REQUEST FOR CEO ENDORSEMENT/APPROVAL

PROJECT TYPE: FULL-SIZE PROJECT
THE GEF TRUST FUND

Submission Date: 6 Oct 2010
Re-submission Date: 5 Jan 2011

PART I: PROJECT INFORMATION

GEFSEC PROJECT ID: 3641
GEF AGENCY PROJECT ID: 44099
COUNTRY(IES): Cook Islands, Samoa, Tonga, Vanuatu, (Papua New Guinea*)
PROJECT TITLE: Promoting Energy Efficiency in the Pacific (PEEP)
GEF AGENCY(IES): Asian Development Bank
OTHER EXECUTING PARTNER(S): N/A
GEF FOCAL AREA(s): Climate Change
GEF-4 STRATEGIC PROGRAM(s): CC SP-1, EE in Buildings
NAME OF PARENT PROGRAM/UMBRELLA PROJECT: Pacific Alliance for Sustainability (PAS)

Expected Calendar	
Milestones	**Dates**
Work Program (for FSPs only)	Nov 2009
Agency Approval date	Mar 2011
Implementation Start	Jun 2012
Mid-term Evaluation (if planned)	Jun 2013
Project Closing Date	Jun 2015

*The participation of Papua New Guinea (PNG) will be fully supported from co-financing sources; no GEF funds will used in PNG.

A. PROJECT FRAMEWORK

Project Objective: Improved energy security, greater affordability of energy services, and reduced greenhouse gas (GHG) emissions from the power sector of the five participating countries.

Project Components	Indicate whether Investment, TA, or STA	Expected Outcomes	Expected Outputs	GEF Financing		Co-Financing[1]		Total ($) c=a+ b
				($) a	%	($) b	%	
1. Establishment of comprehensive database of energy use by sector and appliance type in each participating country	TA	Improved and continuous monitoring of energy end use data to facilitate the rigorous evaluation of EE programs and interventions	1.1 Ongoing and comprehensive surveys fielded on energy end use and major energy consuming appliances 1.2 Database established in each country to record and regularly monitor energy consumption by sector and appliance	220,000	38	355,500	62	575,500
2. Mainstreaming of EE practices into government processes, policies, and procedures	TA	EE practices mainstreamed in Government energy and environmental policies Suitable guidelines, codes, tariffs, and directives for EE	2.1 National EE targets incorporated into national energy policies by 2012 2.2 Sales of energy inefficient appliances suppressed through Minimum Energy Performance Standards (MEPS) & labeling programs	894,000	44	1,123,500	56	2,017,500

		developed and adopted Enhanced institutional capacity developed to harness EE opportunities in both short and long-term planning horizons	2.3 EE of new buildings improved through simple & enforceable EE codes 2.4 Delivery of training programs in energy audits and EE products and services 2.5 EE Service Providers motivated, organized and incentivized to implement EE activities					
3. Implementation of national-scale EE programs in each participating country	Investment, TA	Increased market penetration and implementation of key EE technologies, practices and products in the residential, commercial, tourism, government, and social sectors Implementation of national EE initiatives across all 5 participating countries, leading to material annual energy savings and GHG emission reductions	3.1 At least 50% of street lighting upgraded using LED or HPS technology 3.2 Replace all incandescent bulbs installed in the residential lighting sector with CFLs 3.3 Energy audits and equipment retrofits in hotels and other non-residential private buildings 3.4 Energy audits and equipment retrofits in major public buildings	3,400,000	44	4,393,000	56	7,793,000
4. Public awareness and information sharing	TA	Improved public awareness and understanding of EE and the benefits of energy saving policies, activities and technologies	4.1 Campaign to increase awareness of EE by population and key stakeholders 4.2 Information on EE best-practices and lessons learned shared between countries and major stakeholders through regular regional meetings and workshops	292,000	44	379,000	56	671,000
Project management - Establishment of National Implementation Unit (NIU) and National Steering Committee (NSC) in each county - Project monitoring and evaluation system operating effectively - Activities prepared, reviewed, and approved consistent with set criteria				448,545	40	666,000	60	1,114,545
Total Project Costs				5,254,545		6,917,000		12,171,545

B. SOURCES OF CONFIRMED CO-FINANCING FOR THE PROJECT

Name of Co-financier (source)	*Classification*	*Type*	*Project*	*%*
Government of Cook Islands, Samoa, Tonga, & Vanuatu	Nat'l Gov't	In-kind	1,797,000	26%
Power Utilities	Nat'l Gov't & Private Sector	In-kind & cash	1,620,000	24%
GEF Agency: ADB[1]	Impl. Agency	Cash	1,000,000	14%
Government of Australia[2]	Nat'l Gov't	Cash	1,000,000	14%
Government of Japan[3]	Nat'l Gov't	Cash	1,500,000	22%
Total Confirmed Co-financing[4]			6,917,000	100%

C. FINANCING PLAN SUMMARY FOR THE PROJECT ($)

	Project Preparation a	*Project b*	*Total c = a + b*	*Agency Fee*	*For comparison: GEF and Co-financing at PIF*
GEF financing	200,000	5,254,545	5,454,545	525,455	5,254,545
Co-financing	485,000	6,917,000	7,402,000		10,610,000
Total	685,000	12,171,545	12,856,545	525,455	15,864,545

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

GEF Agency	*Focal Area*	*Country Name/ Global*	*(in $)*		
			Project (a)	*Agency Fee (b)*	*Total c=a+b*
ADB	Climate Change	Cook Islands	1,401,212	140,121	1,541,333
		Samoa	1,401,212	140,121	1,541,333
		Tonga	1,401,212	140,121	1,541,333
		Vanuatu	1,050,909	105,092	1,156,000
Total GEF Resources			5,254,545	525,455	5,780,000

[1] To be financed from ADB Technical Assistance Special Fund IV.
[2] To be financed from AusAID funds through the Pacific Region Infrastructure Facility (PRIF).
[3] To be financed from the Asia Clean Energy Fund (ACEF) under the Clean Energy Financing Partnership Facility (CEFPF), provided by the Government of Japan.
[4] Not included in the sources of confirmed co-financing are contributions from public and private sector building owners to support the implementation of EE retrofits arising from project supported energy audits under sub-components 3.3 and 3.4. It is assumed that a minimum amount of $2,500,000 will be contributed from these sources based on consultation meetings conducted with individual building owners, hotel associations and chambers of commerce in the participating countries, as well as on experience from building retrofit pilots carried out in Vanuatu. These meetings and pilots concluded that building owners would pay for the implementation of EE retrofits, on the basis that they received financial support equal to 20% of the cost of the measure. Since individual letters of support cannot be obtained from individual building owners until energy audits have been conducted during the implementation phase, this source of co-financing has been excluded from Table B.

E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	*Estimated person weeks*	*GEF amount ($)*	*Co-financing ($)*	*Project total ($)*
*Local consultants**	1,060	700,000	625,000	1,325,000
*International consultants**	675	1,440,000	772,500	2,212,500
Total	1,735	2,140,000	1,397,500	3,537,500

* Details provided in Annex C.

F. PROJECT MANAGEMENT BUDGET/COST

Cost Items	*Total Estimated person weeks/months*	*GEF amount ($)*	*Co-financing ($)*	*Project total ($)*
*Local consultants**	192	288,000	0	288,000
*International consultants**	111	0	444,000	444,000
*Office facilities, equipment, vehicles and communications**			100,000	100,000
*Travel**			82,000	82,000
Monitoring and evaluation		160,545	0	160,545
Total	**303**	**448,545**	**626,000**	**1,074,545**

* Details provided in Annex C.

G. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? yes ☐ no ☒

H. DESCRIBE THE BUDGETED M &E PLAN:

The M&E plan is consistent with GEF policies, including SMART[5] indicators as well as mid-term and end-of-project targets. The M&E plan will be reviewed and revised as necessary at project inception and a project supervision plan will be developed at this stage. The main weight will be on outcome monitoring, but financial and implementation monitoring will also be equally considered.

The establishment of a suitable baseline for further development of energy efficiency in the Pacific Islands is an important building block of the project's M&E system. Particular emphasis will be placed on involving decision makers and other key stakeholders in project monitoring, so as to be able to determine and measure energy savings and GHG emission reductions resulting from this project.

The main assessment method will be through the mid-term and terminal evaluations. The National Steering Committee (NSC) in each country will participate in the mid-term evaluation and the terminal evaluation will be managed by ADB. A summary of M&E activities envisaged is provided below.

Type of M&E activity	**Responsible Parties**	**Project Budget US$** *Excluding project team staff time*	**Time frame**
Inception Workshop and Report	▪ ADB ▪ NIUs ▪ NSCs	30,545	Within first two months of project start up
Project Implementation Review (PIR)	▪ ADB ▪ NIUs ▪ NSCs	None	Annually
Periodic status/ progress reports	▪ NIUs	None	Quarterly

[5] Specific, Measurable, Achievable, Realistic, and Time-bound.

Type of M&E activity	Responsible Parties	Project Budget US$ *Excluding project team staff time*	Time frame
Mid-term Evaluation	▪ ADB ▪ External Consultants (i.e. independent evaluation team)	40,000	At the mid-point of project implementation.
Final Evaluation	▪ ADB ▪ External Consultants (i.e. independent evaluation team)	40,000	At least three months before the end of project implementation
Project Terminal Report	▪ ADB ▪ NIUs ▪ Government counterparts	None	At least three months before the end of the project implementation
Measurement of project results.	▪ ADB and NIUs will oversee the identification and measurement of key results indicators related to GHG reductions. Results to be monitored include: changes in power plant fuel consumption and changes in electricity consumption for residential sector, commercial sector, public sector.	50,000	Mid and end of project (during evaluation cycle) and annually when required.
TOTAL indicative COST Excluding project team staff time and ADB staff and travel expenses		160,545	

PART II: PROJECT JUSTIFICATION:

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

Current situation

The five ADB Pacific Developing Member Countries (PDMCs) included in this project are extremely vulnerable to the cost of imported fossil fuels. Cook Islands, Tonga and Vanuatu have electricity generation systems that almost exclusively rely on fossil fuel (diesel) power generation. In addition, in all the five PDMCs transportation is also dependent on imported fossil fuels. Paying for these imported fossil fuels places a major strain on local economies and trade balances. PDMC economies are already under strong pressure to meet urgent national social, development and environmental needs while being economically reliant on limited and uncertain value exports (e.g. copra), remittances from overseas, tourism, and foreign aid support. Fossil fuels are a major cost that PDMCs have little control over and the volatility and high level of oil-based fossil fuel prices is a threat to their ongoing social, economic and environmental development and sustainability.

The accumulation of greenhouse gases (GHGs) in the atmosphere and associated climate change impacts are significantly contributed to by the development and use of conventional energy. Although the accumulation of GHGs is largely the result of energy use by developed countries, the high vulnerability to the impacts of climate change of small islands and low-lying atolls has created very strong interest in addressing the problem within PDMCs, while also pursuing their other sustainable development aspirations. Hence PDMCs are amongst the most

active countries supporting deep global GHG emission reductions and one means by which they may show their tangible support is to manage their own GHG emissions with a mix of EE and RE activities.

PDMCs continue to be the beneficiaries of a wide variety of donor projects in the energy field. However, most projects have been developed and implemented in silos, with funding predominantly being focused on visible RE applications. Consequently, EE activities and integrated whole of sector approaches have been largely neglected. Past EE activities, including ADB regional TAs (PREGA[6], REEP[7] and PEEP Phase I[8]) have mostly comprised studies of energy saving potentials and the provision of policy and advisory assistance. While studies can be a necessary input, they have generally lacked a tangible follow-on implementation focus linking capacity building to catalyzing the deployment of EE appliances, equipment, building designs and ongoing operational energy efficient practices. For example, (i) there has been energy audit training and energy audits undertaken but without a linkage to accessing financing mechanisms to implement the findings; (ii) there have been household surveys undertaken but without a proper energy end-use focus and without assembling the information into usable and updatable energy end-use databases; and (iii) studies of the potential for appliance Minimum Energy Performance Standards (MEPS) and energy labeling have been undertaken but without identified funding paths to implement the findings[9].

A recent paper[10] has identified that, on average, only seven cents has been spent on energy efficiency for every dollar spent on renewable energy in the Pacific, and the forward pipeline of projects suggests that this spending imbalance is not expected to change significantly in the short to medium term. Although energy efficiency is more complex to implement, when done correctly, it is far more cost effective. In practice, projects on both energy efficiency and renewable energy are required, but the balance clearly needs to shift more to energy efficiency.

There have also been few systematic efforts to transform the sector to more EE systems. Significant potential exists to catalyze the use of EE equipment including (i) long lifetime, voltage variation tolerant CFLs; (ii) long lifetime, low power streetlamps such as LEDs, (iii) modern linear fluorescent fittings with low loss ballasts and reflector diffusers, (iv) high part-load efficiency inverter air conditioners, and (v) and modern low-cost Solar Water Heaters (SWH)[11]. Finally, there has been little effort to ensure that new buildings are constructed to be energy efficient through practical and enforced EE provisions in applicable building codes. Large potential for implementation-focused and properly funded EE activities therefore exists.

Electricity tariffs in the participating PDMCs are very high and range from 22-46 US cents/kWh[12] (due to low economies of scale and high reliance on expensive diesel generation). In the case of the main island in each participating PDMC, electricity tariffs are at, or close to, the true cost of supply with fuel price pass-through arrangements in place. Outer-island and remote grid tariffs are sometimes higher than main island tariffs but are generally below the true cost of supply. These factors result in a widespread over-reliance on unsustainable subsidies and transfers from central government, as well as hand-to-mouth operating regimes characterized by fuel shortages, unreliable and inefficient equipment and inadequate maintenance regimes. Some useful projects are

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[6] ADB, 2000. Regional TA-5972: *Promotion of Renewable Energy, Energy Efficiency and Greenhouse Gas Abatement (PREGA)*. Manila.

