000,000	100,000	1,100,000

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

<sup>2</sup> 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.

## E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

<i>Component</i>	<i>Estimated person weeks</i>	<i>GEF amount(\$)</i>	<i>Co-financing (\$)</i>	<i>Project total (\$)</i>
Local consultants*				
International consultants*	50.4	50,000	105,000	155,000
<b>Total</b>	50.4	50,000	105,000	155,000

\* Details to be provided in Annex C.

#### F. PROJECT MANAGEMENT BUDGET/COST

<i>Cost Items</i>	<i>Total Estimated person weeks/months</i>	<i>GEF amount (\$)</i>	<i>Co-financing (\$)</i>	<i>Project total (\$)</i>
Local consultants*	97.52	22,342	68,744	91,086
International consultants*	48.76	42,658	131,256	173,914
Office facilities, equipment, vehicles and communications*				
Travel*				
Others**		25,000	75,000	100,000
<b>Total</b>	<b>146.28</b>	<b>90,000</b>	<b>275,000</b>	<b>365,000</b>

\* Details to be provided in Annex C. \*\* Other costs include incremental operating costs and training and workshops as approved by the World Bank. "Operating Costs" means the incremental recurrent operating costs of the Project incurred by the Recipient and the Project Implementing Entity on account of Project implementation, monitoring, evaluation, coordination and supervision, as approved by the World Bank based on annual budgets acceptable to the World Bank, which would not have been incurred but for the Project. These include but are not limited to: (i) operation and maintenance of vehicle, repairs, fuel and spare parts; (ii) equipment and computer maintenance, including hardware and software; (iii) communication costs and shipment costs (whenever these costs are not included in the cost of goods); (iv) office supplies; (v) rent for office facilities; (vi) utilities and insurances; (vii) travel and per diem costs for technical staff carrying out supervisory, data collection and quality control activities; (viii) bank fees and charges; (ix) salaries and benefits of local Project administrative staff [and benefits for Project local staff] but excluding salaries of the Recipient's civil servants. "Training and Workshops" includes but is not limited to, in relation to the Project: (a) reasonable travel, room, board and per diem expenditures as incurred by trainers and trainees in connection with their training and by non-consultant training facilitators; (b) course fees; (c) community outreach and ownership activities; (d) training facility rentals; and (e) training material preparation, acquisition, reproduction and distribution expenses, in each case as approved by the World Bank based on annual budgets acceptable to the World Bank.

#### G. DOES THE PROJECT INCLUDE A “NON-GRANT” INSTRUMENT? yes no

#### H. DESCRIBE THE BUDGETED M & E PLAN:

The project will be implemented on a “design, supply and install” arrangement with a 3 year capacity building and maintenance program. The Project Support Team (PST) (arrangement outlined in PART III) will develop a detailed work plan for the project to program and manage project implementation with the assistance of the World Bank. Periodic reports will be prepared to monitor and evaluate the progress of the project implementation. Implementation will be programmed to meet the requirements of the operators’ of facilities at each of the sites to ensure minimum disruption to their activities. The project provides for a PST support officer (budget USD 30K) and part of the responsibilities of the PST support officer includes reporting against the implementation plan.

In addition, the Public Utilities Board (PUB) will develop and implement a project monitoring and implementation plan for ongoing monitoring against the project results framework provided in Annex A. PUB will provide quarterly reports against the project results framework. The capacity building component (USD 35K) of this project will provide the training to the PUB staff for ongoing reporting. The PST support officer will provide this service in the initial period of the project. The subsequent reporting against the results framework will be integrated into the normal operations of PUB’s business.

**PART II: PROJECT JUSTIFICATION:** In addition to the following questions, please ensure that the project design incorporates key GEF operational principles, including sustainability of global environmental benefits, institutional continuity and replicability, keeping in mind that these principles will be monitored rigorously in the annual Project Implementation Review and other Review stages.

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

**Country context:** Kiribati is one of the most remote and geographically dispersed countries in the world. The country is composed of 33 islands spread over 3.5 million square kilometers – an area larger than India. The estimated population of Kiribati is about 110,000 who live on 20 coral atolls and a single volcanic island, with a total land area of less than 800 square kilometers. The capital, South Tarawa, is about 4,000 kilometers from Australia, Hawaii, and New Zealand.

Although at the margins of the global economy, Kiribati's economic geography means that it is heavily reliant on external factors, with economic performance being highly volatile. In the last ten years, GDP growth has averaged around 1.1% per annum, but has ranged from -5% to 6%. Kiribati's growth prospects are constrained by its geographic isolation, its narrow export base, and impediments to private sector activity. Comparative advantages are limited because of permanent cost wedges associated with Kiribati's small size and remoteness from markets. Systemic volatility is exacerbated by Kiribati's exposure to natural hazard risks, particularly drought and the loss of groundwater.

Kiribati is highly reliant on imports – equivalent to over 50% of GDP. With exports of only about 3% of GDP, Kiribati faces a significant structural trade gap. Main sources of external income are investment earnings from the Revenue Equalization Reserve Fund (RERF) established in the 1950s to invest royalties from now depleted phosphate reserves, workers' remittances, and the sale of fishing licenses to operate in its Exclusive Economic Zone. These external income sources are equivalent to about half of GDP or about a third of GNI. In addition, foreign aid has also amounted to about 20-25% of GDP in recent years.

**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 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. The maximum demand is about 4.5 MW with the minimum about 2.0 MW. The demand peaked at around 5.3 MW in 2006 but has since declined.

The load profile examined over a week in September 2011 found that on a typical weekday the peak load is about 3.5 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 around 3 MW. On a typical weekend, the peak is around 2.7 MW.

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. PUB's generation cost is estimated to be about AUC 52/kWh, at a delivered fuel cost of AUC 35/kWh (\$1.27/liter)<sup>1</sup>. PUB invoices AUC 44/kWh and collects AUC 40/kWh as a result of increase in the total arrears. 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. 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.

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<sup>1</sup> Note that the wholesale price of diesel in Kiribati was AU\$1.33/liter and retail price was AU\$1.47/liter in 2010-2011. PUB may therefore benefit from some subsidy from KOIL.

The strategy underlying the project design is the strengthening of 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 stations, and maintenance services for the solar PV power stations are provided by the private sector for the first three 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, Kiribati Solar Electricity Corporation (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 for routine check and service of the home sized solar PV system as needed. By contrast, PUB has an established and demonstrated track record and adequate organizational capacity for the operation 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 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.

Review of studies on available technical options and supply chains<sup>2</sup> for renewable energy indicates that grid-connected PV is the most suitable option to reduce oil dependency and grid generation costs in the medium term. 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 over the longer term. A feasibility study on grid connected solar PVs undertaken in 2012 shows that 900kWp of solar PVs can be installed on the South Tarawa grid system without the need for enhancements to the system in the short to medium term. This will constitute 27% of average peak demand and 7% of energy demand.

The initial 516 kW proposed catalytic investment under this project takes care of the financing constraints, weak supply chain, and limited capacity. The Technical Assistance (TA) component builds local experience and sets the stage for future expansion in a least-cost manner without reliance on GEF finance. In addition the project will help strengthen institutional and technical capabilities of the PUB to plan and implement such a least-cost plan.

