



GEF-6 REQUEST FOR PROJECT ENDORSEMENT/APPROVAL

PROJECT TYPE: FULL-SIZED PROJECT

TYPE OF TRUST FUND: GEF TRUST FUND

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PART I: PROJECT INFORMATION

Project Title: Facilitating Renewable Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction (FREAGER)			
Country(ies):	Papua New Guinea	GEF Project ID: ¹	9273
GEF Agency(ies):	UNDP	GEF Agency Project ID:	5569
Other Executing Partner(s):	Climate Change and Development Authority (CCDA)	Submission Date:	29 March 2017
		Resubmission Date:	5 May 2017
GEF Focal Area (s):	Climate Change	Project Duration (Months)	48
Integrated Approach Pilot	IAP-Cities <input type="checkbox"/> IAP-Commodities <input type="checkbox"/> IAP-Food Security <input type="checkbox"/>	Corporate Program: SGP	<input type="checkbox"/>
Name of Parent Program	NA	Agency Fee (USD)	269,860

A. FOCAL AREA STRATEGY FRAMEWORK AND OTHER PROGRAM STRATEGIES²

Focal Area Objectives/Programs	Focal Area Outcomes	Trust Fund	(USD)	
			GEF Project Financing	Co-financing
CCM-1 Program 1	Accelerated adoption of innovative technologies and management practices for GHG emission reduction and carbon sequestration	GEFTF	1,903,132	16,588,356
	Policy, planning and regulatory frameworks foster accelerated low GHG development and emissions mitigation	GEFTF	718,830	6,265,571
	Financial mechanisms to support GHG reductions are demonstrated and operationalized	GEFTF	218,678	1,906,073
Total Project Costs			2,840,640	24,760,000

B. PROJECT DESCRIPTION SUMMARY

Project Objective: Enabling the application of feasible renewable energy and energy efficiency technologies for achieving greenhouse gas emission reduction in PNG						
Project Components / Programs	Financing Type ³	Project Outcomes	Project Outputs	Trust Fund	(USD)	
					GEF Project Financing	Confirmed Co-financing
Component 1. Energy Policy, Planning, and	TA	1. Rigorous implementation and enforcement of approved	1.1. Completed government capacity building programs for the design and	GEFTF	654,475	5,704,630

¹ Project ID number remains the same as the assigned PIF number.

² When completing Table A, refer to the excerpts on [GEF 6 Results Frameworks for GETF, LDCF and SCCF](#).

³ Financing type can be either investment or technical assistance.

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Institutional Development		national and provincial energy policies, plans, and standards to promote the application of renewable energy and energy efficiency technologies	development of RE and EE technology projects 1.2. Approved national-level policies or regulations that promote RE and EE 1.3. National-level RE and EE roadmaps, with proposed funding allocations for projects, submitted, approved, and implemented 1.4. Formulated, adopted, and effectively enforced standards to promote adoption of RE and EE 1.5. Formulated, approved, and implemented effective institutional plans for promoting RE and EE, detailing responsibilities of relevant agencies and coordinating mechanisms among them 1.6. Detailed adopted provincial plans for promoting RE and EE in townships (provincial and district centers) and villages, including specific pipeline projects that will replicate the project demos			
Component 2. Renewable Energy and Energy Efficiency Technologies Applications	TA	2A. Enhanced technical-commercial viability and capacity in the application of energy efficiency technologies and development of feasible RE-based energy systems in the country	2A.1. Completed capacity building program for technical personnel in the private and public sectors on the detailed technical preparation and implementation of community-based RE mini-grids and township EE programs 2A.2. Well-researched and verified sourcing information on RE and EE products, including brands/specifications, sourcing channels, and prices 2A.3. Detailed information on “honest,” best possible costing of community RE mini-grid projects 2A.4. Designed and trialed training program for developing capacity in O&M	GEFTF	447,250	3,898,386

			<p>for RE mini-grid projects among local people and local officials in project areas, including certification program</p> <p>2A.5. Proven system for power purchase agreements (PPAs) between PPL and independent power providers (IPPs) running community based RE mini-grids</p> <p>2A.6. Adopted business plans for productive use of renewable energy that raise the incomes of local people, especially women</p> <p>2A.7. Published and disseminated information on findings from monitoring of the project RE and EE demos</p>			
	Inv	2B. Increased installed capacity of RE based power systems and implementation of viable EE technology applications in PNG	<p>2B.1. Completed successful demos of commercially viable mini-hydro systems in PNG</p> <p>2B.2. Completed successful demo of commercially viable off-grid solar PV mini-grid system in PNG</p> <p>2B.3. Completed successful demo of commercially viable township energy efficiency programs</p> <p>2B.4. Completed demonstrations of productive applications of RE mini-grid systems that raise the incomes of local people</p>	GEFTF	962,000	8,385,124
Component 3. Financing of Renewable Energy and Energy Efficiency Projects	TA	3. Improved availability of, and access to, financing for renewable energy and energy efficiency initiatives in the energy generation and end-use sectors	<p>3.1. Completed group capacity building program for the banking sector, investors in the commercial /private sector (including PPL), and the government sector on financing RE and EE via equity investment and loans</p> <p>3.2. Designed, funded, and launched special financing mechanism for EE projects</p> <p>3.3. Designed, funded, and launched special loan fund for RE projects, carried out by a PNG commercial bank</p>	GEFTF	199,100	1,735,424

			3.4. Publicly available information on sources of funding for RE and EE (e.g. Green Climate Fund, crowdfunding, social impact funds, etc.), including listing of sources and how-to-apply guide on effectively accessing funds			
Component 4. Energy Development and Utilization Awareness Enhancement	TA	4. Improved awareness of, attitude towards, and information about renewable energy and energy efficiency applications in the energy generation and end-use sectors	4.1. Convincing, analytic, and well-disseminated briefing materials for policy makers showing that RE in many cases is more cost effective than fossil fuel in PNG and that EE projects bring strong benefits to businesses' bottom lines 4.2. Materials that enable PNG engineers, officials, and communities to work together (without outside assistance) to develop quality community RE projects at low and well-controlled costs 4.3. Database on RE resources and pipeline RE projects in PNG 4.4. Designed RE and EE courses and materials for the education sector 4.5. Completed RE and EE multi-channel media promotion campaign in PNG 4.6. Completed one-on-one TA for selected local equipment manufacturers/fabricators in the design and production of RE/EE technology equipment or components 4.7. "One-stop-shop" website providing range of information on RE and EE in PNG	GEFTF	442,545	3,857,376
Subtotal					2,705,370	23,580,940
Project Management Cost (PMC) ⁴				GEFTF	135,270	1,179,060
Total Project Costs					2,840,640	24,760,000

⁴ For GEF Project Financing up to \$2 million, PMC could be up to 10% of the subtotal; above \$2 million, PMC could be up to 5% of the subtotal. PMC should be charged proportionately to focal areas based on focal area project financing amount in Table D below.

C. CONFIRMED SOURCES OF CO-FINANCING FOR THE PROJECT BY NAME AND BY TYPE

Please include evidence for [co-financing](#) for the project with this form.

Sources of Committed Co-financing	Name of Co-financier	Type of Co-financing	Amount (USD)
National Government	PNG Power Limited	Cash	16,000,000
		In-Kind	2,000,000
	Office of Climate Change & Development	Cash	1,300,000
		In-Kind	2,700,000
Local Government	Eastern Highlands Provincial Government	Cash	1,000,000
		In-Kind	630,000
	East Sepik Provincial Government	Cash	630,000
		In-Kind	200,000
GEF Agency	United Nations Development Programme	Cash	300,000
Total Committed Co-financing*			24,760,000

*Additional parallel co-financing of USD 3.26 million is expected to become available during the project implementation, to be provided by the following district governments: (1) Daulo District, Eastern Highlands Province (USD1 million); (2) Lufa District, Eastern Highlands Province (USD 1 million); (3) Wewak District, East Sepik Province (USD 630,000); and (4) Maprik District, East Sepik Province (USD630,000). This will bring the grand total of parallel co-financing to USD 27,720,000 and the grand total of project financing to USD 30,860,640.

D. TRUST FUND RESOURCES REQUESTED BY AGENCY(IES), COUNTRY(IES) AND THE PROGRAMMING OF FUNDS

GEF Agency	Trust Fund	Country Name/Global	Focal Area	Programming of Funds	(in USD)		
					GEF Project Financing (a)	Agency Fee ^{a)} (b) ²	Total (c)=a+b
UNDP	GEFTF	Papua New Guinea	Climate Change	NA	2,840,640	269,860	3,110,500
Total Grant Resources					2,840,640	269,860	3,110,500

a) Refer to the [Fee Policy for GEF Partner Agencies](#)

E. PROJECT’S TARGET CONTRIBUTIONS TO GLOBAL ENVIRONMENTAL BENEFITS⁵

Provide the expected project targets as appropriate.

Corporate Results	Replenishment Targets	Project Targets
4. Support to transformational shifts towards a low-emission and resilient development path	750 million tons of CO _{2e} mitigated (include both direct and indirect)	5,107,565 tons (direct and top-down consequential)

F. DOES THE PROJECT INCLUDE A “NON-GRANT” INSTRUMENT? NO

(If non-grant instruments are used, provide an indicative calendar of expected reflows to your Agency and to the GEF/LDCF/SCCF Trust Fund) in Annex D.

⁵ Update the applicable indicators provided at PIF stage. Progress in programming against these targets for the projects per the *Corporate Results Framework* in the [GEF-6 Programming Directions](#), will be aggregated and reported during mid-term and at the conclusion of the replenishment period. GEF6 CEO Endorsement /Approval Template-Dec2015

PART II: PROJECT JUSTIFICATION

A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN WITH THE ORIGINAL PIF⁶

Changes from the PIF: Strong efforts were made in PPG design work to honor the original design of the PIF. The key difference between the ProDoc design and that of the PIF is greater specificity of the ProDoc design, focusing many of the activities on community RE mini-grids and township EE programs. While the township EE programs are quite broad in terms of technology addressed, the RE mini-grids focus mainly on micro/ mini-hydro and PV mini-grids. Yet, it is noted that these distinctions are mainly made at the activity description level, rather than in the output wording. Another significant difference noted is that in some instances organization of ProDoc outputs takes a different approach than organization of PIF outputs. For example, the ProDoc demo investment outputs are organized by technology, with a different output for each of PV mini-grid, micro/ mini-hydro mini-grids, and township EE programs, whereas the corresponding PIF outputs were divided by step in the demo process, beginning with demo design and on through to implementation and evaluation. Similarly, capacity building outputs in the ProDoc are organized by type of stakeholder and focus of workshop, thus including an output for each of programs for government officials on RE and EE pipeline project development, programs for technical personnel on RE mini-grid technical aspects and EE technical aspects, and programs for the financial sector on loan and equity financing of RE and EE. The corresponding PIF outputs in contrast, are organized by step in the capacity development process, beginning with evaluation of past experience and needs and on through to implementation of capacity building and evaluation of that implementation. A detailed accounting of adjustments from the PIF is given in Annex E of this document.

A.1. Project Description.

This section provides an update on and elaboration of content provided in the PIF for the sub-areas of Section A.1 when relevant.

A.1.1 Global Environmental Problems, Root Causes, and Barriers

N/A (Please see UNDP ProDoc, Section II, for elaboration on the PIF, including the following ProDoc Section II subsections: Background on Current and Projected GHG Emissions in PNG, PNG's Energy Sector, PNG's Power Sector, Institutional Structure and Legislative Framework of the Energy Sector, and Barriers to the Use of EE and RE Technologies in PNG.)

A.1.2 Baseline Situation, Baseline Scenario, and Baseline Projects

NA (For elaboration on the PIF, please see UNDP ProDoc, Sections II and IV. For ProDoc Section II, relevant sub-sections are: Experience with and Potential for RE in PNG and Experience with and Potential for EE in PNG. For ProDoc Section IV, the relevant subsection is ii. Partnerships, where, in the second half of this subsection, information is offered on baseline projects.)

Additional information and elaboration on the baseline scenario, reflecting findings and design work of the PPG stage, are as follows: The "baseline scenario" is the business-as-usual case, in which there is no project. The baseline scenario for the year 2021, when the proposed project would have closed after its four-year duration, is considered. In the baseline scenario, it is expected that, while donors continue to make efforts

⁶ For questions A.1 –A.7 in Part II, if there are no changes since PIF , no need to respond, please enter "NA" after the respective question.

to support PNG in developing national-level policy and plans for RE and EE, not many real results are seen on the ground. And, without real results, policy makers hesitate, so that proposed policies and plans remain under discussion rather than being fully adopted. In addition, policy-makers remain unclear about the cost advantage of RE and EE over diesel. Potential large-scale RE installations, such as large hydro and wind, continue to be stalled by land negotiation issues and high and opaque costs. While a few micro or mini-hydro station projects may be initiated, these will struggle with technical issues and ill-defined costs, as well as lack of funding. While solar PV home systems (SHSs) continue to be deployed in the market, no larger-scale systems, namely solar PV mini-grids, have been set up. Potential project proponents continue to lack information on how to cost-effectively source quality equipment for RE mini-grids; and providers of engineering, civil works, and construction services continue to quote them prices far higher than is reasonable. Provinces continue to be uninvolved in planning for RE projects and EE initiatives. In the EE area, a limited number of lighting retrofit projects continue with the support of trained staff from PPL, but PNG continues to lack capacity for EE audits and retrofits involving air conditioning, refrigeration, and industrial EE initiatives, so that EE potential is vastly under-tapped.

A.1.3 Proposed Alternative Scenario, GEF Focal Area Strategies, and Description of Expected Outcomes and Components

NA (For elaboration on the PIF, please see UNDP ProDoc Sections II and IV. For ProDoc Section II, please see the sub-sections of: Strategy Adopted, Approach to Full Project Design, and Expected Difference with Business-as-Usual (No Project) Situation. For Section IV, please see the sub-section of: Expected Results, which provides a detailed listing of project activities. Key aspects of elaboration on the PIF are also offered below.)

Elaboration on Alternative Scenario - Overall Vision of Project Results: In the scenario in which the FREAGER project is implemented, by the end of project in the year 2021, policy makers at the central level in PNG will be quite aware of the cost advantage of RE and EE over diesel. They will have seen actual proof on the ground that micro/mini-hydro mini-grids and PV mini-grids are technically and commercially viable means of bringing power to communities at costs much lower than diesel generators. They will also have seen that the incomes of local communities can be enhanced by the productive use of the power from community RE mini-grids. In this scenario, with the success of the project's community RE mini-grid demonstrations, selected provinces, by the time of project close, will have already supported the construction of a good number of replications, with more planned projects in the pipeline. Township EE Program demos will have similarly shown central policy makers and provincial officials the commercial and technical viability of a range of EE measures. By the time of project close, similar township EE programs will have been initiated in other of PPL's township diesel centers. With their enhanced level of awareness and the success of the project demos, national level policy makers will have come on board and begun to adopt policies, standards, and plans supportive of community RE mini-grids and township EE programs. In addition, at this point, they will be starting to consider broader RE and EE policies, such as those that promote large-scale RE installations. In the FREAGER scenario, provinces will have been proactive in developing comprehensive RE and EE plans and will have allocated funding to realize specific projects included in those plans. Financial mechanisms to support RE and EE (which will be needed both to stimulate the market and to provide upfront capital when unavailable) will have been successfully launched and in the process of being expanded. This includes an ESCO fund for financing the up-front costs of EE measures and a loan fund for community RE mini-grids. Lastly, at the time of project close, good information will exist on community RE mini-grid development, RE pipeline projects, RE resources, and EE technologies in the PNG context, so that the group of stakeholders involved in the development of RE and EE projects in PNG is expanding. Larger scale RE projects will have been slower to develop. Yet, with the confidence gained via experience with community scale RE mini-grids, by 2021, more serious plans

will have been developed for large-scale RE projects. In all, as a result of project RE and EE demos, GHG emissions in PNG will have been reduced from the baseline level by 16,878.5 tons CO₂ during project implementation. Total direct emission reductions from the project demos will be 156,879 tons CO₂ over the lifetime of the demo installations. Replications occurring after the project, but due to the direct influence of project activities (such as design of RE mini-grid projects and township EE programs) is estimated to be 541,181 tons CO₂, so that total emission reductions due directly to the project (including the demos and replications directly contributed to by the project) are estimated to be 698,060 tons CO₂. Finally, consequential emission reductions, not due directly to activities of the project, but influenced by the project or its directly-contributed-to replications, are estimated to be in the range of 2,094,179 tons CO₂ (bottom up approach) to 4,409,597 tons CO₂ (top down approach).