[7] ADB. 2006. Regional TA-6102: *Renewable Energy and Energy Efficiency Program for the Pacific (REEP)*. Manila.

[8] ADB. 2008. Regional TA-6485: *Promoting Energy Efficiency in the Pacific (PEEP, Phase I)*. Manila.

[9] Recent studies include: G. Wilkenfeld, 2010. *The Costs and Benefits of Electrical Appliance Energy Labeling and Minimum Energy Performance Standards for Pacific Island Countries*. Prepared for the Department of Climate Change and Energy Efficiency, Government of Australia; and Renewable Energy and Energy Efficiency Partnership (REEEP). 2009. *Pacific Island Countries Energy Efficiency, Auditing and Appliance Labeling (EEAAL)*. Melbourne.

[10] P. Johnston, 2010. *The Case for Increased Investment in Energy Efficiency in the Pacific Islands*, Suva, Fiji.

[11] SWH will replace electric and gas water heaters. SWH are included in the project as their support is generally not included in RE projects in the Pacific. The inclusion of SWH also responds to GEF STAP comments on the Project Identification Form (PIF) to consider RE applications.

[12] Actual residential tariffs are $0.46/kWh in Cook Islands; $0.22/kWh in PNG; $0.36/kWh in Samoa; $0.42/kWh in Tonga; and $0.44 in Vanuatu.

underway to improve the supply side technical and efficiency aspects of PDMC grids[13] and their remote island electricity systems, although more could still be done in this area. However, electricity supply costs and tariffs are expected to remain high, causing demand-side EE to remain a highly cost effective method of reducing PDMC reliance on fossil fuels.

In the absence of this project, EE will continue to be under-utilized due to a range of barriers. The participating PDMCs are marked by limited human and institutional capacity to respond to energy challenges, and key barriers to the deployment of EE initiatives include: (i) insufficient public understanding and awareness of the potential of energy efficiency initiatives; (ii) lack of confidence among stakeholders in energy efficiency technologies due to the limited success of demonstration programs; (iii) inadequate institutional capacities and technical expertise to plan, manage, and maintain energy efficiency programs; (iv) lack of clear and practical EE policies, legislation, regulatory frameworks and enforcement; and (v) limited political commitment and financial support to the sector. The project will address these limitations by prioritizing the establishment of appropriate institutional arrangements; implementing suitable policy and legislative support; collecting, analyzing, and disseminating energy data required for identification and monitoring of demand-side efficiency improvements; and implementing national-scale EE programs and public awareness campaigns. Training for EE Service Providers with the aim of encouraging participation by the private sector and providing access to scarce capital will also help promote the sustainability of energy efficient practices over the long term.

The proposed project

The objective of this project is to reduce GHG emissions from the power sector through EE improvements in the residential, commercial and governmental buildings sectors, and for street lighting - in the five participating ADB PDMCs. To achieve this objective, the specific project components are summarized as follows:

Component 1 – Establishment of comprehensive database of energy use by appliance/equipment type in each participating country. Project preparatory activities have already performed a baseline survey of energy use by sector and major appliance category. This component will complement the analysis and pilot projects already undertaken[14] and carry out surveys to complete the picture of existing and projected appliance and equipment characteristics; patterns of use; and useful lifetimes. The main output will be a database in each country of energy use by sector and appliance, and which will be made accessible to all interested stakeholders. Resources will be used to train and build the capacity of local government energy units in maintaining the database and keeping it up to date with relevant and accurate information so as to ensure that the provision of reliable data is sustainable in the medium to long-term. To further ensure sustainability, it has been agreed that the databases will be hosted by government departments who will contribute co-financing to the activity during the project and over the longer term after completion of the project.

Component 2 – Mainstreaming of EE practices into government processes, policies, and procedures. This component will involve (i) establishment of practical and implementable EE targets and their incorporation into national energy policies, sector roadmaps and plans; (ii) suppression of high energy consumption appliance and equipment sales and use, and the phase-out of inefficient technologies (e.g. GLS[15] incandescent light bulbs and non-inverter AC units) through import regulations caused by the development, adoption and enforcement of effective minimum energy performance standards (MEPS) and/or energy labeling; (iii) improvement of EE best-practices for new-build residential, commercial, government, and social buildings, including establishment of simple, effective and enforceable EE provisions in building codes for new buildings; (iv) developing and implementing training programs for local experts in undertaking energy audits and in providing EE products and

[13] For example, support is being given from the European Union through its 9th EDF to support the Pacific Power Association (PPA) to assist with quantification of supply side losses of Pacific power utilities.
[14] Major project preparatory activities were funded by a $200,000 Project Preparation Grant (PPG) from GEF and from ADB regional TA-6485: *Promoting Energy Efficiency in the Pacific (PEEP), Phase I.*
[15] General Lighting Service (lamps) – i.e. not specialist applications such as fridge and decorative lights.

services, and the effective communication of their benefits to decision makers; and (v) supporting the development of EE service providers motivated, organized and incentivized to implement EE activities.

Component 3 – Implementation of national-scale energy efficiency programs. As analyzed and piloted in the preceding ADB-funded regional project, this component will involve a number of tangible EE implementation initiatives, including (i) upgrading of street lighting using energy efficient and long-life technologies; (ii) roll-out of energy efficient lighting systems to the residential sector; (iii) energy audits in hotels and other non-residential private buildings and the subsequent implementation of recommended EE improvements in air conditioning, lighting, refrigeration, water heating, and management schemes; and (iv) energy audits in the government building sector and the subsequent implementation of recommended EE improvements in air conditioning, lighting, refrigeration, water heating, and management schemes.

Component 4 – Public awareness and information sharing. This component will include: (i) information dissemination to public and private stakeholders on the benefits of energy saving technologies and practices through public education programs, workshops, and media; and (ii) leveraging project benefits and information exchange beyond the five participating countries using regional workshops, innovative ICT methodologies, and knowledge products in a usable format.

Expected energy savings and GHG emission reductions

The project will result in energy savings, which can be translated into GHG emission reductions based on diesel generator fuel savings. Global environmental benefits will accrue from the project through reductions in GHG emissions from the five participating countries and from a shift away from the current upwards trajectory of emissions from the power sector. The global environment effect of the project can be estimated by calculating the energy savings resulting from each component.

There are two categories of GHG emission reductions defined by the GEF[16], which are applicable for this project:

A. **Direct GHG reductions** – Emission reductions achieved by projects that are planned and implemented as part of the project as well as energy efficiency investments leveraged as a result of the project during the project's supervised implementation period.

B. **Indirect GHG emission savings** – Emission reductions achieved after project completion as a result of the enabling environment for EE practices and investments created by the GEF project through capacity building, policy frameworks, standards and other catalytic actions for replication.

Direct GHG reductions

Direct GHG reductions can be calculated for Output 2.2, 3.1, 3.2, 3.3 and 3.4 and are presented below. The annual savings were calculated as part of the project preparation activities by ADB under TA 6485. This TA gathered energy data in all participating PDMCs and energy and CO2 savings were estimated for specific energy efficiency measures. The table below summarizes the annual savings, by activity and by country.

[16] "*Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects*," GEF/C.33/Inf.18 April 16, 2008

Program Activity	Cook Islands		PNG		Samoa		Tonga		Vanuatu	
	Annual Energy savings (MWh)	Annual CO2 Savings (tons)	Annual Energy savings (MWh)	Annual CO2 Savings (tons)	Annual Energy savings (MWh)	Annual CO2 Savings (tons)	Annual Energy savings (MWh)	Annual CO2 Savings (tons)	Annual Energy savings (MWh)	Annual CO2 Savings (tons)
2.2 Suppression of high energy consumption Appliances	995	647	10,419	6,772	3,030	1,969	2,475	1,683	1,226	687
3.1 Street lighting	138	90	1,844	1,199	1,558	1,013	793	540	62	35
3.2 EE lighting	919	597	5,401	3,511	800	520	986	671	1,209	677
3.3 EE in hotels and non-residential private buildings	1,430	930	3,771	2,451	1,297	843	157	107	2,131	1,193
3.4 EE in public buildings	282	184	4,035	2,623	1504	978	595	405	705	395
Total Annual Energy Savings (MWh)	47,762									
Total Annual CO2 savings (tons)	30,720									

Hence, the project will result in direct reductions of 47,762 MWh and 30,720 tons of CO2 per year. Based on assumed equipment and appliance lifetimes of 15 years, total reductions should reach 716,430 MWh and 460,800 tons of CO2.

Indirect GHG emission savings

Indirect GHG emission savings will be derived from all project components. However, GHG savings from activities under Components 1, 2 & 4, (e.g. policy formulation, institutional strengthening, and awareness raising), are difficult to quantify and have been excluded from this calculation. A calculation of partial indirect GHG savings has been made for Outputs 2.4, 3.3 and 3.4 only, where capacity for building energy efficiency will be built within each country. These outputs will provide training on energy efficiency to the private sector and then these trained national experts will be used to complete energy audits on a number of buildings. The experience obtained on understanding building energy balances and targeting energy efficient measures for different buildings will create an enabling environment for a steady growth of energy efficient retrofits in buildings after the end of the project.

Using the bottom-up approach, we can make a conservative estimation of how many times the investments made during the project might be replicated with the following formula:

$CO_{2\ indirect} = CO_{2\ direct} \times RF$;

Hence, the direct CO2 savings are multiplied by a replication factor (RF), to obtain the indirect CO2 savings. In this project, the direct savings obtained from implementing energy efficiency in existing buildings (outputs 3.3 and 3.4) will be used to evaluate how much indirect savings can be expected from additional EE work accomplished by the workforce trained by the project. With a conservative replication factor of 1.2, 10,109 annual tons of CO2 coming from output 3.3 and 3.4 direct savings this will result in indirect savings of 12,131 tons of CO2 annually. Based on an average 15 years lifetime for EE implementation measures in buildings, a total of 181,965 tons of CO2 can be accounted as indirect savings.

Total GHG Emission Savings from Project

In total, the implementation and training activities are expected to result in annual energy savings of 66,850 MWh, resulting in 42,851 tCO2 savings.

In conclusion, the project total emission reduction will result in **642,765 tCO2:** 460,800 tCO2 from direct emission savings and 181,965 tCO2 from indirect emission savings.

B. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL AND/OR REGIONAL PRIORITIES/PLANS:

End-use EE is recognized by many PDMC governments as well as regional agencies as a least-cost priority by which fossil fuel dependence, high power tariffs and GHG emissions from the power sector can be reduced. At the national scale, all participating PDMCs have national policy statements that emphasize the importance of demand-side EE measures as a means to reducing national dependence on fossil fuels, and the Tonga Government has already incorporated EE recommendations from PEEP (Phase I)[17] into the Tonga Energy Roadmap[18] (TERM). The project is also in line with the Cook Islands national energy policy which aims at decreasing by 20% its per capita energy consumption by increasing efficiency in energy use through the adoption of new technologies and energy conservation.

At the regional level, this project is in line with the Framework for Energy Security in the Pacific Islands[19] (FAESP) which was adopted by Pacific Islands Leaders in August 2010. The Framework supports the promotion of energy efficiency and productivity through a whole-of-sector approach and through the premise of "many partners one team one plan". End-use energy consumption and energy efficiency activities are given prominence in the FAESP as a guiding theme of the framework.

There have been a range of national and regional focused projects undertaken to help the participating PDMCs build GHG reporting capacities and report on national emissions, formulate policies and plans for GHG mitigation and adaptation, and identify opportunities for EE and RE mitigation opportunities. Prior relevant regional projects include (i) the Pacific Islands Energy Policy and Strategic Action Plan (PIESAP), 2004-2007 which assisted PDMCs to draft and adopt national energy policies; (ii) the Pacific Islands Renewable Energy Project (PIREP), 2003-2006 which conducted energy sector assessments in 15 Pacific countries and identified GHG mitigation opportunities in both RE and EE; and (iii) the UNDP-managed Second National Communication project which is assisting Pacific countries to prepare their Second National Communications and their respective GHG inventories.

The existence of significant realizable EE potentials in the five participating PDMCs has also been confirmed by a number of previous regional ADB studies. The Renewable Energy and Energy Efficiency Program for the Pacific[20] (REEP) provided case studies of energy efficiency potential in Fiji Islands and Samoa and supported the removal of policy and institutional barriers to energy efficiency, and the promotion of private sector participation in energy management and demand-side services. Likewise, the ADB PEEP (Phase I) initiative has undertaken five pilot-scale energy efficiency implementation projects of relevance to this project, and has identified a range of further EE options that this project will follow up on and implement as appropriate. By means of its work with in the Pacific through PREGA, REEP, PEEP (Phase I) and other projects, ADB has identified limitations in EE human capacity

[17] ADB. 2008. Regional TA-6485: *Promoting Energy Efficiency in the Pacific (PEEP, Phase I).* Manila.
[18] Government of the Kingdom of Tonga. 2010. *Tonga Energy Roadmap (2010-2020).* Nuku'alofa, Tonga.
[19] Secretariat of the Pacific Community. 2010. *Towards an Energy Secure Pacific. A Framework for Action on Energy Security in the Pacific*. Suva, Fiji.
[20] ADB. 2006. Regional TA-6102: *Renewable Energy and Energy Efficiency Program for the Pacific*. Manila.

as well as in reliable energy supply, energy end-use, and appliance and equipment data. As shown, this GEF-PEEP project provides the opportunity to address these shortcomings relating to capacity and data and to build the capacity of stakeholders in the region to successfully deploy a number of energy efficient technologies at scale.