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<sup>2</sup> Wind and Bio-fuel (coconut oil – CNO) are two alternative options for Kiribati. Limited wind resource data and geographic considerations limit wind potential, supply chain considerations and aging plantations are issues for CNO. Refer to Feasibility Study of a Hybrid Energy System for sustainable Energy Production in Kiribati, Tarakia, 2009 and Pacific Regional Energy Report, Kiribati National Report, PIREP 2004.

**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 Greenhouse Gas (GHG) emissions from diesel fuel use for grid electricity supply in Kiribati. The specific objective of the proposed Medium Sized Project (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.

It is estimated that the project will reduce diesel fuel use by 230,000 liters per annum and reduce GHG emissions by 765 tons per annum. Savings from the reduction in diesel fuel use will reduce the level of direct and indirect subsidies transfers from the Government to the PUB. The main beneficiaries of the project are the electricity consumers of Kiribati South Tarawa by stabilizing prices over the longer term through fuel diversification, the PUB/KESC and Kiribati Institute of Technology (KIT) in terms of medium term renewable energy plan and capacity to integrate renewable energy into the grid and the Government in terms of reduced financial support to the PUB.

**Project Description:** The projects involves an investment in 516 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 four of technically suitable locations that have been identified with associated inverters to enable grid in-feed at each location (refer to Annex H). A feasibility study completed in 2012 has taken into account engineering, economic and market conditions and has determined the sizing and key specifications of the power stations, taking into account load shape characteristics and operational and system reliability considerations that may arise from injecting the power into the South Tarawa grid system. Design considerations take into account the maritime environment within which the equipment must function reliably.

For procurement purposes, the project will be implemented largely on a “design, supply and install” contract for the solar PV installation, and include a 3 -year operations and maintenance (O&M) and capacity building program to cover the entire project duration, while PUB gains experience in O&M and builds its capacity to initiate and manage future investments. The Consultants will also prepare technical bid documents for the design, supply and install contract and for ongoing capacity building and maintenance programs.

In addition, the project includes technical assistance comprising the following:

1. Implementation Consultant (Employer’s Engineer) to assist PUB, including: supporting preparation of technical requirements and bidding documents, and technical evaluation of contractor bids received for the design, supply and installation of solar power stations, supervision of contractor through commissioning and plant’s operational integration including monitoring systems and safeguards supervision.
2. Preparation of a short to medium term development and implementation plan for PUB grid system based on least cost options for additional grid connected solar PV (central and distributed) to meet demand and reduce dependence on diesel for power generation

and safety considerations. [This has been completed as part of the feasibility study undertaken during the project preparation].

3. Recommendations for improving the financial viability of PUB and the sector.
4. Technical assistance, including training for PUB staff for the solar power station operations and maintenance, capacity building and appropriate support to ensure compliance with Bank safeguards framework applicable to the project, as well as financial management. Training and capacity building on grid connected systems will also include staff of KSEC and students of KIT to ensure a broader skills base in grid connected systems in Kiribati.

**Project Components:** The project will have three components:

### **Component 1: Investment in Grid Connected Solar Photovoltaic Equipment**

Support the Project Implementing Entity to invest in 516 kilowatt peak capacity of grid connected solar photovoltaic without storage, to kick-start a staged implementation strategy over the medium-term, installed and managed at technically suitable locations as approved by the Government of Kiribati that have been identified with associated inverters to enable grid in-feed at each location.

### **Component 2: Maintenance Program and Capacity Building**

Support the Project Implementing Entity to implement the investment through a “design, supply and install” contract for the solar photovoltaic installation with operations and maintenance provisions to cover the entire Project implementation, and to gain experience in operations and maintenance and build capacity to initiate and manage future investments.

### **Component 3: Project Management**

- (a) Support the Recipient to effectively manage the fiduciary aspects of the Project (including procurement and financial management) through the Central Fiduciary Unit.
- (b) Support the Project Implementing Entity to effectively manage the technical aspects of the Project through its Project support team.

**Expected global environmental benefits:** Investment proposed under the project is expected to yield about 765 tons per year<sup>3</sup>, or cumulative 15.3 thousand tons CO2 emission reductions over 20 years from diesel fuel substitution. Relative to Kiribati's energy sector CO2 emissions in 2011, this is about 5.4 % reduction. 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 an additional 1,350 tons per year in the short to medium term (with 900kW of solar PVs).

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<sup>3</sup> Based on 0.9kg/CO2 equivalent per kWh of diesel generation that is displaced ( $850,000\text{kWh} \times 0.9\text{kg} = 765,000\text{kg}$ ).

## **DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL AND/OR REGIONAL PRIORITIES/PLANS:**

The proposed MSP is fully consistent with Kiribati's national priorities, policies and plans. The Kiribati National Energy Policy (KNEP, April 2009)<sup>4</sup>, 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 2012-2015)<sup>5</sup>: "enhancing economic growth for sustainable development", with emphasis on "available, accessible, reliable, affordable, clean and sustainable energy options". The KNEP 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.

Kiribati's Initial Communication under the United Nations Framework Convention on Climate Change<sup>6</sup> notes that the sole source of CO2 emissions is from the burning of fossil fuels. All fossil fuels are imported into Kiribati.

The main contributions to CO2 emissions are from the electricity and transport sectors. The Initial Communication states that the objectives of the energy sector are to supply "efficient" electricity "in urban areas for domestic and commercial consumers, and (facilitate) greater utilization of renewable energy systems which are proven to be technically and economically viable."

**Relationship to CAS:** The World Bank's Country Assistance for Kiribati reflects the Government's development priorities, and is consistent with the unifying themes of World Bank Group engagement in the Pacific islands. The World Bank's engagement with Kiribati is focused on:

- Building resilience against external shocks, with a particular focus in Kiribati on climate change adaptation; and
- Mitigating economic isolation by encouraging regional and global integration.

As well as contributing to CO2 emission reduction, the Bank will also be helping to reduce Kiribati's vulnerability to external economic shocks, such as the food and fuel price increases. The proposed 516kW grid-connected solar photo-voltaic generator for South Tarawa (financed by GEF with support from Australia) will help diversify electricity generation and reduce reliance on diesel, imports of which are currently equivalent to 15% of GDP.

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<sup>4</sup> Kiribati National Energy Policy (KNEP), Ministry of Public Works and Utilities, April 2009.

<sup>5</sup> Kiribati Development Plan, as approved by Cabinet, 25 April 2012.

<sup>6</sup> September 1999 – refer to sections 3.4 and 3.6, currently being revised.

**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 support on an ongoing basis during the course of project implementation. 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 focused 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 has been active in electricity grid sector on Tarawa is Japan. The Bank was informed by JICA that Japan have in the past provided the diesel generators to PUB.

**E. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES:**

The feasibility study undertaken as part of the preparation of this project identified the potential for 900kW of solar PVs on the South Tarawa grid without significant enhancements to the grid system. This has been a catalyst for consideration for another solar PV project. The Bank is aware that the Government is working with Pacific Forum Secretariat to develop another 400kW of grid connected solar PV project for the South Tarawa grid with a Japanese partner, with funding from Japan.