Key Points of Elaboration on Strategy of Project Design: The overall goal of the proposed project is reduction in GHG emissions from the energy production and energy end use sectors in PNG. The objective, or end to which the proposed project and other efforts are expected to contribute, is the enabling of the use of renewable energy and energy efficiency technologies for achieving greenhouse gas emission reduction in PNG. The project adopts a number of key strategies to realize its contribution to this objective. The main, overall strategy is (1) a multi-pronged barrier removal approach. Other key strategies include: (2) selection of specific RE and EE technologies, scales of use, and locales on which to focus in order to best facilitate an initial wave of replication; (3) strong emphasis and stakeholder education on the cost advantage of RE and EE as compared to diesel; (4) emphasis on facilitating sourcing and “honest best costs” for installation of RE and EE technologies; and (5) a dual top-down bottom-up approach, so that policy and planning gridlock at the central government level can be inspired by successes in the provinces.

Elaboration of Description of Project Outcomes and Components: This subsection elaborates the PIF’s description of the project’s four components, along with their targeted outcomes and main areas of work. Three of the components have just one outcome on which they focus, though Component 2, which focuses on technical and commercial viability has an investment outcome (the project demos) and a technical assistance outcome. Exhibit 1 illustrates the full project design, showing the project’s contribution to the project objective (which it is intended to contribute to, along with other projects), the five project outcomes, and the many outputs feeding into each of these outcomes. A detailed listing of proposed project activities, organized by component, outcome, and output, is given the UNDP ProDoc Section IV’s subsection on Expected Results.

Component 1. Energy Policy, Planning, and Institutional Development: This component will focus on policy, planning, and institutional development for RE and EE in PNG, with a focus on community RE mini-grid systems and township center EE programs. The targeted outcome of the component will be: “rigorous implementation and enforcement of approved national and provincial energy policies, plans, and standards to promote the application of renewable energy and energy efficiency technologies.” The outcome will include multi-session capacity building programs at both the national and provincial levels that will result in participants having prepared pipeline community RE mini-grid projects or township center EE programs by the concluding session. The component will target adoption of policy supporting EE and RE, including the elimination of import tariffs on key types of EE and RE equipment, ICCC policy on the licensing of and billing for community RE mini-grids, and Department of Land and Physical Planning policy for involvement of ILG (indigenous landowner group) associations in the establishment, management, and operation of community RE mini-grids. Further, it will support RE and EE policy gap analyses and related policy design, with a focus on financial incentives for community RE mini-grid development and building and industrial EE retrofits. The component will support the preparation of national roadmaps for each of community RE mini-grids and township center EE programs. It will support

the design and enforcement of standards for EE and RE equipment, as well as the incorporation of EE building standards into the national building code and, as a pilot, into one province's building code. Institutional work will include design of an institutional plan for PPL to support customers in carrying out energy efficiency initiatives and a plan for national level government institutions to cooperate in promoting community RE mini-grids and township EE programs. Lastly, the component will support the design of provincial RE and EE plans for partner provinces, with an emphasis on community RE mini-grids and township EE programs.

Component 2. Renewable Energy and Energy Efficiency Technologies Applications (Commercial and Technical Viability, including Project Demos): This component will focus on facilitating the achievement of technical and commercial viability for RE and EE projects in PNG (TA portion of component), as well as demonstrating that technical and commercial viability (investment portion of component). The priority will be to enable PNG to achieve and replicate “honest,” low-cost, technically sound community RE systems and township center EE retrofits. The two targeted outcomes of the component will be: (2A) “Enhanced technical-commercial viability and capacity in the application of energy efficiency technologies and development of feasible RE-based energy systems in the country.” (2B) “Increased installed capacity of RE based power systems and implementation of viable EE technology applications in PNG.” Technical assistance will include capacity building programs for technical personnel, covering (i) the costing of, sourcing for, and technical aspects of community micro/mini-hydro and PV mini-grids and (ii) energy audits, sourcing, retrofits, and verification of energy savings for both building and industrial energy efficiency initiatives. The component will support the development of sourcing information for PNG, with an emphasis on determining low-cost, high quality sources for micro/mini-hydro mini-grid equipment, PV mini-grid equipment, and building energy efficiency equipment. Further, the component will assess and prepare detailed information on the “honest” lowest cost of establishing quality micro/mini-hydro mini-grids and PV mini-grids in PNG. It will prepare and pilot O&M training curricula for micro/mini-hydro mini-grids and PV mini-grids. It will develop and test a system for power purchase agreements (PPAs) between PPL and those running community based RE mini-grids. Business advising support for the use of RE mini-grid power in ways that will raise incomes will be provided to communities. The component will also carry out monitoring and documentation of the experience with of each of the project demos.

Demos will be carried out in four main areas: mini-hydro mini-grid systems, PV mini-grid systems, productive use of renewable energy to raise incomes, and township energy efficiency programs. Mini-hydro mini-grid systems will be developed from scratch in Eastern Highlands Province in each of Gotomi Ward, Lufa District (200 kW system), and Miruma Ward, Daulo District (200 kW system). On Samarai Island in Milne Bay Province, the project will support a 50 kW PV mini-grid system with battery back-up. At the two Eastern Highlands sites and the Samarai site, the component will support the implementation of productive uses of RE to raise incomes. Lastly, in East Sepik Province, at both Wewak and Maprik, the component will support the implementation of township energy efficiency programs, which will include energy audits and retrofits for top energy consuming customers, advising to new customers soon to come online of how to cut future energy consumption via better design and purchase of more efficient equipment, consumer programs to replace refrigerators and lights, and streetlight retrofits. Most audits and retrofits will be in the building sector, but there will be one major industrial audit and retrofit initiative.

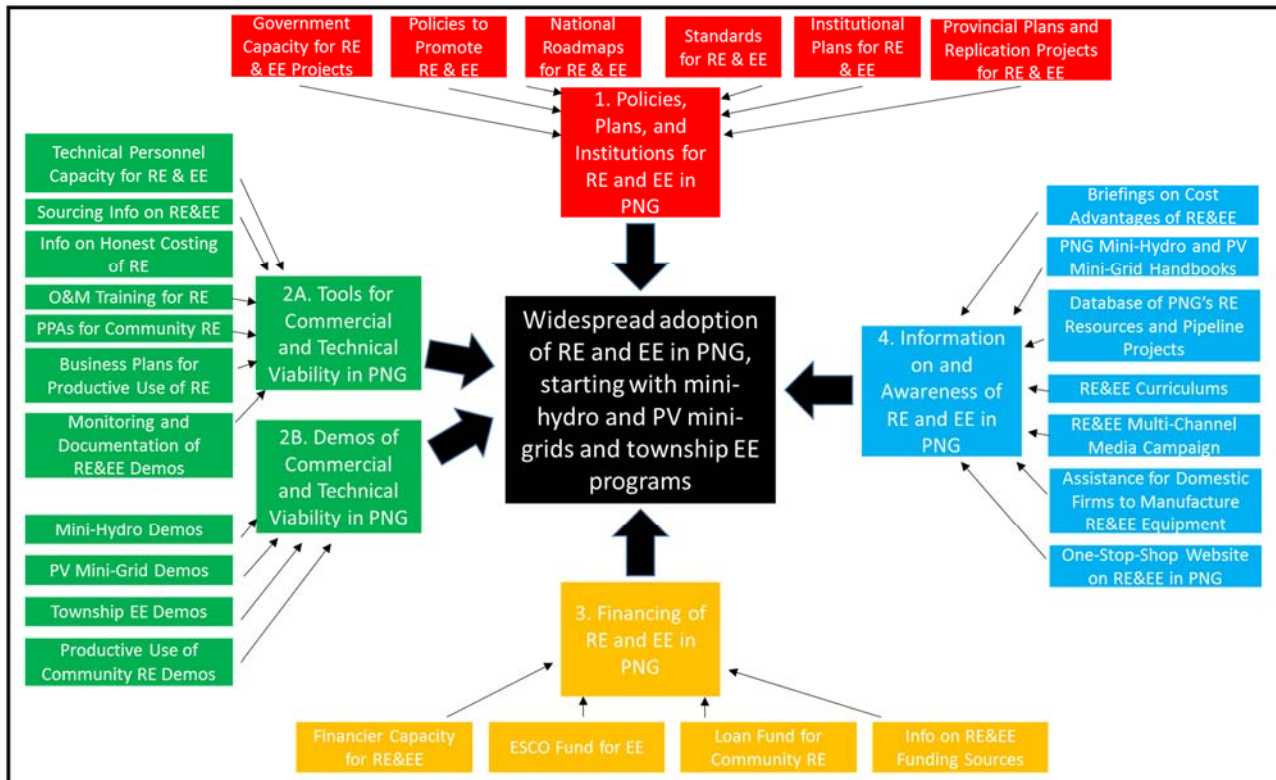


Exhibit 1. Full Project Design Strategy: Several outputs feed into each of the four main barrier areas, or five outcomes. The project outcomes, in turn, contribute to the project objective via the widespread adoption of the RE and EE technologies selected as focus areas for the project.

Component 3. Financing of Renewable Energy and Energy Efficiency Projects: This component will focus on facilitating the mobilization of financing for RE and EE in PNG, including both equity investment and loan financing. Financial mechanisms are needed both to stimulate the market and to provide up-front capital when unavailable. Component 3’s targeted outcome will be: “Improved availability of, and access to, financing for renewable energy and energy efficiency initiatives in the energy generation and end-use sectors.” The component will carry out a capacity building program for the banking sector, investors in the commercial/private sector (including PPL), and government officials regarding the equity and debt financing of community-based RE mini-grids and of EE, including building and industrial retrofits and residential appliance and lighting replacement. It will provide technical support to PPL for the setting up of an “ESCO” fund to finance the up-front costs of energy efficiency retrofits at large electricity consuming customers, who will then pay PPL back based on monthly verified electricity savings. It will also provide technical support for the setting up of a loan fund (or a sub-fund of an existing SME fund) at a commercial bank in PNG to finance community-based RE mini-grid systems. Lastly, it will prepare a listing and how-to-apply guide of high potential funding sources (such as the Green Climate Fund, social impact funds, etc.) for future RE and EE projects in PNG.

Component 4. Energy Development and Utilization Awareness Enhancement (Information on and Awareness of RE and EE): This component will focus on increasing the availability of quality information on the development of RE and EE in PNG, as well as raising the awareness among stakeholders of RE and EE. Component 4’s targeted outcome will be: “Improved awareness of, attitude towards, and information about renewable energy and energy efficiency applications in the energy generation and end-use sectors.”

The component will develop quality briefing materials for policy makers that show that community micro/mini-hydro and PV mini-grids can be much lower in cost over time than diesel mini-grids and are also often lower cost than grid extension. It will develop briefing materials that show the benefits to the bottom line of building and industrial energy efficiency retrofits. It will develop how-to guides on the development of micro/mini-hydro mini-grids and PV mini-grids that are tailored to the situation of PNG and that include important information developed in other components of this project, such as that on “honest” costing, best sourcing channels, etc. It will develop a database on RE resources and pipeline projects in PNG. This will include mini-hydro resources, as assessed by the project, in Eastern Highlands Province and Morobe Province, and solar PV resources, as assessed by the project, in Milne Bay Province. It will also include RE resource data already developed by other initiatives. And, it will include listings of pipeline micro/mini-hydro and PV mini-grid projects as developed under Component 1 of this project. It will design RE and EE courses and materials for the education sector⁷, including specialized, short-term RE mini-grid courses and building energy audit course for tertiary institutions and more general RE/EE course materials for high schools and primary schools. The component will also carry out a multi-channel media campaign in PNG to promote RE and EE, particularly community RE mini-grids and township center EE programs, such as demonstrated in Component 2. Media channels or methods will include television, radio, print and online news media, social media, text messaging, and celebrity endorsement. The component will reach out to manufacturers and support them in local production of equipment or components related to micro-/mini-hydro and PV mini-grids as a means of reducing costs. Finally, the component will support the preparation of a “one-stop-shop” website that will allow access to all the materials on RE and EE in PNG developed under the project, as well as select materials from other projects.

A.1.4 Incremental/ Additional Cost Reasoning

NA (For elaboration on the PIF, please see UNDP ProDoc Section V’s subsection i. Cost Efficiency and Effectiveness.)

A.1.5 Global Environmental Benefits

NA (For elaboration on the PIF, please see UNDP ProDoc Annex 2 of GHG Emission Reduction Calculations.)

⁷ The justification of leveraging the education sector as a channel for awareness building and information dissemination is threefold:

(a) Spreading awareness more broadly through society can be effectively achieved by including young people as one starting point. Based on experience around the world, efforts in the education sector have been shown to drive broader awareness in society. For example, at the primary and high school levels (which are referenced in the comment), it has been found in many countries such as in PNG that influencing the awareness of students on topics such as the environment or healthy eating is often an effective way to raise public awareness more generally. Students bring their learning home and influence their parents to adopt better practices.

(b) Leveraging the education channel makes an investment in the future by raising awareness in the next generation. The awareness building referred to in Outcome 4 is expected broadly to happen among the general public, so that project results will be leveraged and sustained. That is, the more that the public becomes aware of the potential of RE and EE for PNG, the more that various individuals and organizations will pay close attention to project results and replicate them on a wider scale across the country. And, the youth of the country (including students in tertiary education, students in high school, and students in primary school), are an important segment of the general public that the project intends to reach.

(c) Leveraging the education sector at the tertiary level raises the information possessed by persons that may potentially work in the more specific areas promoted by the project, such as mini-hydro mini-grids, solar PV mini-grids, and energy audits. This aspect (tertiary education curricula) of Output 4.4, then, contributes to PNG’s strengths in the specific areas of RE and EE promoted by the project demos. At present, while there are general technical courses in electrical engineering (at the University of Technology) and in electronics and instrumentation (at technical institutes) at the tertiary level in PNG, there is a lack of specific technical RE and EE course materials.

GEF6 CEO Endorsement /Approval Template-Dec2015

Note: Revised GHG emission reduction calculations indicate direct ERs for the project of 698,060 tons CO₂ (from the project demos and direct post project replications combined) and consequential ERs for the project ranging from 2,094,179 (bottom up approach) to 4,409,597 (top down approach) tons CO₂.

A.1.6 Innovation, Sustainability, and Potential for Scale Up

NA. The text below elaborates on the PIF.

The proposed project adopts several innovative approaches and incorporates sustainability and replication strategies across multiple components. First, the project is innovative in its selection of RE installation types and EE program type. For RE, the project will focus on mini-hydro and PV mini-grids. The project's PV mini-grid will be the first to date in PNG, so is clearly innovative in that regard. While there have previously been mini-hydro stations in PNG, the project's approach to ensuring these are installed in a methodical way, demonstrating a well-defined and low cost, is also innovative. In the past, those few mini-hydro stations that have been installed in PNG have been either of low quality (and thus prematurely short lifetime) or dependent mainly on capacity external to the nation. Further, lack of information on costs has led to quotes many times the reasonable level, which seemingly render the systems impractical on a cost level and present the risk of local communities and local governments being taken advantage of. In general, the project's focus on raising awareness of the cost competitiveness of RE and EE as compared to diesel in PNG is innovative. Past projects have not endeavored to raise awareness on a large scale of this issue. Further, the project's approach of ensuring that there is good information on sourcing and honest price engineering, construction, and civil works services is an innovative way of addressing a key problem plaguing many different types of projects in PNG – lack of knowledge by proponents of the fair price and of measures to take to be sure and get it. The project also takes an innovative approach in its capacity building programs for government officials. To ensure more results-oriented capacity building programs, these programs will each be carried out as a series of three workshops. Following each workshop in the series, participants will be required to do “homework” after their return home that includes key steps in the RE or EE project development process. The end result will be that each participant will develop one or two pipeline projects by the end of the workshop series. Finally, another innovative aspect of the project is its multi-channel media campaign, which aims to promote RE and EE, particularly community RE mini-grids and township EE programs, via various media channels, such as television, radio, print media, online news, social media, and text messaging.

Instead of relegating replication efforts to just one component, the project has strategically designed support for replication of the project demos in all four of its components. Further, the project puts strong emphasis on its demo provinces of Eastern Highlands Province, Milne Bay Province, and East Sepik Province, as well as on its other partners of Morobe Province and the Evangelical Lutheran Church, as channels for achieving replication of the project demos. As mentioned above, capacity building work with government officials in the planning, policy, and institutional component of the project takes a “learn by doing” approach in which actual pipeline projects will be the results of training. Such programs will be held not only in PNG's capital city of Port Moresby, but also in partner provinces, with district officials in attendance. The component further supports preparation of provincial level RE and EE plans, which will include specific pipeline projects and funding sources for them. The project's commercial and technical viability component supports replication by generating needed information on sourcing and honest costs, while at the same time implementing the demos and documenting their results. The financing component develops funds for both EE and community RE mini-grids, another element needed to promote replication. Finally, the information and awareness component has various aspects supporting replication, such as a listing of pipeline RE projects, RE resource assessments in partner provinces, and a one-stop-shop website to bring together all available information on RE and EE in PNG.