This GEF-PEEP project is fully consistent with ADB's core focus in the Pacific, in particular with its Strategy 2020[21] which calls for the promotion of energy efficiency through an integrated mix of supply-side and demand-side measures. This GEF project is also consistent with ADB's recently published Pacific Approach 2010-2014[22], which highlights the pivotal role energy efficiency needs to play in lowering energy costs, reducing dependence on fossil fuels and lowering GHG emissions. The ADB Pacific Approach Framework also identifies the energy sector as one of the top four ADB operational priorities for the region. This GEF-PEEP project is consistent with the ADB Pacific Regional Operations Business Plan 2010-2012[23]. The ADB co-financing component of this GEF-PEEP project is specified in the ADB pipeline for TA scheduled for consideration and funding in 2010. Improving EE is also directly consistent with each of the five participating PDMCs' ADB Country Partnership Strategies, which all highlight energy, and energy efficiency, as strategic objectives. The PDMCs have also enshrined EE within their National Development Plans, Energy Policies, and Renewable Energy and Energy Efficiency Strategies, as well as their National Policies on Combating Climate Change and Communications to the UNFCCC. As well as carrying out extensive in-country project preparatory work, ADB has also undertaken a Fact-finding Mission to each participating country and endorsement of the project has been documented in a Memorandum of Understanding signed by the relevant government agency in each country.

C. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH GEF STRATEGIES AND STRATEGIC PROGRAMS:

The project responds to Climate Change Focal Area Strategic Objective 1 and Strategic Program 1, promoting energy-efficient technologies and practices in the appliances, equipment, and design and operation in the residential and commercial, government, and social building sectors. The project activities will improve the energy-efficiency of buildings and their energy using appliances, equipment, and systems through the increased adoption of energy-efficient designs, technologies, and appliances, particularly in the residential, hotel and tourism and public building sectors. Facilitating national ownership of policy formulation, regulation drafting and enforcement design, along with capacity building and awareness-raising will ensure long-term sustainable post-project impacts.

D. JUSTIFY THE TYPE OF FINANCING SUPPORT PROVIDED WITH THE GEF RESOURCES.

The project is targeted to address and remove existing policy, regulation and implementation gaps and also technical capacity barriers at the institutional and market levels by providing technical assistance. No new loan or revolving-fund mechanisms are considered necessary, and therefore grant-type funding is considered the most appropriate means to enable successful delivery of the project outcomes. GEF resources are needed to secure expertise, human resources, co-funding of energy efficient equipment and the support activities needed to remove key barriers by carrying out the activities as described in this project plan.

E. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES:

The project will be developed in close cooperation and coordination with each country's power utility, Energy Department, Ministry of Environment, Finance Ministry (ADB counterpart and relevant agency for government building retrofit funding), Ministry of Works (or equivalent responsible for the enforcement of building code provisions), and Customs Department (for MEPS and Labelling enforcement at the wharf and for the application of any preferential import duties on energy efficient products). Care has been taken to ensure that the project complements previous and on-going international cooperation initiatives that have been developed in the field of EE & RE for the Pacific Islands region as follows:-

[21] ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank 2008–2020*. Manila.
[22] ADB. 2009. *ADB's Pacific Approach 2010-2014*. Manila.
[23] ADB. 2010. *Pacific: Regional Operations Business Plan 2010-2012*. Manila.

- The Framework for Action on Energy Security in the Pacific[24] (FAESP).
- The Performance Benchmarking initiative for power and water utilities being undertaken in the Pacific by the Pacific Region Infrastructure Facility (PRIF), ADB, Secretariat of the Pacific Community (SPC) and the Pacific Power Association (PPA).
- Japan, EU, and IUCN[25] managed projects that are primarily providing fully grant funded "hardware" for renewable energy projects (e.g., solar equipment).
- The SPC Regional Environment Programme (formerly under SPREP and now under SPC) activities that have been focusing mainly on capacity building projects.
- The joint SPC and Renewable Energy and Energy Efficiency Partnership (REEEP) activities relating to energy efficiency and appliance labeling that have been primarily focusing on identifying the scope for energy efficiency regulations and policies in conjunction with SPC.
- The GEF-funded "*Energizing the Pacific*" initiative which is providing a coordination mechanism that brings together development partners and regional organizations active in the Pacific energy sector, together with providing support to grid-based RE initiatives. This mechanism has been used to involve development partners in the preparation of the PEEP initiative and will continue to be an important forum for consultation during project implementation.

The project will collaborate with these on-going EE and RE initiatives on an activity based basis. The ADB-based, regionally-based and the national NIUs (National Implementation Units) will coordinate the project's effort with activities developed by other allied initiatives. The relevant national Energy Departments and/or Ministries of Environment will be used as the main link between other cooperation activities, since they are either in charge of, or directly connected to, the implementation of complementary EE initiatives.

Sustained efforts will be made to cooperate closely with all regional energy initiatives in the region from which useful lessons for this project can be learned, or with which productive synergies can be developed at the design and/or implementation stages. The project will incorporate the lessons and best practices from the previous ADB REEP program and will build on ADB's on-going initiatives addressing power sector reforms in the participating countries as well as on the results from past and ongoing GEF-related activities, such as the GEF Pacific Islands Greenhouse Gas Abatement Renewable Energy Project (PIGGAREP) and the previous Pacific Islands Climate Change Assistance Program (PICCAP). This initiative will also coordinate with relevant Pacific Island country and donor coordination meetings, as well the FAESP and the PPA and their associated reporting, monitoring and coordination mechanisms to increase awareness on EE opportunities in the PDMCs.

F. DISCUSS THE VALUE-ADDED OF GEF INVOLVEMENT IN THE PROJECT DEMONSTRATED THROUGH INCREMENTAL REASONING :

Baseline

Without the proposed project, a major opportunity would be missed to accelerate adoption of energy-efficient equipment and appliances, including lights, freezers, refrigerators and air conditioners in the PDMCs. The business-as-usual scenario would likely include the continuation of high energy consuming appliances and equipment sales to the general population. The reason is that most people are not aware of the benefit of high efficiency equipment and mostly care about the initial cost of what they buy. This is a general consumer behaviour which can only be overcome through policy and regulatory interventions supported by concentrated educational and awareness efforts.

[24] Secretariat of the Pacific Community. 2010. *Towards an Energy Secure Pacific. A Framework for Action on Energy Security in the Pacific*. Suva, Fiji.
[25] Austrian and Italian funded and International Union for Conservation of Nature managed projects.

In the baseline scenario, equipment with low efficiency will continue to be available on the market and will use more electricity than required throughout their life.

Another missed opportunity would be the improvement of existing buildings in terms of energy consumption. Most dwellings were built with no concern for their electricity consumption. Windows have no shading resulting in excessive air conditioning loads; air conditioners and refrigeration system are inefficient; artificial light levels are often too high and lighting is provided by inefficient lamps, ballasts and fittings. Under the baseline situation, inefficient appliances and equipment will only be replaced in existing buildings when equipment breaks down. Cheapest initial cost and energy inefficient equipment will be installed in their place. This energy loss will be large and will negatively impact on power generation for as long as the equipment is operational, which could be up to 10-15 years.

GEF Project Alternative Scenario

In this GEF alternative energy efficiency project, ADB's approach proposes to use a combination of market push via implementation assistance, energy efficiency policies and regulations, energy efficiency provisions in building code, and education and awareness interventions and market pull via provision of EE training to local experts, such as engineers, building managers, architects, and other technical service providers.

ADB will implement specific EE measures targeting lighting, appliances and equipment in each country. These measures will mostly be implemented within existing buildings, improving their energy efficiency and raising the awareness on the benefits of energy efficiency within Pacific countries by sharing results during regional workshops. Marketing tools will be developed regionally, educating the population on energy efficiency and its environmental and economic benefits. Awareness campaigns will be held in each country and special events will be organised to promote energy efficiency. This will be conducted in collaboration with the implementation activities, to ensure maximum impact in the market.

Governments will include energy efficiency in their national energy policies and building codes. Where possible, governments will also have a critical role in suppressing high consumption appliances importation by implementing import duty schemes that reduce the cost of higher energy efficiency appliance on the market, rendering them more attractive to consumer.

Therefore, the project will build EE local capacity, raise awareness of the population and implement tangible EE projects resulting in direct energy saving for each country.

Sustainability

The establishment of an effective EE programme promoting demand-side energy efficiency leads to a more sustainable energy future. Once established, the projects will effectively transform the market to a higher level of efficiency for lighting, appliances, existing buildings, new buildings, and street lighting.

Since the proposed GEF project comprises a strong capacity building element, the main outputs of this project will not only be newly implemented EE projects, but also institutional structural growth with a capacity to effectively maintain energy efficiency services. The project will specifically focus on addressing issues related to awareness barriers by increasing institutional capacity and awareness as well as providing information on energy efficiency to improve the knowledge of the population, engineering and technical services provision firms, and relevant governmental agencies.

Sustainability will also be enhanced by tying the initiative to whole-of-sector programs, and established institutional bodies such as the Implementation Unit for the Tonga Energy Road Map, the Samoa National Energy Committee, and the Vanuatu National Advisory Committee on Climate Change. Likewise, the project will coordinate with regional initiatives such as FAESP and the Energy Development Partners Working Group (EDPWG), which have been endorsed by leaders of PDMCs and which guide the activities of donors in the sector.

These mechanisms will serve to coordinate follow-up assistance when the implementation of this project is complete.

Replicability

The project is designed to create an enabling environment for the market transformation of more energy efficient equipment and practices in building through technical capacity improvement and awareness raising. One of the key requirements for replicability is to overcome the low penetration of high efficiency appliances, equipment and lighting systems - due to the lack of knowledge on their long-term benefits - which will be addressed through increased institutional capacity and awareness.

A comprehensive monitoring, feedback and evaluation system will accompany the proposed project. This will help to identify what works, what doesn't, the reasons for this, and the impact level in term of energy savings. Achievements and lessons will be extracted from that experience and, through the regional workshop, be disseminated within Pacific countries to encourage replicability.

G. INDICATE RISKS, INCLUDING CLIMATE CHANGE RISKS, THAT MIGHT PREVENT THE PROJECT OBJECTIVE(S) FROM BEING ACHIEVED AND OUTLINE RISK MANAGEMENT MEASURES:

Risk	Level	Mitigation Measure
Change in government priorities leading to reduced support for the project and implementation delays	Low	Most costs associated with power generation are linked to the international oil price - which is not expected to significantly and sustainably decrease during the project's implementation, or post-project. Indeed the international oil price is widely regarded as more likely to increase than decrease. PDMC governments are well aware and very concerned that oil prices are more likely to increase in future, and that EE needs to be strongly supported to reduce their dependency on imported oil over which they have no control on its price. In addition, the project will establish a steering committee in all PDMCs which will include all major stakeholders within the relevant government ministries and agencies. Having the government participate in the implementation of the project and providing them with a level of responsibility over the project activities in their country will increase their understanding and ensure their support for the project.

Lack of local capacity to complete energy audits and identify savings potential	Low	The project includes capacity building activities, which will provide training to the private sector to develop local capacity in term of energy audits, EE products and technology and life cycle analysis. This training will develop local experts to promote EE and to identify energy saving potentials in major buildings. Use of the project budget to be spent on the recruitment of local experts to work on the project will also serve as a mitigation measure.
Following the completion of energy audits and reports, facilities might not be willing to invest and finance the installation of new equipment, even if the energy reduction potential is highly cost-effective.	Low	The project will provide financial incentives to the private sector to make the energy conservation measures (ECM) identified by the energy audits more financially attractive. The level of incentive will be based on the return on investment (ROI), potential savings and complexity of the measure. Reducing the simple payback to 2-3 years and providing suitable technical analyses should make the ECM attractive enough to get the private sector willing to invest.
Presence of manipulation or corruption by local stakeholders during the process of providing subsidies and/or grants for EE initiatives in private sector	Low	Clear metrics and decision-making criteria will be developed by which to select individual projects and a Steering Committee with representatives from ADB and regional organizations will be established to allow for transparent and robust project selection. The ADB consultants will advise on technology and project selection but the final decision will rest with the Steering Committee.

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

The proposed project will result in the reduction in electricity and fuel consumption due to higher energy efficiency. The electricity and fuel saved from the successful implementation of the project will lead to a reduction of carbon dioxide (CO_2) emissions, which is estimated at 42,851 tons of CO_2 annually. As a result, the intervention of the GEF will lead to an emissions reduction impact of 642,765 tones CO2 over a 15-year period. Given GEF funding of US$ $5,254,545 for this project, the avoided cost of emissions reductions is US$8.17/t CO_2, compared with a maximum unit abatement cost of around US$10/t$CO_2$ for GEF GHG emission reductions projects. This calculation is conservative as it excludes those indirect emission reductions from activities such as capacity building, institutional strengthening and public awareness campaigns which will also lead to meaningful reductions in GHG emissions. Hence, the actual cost-effectiveness of the whole project will likely be significantly better than $8.17/tCO2. Furthermore, it is acknowledged that there is an additional cost of doing business in the Pacific, due for example to low economies of scale, high transportation costs, etc, which mean that abatement costs in the region are likely to be significantly higher than benchmark measures in countries such as China and India. A cost effectiveness of the GEF contribution of US$ 8.17/ton CO_2 for the proposed project is therefore deemed acceptable.