Such an activity, should it materialize, 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. This will help realize the 900kWp short to medium term potential for solar PV identified by the feasibility study undertaken with the support of the Bank. There are potential synergies between the two projects in terms of implementation, operations and maintenance and capacity building programs.

Electrification outside the grid system in the outer islands is undertaken by the KSEC. 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). The Bank also understands from the EC representative in Kiribati that KSEC also intends to build in “on-grid” capability by installing 10kW of solar PVs on its facility in Tarawa. The Bank’s capacity building program tied to the proposed project will seek to coordinate work with KSEC and the Kiribati Institute of

Technology to build on-grid solar PV expertise in Kiribati. KSEC's interaction with the Bank during the course of supervision of the project and the direct link to its accumulated knowledge base on solar PV program experience worldwide, such as in finalizing the terms of reference for consultants, bid documents for the design, supply, installation and maintenance contracts, and technical and safeguards supervision for the project, will also benefit KSEC.

**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. 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: 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 the project will help strengthen the capacity of the PUB to mainstream and scale up efficient and cleaner generation technology additions needed to meet demand growth 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 and technical assistance, together with the experience gained from the first grid-connected investment project and the recommendations 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 OUTLINE RISK MANAGEMENT MEASURES:**

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 managed by virtue of the fact that the GEF grant is expected to leverage other co-financing together with the Pacific Region Infrastructure Facility (PRIF).

Risk associated with land ownership and rights have been addressed by ensuring that the solar PV installations are on land owned by the government or on long term leases to the government with facilities owned by the government. In addition, the government will be required to provide details of the lands where the installations will be placed and to confirm that there are no outstanding issues in relation to those lands prior to project implementation.

The implementation capacity risks in terms of financial management, procurement, and engineering for solar PVs within the implementing agency PUB is being managed by:

1. Utilizing the Central Fiduciary Unit established within the Ministry of Finance and Economic Management for fiduciary support and management; and
2. Procurement of an employer's engineer under the project to support preparation of bid documents (technical), bid evaluation and supervision of the installation of the solar PVs and the implementation of the Environmental Management Plan.

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 a period of 3 - years.

Technology performance risk on account of a potentially corrosive maritime environment is being addressed by specification of equipment that has been proven in such environments.

There are two conceivable climate change risks, neither predictable nor able to be planned for:

- 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 516 kWp PV will contribute to lowering the generation costs; and
- ii. Natural changes in cloud and rainfall patterns may affect solar insolation levels all over the world, not just Kiribati.

The feasibility study has identified other sustainability issues and opportunities for improving performance of the diesel generators and reducing the costs. There is work in progress in relation to reform of State-Owned Enterprises (SOE) that will provide a holistic assessment of SOE performance and reform measures. The Public Infrastructure Advisory Center (PIAC) has

engaged a Utility Management Expert to assist the PUB in identifying and addressing utility performance issues. These are discussed further in PART IV.

#### **H. EXPLAIN HOW COST-EFFECTIVENESS IS REFLECTED IN THE PROJECT DESIGN:**

The feasibility study shows that on purely “asset cost” (capital plus operating) basis, grid solar PV is cost competitive with diesel. The levelized cost of electricity (LCOE) for solar PV ranges between US\$ 32/kWh to US\$ 39/kWh whilst cost of diesel (fuel only) ranges between US\$ 45/kWh to US\$ 57/kWh depending on the capital and operating costs estimates used for solar PVs. The solar PV is competitive with the cost of diesel fuel costs (LCOE) even at high capital costs. Annex G provides further details on the LCOE assessment.

Analysis on a component basis shows that solar PVs and inverters for the project will cost US\$ 2.3/W. Civil works, engineering and monitoring equipment and connection to the grid add another US\$ 3.3/W. Pre-emptive roof replacements<sup>7</sup> add another US\$ 1/kW (Total cost US\$ 6.6/W). Civil works, materials and engineering costs are higher for solar PV installations in Kiribati because most of the materials and labor for the project has to be sourced from overseas.

The contribution of GEF investment support is to reduce the performance risk for market-ready grid renewable technologies. This is best done by GEF bearing a significant portion of the investment cost for the ‘start-up’ phase. In quantitative terms, considering only the GEF contribution of the order of \$ 1 million, implies abatement cost of about \$64 per ton of CO<sub>2</sub> reduced from the first 516 kWp installed; whereas taking the entire investment into account – with co-financing – the abatement cost would be about \$250 per ton.

### **PART III: INSTITUTIONAL COORDINATION AND SUPPORT**

#### **A. INSTITUTIONAL ARRANGEMENT:**

The Implementing Agency for the project is the Kiribati Public Utilities Board (PUB), accountable to the Government of Kiribati and which will be required to comply with the legal agreements with World Bank/GEF/AusAID. The following legal agreements will support the agreed institutional agreements for the implementation of the project:

- (i) A Grant Agreement between a GoK and the World Bank;
- (ii) A Project Agreement between PUB and the World Bank; and
- (iii) A Subsidiary Agreement between the GoK and PUB.

A Project Operations Manual will be prepared by the PUB for approval by the World Bank and will detail the activities to be supported by various stakeholders and the coordination arrangements. The legal agreements will require the PUB to comply with the Operations Manual and the Environmental Management Plan.

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<sup>7</sup> Feasibility study has identified that some of the roofs on which the solar panels will be mounted will need replacement during the life of the solar PVs. The study recommends that in order to avoid having to replace the panels for future roof maintenance, the roofs be replaced prior to the installation of the panels. This provides an added benefit to government facilities like the Tungaru hospital and King George V Secondary School whereby future government costs is funded by the solar PV project.

## **B. PROJECT IMPLEMENTATION ARRANGEMENT:**

The project implementation structure will be set up as follows:

1. The Project Support Team (PST) established within the PUB
2. The Central Fiduciary Unit (CFU) established within the Ministry of Finance and Economic Development (MFED), which will undertake the fiduciary activities for the project, namely procurement and financial management.

**The Project Support Team (PST):** The PST will make all necessary decisions and provide guidance for the implementation of project activities, including approval of overall work plan, providing technical inputs for the procurement activities (including evaluation of bids and consultants' proposals), and technical and safeguards supervision. The PST will be led by the CEO of the PUB with the support of the Power Engineering Manager and administrative support for the PUB. The Ministry of Environment, Lands and Agricultural Development (MELAD) will oversee the compliance with the Environmental Management Plan by the PST and the contractor.

The PST will include a suitably qualified technical consultant (Employer's Engineer), provided for under this project, to provide all technical inputs for the procurement of the solar power stations contract, supervise the implementation of the project and the implementation of the Environmental Management Plan. The PST will report to the Government of Kiribati (GoK) and the World Bank through the Board of the PUB.

The PST will be accountable to the GoK and the World Bank for ensuring (a) the substantive quality of the project, (b) the effective use of both GoK and World Bank resources allocated to it, (c) and proper coordination and supervision of the project.

**The MFED Central Fiduciary Unit (CFU):** A CFU has already been established within the MFED to provide fiduciary (financial management and procurement) support of this and other projects financed by the World Bank and other development partners. The CFU has been resourced adequately for its functions and reports to the Secretary of Finance and Economic Development. The project provides for funding of activities related to the solar PV project.

