United Nations Development Programme

Government of Papua New Guinea

PIMS 5569: Facilitating Renewable Energy & Energy Efficiency Applications for Green House Gas Emission Reduction (FREAGER)

Final Mid-Term Review (MTR) Report

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BASIC REPORT INFORMATION

Title of UNDP supported GEF financed project: Facilitating Renewable Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction (FREAGER)

UNDP PIMS#: 5569

GEF project ID#: 9273

Mid Term Review time frame: January – May 2020

Date of Mid Term Review report: 5 May 2020

Region and countries included in the project: Papua New Guinea (PNG)

GEF Operational Focal Area/Strategic Program: Climate Change

Executing Agency/Implementing Partner and other project partners: Climate Change and Development Authority (CCDA)

MTR members (international consultant and national consultant): Mr. Manfred Stockmayer (international consultant), Mr. Tom Nelson Anayabere (national consultant)

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We hope that this report provides valuable inputs for the remaining lifetime of the project and contributes towards a successful implementation of the FREAGER Project.

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ABBREVIATIONS

AWP	Annual Work Plan
CCDA	Climate Change and Development Authority
CEO	Chief Executive Officer
CO2	Carbon Dioxide
CSO	Civil Society Organization
DOWI	Department of Works and Implementation
DEC	Department of Environment and Conservation
EE	Energy Efficiency
EPC	Engineering, Procurement and Construction
ESCO	Energy Service Company
FREAGER	Facilitating Renewable Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction
GDP	Gross Domestic Product
GEF	Global Environment Facility
GGGI	Global Green Growth Institute
GHG	Greenhouse Gas
I	Interview
ICCC	Independent Consumer and Competition Commission
ILG	Incorporated Land Group
ISO	International Standards Organisation
LPAC	Local Project Appraisal Committee
kW	Kilowatt
LR	Literature Review
MoU	Memorandum of Understanding
MTR	Mid-Term Review
MW	Megawatt
M&E	Monitoring and Evaluation
NIM	Nationally Implemented Measure
NISIT	National Institute of Standards and Industrial Technology
NPD	National Project Director
OFP	Operational Focal Point
PB	Project Board
PIF	Project Identification Form
PIR	Project Implementation Reviews
PKG	PNG Kina
PM	Project Manager
PMU	Project Management Unit
PNG	Papua New Guinea
POPP	Programme and Operations Policies and Procedures
PPL	PNG Power Limited
PPO	Public Procurement Office
Prodoc	UNDP Project Document for “Facilitating Renewable Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction (FREAGER)”
Project	The project under review: “Facilitating Renewable Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction (FREAGER)”
PPG	Project Preparation Grant
PV	Photovoltaic

RE	Renewable Energy
RTA	Regional Technical Advisor
SDG	Sustainable Development Goals
SMART	Specific, Measurable, Achievable, Relevant, Time-bound
ToR	Terms of Reference
UNDP	United Nations Development Programme
US$	US Dollar

1. EXECUTIVE SUMMARY

1.1 Project Information Table

Project Title	Facilitating Renewable Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction (FREAGER)		
UNDP Project ID (PIMS #):	5569	PIF Approval Date:	21.10.2015
GEF Project ID (PMIS #):	9273	CEO Endorsement Date:	13.06.2017
ATLAS Business Unit, Award # Proj. ID:	00094483	Project Document (ProDoc) Signature Date (date project began):	20.10.2017
Country(ies):	Papua New Guinea (PNG)	Date project manager hired:	n/a
Region:		Inception Workshop date:	18.05.2017
Focal Area:	Climate Change	Midterm Review completion date:	05.05.2020
GEF Focal Area Strategic Objective:	CC-1 Program 1	Planned closing date:	Aug 2021
Trust Fund [indicate GEF TF, LDCF, SCCF, NPIF]:	GEF	If revised, proposed op. closing date:	
Executing Agency/ Implementing Partner:	Climate Change and Development Authority (CCDA)		
Other execution partners:			
Project Financing	at CEO endorsement (US$)	at Midterm Review (US$)*	
[1] GEF financing:	US$ 2,840,640	US$ 740,529	
[2] UNDP contribution:	US$ 300,000	US$ -	
[3] Government:	US$ 2,930,000 cash + US$ 3,530,000 in-kind	US$ - cash US$ 300,000 in-kind	
[4] Other partners:	US$ 16,000,000 cash + US$ 2,000,000 in-kind	US$ 644,765 cash US$ 1,000,000 in-kind	
[5] Total co-financing [2 + 3+ 4]:	US$ 24,760,000	US$ 1,994,765	
PROJECT TOTAL COSTS [1 + 5]	US$ 27,600,640	US$ 2,735,294	

1.2 Project Description

The “Facilitating Renewable Energy & Energy Efficiency Applications for Green House Gas Emission Reduction (FREAGER)” project (PIMS #5569) started in October 2017 and is now in its third year of implementation. The objective of the Project is the enabling of the use of Renewable Energy (RE) and Energy Efficiency (EE) technologies for achieving greenhouse gas emission reductions in Papua New Guinea (PNG). PNG’s greenhouse gas (GHG) reduction efforts to date have focused on the forestry sector. Yet, despite low per capita energy use at present, with only 15 percent of the population having access to electricity, the adoption of RE and EE technologies in PNG has strong potential both to reduce current GHG emissions and avoid future, growing GHG emissions expected as rising per capita energy use and electrification accompany development of the nation. Analysis shows that community RE mini grid and township diesel center based EE programs present particularly compelling win-win propositions for PNG. FREAGER will demonstrate the relevant technologies for and aim to achieve widespread replication of micro/mini-hydro mini grids, solar PV mini grids, and township EE programs.

The project has four major components:

- Component 1: Energy Policy, Planning, and Institutional Development
- Component 2: Renewable Energy and Energy Efficiency Technology Applications (commercial and technical viability)
- Component 3: Financing of Renewable Energy and Energy Efficiency Projects
- Component 4: Energy Development and Utilization Awareness Enhancement (RE and EE information and awareness)

The Project Objective is to enable the application of feasible renewable energy and energy efficiency technologies for achieving greenhouse gas emission reductions in PNG. The project is expected to generate GHG emission reductions through the implementation of the planned demos of 16,878 tons of CO2eq by end of the project. Also, the project aims at providing 7,550 new households in rural areas and townships with access to RE mini-grid generated electricity services or making use of established EE programs.

The FREAGER project is implemented following UNDP's national implementation modality (NIM) with UNDP support, according to the Standard Basic Assistance Agreement between UNDP and the Government of Papua New Guinea. The Implementing Partner is the Climate Change and Development Authority (CCDA), which is responsible and accountable for managing this project, including the monitoring and evaluation of project interventions, achieving project outcomes, and for the effective use of UNDP resources.

A Program Management Unit (PMU) was established jointly by UNDP and CCDA and is located in CCDA's Low Carbon Growth/Mitigation Division. The primary role of the PMU is to oversee, support, administer and coordinate the implementation of the project under the guidance of the National Project Director (NPD) in CCDA. The National Project Manager is responsible for running the project on a day-to-day basis on behalf of the Implementing Partner. The Project Board (PB) is responsible for monitoring of the project at a high level and for providing high-level support and decision-making as needed. The PB is meeting twice annually and consists of Senior Executives (UNDP and CCDA), Senior Beneficiaries (CCDA, PPL – PNG Power Limited, the Provinces of East Sepik, Eastern Highlands and Milne Bay), a Senior Supplier (PPL) and other Board members (DPE – Department of Petroleum and Energy, ICCC – Independent Consumer and Competition Commission, NISIT – National Institute of Standards and Industrial Technology).

1.3 Project Progress Summary

The Project's LPAC Meeting was held on 27 July 2017, signing of the ProDoc was on 20 October 2017, the Inception Workshop was held on 24 July 2018 and the Inception Report was issued on 15 May 2019. This sequence of events shows the serious delays the project has encountered in its initial phase. After the signing of the ProDoc, management of the Project was carried out by UNDP-internal staff due to funding issues and the PMU was only setup in September 2018, when the Project Manager got hired. The PMU is jointly established by UNDP and CCDA and sits in CCDA's Low Carbon Growth and Mitigation Division. The National Project Director (NPD) is the director of CCDA's Low Carbon Growth and Mitigation Division.

A major first deliverable under Component 1 was a policy gap analysis, which was carried out by GGGI (Global Green Growth Institute) and which was finalized in July 2019. The analysis concluded

that there is a wide range of policy, legislative and regulatory gaps regarding renewable energy and energy efficiency in Papua New Guinea, including lack of consistent legislation and regulatory certainty, considerable inconsistency between existing provisions and a lack of existing policies and regulations not being enforced. Work of GGGI also included a Socio-Economic Analysis, which found considerable socio-economic benefits associated with renewable energy and energy efficiency in PNG.

Work has been initiated to work on an off-grid code (in cooperation with Independent Consumer & Competition Commission – ICCC) as well as on standards for RE and EE technologies as well as off-grid power generation and distribution (in cooperation with the National Institute of Standards and Industrial Technology – NISIT). The off-grid code needs to undergo a vigorous stakeholder consultation, including regional consultations. Implementation of new standards will be either through straight adoption of existing standards (e.g. ISO, Australian standards) or revision of existing standards.

There are a number of workshops to be carried out under the different project Components. Most workshops haven't been held up to now due to delays in the early phases of the project and will be carried out in the second half of project lifetime.

All 5 demonstration activities have been identified during the PPG phase and are currently in various stages of development. This is positive, as no change in the demos was required. A consultant has been engaged in October 2019 for the preparation and implementation of the 2 mini-hydro projects with an expected capacity of 200kW each. The contract includes the preparation of a feasibility study, technical specification, commissioning and conduct maintenance training for the operators. For construction, a separate contract needs to be signed with a suitable constructor.

The time schedule suggested for the mini-hydro demos is extremely tight. A draft of the feasibility study is to be submitted beginning of May 2020, but delays in the inception phase indicate that the deadline will be missed. The final feasibility study is due end of June 2020, procurement of equipment and construction are planned to be carried out between October 2020 and April 2021. Based on the delays incurred up to now and taking into account the complexity of this project, commissioning by end of April 2021 is highly unlikely. There are various key issues in the demos, which need to be clarified, including: data collection, unclear situation regarding regional electricity grids, ownership and operation of the hydro power plants as well as financing.

The implementation of the solar PV mini-grid demo in Samarai Island is now well underway after delays in the initial phase. The system installed on Samarai island will have a peak capacity of 75 kW and will also include batteries to store electricity for consumption during evening and night. Electricity will be used in the already existing mini-grid, which is operated by PPL. The contract with a PNG-registered EPC (Engineering, Procurement and Construction) contractor was signed in April 2019 and the demo is planned to be commissioned in April 2020. Total investment cost was indicated at PGK 2.1 million (around USD 580,000).

During the MTR site visits, energy audits in Wewak and Maprik had begun. A total of around 20 institutions and companies will be audited, the list of entities is consistent with the list developed during the PPG phase. No results were available from the energy audits that were conducted, so it needs to be seen which type of EE measures will be identified and what would be the total investment necessary for carrying out the identified EE measures. The issue of co-financing was raised during the MTR and it was clarified by the district administration that public funding can only be used to co-finance investment into public buildings and institutions, such as hospitals, schools, public

administration buildings or street lighting. Energy efficiency measures in private companies cannot be co-financed by the district authority.

Regarding financing, only one financing institution participated in FREAGER meetings up to now (Bank South Pacific) and confirmed that RE and EE projects can be applies for financing under existing loan schemes of the bank. However, no specific credit/loan facility for RE and EE projects will be established which will have preferential terms for such projects. The Project also includes the plan of establishing an ESCO, which would be financed and operated by PPL. Up to now, no discussions on that topic have been held with PPL. Also, there has been no indication by PPL to start initiatives in that direction.

Preparation of step-by-step guides for solar PV, mini-hydro and energy efficiency has been initiated and first drafts of these guides have been shared during the MTR mission. The purpose of the step-by-step guides is to provide guidance on the development and implementation of RE and EE projects, covering technical, financial, legal and environmental aspects. The University of PNG was hired to prepare these drafts. Work has started in early 2019 and finalization of the guides has been seriously delayed, leading to delays of other activities, such as the various workshops to be held to present and discuss these draft guides. Further work is required to improve the quality of the draft guides.

The FREAGER project website has been established and can be found at: https://freager.org. The website only provides very general information on the project and is far away from being used as an active tool to communicate the work carried out and results achieved by the Project. Facebook and Instagram pages haven't been setup up to now. This is due to lack of resources in the PMU to deal with communication and marketing.

1.4 MTR Ratings & Achievement Summary Table

The following table summarizes the MTR ratings and achievements.

Table 1: Summary Review of Project[1]

Measure	MTR Rating	Achievement Description
Progress Towards Results	Objective: Moderately Unsatisfactory (MU)	• No GHG emission reductions generated, no diesel avoided and no new households benefitting so far, as implementation of demonstration activities (demos) are delayed. • No implementation of replication projects • Samarai solar PV mini-grid demo is expected to be commissioned in April 2020 • Cash co-financing for Samarai solar PV has been provided by PPL (US$ 0.6 million) • Other demos are in preparation stage, with initial work being carried out both on the demos on mini-hydros and energy efficiency. Implementation of these demos is expected in 2021/2022

[1] The Project outputs are rated on the following scale: 6: Highly satisfactory (no shortcomings), 5: Satisfactory (minor shortcomings), 4: Moderately satisfactory, 3: Moderately unsatisfactory (significant shortcoming), 2: Unsatisfactory (major problems); and 1: Highly unsatisfactory (severe shortcomings). Sustainability is rated on the following scale: 4: likely, 3: moderately likely, 2: moderately unlikely, 1: unlikely.

	Outcome 1: Moderately Satisfactory (MS)	• High interest on a provincial level to support the development of RE and EE investments. However, tangible commitments need to be confirmed. • Work on standards on track, commitment from NISIT for cooperation on standards, fair chance that end-of-project (EOP) target is achieved
	Outcome 2A: Moderately Satisfactory (MS)	• Samarai solar PV mini-grid demo is under implementation and will be put into operation in April 2020 • Mini-hydro powered grid demos in Gotomi and Miruma are planned to be implemented in 2021/2022.
	Outcome 2B: Moderately Unsatisfactory (MU)	• The Samarai solar PV mini-grid demo will have a capacity of 75 kW. • The mini-hydro powered grid demos in Gotomi and Miruma are expected to have a capacity of 200 kW each, assuming both demos are implemented. • Township EE programs for Wewak and Maprik are under preparation, confirmation of co-financing by provincial governments is under discussion
	Outcome 3: Unsatisfactory (U)	• PPL has committed to provide funding of USD 600,000 for financing of the Samarai solar PV demo, no further private sector funds have been confirmed • Bank South Pacific confirmed that standard loan facilities already exist, which can be used for RE and EE projects. However, no specific credit/loan facility for RE and EE will be established.
	Outcome 4: Moderately Satisfactory (MS)	• Likely that a good number of project developers, consultants, engineering and construction firms, building and industrial facility owners, etc. will see business opportunities in RE and EE • Positive feedback from policy makers during the MTR on-site visit. It is estimated that the EOP target on policy makers endorsing RE and EE initiatives will likely be achieved
Project Implementation & Adaptive Management	Moderately Unsatisfactory (MU)	Serious delays in initial phases of the Project implementation due to not sufficient capacity in the PMU. The national project manager receives ad-hoc support from UNDP staff (e.g., for procurement purposes), but the PMU lacks a communications officer and a procurement and administration assistant (as planned in the ProDoc). There is support from CCDA and PPL. However, due to resource constraints in these entities, the work to be carried out for the FREAGER project has limited priority.
Sustainability	Moderately likely (ML)	There are certain risks to the sustainability of project impacts, and it is likely to expect that key outcomes will not be sustained. The key financial risk to sustainability is the lack of cash co-financing provided up to now and the unclear situation regarding cash contributions in the remaining lifetime of the Project. Shortage of cash funds from UNDP led to a seriously under-staffed PMU and to delays in basically all activities to be implemented.