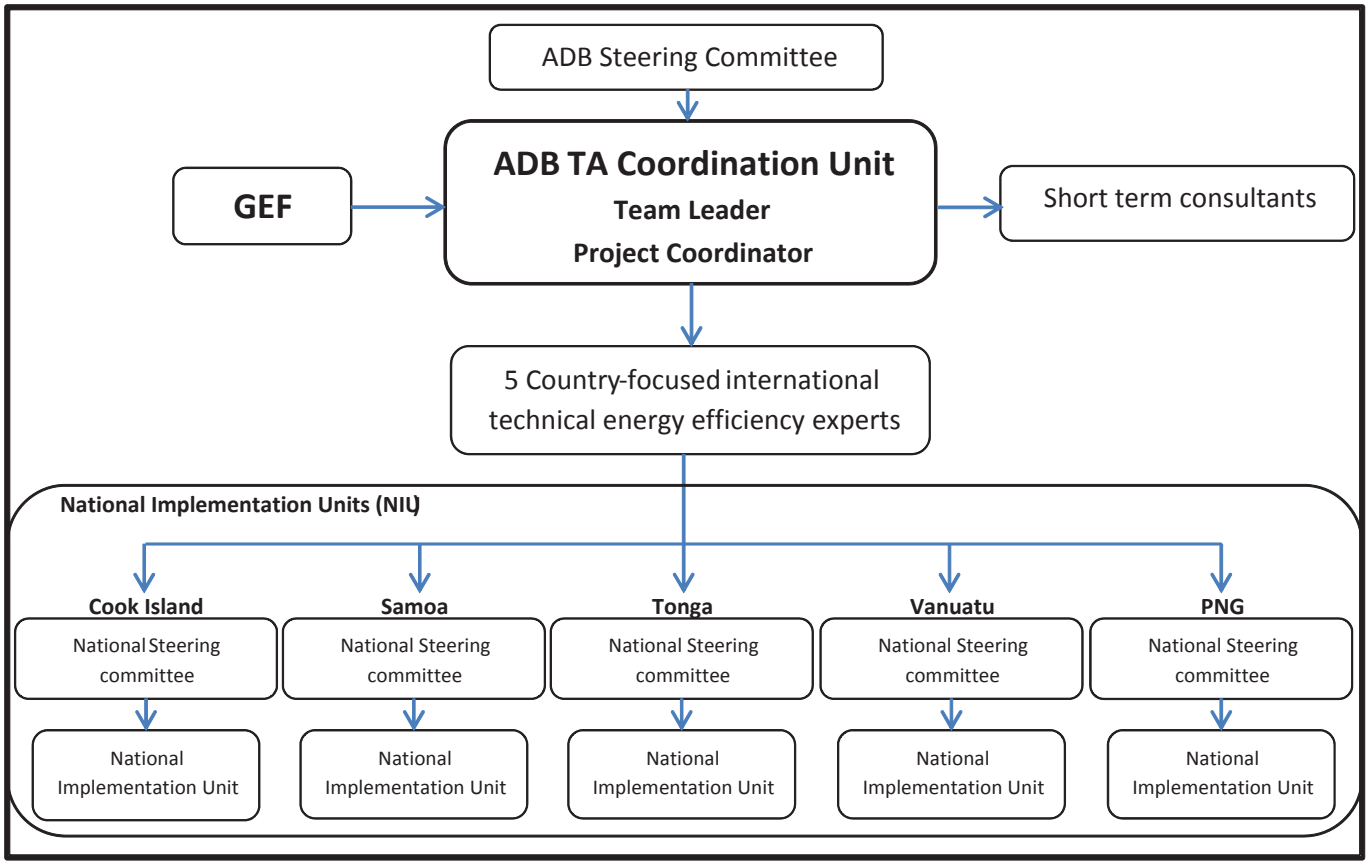
PART III: INSTITUTIONAL COORDINATION AND SUPPORT

A. INSTITUTIONAL ARRANGEMENTS: N/A

B. PROJECT IMPLEMENTATION ARRANGEMENTS:

ADB will be the Executing Agency (EA) for the project. ADB will recruit a Program Coordinator/TA Manager to undertake project management and a Team Leader/EE Technical Expert to provide the technical leadership for the

project on behalf of ADB's Pacific Area Regional Department (PARD). A local Implementing Agency (IA) will be appointed in each of the five participating countries as follows: (i) Cook Islands: Energy Department; (ii) Papua New Guinea: Energy Unit, Department of Petroleum and Energy; (iii) Samoa: Ministry of Natural Resources and Environment; (iv) Tonga: Tonga Energy Road Map Implementation Unit, Prime Ministers Department; and (v) Vanuatu: Energy Unit, Ministry of Lands and Natural Resources.



Steering Committees

An ADB Steering Committee (ADB-SC) will be established to provide overall co-ordination of the project at ADB between the ADB departments that can provide useful input to the project and PARD who will be responsible as the specific EA department. Other departments that will be invited to join the ADB-SC are Regional and Sustainable Development (RSID), South East Asia (SERD), Mekong, and South Asia (SARD), given the similarity of activities that will be undertaken by the project and previous projects undertaken by other ADB departments in other applicable Asian countries.

A National Steering Committee (N-SC) will be set up in each PDMC and will consist of high level representatives from relevant ministries, the GEF focal point, power utility(s) and ADB. It will be chaired by the IA. Representatives from other bilateral or multilateral programs and projects will be invited as appropriate according to their synergies and potential for cooperation with project implementation. The primary roles of the N-SCs will be: (i) to provide overall guidance to the implementation of the project in the applicable PDMC, and (ii) to ensure the necessary coordination among participating agencies and other organizations. In addition to (quarterly) progress meetings, the N-SCs will meet annually to monitor implementation progress and confirm the work plan for the subsequent year. Minutes of N-SC meetings will be agreed and signed by ADB and the IA. Where National Energy

Committees, or other projects with similar representation to the N-SC, already exist then as far as possible meetings will be integrated or held back-to-back to reduce travel costs and staff time from holding separate meetings.

ADB TA Coordination Unit (TCU) and National Implementation Units (NIUs)

ADB will create a TCU which will be responsible for the overall operational management and implementation of project activities. The TCU will manage day-to-day operations of the project, both for the project as a whole and also for each of the applicable five PDMCs. The TCU will comprise a full-time program coordinator responsible for overall coordination, budget, contracting and output measurement issues, and a half-time Team Leader/EE Technical Expert responsible for overall strategic, technical and implementation project matters. The TCU will be based in the Pacific region to facilitate effective project management and close co-ordination and sharing of information between countries. Project implementation will be closely co-ordinated with the Secretariat of the Pacific Community (lead agency for co-ordinating energy activities in the Pacific) and other development partners and the TCU will ensure that data and lessons learned are shared regularly amongst project stakeholders.

In each of the five applicable PDMCs, project activities will be led on a day-to-day basis by a National Implementation Unit (NIU), comprising a National Project Coordinator (NPC - reporting thorough an applicable PDMC Implementing Agency (IA) to the TCU), and a part-time international country-focussed energy efficiency technical expert (separately responsible to the TCU) who will provide technical and administrative back-stopping to ensure that PDMC project operations progress in a timely, technically sound and effective fashion.

A number of international experts will report to the TCU to lead specific project technical activities and to support the PDMC NIUs. A number of national experts and subcontractors will report to the NIUs to assist with project technical activities and to provide support. All international and national project consultants and experts will be recruited by ADB as per applicable ADB rules and regulations.

The TCU will prepare quarterly progress reports to review achievement in the previous quarter, prepare financial reports and develop work plans and budgets for next quarter. All these documents will be submitted to ADB for endorsement/approval. The TCU will also produce annual progress reports, which must be submitted to the project SC at least two weeks before the annual meeting. At the end of the project, the TCU will produce a terminal report, which will to be submitted to the SC at least two weeks before the final meeting.

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

The original PIF was based on the Project design in place during early 2008. Since that time, extensive additional preparatory work has taken place, funded in part by Promoting Energy Efficiency in the Pacific[26] (Phase I), together with GEF PPG resources. The project rationale and overall structure have changed little since the original PIF, however a number of sub-components have significantly evolved and ADB has provided a cover letter to the GEF CEO to explain the changes.

Specifically, the sub-component relating to Power Factor Correction (PFC) has been removed from the project framework and the scope of activities relating to energy efficient lighting and building energy improvements has been expanded. The inclusion of the PFC activity in the PIF was deemed to be an important initiative for the power utilities in Samoa and PNG and a preliminary assessment at the PIF stage had estimated that GHG savings of 17.9 kt CO2e/yr could be achieved. However, subsequent to PIF approval, more detailed preparatory work, funded by the GEF Project Preparation Grant, found that the technical basis used for these calculations had over-estimated the energy savings. Although PFC increases the efficiency of the electricity distribution network, it was found that it

[26] ADB. 2008. Regional TA-6485: *Promoting Energy Efficiency in the Pacific (PEEP), Phase I.* Manila.

does not significantly reduce the consumption or supply of electricity by the power generating plant as previously assumed. Expectations of the savings potential from this activity at the PIF stage have been recalculated and, based on GEF methodology, and further assessments at the PPG phase, have reduced to 0.9 kt CO2e/yr.

PPG analysis has indicated that GEF funds can be used to generate equally significant and highly cost-effective savings by expanding the scope of the other activities in the Project Framework, and hence the financial resources for the PFC activity have been reallocated to increase the scope of these energy efficiency measures. The scope of the residential lighting activity will be increased from pilot-scale activities to a holistic model of lighting energy efficiency improvement across all the participating countries. Similarly the scope of the non-residential and public building components has been widened from hotels, to include other important non-residential buildings in the religious and social sectors and to include follow up of energy audits with investments in equipment retrofits. This holistic approach will produce cost-effective GHG savings of 30.7 kt CO2e/yr at a cost of $8.17/tCO2e. For illustrative purposes, a table illustrating the impact of the changes made since the PIF endorsement on the project's GHG savings is presented below.

Impact of changes made since PIF stage on GHG savings

	tCO2e/yr	**tCO2e/yr**
Total GHG savings at PIF stage		**26.2**
Changes made during PPG stage		
1. Remove PFC project	(17.9)	
2. Introduce MEPS activity	11.8	
3. Expand other activities		
3.1 Street Lighting	0.4	
3.2 Residential CFL	4.0	
3.3 EE in hotel sector	3.5	
3.4 EE in public building sector	2.7	
Subtotal of changes made		**4.5**
Total GHG savings at Endorsement stage		**30.7**

A new Component 1 has also been added to the Project Framework to establish a comprehensive database of energy use by sector and appliance type in each participating country. During the preparatory work it became very clear that availability and reliability of energy data is a significant constraint in the region. Although significant survey work was carried out during the preparatory phase, the requirement to create a reliable and comprehensive database for energy end-use in each country was sufficient to justify the creation of a new project component. A small proportion of funding under Component 1 will be used to extend the data collection and sample sizes in several of the countries, however the majority will be used to design and implement a new end-use energy database in each of the countries. Funds will be used to train and build the capacity of the local government energy units in maintaining the database and keeping it up to date with relevant and accurate information so as to ensure that the provision of reliable data is sustainable in the medium to long-term.

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
Bruce Dunn Asian Development Bank		January 5, 2011	Robert Kesterton Energy Specialist	+632 632 4530	rkesterton@adb.org

ANNEX A: PROJECT RESULTS FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
Impact Reduction in fossil fuel use by the power sector without a corresponding reduction in energy services in the participating countries	**By end 2018:** Reduction in fossil fuel imports used for power generation by 10% relative to 2008 baseline of 135 million liters per year Total energy savings from the power sector of the participating countries of 45,000 MWh per year GHG emission reductions from the power sector of the participating countries of 30,000 tCO2e per year	Annual national statistics and economic publications Power utility annual reports Surveys of monthly power bills and utility billing system	**Assumptions** • Stable macroeconomic conditions in the participating countries • Technology mix for power generation remains stable • Strong commitment from PDMC governments • Strong stakeholder support from public and private sector **Risks** • Insufficient capacity in IA to sustain EE initiatives over time • Governments slow to implement effective regulation • Lack of data and difficulty in establishing accurate baseline
Outcome End consumers use power efficiently in the participating countries	**By 31 March 2015:** Average monthly power consumption by residential customers reduced by 10% relative to baseline of 125 kWh/month Average monthly power consumption by commercial customers reduced by 10% Average monthly power consumption by public buildings reduced by 10%	National budget reports & statistical publications National EE roadmap implementation progress reports Power utility reports Surveys of monthly power bills and utility billing system	**Assumptions** • Rational power pricing is sustained and enhanced • Affordable EE equipment and appliances are available in the local market • Private sector is willing to invest in EE **Risks** • Low enforcement capacity • Few local partners participate • Energy inefficient appliances continue to be imported from overseas and sold locally
Outputs 1. Stakeholders have access to comprehensive information on energy use by sector and appliance	**By 31 March 2013:** Comprehensive database of major energy consuming equipment and appliances exists in each participating country	Appliance, equipment and awareness survey Customs and Excise import data records National census data Statistical data generated by sector and household surveys	**Assumptions** • Strong commitment and willingness of government to participate in the initiative and to establish effective regulation • Adequate human and financial resources are made available • Close coordination with other development partners • Necessary local skills are available to supervise and implement initiatives • Strong involvement from power utilities and private sector stakeholders