The overall oversight and coordination of the project will be provided by a high-level GoK Solar Steering Committee. The Implementing Agency (PUB) will work closely with and report the progress of project implementation to the Steering Committee.

#### **PART IV: EXPLAIN THE ALIGNMENT OF PROJECT DESIGN WITH THE ORIGINAL PIF:**

The project is substantially the same as that in the original PIF except that one original component has been excluded due to lack of strategic fit with this project and another reduced in light on processes that are already underway.

The component related to the development of an Operations Manual for the KSEC has been excluded. KESC supplies solar PV for off-grid consumers supported by the European Commission (EC). Following discussions with the EC representative in Kiribati it was considered that the need for an Operations Manual will be best assessed and supported by the EC given their significant involvement in that area.

Technical assistance to improve PUB financial viability of the PUB and its planning processes has been limited to identifying the opportunities for the electricity operations for a more substantial review and action as part of utility-wide processes already under way (details below). The PUB provides electricity, water and sanitation services in Kiribati. The solar PV feasibility study has identified issues in relation to the viability of the electricity sector. The PUB and the Government have been notified of the opportunities.

The feasibility study has identified the following sustainability issues and opportunities for improving performance of PUB and reducing the costs:

- **The maintenance contract for the diesel power stations into which the Solar PV stations will be integrated is awaiting renewal.** Although the performance of Kiribati with respect to the performance of the electricity supply sector ranks favorably with other Pacific Island countries<sup>8</sup>, this could be impacted without regular maintenance of the power stations. This could impact on the performance of the solar PV installations by reducing the reliability of the diesel systems which will remain the main source of electricity in the short to medium term.
- **Electricity tariffs do not fully recover the costs of electricity supply.** Electricity in Kiribati is generated at AUc 52/kWh, billed at AUc 44/kWh and collected at AUc 40/kWh. PUB needs to consider immediate actions to close the gap on the cost of generation and collections to ensure that the electricity part of its integrated electricity, water and sanitation business is commercially viable and does not require continued support.
- **PUB does not meter and bill all electricity it supplies.** The pumps used for water and sanitation services is one such example and it is important that PUB meters all its electricity supply to close the gap between generation costs and billing, and if the government so decides, to ensure any subsidies between its businesses are transparent.

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<sup>8</sup> Performance benchmarking for Pacific Power Utilities, prepared by the Pacific Power Association with support of the Pacific Infrastructure Advisory Center (PIAC) and the Secretariat of the Pacific Community (SPC), December 2011.

- **The feasibility study has identified that improved monitoring and optimization of the dispatch of diesel generators can reduce fuel use and provide savings.** Further work is required to assess the costs and benefits of such optimization which may best be coupled with a renewed maintenance contract, taking into account any warranty issues in relation to the diesel plants.
- **The current reserve margin on the system is assessed to be low.** The PUB/Energy Unit/MPWU need to consider long term capacity planning for the system to balance demand and supply on the grid system.

The above issues have been discussed with the Ministry of Public Works and Utilities and the PUB. There is work in progress in relation to reform of State-Owned Enterprises (SOE) that will provide a holistic assessment of SOE performance and reform measures. Pacific Infrastructure Advisory Center (PIAC) has procured a Utility Management Expert for the PUB, reporting to the CEO with responsibilities that include identifying opportunities for improving the financial and operational performance of PUB's business. The Bank has been working closely with PIAC, and briefed the Utility Management Expert to ensure that matters identified as part of Bank's work in the electricity sector are appropriately prioritized as part of any business improvement measures for PUB.

Medium term plan for staged renewable energy has been completed through a feasibility study on solar grid connected solar PVs on the South Tarawa grid system as part of project preparation. The preliminary report has been provided to the Government which is the basis for this investment and considerations of other potential projects. The feasibility study has identified opportunities for supply side efficiency improvements that are outlined above. An earlier PIREP<sup>9</sup> study noted an absence of concentrated efforts to improve demand side measures for more efficient electricity use in Kiribati, particularly in government facilities. The Energy Unit as part of the implementation plan for the KNEP, under the key policy area of energy efficiency and conservation, has planned activities that include energy audits of Government facilities and implementation of recommendations of the audits to reduce energy consumption.

Finally, the costs for the project are AUD 1020K higher than the PIF due mainly to replacement of some of the roofs where the solar PVs will be installed to avoid removal of the installations for roof maintenance (USD 500K), inclusion of a 3-year operation and maintenance support contract (USD 155K), and costs/consultants for fiduciary, bids and engineering supervision (USD 265K) which were not specifically included under the PIF costs. Civil works were also assessed to be higher due to labor and materials being imported.

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<sup>9</sup> Pacific Regional Energy Assessment Report, Kiribati National Report, PIREP, 2004.

## **PART V: AGENCY(IES) CERTIFICATION**

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for CEO Endorsement.

Agency Coordinator, Agency name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Karin Shepardson GEF Agency Coordinator			Jiang Ru Project Contact Person	202-473-8677	jru@worldbank.org

## ANNEX A: PROJECT RESULTS FRAMEWORK

TABLE 1: WORLD BANK SUPPORTED PROJECT

Objectives/outcomes	Indicators	Baseline	Target Value	Means of verification	Assumption/risks
<b>Project objective</b>					
Reduced reliance on diesel generation.	Energy from renewables	-	7%	Metered supply from solar PVs.	Local capacity and donor support to catalyze and maintain investment.
	Medium term renewable energy plan and PUB capacity to increase renewable generation.	Limited.	Feasibility study on amount of renewable energy on grid and 30 (over 3 years) trained staff to integrate RE into grid.	Report (kWh and sites) and number of staff trained in renewable energy systems.	Lack of ongoing local capacity and commitment to diversification.
<b>Component 1 – Solar PVs</b>					
516 KW grid connected solar PV.	Solar energy kWh per year.	-	850,000	Metered supply from solar PVs.	Solar radiation and capacity factor realized.
	Reduction in diesel use l/yr.	-	230,000	Fuel use for equivalent generation.	As above.
	Savings \$/yr.	-	290,000	Liters avoided x cost/liter.	As above
CO2 reductions	Tons per annum	-	765	Generation from solar PVs x 0.9 kg/kWh	As above
<b>Component 2 – Maintenance and capacity building</b>					
Maintenance program.	Maintenance program developed and implemented.	-	At least two programmed maintenance undertaken per annum.	Report by PUB.	Installations serviceable. Maintenance program adequate.
Capacity building.	Training plan to “build” local capacity for maintenance and expansion.	Limited.	At least 30 PUB, KESC, and KIT staff trained. At least 10 per annum.	No. of staff “accredited” for solar systems.	Trained staff remain on the island and in the industry. Contract non-compliance. Lack of ongoing interest.