1.5 Concise summary of conclusions

The following conclusions can be drawn:

- The project is in general well-structured and the 4 components are a direct response to the main barriers identified during the project preparation phase. The various activities listed under each of the components clearly contribute to the outputs and outcomes defined for the 4 components. However, there are major shortcomings in the project design:
    - The number of activities in combination with the work required under each of the activities is highly challenging. Design of regulations and policies, design and promotion of energy roadmaps, formulation and adoption of standards, design and promotion of provincial RE and EE plan, preparation and implementation of various demos, design and operation of an ESCO fund, various capacity building activities with various stakeholders (just to name the most relevant activities) are an extremely ambitious program, especially when taking into account the limited experience in the country with RE and EE at project start.
    - The lifetime of the project is slightly less than 4 years. Taking into account the large number of activities to be carried out in combination with the planned demos, it is not clear why the project has not been designed for a period of 5 years.
    - Many of the activities were intended to be carried out in parallel and there was a lack of differentiation when is the right time for a specific activity to be carried out. For example training sessions for capacity building, implementation of demos or setting up funding mechanisms were all supposed to be carried out in parallel and throughout the 4 years lifetime of the project, rather than being implemented in consecutive steps, which would make more sense. There is little indication of adaptive management to solve these issues, which is based on lack of experience of the project manager and lack of project resources.
    - Assumptions on the timeline for implementation of the demos were totally unrealistic. It was assumed that all solar and EE demos will be implemented within the first year and will operate 3 full years during the project lifetime. All small hydro demos were supposed to be implemented until the end of year 2, generating GHG emission reductions over 2 full years during the project lifetime. With the need to carry out feasibilities, apply for environmental and operation permits, securing land (for hydro and solar PV) and water rights (for hydro), securing co-financing, constructing the plants and putting them into operation, it is difficult to understand why these unrealistic assumptions were made in the ProDoc.
    - The schedule of the ProDoc also doesn't take into account that there is an inception phase of the project, where the Project Board is constituted, an inception workshop is held and inception report is being prepared, stakeholders are being brought on board. This is standard for all GEF projects and it is difficult to understand why this hasn't been considered and the assumption of immediate start of implementation of the demos was made.
- The Project Results Framework is well elaborated and includes well-defined indicators. A ramp-up period was considered by defining mid-term targets at between 25% and 40% of the end-of-project targets. However, a considerable part of the indicators are related to the completion of the demos and requires demos to be up and running. The footnotes in the Project Results Framework of the ProDoc clearly describe which levels are expected to be achieved by the MTR, but again these indicators assume unrealistically short implementation periods for demos. Whereas these indicators are perfectly adequate for defining end-of-project targets, it would have been beneficial for the Project and all stakeholders involved

including additional indicators, which are suitable to evaluate progress, rather than confirming completion.

- The project faced serious delays in its initial phase. After the signing of the ProDoc, management of the Project was carried out by UNDP-internal staff due to funding issues and the PMU was only setup in September 2018, when the Project Manager got hired. This is almost 1 year after the ProDoc signing. The Inception Workshop was held in July 2018, the Inception Report was only finalized in May 2019. Usually, the inception phase of a project is taking around 3 months.
- In general, there has been limited progress with activities and outputs in the first 2 years due to management and financing issues in the early stages of the project. The main outputs produced so far are a policy gap analysis and a socio-economic analysis, both carried out by GGGI. The studies confirm the existing regulatory gaps as well as socio-economic benefits associated with renewable energy and energy efficiency. Other outputs, such as the step-by-step guides for solar PV, mini-hydro and energy efficiency or energy efficiency audits are still in preparation. Work on standards and the off-grid code is currently being kicked-off and various workshops will be initiated soon.
- There is good progress on the implementation of the Samarai solar PV demo and the solar PV plant is planned to be commissioned in April 2020. The preparation and implementation of the Samarai demo is a good example of successful project implementation, with the key aspects being ownership and commitment. This is secured as PPL is operating the Samarai mini-grid and is currently experiencing high operation costs due to the use of diesel.
- The development of the 2 mini-hydro demos is underway with consultants hired to carry out the feasibility studies. Various meetings with stakeholders revealed a number of serious challenges for these demos, including data collection, tight schedules, grid situation, ownership and operation, co-financing and coordination between stakeholders. Additionally, the likelihood of commissioning by end of April 2021 is highly unlikely.
- Work on the energy audits in Wewak and Maprit has begun. Results are still pending. In discussions on co-financing it was clarified by the district administration that public funding can only be used to co-finance investment into public buildings and institutions, such as hospitals, schools, public administration buildings or street lighting. Energy efficiency measures in private companies cannot be co-financed by the district authority. This needs to be taken into consideration when proceeding with implementation.
- There was little progress up to now under Component 3, improving access to finance for RE and EE. There is limited interest from financing institutions and FREAGER managed to get in contact with only one bank. The bank confirmed that RE and EE projects can apply under existing loan schemes. However, no specific credit/loan facility for RE and EE will be established which will have preferential terms for such projects. The ProDoc included a plan of establishing an ESCO, but up to now no indication from PPL was received to start initiatives in that direction.
- The FREAGER project website has been established (https://freager.org), but the website only provides very general information on the project due to lack of resources in the PMU to deal with communication and marketing.
- The MTR came to the conclusion that all identified barriers are – to various degrees – still valid. Barriers include those related to policy, planning, and institutions; technical and commercial viability; financing; and information and awareness. Conscientious and enhanced implementation of the remaining activities in all components will be required to work on overcoming those barriers. The AWP 2020 reflects this understanding and is a good step in the right direction.

- There are serious issues in management of the Project due to lack of resources. In the first phase, the Project was managed by UNDP-internal staff due to funding issues. The PMU was only set up in September 2018, when the Project Manager got hired. Due to lack of co-financing provided by UNDP, which was supposed to cover the bulk of project management costs, the PMU was not set-up as planned. Currently, it includes only the national project manager and receives ad-hoc support from UNDP staff (e.g. for procurement purposes). The positions of a Communications Officer and a Project Administration, Finance, and Procurement Officer haven't been filled up to now. There is support from CCDA and PPL, however, due to resource constraints in these entities, the work to be carried out for the FREAGER project has low priority. This has been raised with both entities by UNDP, however, there was limited positive response.
- The Project Board (PB) met 3 times since project start, in March 2018, February 2019 and November 2019. The PB is supposed to meet twice a year. However, it was discussed and agreed upon in the second meeting (February 2019) to meet quarterly in order to closely monitor project implementation. Funding was set aside to cover meeting costs. But still, only 2 meetings were held in 2019.
- The minutes of the PB meetings mention various challenges the Project is facing, however, there seems to be a lack of understanding how severe the situation has been. The minutes of the February 2019 meeting takes note of the achievements and delays in implementation, but still "expresses a strong view that the PMU had made excellent progress in addressing these delays". At that point, not even the Inception Report has been finalized, which was more than 18 months after project start and 7 months after the Inception Meeting was held. The minutes of the November 2019 meeting discuss in more detail the progress with the different demos, however, the action points are very general. Limitations in the capacity of the PMU were not raised.
- Work planning is done through Annual Work Plans (AWPs), which are prepared by the Project Manager and then presented to and approved by the Project Board. The Annual Work Plan also includes the budget envisaged to be spent for the activities carried out within one calendar year.
- The delay in project implementation is reflected in the project expenses over the first 2 years. Only 37% of allocated funds could be disbursed in 2018 and 2019, overall disbursement is only 26.1% as of 31 December 2019. This was mainly caused by the slow start-up of the project, and also due to the unrealistic assumptions in the ProDoc regarding implementation of the planned demos.
- The project has received co-financing commitments from UNDP, CCDA, PPL and the Provinces of Eastern Highlands and East Sepik. Total co-financing commitment at GEF CEO endorsement was US$ 24.76 million, out of which US$ 19.23 million were in cash and US$ 5.53 million in-kind. By the time of the mid-term review, co-financing amounted to US$ 2.00 million, around 8.1% of expected co-financing over the lifetime of the project. The only cash co-financing received so far was the investment by PPL into the Samarai solar PV demo. All other cash co-financing hasn't materialized up to now. As of the mid-term, cash co-financing is only 3.4% of the expected cash co-financing over the lifetime of the project.
- Stakeholder engagement is formalized through the Project Board, which includes all key stakeholders. It was requested that board meetings are held 4 times per year to allow improved communication and coordination. An MoU has been signed between UNDP, CCDA and PPL regarding the cooperation in the FREAGER project. Due to changes in PPL management, it is recommended to revive the cooperation at a high level between executives of UNDP, CCDA and PNG Power, to be followed by a coordination meeting/workshop at the

project manager/project staff level. For further details, please see the recommendations section.
- There are considerable risks to sustainability of the project impacts, mainly due to lack of or unclear situation regarding co-financing, a lack of remaining project time to carry out training/capacity building activities, and delays in the implementation of the activities for improving the institutional framework for RE and EE.

1.6 Recommendations

The following recommendations can be made:

Recommendation 1 – Immediate action to secure cash co-financing from all key stakeholders:
There is an alarming mismatch between cash co-financing commitment at endorsement, cash co-financing provided up to the MTR and expected future cash co-financing. The lack of financial funds is a severe threat to carrying out all further planned activities by the PMU and providing the necessary funds for investment into the demos. In detail, the Project faces the following challenges in terms of co-financing:

- Due to lack of resources for project management, the PMU is heavily under-resourced, with direct negative impacts on the entire performance of the project. The UNDP co-financing of US$ 300,000 was planned to be used for project management. The UNDP Country Office is aware of its co-financing commitments and is also aware that resources in the region have been reduced. The Country Office is in discussions with headquarters to solve the situation. These funds are required to adequately manage the Project in the remaining project lifetime.
- PPL made cash co-financing commitments at endorsement of US$ 11 million for the demos on mini-hydro development, US$ 2 million for solar PV mini-grids demos and US$ 3 million towards township energy efficiency program, for a total of US$ 16 million of cash co-financing. So far, co-financing of US$ 0.6 million has been provided for the implementation of the Samarai solar PV demo. Discussions with PPL during the MTR mission led to the conclusion that the current management is not aware of the co-financing commitments made in 2017. As cash co-financing will be required for the implementation of the planned demos, clarification about the potential funding available is urgently required. As mentioned in recommendation #4, the cooperation with PPL needs to be revived at high level, this should also include clarification on the co-financing available for the FREAGER project.
- CCDA is facing budget restrictions, which have an impact on the in-kind contribution provided to the project as well as the cash co-financing that it has committed to the project. No clarity was reached during the MTR mission regarding the level of cash co-financing is available from CCDA. This should be discussed and addressed by CCDA urgently.
- Meetings with provincial governments in Eastern Highlands and in East Sepik Province confirmed budget restrictions and it was made clear that the level of co-financing committed at endorsement will not be reached. It was mentioned by both provinces that reservations in the 2020 budget need to be made urgently to get clarity on the co-financing available for the mini-hydro and energy efficiency demos. Additionally, potential co-financing contributions of Daulo and Lufa Districts for the mini-hydro demos and from Wewak and Maprik Districts for the township energy efficiency projects should be investigated.

Recommendation 2 – Extend project end-date by 12 months: The original design of the Project included a project lifetime of slightly less than 4 years, from October 2017 to August 2021. Taking into account the large number of activities to be carried out in combination with the demos, it is not clear why the project has not been designed for a period of 5 years. Additionally, there have been considerable delays in the initial project phases, with the Inception meeting taking place only 9 months after project start and the project manager only being hired almost a year after project start. It is therefore recommended to extend the project end-date by 12 months to August 2022. This will give higher likelihood for remaining activities being implemented according to the plan and for the demos being implemented (installed, commissioned, and operational). A condition for this extension is the provision of cash co-financing from UNDP as committed during endorsement. Without this co-financing, proper staffing of the PMU and support with international experience is not feasible.

Recommendation 3 – Increase capacity of the PMU: Increasing the capacity of the PMU needs to be an immediate action point. The project manager needs strong support in administration and procurement to be able to focus on strategic decisions. An administration assistant is required to support the project manager in day to day work and follow up with procurement to ensure full documentations are available to conduct the assessment required by procurement team. Additional support in communication is necessary to increase the content of the website and support the upcoming communication and media work planned under Component 4. Currently the website only provides very general information on the project and is far away from being used as an active tool to communicate the work carried out and results achieved by the Project. Facebook and Instagram pages haven't been setup up to now.

A key focus of the PMU needs to be the preparation and implementation of the demos. The Project Manager is lacking the necessary technical know-how to provide the required strong lead in the work on the demos and should be supported by 2 experts, one focusing on the mini-hydro demos, and one focusing on the EE township programs ("Demo Project Managers"). These experts can either be provided from key stakeholders such as CCDA or PPL, but this should be under the condition that experts have sufficient time dedicated to the FREAGER Project and that work for the project has priority over other commitments. If this cannot be secured, external experts should be hired.

Work of the Demonstration Project Managers has to be supported by an international technical advisor. Depending on the capacity on RE and EE, this should be one or two advisors. International technical support has proven to be very helpful for the Samarai solar PV demo and should also be used for the mini-hydro and energy efficiency demos.

Recommendation 4 – Improve key stakeholder engagement: CCDA and PPL have key roles in the implementation of the FREAGER Project. CCDA is the Implementing Partner, and PPL is the senior supplier. CCDA has been active in co-chairing the Project Board and supporting various activities. However, more leadership from CCDA would be helpful taking into account the delays in implementation of activities up to now and the extensive work program until end of the project. A clear commitment of additional resources contributing to the management of the implementation of the demonstration activities would be an important contribution. Due to changes in PPL management, a lack of full understanding of the role of PPL as well as the co-financing commitments given were identified during the MTR mission. It is recommended to revive the cooperation at the high level between executives of UNDP, CCDA and PPL, to be followed by a coordination meeting/workshop at the project manager/project staff level.

Recommendation 5 – Improve number of Project Board meetings and increase quality on guidance: The PB is supposed to meet twice a year, up to now only 3 meetings have been held. As stated by stakeholders in PB meetings and as also communicated in different meetings during the MTR mission, PB meetings should be held 4 times a year in 2020 and 2021. With the large number of activities to be carried out under all components, regular meetings of all relevant stakeholders are necessary to ensure proper information of all stakeholders, properly steer the project and initiate activities of adaptive management, if necessary. This is especially the case for stakeholders involved in the implementation of demos, including provincial governments and district administrations. In addition to increasing the frequency, also the quality on guidance by the PB needs to be improved. Action points decided in the PB meetings need to be more elaborated and give clear guidance for the PMU. Deadlines are to be mentioned in the minutes and in the following meeting it should be checked whether activities are implemented as planned.

It is understood that travel costs to allow members outside of Port Moresby to participate in the PB meetings are a concern. Although face-to-face meetings are to be preferred, participation via conference calls (e.g. through Zoom or Microsoft Teams) or skype should be considered in case of budget constraints. As a response to COVID-19, PB meetings can be arranged as virtual meetings.

Recommendation 6 – Provide support to PMU in project management and M&E: Planning in the Annual Work Plans is done by activities as defined in the ProDoc, the implementation schedule is by quarter. While all activities are listed in the AWP, it is difficult to understand how proper project management can be carried out, as there is lack of detail on steps necessary to prepare and implement all activities. A more detailed work plan, which allows proper project management for the remaining lifetime of the Project is necessary and would be an important tool for ensuring timely delivery of activities and outputs. Support through additional human and financial resources should be provided to the PMU. Additionally, support by UNDP on M&E for the PMU is recommended, which also includes the collection of data/results provided by project partners on implementation of activities. Information provided during the MTR (such as PIR) indicates that the M&E system hasn't been set up properly and therefore cannot be used as a project management tool to identify where activities need to be carried out to achieve the projected results and outputs. The Monitoring Plan has to be implemented as defined and described in the ProDoc. The plan clearly describes for each indicator the frequency and responsibility of data collection and defines the means of verification. A considerable number of indicators requires external input from project consultants. These should be hired in due time to set-up the monitoring system properly and define data and information demands in time for the terminal evaluation.

Recommendation 7– Reduce work input on Component 3, focus on ESCO concept: With the considerable delays in the initial project phase and the large number of activities still to be carried out, it is clear that not all activities can be carried out as planned. Response on the initial work under Component 3 (financing of renewable energy and energy efficiency projects) has been meager. Only one financing institution participated in FREAGER meetings up to now (Bank South Pacific) and confirmed that RE and EE projects can apply under existing loan schemes. However, no specific credit/loan facility for RE and EE will be established which will have preferential terms for such projects. With the difficult financial situation of the government, there is no funding available covering the difference between commercial rates and preferential terms. Discussions during the MTR mission with PPL didn't give confidence on the interest of the company to investigate energy efficiency investments under an ESCO setting. Talks on the ESCO concept between UNDP and PPL should be taken to the management level, to get a high-level commitment for pursuing this opportunity The

activities under Component 3 should focus on the planned workshops, preparing and implementing the ESCO concept with PPL and making information on sources of funding for RE and EE publicly available.

Recommendation 8– Critically review progress of mini-hydro projects: Due to the delays in the initial project phases, there is a considerable risk that implementation of the mini-hydro demos will not be feasible within the (extended) lifetime of the Project. This seems to be specifically the case for the Miruma mini-hydro demo, where – based on information provided during the MTR mission – there is no grid existing for supplying electricity generated to consumers. In the case of Gotomi, the existence of a mini-grid owned by PPL was confirmed, but as the mini-grid is currently not in operation, there was lack of clarity under which conditions the grid can be restarted and whether there are additional barriers not considered up to now.

Once the feasibility study for both projects becomes available, the likelihood of successful project implementation within the remaining lifetime of the Project needs to be critically reviewed. If there is a considerable risk that implementation cannot be finalized in time, two options should be considered: (a) secure commitment of stakeholders/partners to implement the demo after the support from GEF has stopped (i.e., after end of FREAGER Project). This could for example be through PPL or private sector investors. (b) if no partner can be committed to secure successful implementation, preparation should be pushed forward as far as feasible (e.g. prepare drawings, secure permissions, prepare tender documents), but construction should not be started.