2. EE practices have been mainstreamed into government processes, procedures and policies in the participating countries	**By 31 March 2013:** National EE targets incorporated into national energy policies Schemes to reduce importation of low EE equipment and appliances adopted in the 4 countries EE building codes for residential, commercial & public buildings established	National energy policy documents and government policy decisions National legislative documents National building codes and regulations Syllabus of EE courses developed and given to the private sector and local technical institutes	• Capacity within government to enforce EE reforms **Risks** • Reforms are delayed by legislative process • Political support is weak • Elections bring new government(s) with different priorities • Counterpart funding gap • Lack of energy audit and associated EE service capacity • The process of providing subsidies and/or grants for EE initiatives is subject to manipulation or corruption by local stakeholders
3. EE programs implemented effectively and sustainably in each participating country	**By 31 March 2015:** 50% of all public street lighting upgraded using LED or HPS technology All incandescent bulbs installed in the residential lighting sector replaced with CFLs Reduction in monthly energy consumption of major public and commercial buildings by 10%	Project managing contractor reports Economic analysis reports (demand, least-cost, benefit) of individual EE programs Annual household appliance surveys Power utility reports Global Environment Facility mid-term review report	
4. Information on EE has been shared and public awareness of the benefits of energy saving has improved	**By 31 March 2015:** At least 50% of population aware of EE initiative and benefits of energy conservation	Public awareness survey data and published materials Regional workshops presentations and attendees list	
5. Effective project management has been established	**By 31 March 2015:** Program of activities implemented on time and to budget	Minutes of Steering Committee Global Environment Facility mid-term review report Annual work plans and quarterly progress reports	
Activities with Milestones 1.1. Carry out detailed survey of energy consumption, duration of use, and life expectancy for each major energy consuming equipment and appliance type by Feb 2012 1.2. Establish a database of energy use by sector for major equipment and appliance			**Inputs** • ADB: $1,000,000 • Governments: $1,797,000 • Global Environment Facility:

types in each country by end Apr 2012 1.3. Hold raining on database development and management in each country by Apr 2012 1.4. Ensure the database is sufficiently robust to assist with determining energy baselines by Oct 2012 1.5. Build survey capacity and ensure database and survey data is updated and kept relevant by Apr 2013 2.1. Initial drafts of EE policies and targets prepared by Oct 2012 2.2. Initial drafts of appliance EE schemes, EE components of building codes, and EE fiscal legislation prepared by Oct 2012 2.3. Implementation and enforcement of appliance EE schemes from Apr 2013 2.4. Implementation and enforcement of EE in building codes from Apr 2013 2.5. Preparation and establishment of a training program for energy auditors and EE specialists in each country by Oct 2012 2.6. Enabling legislation regarding EE passed by governments and enacted by Apr 2013 3.1. Preliminary design of national scale EE programs (residential EE lighting; street lighting; commercial/public building sector) in each country by Apr 2012 3.2. Finalization of EE bidding documents by Jul 2012 3.3. Tendering and evaluation of EE bids by Oct 2012 3.4. Finalization of procurement, shipment, and inspection of EE lighting products by Apr 2013 3.5. Roll-out of energy efficient lamps and installation between Apr 2013 and Apr 2014 3.6. Energy audits performed on major public and commercial buildings by Apr 2013 3.7. Agreement with building owners and implementation of recommendations from energy audits between Apr 2013 and Apr 2015 3.8. Assessment of eligibility of EE programs and activities for CDM by Apr 2013 4.1. Launch of public awareness campaign by Apr 2012 4.2. Information dissemination and advertising in local media between Apr 2012 and Apr 2013 4.3. Development of ICT program to facilitate regional workshops to exchange information on EE best-practice and lessons learned between countries by Apr 2013 4.4. Conduct regional workshops for results dissemination and to share project benefits with all PDMCs 5.1. Establishment of Steering Committee with representatives from ADB and a regional entity from the Pacific by Apr 2011 5.2. International team leader/technical expert and national program coordinator appointed by Jul 2011 5.3. International advisor and national energy efficiency manager appointed in each country by Oct 2011 5.4. Program management and administrations systems established and functioning by Oct 2011 5.5. Review background material (TA-6485, government statistics, and power utility records to build a picture of energy consumption by sector by Oct 2011 5.6. Inception workshop held in each country by Feb 2012 5.7. Establishment of an energy efficiency function within all 4 IAs and training program for personnel devised by Apr 2012 5.8. Develop an “ideal” scenario for each country and perform a gap analysis to identify the necessary steps required by Apr 2012 5.9. Annual work plans and quarterly progress reports provided on time 5.10. Annual reviews of performance and agreements for managerial changes 5.11. TA completion report prepared by Apr 2015	$5,254,545 • Government of Australia: $1,000,000 • Government of Japan: $1,500,000 • Power utilities: $1,620,000 • 196.5 person-months of international consulting services and 313 months of national consulting services from individual consultants directly engaged by ADB

CFL = Compact Fluorescent Lamp; EE = Energy Efficiency; GEF = Global Environment Facility; GHG = Greenhouse Gas; HPS = High-Pressure Sodium; LED = Light-Emitting Diode; MEPS = Minimum Energy Performance Standard; PDMC = Pacific Developing Member Country; USP = University of the South Pacific

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)

A) STAP COMMENTS

STAP Comment(1): The PIF identified five specific EE programs for support. Neither of these programs supports directly renewable energy sources. At least at the feasibility level, STAP recommends conducting analysis of different renewable energy technologies and barriers for their penetration. The project's support for EE enabling environment should include promotion of renewable energy technologies.

ADB response: Many efforts are already being made within the PDMCs to promote renewable energy but energy efficiency efforts have been limited, hence this project's main focus is on energy efficiency and not renewable energy. Still, this project will promote renewable energy where it has been found that existing RE efforts have been lacking, in particular by promoting solar water heater within components 2 and 3. Activities related to energy efficiency in buildings will promote solar water heater where applicable and solar water heater will be taken into account for the suppression of high energy consumption equipment (output 2.2) and the inclusion of energy efficiency in applicable building codes. Please also refer to the GEF Council comment below from Australia which highlights the significant range of activities in the Pacific relating to RE and which advocates for this project to concentrate on EE.

STAP Comment(2): Furthermore, STAP recommends conducting a baseline assessment of energy needs in different sectors of the economy, develop cost-effective mitigation scenarios, explore mitigation/adaptation synergies and develop solutions that are not only beneficial for provision of clean energy, but also benefit other environmental services such as clean water, sustainable waste management, integrated coastal management, and sustainable land management. This project is submitted as a part of the GEF Pacific Alliance for Sustainability (PAS) Programmatic Approach. Without strong integration between this project and other complementary PAS initiatives, the large potential benefits of PAS will not be materialized.

ADB response: Considerable baseline assessment of energy needs in PDMCs has already been undertaken by UNDP over many years. The energy efficiency potential in PDMCs and its link to GHG reductions is clear and sufficiently unambiguous that interventions do not need to wait for the results of further analyses. Energy efficiency measures are generally available through discrete interventions which do not require deep programmatic integration with other environmental objectives to be justifiable and/or effective. The project will coordinate with other environmental objectives and interventions (e.g. appliance water efficiency labeling) as far as possible, but this integration can be undertaken during implementation and does not necessitate costly and time consuming analysis before the project start.

STAP Comment(3): Emphasis on five EE programs in terms of their GHG mitigation potential, cost-effectiveness, return on investment and other factors is not explained. STAP expects systemic analysis of energy technologies for support at the project document submission phase.

ADB response: The emphasis on five specific outputs for the project GHG saving potential is made because they are the one resulting in direct GHG reduction. A more detailed explanation has been provided within this document in Part II section A. In addition, this document also presents indirect GHG emission savings, which will occur outside the project's scope but under its influence.

STAP Comment(4): The project concept is lacking a description of the baseline scenario.

ADB response: Description of baseline scenario has been added in Part II section F.

STAP Comment(5): STAP recommends considering climate risks as a part of project risk management strategy.

ADB response: Climate risks will be considered during relevant project implementation activities, e.g. the impact of extreme climate events on building external shading elements and on solar water heaters.

B) GEF COUNCIL COMMENTS

Australia Comment (1): General comments – Donor coordination, alignment with Pacific Island government energy policies and plans, and using harmonized programmatic approaches wherever possible is essential to reduce transaction costs and administration burdens for Pacific island countries. It is pleasing to see that for the most part the PIFs for the three proposed projects outline how they link with existing energy activities in the Pacific region. The existing Energizing the Pacific coordination mechanism (separate to the project proposed in this work program) brings together many development partners and regional organisations active in the Pacific energy sector. Partners meet quarterly to discuss Pacific energy issues and provide updates on active and future activities. This provides a valuable platform for development partners to discuss alignment of specific energy activities for better outcomes. A key early outcome has been an agreement to undertake joint donor missions where practicable, thus reducing the burden on PICs. AusAID would urge any energy program undertaken in the Pacific to link with this coordination work. Recommendation – To ensure greater and continued alignment we encourage partners in the Promoting Energy Efficiency in the Pacific and Low-Carbon Energy Islands projects to establish direct links with the Energizing the Pacific coordination mechanism that has already been put in place.

ADB response: ADB is an active member of the *Energizing the Pacific* initiative and regularly attends its meetings. Development partners are fully aware of the PEEP initiative and this mechanism has been used to involve stakeholders in the preparation of the initiative through presentations and regular updates at meetings. It is anticipated that *Energizing the Pacific* will continue to be an important forum for consultation during project implementation phase. Other forums for regular co-ordination have also included the Tonga Energy Roadmap (TERM) and the Pacific Islands Regional Energy Policy for Action (PREPA) and its subsequent Framework for Action on Energy Security in the Pacific (FAESP) that is currently under development, both of which have drawn the attention of development partners and stakeholders to this EE initiative. This project will coordinate with the FAESP and also with the Energy Development Partners Working Group (EDPWG) and these issues are addressed above in sections B and E of the CEO Endorsement Documentation.

Australia Comment (1): Australia is supporting this project through its contribution to the ADB's multi-donor Clean Energy Fund. The ADB has already presented this project at the Energizing the Pacific donor coordination group to ensure its design complements and builds upon other work in the Pacific region. The energy efficiency measures promoted in this project, such as efficient street lighting, building codes and appliance standards, present a good opportunity to reduce the consumption of electricity in the Pacific, which is almost exclusively produced by diesel generators from fuel imports. The potential benefits from these measures include: reduced greenhouse gas emissions; more affordable electricity for households, business and government; and improved resilience to the volatile international oil market. Recommendation – We would be interested in clarification from the STAP on its recommendation that an analysis on renewable energy technologies be conducted as part of this project. Besides being beyond the scope of this project, such analysis could duplicate work already underway, including by the ADB as part of its Promoting Renewable Energy in the Pacific project, which is also supported by Australia through the Clean Energy Fund.

ADB response: ADB thanks the Government of Australia for its support to this project through the multi-donor Clean Energy Fund. ADB strongly supports the view of Australia that there are a significant number of other initiatives which are already providing support for RE in the Pacific. To list a few, these

include, but are not limited to, support from PIGGAREP, JICA, EU Energy Facility, REEEP, SPC, as well as the Regional Technical Assistance for Promoting Access to Renewable Energy in the Pacific, which is being funded by the multi-donor Clean Energy Fund. ADB's response to the STAP comment is provided above and reiterates the risk of duplicating work in this area if RE is included as a significant project component. However, the project deliberately includes activities to support solar water heater applications as it does not seem that this very useful RE technology is being supported to any significant extent by other existing RE projects.

France Comment (1): The project aims at reducing Greenhouse Gas Emissions and improving Energy Security through Energy Efficiency and Conservation. The project has a standard but efficient approach.

ADB response: No response is required.

C) GEF SECRETARIAT COMMENTS ON FIRST SUBMISSION (27 OCTOBER 2010)

Question 6. Is the proposed GEF Grant (including the Agency fee) within the resources available for the RAF allocation?

Secretariat comment (1): GEF grant request for each country was changed. Please provide the reasons for it. Vanuatu is going to utilize more than $3,300,000 in total. Please adjust the request so that the request will be within the limit.

ADB response: The GEF grant request for each country is now exactly the same as at the PIF stage, with an equal allocation to each participating country. ADB understands that an assessment of available RAF allocation is made by GEF at the PIF stage, hence it is assumed that the request does not exceed the RAF allocation for each country.

Question 8. Is the global environmental benefit measurable?

Secretariat comment (2): It is explained that the project will result in 0.667 million tCO2 reduction (0.477 million from direct savings and 0.19 million from indirect savings). But sufficient explanations are not provided on its assumptions etc., including its baseline. Please explain how it was estimated more in detail. In addition, the estimation of the expected CO2 emission reduction of each specific intervention was significantly increased from the PIF stage (residential lighting 2 -> 6.3, non-residential building 2 ->5.5, public building 1.9 -> 10.6[27]) while the total budget was significantly reduced. Please explain why. (What are the differences in the assumptions in the calculations).

ADB response: At the PIF stage, energy and CO2 savings estimates were necessarily based on a range of initial technology deployment and savings assumptions, since all the necessary data had not yet been collected. Detailed emission reduction potentials have now been calculated and described as part of the ADB regional TA-6485: Promoting Energy Efficiency in the Pacific. In particular, the GEF-funded PPG grant of $200,000 allowed a significantly more detailed analysis of the full scale project energy efficiency potentials than the earlier ADB project which was more focussed on policy work and on identifying and implementing specific pilot projects. A summary of the methodology and assumptions used to calculate the energy and CO2 savings is now presented in Annex F.

[27] Actual number is 4.6 ktCO2e not 10.6 ktCO2e as calculated by GEF. Benefit from activity has increased by a factor of approximately 2.5.

Specifically, more detailed preparatory work to assess the Power Factor Correction (PFC) activity as presented in the PIF has led to a revision in the calculation of the energy savings associated with that activity. As explained in Part IV, and in the cover note to explain the revisions, the PFC activity was estimated to produce a GHG savings of 17.9 kt CO2e/yr. However, more detailed preparatory work, funded by the GEF Project Preparation Grant, found that while PFC increases the efficiency of the electricity distribution network, it will not significantly reduce the consumption or supply of electricity by the power generating plant as indicated by the preliminary assessment. Expectations of the savings potential from this activity have been recalculated and, based on further assessments at the PPG phase, have reduced to 0.9 kt CO2e/yr.

PPG analysis has indicated that GEF funds can be used to generate equally significant and highly cost-effective savings by expanding the scope of the other activities in the Project Framework, and hence the financial resources for the PFC activity have been reallocated to increase the scope of these energy efficiency measures. Consequently, calculations of emission reductions from these activities have increased by the amounts noted in the Secretariat's comment above. For example, the scope of the residential lighting activity has been increased from the pilot CFL distribution model implemented in a short period of time in the Cook Islands, to a holistic model of lighting energy efficiency improvement across all the PDMCs. Similarly the scope of the non-residential and public building components has been widened from hotels, to include other important non-residential buildings in the commercial and social sectors and to include follow up of energy audits with investments in equipment retrofits. This holistic approach will be more cost-effective and unlock greater EE gains, but will take longer to implement, hence the implementation period has been increased from 2.5 to 4 years.