**TABLE 2: RESULTS ARISING FROM CATALYTIC INVESTMENT OVER THE MEDIUM TERM-CUMULATIVE (NOT DIRECTLY FROM THE WORLD BANK PROJECT)**

<b>Medium term plan for renewable energy – completed as part of project preparation The following indicators measure catalytic solar PV investment in addition to this project</b>					
Medium-term least cost plan for renewable.	Plan for solar PV expansion.	Not available.	900 kW installed.	Installed capacity.	Funding and site constraints.
	Solar energy kWh per year.	-	1,500,000	Metered supply from solar PVs.	Solar radiation and capacity factor realized.
	Reduction in diesel use l/yr.	-	396,000	Fuel use for equivalent generation.	As above.
	Savings/yr.	-	500,000	Liters avoided x cost/liter.	As above.
CO2 reductions	Tons per annum	-	1,350	Generation from solar PVs x 0.9 kg/kWh	As above

**ANNEX B: RESPONSES TO PROJECT REVIEWS** (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF undertaken in 29 April 2010)

**COMMENTS FROM GEF SECRETARIAT AT PIF REVIEW AND TEAM RESPONSE**

More facts on framework – Total power installed, current cost of electricity production

Refer to PART II. The feasibility includes detailed studies on the load profiles.

Incentives for PUB to operate the plant

The plant will contribute to \$290K per annum in fuel savings to PUB which provides a commercial incentive and reduces the need for Government support. PART II provides more details.

Who else might be interested in operating and maintaining the investment?

KSEC, the current rural service provider for solar energy services may have an interest. KSEC's business model is not suited to this investment and KSEC does not have the capability managing grid systems which will need to be coordinated with PUB. An IPP is another alternative, however the size of the investment is not likely to a remote island like Kiribati will be logically challenging – Refer to PART II.

Financial arrangements – will savings lead to lower electricity prices, public investments, or incentives for future investors.

The project is unlikely to lead to immediate lowering of electricity prices given that PUB does not recover its full costs at present. However overtime, increased level of renewable energy (solar PVs) can contribute to lower PUB costs and prices. Other investments are already being planned with development partners and increased capacity and confidence with solar PVs would act as a catalyst for further investments by the PUB.

Project sustainability

The project through its feasibility study is already acting as a catalyst for considerations for further solar PV installations.

The project includes a 3-year maintenance plan and capacity building for local PUB staff, KSEC staff and through technical colleges. This will ensure adequate local capacity to maintain the project's investment and look at further investments in renewable energy.

The issues associated with the corrosive environment in Kiribati will be addressed by ensuring that equipment supplied is proven in such conditions.

**COMMENTS FROM PRIF/GEF SECRETARIAT AT PIF REVIEW MEETING**

**PIF peer reviewers:** Nataliya Kulichenko, Senior Energy Specialist (ETWEN); Xiaodong Wang, Senior Energy Specialist (EASIN); and Emilia Battaglini, Senior Environmental Specialist (EASNS).

**Written comments:** Jiang Ru (Operations Officer, GEF Coordinator), Surhid Gautam (EAP Safeguards Secretariat) and from AusAid.

**Participants in the PIF review meeting:** From Sydney: Charles Feinstein (Chair, SD Leader), Wendy Hughes (TTL), Emilia Battaglini (peer reviewer), Kylie Coulson (FM team member), Arun Sanghvi (consultant, team member); from Washington DC: Jiang Ru (Operations Officer and GEF Coordinator); from Canberra: Paul Wright, Sarah Thomas (AusAID representatives to PRIF); and from Wellington: Michael Upton, Jonathan Fletcher, Sonya Cameron (NZAID representatives to PRIF and technical staff).

### **Overview of the context and strategic approach underlying the project design**

Strategic principles guiding the project, specifically, the scope and design of the first engagement:

- Be simple enough to be successfully implemented given the capacity constraints;
- have an early positive impact in the electricity sector; and
- 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 lead to strengthened institutional capacity and technically and financially sustainable sector.

The project’s geographical and sectoral focus is primarily the S. Tarawa grid system owned and operated by the Public Utilities Board (PUB). This sub-sector represents a crucial and the single major dimension of the electricity sector. Within the present reach of the PUB grid system reside just under half of Kiribati’s total population of about 110,000. The remainder of the population is widely scattered across 16 atolls comprising several hundreds of islets.

The participants recognized that 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 strengthen the capacity at an appropriate pace in a staged, step-by-step approach which will extend beyond the proposed initial project.

Overall, the participants welcomed the overview presented by the task team and endorsed the strategic principles outlined above. The project team agreed to take on board the guidance that the revised project document to be prepared for GEF CEO endorsement review will provide an expanded section on country and sector background, elaborating explicitly the essential diagnostics and in light thereof the strategic rationale and staged ‘roadmap’ approach highlighted above. Furthermore, the revised project document will also explicitly incorporate the capacity issues in the risks section.

## **Key issues raised and Team response**

- (i) Justification of proposed investment, including fit with least cost plan and rationale for developing solar PV first.

The team clarified that a basic “least cost plan” for reducing dependence on petroleum for electricity production will be developed during the course of the project. The project is designed to move forward with investment and planning in parallel in order to get strong government engagement and have an immediate positive impact on the sector, as well as to gather relevant data and gain experience required to properly evaluate subsequent renewable energy investments. The options expected to feature in the least cost plan would include supply side efficiency improvements, end-use efficiency improvements, and development of domestic renewable energy resources (solar PV and potentially other options such as coconut oil substitution for diesel in existing diesel engines). While efficiency measures may turn out to be lower cost than investment in PV, to achieve a significant reduction in dependence on diesel for electricity generation will very likely entail a combination of these options.

The proposal to move forward with solar PV investment first is based on the following considerations:

- a. Initial levelized economic cost analysis suggests that the solar PV grid supply option of the project is likely to be cost competitive compared to diesel-based generation. Further analysis will be undertaken as project preparation progresses. [*This has now been confirmed by the feasibility study undertaken for solar PV installations*]; and
- b. Effective design and implementation of efficiency programmes will take some time in Kiribati. Properly defining sustainable efficiency improvement programmes requires good data on the supply and use of electricity. The availability of data is quite limited. Also, end-use efficiency options will require sustainable supply chain arrangements which will need to be carefully developed. Experience in PICs and elsewhere indicates that end-use efficiency programmes require good institutional arrangements and where these are lacking, effective implementation is difficult and theoretical benefits are slow to materialize in practice. Taking these factors into account the recommended approach to project design is to start with an investment that is expected to be an element of the least cost plan and that can be implemented in the current environment, while simultaneously developing the least cost plan, including the efficiency elements. The team also noted that experience points to hybrid systems being more capital intensive as well as technically far more challenging from a design and operational standpoint. The team noted that further design work on the proposed investment in grid connected PV will be undertaken as part of project preparation. Assessing the level of solar PV penetration and other RE options in the Tarawa grid system, taking into account load growth, will be covered as part of the least cost planning. [*Potential for supply side efficiency has been identified and communicated to the GoK/PUB. Programs underway are likely to support further work in this area*].

The project team agreed to:

- a. review the scope of the proposed project investment preparation effort during the upcoming mission with a view to further defining the technical and economic assessment;
- b. develop further the scope of the planning exercise which will include both supply and end-use efficiency options.

**(ii) Project structuring options and Financing plan: what is the rationale for public sector owned, 100% grant model?**

The project team explained that it would likely be difficult to attract a 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. Moreover, work would be required to revise policy and regulatory arrangements to put in place an operationally workable IPP / PPP framework. Private sector participation may be considered for subsequent projects and the required legal, policy and regulatory changes could be evaluated as part of the planning exercise. The option of considering KSEC (the public entity responsible for the off-grid solar PV programme) as the owner and/or operator of a grid-connected PV plant was raised. The team responded that KSEC has a decentralized structure, reflecting the disbursed locations of customers. They have no experience in the utility business. The meeting endorsed the strategy of 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.