Replication, as covered above, is one means of ensuring sustainability of project results. Replication ensures that the results do not end with the project demos, but continue with new installations even after project close. In addition to replication (or “scaling up”), ensuring that both demo and replication systems have a long life and are taken care of after project close is another key aspect of sustainability. In this regard, the project design works to ensure there is strong ownership of systems by stakeholders and that mechanisms are put in place for ongoing success. On the financial sustainability side, the project will support the development of billing systems and PPAs, so that community RE systems have ongoing income to pay for repairs and pay for personnel to operate and maintain the systems. The project will promote the productive application of RE in the demo RE mini-grid communities. In this way, not only will incomes of local people be raised by making income-generating use of the power, but the revenues of the systems will also be raised, thus enhancing their financial sustainability. Further, the project will develop O&M training curriculum and train stakeholders in O&M, so that the systems can be technically maintained. The installed EE retrofits present less sustainability risk than the community RE mini-grid systems. Yet, as a part of the recommendations of the energy audits, recommendations on human usage habits and maintenance of equipment that impact EE will also be included. Lastly, sustainability of the two funding mechanisms that the project will design are ensured in that the funds will be administered not by the project, but by organizations that have a vested interest in the funds’ successes. PPL will administer the ESCO EE retrofit financing fund. The fund will be used in PPL’s township diesel centers, where less power use translates directly into less diesel use and therefore reduction in PPL’s financial losses from such diesel centers. The community RE mini-grid fund will be administered by a commercial bank that already has an SME fund. As the community RE mini-grids demonstrate long-term commercial viability via a steady stream of revenues, assuming proper and adequate actions are done to facilitate successful operation of the installed systems, the commercial bank will be incentivized by the success of such loans to continue with them as a means to ensuring success of their SME fund.

A.2. *Child Project?* If this is a child project under a program, describe how the components contribute to the overall program impact. N/A

A.3. Stakeholders. Identify key stakeholders and elaborate on how the key stakeholders’ engagement is incorporated in the preparation and implementation of the project. Do they include civil society organizations (yes /no); and indigenous peoples (yes /no)? ⁸
NA (For elaboration on the PIF, please see UNDP ProDoc Section IV, namely, the subsections: ii. Partnerships and iii. Stakeholder Engagement.)

A.4. Gender Equality and Women's Empowerment. Elaborate on how gender equality and women’s empowerment issues are mainstreamed into the project implementation and monitoring, taking into account the differences, needs, roles and priorities of women and men. In addition, 1) did the project conduct a gender analysis during project preparation? (Yes /No) Did the project incorporate a gender responsive project results framework, including sex-disaggregated indicators? (Yes /No); and 3) what is the share of women and men direct beneficiaries (women 40%, men 60%)? ⁹
NA. (For elaboration on PIF, please see ProDoc Section IV, subsection iv. Mainstreaming Gender, and ProDoc Annex 15. Gender Analysis).

⁸ As per the GEF-6 Corporate Results Framework in the GEF Programming Directions and GEF-6 Gender Core Indicators in the Gender Equality Action Plan, provide information on these specific indicators on stakeholders (including civil society organization and indigenous peoples) and gender.

⁹ Same as footnote 8 above.

A.5 Risk. Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation:

NA. (For elaboration on the PIF, please see ProDoc Section IV, subsection ii. Risk Management, Annex 8 Social and Environmental Screening, and Annex 10, Risk Log.)

A.6. Institutional Arrangement and Coordination. Describe the institutional arrangement for project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.

NA. The below provides elaboration on the PIF:

The FREAGER Project organization is illustrated by Exhibit 2.

CCDA will be the project implementing partner. As such, it will be responsible and accountable for managing the project, including the monitoring and evaluation of project interventions, achieving project outcomes, and for the effective use of GEF resources. National Implementation Modality (NIM) will be used for implementation with UNDP's support to the project. A separate Letter of Agreement (LoA) for UNDP's support services to the project will be signed between CCDA and UNDP.

PPL will be a responsible party for the project. Using the Responsible Party Implementation Modality, PPL will sign a Memorandum of Understanding with UNDP and CCDA. The MOU will outline the activities that PPL will be responsible for implementing.

The UNDP County Office will provide project assurance. UNDP (based on the support outlined in the LoA) will monitor the project's implementation and achievement of the project outputs and milestones, and ensure the proper use of UNDP/GEF funds. Additional quality assurance will be provided by the UNDP Regional Technical Advisor as needed.

The Project Board (also called Project Steering Committee) will include CCDA and UNDP as the leads and PPL as the supplier organization. It will include other project board members, such as DPE, ICCC, and NISIT. In addition, provincial partners, including Milne Bay Province, Eastern Highlands Province, East Sepik Province, and Morobe Province will have board membership. The Project Board will be responsible for making, by consensus, management decisions when guidance is required by the Project Manager, including recommendation for UNDP/Implementing Partner approval of project plans and revisions. In order to ensure UNDP's ultimate accountability, Project Board decisions should be made in accordance with standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. In case a consensus cannot be reached within the Board, final decision shall rest with the UNDP Programme Manager.

The National Project Director (NPD) will be the Director, Low Carbon Growth/Mitigation Division of CCDA, as delegated by the Managing Director (of CCDA). The NPD will be responsible for day-to-day oversight of the PMU, including strategic oversight and guidance to project implementation in close collaboration with UNDP. The NPD will not be paid from the project funds, but will represent a Government in-kind contribution to the Project. The NPD may sign and approve the project financial reports and the financial requests for advances or any contracts issued under NIM component of the project. The NPD may delegate the above activities to the National Project Manager. The NPD shall be assisted by

a National Project Manager and key technical and administrative staff. The NPD and D/NPD will be responsible for provision of overall oversight of technical coordination of the project with PPL and other stakeholders. He/She will also participate in meetings of the UN/UNDP Coordination Mechanisms.

The Project Manager will run the project on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the Board. The Project Manager function will end when the final project terminal evaluation report, and other documentation required by the GEF and UNDP, has been completed and submitted to UNDP (including operational closure of the project). The project manager will be recruited from the market. The project manager will oversee other project management office team members, who will be responsible for the overall management, monitoring and coordination of project implementation according to UNDP rules on managing UNDP supported projects.

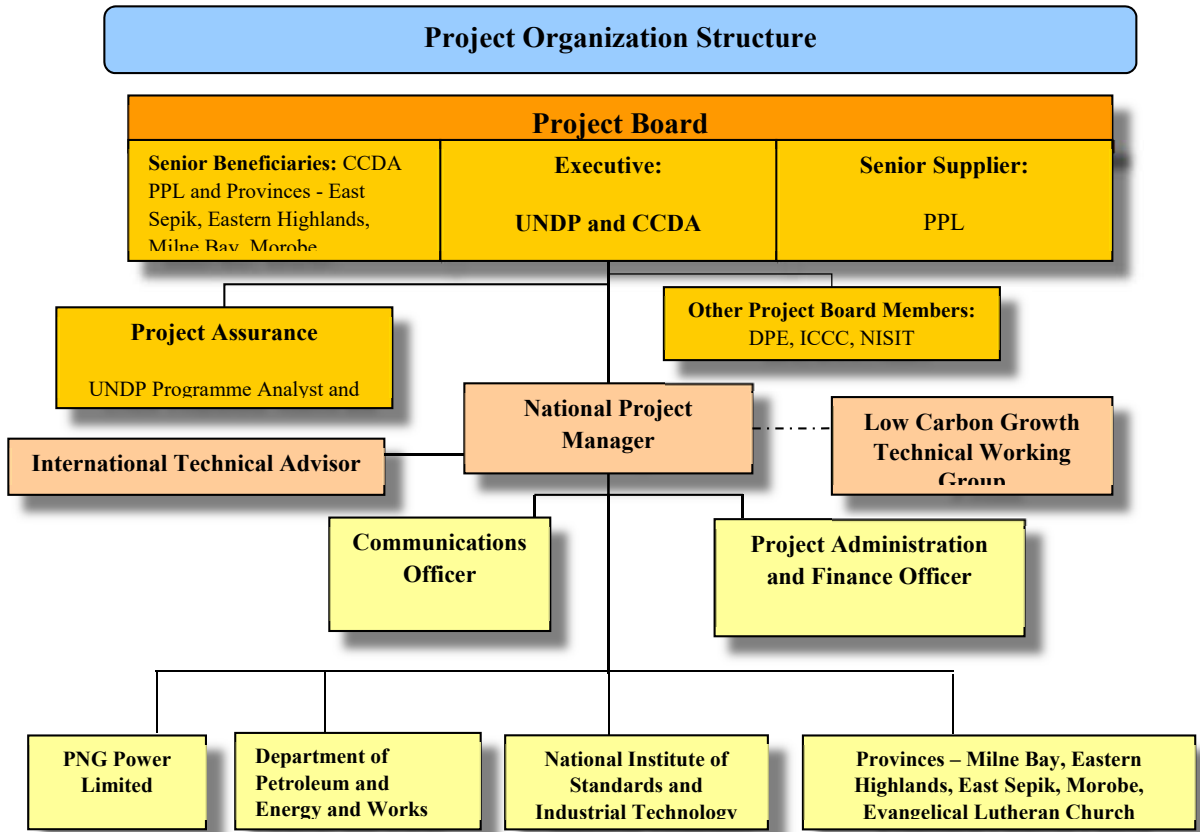
A Program Management Unit (PMU) will be established jointly by the UNDP and CCDA to be located within the latter's Low Carbon Growth/Mitigation Division. The primary roles of the PMU are to oversee, support, administer and coordinate the implementation of the project under the guidance of the National Project Director (in CCDA). The PMU shall be supported by regular personnel of CCDA and PPL, to be complemented by staff to be recruited under this project. The PMU will be led by the national project manager, who is referenced above. He/She will be assisted by an international technical advisor who will provide technical assistance to the PMU/CCDA/PPL and mentor the project manager. A communications officer will lead and provide guidance on implementation, and update as required a communication, consultation, and participation strategy for the project. A procurement and administration assistant will focus on financial management and procurement to ensure effective and efficient implementation of project activities.

The project will make use of the Low Carbon Growth Technical Working Group (TWG) currently managed by CCDA, comprising representatives from provincial governments, NGOs and industry. When necessary, the PMU will request the Low Carbon Growth TWG to coordinate technical support for the implementation of project activities.

The project will also extensively use a number of international and national consultants that will be selected based on UNDP principles.

The project will seek synergies with other ongoing donor-financed projects, as relevant. Projects of interest have been summarized in sub-section ii ("Partnerships) of ProDoc Section IV. Of these, three, due to their areas of focus, are the most likely to have synergies with FREAGER: (1) The World Bank-GEF Energy Sector Development Project has pursued a number of RE related policy initiatives at the national level that may have synergies with FREAGER's policy work. The World Bank-GEF project's wind resource assessment work, to be continued through 2017, may have synergies with FREAGER's work in RE resource data aggregation and establishment of a one-stop-shop website on RE and EE in PNG. (2) The IFC's multi-country Pacific Renewable Energy Generation Project, although focusing on grid-connected RE power generation, may have synergies with FREAGER. While FREAGER community RE mini-grid work has a somewhat different orientation, some mini-grid locations in which excess power is generated may have an opportunity to connect to the grid and sell power back to the grid. FREAGER's work in PPA design for such cases may have synergies with the IFC project. (3) New Zealand's development of a 1 MW mini/small hydro station in PNG's Enga Province is quite relevant to the work of FREAGER. Synergies between the two projects will be sought to leverage learning and experience.

Exhibit 2. Project Organization



Additional Information not well elaborated at PIF Stage:

A.7 *Benefits*. Describe the socioeconomic benefits to be delivered by the project at the national and local levels. How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCF/SCCF)?

The FREAGER project presents a compelling win-win situation in which actions with global environmental benefits have the potential for strong national and local socioeconomic benefits. Global environmental benefits of the project, presented in Annex 2 of the ProDoc, will be the substantial reduction in (and avoidance of future) GHG emissions. At the national level, PNG faces strong energy challenges, with only 85 percent of the population having access to electricity and with the nation’s many diesel powered township centers creating losses (as “loss centers”) for the national utility, PPL. As discussed earlier in this document, RE and EE have the potential of being cost effective solutions superior to diesel power generation in the long run for PNG. EE can reduce the financial losses for PPL. RE can increase electrification rates in off-grid (or low priority, frequent blackout grid-connected) areas. It can do so at a cost over time that is much less than that of diesel power generation.

Local level benefits overlap with national ones in the areas of cost savings and energy access. EE, by reducing power bills with investments that have short payback periods, can improve the bottom line of

businesses, institutions, and households. Businesses, as a result, can become more profitable; and households can have more disposable income, which may lead to greater stimulation of the economy in other sectors. RE can improve the lives and potentially incomes of local people who newly gain access to electricity. The project will promote productive applications of electricity so that local people not only benefit from the daily life conveniences of electricity, but can also use the electric power to improve their incomes. For example, they may be able to produce higher value coffee product using electricity based machines and therefore sell the coffee at a higher price. With electric ovens, as another example, women may be able to develop small baking businesses making scones and other breads. With the project's emphasis on productive use of RE for women, the economic position of women in particular, may be improved. For areas that switch from diesel to RE (or that reduce diesel consumption via EE), improved local air quality will be an important local benefit. Samarai Island, where diesel generators will be replaced by a PV mini-grid, will be an example of such improved air quality. As the island has hopes to increase its tourism business, the improved air quality will not only have health benefits for PPL staff and locals, but may increase the aesthetic qualities of the island and thus its attraction as a tourist destination.

A.8 Knowledge Management. Elaborate on the knowledge management approach for the project, including, if any, plans for the project to learn from other relevant projects and initiatives (e.g. participate in trainings, conferences, stakeholder exchanges, virtual networks, project twinning) and plans for the project to assess and document in a user-friendly form (e.g. lessons learned briefs, engaging websites, guidebooks based on experience) and share these experiences and expertise (e.g. participate in community of practices, organize seminars, trainings and conferences) with relevant stakeholders.

The proposed project has knowledge management woven throughout its design. Its fourth component, which focuses on information and awareness, in particular, will develop a number of knowledge products. A key output of the fourth component will be a “one-stop-shop” website on RE and EE in PNG. This output will bring together the many knowledge products of the project (from all components) and put them in a convenient place accessible to persons in PNG who wish to develop RE and EE projects, as well as to others in the region and world, who may learn from the experience of PNG.

Among the knowledge products developed by the project and included on the one-stop-shop website will be, from Component 2 (technical and commercial viability), reports on the experience and lessons learned via the project demos in the areas of PV mini-grid, mini-hydro mini-grid, productive uses of RE, and township EE programs. Also from Component 2 will be information on lowest cost sourcing channels into PNG of quality RE and EE products, information of “honest,” best costs of engineering, civil works, and construction aspects for mini-hydro and PV mini-grid projects in PNG, curriculum from technical training on micro/mini-hydro and PV mini-grid in PNG, and curriculum from technical training for EE in PNG (covering, in particular, refrigeration, AC, and industrial aspects).

From other outputs of Outcome 4, knowledge products of the project that will be included on the one-stop-shop website will be “how-to” guides on each of micro/mini-hydro and PV mini-grids tailored to the situation in PNG, briefings on the cost advantages of RE and EE as compared to diesel in PNG, educational curricula on RE and EE (including tertiary level curriculum on community RE mini-grids and building energy audits and high school and primary school materials to be integrated into more general coursework), print and online media articles on RE and EE in PNG, RE pipeline projects looking for funding and partnerships, and data on RE resources in PNG. The last of these, data on RE resources, will bring together information developed by the proposed project as well as information developed via other channels, such as wind resource data from the World Bank-GEF project.

From Component 1 (policy, plans, and institutions), all draft policies, roadmaps, standards, regulations, and plans, as well as their approval status, will be made available on the one-stop-shop website. Further, curriculum from various trainings for government officials will be made available on the website.