Question 9. Is the project design sound, its framework consistent & sufficiently clear (in particular for the outputs)?

Secretariat comment (3): Now some components become less concrete than the PIF stage. For example, while Hotel sector was specifically mentioned at the PIF stage, the CEO endorsement document just refers to non-residential private buildings." Please explain why it happened.

ADB response: As discussed in the response to comment 2, the change in this activity from hotel sector to non-residential buildings has been made to broaden the activity so as to allow for the inclusion of new building categories found to be important during the PPG stage. In particular, a significant opportunity was found to exist in the religious and social building sectors. Significant energy saving potentials were observed in these categories during the PPG work, and it was deemed important to include other types of buildings with cost-effective efficiency potentials. To clarify this change, the title of the sub-component has been changed to "Energy audits and equipment retrofits in hotels and other non-residential private buildings".

Secretariat comment (4): Please explain exactly what will be done by Component 1 to establish the database. In particular its relation to the PPG activities and pilot projects already undertaken needs to be clarified. What would be the added value of this exercise?

ADB response: Component 1 has been added to the Project Framework to establish a comprehensive database of energy use by sector and appliance type in each participating country. During the preparatory work it became very clear that availability and reliability of energy data is a significant constraint to development in the region and the requirement to create a reliable and comprehensive database for energy end-use in each country was deemed sufficient to justify the creation of a new project component. This finding is mirrored by the recently published Framework for Action on Energy Security in the Pacific

(FAESP)[28] which highlights the importance of strengthening national capacity for collection and analysis of energy data and information.

Significant survey work has been carried out under the preceding ADB TA (RETA-6485) and the GEF PPG, and this has been used to calculate baseline end-use energy data, critical to the design of this project. A small proportion of funding under Component 1 will be used to extend the data collection and sample sizes gathered during project preparation in several of the countries, however the majority will be used to design and implement a new end-use energy database in each of the countries. Funds will be used to train and build the capacity of the local government energy units in maintaining the database and keeping it up to date with relevant and accurate information so as to ensure that the provision of reliable data is sustainable in the medium to long-term. To further ensure sustainability, it has been agreed that the databases will be hosted by government departments who will contribute co-financing to the activity during the project and over the longer term after completion of the project. Regional bodies such as the Secretariat of the Pacific Community (SPC) and the Pacific Infrastructure Advisory Center (PIAC) have highlighted the importance of these initiatives and have indicated possible funding sources to ensure sustainability post-project completion.

Secretariat comment (5): One of the key components for investment at the PIF stage (power factor correction) was removed at this stage. And that was because "PFC efforts would free up some network capacity and lower line losses, but the impact on electricity generation would be minimal, and nearly the same amount of fuel would still be consumed." However at the PIF stage, this intervention consists almost 70% of energy savings of this project. Please explain why such a big difference could have happened.

ADB response: The inclusion of PFC was based on a preliminary assessment conducted at the time of PIF preparation. At that time, the potential for PFC was deemed important to the power utilities in Samoa and PNG and the TA consultants calculated that the activity would contribute emission reductions of 17.9 ktCO2e/yr. More detailed preparatory work, funded by the GEF PPG, found that, although PFC increases the efficiency of the electricity distribution network, it does not significantly reduce the consumption or supply of electricity by the power generating plant as previously assumed. Expectations of the savings potential from this activity at the PIF stage have been recalculated and, based on GEF methodology, and further assessments at the PPG phase, have reduced to 0.9 kt CO2e/yr.

PPG analysis has however indicated that GEF funds can be used to generate equally significant and highly cost-effective savings by expanding the scope of the other activities in the Project Framework, and hence the financial resources for the PFC activity have been reallocated to increase the scope of these energy efficiency measures. The scope of the residential lighting activity will be increased from pilot-scale activities to a holistic model of lighting energy efficiency improvement across all the participating countries. Similarly the scope of the non-residential and public building components has been widened from hotels, to also include other important non-residential buildings in the commercial and social sectors and to include follow up of energy audits with investments in equipment retrofits. This holistic approach will produce cost-effective GHG savings of 30.7 kt CO2e/yr at a cost of $8.17/tCO2e.

Secretariat comment (6): Instead, the most significant CO2 savings are expected from the newly planned activity, suppression of high energy consumption appliances. It is questionable that such a big new potential emerged as it will depend on behavioural change of the people and it was not identified at the PIF stage even after the careful investigations of all the potentials by the ADB. Please explain.

ADB response: As discussed in the response to Secretariat comment 2, most of the PFC resources have been utilized by expanding the scope of the residential CFL and energy audits and retrofits in the non-

[28] Secretariat of the Pacific Community. 2010. *Towards an Energy Secure Pacific. A Framework for Action on Energy Security in the Pacific*. Suva, Fiji.

residential and public building sectors. The financing allocation for Component 2 of $1.8 million (equivalent to Component 1 in the PIF) is broadly comparable with the allocation at the PIF stage.

The suppression of high energy consumption appliances through the implementation of Minimum Energy Performance Standards (MEPS) will reduce energy consumption through regulating the import of high energy consuming appliances, rather than by relying on any behavioural change on the part of the user. ADB considers this to be a critical, and extremely cost-effective, component of any comprehensive demand-side energy efficiency initiative. However, inclusion of the activity at the PIF stage was not possible because key information on major energy using appliances and equipment and energy consumption data had not been fully gathered or analysed for the participating PDMCs. Although significant potentials were identified in principle, the lack of detailed data and analyses to back-up the findings meant that inclusion in the PIF was not possible. Moreover, since PIF approval, an important study[29] developed for Pacific countries by the government agency responsible for the implementation of the MEPS scheme in Australia has been published and highlights the significant energy-saving potentials to be generated from MEPS schemes in the Pacific. Data gathered by consultants working on the preparation of this project has confirmed the importance of this activity and, as such, have been included in this CEO endorsement request. The savings calculated for this activity will come from enforcement of minimum energy standards for imported refrigerators, freezers and air-conditioners.

Secretariat comment (7): This is a big change of project design and a cover note to summarize the major revisions should be provided in accordance with the GEF rules and procedures.

ADB response: A cover note has been prepared to explain the removal of the PFC activity from the Project Framework and has been submitted to GEF with this re-submission. ADB believes that the other project modifications do not constitute a major change in scope. Rather, they are of the kind expected as the project design is improved and tightened and informed by more extensive and better quality data. Since the PIF stage, additional project preparatory activities have been undertaken, funded in tandem by ADB RETA-6485 and the GEF-funded PPG. These have permitted the collection of additional data, performance of additional surveys, and implementation of additional pilot projects. ADB believes that the project is now better designed and better able to implement significant improvements across the spectrum of demand-side energy efficiency opportunities in the five participating countries.

Secretariat comment (8): The arrangement for the regional coordination looks not sufficient. It looks there will be no opportunities for the countries to sit together and discuss. Please clarify.

ADB response: Steps have been taken to allow for significant co-ordination between countries and it is anticipated that lessons will be shared and synergies will be developed across the wider region. Component 4 specifically includes an activity to share information on EE best-practices and lessons learned between countries and stakeholders through regular regional meetings and workshops. As illustrated in Part III, the project implementation arrangements will allow for significant sharing of information between countries. The project has also been designed in close co-ordination with development partners and regional organizations in the Pacific and this close association will be continued during implementation. In particular, the implementation will be closely co-ordinated with the Secretariat of the Pacific Community which was nominated in 2009 as the lead agency responsible for co-ordinating energy activities in the Pacific and which has been responsible for developing the recently published Framework for Action on Energy Security in the Pacific (FAESP).

Secretariat comment (9): It also needs to explain how the PPG was spent.

[29] G. Wilkenfeld, June 2010, *The Costs and Benefits of Electrical Appliance Energy Labelling and Minimum Energy Performance Standards for Pacific Island Countries*. Prepared for the Department of Climate Change and Energy Efficiency. Government of Australia.

ADB response: Spending by PPG activity is detailed in Appendix D.

Question 13. Has the cost-effectiveness sufficiently been demonstrated in project design?

Secretariat comment (10): Not sufficient. Please see the comments on item 8 (referring to Secretariat comment 2 above).

ADB response: Justification of the global environmental benefit has now been provided in the response to Secretariat comment (2) above. Also, cost-effectiveness of the project has been calculated and is presented in Section H of the CEO Endorsement Document. This demonstrates that the avoided cost of GHG emissions is equal to $8.17/tCO2e, which is deemed to be highly cost-effective in the context of the Pacific region. Thus project cost-effectiveness is demonstrated.

Question 14. Is the project structure sufficiently close to what was presented at PIF?

Secretariat comment (11): No. Please see the comments on item 9 (referring to comment 3 to 9).

ADB response: This has been addressed in the ADB response to Secretariat comments 3 to 8 above and a cover letter has been submitted to explain the changes resulting from the removal of the PFC activity. Also, Part IV has been updated with a full explanation of the alignment of the project design with the original PIF.

Question 19. Is the GEF funding level of project management budget appropriate?

Secretariat comment (12): Further comments needed (see comments on item 22).

ADB response: ADB has addressed comments on item 22 (question 22) below and believes the level of funding for project management to be appropriate for the planned activities. Please clarify further if additional information or changes are required.

Question 20. Is the GEF funding level of other cost items (consultants, travel, etc.) appropriate?

Secretariat comment (13): Further comments needed (see comments on item 22).

ADB response: ADB has addressed comments on item 22 (question 22) below and believes the level of funding for other cost items to be appropriate for the planned activities. Please clarify further if additional information or changes are required.

Question 22. Are the confirmed co-financing amounts adequate for each project component?

Secretariat comment (14): The total amount of cofinancing was significantly reduced from the PIF stage ($10.6 million to $4 million) with some key components removed. Then as the whole scale of intervention was compressed, the GEF financing request should be reduced in the comparable manner.

ADB response: Additional cofinancing has been confirmed since submission of the CEO Endorsement Request and has been included in the updated version of the confirmed cofinancing table. The total

cofinancing amount now totals $9.4 million. ADB believes this is sufficiently close to the $10.6 million presented in the PIF to justify maintaining the GEF financing request at the current level. Leveraging of cofinancing in the Pacific above a ratio of about 1:1 is considered to be good, especially in the context of the significant development constraints, low capacity and lack of participation by the private sector in the region. This project has significantly exceeded this ratio, and cofinancing of $9.4 million represents a leverage ratio of approximately 1:1.8. Even if the $2.5 million from building owners is discounted, the resulting leverage ratio of 1:1.3 is still significantly better than the Pacific benchmark of 1:1. Although the PFC activity has been removed, it is critical to the success of the project that the GEF funding level is maintained. This will ensure the cost-effective activities envisaged under Component 3 will be able to be fully implemented and is especially critical in the Pacific where the countries involved are small, where inter-island travel costs are high, and where local capacities are weak.

Secretariat comment (15): All the cofinancing planned in cash at the PIF stage was removed except from ADB. That is not acceptable. Although the explanations for the difficulty to secure cofinancing letter from private sector were provided, it sounds there is no guarantee for the success of this project. At least some concrete evidence (the record of the meetings etc.) should be provided that such investment from private sector will happen.

ADB response: In terms of co-financing, only the contributions of $1.797 million from National Governments relates to in-kind financing. In addition to $5.25 million in GEF funding, cash cofinancing is being provided from a number of sources as follows: (i) $1 million from ADB TASF-IV; (ii) $1 million from Government of Australia through the Pacific Region Infrastructure Facility (PRIF); and (iii) $1.5 million from Government of Japan through the Asia Clean Energy Fund. Contributions of $1.62 million from power utilities have also been confirmed through signed letters of support and will be in the form of concrete financial investments in EE equipment such as LED streetlights, CFL lamps, and energy audits, as well as providing in-kind services such as equipment installation and maintenance and public awareness campaigns. As explained in the footnote to table B, cash contributions of at least $2.5 million will also be leveraged from building owners to pay for EE equipment retrofits that are recommended by the energy audits. During the preparatory stage, meetings were held with Chambers of Commerce, Hotel Associations, Industry Groups, however, individual letters of support cannot be obtained until the energy audits are implemented.

Secretariat comment (16): Why cofinancing from power utilities was reduced into 1/3 and changed from cash to in-kind?

ADB response: Cofinancing from power utilities is equal to $1.6 million, compared to $2.7 million at the PIF stage. The reduction is the result of eliminating the PFC activity as outlined in the response to Secretariat comment 2 above. Contributions from the power utilities have been confirmed through signed letters of support and will be in the form of cash payments for EE equipment such as LED streetlights, CFL lamps, and energy audits, as well as providing in-kind services such as equipment installation and maintenance and public awareness campaigns. The type of cofinancing has been reclassified to reflect a mix of in-kind and cash contributions in table B so as to more accurately and reflect what is expected from the utilities.

Secretariat comment (17): Even for the remaining cofinancing, letters of commitment from Cook Island, Tonga, Vanuatu, state-owned power utilities, and ADB are missing. Please provide these letters.

ADB response: All letters of cofinancing have been provided in the latest submission. $1 million in ADB TASF funding has been allocated to the project and will be made approved upon clearance by GEF.

D) GEF SECRETARIAT COMMENTS ON SECOND SUBMISSION (15 DECEMBER 2010)

Question 6. Is the proposed GEF Grant (including the Agency fee) within the resources available for the RAF allocation?

Secretariat comment (1): RAF Allocation: GEF grant request for each country was changed again. But yet total GEF financing for Vanuatu projects including this project is beyond the limit. Please revise budget for this project into $1,156,000 or confirm with the OFP that budget for other projects will be reduced.