Considering (a) the “barrier removal” aspect of the first grid-connected solar PV project in terms of operational experience and confidence in a technology that is “new” in terms of grid-based electricity supply in Kiribati, and (b) the current very weak financial situation in the power sector, the use of 100% grant funding is deemed appropriate. As part of the TA under the project, assistance will be provided towards improving the financial situation of the electricity sector. Subsequent investment will depend on improved financial performance, but as a baseline assumption would be based on an increasing fraction of “harder” financing such as IDA credits.

**(iii) Operational sustainability.** It was agreed that this 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. This process of learning by doing will also strengthen PUB capacity for the future. [*The project provides for ongoing maintenance program for 3 years for sustainability and capacity building within the PUB, KESC and the KIT to broaden the expertise base for solar PVs in Kiribati*].

(iv) Longer term sustainability

The team explained that the proposed project in of itself will not fully address the longer term financing and financial sustainability of the grid system in S. Tarawa. However, 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. This 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. Furthermore, with the guidance from the meeting, during upcoming preparation the team will discuss with the GOK the merits of undertaking a financial analysis and tariff analysis of the grid system to inform future policy steering towards financial sustainability. The meeting endorsed the desirability of the team scoping a TA on financial and tariff issues and supported the team's view that it would be counterproductive to "push" for any policy conditionality related to this issue. The meeting also drew attention to the importance for the GOK to consider separation of the PUB's water and electricity businesses in bookkeeping as well as financial terms. *[PUB's generation costs and revenue have been examined as part of the feasibility study and the level of under recovery, metering and collection issues have been identified and communicated to the Government and PUB. The current program of reform of the SOEs and procurement of a Utility Management Expert for the PUB is expected to highlight the issues as basis for a PUB action plan].*

(v) Safeguards issues.

The WB mission to Kiribati in May includes a safeguards specialist. Following the mission, the PIF and ISDS will be revised and shared with the EAP Safeguards team for further input. *[An Environmental Impact Assessment and an Environmental Management Plan for the project has been prepared. The project is classified as Category C. A revised ISDS has also been prepared for safeguards clearance].*

(vi) Processing.

The meeting endorsed the use of the further processing and approval under GEF MSP procedures, which means no decision meeting and final approval authority rests in the region with the Country Director, coupled with GEF CEO Endorsement. A revised version of this PIF was shared with PRIF partners and submitted to GEF following the completion of the mission visiting Kiribati in May. Further preparation will be undertaken with specialist consultant support focusing on the design, sizing and cost / benefit of the proposed investment. A draft MSP GEF CEO endorsement package will be prepared by about November 2010. It will include documentation on (a) Results Framework and Monitoring, (b) Procurement Arrangements, (c) Implementation arrangements ,(d) Financial management and Disbursement Arrangements, and (e) Environmental and Social safeguards with a scope similar to the documentation normally provided for an IDA credit / grant. The GEF CEO endorsement package will be circulated for virtual review to PRIF partners and the WB GEF coordinator. Based on the review, PRIF partners or GEF coordinator may request a meeting to discuss the project. After addressing issues raised through the review, the Package will be

submitted for WB Country Director approval and GEF CEO Endorsement. [A revised PIF was prepared and shared with PRIF and GEF. This project proposal includes the results framework, procurement and financial management arrangements, and implementation arrangements. An EIA and EMP have been prepared for clearance by the WB safeguards secretariat].

### **Summary of Agreements Reached**

The meeting endorsed:

- (i) further project preparation, starting with the upcoming preparation/pre-appraisal mission, along the concept design set out in the PIF, subject to the guidance noted in the preceding sections; and
- (ii) the processing steps and documentation requirements for the proposed operation to follow the MSP procedures, with the supplemental documentation as per above.

## ANNEX C: CONSULTANTS TO BE HIRED FOR THE PROJECT USING GEF RESOURCES

<b><i>Position Titles</i></b>	<b><i>\$/ person week*</i></b>	<b><i>Estimated person weeks**</i></b>	<b><i>Tasks to be performed</i></b>
<b>For Project Management</b>			
Local			
Financial and procurement support	1,000	12.19	Bid documents, procurement and financial management, reporting.
PST support officer	833	12.19	Project support and reporting.
International			
Project Manager/Employer's Engineer	3,500	12.19	Bid evaluation and supervision of project implementation and safeguards.
Justification for Travel, if any:			
<b>For Technical Assistance</b>			
Local			
International			
Training and capacity building	2,500	4	Training of PUB, KESC and KIT staff and students.
Operations and Maintenance support	3,300	12.12	Team to provide periodic O&M support over 3 years.
Justification for Travel, if any:			

\*Provide dollar rate per person week. \*\*Total person weeks needed to carry out the tasks.

## **ANNEX D: PROCUREMENT ANNEX**

1. A procurement capacity and risk assessment of PUB has concluded that PUB would require procurement support given its limited in-house procurement capacity (the assessment and mitigation action plan will be available in the Project Risk Assessment & Management System – PRAMS, in the project portal). It has been agreed with MFED that its central CFU will undertake all procurement processing on behalf of the project. The MFED CFU will have a full-time procurement officer who will be responsible for processing all procurement activities for up to three projects, including this project. The international Procurement Advisor, already hired to the CFU, provides overall guidance and oversight on all procurement activities undertaken by the CFU. The key procurement activity under the project is the design, supply and installation of the solar power stations which will be procured on a single responsibility basis. The Bank's standard bidding documents for Plant Design, Supply and Installation will be used, and the activity will be subject to prior review. PUB's Project Support Team (PST) will provide technical inputs to the CFU for preparing and processing all project procurement activities. Specifically, the Employer's Engineer in the PST will provide all technical requirements for the bidding documents, the evaluation of bids and follow up on contract award decisions. The procurement-related risk is rated high and, with the implementation of agreed mitigation actions, would be moderate.
2. Key risk mitigation measures agreed are as follows:
  - i. To mitigate the risk of non-compliance with the Bank's Procurement and Consultant Guidelines and the Government of Kiribati's approval processes:
    - procurement processes and procedures (including relevant standard/sample documentation agreed with the Bank), will be included in a Procurement Manual, to be prepared by the MFED CFU, and followed for the project;
    - regular reports on project procurement performance, based on procurement-monitoring indicators agreed with the Bank, will be prepared by the Procurement Advisor in the MFED CFU; and
    - the MFED will assign dedicated secure space for the CFU to maintain the procurement files.
  - ii. To mitigate the risk of delays and technical inconsistencies, PUB's PST will:
    - liaise closely with the MFED CFU, providing technical support, as and when needed, and
    - conduct regular project progress reviews, jointly with the CFU, and report to the MFED's Infrastructure Projects Review Committee.
  - iii. To mitigate the risk of poor bidder/consultant interest due to remoteness of the country, innovative methods and wide-scale publicity will be used to attract qualified service providers and consultants.