From Component 3 (financing RE and EE), items to be included on the one-stop-shop website will be curriculum from the financial sector capacity building workshops and materials on the ESCO fund and the community RE mini-grid loan fund. The fund materials will include information on how these funds work and how to apply to them, as well as case studies of experiences to date with projects that have been funded by them. Also from Component 3 to be included on the one-stop-shop website will be a guide on potential sources of funding for RE and EE, which will include “how-to” guidance on the most promising sources, such as the Green Climate Fund.

B. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:

B.1 Consistency with National Priorities.

The project is highly consistent with PNG’s national priorities, as well as with its commitments under the United Nations Framework Convention on Climate Change (UNFCCC). Yet, as explained, the project adopts new strategies to address these priorities that have a much higher potential for progress towards the priorities than business-as-usual approaches.

As for priorities and commitments in the area of climate change mitigation, the project, through its focus on the application of technologies that reduce greenhouse gas emissions, is highly consistent with documents indicating PNG’s climate change commitments and targets, which reflect the nation’s aim to achieve substantial reductions in GHG emissions. In its Copenhagen Accord response of 2 February 2010, for example, PNG stated it was seeking to “decrease GHG emissions at least 50 percent before 2030, while becoming carbon neutral before 2050,” subject to certain conditions (UNFCCC, 2010). In addition, PNG’s *National Climate Compatible Development Management Policy* indicates the same targets: (1) 50 percent GHG emissions reduction by 2030 and (2) carbon neutrality by 2050. The project, in its focus on RE and EE as a means of achieving GHG reductions, is further consistent with PNG’s *Second National Communications to the UNFCCC*, which indicates priority on actions and policies related to EE and RE applications in supporting economic and social development, as a win-win means to achieving climate change mitigation related goals. Also with regard to RE and EE, the project is highly consistent with PNG’s *Intended National Determined Contributions (INDC) under the UNFCCC*. This summary page of PNG’s INDC includes the following text: “...PNG’s current economic development is seeing a growth in fuel use therefore a big effort will be to reduce fossil fuel emissions in the electricity generation sector by transitioning as far as possible to using renewable energy. The target in this respect will be 100% renewable energy by 2030, contingent on funding being made available. In addition PNG will improve energy efficiency sector wide....”

In the area of energy access, the project is also highly consistent with PNG’s national priorities. From its low current base of about 15 percent of the population having access to electricity (2016), PNG targets that 70 percent of its population will have access to electricity by 2030. This target is included in PNG’s *National Electrification Rollout Plan*. The project, in its emphasis on controlling costs of community RE systems and creating sustainability of such systems through billing for power and encouraging productive applications, presents a practical avenue to this ambitious goal of bringing electricity to an additional 55

percent of PNG’s population (about 4.2 million people out of a total population of 7.7 million) over the next 14 years.

Further, with regard to energy resources, the project is highly consistent with PNG’s long-term targets. In its *Vision 2050*, issued in 2009, the government indicates a target of achieving 100 percent renewable energy power generation in PNG by 2050. Yet, the long-term plan lacks a detailed roadmap of how to reach the target; and progress since 2009 has been limited. In this regard, FREAGER lays the groundwork for a concrete path towards the long-term vision, via its work in community RE mini-grids and replication of these.

Lastly, the project’s emphasis on productive applications of RE in rural areas, as a means of raising local incomes, is consistent with *Vision 2050*’s goals for broad-based economic development that encompasses the rural population.

C. DESCRIBE THE BUDGETED M&E PLAN:

Exhibit 3 below summarizes the project’s budgeted M&E Plan. FREAGER’s M&E will be conducted at multiple levels. At the most basic level, a project management office team member will be responsible for tracking project indicators and preparing quarterly reports and initial drafts of annual project reports. Also at the level of project team members, site visits to the project demos will be carried out to monitor their progress. (CCDA and UNDP may also participate in these site visits.) At the next level, the full project team will meet periodically and at least once per quarter to discuss project progress, indicators, and problems encountered in project management. The Project Board will, in turn, meet at least once every six months to monitor and evaluate project progress, taking actions as necessary. In addition to the foregoing measures, the project will commission a mid-term review after about two years of implementation and a terminal evaluation after about four years of implementation, as the project is nearing its close. These evaluations will be carried out by parties who have not previously been involved with the project. The project’s M&E plan and indicators will be finalized at the time of inception.

Exhibit 3: FREAGER Budgeted M&E Plan

M&E Activity	Primary responsibility	Indicative costs to be charged to the Project Budget ¹⁰ (USD)		Time frame
		GEF grant	Co-financing	
Inception Workshop	UNDP Country Office	7,600	20,000	Within two months of project document signature
Inception Report	Project Manager	None	None	Within two weeks of inception workshop
Standard UNDP monitoring and reporting	UNDP Country Office	None	None	Quarterly, annually

¹⁰ Excluding project team staff time and UNDP staff time and travel expenses.
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M&E Activity	Primary responsibility	Indicative costs to be charged to the Project Budget ¹⁰ (USD)		Time frame
		GEF grant	Co-financing	
requirements as outlined in the UNDP POPP				
Monitoring of indicators in project results framework	Project Manager	16,000 (@ USD 4,000/year)	40,000	Annually
GEF Project Implementation Report (PIR)	Project Manager and UNDP Country Office and UNDP-GEF team	None	None	Annually
NIM Audit as per UNDP audit policies	UNDP Country Office	16,000 (USD4,000/year)	20,000	Annually or other frequency as per UNDP Audit policies
Lessons learned and knowledge generation	Project Manager Contractors for Outcome 4	Various activities under Outcome 4, budgeted separately from M&E	Various activities under Outcome 4, budgeted separately from M&E	Annually
Monitoring of environmental and social risks, and corresponding management plans as relevant	Project Manager UNDP CO	None	20,000	On-going
Addressing environmental and social grievances	Project Manager UNDP Country Office BPPS as needed	None for time of project manager, and UNDP CO	As needed	As needed
Project Board meetings	Project Board UNDP Country Office Project Manager	12,000 (USD 3,000/year)	25,000	At minimum annually
Supervision missions	UNDP Country Office	None ¹¹	25,000	Annually
Oversight missions	UNDP-GEF team	None ¹¹	As needed	Troubleshooting as needed
Knowledge management as outlined in Outcome 4	Project Manager	Activities under Outcome 4, budgeted separately from M&E	Activities under Outcome 4, budgeted separately from M&E	On-going
GEF Secretariat learning missions/site visits	UNDP Country Office and Project Manager and UNDP-GEF team	None	10,000	To be determined
Mid-term GEF Tracking Tool	Project Manager Contracting organization	10,000	10,000	Before mid-term review mission takes place

¹¹ The costs of UNDP Country Office and UNDP-GEF Unit's participation and time are charged to the GEF Agency Fee. GEF6 CEO Endorsement /Approval Template-Dec2015


M&E Activity	Primary responsibility	Indicative costs to be charged to the Project Budget ¹⁰ (USD)		Time frame
		GEF grant	Co-financing	
Independent Mid-term Review (MTR) and management response	UNDP Country Office and Project team and UNDP-GEF team	21,250	20,000	Between 2 nd and 3 rd PIR
Terminal GEF Tracking Tool	Project Manager Contracting organization	10,000	10,000	Before terminal evaluation mission takes place
Independent Terminal Evaluation (TE) included in UNDP evaluation plan, and management response	UNDP Country Office and Project team and UNDP-GEF team	26,200	30,000	At least three months before operational closure
Translation of MTR and TE reports into English	UNDP Country Office	NA	NA	----
TOTAL indicative COST Excluding project team staff time, and UNDP staff and travel expenses		119,050	230,000	----

PART III: CERTIFICATION BY GEF PARTNER AGENCY(IES)

A. RECORD OF ENDORSEMENT¹² OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S):

NAME	POSITION	MINISTRY	DATE
Gunther Joko	GEF Operational Focal Point	Conservation & Environment Protection Authority	6 May 2015

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF policies¹³ and procedures and meets the GEF criteria for project identification and preparation under GEF-6.					
Agency Coordinator, Agency name	Signature	Date	Project Contact Person	Telephone	Email
Adriana Dinu UNDP/GEF Executive Coordinator		May 5, 2017	Manuel L. Soriano Sr. Technical Advisor Energy, Infrastructure, Transport & Technology	+66-2-304- 9100 Ext 2720	manuel.soriano @undp.org

¹² For regional and/or global projects in which participating countries are identified, OFP endorsement letters from these countries are required even though there may not be a STAR allocation associated with the project.

¹³ GEF policies encompass all managed trust funds, namely: GEFTF, LDCF, and SCCF
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ANNEX A: PROJECT RESULTS FRAMEWORK

This project will contribute to the following Sustainable Development Goal (s): SDG7 - Ensure access to affordable, reliable, sustainable and modern energy for all					
This project will contribute to the following country outcome included in the UNDAF/Country Programme Document: Cluster 4 Outcome - Government and civil society have enhanced their capacity to implement biodiversity conservation, low carbon and climate resilient development initiatives for environmental sustainability, and improved community livelihoods to reduce the vulnerability of women, girls, men, and boys to disaster risks					
This project will be linked to the following output of the UNDP Strategic Plan: Output 1.5. Inclusive and sustainable solutions adopted to achieve increased energy efficiency and universal modern energy access (especially off-grid sources of renewable energy)					
Strategy	Objective and Outcome Indicators	Baseline	Mid-term Target	End of Project Target	Critical Assumptions
Project Objective: Enabling of the application of feasible renewable energy and energy efficiency technologies for achieving greenhouse gas emission reduction in PNG	Cumulative tons of GHG emissions reduced from business as usual via adoption of community RE mini-grid projects and township EE programs in PNG (tons CO ₂) ¹⁴	0	4,517.2	16,878.5	Commitment of the government to RE&EE, irrespective of the party in power, will not change
	Number of new households in rural areas and townships that have access to RE mini-grid generated electricity service or make use of established EE programs ¹⁵	0	1,710 (with at least 20% woman-headed households)	7,550 ¹⁶ (with at least 20% woman-headed households)	Commitment of the government to RE&EE, irrespective of the party in power, will not change
	Total new reductions in or newly avoided amounts of annual diesel consumption achieved via installation of community RE mini-grid systems and total new reductions in annual diesel consumption from improved EE in industrial plants, commercial and institutional buildings, homes, and street lighting achieved via township EE programs (liters diesel per year)	0	2,308,319 ¹⁷	8,839,034 ¹⁸	---
Outcome 1: Rigorous implementation and	Government funding allocated for pipeline community RE mini-grid and township EE programs	0	5	20	Government puts high priority on budget allocated to

¹⁴Based on direct greenhouse gas emission reductions that are achieved by the project demos during the lifetime of the project.

¹⁵Examples include EE appliance and lighting credit programs.

¹⁶Targets for the project demos For RE mini-grids: 1,250 persons in Miruma, 2,000 in Gotomi, 300 in Samarai, with assumption of 5 persons per household, so a total of 710 households; targets for project EE residential credit program: 2,500 persons in Wewak and 2,500 persons in Maprik, so, about 1,000 households total, if assuming 5 persons per household. Demo populations are assumed to be reached by end of year two of project. Replication for RE mini-grids is 4x and that for township EE programs is 3x, all assumed to be initiated by end year four/ end of project.

¹⁷Breakdown is as follows: Amount of diesel reduction resulting from RE mini-grid systems is 695,471 liters diesel per year and amount resulting for EE programs is 1,612,847.9 liters per year.

¹⁸ Breakdown is as follows: Amount of diesel reduction resulting from RE mini-grid systems is 3,477,355 liters diesel per year and amount resulting for EE programs is 5,361,679.3 liters per year.

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enforcement of approved national and provincial energy policies, plans, and standards to promote the application of renewable energy and energy efficiency technologies	designated in national and provincial level RE and EE plans or roadmaps, including both equity and loan funding (USD million)				community RE mini-grid projects and township EE programs among all budget items
	Number of areas in which newly adopted policies and standards (since project launch) promote RE and EE. ¹⁹	0	4	9	Government commits to promoting and implementing community RE mini-grids and township EE programs via improved policies, regulations, and standards
Outcome 2A: Enhanced technical-commercial viability and capacity in the application of energy efficiency technologies and development of feasible RE-based energy systems in the country	No. of new jobs created (or no. of new entrants in the labor force) in the RE or EE sectors in areas such as project development, engineering design, costing and business aspects, and operations and maintenance.	0	30 (of which, at least 20% are women)	100 (of which, at least 20% are women)	---
	Number of cases of high quality RE mini-grid systems achieved at low end international cost benchmarks ²⁰	0	3	12	Organizations providing civil works and construction services make selves available to provide needed services at reasonable costs/ with reasonable, but not excessive profit margins
Outcome 2B: Increased installed capacity of RE based power systems and implementation of viable EE technology applications in PNG	Total capacity of proposed community RE mini-grid systems that are financed (by banks) or approved by local government (for installation permit), kW	0	1,550 ²¹	4,650 ²²	--
	No. of homes and other buildings that are supplied with power from RE mini-grid projects that have received financing or permits	0	7,500 (of which, at least 20% are owned by women)	22,500 ²³ (of which, at least 20% are owned by women)	---

¹⁹The expected policy areas include: (1) waiving of tariffs for imported community RE mini-grid equipment and parts, (2) waiving of tariffs for energy efficient equipment, (3) ICCC policy for licensing of and selling of power by community RE mini-grid owners, (4) Department of Land and Physical Planning policy to support ILG development, operation, and management of community RE mini-grids, (5) other financial incentives for community RE mini-grids, (6) other financial incentives for EE retrofits, (7) new energy efficiency standards in building code, (8) new standards for community RE mini-grid equipment, (9) new standards for energy efficient lights, ACs, and refrigeration.

²⁰One point should be allocated for each quality system that achieves one of the two following costing benchmarks: (1) mini-hydro: USD3,000 per kW or less, (2) PV mini-grid including batteries: USD6,000 per kW or less. Quality defined as those that operate well for ten months or more without substantial problems and that use quality equipment as identified in the project's sourcing work.

²¹This assumes there are a total of 10 systems, 7 of which are roughly 200 kW mini-hydro systems and 3 of which are roughly 50 kW PV systems.

²²This assumes there are a total of 30 systems, 21 of which are roughly 200 kW mini-hydro systems and 9 of which are roughly 50 kW PV systems.

²³ Based on average of Miruma, Gotomi, and Samarai households projected to be powered by their RE mini-grids $(1,250+2,000+300)/5 = 710$ households on average powered per mini-grid; adding an average of 40 non-home buildings per mini-grid, results in an average 750 buildings powered per mini-grid.

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	No. of proposed township EE programs that are financed by PPL and/or provincial governments	0	2	10	---
Outcome 3: Improved availability of, and access to, financing for renewable energy and energy efficiency initiatives in the energy generation and end-use sectors	Total committed new debt and equity financing of community RE mini-grid projects in PNG, including bank, private/commercial sector, or international funding but not including government funding (USD)	\$0.0	\$15 million	\$75 million	Communities have the resources to pay tariffs for power services
	Total committed new debt and equity financing of township EE retrofits in PNG, including PPL, bank, private/commercial sector or other international funding, but not including government funding (USD)	\$0.0	\$3 million	\$10 million	---
	No. of banks or other entities (aside from donors) that are providing debt financing for community RE mini-grids and EE technology application projects in PNG	0	1	3	---
Outcome 4: Improved awareness of, attitude towards, and information about renewable energy and energy efficiency applications in the energy generation and end-use sectors	Number of RE and/or EE project developers and investors, including engineering and construction firms, communities, building and industrial facility owners, etc., that have made use of project generated information found in its one-stop-shop information base or elsewhere ²⁴ to develop and implement RE and EE projects	0	5	40	---
	Number of relevant policy makers that support and endorse RE and EE initiatives in development plans	0	5	20	---
	Number of manufacturers in PNG profitably producing RE and/or EE related equipment	0	2	5	Local equipment manufacturers have the capacity and interest to expand their product scope

²⁴ Including how-to guides, RE resource data, RE pipeline projects list, and project demo monitoring reports, etc.
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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).

B-1. Responses to STAP Comments of September 26, 2015

Note: All responses to STAP comments are newly added during the PPG phase.

STAP Comment 1. Project focus on policy development to support RE and EE in PNG is commendable (since there is no national energy plan as such) and technology deployment is encouraged, including by financial support and improved awareness creation. Earlier capacity building programs are to be reviewed.