2. INTRODUCTION

2.1 Purpose of the Mid Term Review and Objectives

The "Facilitating Renewable Energy & Energy Efficiency Applications for Green House Gas Emission Reduction (FREAGER)" project (PIMS #5569) started in October 2017 and is now in its third year of implementation. The objective of the Project is the enabling of the use of Renewable Energy (RE) and Energy Efficiency (EE) technologies for achieving greenhouse gas emission reductions in Papua New Guinea (PNG). PNG's greenhouse gas (GHG) reduction efforts to date have focused on the forestry sector. Yet, despite low per capita energy use at present, with only 15 percent of the population having access to electricity, the adoption of RE and EE technologies in PNG has strong potential both to reduce current GHG emissions and avoid future, growing GHG emissions expected as rising per capita energy use and electrification accompany development of the nation. Analysis shows that community RE mini grid and township diesel center based EE programs present particularly compelling win-win propositions for PNG. FREAGER will demonstrate the relevant technologies for and aim to achieve widespread replication of micro/mini-hydro mini grids, solar PV mini grids, and township EE programs.

The project has four major components:

- Component 1: Energy Policy, Planning, and Institutional Development
- Component 2: Renewable Energy and Energy Efficiency Technology Applications (commercial and technical viability)
- Component 3: Financing of Renewable Energy and Energy Efficiency Projects
- Component 4: Energy Development and Utilization Awareness Enhancement (RE and EE information and awareness)

In accordance with UNDP and GEF requirements, the project is required to undertake a Mid-Term Review (MTR) at the end of its second year of implementation. The purpose of the MTR is to assess progress made towards the achievement of the objectives and outcomes as specified in the Project Document and assess early signs of project success or failure with the goal of identifying the necessary changes to be made to set the project on-track to achieve expected results. The MTR will also review the project's strategy, its risks to sustainability and make recommendations on how to improve the project over the remaining lifetime. The MTR will also provide an assessment and recommendations on whether the project should be extended beyond the end of its originally planned 4 years lifetime and under what conditions the project should be extended.

2.2 Mid Term Review Methodology and Scope

The MTR was based on the following methodological approach:

- Key project documents of the project were reviewed. The documents provided by the UNDP Project Manager for the MTR are listed in chapter **Error! Reference source not found.**.
- Interviews were conducted with UNDP staff and representatives of all key stakeholders involved in the project. The list of stakeholders interviewed can be found in chapter **Error! Reference source not found.**.
- Site visits to 2 locations were made to review the progress of the implementation of the demos (Wewak in Province of East Sepik, Goroka in Province of Eastern Highlands).

The MTR respected the following key principles:

- Participative: the MTR involved all relevant project stakeholders in the review activities.
- Constructive: the underlying aim of the MTR is to help project stakeholders to find ways to optimize the project, so the project outcomes and objective can be achieved.
- Independence and neutrality: the MTR team has no connections with the project and no interests in the project. The MTR sole objective and interest is to report objectively on the project in order to support future optimization;
- Evidence-based: all findings and conclusions are based on clear and balanced evidence collected during the MTR.

The MTR was undertaken in line and accordance with the new Guidelines for Evaluations published in January 2019. In terms of scope, the MTR covers all aspect of the development and implementation of the Project, from the preparation of the PIF up till and including end-January 2020. According to the ToR (see Annex 1), the assessment covers the following four categories of project progress:

- Project Strategy
- Progress Towards Results
- Project Implementation and Adaptive Management
- Sustainability

The categories evaluative questions, indicators, sources of information and methods of review applied in the review can be found in the MTR Evaluative Matrix in chapter **Error! Reference source not found.**.

2.3 Structure of the MTR Report

This MTR Report is presented as follows:

- An overview of project preparation and implementation from the commencement of operation in October 2017
- Review of project strategy, progress towards results, project implementation and adaptive management and sustainability
- Conclusions and recommendations on how to increase the performance of the project

3. PROJECT DESCRIPTION AND BACKGROUND CONTEXT

3.1 Project Context

PNG's greenhouse gas (GHG) reduction efforts to date have focused on the forestry sector. Yet, despite low per capita energy use at present, with only 15 percent of the population having access to electricity. The adoption of renewable energy (RE) and energy efficiency (EE) technologies in PNG has strong potential both to reduce current GHG emissions and avoid future, growing GHG emissions expected as rising per capita energy use and electrification accompany development of the nation. Analysis shows that community RE mini-grid and township diesel center-based EE programs present particularly compelling win-win propositions for PNG. Over time, both will present substantial cost savings over the business-as-usual case, in which diesel is used, while at the same time lowering present or avoiding future GHG emissions. FREAGER will demonstrate the relevant technologies for and aim to achieve widespread replication of micro/mini-hydro mini-grids, solar PV mini-grids, and township EE programs. It will aim to do so by removing barriers to these technologies in the areas of policy and planning, technical and commercial viability, availability of financing, and information and awareness. In the policy and planning area, the project will promote these technologies via: capacity building programs for officials, through which the officials develop actual pipeline RE mini-grid projects and township EE programs; design of policy incentives; standards work; national roadmaps for community RE mini-grids and township EE programs; and provincial level RE and EE plans.

Technical and commercial viability will be supported through capacity building for technical personnel on RE mini-grids and on building and industrial EE. It will also be supported through developing and disseminating information on best international sourcing channels for EE and RE and on the "honest," best costing for community RE mini grids in PNG. Project demos will include two mini-hydro mini-grids and one PV mini-grid, with support also provided for productive use of RE at all three sites. In addition, demos of comprehensive EE programs (including building and industrial energy audits and retrofits, support for residential customers, support for future, large power customers, and street lighting retrofits) will be developed in two townships that are fully powered by diesel. The project will also support demonstration of PPAs and billing systems, as well as O&M training, for two mini-hydro projects that are already under development. Efforts related to financing EE and RE will include capacity building for the financial sector and the set-up of an ESCO fund to finance EE retrofits and a loan fund for community RE projects. Information and awareness work will include support to develop domestic manufacturing of RE mini-grid and EE products (and thus achieve lower cots) and briefings on the cost competitiveness of RE and EE as compared to diesel. It will further include a multi-channel media campaign for RE and EE and educational materials on RE and EE. It will also include RE mini-grid how-to handbooks tailored to PNG, pipeline RE mini-grid project listings, data from RE resource assessments, and curriculum from various project workshops, all available at a one-stop-shop website on RE and EE in PNG.

3.2 Problems to be addressed by the project

Renewable energy and energy efficiency technologies present a compelling win-win GHG emission reduction opportunity that addresses PNG's issues of power shortage, very low levels of energy access, and very high costs of diesel power generation, as well as its direct uses of liquid petroleum fuels. Yet, adoption of RE and EE to an extent substantially greater than the very limited level

described above will require that a number of barriers be removed. Barriers include those in the areas of:

- Policy, planning, and institutions: policy makers and planners at the national, provincial, district, and local levels lack experience with RE and EE and don't have the expertise to develop RE projects or EE programs. National policies and regulations are required to promote RE and EE, supported by standards and guidelines that can ensure RE and EE are promoted with quality approaches and products.
- Technical and commercial viability: There is a lack of ability in PNG to achieve commercially and technically viable micro/ mini-hydro systems, PV mini-grid systems, and township EE retrofit programs. In each of these areas, there is a need for technical capacity in how to design and construct projects. PNG entities lack information, for example, on which micro/mini-hydro related products, PV mini-grid related products, and energy efficient equipment products have the quality needed to achieve technical goals. Further, PNG lacks information on how to procure such products internationally, when needed, at the lowest possible price, while still ensuring quality.
- Financing: Adoption of community RE systems and township EE initiatives on a wide scale will require strong financing. Although RE and EE present PNG with a bottom line solution potentially far superior to diesel power generation over time, their up-front costs can be higher than the alternative of diesel power generation. Thus, financing of the upfront costs of RE and EE is an important way to stimulate their adoption. Financing mechanisms are needed both to stimulate the market (by providing a critical mass of initial projects in the market) and also to provide the relatively large up-front financing required of RE and EE when funds would otherwise not be available.
- Information and awareness: there is limited information and awareness in PNG for RE and EE generally and for community RE mini –grids and township EE initiatives, in particular. A key area in which there is a lack of information and awareness is that of the potential superior cost performance of community RE systems and township EE as compared to diesel systems and business-as-usual. Were policy makers, in particular, to be briefed in a clear fashion about the cost superiority of RE and EE, this would substantially enhance the potential for the widespread adoption of relevant technologies.

3.3 Project Description and Strategy

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 contribution to this objective. The main, overall strategy is (1) a multi-pronged barrier removal approach. Other key strategies include: (2) well-reasoned 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 cost" 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.

The project has been structured in 4 components to achieve the overarching objective of enabling of the application of feasible renewable energy and energy efficiency technologies for achieving greenhouse gas emission reduction in PNG:

- Component 1: Energy Policy, Planning, and Institutional Development: This component focuses on energy policy, planning, and institutional development for RE and EE in PNG, specifically on community RE mini-grid systems and township center EE programs to address policy, regulatory and institutional barriers to the application of feasible RE and EE technologies for achieving GHG emission reduction in PNG. The expected outcome, from the outputs that will be delivered under this component, is the 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.
- Component 2: Renewable Energy and Energy Efficiency Technologies Applications (Commercial and Technical Viability, including Project Demos): This component focuses 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 “low-cost, technically sound community RE systems and township center EE retrofits. As such, the component will address both technical and commercial barriers to achieving community RE systems and township EE retrofits in PNG.
- Component 3: Financing of Renewable Energy and Energy Efficiency Projects: This component focuses on facilitating the mobilization of financing for RE and EE in PNG, including both equity investment and loan financing. It aims to address barriers to such financing, namely the lack of awareness and capacity of banks and other investors in PNG with regard to RE and EE projects and the lack of precedent in PNG for financing of community RE mini-grids and township EE retrofits. The targeted outcome of the component is improved availability of, and access to, financing for renewable energy and energy efficiency initiatives in the energy generation and end –use sectors. The financing mechanisms introduced will serve to both stimulate the market and to provide funds for upfront investment that would otherwise not be available.
- Component 4: Energy Development and Utilization Awareness Enhancement (Information on and Awareness of RE and EE): This component focuses on increasing the availability of quality information on the development of RE and EE in PNG, as well as on raising the awareness among stakeholders of RE and EE. It addresses the key barriers that stakeholders in PNG lack information about RE and EE, particularly about RE mini-grids and township EE initiatives, and that there is a general lack of awareness among the public in PNG about RE and EE. With regard to information, a key area of note is lack of information among PNG stakeholders about the potential superior cost performance of RE and EE as compared to diesel. The targeted outcome of the component is improved awareness of, attitude towards, and information about renewable energy and energy efficiency applications in the energy generation and end-use sectors.

3.4 Project Implementation Arrangements

UNDP is the GEF Agency for this project. The project is implemented following UNDP’s national implementation modality (NIM with UNDP providing support services). The Implementing Partner for this project is the Climate Change and Development Authority (CCDA) who is responsible and accountable for managing this project, including the monitoring and evaluation of project interventions, achieving project outcomes, and for the effective use of the project resources.

The National Project Director (NPD) is the Director of Low Carbon Growth/Mitigation Division of CCDA, as delegated by the Managing Director of CCDA. The NPD is responsible for day-to-day oversight of the PMU including strategic oversight and guidance to project implementation in close

collaboration with UNDP. A Program Management Unit (PMU) was established jointly by the UNDP and CCDA and is located in CCDA's Low Carbon Growth/Mitigation Division. The primary role of the PMU is to oversee, support, administer and coordinate the implementation of the project under the guidance of the National Project Director. The planned setup of the PMU included the National Project Manager, an international technical advisor to provide technical assistance to the PMU/CCDA/PPL and mentor the project manager, a communications officer and a procurement and administration assistant.

The Project Board (PB) is considered the key governing mechanism for technical and strategic guidance over project implementation. It is constituted to serve as the project's coordination and high level decision making body. The PB ensures that the project remains on course to deliver the desired outcomes of the required quality. The PB is co-chaired by CCDA and UNDP and includes representation from PPL and district representatives. The PB intends to meet at least twice per annum to review project progress, approves project work plans, and approves major project deliverables.

3.5 Project Timing and Milestones

The project document was signed on 20 October 2017, the Inception Workshop was held on 20 July 2018. The planned closing date of the project is August 2021, which means an effective project lifetime of less than 4 years.

The multi-year workplan includes a tight program for all activities to be carried out under the 4 project outcomes. All project components are basically implemented in parallel. The Terminal Evaluation is planned to be carried out between January and March 2021.

3.6 Main Stakeholders

According to the Project Document, the main project stakeholders include:

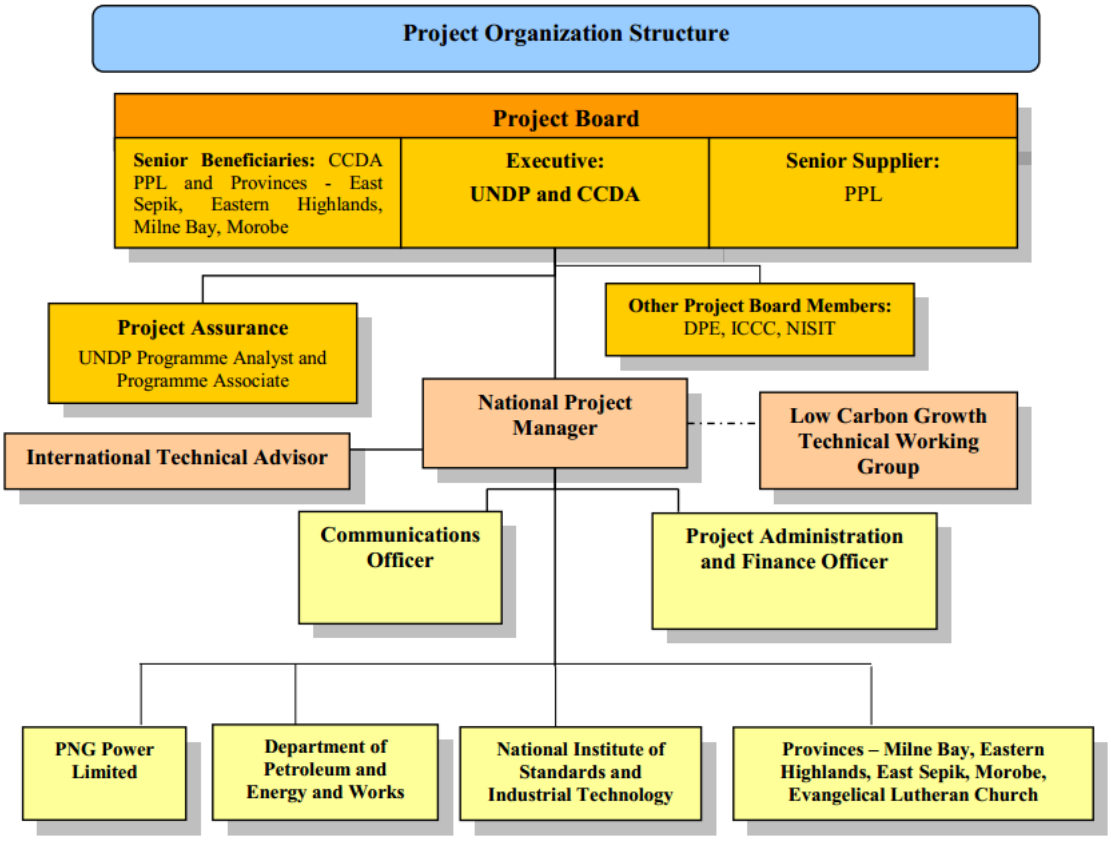
- Climate Change and Development Authority (CCDA): CCDA is the governmental authority in PNG responsible for climate change mitigation and adaptation. As the implementing partner (IP) of the project, CCDA will lead the project steering committee and work closely with the project team to ensure the project is well implemented.
- PNG Power Limited (PPL): PNG Power Ltd (PPL) is a fully integrated power authority responsible for generation, transmission, distribution and retailing of electricity throughout Papua New Guinea and for servicing individual electricity consumers.
- Department of Petroleum and Energy (DPE): DPE is the lead government agency responsible for the energy; sector and plays the key role in energy policy development and energy planning and regulations, including energy advice to PNG Government in the areas of fuel pricings, subsidies, and renewable energy resources.
- Independent Consumer Consumption Commission (ICCC): ICCC is the principal economic regulator and consumer watchdog. Their primary role is to administer and implement the ICCC Act and other related legislation. ICCC performs a number of functions including: administration of price regulation, licensing, industry regulation and other matters outlined under the ICCC Act. In the power sector, ICCC is responsible for determining and regulating prices, as well as issuing licenses to those who produce power for sale.