## **ANNEX E: FINANCIAL MANAGEMENT ANNEX**

### **Financial Management, Disbursements and Procurement**

1. The financial management assessment was carried out in accordance with the “*Financial Management Practices in World Bank-Financed Investment Operations*”, issued by the Financial Management Sector Board on November 3, 2005 and further rationalized in the “*Principles Based Financial Management Practice Manual*” issued by the Board on March 1 2010. Under the Bank’s OP/BP 10.02 with respect to projects financed by the Bank, the borrower and implementing agency are required to maintain financial management systems – including accounting, financial reporting, and auditing systems adequate to ensure they can provide the Bank with accurate and timely information regarding the project resources and expenditures.
2. Overall, the financial management arrangements satisfies the financial management requirement as stipulated in OP/BP 10.02 subject to implementation of agreed actions and mitigating measures. The assessed financial management risk of the project before the mitigating measures is considered substantial and could be reduced to moderate after the proposed and existing mitigating measures are implemented and have shown effective impact. As the project is only \$3.92million US and is made up of a small number of large contracts for solar installation and technical assistance, the FM requirements for the project should be quite straight forward and while the limited FM capacity in Kiribati remains the main issue this will be partially mitigated by the use of the central CFU for maintaining the project accounts. Any change to the above arrangement will substantially alter the FM risk rating of the project.

### **Budgeting Arrangements**

3. The Project budget will be on a cash basis, formulated from the agreed work plans to cover the life of the Project, broken down into each financial year of the Government of Kiribati which spans from January to December. The budget will be an aggregate of the activities whose costs will be estimated at the start of the project and updated annually. As majority project costs are procurable items the budget should be consistent with the procurement plan and include the incremental operating costs. The budget will be formulated by the Project Support Team of the Implementing Agency (PUB) in consultation with the Central Fiduciary Unit. The day to day monitoring of the budget will be done by the CFU.

### **Accounting Arrangements**

4. Kiribati Public Utilities Board is 100% government owned but currently has negligible FM capacity hence it is envisaged the accounting for the project will be carried out by the Kiribati CFU which is also providing accounting services for other World Bank projects. The CFU has developed a Financial Management Manual for use on all World Bank financed projects in Kiribati. The project accounts will be maintained on Quick books the Accounting Software package used by the CFU. Currently there are two accountants working for the CFU and there is some FM risk that when the projects scale up the current resources may be stretched however the project will provide financial resources and a Subsidiary Agreement will be signed between PUB and MFEM which will outline the CFU obligations. The fiduciary obligations will also be outlined in a Project Operations Manual. There is a risk that direct payments may not be captured in the project financial records as they are not transacted through the DA and this will

be reviewed during FM implementation review missions. Further due diligence will be provided by regular visits by the International Financial Management Advisor to Kiribati to review the CFU's operations and advise/train CFU staff as necessary.

### **Internal Controls**

5. Internal controls are considered quite weak with no effective internal audit mechanisms within Kiribati. The central CFU will be required to build on the existing internal controls within the framework of the Government of Kiribati, implementing appropriate measures to strengthen the internal controls to an acceptable level. The project internal controls will be outlined in the CFU Operations Manual prepared by the International Advisor to the CFU. To ensure adequate segregation of duties it is recommended that all contracts are reviewed and agreed to by PUB and that invoices are approved for payment by PUB. Hence the primary FM role of the CFU will be the preparation of documentation and recording of financial transactions.

### **Flow of Funds**

6. Under the current project design the majority of expenditures will be for relatively large contracts and hence the majority of the disbursement from the World Bank will be through Direct Payments. A Designated Account will also be opened for smaller operating costs and this will be opened and operated by the CFU. As there is no Central Bank in Kiribati the DA will be opened directly by the CFU.

### **Financial Reporting**

7. The financial reporting for this project will be done by the CFU. Semester unaudited financial reports will be required showing, budget, expenditure for the quarter, year to date and cumulative expenditure. In addition commitments, contracted amounts not yet expended, will be included in the reporting requirements. Other than disclosure of commitments reporting will be on a cash basis. Reports will classify expenditure by component and sub-component if required. The IFR will be prepared in AUD. The reports will be required to be submitted not later than 45 days after the end of each calendar semester.

### **External Audit**

8. The Kiribati National Audit Office (KNAO) will conduct an annual audit of the project accounts. The audited financial statements will be required to be received by the Bank within 6 months of the end of each of the reporting periods. The Kiribati National Audit Office has experience in auditing government departments and World Bank Funded projects and is an auditor acceptable to the Bank. There is some risk over the timely completion of the project annual audits due to the limited number of staff in the KNAO.

### **Disbursement Procedures**

9. The project will use Advance, Direct Payment and Special Commitment methods of disbursement.

10. In order to facilitate smaller payments, it has been requested that a Designated Account (DA) be opened to enable the Bank to advance funds to the project. The Designated Account will be advanced funds to a ceiling of \$100,000 and will be in AUD, Subsequent replenishments to the DA will be made through Withdrawal Applications as required. The documentation required

for the replenishment of the advance will be by Statement of Expenditure. Direct payments will require the completion of a Withdrawal Application accompanied by an invoice from the supplier. This payment must be incorporated into the project financial accounts even though there is no transaction in the DA.

11. While documentation will not be required to be sent for claims for replenishment of DA, except for those contracts subject to prior review, the project will be expected to retain documentation for audit and review by World Bank staff. The CFU will prepare all Withdrawal Applications ready for signature by the authorizing officers. Due to technology issues there have been delays in the submission of Withdrawal Applications for other projects in Kiribati however, this is expected to be resolved before the commencement of disbursements for this project and delays in WAs is not considered a high risk.

12. The project will have 1 disbursement category as outlined in the table below:

<b>Category</b>	<b>Amount of the grant (USD Million)</b>	<b>Percentage of Expenditures to</b>
Goods, works, consultants' services and incremental operating costs.	3,920,000	100%
<b>TOTAL AMOUNT</b>	<b>3,920,000</b>	

13. There is provision retroactive financing of up to \$100,000 for eligible expenses incurred up to 12 months prior to signing of the Legal Agreement.