PPG-Phase Response to STAP Comment 1. Thank you for this input. During the PPG, we found that past donor support has faced some challenges in promoting policy development, particularly because of overlapping mandates among organizations, such as between DPE and PPL. As a result, FREAGER will provide support in improving coordination among organizations. It will further take a bottom-up approach to policy, demonstrating successful technologies and successful plans in the provinces as a means of creating evidence for and buy-in from national level policy makers to participate in the design and eventual approval of policies. One other important decision made during the PPG phase design is to focus central level policy work more narrowly in order to make it more likely targets will be achieved. Thus, policy and standards work will emphasize RE mini-grids (PV and micro/ mini-hydro) and diesel township center EE programs rather than targeting the full range of RE technologies, which is quite broad, both in resource type and scale. Capacity building is a key part of project design and the project's capacity building for government officials at the national, provincial, and district levels included in the project is quite extensive. In order to make the capacity building more effective, it has been decided that various capacity building programs for government officials will each be carried out as a series of three workshops. After each workshop in the series of three, attendees will have homework, which will be steps in the RE mini-grid project or township EE program development process. This "homework" approach is being taken to ensure more concrete results from capacity building workshops than might have been achieved in the past. This approach draws from the field of learning theory, in which many have noted that adults learn best by doing, rather than just by hearing or seeing.

STAP Comment 2. PNG has good RE resources but few have been captured to date due mainly, it is claimed, to lack of suitable expertise to identify and develop projects. Even the power utility PPL that employs technical experts, lacks capability on RE grid integration. This lack of expertise also applies to EE opportunities and as a result few private sector initiatives exist.

PPG-Phase Response to STAP Comment 2. This is also an important point. We agree that lack of suitable expertise in PNG is one of the key barriers. Part of that expertise is purely technical, but part of it has a lot to do with sourcing and costing. During the PPG, we found that costs quoted for mini-hydro systems vary widely and no one seems sure, really, how much things should reasonably cost. To address your concern (and the specific issues of technical expertise, sourcing expertise, and costing expertise), the project will make strong use of international consultants that have the required expertise for relevant activities. International consultants will be teamed with national consultants and work together to bring the technical, costing, and sourcing expertise needed to PNG. This expertise will be disseminated via capacity building workshops, documentation of the demos, and the project's one-stop-shop website.

STAP Comment 3. In spite of many previous efforts, there remains a lack of general understanding of the benefits from EE and RE. A number of projects funded by ABD, WB, NZAid, and governments are already in place on RE electricity generation, rural electrification, and RE resource mapping. Biomass and bioenergy is mentioned as having potential. Is biomass to be included in the RE resource assessment? There is no specific mention of renewable heat (arising from solar thermal or biomass) being incorporated in the proposed national energy plan or policies.

PPG-Phase Response to STAP Comment 3. About the lack of understanding of the benefits of EE and RE, this is a key point that you have made that has been incorporated into our project design. Working closely with PPL in the PPG design work, we gathered information that shows RE and EE have huge cost benefits over long-term use of diesel generators in PNG. This is important because PPL is using diesel generators in many of its township centers and even to supplement power in those places that have access to electricity generated by large hydropower facilities. In places where PPL is using diesel generation only, the financial losses to the company are substantial. They are anxious to turn this situation around. Part of the roles of the demos will be to demonstrate this cost competitiveness and that is why we are focusing on ensuring that sourcing and overall costing is kept down via expert input and documentation. In addition, we have a specific output that will generate briefings for policy makers on the cost competitiveness of RE mini-grids and EE programs as compared to diesel generation. These briefings will be proactively disseminated via face-to-face meetings with policy makers at the national and provincial levels. About biomass/ bioenergy and solar thermal, we have decided to make the project more effective by narrowing the scope. Therefore, we will be focusing on micro/ mini-hydro and PV mini-grids only on the RE side. A number of considerations came into play in selecting mini-hydro mini-grids and PV mini-grids as the two areas of focus for the RE aspects of the project. Most importantly, these were both found to be areas in which the project has potential to have a high degree of impact. The PV mini-grid will be the first system of its kind in PNG and the potential for replication is substantial. In contrast, for example, there is already significant experience and other donor activity with PV solar home systems (SHSs) in PNG. And, mini-hydro mini-grids were seen as having high potential for being the most cost effective means of getting power to many off-grid communities in PNG, though there is a great need for technical assistance to achieve this. Finally, the mini-grid potential of these technologies was attractive to our project partners and co-financiers, particularly PPL (PNG Power, Ltd.). The strong role of PPL in the project and the focus of the Government on expanding access to electricity further cemented the selection of these two technologies, which have strong mini-grid potential. With regard to policy work, we will also focus largely on these more narrow areas only.

STAP Comment 4. An ADB project on EE in the Pacific has been completed. However, as energy demand continues to grow with electrification, economic growth, and dependence on diesel fueled generation, GHG emissions are increasing. Nevertheless, there should be lessons to learn from the EE project and an evaluation of outcomes should be undertaken before further investment. While the proposal has some degree of assessment for RE technologies and options, EE options and sectors are not assessed properly.

PPG-Phase Response to STAP Comment 4. We have looked at lessons learned from previous EE projects during the PPG phase. What we learned is that EE work has been undertaken in the capital of Port Moresby supported by ADB. The focus was on lighting. There was success with a very fast payback project of lighting retrofits of PPL's office building in Port Moresby. This case study (especially the fast payback and monthly savings on the energy bill) will be useful as we work with township centers to encourage them to implement EE audits and retrofits. Yet, this earlier work did not go beyond lighting. There is a need to address air conditioning and refrigeration and also get experience in industrial EE in PNG. One of the challenges reported with the ADB work is difficulties measuring EE savings due to growth of energy

consumption in Port Moresby. For FREAGER, there will be an emphasis on measuring energy savings within individual systems of buildings or factories the project addresses so that the EE savings can be proven. As for technologies, the project will focus on the areas mentioned (lighting, AC, refrigeration, industrial). Yet, there will be assessment and support for sourcing quality product at good prices. There will also be standards and certification work corresponding to relevant EE products under the project's policy component.

STAP Comment 5. The alternative scenario as proposed makes good sense in theory, though in practice it is fairly ambitious since there are many different threads running through it. So without the stated ~\$15M investment from the national and provincial governments, it will not be achieved. There is also some concern over the present capacity of government departments to manage all the various sub-components given some are fairly specialist. So the capacity building component of the project is critical. Are there some people with knowledge gleaned from the previous capacity building projects who can assist? Who exactly will undertake the training of government officials, financiers, bankers?

PPG-Phase Response to STAP Comment 5. The project design has been made much more specific through the PPG phase. The narrowing of scope will make the various threads more manageable. In particular, the PPG team found that, for the project to cover renewable energy in PNG in a comprehensive way, would be to be too ambitious. Thus, the team has narrowed the focus of many of the RE-related activities to RE mini-grids, either micro/ mini-hydro or PV mini-grid. As for co-financing, the demo co-financing will be particularly important. Because PPL has already fully allocated financing for one demo (the Samarai PV mini-grid) and has a strong financial interest in allocating its committed financing for the East Sepik Province EE demos, this portion of co-financing is quite likely to materialize. In East Sepik Province, PPL is losing money daily due to the high cost of diesel fuel and therefore has a strong interest in supporting the up-front costs of EE measures that can help to reduce current diesel consumption losses or at least reduce business-as-usual growth in losses from growth in diesel consumption. The PPG design team agrees with the reviewer that capacity building is critical and has designed extensive capacity building for the government sector into the project. There is also capacity building for the technical sector (e.g. engineering firms) and the banking and financial sector. For all of this capacity building, workshop curriculum design and the workshops themselves will be led by international experts working closely with local experts. The strategy is that the international experts will bring the specific technical and/or sector expertise needed while the national consultant will help tailor the materials and workshops to the local situation. In terms of management of the components, the project will recruit for its PMO team a part-time international expert that has the specific expertise needed to support the national team in management of all project components, thus adding international expertise to local knowledge and management skills.

STAP Comment 6. The assessment of GHG reduction from the project is very tenuous. No details are provided and it will not be possible to measure whether the target reduction level of 4.795 Mt CO₂-eq will be met based on the information provided. Under the proposed NEP there will be targets for EE and RE it is claimed, and this would enable GHG emission targets to be assessed. It is not clear when the NEP will be produced and there is no risk shown in Section 4 that it will not be produced. Success of the project appears to hinge on a NEP being produced, supporting policies being developed, and government funding invested in delivering on the targets. Is that likely to be achieved within the 4 year timeframe of the project? Updated GEF GHG accounting guidelines should be used when reporting project emissions (available at: <https://www.thegef.org/gef/node/11187>).

PPG-Phase Response to STAP Comment 6. The implementation of the NEP-related activities under Component 1 of the FREAGER project will be in coordination with the WB project that develops the NEP.

These activities build on the work carried out under this WB project to supplement and augment it and where appropriate enhance it so that the much needed energy policies are approved and effectively enforced. Considering the ongoing national energy policy development activities under the WB project, and building on these, the proposed project activities on energy policy development and implementation are those that will deliver the approved and enforced revised NEP that include LC development policies and strategies; and, approved and enforced LC development standards, policies, and implementing rules and regulations in cities/towns, provinces and districts. With these outputs, the main expectation is that there will be rigorous implementation and enforcement of the approved energy policies both at the national and provincial levels during the project implementation period, possibly by start of Year 3. Obviously, the desire is that the policy implementation will be smooth sailing. Nevertheless, the project team anticipates the risk of the approved policies not enforced or not properly or strictly enforced (see Exhibit 12 and Annex 10 of ProDoc). If such risk will eventuate, the non-enforcement of the approved energy policies will negatively affect sectoral policy direction and commitment towards RE/EE development in PNG. To prevent such risk from happening, the project has been designed to include advocacy on policy change through planned intensive communication and advocacy activities. Furthermore, the approach of briefing policy makers on the cost advantages of RE and EE and showing them proof of concept with the project demos will be applied to ensure they will support RE and EE development.

Considering the point raised by the reviewer about the risk of basing the GHG emission reduction that will be attributable to the FREAGER Project on the targets that were in line with the previous draft NEP, the approach for the GHG emissions reductions has been revised to focus fully on ERs achieved by the project demos and their replication. Thus, the expected ERs are considered to be much more achievable. The GHG emissions reductions are detailed in an annex on this topic (Annex 2 of the ProDoc). These in turn are based on data and information in detailed demo descriptions, a roughly one hundred page document prepared during the PPG phase. Thus, the project-related GHG ERs have been based on more specific planning of micro/ mini-hydro mini-grids, PV mini-grids, and township EE programs for diesel centers and to assist local officials in developing pipeline projects and programs. Finally, per the recommendation, various GEF guidance documents have been referenced in preparing the GHG emission reduction estimates. These include predominantly: *Guidelines for Greenhouse Gas Emissions Accounting and Reporting for GEF Projects: Findings and Recommendations of GEF Working Groups* (May 7, 2015) and *Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects* (April 16, 2008).

STAP Comment 7. Project proponents are advised to consult STAP guidance on biofuel projects available at:

<https://www.thegef.org/gef/node/11215>

PPG-Phase Response to STAP Comment 7. Thank you for this reference. As mentioned, the design team has determined that greater focus within the RE activities is needed to ensure results. Thus, the project will not address biofuel projects and instead focus, for its RE aspects, on micro/ mini-hydro mini-grids and PV mini-grids.

STAP Comment 8. Community-based programs to support EE/RE are useful but given low awareness and lack of capacity, it is not clear how feasible they will be and how responsibilities will be shared between national and local authorities. This important part of the proposal needs further development and explanation of targeted approach. The latter may include support for RE options combined with capacity building in sustainable use of natural resources in targeted communities.

PPG-Phase Response to STAP Comment 8. As mentioned, the project has shifted to a more narrow focus for its RE demos and much of the related RE work. The more narrow focus of the demos is on community micro/ mini-hydro and PV mini-grids. As mentioned, the project will also have capacity building for local officials in which they develop more such RE mini-grid projects. In PNG, provincial level officials and district level officials have annual allocations for which infrastructure should be one of the main targets. These allocations are called PSIP (provincial level) and DSIP (district level). Officials may be encouraged through the project to allocate monies for community micro/ mini-hydro and community PV mini-grids from their PSIP and DSIP funds. On the community side, there may be land issues. The project encourages communities to set up ILGs (indigenous landowner groups). The project will also support the Department of Lands at the national level in developing policy to promote community RE mini-grids.

B-2. Responses to GEF Council Member Comment of Oct. 13, 2015

GEF Council Member Comment 1. Germany seeks clarification on one question: PNG is a net exporter of fossil fuels. The project seeks to “displace” the fossil fuels used in PNG for its own use, as part of its goal to become carbon neutral. Will the “displaced” fossil fuels be made available for export, i.e. burned elsewhere, or not extracted? Please provide information about plans for the further development of PNG’s fossil fuel resources to put the national renewable energy development goals into context.

PIF-Stage Response to GEF Council Member Comment 1. The fossil fuels that are used in the energy consuming sectors, i.e., non-forest sectors of PNG are mainly natural gas and petroleum fuels (gasoline, diesel, fuel oil, LPG and natural gas). According to the Asia Pacific Energy Research Center (APEREC, 2012), the primary energy supply of the country in the 2010–2035 period is projected to grow an annual rate of 4.5%. Oil, which was the predominant form of energy before 2010, will be increasingly supplemented with natural gas and renewable energy (mainly geothermal). PNG has historically been a modest oil exporter, but could become an oil importer after 2020, unless new reserves of oil are found. In 2014, the country became a major LNG exporter. But supply of natural gas for domestic use is very limited. Bulk of the natural gas (LNG) production is committed to the export market.

PNG’s oil production started in 1991, but has been declining since 1993. The exiting oil fields are projected to be depleted by 2026. In 2005, PNG’s first oil refinery started production, sourcing crude oil from both local oil fields and imports. Below is the summary of the medium-term development plan targets in the country’s oil industry.

Indicator	Source	Baseline (2009)	2015 – 2025 target	2030 target
Volume of crude oil production	DPE	13.7 million barrels produced	Produce > 13.7 million barrels	Sustain crude oil production 2009 levels
Remaining oil reserves	DPE	575.5 million barrels	Increase proven reserves by 20%	Increase proven reserves by 70% compared to 2009
Refinery production	DPE	5.8 million barrels of oil processed	Increase 2009 feedstock level by 1 million barrels	9 million barrels processed

Source: PNG Medium Term Development Plan 2011-2015.

In the context of proposed project's planned displacement of fossil fuels with RE resources, the primary objective is the reduction of GHG emissions from the use of fossil fuels. Considering the crude oil production targets, and the fact that part of the crude oil requirements is being imported to augment the shortfall from the domestic crude oil production, it is most likely that the displaced fossil fuels will not be exported but used in other sectors where the demand for such energy carriers is high and cannot be feasibly replaced by RE resources. For example, the oil consumption in the transport sector.

B-3. Responses to GEF Secretariat Comments of August 6, 2016

GEF Secretariat Comment 1. Please change to CCM Object 1, Program 1, because most of the project cost will be used for policy and technology application, and component 3 is not eligible under Program 2.

PIF-Stage Response to GEF Secretariat Comment 1. The PIF has been revised to reflect project alignment with climate change program strategy CC1: Program 1 since the proposed project covers development, demonstration and financing of low carbon (LC) technologies and mitigation options, including policies to support these.

GEF Secretariat Comment 2. The page 7 explains that there is policy barrier because there is no national energy policy, but on page 17, this project is in line with draft National Energy Plan. Please provide information of National Energy Plan, and clarify what barrier will be remained even this plan is finalized and implemented.

PIF-Stage Response to GEF Secretariat Comment 2. Correction has been made in regards to what is actually being referred to in the PIF. It should be National Energy Policy (NEP) not national energy plan that should be stated in Part II, Sec. 6. There is a proposal to develop a national energy plan based on the NEP. There is currently a draft NEP (there are actually two versions, one with Department of Petroleum & Energy (DPE) and the other with the Department of Public Enterprise that oversees state owned public enterprises such as PPL) and no official national energy plan. What is available is the PNG Mid-term Development Plan 2011 2015 (MTDP) that consists, among others, a section on energy development. In that section of the MTDP it is stated that the general aim for energy development is for "all households to have access to a reliable and affordable energy supply, and sufficient power is generated and distributed to meet future energy requirements and demands." The target is to achieve 70% electrification by 2030, and to achieve this, the focus of the country is on expanding natural gas, hydro, and other RE based power generation capacity.