- Department of Public Enterprise: The Department of Public Enterprises was created to provide policy oversight to remedy serious SOE (state-owned enterprise) performance weaknesses and provide stringent oversight to SOEs, so that they become profitable through policy level interventions. These interventions will include not only those for rehabilitating and investing in the existing SOE businesses, but also those for incubating new business opportunities and investments into one structure called the Kumul Consolidation Agenda.
- National Institute of Standards and Industrial Technologies (NISIT): The National Institute of Standards and Industrial Technologies of Papua New Guinea (NISIT) is the government body established under the NISIT Act 1993 to evaluate, improve, and establish conformity assessment schemes and to address issues of productivity and technical barriers to trade.
- Provincial Governments of Milne Bay Province, Eastern Highlands Province, East Sepik Province, and Morobe Province: District administrations in PNG are also subject to the organic laws of PNG. They administer the affairs of the Local Level Governments (LLGs) inclusive of urban, rural, traditional and other forms approved by the National Executive Council (NEC). The district administration is responsible for all LLG matters and for making the appropriate recommendations to the Joint District Planning and Budget Priorities Committee (JDP&BPS) and PEC for district development matters.
- Evangelical Lutheran Church PNG (ELC PNG): The ELC PNG is a church organization established in 1886 in PNG. It is dominant in 17 districts nationwide with over 1.2 million members. The ELC PNG contributes significantly to ministerial services, education, health, and development services.
- Institute of Engineers: The Institute of Professional Engineers Papua New Guinea (IEPNG) is the professional body that represents professional engineers from all disciplines in Papua New Guinea.

Other relevant stakeholders include: PNG Customs; Incorporated Land Group (ILG) Division, Department of Lands and Physical Planning (DLPP); Department of Works and Implementation (DOWI); Department of Environment and Conservation (DEC); and Indigenous Peoples and Local Communities

The following figure from the Project Document shows the Project Organization Structure.

Figure 1: Project Organization Structure


Project Organization Structure
Project Board
Senior Beneficiaries: CCDA PPL and Provinces - East Sepik, Eastern Highlands, Milne Bay, Morobe
Executive: UNDP and CCDA
Senior Supplier: PPL
Project Assurance
UNDP Programme Analyst and Programme Associate
Other Project Board Members: DPE, ICCC, NISIT
National Project Manager
International Technical Advisor
Low Carbon Growth Technical Working Group
Communications Officer
Project Administration and Finance Officer
PNG Power Limited
Department of Petroleum and Energy and Works
National Institute of Standards and Industrial Technology
Provinces – Milne Bay, Eastern Highlands, East Sepik, Morobe, Evangelical Lutheran Church

4. FINDINGS

4.1 Project Strategy

4.1.1 Project Design

The objective of the project is enable the use of renewable energies, with a focus on small hydro and solar PV, and energy efficiency technologies for achieving greenhouse gas emission reductions in PNG. In order to achieve that, the project has been structured in 4 different components:

- Component 1 – Energy policy, planning and institutional development: focuses on energy policy, planning, and institutional development for RE and EE in PNG, specifically on community RE mini-grid systems and township center EE programs to address policy, regulatory and institutional barriers to the application of feasible RE and EE technologies for achieving GHG emission reduction in PNG.
- Component 2 – Renewable energy and energy efficiency technology applications: focuses 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. As such, the component addresses both technical and commercial barriers to achieving community RE systems and township EE retrofits in PNG.
- Component 3 – Financing of renewable energy and energy efficiency projects: focuses on facilitating the mobilization of financing for RE and EE in PNG, including both equity investment and loan financing. It aims to address barriers to such financing, namely the lack of awareness and capacity of banks and other investors in PNG with regard to RE and EE projects and the lack of precedent in PNG for financing of community RE mini-grids and township EE retrofits.
- Component 4 – Energy development and utilization awareness enhancement: focuses on increasing the availability of quality information on the development of RE and EE in PNG, as well as on raising the awareness among stakeholders of RE and EE. It addresses the key barriers that stakeholders in PNG lack information about RE and EE, particularly about RE mini-grids and township EE initiatives, and that there is a general lack of awareness among the public in PNG about RE and EE.

The project and its components are well-structured and are a direct response to the main barriers identified during the project preparation phase. The various activities listed under each of the components clearly contribute to the outputs and outcomes defined for the 4 components.

When analyzing the project design in more detail, there are various observations:

- The number of activities in combination with the work required under each of the activities is highly challenging. Design of regulations and policies, design and promotion of energy roadmaps, formulation and adoption of standards, design and promotion of provincial RE and EE plan, preparation and implementation of various demos, design and operation of an ESCO fund, various capacity building activities with various stakeholders (just to name the most relevant activities) are an extremely ambitious program, especially when taking into account the limited experience in the country with RE and EE at project start.

- The lifetime of the project is slightly less than 4 years. Taking into account the large number of activities to be carried out in combination with demonstration activities, it is not clear why the project has not been designed for a period of 5 years.
- Many of the activities were intended to be carried out in parallel and there was a lack of differentiation when is the right time for a specific activity to be carried out. For example training sessions for capacity building, implementation of demos or setting up funding mechanisms were all supposed to be carried out in parallel and throughout the 4 years lifetime of the project, rather than being implemented in consecutive steps, which would make more sense. There is little indication of adaptive management to solve these issues, which is based on lack of experience of the project manager and lack of project resources.
- Assumptions on the timeline for implementation of demos were highly unrealistic. It was assumed that all solar and EE demos will be implemented within the first year and will operate 3 full years during the project lifetime. All small hydro demos were supposed to be implemented until the end of year 2, generating GHG emission reductions over 2 full years during the project lifetime. With the need to carry out feasibilities, apply for environmental and operation permits, securing land (for hydro and solar PV) and water rights (for hydro), securing co-financing, constructing the plants and putting them into operation, it is difficult to understand why these unrealistic assumptions were made in the ProDoc.
- The schedule of the ProDoc also doesn't take into account that there is an inception phase of the project, where the Project Board is constituted, an inception workshop is held and inception report is being prepared, stakeholders are being brought on board. This is standard for all GEF projects and it is difficult to understand why this hasn't been considered and the assumption of immediate start of implementation of the demos was made.

4.1.2 Results Framework

The Project Results Framework is well elaborated and includes well-defined indicators meeting the requirements of GEF to be "SMART" (Specific, Measurable, Achievable, Relevant, Time-bound). Targets both for MTR and Terminal Evaluation are clearly defined. For each of the Outcomes at least 2 indicators have been identified, which are adequate to measure the achievements made in project implementation. MTR targets take into account that there is a ramp-up period in the project and are usually between 25% and 40% of the end-of-project target. The targets are – where relevant – disaggregated by gender, aiming at shares of at least 20% women and women-headed households.

The majority of indicators is related to the completion of the demos in the sectors energy efficiency, solar PV and mini hydro and requires the demos to be up and running. These include for example GHG emission reductions achieved, capacities installed, financing secured, or jobs created. The footnotes in the Project Results Framework of the ProDoc clearly describe which levels are expected to be achieved by the MTR, but again these indicators assume unrealistically short implementation periods for demos. Any delay in any aspect leading towards the successful implementation of these demos (such as delay in data collection, approvals, financing, construction, etc.) reduces the likelihood of achieving mid-term targets. Whereas these indicators are perfectly adequate for defining end-of-project targets, it would have been beneficial for the Project and all stakeholders involved including additional indicators, which are suitable to evaluate progress, rather than confirming completion.

The Results Framework is based on the assumptions from the ProDoc, which include the quite unrealistic view on the time required to carry out the inception phase followed by preparation and implementation of the demos. As a consequence, the majority of mid-term targets were difficult to reach. This flaw should have been realized during project preparation.

The only recommended revision of the results framework is to revise the indicator under Outcome 4 on "Number of manufacturers in PNG profitably producing RE and/or EE related equipment" by broadening the definition of manufacturers. The assumption in the ProDoc was that local companies will manufacture RE/EE equipment or components. It is not realistic that main components (such as solar panels, mini-hydro turbines, generators, etc.) will be produced in PNG, so focusing on manufacturers is too narrow. This indicator should include all companies with a focus on RE and EE, such as EPC (Engineering, Procurement and Construction) companies, project developers, consulting companies. Guidance should be provided to these companies on how to identify, prepare and implement RE and EE projects and the indicator should measure the number of active local companies active. The revised indicator should be named "Number of companies in PNG profitably involved in RE and/or EE projects".

4.2 Progress Towards Results

4.2.1 Progress towards Outcomes Analysis

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

Component 1 consists of 6 different outputs:

- Output 1.1: Completed government capacity building programs for the design and development of RE and EE technology projects.
- Output 1.2: Approved national-level policies or regulations that promote RE and EE
- Output 1.3: National-level RE and EE roadmaps, with proposed funding allocations for projects, submitted, approved, and implemented.
- Output 1.4: Formulated, adopted, and effectively enforced standards to promote adoption of RE and EE
- Output 1.5: Formulated, approved, and implemented effective institutional plans for promoting RE and EE, detailing responsibilities of relevant agencies and coordinating mechanisms among them.
- Output 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

A major first activity under Component 1 was a policy gap analysis, which was carried out by GGGI (Global Green Growth Institute) and which was finalized in July 2019. The analysis concluded that there is a wide range of policy, legislative and regulatory gaps regarding renewable energy and energy efficiency in Papua New Guinea. In RE there is a lack of consistent legislation and regulatory certainty, considerable inconsistency between existing provisions and a lack of existing policies and regulations not being enforced. Specifically relevant for the project are off-grid areas. Off-grid is defined as all areas outside a 10km radius of the existing PPL grid. There, investors are free to develop and operate mini-/micro-grids, however there is no off-grid code defining essential topics such as licensing, tariffs, financing or safety. For EE as well as for RE there is a lack of standards defining quality, minimum energy performance or energy efficiency in buildings.

Work of GGGI also included a Socio-Economic Analysis, which found considerable socio-economic benefits associated with renewable energy and energy efficiency in PNG. The report illustrates benefits to individual households as well as benefits from preserving global public goods. Individual households benefit from renewable energy and energy efficiency measures in the form of cost savings due to avoided expenses on fossil fuels, increased income due to increased electricity access, and the creation of employment. Wider public benefits include the reductions of CO2 emissions and the related adverse impacts from climate change, the improvement of public health due to lower air pollution, avoidance of environmental degradation (as a result of cutting forests for biomass, mining of coal, and drilling for oil and gas) and associated loss in Gross Domestic Product (GDP), as well as improvement in public budgets. The report further confirmed that renewable energy and energy efficiency measures can directly contribute to achieving 10 of the 17 United Nations' Sustainable Development Goals (SDGs).

Work has been initiated in the development of on an off-grid code as well as on standards for RE and EE technologies as well as off-grid power generation and distribution. The off-grid code will be elaborated in close cooperation with the Independent Consumer & Competition Commission (ICCC) and a consultant has been hired to carry out the work. The off-grid code needs to undergo a vigorous stakeholder consultation, including regional consultations. ICCC expressed a need for support from UNDP in organizing and carrying out the consultations. The time required for the consultation was estimated at 6 months, which seems ambitious.

On standards, a consultant will work with NISIT to identify relevant standards for RE and EE technologies as well as off-grid power generation and distribution, which can be applied in PNG. Implementation of new standards will be either through straight adoption of existing standards (e.g. ISO, Australian standards) or revision of existing standards. The time required is estimated at 12-24 months, depending on the complexity of modifications required to adapt standards to the local situation.

Based on step-by-step guides being developed under Component 4 a series of workshops will be carried out. The purpose of the step-by-step guides is to provide guidance on the development and implementation of RE and EE projects, covering technical, financial, legal and environmental aspects. The workshops will be for national and provincial development planning officials on the planning and development of community micro/mini-hydro and solar PV mini-grids as well as for national and provincial development planning officials and PPL staff on the planning and development of township-wide EE programs. The workshops will be carried out in Port Moresby as well as in Eastern Highlands and East Sepik provinces. Implementation of the workshops is considerably behind schedule due to the delays in preparing the step-by-step guides.

Further work will include the preparation of national RE and EE roadmaps as well as provincial plans for promoting RE and EE in townships.

As a good part of the activities under Component 1 were only planned around the mid-term of the project, the majority of work is currently on time or only facing minor delays. This specifically includes the work on the regulatory framework and standardization, which is about to being kicked off. The time left should be sufficient to achieve the expected results.

The capacity building component under Component 1 is not really fitting and would better be placed under Outcome 4, which also includes the development of the step-by-step guides. The original plan for the training workshops was to have 1 workshop per year for a total of 3 years. This is not optimal and should have been revised in the inception phase when reviewing the work programme. One year

between each of the workshops does not allow participants to sustainably strengthen their know-how on RE and EE. The workshops should now be carried out with a 2-3 month's timeframe between the workshops. It is recommended to revise the workshop program accordingly and to hire a combination of national and international experts to hold the workshops.

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.

Component 2A consists of activities that will deliver 7 different outputs:

- Output 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
- Output 2A.2: Well-researched and verified sourcing information on RE and EE products, including brands/specifications, sourcing channels, and prices
- Output 2A.3: Detailed information on "honest," best possible costing of community RE mini - grid projects
- Output 2A.4: 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
- Output 2A.5: Proven system for power purchase agreements (PPAs) between PPL and independent power providers (IPPs) running community based RE mini-grids
- Output 2A.6: Adopted business plans for productive use of renewable energy (PURE) that raise the incomes of local people, especially women
- Output 2A.7: Published and disseminated information on findings from monitoring of the project RE and EE demos

The workshops to be carried out under Component 2A will have a more technical focus that the workshops under Component 1 and will address both public and private sector experts. Initial trainings on energy efficiency audits have been already carried out with the majority of workshops still pending. During the preparation of the further workshops it should be investigated whether there are overlaps with Component 1 workshops and economies of scale can be used.

Component 2 also included the collection of information on high quality products needed for solar PV mini-grids, mini-hydro and various EE retrofits as well as information on costing of these technologies. This work was included in the contract of UPNG on the preparation of the step-by-step guides (under Component 4). The step-by-step guides have been prepared only using national expertise, which is in contradiction to one of the major barriers on which the project is based on, limited information and awareness in PNG for RE and EE generally and for community RE mini–grids and township EE initiatives, in particular. It is highly recommended that a peer review process is started, and the guides undergo a revision by an international expert.

Another component of Component 2 is the preparation of a template for a Power Purchase Agreement (PPA) between PPL and Independent Power Producers (IPPs). The ProDoc refers to a setting where the IPP operates a mini-grid and would sign a PPA with PPL. This does not make sense, as PPL would not deliver electricity into a mini-grid operated by an IPP, but rather the other way around. It is understood that PPL has already signed PPAs with IPPs. These PPAs should be taken as a starting point for developing the template, taking into account that the template will be

applied to mini-grids, which are not connected to PPL's national/regional grids. As such, the template should be applicable to any agreement between a power producer and a grid operator, no matter whether PPL is involved or not.

Productive use of energy is a key aspect for improving the living situation of the rural population, as it looks at new income generation activities based on the availability of electricity. This output was planned for the second half of the Project and is therefore still in time.

Due to the delays with the implementation of the demonstration project, efforts on publishing and disseminating information on findings from monitoring should be reduced. It is expected that only the Samarai solar PV mini-grid demo will be implemented sufficiently early before the end of the Project lifetime to allow monitoring, as well as selected energy efficiency measures. Efforts should focus on those activities. For the hydro demos most likely the time between finishing implementation and end-of-project will be too close to allow monitoring.

Outcome 2B: Increased installed capacity of RE based power systems and implementation of viable EE technology applications in PNG.

Component 2B consists of activities for delivering 4 different outputs:

- Output 2B.1: Completed successful demos of commercially viable mini-hydro systems in PNG
- Output 2B.2: Completed successful demo of commercially viable off-grid solar PV mini-grid system in PNG
- Output 2B.3: Completed successful demo of commercially viable township energy efficiency programs
- Output 2B.4: Completed demonstration of productive applications of RE mini-grid systems that raise the incomes of local people

Component 2B focuses on the implementation of demonstration activities and includes 5 demos:

- Mini-hydro mini-grid system in Gotomi Ward, Lufa District, Eastern Highlands Province
- Mini-hydro mini-grid system in Miruma Ward, Dalau District, Eastern Highlands Province
- Solar PV mini-grid on Samarai Island, Milne Bay Province
- Township Energy Efficiency Program in Wewak, East Sepik Province
- Township Energy Efficiency Program in Maprik, East Sepik Province

All 5 demos have been identified during the PPG phase and are currently in various stages of development. This is positive, as no change in demos was required.

WAPCOS Limited of India has been engaged in October 2019 for the preparation and implementation of the 2 mini-hydro demos. The contract with WAPCOS includes the preparation of a feasibility study, technical specification, commissioning and conduct maintenance training for the operators. Supervision during construction is currently not included but being discussed between WAPCOS and UNDP. For construction, a separate contract needs to be signed with a constructor.

Based on existing information, the capacity of the mini-hydro demo plants is estimated at 200 kW each. In a pre-feasibility study investment costs for the Gotomi project were estimated at around USD 520,000 including a mini-grid. For Miruma no cost estimate is available, but as there is an existing electricity grid, investment costs are expected to be below costs of the Gotomi project.

WAPCOS has presented an inception report in December 2019 detailing all steps and providing a detailed time schedule for the entire project implementation. At the time of the MTR on-site mission, the first mission of WAPCOS was under preparation and was expected to be carried out beginning of March. Expected end date (marked by the submission of the completion report) is 30 April 2021.

The time schedule suggested by WAPCOS is extremely tight. A draft of the feasibility study is to be submitted beginning of May 2020, but this was based on the first site visit to take place in early January. With the site visit being delayed by 1.5 to 2 months, it seems likely that the draft submission date of the feasibility study will be delayed as well.