## **ANNEX F: SAFEGUARDS ANNEX**

1. The project triggers OP4.01 Environmental Assessment. It is categorized as “C” given that the potential environmental impacts are mostly temporary and minor during the installation of PV solar systems on roof tops of schools, government buildings, and hospitals (four sites in total). The proposed project does not involve storage of solar power, but only supply the grid through an inverter. Therefore, there is no concern associated with battery disposal. No decommissioning of existing diesel generation plants will be involved either. An Environmental Management Plan (EMP) was prepared as a result of an environmental assessment. The EMP will form part of the contracts to enforce its implementation. Public Utilities Board (PUB) will need to apply for a license from the Ministry of Environment, Lands and Agricultural Development prior to proceedings with the solar PV installations, which for a Category C project is expected to be forthcoming.
2. During the preparation of the EMP, stakeholder consultations were held in South Tarawa to inform the findings from the Inception Report and feasibility studies. The EMP not only includes typical management measures to ensure the safety and environmental performance at all project sites, but also provisions to require that the contractors to be informed of local culture and customs by the PUB officers before starting the work. A Project Supervision Engineer will be assigned to carry out day-to-day oversight of the environmental and social performance of the contractors. A Grievance Redress Mechanism is built into the EMP to ensure that any concerns or complaints from the public (e.g., due to construction-related nuisances, accidental damage of assets/structures by contractors, land occupation,) will be addressed in a timely and satisfactory manner. The final EMP will be disclosed in the InfoShop and locally. Notice of final public consultation on the EMP was published in English and Gilbertese and consultations were held on 6 July 2012. A Project Information Bulletin that includes grievance procedures and contacts was also published in English and Gilbertese. The ISDS will be disclosed at the InfoShop after being approved by the Sector Manager and the Regional Safeguards Advisor.
3. OP4.10 Indigenous Peoples is not triggered because Kiribati is a homogenous society, 99% of the population consists of I-Kiribati people and the remainder of the population consists of recent migrants such as Tuvaluans and Europeans. The communities living around the currently identified project area are likely to host people who have an ancestral attachment to the land (original landowners). However, these communities will not have a separate language, separate institutions, nor will they self-identify as indigenous peoples.
4. OP 4.12 Involuntary Resettlement is not triggered as the project will not require involuntary resettlement. A due diligence review of the land ownership at the selected project sites was carried out. The Government of Kiribati through the National Infrastructure Committee and the Director of the Department of Lands will provide further confirmation that the solar PVs may be installed at the selected sites and that the sites are not affected by land ownership issues or rights that may impact on the sustainability of the project prior to project implementation.

5. Financial implications of any project-related mitigation or remediation will be in the main be covered by normal construction contract provisos of the design, supply and install contract, and will fall upon the contractor as normal good practice (third party insurance, civil damages, etc.). In the unlikely event that some injury, loss or damage occurs that is not covered under the design, supply and install contract, the Government of Kiribati will ensure that any loss or damage to any individual not elsewhere included will be covered by the Government on the principle that the Affected Person will be compensated to restore any loss of livelihood to at least its former status, or better.

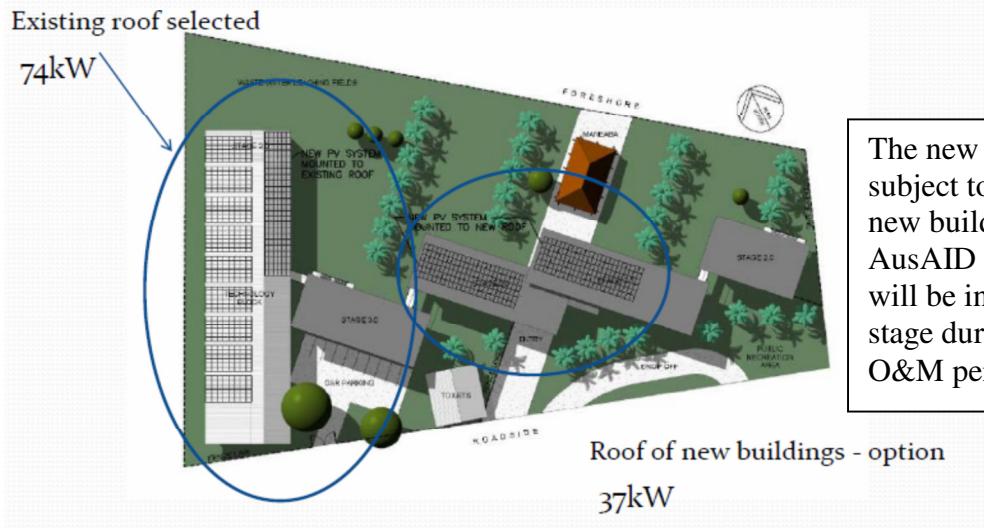
## ANNEX G: LEVELIZED COST CALCULATIONS OF DIESEL AND SOLAR PV

The following provides leveled cost estimates of diesel and solar PVs for each kWh generated.

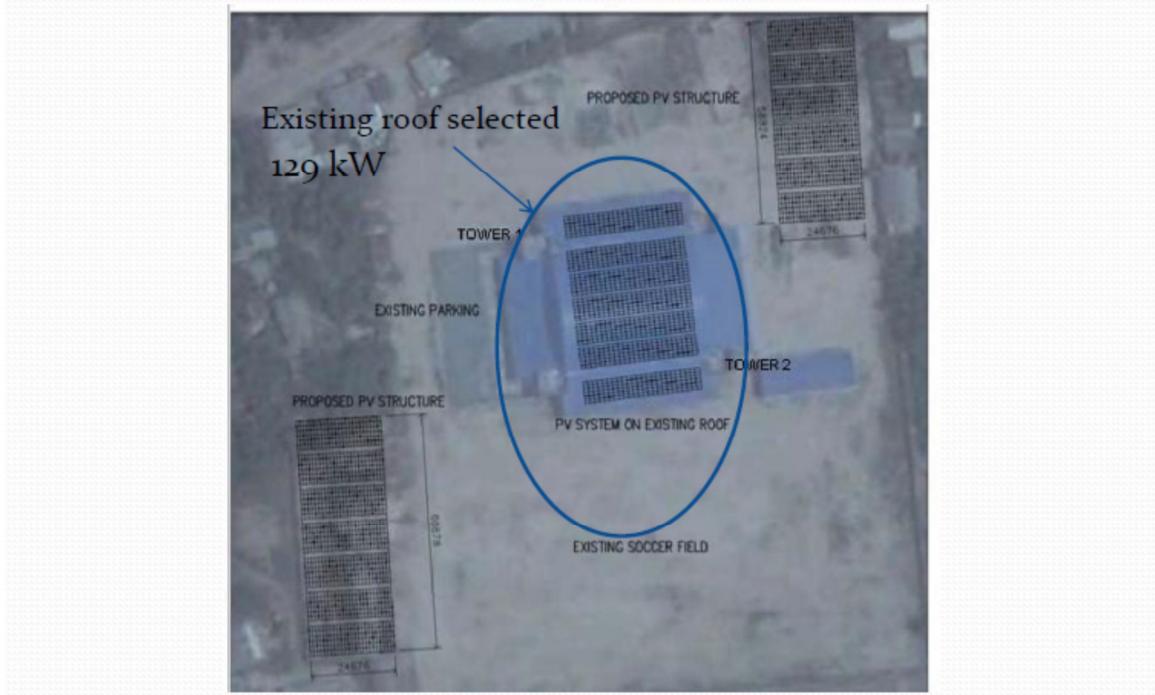
KIRIBATI GRID CONNECTED SOLAR PV - LCOE ANALYSIS		Diesel		Solar PV	
		High	Low	High	Low
Discount rate		10%	10%	10%	10%
Capital cost/kW - Plant		0	0	5,200	4,500
Capacity factor		60%	60%	20%	20%
Fuel cost, USD/kWh*		0.382	0.354	0.000	0.000
Fuel cost escalation, real % per year		5%	3%	0%	0%
O&M cost, USD/kWh		0.00	0.00	0.04	0.02
Lifetime, years		20.00	20.00	20.00	20.00
LCOE USD/kWh		0.571	0.447	0.389	0.322

## ANNEX H: SOLAR INSTALLATION SITE DETAILS

### Kiribati Institute of Technology



### Betio Sports Complex



# Tungaru Central Hospital

165 kW



# King George V Secondary School

110kW