To come up with the national energy plan, the NEP has to be first clearly delineated and officially established and enforced. There is work that is ongoing on the drafting of the NEP. The proposed GEF project intends to build on such work to supplement and augment it and where appropriate enhance it. Based on information from the DPE, the project proponents think that the current work on developing the NEP can use additional support from the GEF to ensure that appropriate energy policies are formulated, recommended, approved and effectively enforced. While the current approach focuses on energy generation infrastructures, the proposed

GEF project will address the policy issues that would make these energy generation assets support the achievement of broad improvement in living standards in the country. Among those that need to be enhanced are on: (a) energy regulatory framework; (b) energy development and utilization policies; and, (c) enforcement of proposed and existing energy policies and strategies. The remaining issues concerning the lack of capacity for the application of LC development procedures, standards, policies and implementing

rules and regulations (IRRs) on the promotion and incorporation of EE & RE applications in city/town, province and district development planning and implementation, still have to be addressed. Furthermore, the related institutional issues on the effective implementation of the energy policies, and LC development standards, policies, and IRRs, including institutional mechanisms that integrate LC development with the socio economic, climate change and disaster management objectives of the country, will also have to be addressed.

GEF Secretariat Comment 3. Also please clarify what NEP stands for, National Energy Plan or National Energy Policy.

PIF-Stage Response to GEF Secretariat Comment 3. NEP stands for National Energy Policy. There is at the moment no national energy plan. The intention is to develop the national energy plan based on the NEP.

GEF Secretariat Comment 4. Please include financial sectors as stakeholders, otherwise the financial scheme will not be properly developed and implemented.

PIF-Stage Response to GEF Secretariat Comment 4. Yes the financial sector is a key stakeholder of the project and will be involved in the design, establishment and operationalization of feasible financing models and schemes to facilitate financing of LC (e.g., EE and RE) development projects. The table in Part II, Sec. 2 has been revised to include the banks/financial institutions and their expected role in the preparation/design of this proposed project.

GEF Secretariat Comment 5. It proposes community based application of energy efficiency (EE) and renewable energy (RE) as innovation. Please describe this application in the main document, not in the footnote (e.g. no.14 on page 11).

PIF-Stage Response to GEF Secretariat Comment 5. The previous and current electrification projects in the country are mainly infrastructure related and focus more on big capacity power generation projects that are either RE, or non RE based. Obviously, to meet the target of 70% electrification by 2030, more power generation capacity has to be installed. Also, to achieve the target of carbon neutrality in 2050, the utilization of available feasible renewable energy resources for power generation, and the application of feasible RE and EE technologies in the energy end use sectors are necessary. Past initiatives on the application of RE technologies are mainly on big size hydro, geothermal and biomass power generation applications funded by the GOPNG, donors and foreign investors. Because of the lack of investments in the maintenance of the infrastructures installed and in performing operational maintenance on existing power generation, transmission and distribution assets, the country (particularly the countryside) experience unreliable electricity supply and ultimately higher social and economic cost. On EE, previous initiatives have been on capacity building. But still up until now, the general levels of EE awareness and knowledge/skills on EE technology/technique applications among the energy end users are low. This project will help facilitate, contribute to, lay the groundwork, and pave the way for, the achievement of the country's 2030 electrification target, and the 2050 carbon neutrality target, through more effective and tangible applications of RE based energy systems (for power and non-power purposes) and EE technology applications in the end use sectors both in urban and rural areas of the country. In many districts (in a number provinces), there are available RE resources that can be tapped to reduce the utilization of existing diesel power generation systems. This is not currently being done mainly because of the relatively small system size, compared the typical power generation capacities that the PNG Power Ltd. (PPL) is interested in developing and operating. Many rural communities in the country are not electrified (electrification in PNG is currently below 20%) but there are available RE resources in many of these localities. Enabling the

cost effective use of such resources utilizing financing from the government and from the private sector (e.g., public private partnerships, private sector investments, local government outsourcing, etc.) is among the strategies that the project will employ, and this is something novel in PNG. Another novel idea is the implementation of tangible actions that are geared towards optimization of the use of energy (i.e., energy efficiency) in the energy end use sectors. This will not only reduce GHG emissions, but also contribute to the reduction of electricity demand and in so doing contribute to the reduction of the magnitude of overall power generation capacity (RE and non RE based) needed to meet current and future electricity demands.

To further facilitate these innovative ideas, the following demonstrations of LC policy and technology applications will be considered for inclusion in the project: (1) Application of the integrated energy planning techniques for the benefit of the DPE; (2) Application of feasible community based RE energy systems for productive uses and household energy needs; (3) Application of EE technologies selected energy end use sectors such a public utilities, buildings, and in the transport sector; (4) Design, engineering and financing of feasible RE and EE technologies; and, (5) Piloting of specific policies and strategies for the application of RE and EE techniques, measures and practices.

GEF Secretariat Comment 6. Please explain why this GEF fund is request in addition to ongoing World Bank project.

PIF-Stage Response to GEF Secretariat Comment 6. One of the components of the ongoing WB project is on the development of the NEP. The proposed project intends to build on such work to supplement and augment it and where appropriate enhance it so that the much needed energy policies are approved and effectively enforced. Based on the initial assessments made, among those that need to be enhanced are on the following: (a) energy regulatory framework; (b) energy development and utilization policies; and, (c) enforcement of proposed and existing energy policies and strategies. The work that is currently being done on the development of the appropriate energy regulatory framework will be enhanced by addressing concerns regarding the needs for the application of LC development standards, policies and IRRs on the promotion and incorporation of EE & RE applications in city/town, province and district development planning and implementation; and for easy to use guidance and reference documents on these subjects to district and provincial governments. The enhancements will also include the provision of supplementary information (e.g., policy researches, analyses and assessments) to the DPE on LC development and implementation mechanisms compatible to the PNG context. Considering the current activities of the ongoing energy policy development activities in the country, and building on these, the indicative incremental activities on energy policy making are the development of the supporting guidance, rules and regulations and legislations; and the piloting and evaluation of the implementation of specific policies. On the enforcement of the proposed and existing energy policies, the indicative incremental activities are on the promotion of the proposed energy policies to get these approved and enforced, capacity building on the application and compliance, and tracking of the progress and impacts of energy policy implementation for purposes of potential future enhancements (if necessary). Additional incremental activities will be carried out focusing on the establishment and operationalization of the pertinent institutional framework for the implementation of LC development standards, policies, and IRRs, including institutional mechanisms that integrate LC development with the socio economic, climate change and disaster management objectives of the country.

GEF Secretariat Comment 7. Overall, this project has many NAMA related elements. Please explain if the Government of Papua New Guinea would consider including NAMA registration as one of the activities.

PIF-Stage Response to GEF Secretariat Comment 7. Agree. To date, the GOPNG through OCCD has only registered the country's focal point for NAMA. There has not been any further work on NAMA. Together with the assistance from this proposed project, the current process for developing the country's Intended Nationally Determined Contributions (INDC) is expected to help package the country's NAMAs that will be identified, developed, registered and later implemented. Some of the proposed activities on the identification and development of LC development projects (EE and RE) in Component 2 are intended to also assist in the speeding up the country's rather slow NAMA development work. These activities will also come up with potential NAMA projects that the country can consider to develop, prioritize, register and implement.

GEF Secretariat Comment 8. Component 1; GEF does not support lobbying activity. Please revise. Please clarify who will implement this component, and please include the relevant stakeholders in this component. In the stakeholders table on page 15, neither Department of Petroleum and Electricity nor PNG Power Limited are responsible for policy and regulations. Also Provincial government seems not to participate in policy development and implementation. It concerns that the project will fail to implement the policy without their participation.

PIF-Stage Response to GEF Secretariat Comment 8. Lobbying in this context means promoting, advocating and awareness raising for the purpose of having the proposed policies, standards and IRRs approved. The word has been changed if that does not sound proper to GEF now.

Component 1 will be implemented with the Energy Division (ED) of the DPE as lead. The DPE is responsible for energy policy development; energy planning; data collection; energy advice to PNG Government including in areas of fuel prices, subsidies and electricity tariffs. Please note that the stakeholders table in Part II, Sec. 2 is for presenting the roles of each project stakeholder in the project design/preparation, i.e., how they will be engaged in project design/preparation. Hence, their individual roles are not stated. Nevertheless, here are the other stakeholders, with their specific mandates (not necessarily their role in the project design), that will be involved in the implementation of Component 1:

- PNG Power Limited (PPL): Responsible for generation, transmission and distribution of power nationally, and; technical regulation of electricity provision;
- Department of Environment and Conservation (DEC): Responsible for establishing environmental standards; conducting environmental impact assessments; coordination of GHG emission policies;
- Independent Consumer and Competition Commission (ICCC): Responsible for setting electricity tariffs; fuel price control, and; awards power generation licenses;
- Provincial and Local Level Governments: Responsible for the implementation and enforcement of both national and local government policies, standards, rules and regulations, and in this context, those on energy and climate change mitigation related sustainable development aspects; and,
- Other agencies, including but not limited to, PNG National Statistical Office, National Institute of Standards and Industrial Technology (NISIT) and Industry Associations such as the PNG Chamber of Commerce and Industry.

The roles/responsibilities of these stakeholders in the project implementation will be clearly defined during the project design stage. The policy related roles/responsibilities of Provincial/Local governments in the project design have been emphasized in the PIF.

GEF Secretariat Comment 9. Risk: Please revise mitigation action of No. 5 risk on policy as well.

PIF-Stage Response to GEF Secretariat Comment 9. The word "lobbying" has been replaced with "promotional". Advocacy and promotional activities have been very effective in achieving the approval and enforcement of recommended policies, irrespective of these being GEF or non GEF projects.

GEF Secretariat Comment 10. Component 2; Please explain what are commercial applications of EE and RE, and difference from community based application.

PIF-Stage Response to GEF Secretariat Comment 10. In the context of this project, commercial applications of EE and RE would include projects that are financed by the individual end user or owner; by an ESCO; or, by a bank/financial institution. Examples of commercial EE technology applications include projects financed (using equity and/or loans from banks) by an industrial plant or a commercial building and implemented by suitable engineering or architectural firms; or EE application projects designed, financed and implemented by ESCOs. Examples of commercial RE applications include power generation projects financed (using equity and/or loans from banks) by an independent power producer; RE system projects (power or non-power) financed (using equity and/or loans from banks) by an industrial facility or a commercial building and implemented by suitable engineering or architectural firms; or similar projects designed, financed and implemented by ESCOs.

Community based application can either be commercial such as in the case of a private entrepreneur financed and operated RE based power generation and distribution system in a specific community/locality. This is basically a commercial business. Community based application can also be non-commercial for a specific period of time like in government supported electrification programs in remote rural areas wherein the main aim of the program is social rather than commercial. The electricity services maybe free or subsidized at the start, but for sustainability reasons may gradually progress into something of a commercial business (run by the community, or by an entrepreneur in the community) especially when the social objective has been already achieved.

GEF Secretariat Comment 11. Component 4; Please focus the awareness activity related with practical tools and schemes available for the public, so that the public will change behavior after they participated the activities.

PIF-Stage Response to GEF Secretariat Comment 11. For Component 4, the project proponents agree to the comment that awareness raising activities should result in the change of behavior. The proposed program will focus on specific stakeholders that will play key roles in developing, implementing, operating and sustaining low carbon initiatives (e.g., EE and/or RE) in the country. The outputs and activities have been revised in line with the reviewer's suggestion on practical tools and schemes for the public to ensure the realization of improved awareness and attitude towards EE and RE applications in energy generation and energy end uses in the country.

GEF Secretariat Comment 12. GEB; Table F expected 4,795 kilotons of CO2 mitigated, but page 13 shows 6 to 6.5 Mtons. Please clarify. Also this number is relatively high comparing other CCM projects. Please explain how this is calculated.

PIF-Stage Response to GEF Secretariat Comment 12. The CO2 emission reduction estimates are based on the historical annual CO2 emissions from the use of gas, liquid and solid fossil fuels in PNG from 2000 2011 (<http://data.worldbank.org/country/papuanewguinea>). The average annual CO2 emissions from that period was 4,366 ktons. The results of a trend analysis of these data show that the CO2 emissions by 2030 would be about 9,644 ktons/year. This is about the same as the lower bound value of the forecast CO2

emissions range of 10 to 14 Mtons/year by 2030 (Source: National Climate Compatible Development Management Policy Report of Office of Climate Change and Development, Papua New Guinea). The estimates 6.0 to 6.5 Mtons stated in page 13 of the PIF are CO₂ emissions, not CO₂ emissions mitigated. This range of CO₂ emissions is based on two cases involving the implementation of actions that will result in an average annual incremental CO₂ emission reduction from fossil fuel combustion of about 20% (Case 1) and 25% (Case 2) during the period 2017-2030. This considers the trend projection that will result in about 10 Mtons/year CO₂ emissions by 2030 as the baseline case. For Case 1, the result is an average annual CO₂ emission of about to 6.5 Mtons, and for Case 2, the result is about 6.0 Mtons. The proposed project considers the conservative case of achieving an average 20% incremental reduction in annual CO₂ emission. That translates to a total incremental CO₂ mitigated (direct and indirect) of about 23,976 ktons during the period 2017 2030. Assuming 20% of this cumulative amount is directly attributable to the proposed project, the potential total incremental CO₂ emissions mitigated would be 4,795 ktons. Yes, this amount is high compared to the other CCM projects in the Pacific because: (a) The fossil fuel consumption in the country is high (as shown in the above figure); and, (b) PNG is the Pacific island country (PIC) that has the largest land area, population, amounts of indigenous energy resources, and number and volume of economic activities.

GEF Secretariat Comment 13. Knowledge Management; Please consider and include how the project will learn from other relevant project in LDCs and SIDS.

PIF-Stage Response to GEF Secretariat Comment 13. Part II, Sec. 7 has been revised to include uptake of lessons learned and best practices on the application of low carbon development strategies and techniques and EE/RE technologies from other countries like those in Asia, the PICs and in other SIDS, as well as sharing of project results to the same. The results of the project activities (e.g., EE/RE technology applications) will also be disseminated to these other countries through the information exchange network that will be created and operated under the project.

GEF Secretariat Comment 14. Please include table D, so that the amount is correctly followed.

PIF-Stage Response to GEF Secretariat Comment 14. The filled in table has now been included in the revised PIF.

GEF Secretariat Comment 15. Please check co financing amount in Table A, B and C, and revise.

PIF-Stage Response to GEF Secretariat Comment 15. The total co financing amount in Part I, Sec. A has been corrected to match with those stated in Secs B and C.

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF PPG FUNDS²⁵

A. Provide detailed funding amount of the PPG activities financing status in the table below:

PPG Grant Approved at PIF: USD100,000			
<i>Project Preparation Activities Implemented</i>	<i>GEF/LDCF/SCCF Amount (\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent as of Nov. 8, 2016</i>	<i>Amount Committed (but not yet spent)</i>
Activity 1 - Initiate Studies & Surveys	30,000	22,119	7,881
Activity 2 - Conduct Logical Framework Analysis Workshop	20,000	14,357	5,643
Activity 3 - Identification & Assessment of Demonstration Sites	10,000	10,000	0
Activity 4 - Detail Design of Project Components & Activities	15,000	11,260	3,740
Activity 5 - Conduct of Stakeholder & Project Partner Coordination Meetings	5,000	4,804	196
Activity 6 - Preparation of UNDP ProDoc and GEF CER	17,500	12,097	5,403
Activity 7 - Finalization of UNDP ProDoc and GEF CER	2,500	0	2,500
Total	100,000	74,637	25,363

The objective of the PPG exercise was achieved with the successful implementation of the planned activities for the design, development and preparation of the FREAGER Project. The project development team (PDT) that was organized by the implementing partner, CCDA, carried out the PPG Exercise based on the agreed project initiation plan. The PDT was able to gather and organize the relevant data and information that were used in the design of the various project activities. Information about the ongoing and planned programs of the GoPNG, as well as private sector entities that are interested, in RE-based power generation and EE technology/technique applications, were gathered, processed and analyzed to obtain a clear understanding of the current situation concerning the issues and concerns regarding the GHG emission reduction target of the country. Plans and programs of the country in line with its electrification program and its NDCs were also researched and reviewed. The discussions with the key stakeholders and project partners have made possible the identification of relevant issues and barriers that need to be addressed and considered in the development and implementation of the FREAGER Project. The CCDA, PPL, relevant private sector entities, and RE/EE technology experts in the country were engaged in intensive discussions for the project development team to fully understand the nature and extent of these issues/barriers. As is the usual practice in project design, a logical framework analysis (LFA) was carried out by the PDT together with the stakeholders to verify and confirm the project results framework that was developed during the PIF stage of the project development. The LFA confirmed the previously defined project goal and objective, and expected outcomes. Discussions with PPL and selected provincial governments regarding their technical capacity development needs, and other technological and business concerns became the basis of the demonstrations and specific technical assistance in various aspects of the design, engineering and installation of RE-based energy systems both for power applications. The discussions with the stakeholders

²⁵ If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue to undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities. Agencies should also report closing of PPG to Trustee in its Quarterly Report.

and project partners also resulted in getting commitments for the co-financing of the baseline activities that were subsumed into the project, the government's contribution to the funding of some of the incremental activities, as well as in the agreed project coordination mechanisms and the project implementation arrangements. The outputs of the PPG exercise were used in the detailed design of the FREAGER project components and the relevant activities that will deliver the necessary outputs that will collectively realize the expected outcomes of this GEF-funded climate change mitigation project of PNG.