The final feasibility study is due end of June 2020, procurement of equipment and construction are planned to be carried out between October 2020 and April 2021. Based on the delays incurred up to now and taking into account the complexity of this project, commissioning by end of April 2021 is highly unlikely.

During meetings with various stakeholders, a number of key issues were identified, which need to be taken into account when proceeding with the mini-hydro power demos:

- The incept report of WAPCOS clearly identified data to be collected, which will be required to determine the capacity of the project. These data requirements have been communicated to CEPA and the Mineral Resource Authority. Data collection should immediately be followed up to make sure as much data as possible is available during the first site visit of the consultant.
- During the MTR mission it was not possible to get a full understanding of grid situation at both sites. For Goroka, there seems to be an existing PPL grid, but it seems that the grid has been not in operation for a number of years due to financial reasons. In Miruma no grid seems to be existing at the moment. The inception report prepared by WAPCOS only makes secondary reference to analysis of existing grids or analysis of demand by potential consumers. This is a serious concern, as a full understanding on current and future demand is necessary for a correct sizing of the mini-hydro demos. This should be raised with the consultant before the mission in order to allow proper preparation of the mission.
- If it is correct that there is an existing grid in Goroka owned by PPL, PPL needs to be brought to the table immediately to understand the situation in the regional grid and the reasons why it hasn't been operating over the last few years. It needs to be investigated under which conditions the grid can be restarted and whether there are additional barriers not considered up to now. Bringing PPL to the table will give a much better understanding on the demand to be expected.
- It is understood that there is an intention for ILGs (Indigenous Landowners Groups) to own and operate these demos. It was clarified during the MTR mission that setting up ILGs is a time-consuming process, which should be started immediately after the exact location of the sites has been determined.
- Permits and licenses will be issued by CEPA and ICCC for the environmental permission and the operation license. Again, these are time-consuming processes, which need to be planned well-ahead to be able to ensure implementation of the projects within the limited time available.
- Financing of the demos hasn't been clarified yet. The GEF budget includes a specific grant component, which will be used for co-financing the investments. The Eastern Highlands Provincial Administration has provided a co-financing statement during the PPG phase, which also includes a note of further co-financing potentially available from Upper Asaro Local Level Government and Lufa District. Confirming the availability of regional co-financing is an

immediate priority. A financing plan needs to be developed as soon as the feasibility study has identified costs for each of the locations.

- During meetings in Easter Highlands Province it was conveyed that there is not sufficient coordination between stakeholders. Due to the limited timeframe available for preparing and implementing the demos, immediate and continuous coordination between all stakeholders is essential.

The implementation of the solar PV mini-grid demo in Samarai Island is now well underway after delays in the initial phase. The system installed on Samarai island will have a peak capacity of 75 kW and will also include batteries to store electricity for consumption during evening and night. Electricity will be used in the already existing mini-grid, which is operated by PPL. Current peak demand in Samarai is only 30 kW, but there is potential for new income generating activities, which would increase demand over the coming years. The installed diesel generators will serve as a backup in case the supply from the solar PV unit is not covering demand.

The contract with the EPC contractor was signed in April 2019. The contractor is a PNG registered company, owned by an Australian. FREAGER provided technical support through an Australian consulting company. There were delays in making initial payments to the EPC contractor due to lack of foreign currency. First payments were then made in November/December 2019 and the project is planned to be commissioned in April 2020. Total investment cost was indicated at PGK 2.1 million (around USD 580,000).

The preparation and implementation of the Samarai solar PV demo is a good example of successful project implementation, with the key aspect being ownership and commitment. This is secured as PPL is operating the Samarai mini-grid and is currently experiencing high operation costs due to the use of diesel. The entire planning and preparation process is in the hand of PPL and where necessary additional technical input is provided by the FREAGER project.

During the MTR site visits, energy audits in Wewak and Maprit had begun. A total of around 20 institutions and companies will be audited, the list of entities is consistent with the list developed during the PPG phase. No results were available from the audits, so it needs to be seen which type of measures will be identified and what the total investment necessary for carrying out the EE projects will be.

At discussions during the MTR mission the issue of co-financing was raised. It was clarified by the district administration that public funding can only be used to co-finance investment into public buildings and institutions, such as hospitals, schools, public administration buildings or street lighting. Energy efficiency measures in private companies cannot be co-financed by the district authority. The ProDoc includes a considerable co-financing commitment of PPL into energy efficiency measures. It was also envisaged, that investments by PPL will be made through an ESCO structure to be established with support of the FREAGER project. The co-financing ability of PPL needs to be revisited urgently to be able to plan the implementation of energy efficiency measures in private sector. Additionally, companies where energy audits were carried out should be informed about the results of the audits and co-financing should be discussed with these companies.

Outcome 3: Improved availability of, and access to, financing for renewable energy and energy efficiency initiatives in the energy generation and end-use sectors.

Component 3 consists of activities for delivering 4 different outputs:

- Output 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.
- Output 3.2: Designed, funded, and launched special financing mechanism for EE projects.
- Output 3.3: Designed, funded, and launched special loan fund for RE projects, carried out by a PNG commercial bank
- Output 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

Under Component 3 there have been limited activities implemented so far. Only one financing institution participated in FREAGER meetings up to now (Bank South Pacific) and confirmed that RE and EE projects can apply under existing loan schemes. However, no specific credit/loan facility for RE and EE will be established which will have preferential terms for such projects.

As mentioned before, the ProDoc includes the plan of establishing an ESCO, which would be financed and operated by PPL. Up to now, no discussions on that topic have been held with PPL, also, there has been little indication by PPL to start initiatives in that direction. The main reasons for that seem to be changes in PPL management, changes in PPL staff working on the project and lack of activity from UNDP side to re-establish high-level contacts and commitment with PPL management.

Due to the general delay in most project activities, further activities under Component 3 should be limited to the planned workshop and preparing an ESCO concept for PPL.

Outcome 4: Improved awareness of, attitude towards, and information about renewable energy and energy efficiency applications in the energy generation and end-use sectors.

Component 4 consists of activities that will deliver 7 different outputs:

- Output 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
- Output 4.2: Guidebooks for enabling PNG engineers, officials, and communities to work together (without outside assistance) to develop quality community RE projects at low and well-controlled costs.
- Output 4.3: Database on RE resources and pipeline RE projects in PNG
- Output 4.4: Designed RE and EE courses and course materials made available for the education sector
- Output 4.5: Completed RE and EE multi-channel media promotion campaign in PNG
- Output 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
- Output 4.7: "One-stop-shop" website providing range of information on RE and EE in PNG

Work under Component 4 focused up to now on the preparation of step-by-step guides for solar PV, mini-hydro and energy efficiency. and provide guidance on the development and implementation of RE and EE projects, covering technical, financial, legal and environmental aspects. The first drafts of these guides have been shared during the MTR mission. The University of PNG was hired to prepare these drafts. Work has started in early 2019 and finalization of the guides has been seriously delayed, leading to delays of other activities, such as the various workshops to be held.

A first analysis of the 3 guides comes to the following conclusions:

- The hydro power guidebook is well written and presented and gives good guidance for the development of hydro power projects. As per the ProDoc, FREAGER deals with micro-hydro (5 kW to 100 kW) and mini-hydro (100 kW to 1 MW) systems, whereas the guidebook only looks at micro-hydro projects. Reference should be added in the guidebook pointing out that mini-hydropower systems have to be thoroughly and site-specifically developed by experienced companies/organizations and installed by experienced engineering companies/organization with all due diligence to safety, environmental, ecological, and social impacts, meeting all regulatory and licensing requirements.
- More work is necessary on the solar PV guidebook, the main comments are:
    - Section 3.1: Guidebook should not be written to favor a particular company or institution as if they are the only experts, as there are many other institutions and organizations.
    - Section 3.3: The guide is way to theoretically written and presented. Basically, a thorough on-field technical feasibility study should provide many of the design requirements. Note that such projects cannot be designed by using outdated or assumed data.
    - Section 4.1 (7): Mentions identifying the best orientation and tilt angle of solar array for the project site to maximize solar radiation reaching the solar panels surface, but no explanation of how to practically conduct this was included in Section 5 on PV System Design.
    - Section 5 System Design: This section is full of cut & pastes with no clear step-by-step guide of actually designing a Solar PV Mini-Grid System. No examples of 3 phase PV systems, how to synchronize these for operating in parallel with a 3 phase diesel genset.
    - Section 5.10.4 Shadow Analysis: There is a calculation method referred to as Shadow-Loci Analysis. Description given here does not give the user any practical method of determining shadow interference throughout the year or seasons.
    - Section 5.15 Selection of Inverter and Charge Controller: More explanation required on selection of charge controller.
    - Section 5.19 Generator Sizing: This Section should mention site elevation and genset derating factor calculations. Also explain the issue of pre-heating of oil in extreme cold places otherwise the oil will clog up. No mention of changeover switching, and hybrid controller requirements or determinations is included in guidebook.
    - Section 5.20 Cabling between Components: DC Cable sizing examples required as part of this guide, including voltage loss calculations over wiring distances, instead of just making reference to AS/NZ standards.
    - No engineer or electrician without any practical hands-on PV design experience can use Section 5 to successfully design a good and efficient PV System. Hence, this Section lacks practical depth in design methodology description and examples.
- The Energy Efficiency guidebook is a good start for theoretical studies in a classroom environment. However, it is not recommended to be used by a layperson in the field to conduct EE works unless under direct supervision of a PPL licensed electrician with hands-on experience in conducting remedial/corrective EE works. This should be clearly indicated in the guide.

The FREAGER project website has been established and can be found at: https://freager.org. The website only provides very general information on the project and is far away from being used as an active tool to communicate the work carried out and results achieved by the Project. Facebook and

Instagram pages haven't been setup up to now. This is due to lack of resources in the PMU to deal with communication and marketing.

Further work in the second half of the Project will focus on preparing RE and EE training courses. Work is planned to be carried out by UPNG, Center of Renewable Energy. However, due to the poor performance in the preparation of the step-by-step guides it should be considered whether there are more capable institutions/companies to carry out that work.

For the communication and media work planned to be carried out, additional resources will have to be provided to the PMU. This requires personnel experienced in communication and media work, as the current staff of the PMU is lacking this capacity.

Table 2: Progress towards Results Matrix

PROJECT GOAL: Enabling of the application of feasible renewable energy and energy efficiency technologies for achieving greenhouse gas emission reduction in PNG								
Project Strategy	**Indicator[2]**	**Baseline Level[3]**	**Level in 1st PIR (self-reported)**	**Midterm Target[4]**	**End-of-project Target**	**Midterm Level & Assessment[5]**	**Achieve-ment Rating[6]**	**Justification for Rating**
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 CO2)	0		4,517.2	16,878.5	No GHG emission reductions generated so far, as implementation of demos delayed. Samarai solar PV mini-grid is expected to be commissioned in 2020, other demos in 2021/2022.	MS	The GHG emission reduction generated will be well below the end-of project target. Samarai solar PV demo can generate around 400 tons over 2 years. The mini-hydro demos run the risk of not being finalized within the lifetime of the project, the maximum contribution expected at time of MTR is 0.5 years. Additionally, there is a likelihood that not both mini-hydro demos are being implemented due to the complexity of project development and implementation. Implementation of the EE demos can take place quickly provided relevant opportunities are identified and financing is available (from province

[2] Populate with data from the Logframe and scorecards
[3] Populate with data from the Project Document
[4] If available
[5] Colour code this column only
[6] Use the 6 point Progress Towards Results Rating Scale: HS, S, MS, MU, U, HU

								administration for measures in public entities and from PPL/private companies for measures in private entities. If preparation of EE programs is finalized quickly, 1 full year of GHG emission reductions is feasible. Based on the figures from the ProDoc, the maximum GHG emission reduction achievable is in the range of 3,000 to 5,000 tons during Project lifetime. Most likely, emission reductions will be well below these figures. Considering the now unrealistic timeline of each demo implementation in the ProDoc, the progress can be evaluated as MS.
	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	0		1,710 (with at least 20% woman-headed households)	7,550 (with at least 20% woman-headed households)	No new households benefitting so far. Samarai solar PV mini-grid demo is expected to be commissioned in 2020, other demos in 2021/2022.	MU	Samarai solar PV will serve around 300 people (estimated 60 households). The mini-hydro demos will be serving an area of around 2,500 people (500 households) in Miruma and around 3,500 people (700 households) in Gotomi. However, it was not clear during the MTR how many households will actually be served by the demos in the

								areas. Information received indicated that the focus of new consumers will be on provincial buildings and facilities, rather than households. The majority of EE measures will not cover households.
	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	8,839,034	No diesel avoided so far, as implementation of demos delayed. Samarai solar PV mini-grid demo is expected to be commissioned in 2020, other demos in 2021/2022.	MS	The avoided diesel consumption will be well below the target. Samarai solar PV demo will save around 155,000 liters over 2 years. The mini-hydro demos run the risk of not being finalized within the lifetime of the project. The maximum contribution expected at time of MTR is 0.5 years. Implementation of the EE demos can take place quickly provided relevant opportunities are identified and financing is available (from province administration for measures in public entities and from PPL/private companies for measures in private entities. If preparation of EE programs is finalized quickly, 1 full year of avoided diesel consumption is feasible. Based on the annual figures from the ProDoc, this would give an avoided diesel

								consumption of up to 2,000,000 tons. Considering the now unrealistic timeline of demo implementation in the ProDoc, the progress can be evaluated as MS.
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	Government funding allocated for pipeline community RE mini-grid and township EE programs designated in national and provincial level RE and EE plans or roadmaps, including both equity and loan funding (USD)	$0.0		$5 million	$20 million	Up to the MTR, no confirmation of co-financing from government and provincial authorities has been received. Stakeholders are aware of the co-financing commitments made during the PPG phase. Due to budget cuts, it is unlikely that the co-financing levels committed will be achieved.	MS	Due to stagnation of the national economy since 2014, there is a low likelihood that co-financing levels committed in the PPG phase can be realized. However, there seems to be high interest at the provincial level to support the development of RE and EE investments.
	Number of areas in which newly adopted policies and standards (since project launch) promote RE and EE.	0		4	9	Gap analysis by GGGI has been finalized, consultant for preparing standards in EE has been hired, consultant for RE standards to be hired.		Work is on track, commitment from NISIT for cooperation on standards, fair chance that end-target is achieved.
Outcome 2A: Enhanced technical-commercial viability and capacity in the application of energy efficiency technologies and development of	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)	As capacity building activities have been delayed, there is limited progress to be seen on new jobs created in RE and EE. One firm was newly	MS	Based on the variety of opportunities, especially in energy efficiency with various types of measures, it is likely that a good number of project developers, consultants,

feasible RE-based energy systems in the country						established after seeing the potential of work in the energy efficiency space.		engineering and construction firms, building and industrial facility owners, etc. will see business opportunities in RE and EE, leading to a sizeable number of new jobs created.
	Number of cases of high quality RE mini-grid systems achieved at low end international cost benchmarks	0		3	12	Samarai solar PV mini-grid demo is under implementation and will be put into operation in 2020. Mini-hydro powered mini-grid demos in Gotomi and Miruma are planned to be implemented in 2021/2022.		At the time of MTR it is likely that 1 RE mini-grid (Samarai solar PV) demo will be implemented during the course of the project. The implementation of the 2 hydro mini-grid demos is unlikely. Due to delays in project implementation, no replication is expected.
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	4,650	The Samarai solar PV mini-grid demo will have a capacity of 75 kW. The mini-hydro demos in Gotomi and Miruma are expected to have a capacity of 200 kW each, assuming both demos are implemented. This would bring the total to 475 kW, assuming all 3 demos are implemented.	MU	At the time of MTR it is likely that the Samarai solar PV mini-grid demo will be implemented in 2020. The mini-hydro demos in Gotomi and Miruma are before feasibility stage and it is not secured that either or both demos will be implemented before Project end. Due to delays in project implementation, no replication is expected.
	No. of homes and other buildings that are supplied with power from RE mini-grid projects that have received financing or	0		7,500 (of which, at least 20% are owned by women)	22,500 (of which, at least 20% are owned by women)	This indicator measures replication of the demos. As no demonstration		Based on the current progress, it is highly unlikely that the end-of-project target will be achieved.

	permits					activities have been implemented up to now, there is no progress.		
	No. of proposed township EE programs that are financed by PPL and/or provincial governments	0		2	10	Township EE programs for Wewak and Maprik are under preparation, confirmation of co-financing by provincial governments is under discussion		Apart from the 2 township EE programs for Wewak and Maprik it is not likely that further programs will be prepared during the term of the project.
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	PPL has committed to provide funding of USD 600,000 for financing of the Samarai solar PV mini-grid demo, a first tranche has been paid already to the contractor. No further private sector funds have been confirmed.	U	Based on the current progress, it is highly unlikely that the end-of-project target will be achieved.
	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	During the PPG phase, PPL has committed to provide co-financing for energy efficiency investments of USD 3 million. No private sector funding in sight currently.		During the PPG phase, PPL confirmed co-financing of USD 3 million for EE, preferably through an ESCO structure. At time of the MTR, it does not seem feasible that these funds will be committed during the course of the project due to funding issues within PPL. Further private sector funding is currently not in sight.
	No. of banks or other entities (aside from donors) that are providing debt	0		1	3	Only lose talks have been held with Bank South		Based on the discussions with banks held up to now and

	financing for community RE mini-grids and EE technology application projects in PNG					Pacific, which confirmed that standard loan facilities already exist, which can be used for RE and EE projects. However, no specific credit/loan facility for RE and EE will be established.		due to the financial situation of the entire economy in PNG, it is not likely that banks will provide specific credit/loan facilities for financing of community RE and EE projects.
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 to develop and implement RE and EE projects	0		5	40	As capacity building activities have been delayed, there is limited progress to be seen on new companies becoming active in RE and EE. One firm was newly established after seeing the potential of work in the energy efficiency space.	MS	Based on the variety of opportunities, especially in energy efficiency with various types of measures, it is likely that a good number of project developers, consultants, engineering and construction firms, building and industrial facility owners, etc. will see business opportunities in RE and EE.
	Number of relevant policy makers that support and endorse RE and EE initiatives in development plans	0		5	20	No survey of involved policy makers was carried out to determine the number of policy makers endorsing RE and EE initiatives in development plans, so progress could not be evaluated during the MTR.		No survey of involved policy makers was carried out to determine the number of policy makers endorsing RE and EE initiatives in development plans. However, based on the positive feedback from policy makers during the MTR on-site visit, it is estimated that the end-of project target will likely be achieved.
	Number of companies in PNG profitably involved in	0		2	5	The main components of		The majority of equipment for solar

	RE and/or EE projects					equipment for solar PV, mini-hydro and energy efficiency will be imported, which only leaves some niches for manufacturers. Work in the project will focus on retailers.		PV, mini-hydro and energy efficiency will be imported. This indicator includes all companies with a focus on RE and EE, such as EPC (Engineering, Procurement and Construction) companies, project developers, consulting companies. Guidance should be provided to these companies on how to identify, prepare and implement RE and EE projects and the indicator should measure the number of active local companies active.