ADB response: In the second submission, dated 1 December 2010, the GEF grant request was changed back to be consistent with the original country allocation in the approved PIF, i.e. GEF resources were split equally between each participating country. This was on the assumption that the budgeted amounts did not exceed the RAF Allocation for any country since they had been approved by the GEF at the time of PIF approval. Given confirmation by the GEF Secretariat that Vanuatu has existing headroom under the RAF Allocation of only $1,156,000, the budget for this country has been reduced accordingly and the balance has been spread evenly across the other participating countries. Non-GEF sources of co-financing will be used to ensure that Vanuatu receives the necessary overall level of funding as originally anticipated.

Question 9. Is the project design sound, its framework consistent & sufficiently clear (in particular for the outputs)?

Secretariat comment (2): Component 3.2 was once again changed. Now it says "replace all incandescent bulbs installed in the residential lighting sector with CFLs." Please explain and confirm that GEF financing will be used only "incremental" cost for GHG emission reduction.

ADB response: During the project preparation stage, detailed baseline surveys were undertaken to confirm the average number of incandescent bulbs installed per household. These surveys revealed a relatively smaller number of lighting fixtures per household and a significantly higher proportion of lighting demand being provided by fluorescent tubes and halogen lamps than had been assumed at the PIF stage. As a consequence the baseline number of incandescent bulbs installed across the five participating countries is now assessed as being slightly less than an average of two per household. Since the new CEO Endorsement target of replacing all incandescent bulbs is lower (more conservative) than supplying two incandescent bulbs to each household at the PIF stage, component 3.2 was reworded to reflect the fact that all incandescent bulbs are now proposed to be replaced.

Replacement of all incandescent bulbs is deemed an appropriate measure for the project to undertake because, despite the very high power tariffs and general awareness campaigns previously undertaken in the Pacific, very low penetrations (<10%) of CFLs continue to be recorded. The reputation of CFLs has been damaged by the uncontrolled importation of often inferior quality CFLs (particularly short life and low voltage variation tolerance) and consumer confidence in CFLs needs to be rebuilt by the project supporting the importation and distribution of high quality CFLs widely throughout the community. Furthermore, this project will be critical in establishing a realistic and sustainable reference price for CFLs. The replacement of all CFLs through bulk procurement will rationalize importation channels and create sustainable competitive pressures required for the creation of an affordable and post-project sustainable CFL benchmark retail price in the five participating countries.

This approach has already been trialed and proven to be successful in the Cook Islands in the ADB funded PEEP-Stage 1 project where a pilot project carried out the replacement of incandescent lamps on the main island of Rarotonga. In Rarotonga the CFL market has been transformed to a point where the new standard CFL is one that substantially exceeds Efficient Lighting Initiative (ELI) technical requirements.

Post implementation, the price of higher than ELI specification CFLs on Rarotonga has remained at a lower than pre-project cost (for low quality CFLs) and few incandescent lamps are now being sold. In isolation, a policy led ban on incandescents is not deemed to be a viable option in the Pacific as there are multiple established importation routes for lighting products and enforcement capacity is also currently weak. A market transformation approach is therefore favored over a policy-led approach to energy efficient lighting in the Pacific.

ADB confirms that GEF financial resources will only be used to pay for the incremental cost of CFL bulbs over and above the cost of a standard incandescent bulb. Hence GEF financing will only be used to pay for the "incremental" cost of GHG emission reductions. The remainder of the cost will be paid for using ADB and other co-financing resources. The cost of distributing and replacing the lamps will be borne by the power utility in each of the participating countries.

Secretariat comment (3): Please explain exactly how many bulbs are planned to be replaced with how much compared with these numbers of the same component in the PIF.

ADB response: The following table illustrates the characteristics of component 3.2 as envisaged at the PIF stage and now, at the CEO Endorsement stage. At the PIF stage the program was limited in envisaged scope to less than a quarter of all households in the participating countries. In the absence of complete household survey data, it was assumed that only 30,000 households would be covered by the program. Energy savings were estimated based on the initial assumption that 2 incandescent bulbs would be replaced per household. This gave a total number of incandescent bulbs to be replaced of 60,000.

	Units	**At PIF**	**At CEO Endorsement**
Number of households included	No	30,000	127,570
Number of bulbs replaced	No	60,000	182,064
Energy savings	GWh/yr	3.0	9.3
Emission reductions	ktCO2e/yr	2.0	6.0
Total cost	$million	0.5	1.3
Of which GEF	$million	0.3	0.6
Of which Cofinancing	$million	0.2	0.7

Detailed survey work has since been completed during project preparation and the actual number of incandescent bulbs installed in all 5 countries is now estimated at 182,064. Allocating resources made available by removal of the PFC component to the highly cost-effective CFL activity allows for the replacement of all 182,064 bulbs estimated to be present in the 5 participating countries. For information, the table below summarizes the assumptions used to determine the baseline energy use and emissions from incandescent bulb usage, which are presented at Appendix E.

	UNITS	**COO**[30]	**PNG**	**SAM**	**TON**	**VAN**
Number of HHs	No.	4,113	74,574	27,000	11,255	10,628
Av. number of IBs per HH	No.	4.04	1.47	0.53	1.63	2.20
Number of IBs to be replaced	No.	16,617	109,370	14,380	18,315	23,382
Av. IB lamp power	W	44.6	60.0	57.8	45.1	42.3

[30] This relates to project implementation in the outer islands of Cook Islands only. As discussed above, the main island of Rarotonga has already been addressed by the pilot project under ADB RETA-6485: Promoting Energy Efficiency in the Pacific (Phase I).

CFL lamp power replacement	W	13.00	13.00	13.00	13.00	13.00
Av. lamp usage per day	hours	4.0	2.5	3.0	4.0	4.4

Secretariat comment (4): 4. Please also explain the delivery model to installing CFLs in all the houses.

ADB response: CFLs will be procured centrally by the PEEP (Phase II) implementation team to ensure the lowest possible unit cost is achieved and also to ensure compliance with minimum ELI technical requirements (noting that in the Cook Islands pilot it has proved possible to purchase CFL's at competitive prices that greatly exceed ELI lifetime and voltage tolerance ELI specifications). Specifications will also follow or exceed those of other ADB CFL programs which have been successfully implemented in Nepal, Pakistan and the Philippines. Lessons from these programs will be followed and specifications will include a minimum 10,000 hours rated lamp life and an ability to cope with the high voltage fluctuations typically found in Pacific DMCs.

Likewise, the delivery model will follow the methodologies employed in the successful ADB programs in Nepal, Pakistan and Philippines and also in the pilot project in Cook Islands. Once procured, CFLs will be distributed to the single power utility in each of the participating countries who will have responsibility for distributing the CFLs to all of their residential customers. The utilities will carry out comprehensive installation programs in conjunction with their regular programs of meter reading. Meter readers will be responsible for replacing existing incandescent bulbs in customer premises and a CFL will only be provided in exchange for a working regular incandescent bulb being surrendered. Provision will be made to equip power utilities and major retailers with recycling points where the incandescent bulbs and end-of-life CFLs can disposed of properly.

Secretariat comment (5): Similarly please explain how the whole replaced CFLs will be maintained after the closure of the project. This is related to the first question. If the replacements of CFLs can be maintained by policy etc. after the closure of the project, then it is hard to understand why "all the lights" should be replaced with CFLs in the first place rather than relying on these policies.

ADB response: ADB considers it important to replace all incandescent lamps in the five participating countries for several reasons. Firstly, the reputation of CFLs has been damaged by the past and present importation of inferior quality CFLs with poor rated life expectancy (and reputedly even shorter life in practice) and a low tolerance of voltage fluctuations, a fact which is common in the Pacific. Secondly, several policy and awareness measures relating to CFLs already exist and CFLs (of generally low and uncertain quality) are already stocked by most retailers, yet penetration rates are consistently lower than 10% across all five countries. Consumers are also prevented from purchasing CFLs by their high upfront cost. Consumers are generally unaware of the existence of higher quality CFLs, and even if consumers were aware there is no enforcement of consumer labeling for CFLs to ensure that any quality claims made are correct, nor is there sufficient current or realistic future capacity for such enforcement of labeling requirements for CFLs. By carrying out bulk procurement of high specification CFLs across the 5 countries, the program will establish a lower reference price for CFLs and set an affordable benchmark price for long life and wide voltage tolerant CFLs. Furthermore, fewer than 2 incandescent bulbs per household will be procured, hence the scale of the initiative is realistic. By including all households and replacing all incandescent bulbs the program will also achieve equality amongst all participants.

A need exists to build confidence across the whole population base by distributing high quality CFLs widely in the community. Based on the very positive experience from the PEEP Phase 1 pilot CFL project in Cook Islands, it is anticipated that this approach will "kick start" the use of CFLs in the participating countries and across the wider Pacific by increasing consumer confidence in CFLs and boosting their affordability. Program continuity will be ensured by a comprehensive campaign to raise public awareness of high

performance CFLs (noting that high performance CFLs generally do not cost noticeably more than the existing low performance CFLs). However, public awareness campaigns alone have been shown to be insufficient to catalyze the sector without a comprehensive program to roll out affordable and high quality CFLs across all households in the participating countries. Thus awareness campaigns are a necessary component but not sufficient on their own. To be effective, awareness campaigns need to reinforce the reality of affordable retail price and high performance CFLs in an integrated market transformation approach as proposed. Policy support will be harnessed as far as possible, but the weak policy capacity in the Pacific (as extensively documented in numerous studies) strongly suggests that a policy led approach cannot be effective on its own.

Secretariat comment (6): Please identify exactly what will be the other "non-residential private buildings" than Hotels, including the numbers of the buildings and difference in budget from the PIF of this exact component.

ADB response: At the PIF stage, the implementation of this component was envisaged to be restricted to the hotel sector in Cook Islands, PNG and Vanuatu only. Since the PIF was formulated, the proposed activity has been extended to include the hotel sectors of Samoa and Tonga. During the PPG stage, religious buildings, including religious owned schools and community centers, were also found to be important users of energy with an allied significant scope for energy savings. Hence this sub-component has been extended to include relevant religious sector buildings in Cook Islands, Samoa and Tonga. The table below illustrates the changes made to this sub-component since the PIF was approved. Note that the budget at CEO Endorsement stage does not include $2.4 million in cofinancing expected to be leveraged from the building owners but which has not been included in the list of confirmed cofinancing because letters of support cannot be obtained at this stage.

	Units	**COO**	**SAM**	**TON**	**Total**
Additional hotels included	No		64	24	88
Inclusion of religious buildings	No	16	168	194	378
Additional baseline power consumption	GWh/yr	1.1	17	13	31.1
Additional energy savings	GWh/yr	0.2	3.1	2.3	5.6
Additional emission reductions	ktCO2e/yr	0.1	1.9	1.5	3.5
Budget at PIF stage	$million				0.5
Budget at CEO Endorsement stage	$million				1.8

Secretariat comment (7): For reference, please provide information on how much was planned to be used for deployment of power factor correction equipment at the PIF stage.

ADB response: Total cost of the PFC program was to be $3.2 million. Approximately $0.8 million of this cost was to have been funded by the Global Environment Facility and the balance of $2.4 million was to be funded by local contributions from the power utilities in the five participating countries. As discussed elsewhere in the first response to GEF Secretariat Comments, the funding for this component has now in the CEO endorsement phase been used to expand the scope of the other programs including residential lighting and building energy audits and retrofits. Given the PFC activity envisaged significant contributions from power utilities, its removal is also responsible for the related reduction in the level of confirmed cofinancing at the endorsement stage. It is expected that this cofinancing will be replaced by contributions for retrofits

from building owners, but since they are much more numerous and dispersed in nature, it has not been possible to obtain individual letters of cofinancing from each. Hence, this private sector building retrofit co-financing has been excluded from Table B in the CEO Endorsement Documentation.

Question 22. Are the confirmed co-financing amounts adequate for each project component?

Secretariat comment (8): The document for co-financing from Japan is not appropriate. Attached is just a proposal. Please attach information after approval.

ADB response: The co-financing from Japan has been reviewed in full by the ADB Clean Energy Working Group and was cleared in early November 2010 by the Climate Change Steering Committee. $1.5 million in funding from the Clean Energy Financing Partnership Facility have already been allocated to this PEEP (Phase II) project. At this stage in the approval process, no CEFPF request has ever been rejected by the Government of Japan and ADB is confident that a no objection from the Government of Japan will be provided in January 2011. ADB kindly requests that GEF begins the 28-day circulation process to GEF Council members during which time the final CEFPF documentation will be provided. This will enable both GEF and CEFPF funding to be confirmed in time for the final ADB board approval date of 20 March 2011.

Secretariat comment (9): The sample meeting minute cannot be recognized as a evidence of confirmation as 1) it is not clear what 20% means, 2) no signature of building owners, and 3) not complete. Please provide more appropriate and comprehensive evidences. Or reconsider the amount of cofinancing from building owners.

ADB response: ADB has considered the GEF comments above and has decided to remove the amount of $2.5 million from the cofinancing table as suggested. ADB would like to highlight that although the evidence for cofinancing from building owners does not exist at this stage, ADB has a high degree of confidence that cofinancing from building owners will be achieved upon provision of investment grade energy audits by the PEEP (Phase II) program and as evidenced through numerous meetings with building owners during the preceding ADB RETA. However, ADB recognizes that this source of co-financing does not meet the GEF's definition of "confirmed co-financing" and has therefore removed it from Table B of the updated CEO Endorsement Document as recommended.