ANNEX D: CALENDAR OF EXPECTED REFLOWS (if non-grant instrument is used)

Provide a calendar of expected reflows to the GEF/LDCF/SCCF Trust Funds or to your Agency (and/or revolving fund that will be set up): NA

Annex E. Changes from the PIF

This annex presents and explains changes in the project framework from that originally proposed in the PIF. Exhibit 1 compares the component titles, and outcomes in the PIF and in the ProDoc, including the budget allocations for the outcomes. Exhibits 2 through 6 compare PIF outputs of each outcome to ProDoc outputs for Outcomes 1, 2A, 2B, 3, and 4, respectively. Strong efforts were made in PPG design work to honor the original design of the PIF. Probably the key difference between the ProDoc design and that of the PIF is greater specificity of the ProDoc design, focusing many of the activities on community RE mini-grids and township EE programs. While the township EE programs are quite broad in terms of technology addressed, the RE mini-grids focus mainly on micro/ mini-hydro and PV mini-grids. Yet, it is noted that these distinctions are mainly made at the activity description level, rather than in the output wording. Another significant difference noted is that in some instances organization of ProDoc outputs takes a different approach than organization of PIF outputs. For example, the ProDoc demo investment outputs are organized by technology, with a different output for each of PV mini-grid, micro/ mini-hydro, and township EE program, whereas the corresponding PIF outputs were divided by step in the demo process, beginning with demo design and on through to implementation and evaluation. Similarly, capacity building outputs in the ProDoc are organized by type of stakeholder and focus of workshop, thus including an output for each of programs for government officials on RE and EE pipeline project development, programs for technical personnel on RE mini-grid technical aspects and EE technical aspects, and programs for the financial sector on loan and equity financing of RE and EE. The corresponding PIF outputs in contrast, are organized by step in the capacity development process, beginning with evaluation of past experience and needs and on through to implementation and evaluation of that implementation. The rationale for these changes in presentation of outputs is that it will be easier for implementers to understand and implement activities. Topic based organization makes it easier for those responsible for implementing to grasp what to do. The tasks are less abstract. This kind of organization also better facilitates the recruiting of consultants or sub-contractors. In the case of the demos, for example, the outputs are now organized by technology type which also corresponds to partner province. So, some consultants may be recruited to work on mini-hydro in Eastern Highlands Province (one output), while others may work on PV mini-grid in Milne Bay Province (another output).

Exhibit 1: Comparison of PIF Framework to ProDoc Framework – Title, Objective, Components, and Outcomes

PIF Version	ProDoc Version	Changes and Explanation
<p><u>Component 1: Energy Policy and Institutional Framework Development</u></p>	<p><u>Component 1: Energy Policy, Planning, and Institutional Development</u></p>	<p>Minor change to clarify scope: The word “planning” has been added to show that this component will include considerable work in preparing EE and RE plans. Further, the word “framework” is dropped for brevity.</p>
<p><u>Outcome 1: Implementation of approved national energy policy, and enforcement of supportive policies, rules and regulations on low carbon (LC) development that includes the application of renewable energy and energy efficiency in energy generation and energy-end use sectors</u></p> <p>GEF allocation: USD541,170</p>	<p><u>Outcome 1: Rigorous implementation and enforcement of approved national and provincial energy policies, plans, and standards to promote the application of renewable energy and energy efficiency technologies</u></p> <p>GEF allocation: USD645,475</p>	<p>Relatively minor changes to increase specificity of scope and decrease wordiness. “National” changed to “national and provincial,” as provincial standards and plans also included in work. The words “plans” and “standards” are added for specificity within the realm of policy. “Low carbon development” deleted for brevity, as this is implied in the project objective to which this outcome will contribute. The words “rigorous” and “enforcement” added to emphasize that the targeted result is not just adoption of policies but that the policies have a real impact.</p> <p>Budget allocation increased substantially by USD 104,305. In the PPG phase, a detailed, itemized, activity-wise budget was prepared. Given the substantial content determined for this outcome, funding needs are substantial. In particular, to ensure capacity building for national, provincial, and district officials is effective, five workshop series of three workshops per series (with “homework” to design projects in between) are designed. It is believed these workshop series will have more effectiveness, through “learning by doing,” than typical one-off capacity building meetings. Yet, this multi-workshop approach substantially increases expenditures. Because some other ProDoc outcomes require less allocation than was indicated in the PIF, a greater allocation for Outcome 1 is possible. In particular, due to strong co-financing for the demos, extra funding is available from the original allocation to Outcome 2B, the demo outcome.</p>
<p><u>Outcome 2A: Enhanced technical viability and capacity in the application of EE technologies and development of feasible RE-based energy systems (power and non-power production) in the country</u></p> <p>GEF allocation: USD541,000</p>	<p><u>Outcome 2A: Enhanced technical-commercial viability and capacity in the application of energy efficiency technologies and development of feasible RE-based energy systems in the country</u></p> <p>GEF allocation: USD447,250</p>	<p>Some adjustments in language to clarify meaning: The term “commercial” is added to indicate that both technical viability and capacity and commercial viability and capacity will be improved. In particular, an important part of Outcome 2A will be related to keeping the costs of RE and EE down by improving sourcing channels and improving knowledge of reasonable costs so purchasers / proponents will not be overcharged. Further, the parenthetical “power and non-power production” has been deleted, as the RE demos will focus on the community power production options of min-hydro and PV mini-grids.</p>

		Decrease in budget allocation of USD 93,750. During the PPG phase, detailed costing on an activity-wise basis was conducted and total requirements for GEF funding were determined to be less than indicated in the PIF stage. In particular, project co-financing committed and additional amounts expected are larger than projected in the PIF stage.
<p><u>Outcome 2B:</u> Increased installed capacity of RE-based energy systems (power and non-power production) and implementation of viable energy efficiency technology applications in the country.</p> <p>GEF allocation: USD1,076,100</p>	<p><u>Outcome 2B:</u> Increased installed capacity of RE based power systems and implementation of viable EE technology applications in PNG</p> <p>GEF allocation: USD962,000</p>	<p>Minor adjustments only: Parenthetical of “power and non-power production” has been changed to “power” as RE demos will focus on power applications only. “The country” changed to “PNG.”</p> <p>The GEF allocation for Outcome 2B has been reduced by USD 114,100. The new allocation level is based on activity-wise budget computations. Further, because very strong co-financing support will be available for the investment portion of the Samarai Island PV mini-grid demo and the East Sepik Province EE retrofit demos, less GEF funds than anticipated will need to go to support these. Project co-financing committed and additional amounts expected are larger than projected in the PIF stage. Excess GEF funds (as compared to PIF levels) are used to increase the budget for other outcomes.</p>
<p><u>Component 3:</u> GEF allocation: USD270,500</p>	<p><u>Component 3:</u> GEF allocation: USD199,100</p>	<p>GEF allocation reduced by USD 71,400. PPG work included activity-wise budget estimates, so that a more precise picture of needs was developed. Further, PPG work confirmed that specially designed funds included in this outcome, the EE ESCO fund and the Community RE Loan Fund, will be funded by PPL and commercial banks, respectively, benefiting from higher committed and expected co-financing than projected at the PIF stage. Thus, the GEF funds will be used for design of these mechanisms only, at relatively low expenditure.</p>
<p><u>Component 4.</u> GEF allocation: USD276,600</p>	<p><u>Component 4:</u> GEF allocation: USD442,545</p>	<p>Substantial increase of budget allocation by USD 165,945. During the LFA workshop, attendees identified a number of key areas for awareness and information building. Also, certain outputs identified, such as the multi-channel media campaign or TA for manufacturers to newly manufacture RE and EE equipment in-country, require substantial resources. Fortunately, excess allocation of GEF funding from Outcomes 2A, 2B, and 3 can be utilized partly for Outcome 4’s increase in budget allocation.</p>
<p><u>Project Management</u> GEF allocation: USD135,270</p>	<p><u>Project Management</u> GEF allocation: USD135,270</p>	<p>No change in project management budget allocation.</p>

Exhibit 2: Comparison of PIF Framework to ProDoc Framework – Outputs of Outcome 1

<u>Outcome 1: Rigorous implementation and enforcement of approved national and provincial energy policies, plans, and standards to promote the application of renewable energy and energy efficiency technologies</u>		
PIF version output	ProDoc version output	Changes and explanation
<u>Output 1.1.</u> Finalized policy research, analysis and assessment on low carbon (LC) development and implementation mechanisms compatible to the PNG context, including disseminated guides and reference documents on LC development planning, design and implementation.	<p><u>Output 1.1.</u> Completed government capacity building programs for the design and development of RE and EE technology projects.</p> <p><u>Output 1.2.</u> Approved national-level policies or regulations that promote RE and EE</p>	PIF Output 1.1 is encompassed by ProDoc Outputs 1.2 and 1.1. PIF Output 1.1’s “policy research, analysis, and assessment” is matched by the policy gap analysis work of ProDoc Output 1.2, which precedes its policy formulation work. PIF Output 1.1’s “Guides and reference documents on LC development planning, design, and implementation” are replaced by ProDoc Output 1.1’s capacity building program for government officials, which focuses on planning and development of pipeline projects. The reorganization has the advantage that policy and regulatory efforts are encompassed in one output, while support for planning capabilities is encompassed in another output.
<u>Output 1.2.</u> Formulated and recommended LC development standards, policies and implementing rules and regulations (IRRs) on the promotion and incorporation of EE & RE applications in city/town, province and district development planning and implementation for inclusion in the National Energy Policy (NEP)	<p><i>Output 1.2</i></p> <p><u>Output 1.4.</u> Formulated, adopted, and effectively enforced standards to promote adoption of RE and EE</p>	PIF Output 1.2 is encompassed in ProDoc Outputs 1.2 and 1.4. PIF Output 1.2’s policies match ProDoc Output 1.2, while its standards match ProDoc Output 1.4. The reorganization has the advantage that policy and regulatory efforts are encompassed in one output, while the standards efforts are encompassed in another output. Finally, as the draft NEP has already been formulated, this is no longer included as a part of the new outputs.
<u>Output 1.3.</u> Formulated and recommended policies on sustainable energy supply and utilization services for inclusion in the NEP	<i>Output 1.2</i>	PIF Output 1.3 is encompassed in ProDoc Output 1.2. The difference is that a draft NEP has already been formulated, so that this is no longer included as part of the new output.
<u>Output 1.4.</u> Approved and enforced revised NEP that include LC development policies and strategies	<p><i>Output 1.2</i></p> <p><u>Output 1.3.</u> National-level RE and EE roadmaps, with proposed funding allocations for projects, submitted, approved, and implemented</p>	The LC development policies and strategies of PIF Output 1.4 are encompassed in ProDoc Output 1.2 (policies) and ProDoc Output 1.3 (strategies). The reorganization has the advantage that policy efforts are encompassed in one output, while strategies are encompassed in another output. This is useful as the approach to policy development may be different than the approach to strategy development. A key further difference is that the project no longer plans to focus on the NEP, as it has already been formulated and entered into the approval pipeline through another project.
<u>Output 1.5.</u> Approved and enforced LC development standards, policies,	<i>Output 1.2</i>	PIF Output 1.5 is encompassed in ProDoc Output 1.2 (policies and IRRs) and ProDoc Output 1.4 (standards). The reorganization has the advantage that

and IRRs in cities/towns, provinces and districts	<i>Output 1.4</i>	policy and regulatory efforts are encompassed in one output, while the standards efforts, which involve a different approach, are encompassed in another output.
<u>Output 1.6.</u> Completed proposed national energy plan tabled for review and approval by the GOPNG	<i>Output 1.3</i>	PIF Output 1.6 is encompassed in ProDoc Output 1.3. Both deal with energy plans at the national level. The difference is that the PIF output had focused on the national energy plan which has already been drafted and put in the approval pipeline by another project. The ProDoc output will instead focus on more specific national-level plans (“roadmaps”) for community RE mini-grids and township EE, which is more suitable to the current situation in PNG.
<u>Output 1.7.</u> Approved and budgeted follow-up plan for the evaluation and potential enhancement of LC development planning and strategies in cities/towns, provinces and districts	<u>Output 1.6.</u> Detailed adopted provincial plans for promoting RE and EE in townships (provincial and district centers) and villages, including specific pipeline projects that will replicate the project demos	PIF Output 1.7 is encompassed in ProDoc Output 1.6. The latter adds specific pipeline projects to ensure that the plans are actionable.
<u>Output 1.8.</u> Completed assessment of applicable institutional mechanisms for the effective implementation of LC development standards, policies, and IRRs, including strategies and initiatives	<u>Output 1.5.</u> Formulated, approved, and implemented effective institutional plans for promoting RE and EE, detailing responsibilities of relevant agencies and coordinating mechanisms among them	PIF Output 1.8 is encompassed in ProDoc Output 1.5. The PIF output, which focuses on assessment of institutional mechanisms, is the first step in the process to achieve the ProDoc output. The advantage of the ProDoc organization is that the key steps in the institutional process: assessment, formulation, and implementation are encompassed in one output.
<u>Output 1.9.</u> Formulated and recommended institutional framework for the implementation of LC development standards, policies, and IRRs, including institutional mechanisms that integrate LC development with the socio-economic, climate change and disaster management objectives of the country	<i>Output 1.5</i>	PIF Output 1.9 is encompassed in ProDoc Output 1.5. The PIF output, which focuses on the formulation and recommendation of the institutional framework is the second step in the process to achieve the ProDoc output. The advantage of the ProDoc organization is that the key steps in the institutional process: assessment, formulation, and implementation are encompassed in one output.
<u>Output 1.10.</u> Completed performance evaluation of the adopted institutional mechanisms, and implemented enhancements of the institutional framework	<i>Output 1.5</i>	PIF Output 1.10 is encompassed in ProDoc Output 1.5. The PIF output, which focuses on implementation of the institutional framework is the third step in the process to achieve the ProDoc output. The advantage of the ProDoc organization is that the key steps in the institutional process: assessment, formulation, and implementation are encompassed in one output.

Exhibit 3: Comparison of PIF Framework to ProDoc Framework – Outputs of Outcome 2A

<u>Outcome 2A</u> : Enhanced technical-commercial viability and capacity in the application of energy efficiency technologies and development of feasible RE-based energy systems in the country		
PIF version output	ProDoc version output	Changes and explanation
<u>Output 2A.1</u> . Completed evaluation of applicable and feasible LC technologies (EE & RE) in PNG, including identified and prioritized LC energy projects	<i>None</i>	Instead of waiting to evaluate potential technologies for the project demos during implementation (under PIF Output 2A.1) and thus delay demo technology and site selection, it was decided to select demo technologies and sites during the PPG phase to ensure the demo implementation was timely. Thus, this PIF output has been dropped. Instead, expert opinion, research, and consultation during the PPG phase enabled enough evaluation of technologies to design the project demos.
<u>Output 2A.2</u> . Documented energy performance and impact reports on implemented demos; including action plan for community-supported LC energy initiatives in highland and outer island communities	<u>Output 2A.7</u> . Published and disseminated information on findings from monitoring of the project RE and EE demos <i>Output 1.6</i>	PIF Output 2A.2 is mainly encompassed in ProDoc Output 2A.7 (monitoring and documentation of the project demos). Its action plans for communities are encompassed in ProDoc Output 1.6's provincial level planning. The new organization separates demo monitoring/ documentation activities from local planning activities and thus will increase ease of implementation.
<u>Output 2A.3</u> . Completed capacity development program for the national, provincial and district government authorities and local community leaders on the planning and evaluation of LC development projects	<i>Output 1.1</i> <u>Output 2A.1</u> . Completed capacity building program for technical personnel in the private and public sectors on the detailed technical preparation and implementation of community-based RE mini-grids and township EE programs	PIF Output 2A.3 matches ProDoc Output 1.1. Both are capacity building programs for national and local government officials on LC planning. ProDoc Output 2A.1 extends RE and EE capacity building to a new group – technical personnel.
<u>Output 2A.4</u> . Completed design and implementation plans for the replication of demonstrated LC energy projects, including those that would be considered as among the Nationally Appropriate Mitigation Actions (NAMAs) of the country.	<i>Output 1.6</i> <i>Output 1.1</i>	PIF Output 2A.4 is encompassed in the content of ProDoc Outputs 1.6 and 1.1. ProDoc Output 1.6 calls for RE and EE plans that include specific pipeline projects for replication of the project demos. ProDoc Output 1.1, while a capacity building program, has as its one of its results the preparation of pipeline RE and EE projects that are replications of the project demos. These specific projects, in turn, can be further elaborated for entry into the RE and EE plans of ProDoc Output 1.6.
<i>None</i>	<u>Output 2A.2</u> . Well-researched and verified sourcing information on RE and EE products, including brands/ specifications, sourcing channels, and prices	PPG work identified information on sourcing of RE and EE products of good price and quality to be crucial to commercial viability of the project demos (PIF and ProDoc Outcome 2B) and to plans for their replication, as targeted in PIF Output 2A.4 and ProDoc Output 1.6.