4.2.2 Remaining barriers to achieving the project objective

The ProDoc listed a number of barriers for the implementation of the Project, namely (1) policy, planning, and institutions; (2) technical and commercial viability; (3) financing; and (4) information and awareness. All barriers are – to various degrees – still valid and require implementation of the planned project activities to address these barriers:

- The main barrier is the lack of confirmed co-financing from various stakeholders. Consultations with stakeholders during the on-site mission made clear that there is limited awareness of the level of co-financing by the various project partners committed during the project preparation phase, especially for the cash component of the co-financing. Consultations also made clear that due to government budgets being very tight, there is a very high risk that the committed co-financing levels will not be reached. This might have serious impacts on the implementation of demonstration activities, which rely to a large share on co-financing from provincial administrations.
- While PPL is providing co-financing for the Samarai solar PV demo, there is lack of awareness on commitments made towards co-financing of mini-hydro demos as well as energy efficiency investments.
- The absence of UNDP's cash co-financing is a serious risk for the project, as the PMU doesn't have the required personnel to carry out the project as planned. Funding of the PMU through UNDP needs to be secured to carry out the remaining activities.
- There is progress on overcoming policy, planning and institutional barriers in the upcoming work with ICCC and NISIT on the off-grid code and various standards. However, the lack of progress in setting up the National Energy Authority (NEA) is a key limitation in getting full focus of the relevant authorities on the work of FREAGER.
- Technical and commercial viability barriers have not yet been overcome due to the delay in implementing demonstration activities. The Samarai solar PV demo is most advanced and technical issues seem to be solved, still, it is too early to draw conclusions on the financial viability as investment is not finalized and there is no experience from the operation of the demo. For the mini-hydro demos, technical implementation is still facing various challenges due to lack of progress in preparation of the demos. Especially the lack of clarity on connecting supply (mini-hydro power) with demand (existing grid? New consumers?) puts question marks on the successful implementation of the demos.
- Due to delays in the implementation of various project activities, there was little active work on overcoming information and awareness barriers. The finalization of the step-by-step guides has been delayed and capacity building workshops haven't started yet.

4.3 Project Implementation and Adaptive Management

4.3.1 Management Arrangements

The LPAC Meeting was held on 27 July 2017, signing of the ProDoc was on 20 October 2017, the Inception Workshop was held on 24 July 2018, and the Inception Report was issued on 15 May 2019.

This sequence of events shows the serious delays the project has encountered in its initial phase. After signature of the ProDoc, management of the Project was carried out by UNDP-internal staff due to funding issues and the PMU was only setup in September 2018, when the Project Manager got hired. The PMU is jointly established by UNDP and CCDA and sits in CCDA's Low Carbon Growth

and Mitigation Division. The National Project Director (NPD) is the director of CCDA's Low Carbon Growth and Mitigation Division.

The role of the PMU (Project Management Unit) is to oversee, support, administer and coordinate the implementation of the project under the guidance of the NPD. The PMU was supposed to be led by a national project manager with support by an international technical advisor, a communications officer and a procurement and administration assistant. Additionally, the PMU was supposed to receive support by regular personnel of CCDA and PPL.

Due to lack of co-financing provided by UNDP, which was supposed to cover the bulk of project management costs, the PMU was not set-up as planned. Currently, it includes only the national project manager and receives ad-hoc support from UNDP staff (e.g. for procurement purposes). There is support from CCDA and PPL. However, due to resource constraints in these entities, the work to be carried out for the FREAGER Project has limited priority. It goes without saying that a PMU that is staffed with only around a third of its planned capacity has difficulties in managing the Project. The lack of administration support leads to the project manager being held up by various micro-management tasks (e.g. making sure during the MTR mission that meeting rooms in hotels are booked), rather than focusing on strategic decisions on how to proceed with implementing the overwhelming list of activities. The lack of communication support leads to a meager project website with limited updates on project progress. [Note: at the time of finalizing the MTR Report, the FREAGER website was down].

Increasing the capacity of the PMU needs to be an immediate action point. The project manager needs strong support in administration and procurement to be able to focus on strategic decisions. Additional support in communication is necessary to increase the content of the website and support the upcoming communication and media work planned under Component 4. For the implementation of the demonstration activities, it is recommended to assign sub-project managers, who only focus on the preparation and implementation of the demos. The implementation of the Samarai solar PV demo, which is fully managed by PPL, is a successful example showing that a committed project manager (with support on technical issues by contracted international experts) can lead the implementation of a challenging project. Sub-project managers should be hired for the mini-hydro demos and for the energy efficiency demos.

CCDA is the Implementing Partner of the Project and is responsible and accountable for managing the Project, including the monitoring and evaluation of project interventions and coordinating activities to ensure the delivery of agreed outputs in each project component. CCDA has played an active role in the Project Board and has contributed to various activities. However, more leadership from CCDA would be helpful taking into account the delays in implementation of activities up to now and the extensive work program until end of the project. A clear commitment of additional resources contributing to the management of the implementation of the demos would be an important contribution.

In February 2019, CCDA, UNDP and PPL signed a Memorandum of Understanding (MoU), defining the contribution of each party to the FREAGER Project. Whereas this was a positive step, wording in the MoU is very general and there is no mention of co-financing commitments (either confirming the commitments made during the PPG phase or revising the commitments). More clarity on the ability to co-finance the project would be necessary to allow proper planning for the next 2 years, this especially concerns the cash co-financing to be provided.

The Project Board (PB) met 3 times since project start, in March 2018, February 2019 and November 2019. In the first meeting only representatives from UNDP and CCDA were present and the meeting focused on setting up the project management structure and discussing the work plan for 2018. During the meeting it was agreed that tenders for the proposed demos will be launched in Q2 of 2018.

The second meeting in February 2019 saw a much wider representation of partners and stakeholders, including PPL, ICCC, NISIT and representatives of the provincial administrations. Main discussion points were the approval of the annual work plan 2019 and the approval of contracts with GGGI for the policy gap analysis and a socio-economic analysis and with UPNG for the sustainable energy curriculum and training material development. The third meeting in November 2019 provided an update on project implementation and approved the work plan for 2020 and the related budget. The PB is supposed to meet twice a year. However, it was discussed and agreed upon in the second meeting (February 2019) to meet quarterly in order to closely monitor project implementation. Funding was set aside to cover meeting costs, still, only 2 meetings were held in 2019.

For 2020 it is recommended – as already planned for 2019 – to hold 4 PB meetings. With the large number of activities to be carried out under all components, regular meetings of all relevant stakeholders are necessary to ensure proper information of all stakeholders, properly steer the project and initiate activities of adaptive management, if necessary. It is understood that travel costs to allow members outside of Port Moresby to participate in the PB meetings are a concern. Although face-to-face meetings are to be preferred, participation via conference calls (e.g. through Zoom or Microsoft Teams) or skype should be considered in case of budget constraints. Holding meetings virtually is also an appropriate response to CCOVID-19.

In addition to increasing the frequency, also the quality on guidance by the PB needs to be improved. In the previous minutes, action points agreed upon in the PB meetings only gave general guidance, but lacked detailed steps to be taken and timelines. Also, at the beginning of the next meeting, the action points decided during the previous meeting should be reviewed.

4.3.2 Work planning

Work planning is done through Annual Work Plans (AWPs), which are prepared by the Project Manager and then presented to and approved by the Project Board. The Annual Work Plan also includes the budget envisaged to be spent for the activities carried out within one calendar year.

Planning in the AWPs is done by activities as defined in the ProDoc, the implementation schedule is by quarter. While all activities are listed in the AWP, it is difficult to understand how proper project management can be carried out, as there is lack of detail on steps necessary to prepare and implement all activities. An example is activity 1.3.1 on “Design and promote national energy roadmap for community based RE power systems”. The activity is planned to be carried out over all 4 quarters of 2020, but there is no detail on the steps required for preparation and implementation, including for example: drafting of ToR for consultants, tendering procedure, milestones for consultant’s work, stakeholder consultations, etc. A more detailed work plan, which allows proper project management would be helpful for the remaining lifetime of the Project and would be an important tool for ensuring timely delivery of activities and outputs.

4.3.3 Finance and co-finance

The following table gives an overview on the project budget and expenditures in the years 2018 and 2019. Although the project started in October 2017, no costs occurred in 2017.

Table 3: Project Budget and Expenditures 2018-2019 (in USD)

Outcome	2018		2019		Total disbursed	Total planned	Total
	Actual	Planned	Actual	Planned	2018-2019	for project	remaining
Outcome 1	99,734	163,620	55,998	163,620	263,354	654,475	391,121
Outcome 2A	133,445	111,813	226,078	111,813	359,523	447,250	1,049,727
Outcome 2B		767,950		-		962,000	
Outcome 3	-	49,775	-	49,775	-	199,100	199,100
Outcome 4	-	113,138	1,571	113,138	1,571	442,545	440,974
Project Management	67,824	21,417	48,257	44,467	116,081	135,270	19,189
Total	301,003	1,227,713	331,904	482,813	740,529	2,840,640	2,100,111
Total (Cumulative Actual)	301,003	1,227,713	632,907	1,710,526			
% of Planned Disbursement (pa)	24.5%		68.7%				
% of Planned Disbursement (cum.)	24.5%		37.0%		Overall disbursement		26.1%

The table above lists planned and actual GEF budget expenditures by year and by Component. As there is no differentiation in ATLAS between Component 2A and 2B, there is only one figure for Component 2. The table confirms the delays in project implementation described in the previous chapters. In 2018, only around 25% of planned funds as per the ProDoc were actually used. To a big portion this is due to the unrealistic assumption in the ProDoc that demonstration activities will be implemented in year 1, whereas in reality no contribution was made to demos. Expenses in all other Components are below expected figures as well due to the late start of activities.

The situation improved in 2019, when actual disbursement increased to almost 70%. Cumulative over both years actual expenditures are only 37% of planned expenditures. Overall, only 26.1% of the GEF funds were spent by the time of the MTR, which, again, reflects the delays in project implementation.

The project has received co-financing commitments from UNDP, CCDA, PPL and the Provinces of Eastern Highlands and East Sepik. Total co-financing commitment at endorsement was US$ 24.76 million, out of which US$ 19.23 million were in cash and US$ 5.53 million in-kind. The following table gives an overview on co-financing commitments at endorsement.

Table 4: Co-financing at endorsement

Sources & type of co-financing	Cash US$	In-kind US$	Total US$
GEF Agency/UNDP	300,000	-	300,000
CCDA	1,300,000	2,700,000	4,000,000
PPL	16,000,000	2,000,000	18,000,000
Eastern Highlands Province	1,000,000	630,000	1,630,000

East Sepik Province	630,000	200,000	830,000
TOTAL	**19,230,000**	**5,530,000**	**24,760,000**

By the time of the mid-term review, realized co-financing amounted to US$ 2.00 million, around 8.1% of expected co-financing over the lifetime of the project. The only cash co-financing received so far was the investment by PPL into the Samarai solar PV demo, all other cash co-financing hasn't materialized up to now. Cash co-financing is only 3.4% of the expected cash co-financing over the lifetime of the project. There are several reasons for the discrepancies between planned and actual co-financing:

- Due to budget cuts, UNDP was not able to provide cash co-financing up to now. The UNDP co-financing of US$ 300,000 was planned to be used for project management. Due to the lack of resources, the PMU is heavily under-resourced, with direct negative impacts on the entire performance of the project. The UNDP Country Office is aware of its co-financing commitments and is also aware that resources in the region have been reduced. The Country Office is in discussions with headquarters to solve the situation.
- PPL has provided a sizeable contribution for financing investment of the Samarai solar PV demo, which is a good start. The cash contribution is valued by PPL at US$ 644,765. The cash co-financing commitment at endorsement included US$ 11 million for mini-hydro development, US$ 2 million for solar PV mini-grid demos and US$ 3 million towards township energy efficiency programs, for a total of US$ 16 million of cash co-financing. Discussions with PPL during the MTR mission led to the conclusion that the current management is not aware of the co-financing commitments made in 2017. As cash co-financing will be required for the demos, clarification about the potential funding available is urgently recommended.
- CCDA is facing budget restrictions, which have an impact on its cash and in-kind contributions to the project. No clarity was reached during the MTR mission regarding the level of cash co-financing available from CCDA. This issue should be picked up with CCDA urgently.
- Meetings with provincial governments confirmed budget restrictions and it was made clear that the level of co-financing committed at endorsement will not be reached. It was mentioned by both provinces that reservations in the 2020 budget need to be made urgently to get clarity on the co-financing available for the mini-hydro and energy efficiency demonstrations.
- The co-financing commitments of the provincial governments also mention potential additional cash contributions on district level, namely from Daulo and Lufa Districts for the mini-hydro demos and from Wewak and Maprik Districts for the township energy efficiency projects. Figures mentioned in the co-financing letters totaled to PNK 6 million (around U$ 1.5 million). The availability and magnitude of realistically available co-financing must be clarified.
- The PMU provided information that PPL confirmed in-kind co-financing up to the MTR at US$ 4 million, compared to a commitment at endorsement of US$ 2 million. PPL has made good contributions towards the project. However, taking into account outcomes achieved and time spent, a maximum in-kind contribution of US$ 1 million is justifiable.

Lack of cash co-financing is a serious concern, having an impact on project management and implementation of the demos. Further elaborations on recommendations can be found in section 5.2.

The following table gives an overview on co-financing at CEO endorsement and at MTR.

Table 5: Co-financing at CEO endorsement and at MTR

Sources & type of co-financing	Name of co-financer	Amount confirmed at CEO Endorsement US$	Actual amount contributed at MTR US$
CASH			
GEF Agency	UNDP	300,000	0
Private Sector	PPL	16,000,000	644,765
Government	CCDA	1,300,000	0
Government	Eastern Highlands Province	1,000,000	0
Government	East Sepik Province	630,000	0
	TOTAL CASH	19,230,000	644,765
IN- KIND			
Private Sector	PPL	2,000,000	1,000,000
Government	CCDA	2,700,000	250,000
Government	Eastern Highlands Province	630,000	50,000
Government	East Sepik Province	200,000	50,000
	TOTAL IN-KIND	5,530,000	1,350,000
	TOTAL CO-FINANCING	**24,760,000**	1,994,765

4.3.4 Project-level monitoring and evaluation systems

The project's Monitoring and Evaluation (M&E) system consist of the indicators and outputs of the project's results framework. As mentioned in chapter 4.1.2, the indicators are adequate to monitor achievements of the project. However, they are not well-selected for evaluating the progress in the various outcomes, but only confirm completion of outcomes. Any delay in any aspect leading towards the successful implementation of these demonstration projects (such as delay in data collection, approvals, financing, construction, etc.) reduces the likelihood of achieving mid-term targets. Whereas these indicators are perfectly adequate for defining end-of-project targets, it would have been beneficial for the Project and all stakeholders involved including additional indicators, which are suitable to evaluate progress, rather than confirming completion.

The M&E Plan in chapter VII and Annex 4 of the ProDoc gives clear guidance on the methods, frequency and responsibilities to collect information and data for monitoring Project progress. Responsibility for the key indicators is basically split between the Project Manager and project consultants to be hired for monitoring.