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

Position Titles	*$/ person week**	*Estimated person weeks***	*Tasks to be performed*
For Project Management			
Local			
National project coordinator	1,500	192	Coordinate the day to day management of the project implementation from ADB headquarters.
For Technical Assistance			
Local			
Local project coordinators	1,250	480	Coordinate the project locally by facilitating international experts input and ensure sustained support from stakeholders
Building energy efficiency expert	1,250	80	Component 3 – Complete energy audits of selected building (public and non-residential) in each country. Provide investment grade audits detailing energy efficiency measures for each selected building.
International			
Country-focused energy efficiency technical experts	2,750	192	Provide ongoing technical and management support to the local project coordinators
Energy efficiency policy expert	4,000	16	Component 2 – Develop energy efficiency policy for each country. Determine possible incentives for EE programs, including fiscal incentives, and subsidies.
Energy standards and labeling expert	4,000	32	Component 2 – Develop a realistic EE standards and labeling scheme for each country based on their particular national situation
Building code energy efficiency expert	4,000	28	Component 2- Develop energy efficiency minimum requirements to be included in each country's building code
Lighting energy efficiency expert	4,000	40	Component 3 – Develop suitable specifications for street lighting replacement activity, as well as CFL's, linear fluorescent lighting systems, low voltage halogen lamps, and reflector and other specialist lamps. Develop an energy efficiency lighting program relevant to each country
Building energy efficiency expert	4,000	60	Component 2 –Develop workshops on energy audits and energy efficiency products and services to be provided alongside local experts to the private sector Component 3 – Complete energy audits of selected building (public and non-residential) in each country. Provide investment grade audits detailing available energy efficiency measures.

Energy investment financial expert	4,000	6	Component 3 – Provide support to each government in the development of a suitable financing scheme in each country to enable the implementation of energy efficiency measures in public buildings.
Energy survey expert	4,000	18	Component 1 – Develop surveys on major energy consumption appliance and equipment ownership and use. Supervise survey implementation and analyze results. Provide training on energy database development and maintenance in each country.
Database expert	4,000	8	Component 1 – Develop database on appliance and equipment energy consumption by sector. Provide training on database development, management and data extraction to local government, agencies and utility.
Energy efficiency marketing expert	4,000	20	Component 4 – Develop promotional, educational, and awareness campaigns and materials for each country, on energy efficiency, efficient appliance and equipment purchase and use, efficient lighting and behavioral issues.
Notes: International consultants' travel costs include $136,800 for travel, and $661,500 in per diem amounting to a total of $798,300.			

* Provide dollar rate per person weeks or months as applicable; ** Total person weeks/months needed to carry out the tasks.

ANNEX D: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS

EXPLAIN IF THE PPG OBJECTIVE HAS BEEN ACHIEVED THROUGH THE PPG ACTIVITIES UNDERTAKEN. All PPG activities and outputs have been completed. PPG resources were spent on a number of activities, including but not limited to (i) sampling and collection of end-use energy data; (ii) determination of project baseline; (iii) identification of project pipeline and quantification of energy and GHG savings from major activities; (iv) conducting meetings with local stakeholders; (v) obtaining letters of co-financing; and (vi) preparation of project documentation including GEF CEO Endorsement Documentation. Specifically, the PPG has justified its value through interrogating the technical assumptions of the project components and identifying the shortcomings of the PFC activity. As a result, it is anticipated that the new Project Framework will allow for the implementation of a well designed and comprehensive demand-side energy efficiency initiative in the region.

A. DESCRIBE FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION, IF ANY: No major concerns

B. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES AND THEIR IMPLEMENTATION STATUS IN THE TABLE BELOW:

Project Preparation Activities Approved	*Implementation Status*	*GEF Amount ($)*				*Co-financing ($)*
		Amount Approved	*Amount Spent Todate*	*Amount Committed*	*Uncommitted Amount**	

Activity 1: Review energy efficiency (EE) practice to date and establishment of baseline	Completed	40,000	45,000	0	0	50,000
Activity 2: Preparation of preliminary guidelines for promotion of EE	Completed	50,000	50,000	0	0	170,000
Activity 3: Identification and rapid assessment of EE projects	Completed	50,000	50,000	0	0	240,000
Activity 4: Preparation of project documentation	Completed	60,000	60,000	0	0	25,000
Total		200,000	200,000	0	0	485,000

* Any uncommitted amounts should be returned to the GEF Trust Fund. This is not a physical transfer of money, but achieved through reporting and netting out from disbursement request to Trustee. Please indicate expected date of refund transaction to Trustee.

ANNEX E: CALENDAR OF EXPECTED REFLOWS

Provide a calendar of expected reflows to the GEF Trust Fund or to your Agency (and/or revolving fund that will be set up).

Not applicable.

ANNEX F: DIRECT GHG REDUCTIONS

The direct GHG reductions presented by the proposed project are based on the preparatory activities funded by ADB under RETA-6485: Promoting Energy Efficiency in the Pacific and by the GEF PPG. Energy efficiency experts spent 12 months in the Pacific region, visiting each participating PDMC to assess the energy situation, review policy and regulatory frameworks and make recommendations to introduce or strengthen EE implementation. The experts carried out detailed baseline surveys, identified potential EE initiatives and calculated the direct energy savings and GHG reductions expected from each measure. During project preparation, a set of activities was selected to be part of the GEF project based on their energy saving potentials and technical feasibility. The following text summarizes the methodology and assumptions used in the calculation of the energy and GHG savings. Energy savings were translated into GHG reduction figures using the following emission and network loss factors provided by the country's respective power utility:

Country	Grid Emission Factor (tCO2e/MWh)	Network Losses
Cook Islands	0.65	20.0%
Papua New Guinea	0.65	17.0%
Samoa	0.65	13.5%
Tonga	0.68	15.0%
Vanuatu	0.56	10.0%

Activity 2.2: Suppression of high energy consumption appliances

The suppression of high energy consumption appliances through the implementation of Minimum Energy Performance Standards (MEPS) will reduce energy consumption through regulating the import of high energy consuming appliances, rather than by relying on any behavioural change on the part of the user. Energy and emission savings from the MEPS initiative in the residential sector have been calculated for refrigerators, freezers and air conditioners only. These appliances have been chosen since their ownership rates are higher and they possess higher saving potentials. The

methodology follows that of a recent study[31] developed for Pacific countries by the government agency responsible for the implementation of the MEPS scheme in Australia. Baseline appliance numbers were retrieved from the country's residential census and through detailed household-level surveys carried out by the project preparatory consultants.

Average baseline energy use for each category of appliance was calculated using data gathered during household surveys in each participating country as well as using historical data from the Australian market, being the most significant determinant of the appliance mix in the participating countries. Average energy use by appliance type after implementation of the MEPS initiative has been calculated based on a rigorous survey of the 64 appliances that are currently available on the Australian market after the implementation of a compatible and comprehensive MEPS program. The following energy savings and emission reductions were calculated by combining the average improvement in appliance energy use with the number of appliances in each country.

	UNIT	COO	PNG	SAM	TON	VAN	TOTAL
Baseline energy use	MWh/yr	2,747	31,776	8,992	7,249	3,707	54,469
With project energy use	MWh/yr	1,917	22,871	6,322	5,097	2,592	38,799
End user energy savings	MWh/yr	829	8,905	2,669	2,152	1,115	15,671
Network energy savings[32]	MWh/yr	995	10,419	3,030	2,475	1,226	18,145
Total GHG savings	**tCO2e/yr**	**647**	**6,772**	**1,969**	**1,683**	**687**	**11,758**

Activity 3.1: Street lighting

A detailed list of street lights installed in each participating PDMC was collected together with information on lamp power and ballast factor. Annual hours of operation (ranging from 1,825 to 4,380 hours) and annual electricity consumption for street lamps were obtained from the power utility in each participating country. New LED systems were proposed based on the industry replacement equivalent to substitute mercury, sodium and fluorescent lamps currently in place. Equivalent LED technology has been assumed to replace HPS lamps at the following power ratings.

EXISTING HPS POWER RATING	EQUIVALENT LED RATING
< 80 W	30 W
80-100 W	40 W
100 W	50 W
100-150 W	60 W
150-200 W	70 W
200 W	80 W
200-250 W	90 W
> 250 W	100 W

Savings were calculated by comparing the power rating of the new LED lamps to their counterpart using the same annual hours of operation. A summary of the baseline energy use and impact of the initiative is provided below.

	UNIT	COO	PNG	SAM	TON	VAN	TOTAL
Baseline energy use	MWh/yr	199	2,573	2,423	1,261	184	6,639
With project energy use	MWh/yr	84	997	1,050	571	128	2,829
End use energy savings	MWh/yr	115	1,576	1,373	690	56	3,811
Network energy savings	MWh/yr	138	1,844	1,558	793	62	4,396

[31] G. Wilkenfeld, 2010. *The Costs and Benefits of Electrical Appliance Energy Labeling and Minimum Energy Performance Standards for Pacific Island Countries*. Prepared for the Department of Climate Change and Energy Efficiency, Government of Australia.

[32] Network energy savings are calculated by adjusting the end user energy savings upwards to account for the network losses associated with that level of electricity used. Network loss figures are provided on page 1.

Total GHG savings	**tCO2e/yr**	90	1,199	1,013	540	35	**2,876**

Activity 3.2: EE lighting

Baseline information was gathered through surveys with cooperation from the respective statistical office and power utility of all participating PDMCs to understand residential sector lighting usage. The mix of fluorescent, incandescent, compact fluorescent and halogen lamps was observed and an average number of incandescent bulbs (IBs) per household (HH) was calculated. Savings were estimated based on the replacement of IBs by compact fluorescent lamps (CFLs), on the assumption that 40-60 W IBs would be replaced with 13 W CFLs. Daily hours of operation, ranging from 2.5 to 4.4 hours, were obtained in each country and were used to calculate the annual savings for replacing incandescent lamps for CFLs. The table below presents the expected energy savings based on the program to replace IBs with CFLs. The savings presented are for the residential sector only, however project savings could potentially be higher than expected as the commercial and industrial sectors will also be targeted where possible.

	UNITS	**COO**	**PNG**	**SAM**	**TON**	**VAN**	**TOTAL**
Baseline energy use	MWh/yr	1,081	5,892	910	1,205	1,587	10,676
With project energy use	MWh/yr	315	1,276	205	347	488	2,633
End use energy savings	MWh/yr	765	4,616	705	858	1,099	8,043
Network energy savings	MWh/yr	919	5,401	800	986	1,209	9,315
Total GHG savings	**tCO2e/yr**	**597**	**3,511**	**520**	**671**	**677**	**5,976**

Activity 3.3: EE in hotels and other non-residential private buildings

During the project preparatory phase, a dataset of hotels and their annual energy consumption was obtained for each country with the support of the national power utility and national chamber of commerce. Energy audits were conducted on a sample of hotels to understand the equipment in place for lighting, cooling, ventilation, electronic, water heaters and occupation controls. Based on these energy audits, project preparatory consultants estimated the average energy savings from implementing energy efficiency measures in a typical hotel for each country. A pilot project was also implemented in Vanuatu, where higher efficiency lighting, solar water heaters and automatic occupancy controls were installed. The pilot project was used to confirm expected savings by including measurement activities before and after the energy efficiency modifications. Using outcomes from the pilot project and results of the energy audits conducted, the consultants calculated the electricity savings expected from rolling out a program of energy audits and equipment retrofits in each country.

	UNITS	**COO**	**PNG**	**SAM**	**TON**	**VAN**	**TOTAL**
Baseline energy use	MWh/yr	6,622	17,905	6,347	760	10,762	42,396
With project energy use	MWh/yr	5,430	14,682	5,204	623	8,825	34,764
End use energy savings	MWh/yr	1,192	3,223	1,143	137	1,937	7,632
Network energy savings	MWh/yr	1,430	3,771	1,297	157	2,131	8,786
Total GHG savings	**tCO2e/yr**	**930**	**2,451**	**843**	**107**	**1,193**	**5,524**

Activity 3.4: EE in public buildings

A dataset of public buildings and their annual energy consumption was obtained for each country with the support of the national power utility and the Ministries of Finance. A sample was selected within different building size categories using various consumption groups and energy audits were completed by the energy efficiency experts. The experts assessed the lighting, cooling, ventilation, motor and computer systems in each building and evaluated the potential savings from implementing energy efficiency measures on these main systems. Based on these audits, savings of 7% to 13% were observed depending on the building size and energy systems in use. Average energy savings for each size of building category were calculated and applied to the building category in each country. Energy saving and emission reduction potentials from the public building program are presented below.

	UNITS	**COO**	**PNG**	**SAM**	**TON**	**VAN**	**TOTAL**

Baseline energy use	MWh/yr	1,743	47,781	11,250	4,430	4,892	70,096
With project energy use	MWh/yr	1,508	44,333	9,925	3,912	4,251	63,929
End use energy savings	MWh/yr	235	3,448	1,325	518	641	6,167
Network energy savings	MWh/yr	282	4,035	1,504	595	705	7,121
Total GHG savings	**tCO2e/yr**	**184**	**2,623**	**978**	**405**	**395**	**4,583**

Aggregate energy and GHG savings

Aggregate energy and GHG savings from the five activities are presented in the table below. Total energy savings of 47,762 MWh/yr and total GHG savings of 30,720 tCO2e/yr reconcile with the direct GHG reductions outlined in the table on page 9.

	UNITS	**COO**	**PNG**	**SAM**	**TON**	**VAN**	**TOTAL**
Baseline energy use	MWh/yr	12,392	105,927	29,922	14,905	21,132	184,278
With project energy use	MWh/yr	9,254	84,159	22,706	10,550	16,284	142,953
End use energy savings	MWh/yr	3,138	21,768	7,216	4,355	4,848	41,325
Network energy savings	MWh/yr	3,765	25,468	8,189	5,007	5,333	47,762
Total GHG savings	**tCO2e/yr**	**2,448**	**16,555**	**5,324**	**3,407**	**2,986**	**30,720**