<i>None</i>	<u>Output 2A.3.</u> Detailed information on “honest,” best possible costing of community RE mini-grid projects	PPG work identified the need for information on reasonable costing of constructing RE mini-grid projects so that proponents will not be taken advantage of and so that RE mini-grids can realize their potential cost advantage over diesel. This information is crucial to commercial viability of the project demos (PIF and ProDoc Outcome 2B) and to plans for their replication, as targeted in PIF Output 2A.4 and ProDoc Output 1.6.
<i>None</i>	<u>Output 2A.4.</u> Designed and trialed training program for developing capacity in O&M for RE mini-grid projects among local people and local officials in project areas, including certification program	PPG work identified the need for capacity building in O&M for RE mini-grids. This will lead to sustainability of the project demos (PIF and ProDoc Outcome 2B) and to the sustainability of replication systems targeted in the planning work of PIF Output 2A.4 and ProDoc Output 1.6.
<i>None</i>	<u>Output 2A.5.</u> Proven system for power purchase agreements (PPAs) between PPL and independent power providers (IPPs) running community based RE mini-grids	PPG work identified the potential for PPAs between community RE mini-grid owners and PPL as a means of ensuring sustainability of systems (through billing income). This will thus promote the sustainability of the project demos (PIF and ProDoc Outcome 2B) and the sustainability of replication systems targeted in the planning work of PIF Output 2A.4 and ProDoc Output 1.6.
<i>None</i>	<u>Output 2A.6.</u> Adopted business plans for productive use of renewable energy that raise the incomes of local people, especially women	Productive use of RE (ProDoc Output 2A.6) is a new area identified during PPG work that was not included in the PIF. Yet, like the above items, productive use can contribute to sustainability (as it will generate billing revenue for community RE systems). This will thus promote the sustainability of the project demos (PIF and ProDoc Outcome 2B) and the sustainability of replication systems targeted in the planning work of PIF Output 2A.4 and ProDoc Output 1.6.

Exhibit 4: Comparison of PIF Framework to ProDoc Framework – Outputs of Outcome 2B

Outcome 2B: Increased installed capacity of RE based power systems and implementation of viable EE technology applications in PNG		
PIF version output	ProDoc version output	Changes and explanation
<p><u>Output 2B.1.</u> Completed designs and implementation plans for the demonstration of the commercial applications of EE and RE technologies that promote and support LC development in the cities/towns, provinces and districts of the country</p>	<p><u>Output 2B.1.</u> Completed successful demos of commercially viable mini-hydro systems in PNG</p> <p><u>Output 2B.2.</u> Completed successful demo of commercially viable off-grid solar PV mini-grid system in PNG</p> <p><u>Output 2B.3.</u> Completed successful demo of commercially viable township energy efficiency programs</p> <p><u>Output 2B.4.</u> Completed demonstrations of productive applications of RE mini-grid systems that raise the incomes of local people</p>	<p>ProDoc Outputs 2B.1, 2B.2, 2B.3, and 2B.4, as a group, encompass the content of PIF Outputs 2B.1 and 2B.2, as a group. Both groups of outputs represent the project demos of RE and EE technologies. The difference is that the ProDoc outputs are organized by technology type: ProDoc Output 2B.1 is mini-hydro, ProDoc Output 2B.2 is PV mini-grid, and ProDoc Output 2B.3 is township energy efficiency programs. (And, ProDoc Output 2B.4 is for productive applications in association with the RE mini-grids.) The PIF outputs, in turn, are organized by steps in the demo process. PIF Output 2B.1 is demo design; and Output 2B.2 is demo implementation/ operation. In the ProDoc outputs, such steps are embedded within the activities. For example, there will be a feasibility study for mini-hydro stations and energy audits for the township EE demos as the first steps in the process. The reorganization of outputs based on technologies is expected to lead to a more easily understood project framework and greater ease of implementation. For example, consultants may tend to be retained by technology type and province in which the demos are located.</p>
<p><u>Output 2B.2.</u> Operational LC development technology application demonstrations in pilot communities</p>	<p><i>Output 2B.1</i></p> <p><i>Output 2B.2</i></p> <p><i>Output 2B.3</i></p> <p><i>Output 2B.4</i></p>	<p><i>See explanation in cell directly above this one.</i></p>
<p><u>Output 2B.3.</u> Completed EE and RE projects financed either through the financing scheme established by the project; or by private sector investments</p>	<p><i>Output 3.2 (see Outcome 3 table)</i></p> <p><i>Output 3.3 (see Outcome 3 table)</i></p>	<p>PIF Output 2B.3 is closely related to and encompassed by ProDoc Outputs 3.2 and 3.3, which fall under the financing outcome of Component 3. The two ProDoc outputs both design and establish operational financing mechanisms, one for EE (ProDoc Output 3.2) and one for RE (ProDoc Output 3.3).</p>

Exhibit 5: Comparison of PIF Framework to ProDoc Framework – Outputs of Outcome 3

<u>Outcome 3: Improved availability of, and access to, financing for renewable energy and energy efficiency initiatives in the energy generation and end-use sectors</u>		
PIF version output	ProDoc version output	Changes and explanation
<u>Output 3.1.</u> Completed evaluation of existing financing schemes for development projects (government, private sector, and regional/international)	<u>Output 3.2.</u> Designed, funded, and launched special financing mechanism for EE projects <u>Output 3.3.</u> Designed, funded, and launched special loan fund for RE projects, carried out by a PNG commercial bank	ProDoc Outputs 3.2 and 3.3, as a group, encompass the content of PIF Outputs 3.1, 3.2, 3.4, 3.5, and 3.6, as a group. All are related to developing and/or implementing and/or evaluating financing schemes/ mechanisms for RE and EE. The ProDoc Outputs are divided by type of project financed (i.e. EE or RE), whereas the PIF outputs are divided by steps in the process of developing and then operating a financing scheme. This change in organization is adopted to achieve greater ease of implementation. An RE mini-grid loan fund will have strong differences with an ESCO fund for financing EE retrofits. So, treating them as separate outputs will be a means of achieving more effective implementation. While ProDoc Outputs 3.2 and 3.3 in their wording do not include specific mention of evaluation of existing schemes, review of existing models will be included in the financing mechanism design process.
<u>Output 3.2.</u> Completed design and development of feasible financing models and schemes to facilitate financing of LC development projects	<i>Output 3.2</i> <i>Output 3.3</i>	<i>See changes and explanation above in the row for PIF Output 3.1</i>
<u>Output 3.3.</u> Completed capacity building for the existing banks (government and private sector) on financing residential/ commercial EE and RE projects	<u>Output 3.1.</u> Completed group capacity building program for the banking sector, investors in the commercial /private sector (including PPL), and the government sector on financing RE and EE via equity investment and loans	ProDoc Output 3.1 is very similar to PIF Output 3.3 and thus replaces it. One key addition that emerged in the PPG stage is that stakeholders would like government officials also to be involved in capacity building for the financing of RE and EE. Thus, they have been added to the list of participant types.
<u>Output 3.4.</u> Established and operational financing scheme for LC development projects	<i>Output 3.2</i> <i>Output 3.3</i>	<i>See changes and explanation above in the row for PIF Output 3.1</i>
<u>Output 3.5.</u> Completed technical assistance services to financing scheme applicants	<i>Output 3.2</i> <i>Output 3.3</i>	<i>See changes and explanation above in the row for PIF Output 3.1</i>
<u>Output 3.6.</u> Completed evaluation of suggested enhanced financing policies for supporting initiatives on low carbon development	<i>Output 3.2</i> <i>Output 3.3</i>	<i>See changes and explanation above in the row for PIF Output 3.1</i>

None	<u>Output 3.4.</u> Publicly available information on sources of funding for RE and EE (e.g. Green Climate Fund, crowdfunding, social impact funds, etc.), including listing of sources and how-to-apply guide on effectively accessing funds	ProDoc Output 3.4 is a new output, identified during the PPG phase LFA workshop as an important area in need of support that could expand RE and EE projects in PNG.
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Exhibit 6: Comparison of PIF Framework to ProDoc Framework – Outputs of Outcome 4

<u>Outcome 4:</u> Improved awareness of, attitude towards, and information about renewable energy and energy efficiency applications in the energy generation and end-use sectors.		
PIF version output	ProDoc version output	Changes and explanation
<u>Output 4.1.</u> Impact analysis report on previous EE/RE capacity building programs in PNG	<i>Output 1.1</i> <i>Output 2.1</i> <i>Output 3.1</i>	PIF Outputs 4.1, 4.2, 4.3, and 4.5 as a group are encompassed in ProDoc Outputs 1.1, 2.1, and 3.1, as a group. The difference is that the group of ProDoc outputs is organized by the type of stakeholder targeted by capacity building and, thus, the main content of the capacity building: ProDoc Output 1.1 is government capacity building in RE and EE; Output 2.1 is capacity building for technical persons in RE and EE; and Output 3.1 is capacity building for the financial sector regarding EE/RE loans and equity investments. The PIF outputs, in contrast, are organized functionally, beginning with analysis of previous capacity building, then moving to capacity needs assessment, next moving to competed capacity building programs for key stakeholder groups, and finally to evaluation of implemented capacity building programs. Under the new ProDoc outputs, each capacity building program includes curriculum design, which will take into consideration previous capacity building experience and needs. In addition, during the PPG stage, previous experience with capacity building was considered and, based on this, a decision was made to include a learning by doing format (with homework) for the government officials. The approach of organizing the ProDoc outputs by targeted stakeholder groups (instead of steps in the capacity building process as in the PIF) was adopted as it will yield increased ease of implementation. In essence, there will be different capacity building programs for different types of stakeholders. Recruiting of consultants will also be divided along the lines of the new output organization, according to which stakeholder capacity building program they will be designing and leading.
<u>Output 4.2.</u> Completed capacity needs assessment in the area of LC	<i>Output 1.1</i>	<i>See changes and explanation above in the row for PIF Output 4.1</i>

development, in general, and EE/RE applications, in particular	<i>Output 2.1</i> <i>Output 3.1</i>	
<u>Output 4.3.</u> Completed EE/RE capacity building programs for key stakeholder groups in the country such as: (a) Government authorities/technical personnel; (b) Local engineering service providers; (c) Electricity sector; and, (d) Energy end-users	<i>Output 1.1</i> <i>Output 2.1</i> <i>Output 3.1</i> <i>Output 2A.6</i>	<i>See changes and explanation above in the row for PIF Output 3.1</i> As for energy end-users, capacity will be built for these through advising on productive applications in ProDoc Output 2A.6.
<u>Output 4.4.</u> Developed and disseminated EE/RE technology application tools/aids for specific stakeholders	<u>Output 4.2.</u> Materials that enable PNG engineers, officials, and communities to work together (without outside assistance) to develop quality community RE projects at low and well-controlled costs <u>Output 4.6:</u> Completed one-on-one TA for selected local equipment manufacturers/fabricators in the design and production of RE/EE technology equipment or components	PIF Output 4.4 is replaced by ProDoc Outputs 4.2 and 4.6. The main difference is that, benefiting from the PPG process, the ProDoc outputs offer more specificity on the types of tools and types of stakeholders targeted. To suit priorities identified during the PPG phase, PIF Output 4.4 content has been split between the two ProDoc outputs, one focusing on tools/aids for community RE development and one focusing on tools/aids for manufacturers of RE/EE equipment. As for the latter (Output 4.6), it is motivated by the potential for cost reduction via domestic manufacturing of RE and EE components. Viability of such domestic manufacturing, in turn, is suggested in that PNG has significant domestic manufacturing, particularly in the Lae area and also some in the Port Moresby area, that might be leveraged to produce cost-effective RE and EE components. Metal-working capabilities in the prefabricated steel construction materials area may be leveraged, as may be capabilities in machine parts fabrication.
<u>Output 4.5.</u> Completed evaluation of the implemented capacity building programs	<i>Output 1.1</i> <i>Output 2.1</i> <i>Output 3.1</i>	<i>See changes and explanation above in the row for PIF Output 4.1</i> The programs (as designed in ProDoc Outputs 1.1, 2.1, and 3.1) will include tests to confirm mastery by participants of materials.
<u>Output 4.6.</u> Published and disseminated information on: (a) Sustainable EE/RE technology applications; (b) Results of EE/RE technology application demonstrations; (c) Formulated and approved policies and regulatory frameworks; and, (d) Mechanics of established financing schemes	<u>Output 4.7.</u> “One-stop-shop” website providing range of information on RE and EE in PNG <u>Output 4.1.</u> Convincing, analytic, and well-disseminated briefing materials for policy makers showing that RE in many cases is more cost effective than fossil fuel in PNG and that EE	PIF Output 4.6 is encompassed in ProDoc Output 4.7. The difference between the two is that ProDoc Output 4.7 aggregates all information developed by the project (including that on technology, demo results, policies, and financing) and some information from non-project sources on a “one-stop-shop” website. PNG currently lacks this kind of resource; and, during the PPG phase, the value of such a site was recognized. ProDoc Outputs 4.1 and 4.2, which will provide some of the information posted on the one-stop-shop website, are, in turn, encompassed within PIF Output 4.6. They are among the key project materials that will be disseminated via the website and other means.

	<p>projects bring strong benefits to businesses' bottom lines</p> <p><i>Output 4.2</i></p>	
<p><u>Output 4.7.</u> Established information exchange network for the promotion and dissemination of knowledge on LC development within and outside of the country</p>	<p><i>Output 4.7</i></p>	<p>In addition to encompassing PIF Output 4.6, ProDoc Output 4.7 also encompasses PIF Output 4.7. The ProDoc output is more specific in envisioning a “one-stop-shop” website to share knowledge on information gathered and developed in PNG on RE and EE policies, capacity building, technical aspects, pipeline projects, etc. This website can be used as an exchange network as envisioned in the PIF output to ensure knowledge generated in the project is accessible within and outside of PNG.</p>
<p><u>Output 4.8.</u> Enhanced energy supply and consumption monitoring and reporting system in the country</p>	<p><u>Output 4.3.</u> Database on RE resources and pipeline RE projects in PNG</p>	<p>ProDoc Output 4.3 corresponds to PIF Output 4.8, but with some adjustment. ProDoc Output 4.3 focuses on providing information on RE resources and pipeline RE projects in PNG. PIF Output 4.8 is in the same key realm of providing aggregated energy related data, but focuses on current energy supply and consumption information. During the PPG stage, this PIF output was considered carefully. It was decided that project resources may be better focused on RE, in particular, by looking at RE resources and RE pipeline projects, rather than gathering information on energy supply and consumption, generally.</p>
<p><i>None</i></p>	<p><u>Output 4.4:</u> Designed RE and EE courses and materials made available for the education sector</p>	<p>While there is no one-for-one match with a PIF output, the educational materials developed under ProDoc Output 4.4 (particularly the tertiary level ones) are related to PIF Output 4.6’s published and disseminated materials on EE and RE. PPG phase attendees of the LFA workshop indicated educational materials to be a particularly important aspect of awareness and information building of EE and RE in PNG, the theme of Component 4, as they address awareness among an important component of the general population (the youth in primary and secondary education and their families) and provide the information needed for some of those in tertiary education to contribute their skills to the RE and EE fields.</p>
<p><i>None</i></p>	<p><u>Output 4.5:</u> Completed RE and EE multi-channel media promotion campaign in PNG</p>	<p>While there is no one-for-one match with a PIF output, LFA workshop attendees indicated the multi-channel media campaign to be a particularly important aspect of awareness building of EE and RE in PNG, the theme of Component 4.</p>