Due to delays in project implementation, very limited work has been done on properly implementing the monitoring and evaluation system. In the PIR 2019, no values for "level at 30 June" have been entered, which is surprising. Based on project progress, most of the indicators should have been reported as zero, instead all indicators were reported as "not set or not applicable". This is a certain indication for lack of understanding of how to use the monitoring system as a project management tool to identify where activities need to be carried out to achieve the projected results and outputs. During the further term of the Project, support by UNDP on M&E for the PMU is recommended.

Where necessary, project consultants should be hired in due time to set-up the monitoring system properly and define data and information demands in time for the terminal evaluation.

4.3.5 Stakeholder engagement

The Stakeholder Engagement Plan lists all relevant stakeholders for the Project and defines the role of each stakeholder in the project. Engagement of stakeholders is formalized in the Project Board (PB), which has met 3 times since project start. As stated by stakeholders in PB meetings and as also communicated in different meetings during the MTR mission, PB meetings should be held 4 times a year in 2020 and 2021 to give good guidance to the project in overcoming remaining barriers. As mentioned before, participation via conference call or skype should be considered in case of budget constraints.

A Memorandum of Understanding (MoU) signed in January 2019 between UNDP, CCDA and PPL defines the relationship between these 3 key stakeholders and defines the roles and responsibilities of each of the stakeholders. Due to changes in PPL management, it is recommended to revive the cooperation at a high level between executives of UNDP, CCDA and PNG Power, to be followed by a coordination meeting/workshop at the project manager/project staff level.

4.3.6 Communications

The internal communication between the Project and the key stakeholders is done bilaterally and through the PB meeting minutes. The minutes are concise and clear, give a good overview on the achievements as well as next steps in the Project. As mentioned before, there is a request for more PB meetings to be held, the number of meetings should be increased to 4 per year for 2020 and 2021.

During several meetings during the on-site mission it was raised that there is a lack of communication between the various project partners, including UNDP, CCDA, PPL and the provincial governments. Partners are not clearly informed about the various next steps to be taken, which makes it difficult to take the necessary preparatory steps on their side. This will be improved by more regular PB meetings but should be supported by activity/output related communication involving all relevant stakeholders. An example is the preparatory work for the mini-hydro demonstration plants, where local and regional stakeholders haven't been involved so far.

External communication is mainly done through the project website (https://freager.org). So far, the website only provides very general information on the project and is far away from being used as an active tool to communicate the work carried out and results achieved by the Project. Facebook and Instagram pages haven't been setup up to now. This is due to lack of resources in the PMU to deal with communication and marketing.

4.4 Sustainability

There are certain risks to the sustainability of project impacts, and it is likely to expect that key outcomes will not be sustained. Accordingly sustainability is rated as Moderately Unlikely (MU). The following sub-chapters give a clear reasoning for this rating.

4.4.1 Financial risks to sustainability

The key financial risk to sustainability is the lack of cash co-financing provided up to now and the unclear situation regarding cash contributions in the remaining lifetime of the Project. Shortage of cash funds from UNPD led to a seriously under-staffed PMU and to delays in basically all activities to be implemented. The unclear situation regarding the cash contributions from partners puts a serious question mark on the implementation of all demonstration activities with the exception of the Samarai solar PV demo. As a consequence, it is not clear whether all planned demos will be implemented.

Based on information received during the MTR mission, there is a fair chance for the Goroko mini-hydro demo to be implemented. However, this has a number of caveats, such as: confirmation of PPL as owner and operator of local grid, no serious challenges for re-starting grid operation, positive feasibility study, sufficient co-financing to carry out investment, majority of activities can be implemented within planned timeframe.

The situation seems to be more challenging for the Miruma mini-hydro demo, if information regarding the lack of an existing grid proves to be correct. The chance to implement the Miruma project within the remaining time of the project needs to be revised after results of the feasibility study are available. However, based on current information, the likelihood of successful implementation is limited.

Regarding EE measures and investments, there was no information available at the time of the MTR to assess the likelihood of implementation. It became clear that the provincial governments will only be willing to support investments in public entities and institutions but will not have funds to support investments in private sector. Co-financing by provincial governments still needs to be confirmed. From PPL there is no commitment up to now to finance investments into EE and there seems to be limited interest in exploring ESCO arrangements. Based on these findings, an implementation of EE measures as planned in the ProDoc seems to be questionable.

A key target for the FREAGER project was to facilitate the achievement of widespread replication of micro/mini-hydro mini-grids, solar PV mini-grids, and township EE programs. This was planned based on the successful implementation of demonstrations, various supporting activities and co-financing available from various stakeholders. In light of current project progress as well as co-financing commitments, sustainability is unlikely.

4.4.2 Socio-economic risks to sustainability

At the time of the MTR, it was difficult to assess the socio-economic risks to sustainability. On the one hand, there are actively involved stakeholders, who are positively looking forward to working with FREAGER now that implementation of the project activities is being intensified. On the other hand, capacity building activities are in a very early stage and it is not possible to assess whether participants in training activities and addressees of communication and marketing work take up sufficient know-how to be able to sustain the results of the project. Due to the delays in various activities, there is a considerable risk to sustainability, as the remaining lifetime of the Project might not allow know-how to be sufficiently rooted to maintain the impacts of the project.

4.4.3 Institutional framework and governance risks to sustainability

There is a risk of institutional framework and governance to sustainability. The delay in setting up the National Energy Authority (NEA) is a key limitation in getting full focus of the relevant authorities in the

work of FREAGER and in embedding the results of the project in the national policy framework for renewables and energy efficiency. There is positive feedback from regulatory entities such as ICCC and NISIT, and the provision of standards and the off-grid code will be an important output of the project. However, without the institutional framework fully set up, it is not fully clear whether the outputs of the project will be taken up by stakeholders.

4.4.4 Environmental risks to sustainability

There is no environmental risk to sustainability since the project is designed to improve energy efficiency and increase the use of renewable energies.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The following conclusions can be drawn:

- The project is in general well-structured and the 4 components are a direct response to the main barriers identified during the project preparation phase. The various activities listed under each of the components clearly contribute to the outputs and outcomes defined for the 4 components. However, there are major shortcomings in the project design:
    - The number of activities in combination with the work required under each of the activities is highly challenging. Design of regulations and policies, design and promotion of energy roadmaps, formulation and adoption of standards, design and promotion of provincial RE and EE plan, preparation and implementation of various demos, design and operation of an ESCO fund, various capacity building activities with various stakeholders (just to name the most relevant activities) are an extremely ambitious program, especially when taking into account the limited experience in the country with RE and EE at project start.
    - The lifetime of the project is slightly less than 4 years. Taking into account the large number of activities to be carried out in combination with the planned demos, it is not clear why the project has not been designed for a period of 5 years.
    - Many of the activities were intended to be carried out in parallel and there was a lack of differentiation when is the right time for a specific activity to be carried out. For example training sessions for capacity building, implementation of demos or setting up funding mechanisms were all supposed to be carried out in parallel and throughout the 4 years lifetime of the project, rather than being implemented in consecutive steps, which would make more sense. There is little indication of adaptive management to solve these issues, which is based on lack of experience of the project manager and lack of project resources.
    - Assumptions on the timeline for implementation of the demos were totally unrealistic. It was assumed that all solar and EE demos will be implemented within the first year and will operate 3 full years during the project lifetime. All small hydro demos were supposed to be implemented until the end of year 2, generating GHG emission reductions over 2 full years during the project lifetime. With the need to carry out feasibilities, apply for environmental and operation permits, securing land (for hydro and solar PV) and water rights (for hydro), securing co-financing, constructing the plants and putting them into operation, it is difficult to understand why these unrealistic assumptions were made in the ProDoc.
    - The schedule of the ProDoc also doesn't take into account that there is an inception phase of the project, where the Project Board is constituted, an inception workshop is held and inception report is being prepared, stakeholders are being brought on board. This is standard for all GEF projects and it is difficult to understand why this hasn't been considered and the assumption of immediate start of implementation of the demos was made.
- The Project Results Framework is well elaborated and includes well-defined indicators. A ramp-up period was considered by defining mid-term targets at between 25% and 40% of the end-of-project targets. However, a considerable part of the indicators are related to the completion of the demos and requires demos to be up and running. The footnotes in the Project Results Framework of the ProDoc clearly describe which levels are expected to be

achieved by the MTR, but again these indicators assume unrealistically short implementation periods for demos. Whereas these indicators are perfectly adequate for defining end-of-project targets, it would have been beneficial for the Project and all stakeholders involved including additional indicators, which are suitable to evaluate progress, rather than confirming completion.

- The project faced serious delays in its initial phase. After the signing of the ProDoc, management of the Project was carried out by UNDP-internal staff due to funding issues and the PMU was only setup in September 2018, when the Project Manager got hired. This is almost 1 year after the ProDoc signing. The Inception Workshop was held in July 2018, the Inception Report was only finalized in May 2019. Usually, the inception phase of a project is taking around 3 months.
- In general, there has been limited progress with activities and outputs in the first 2 years due to management and financing issues in the early stages of the project. The main outputs produced so far are a policy gap analysis and a socio-economic analysis, both carried out by GGGI. The studies confirm the existing regulatory gaps as well as socio-economic benefits associated with renewable energy and energy efficiency. Other outputs, such as the step-by-step guides for solar PV, mini-hydro and energy efficiency or energy efficiency audits are still in preparation. Work on standards and the off-grid code is currently being kicked-off and various workshops will be initiated soon.
- There is good progress on the implementation of the Samarai solar PV demo and the solar PV plant is planned to be commissioned in April 2020. The preparation and implementation of the Samarai demo is a good example of successful project implementation, with the key aspects being ownership and commitment. This is secured as PPL is operating the Samarai mini-grid and is currently experiencing high operation costs due to the use of diesel.
- The development of the 2 mini-hydro demos is underway with consultants hired to carry out the feasibility studies. Various meetings with stakeholders revealed a number of serious challenges for these demos, including data collection, tight schedules, grid situation, ownership and operation, co-financing and coordination between stakeholders. Additionally, the likelihood of commissioning by end of April 2021 is highly unlikely.
- Work on the energy audits in Wewak and Maprit has begun. Results are still pending. In discussions on co-financing it was clarified by the district administration that public funding can only be used to co-finance investment into public buildings and institutions, such as hospitals, schools, public administration buildings or street lighting. Energy efficiency measures in private companies cannot be co-financed by the district authority. This needs to be taken into consideration when proceeding with implementation.
- There was little progress up to now under Component 3, improving access to finance for RE and EE. There is limited interest from financing institutions and FREAGER managed to get in contact with only one bank. The bank confirmed that RE and EE projects can apply under existing loan schemes. However, no specific credit/loan facility for RE and EE will be established which will have preferential terms for such projects. The ProDoc included a plan of establishing an ESCO, but up to now no indication from PPL was received to start initiatives in that direction.
- The FREAGER project website has been established (https://freager.org), but the website only provides very general information on the project due to lack of resources in the PMU to deal with communication and marketing.
- The MTR came to the conclusion that all identified barriers are – to various degrees – still valid. Barriers include those related to policy, planning, and institutions; technical and commercial viability; financing; and information and awareness. Conscientious and enhanced implementation of the remaining activities in all components will be required to work on

overcoming those barriers. The AWP 2020 reflects this understanding and is a good step in the right direction.

- There are serious issues in management of the Project due to lack of resources. In the first phase, the Project was managed by UNDP-internal staff due to funding issues. The PMU was only set up in September 2018, when the Project Manager got hired. Due to lack of co-financing provided by UNDP, which was supposed to cover the bulk of project management costs, the PMU was not set-up as planned. Currently, it includes only the national project manager and receives ad-hoc support from UNDP staff (e.g. for procurement purposes). The positions of a Communications Officer and a Project Administration, Finance, and Procurement Officer haven't been filled up to now. There is support from CCDA and PPL, however, due to resource constraints in these entities, the work to be carried out for the FREAGER project has low priority. This has been raised with both entities by UNDP, however, there was limited positive response.
- The Project Board (PB) met 3 times since project start, in March 2018, February 2019 and November 2019. The PB is supposed to meet twice a year. However, it was discussed and agreed upon in the second meeting (February 2019) to meet quarterly in order to closely monitor project implementation. Funding was set aside to cover meeting costs. But still, only 2 meetings were held in 2019.
- The minutes of the PB meetings mention various challenges the Project is facing, however, there seems to be a lack of understanding how severe the situation has been. The minutes of the February 2019 meeting takes note of the achievements and delays in implementation, but still "expresses a strong view that the PMU had made excellent progress in addressing these delays". At that point, not even the Inception Report has been finalized, which was more than 18 months after project start and 7 months after the Inception Meeting was held. The minutes of the November 2019 meeting discuss in more detail the progress with the different demos, however, the action points are very general. Limitations in the capacity of the PMU were not raised.
- Work planning is done through Annual Work Plans (AWPs), which are prepared by the Project Manager and then presented to and approved by the Project Board. The Annual Work Plan also includes the budget envisaged to be spent for the activities carried out within one calendar year.
- The delay in project implementation is reflected in the project expenses over the first 2 years. Only 37% of allocated funds could be disbursed in 2018 and 2019, overall disbursement is only 26.1% as of 31 December 2019. This was mainly caused by the slow start-up of the project, and also due to the unrealistic assumptions in the ProDoc regarding implementation of the planned demos.
- The project has received co-financing commitments from UNDP, CCDA, PPL and the Provinces of Eastern Highlands and East Sepik. Total co-financing commitment at GEF CEO endorsement was US$ 24.76 million, out of which US$ 19.23 million were in cash and US$ 5.53 million in-kind. By the time of the mid-term review, co-financing amounted to US$ 2.00 million, around 8.1% of expected co-financing over the lifetime of the project. The only cash co-financing received so far was the investment by PPL into the Samarai solar PV demo. All other cash co-financing hasn't materialized up to now. As of the mid-term, cash co-financing is only 3.4% of the expected cash co-financing over the lifetime of the project.
- Stakeholder engagement is formalized through the Project Board, which includes all key stakeholders. It was requested that board meetings are held 4 times per year to allow improved communication and coordination. An MoU has been signed between UNDP, CCDA and PPL regarding the cooperation in the FREAGER project. Due to changes in PPL management, it is recommended to revive the cooperation at a high level between executives

of UNDP, CCDA and PNG Power, to be followed by a coordination meeting/workshop at the project manager/project staff level. For further details, please see the recommendations section.

- There are considerable risks to sustainability of the project impacts, mainly due to lack of or unclear situation regarding co-financing, a lack of remaining project time to carry out training/capacity building activities, and delays in the implementation of the activities for improving the institutional framework for RE and EE.

5.2 Recommendations

The following recommendations can be made:

Recommendation 1 – Immediate action to secure cash co-financing from all key stakeholders:
There is an alarming mismatch between cash co-financing commitment at endorsement, cash co-financing provided up to the MTR and expected future cash co-financing. The lack of financial funds is a severe threat to carrying out all further planned activities by the PMU and providing the necessary funds for investment into the demos. In detail, the Project faces the following challenges in terms of co-financing:

- Due to lack of resources for project management, the PMU is heavily under-resourced, with direct negative impacts on the entire performance of the project. The UNDP co-financing of US$ 300,000 was planned to be used for project management. The UNDP Country Office is aware of its co-financing commitments and is also aware that resources in the region have been reduced. The Country Office is in discussions with headquarters to solve the situation. These funds are required to adequately manage the Project in the remaining project lifetime.
- PPL made cash co-financing commitments at endorsement of US$ 11 million for the demos on mini-hydro development, US$ 2 million for solar PV mini-grids demos and US$ 3 million towards township energy efficiency program, for a total of US$ 16 million of cash co-financing. So far, co-financing of US$ 0.6 million has been provided for the implementation of the Samarai solar PV demo. Discussions with PPL during the MTR mission led to the conclusion that the current management is not aware of the co-financing commitments made in 2017. As cash co-financing will be required for the implementation of the planned demos, clarification about the potential funding available is urgently required. As mentioned in recommendation #4, the cooperation with PPL needs to be revived at high level, this should also include clarification on the co-financing available for the FREAGER project.
- CCDA is facing budget restrictions, which have an impact on the in-kind contribution provided to the project as well as the cash co-financing that it has committed to the project. No clarity was reached during the MTR mission regarding the level of cash co-financing is available from CCDA. This should be discussed and addressed by CCDA urgently.
- Meetings with provincial governments in Eastern Highlands and in East Sepik Province confirmed budget restrictions and it was made clear that the level of co-financing committed at endorsement will not be reached. It was mentioned by both provinces that reservations in the 2020 budget need to be made urgently to get clarity on the co-financing available for the mini-hydro and energy efficiency demos. Additionally, potential co-financing contributions of Daulo and Lufa Districts for the mini-hydro demos and from Wewak and Maprik Districts for the township energy efficiency projects should be investigated.

Recommendation 2 – Extend project end-date by 12 months: The original design of the Project included a project lifetime of slightly less than 4 years, from October 2017 to August 2021. Taking into account the large number of activities to be carried out in combination with the demos, it is not clear why the project has not been designed for a period of 5 years. Additionally, there have been considerable delays in the initial project phases, with the Inception meeting taking place only 9 months after project start and the project manager only being hired almost a year after project start. It is therefore recommended to extend the project end-date by 12 months to August 2022. This will give higher likelihood for remaining activities being implemented according to the plan and for the demos being implemented (installed, commissioned, and operational). A condition for this extension is the provision of cash co-financing from UNDP as committed during endorsement. Without this co-financing, proper staffing of the PMU and support with international experience is not feasible.

Recommendation 3 – Increase capacity of the PMU: Increasing the capacity of the PMU needs to be an immediate action point. The project manager needs strong support in administration and procurement to be able to focus on strategic decisions. An administration assistant is required to support the project manager in day to day work and follow up with procurement to ensure full documentations are available to conduct the assessment required by procurement team. Additional support in communication is necessary to increase the content of the website and support the upcoming communication and media work planned under Component 4. Currently the website only provides very general information on the project and is far away from being used as an active tool to communicate the work carried out and results achieved by the Project. Facebook and Instagram pages haven't been setup up to now.

A key focus of the PMU needs to be the preparation and implementation of the demos. The Project Manager is lacking the necessary technical know-how to provide the required strong lead in the work on the demos and should be supported by 2 experts, one focusing on the mini-hydro demos, and one focusing on the EE township programs ("Demo Project Managers"). These experts can either be provided from key stakeholders such as CCDA or PPL, but this should be under the condition that experts have sufficient time dedicated to the FREAGER Project and that work for the project has priority over other commitments. If this cannot be secured, external experts should be hired.

Work of the Demonstration Project Managers has to be supported by an international technical advisor. Depending on the capacity on RE and EE, this should be one or two advisors. International technical support has proven to be very helpful for the Samarai solar PV demo and should also be used for the mini-hydro and energy efficiency demos.

Recommendation 4 – Improve key stakeholder engagement: CCDA and PPL have key roles in the implementation of the FREAGER Project. CCDA is the Implementing Partner, and PPL is the senior supplier. CCDA has been active in co-chairing the Project Board and supporting various activities. However, more leadership from CCDA would be helpful taking into account the delays in implementation of activities up to now and the extensive work program until end of the project. A clear commitment of additional resources contributing to the management of the implementation of the demonstration activities would be an important contribution. Due to changes in PPL management, a lack of full understanding of the role of PPL as well as the co-financing commitments given were identified during the MTR mission. It is recommended to revive the cooperation at the high level between executives of UNDP, CCDA and PPL, to be followed by a coordination meeting/workshop at the project manager/project staff level.

Recommendation 5 – Improve number of Project Board meetings and increase quality on guidance: The PB is supposed to meet twice a year, up to now only 3 meetings have been held. As stated by stakeholders in PB meetings and as also communicated in different meetings during the MTR mission, PB meetings should be held 4 times a year in 2020 and 2021. With the large number of activities to be carried out under all components, regular meetings of all relevant stakeholders are necessary to ensure proper information of all stakeholders, properly steer the project and initiate activities of adaptive management, if necessary. This is especially the case for stakeholders involved in the implementation of demos, including provincial governments and district administrations. In addition to increasing the frequency, also the quality on guidance by the PB needs to be improved. Action points decided in the PB meetings need to be more elaborated and give clear guidance for the PMU. Deadlines are to be mentioned in the minutes and in the following meeting it should be checked whether activities are implemented as planned.

It is understood that travel costs to allow members outside of Port Moresby to participate in the PB meetings are a concern. Although face-to-face meetings are to be preferred, participation via conference calls (e.g. through Zoom or Microsoft Teams) or skype should be considered in case of budget constraints. As a response to COVID-19, PB meetings can be arranged as virtual meetings.

Recommendation 6 – Provide support to PMU in project management and M&E: Planning in the Annual Work Plans is done by activities as defined in the ProDoc, the implementation schedule is by quarter. While all activities are listed in the AWP, it is difficult to understand how proper project management can be carried out, as there is lack of detail on steps necessary to prepare and implement all activities. A more detailed work plan, which allows proper project management for the remaining lifetime of the Project is necessary and would be an important tool for ensuring timely delivery of activities and outputs. Support through additional human and financial resources should be provided to the PMU. Additionally, support by UNDP on M&E for the PMU is recommended, which also includes the collection of data/results provided by project partners on implementation of activities. Information provided during the MTR (such as PIR) indicates that the M&E system hasn't been set up properly and therefore cannot be used as a project management tool to identify where activities need to be carried out to achieve the projected results and outputs. The Monitoring Plan has to be implemented as defined and described in the ProDoc. The plan clearly describes for each indicator the frequency and responsibility of data collection and defines the means of verification. A considerable number of indicators require external input from project consultants. These should be hired in due time to set-up the monitoring system properly and define data and information demands in time for the terminal evaluation.

Recommendation 7– Reduce work input on Component 3, focus on ESCO concept: With the considerable delays in the initial project phase and the large number of activities still to be carried out, it is clear that not all activities can be carried out as planned. Response on the initial work under Component 3 (financing of renewable energy and energy efficiency projects) has been meager. Only one financing institution participated in FREAGER meetings up to now (Bank South Pacific) and confirmed that RE and EE projects can apply under existing loan schemes. However, no specific credit/loan facility for RE and EE will be established which will have preferential terms for such projects. With the difficult financial situation of the government, there is no funding available covering the difference between commercial rates and preferential terms. Discussions during the MTR mission with PPL didn't give confidence on the interest of the company to investigate energy efficiency investments under an ESCO setting. Talks on the ESCO concept between UNDP and PPL should be taken to the management level, to get a high-level commitment for pursuing this opportunity The

activities under Component 3 should focus on the planned workshops, preparing and implementing the ESCO concept with PPL and making information on sources of funding for RE and EE publicly available.

Recommendation 8– Critically review progress of mini-hydro projects: Due to the delays in the initial project phases, there is a considerable risk that implementation of the mini-hydro demos will not be feasible within the (extended) lifetime of the Project. This seems to be specifically the case for the Miruma mini-hydro demo, where – based on information provided during the MTR mission – there is no grid existing for supplying electricity generated to consumers. In the case of Gotomi, the existence of a mini-grid owned by PPL was confirmed, but as the mini-grid is currently not in operation, there was lack of clarity under which conditions the grid can be restarted and whether there are additional barriers not considered up to now.

Once the feasibility study for both projects becomes available, the likelihood of successful project implementation within the remaining lifetime of the Project needs to be critically reviewed. If there is a considerable risk that implementation cannot be finalized in time, two options should be considered: (a) secure commitment of stakeholders/partners to implement the demo after the support from GEF has stopped (i.e., after end of FREAGER Project). This could for example be through PPL or private sector investors. (b) if no partner can be committed to secure successful implementation, preparation should be pushed forward as far as feasible (e.g. prepare drawings, secure permissions, prepare tender documents), but construction should not be started.

6. ANNEXES

6.1 MTR ToR (excluding ToR annexes)

See separate Annex

6.2 MTR evaluative matrix (evaluation criteria with key questions, indicators, sources of data, and methodology)

Evaluative Questions	Indicators	Sources	Method
Project Strategy			
Project design			
What is the problem addressed by the project and what are the underlying assumptions? Is it clear? Have any incorrect assumptions or changes to the context affected the project results as outlined in the project document?	Clear and coherent descriptions	Approval documents, minutes of PB meetings	Literature Review (LR), Interviews (I)
Is the project relevant? Does the project strategy provide the most effective route towards expected/intended results? Were lessons from other relevant projects properly incorporated into the project design?	Alignment to national/stakeholder priorities, clear and coherent descriptions	Approval documents	LR, I
Does the project address country priorities? Is there country ownership? Is the project concept in line with the national sector development priorities and plans?	Alignment to national/stakeholder priorities, evidence of engagement and commitment, evidence of consultation	Approval documents	LR, I
What are the decision-making processes? Were perspectives of those who would be affected by project decisions, those who could affect the outcomes, and those who could contribute information or other resources to the process, taken into account during project design processes?	Evidence of clear, logical and consultative planning processes and decision-making in the project	Stakeholders. PB members and minutes. Project management reports.	
Were gender aspects raised in project design? Are gender aspect being monitored effectively?	Evidence of gender aspects being raised in project design and being monitored	Approval documents, project reports, stakeholders	LR, I
Are there major areas of concern, recommended areas for improvement?	Concerns and recommendations raised	Stakeholders	I
Results Framework/Log frame			
Is the project's log frame, indicators and targets clear and logical? How "SMART" are the midterm	Clear and logical framework, SMART	Approval documents	LR, backed up by I

and end-of-project targets are (Specific, Measurable, Attainable, Relevant, Time-bound)?	indicators		
Are the project's objectives and outcomes or components clear, practical, and feasible within its time frame?	Clear and logical and realistic project strategy and implementation framework	Approval documents	LR, backed up by I
Can progress so far or future progress catalyze beneficial development effects that should be included in the project results framework and be monitored?	Beneficial development effects identified	Stakeholders	I
Progress Towards Results			
What is progress of the log-frame indicators towards the end-of-project targets using the Guidance For Conducting Midterm Reviews of UNDP-Supported, GEF-Financed Projects; color code progress in a "traffic light system" based on the level of progress achieved; assign a rating on progress for each outcome; make recommendations from the areas marked as "High risk of not being achieved" (red).	Use of project indicators (assuming they are 'SMART'), evidence of actual impact	Project reports, consultations with project management	LR, I
How does the GEF Tracking Tool at the baseline compare to the one completed right before the MTR?	Indicators in tracking tool	GEF Tracking tool at Baseline and before MTR	LR
Are there barriers remaining to achieving the project objective in the remainder of the project?	Remaining barriers	Stakeholders, project reports, approval documents	LR, I
How can successful aspects of the project be further expanded?	Successful aspects	Project reports, stakeholders	LR, I
Project Implementation and Adaptive Management			
Management Arrangements			
How is overall effectiveness of project management? Have changes been made and are they effective? Are responsibilities and reporting lines clear? Is decision-making transparent and undertaken in a timely manner? What are recommended areas for improvement?			
What is the quality of execution of the Executing Agency/Implementing Partner(s)? What are recommended areas for improvement?			
What is the quality of support provided by the GEF			

Partner Agency (UNDP)? What are recommended areas for improvement?			
Work Planning			
Have there been delays in project start-up and implementation? What are the causes? What are proposed solutions?	Evidence of meeting time targets	Approval documents, progress reports, project management	LR, I
Is work-planning results-based?	Evidence of logical, transparent and results oriented planning process	Progress reports, project management	
Has the project document logical/results framework been used as a management tool and have there been any changes since project start? (Ensure any revisions meet UNDP-GEF requirements and assess the impact of the revised approach on project management).	Evidence of logical and transparent planning process, using adaptive management	Approval documents, progress reports	LR, I
Finance and co-finance			
How is the financial management of the project, with specific reference to the cost-effectiveness of interventions	Evidence of clear, transparent reporting, evidence of cost effective processes and purchases	Financial reports, project reports	LR, backed by I
Have there been changes to fund allocations as a result of budget revisions? How were these decided? Have they been appropriate and relevant?	Evidence of reallocation based on clear, logical transparent decision processes	Project reports, budgets	LR, backed by I
Does the project have the appropriate financial controls, including reporting and planning, that allow management to make informed decisions regarding the budget and allowed for timely flow of funds?	Evidence of effective financial controls and management	Project reports, financial reports	LR, backed by I
Is the co-financing mobilized efficiently? Is co-financing being used strategically to help the objectives of the project? Are project teams meeting with all co-financing partners regularly in order to align financing priorities and annual work plans?	Evidence that co-financing is in line with approval documents, evidence of monitoring of co-financing, evidence of co-financers involvement/engagement in project.	Co-financing report, project reports	LR, I
Project-level Monitoring and Evaluation Systems			
Do monitoring tools provide the necessary information? Do they involve key partners? Are	Evidence of efficient and cost-effective monitoring	Approval documents, project reports	LR, I

they aligned or mainstreamed with national systems? Do they use existing information? Are they efficient? Are they cost-effective? Are additional tools required? How could they be made more participatory and inclusive?			
Are sufficient financial resources being allocated to monitoring and evaluation? Are these resources being allocated effectively?	Budget used for monitoring	Project reports	LR, I
Reporting			
Have adaptive management changes been reported by the project management and shared with the Project Board? How are planning and management decision taken?	Evidence that monitoring is actively and effectively supporting project planning and decision-making, with appropriate role of all stakeholders.	Project reports, project management	LR, I
How well has the Project Team and partners fulfilled GEF reporting requirements (i.e. how have they addressed poorly-rated PIRs, if applicable?)	Meeting reporting requirements	Project reports	LR
Have any lessons derived from the adaptive management process been documented and shared with key partners and internalized by partners?	Evidence of this happening	Project reports, project management	LR, I
Stakeholder Engagement			
Project management: Has the project developed and leveraged the necessary and appropriate partnerships with direct and tangential stakeholders?	Evidence of interaction with stakeholders	Project reports, stakeholders	LR, I
Participation and country-driven processes: Do local and national government stakeholders support the objectives of the project? Do they continue to have an active role in project decision-making that supports efficient and effective project implementation?	Evidence of active participation of stakeholders	Project reports, stakeholders	LR, I
Participation and public awareness: To what extent has stakeholder involvement and public awareness contributed to the progress towards achievement of project objectives?	Contribution of stakeholder involvement and public awareness toward project progress	Project reports, stakeholders	LR, I
Communications			
Internal project communication with stakeholders: Is communication regular and effective? Are key	Evidence of internal communication and of it	Project reports, project stakeholders, project	LR, I

stakeholders left out of communication? Are feedback mechanisms for communication? Does this communication with stakeholders contribute to their awareness of project outcomes and activities and long-term investment in the sustainability of project results?	being strategic, effective and efficient	management	
External project communication: Are proper means of communication established or being established to express to the public the project progress and intended impact (is there a project website for example)? Did the project implement appropriate outreach and public awareness campaigns?	Evidence of external communication and of it being strategic, effective and efficient	Project outputs, projects materials and media, project reports.	LR, I
Overall, is the project management effective? Have changes been made and are they effective? Are responsibilities and reporting lines clear? Is decision-making transparent and undertaken in a timely manner?	Evidence of clear, fair decision-making processes and results, evidence of participation from stakeholders and co-financiers.	Project plans, project reports, project stakeholders, project management	LR, I
Sustainability			
Are the risks identified in the Project Document, the most important and are the risk ratings applied appropriate and up to date?	Usefulness of risk analysis and associated tools	Project approval documents and reports	LR, backed by I
Overall, how is risk management of sustainability factors - in terms of risks to motivations, capacity, and resources? Does the project have sustainability benchmarks built into the project cycle?			LR, I
Financial Sustainability: What is the likelihood of financial and economic resources not being available once the GEF assistance ends (consider potential resources can be from multiple sources, such as the public and private sectors, income generating activities, and other funding that will be adequate financial resources for sustaining project's outcomes)?	Evidence that an assessment of options has been undertaken/is planned, and that a complete and realistic upscaling or exit strategy exists or is being prepared.	Project reports, budget reports, minutes of project board	LR, I
Socio-political Sustainability: Are there any social or political risks that may jeopardize sustainability of project outcomes? What is the risk that the level of stakeholder ownership (including ownership by governments and other key stakeholders) will be insufficient to allow for the project	Evidence that socio-political risks to sustainability have been assessed and any mitigation measures taken.	Project reports, budget reports, minutes of project board, project management	LR, I

outcomes/benefits to be sustained? Do the various key stakeholders see that it is in their interest that the project benefits continue to flow? Is there sufficient public / stakeholder awareness in support of the long term objectives of the project? Are the lessons learned are being documented by the project team on a continual basis and shared/ transferred to appropriate parties who could learn from the project and potentially replicate and/or scale it in the future?			
Institutional and Governance Sustainability: Do the legal frameworks, policies, governance structures and processes pose risks that may jeopardize sustenance of project benefits? While assessing this parameter, also consider if the required systems/ mechanisms for accountability, transparency, and technical knowledge transfer are in place	Evidence that institutional/governance risks to sustainability have been assessed, that a full consultation process has taken place/is planned, that potential mitigation measures have been identified/are planned, and that a clear strategy for ensuring sustainability is in place/under preparation	Project reports, budget reports, minutes of project board, project management	LR, I
Environmental Sustainability: Are there any environmental risks that may jeopardize sustenance of project outcomes? The MTR should assess whether	Evidence that any environmental risks to sustainability have been assessed and any mitigation measures taken.	Project reports, budget reports, minutes of project board, project management	LR, I

6.3 Ratings Scales

Ratings for Progress Towards Results: (one rating for each outcome and for the objective)		
6	Highly Satisfactory (HS)	The objective/outcome is expected to achieve or exceed all its end-of-project targets, without major shortcomings. The progress towards the objective/outcome can be presented as "good practice".
5	Satisfactory (S)	The objective/outcome is expected to achieve most of its end-of-project targets, with only minor shortcomings.
4	Moderately Satisfactory (MS)	The objective/outcome is expected to achieve most of its end-of-project targets but with significant shortcomings.
3	Moderately Unsatisfactory (HU)	The objective/outcome is expected to achieve its end-of-project targets with major shortcomings.
2	Unsatisfactory (U)	The objective/outcome is expected not to achieve most of its end-of-project targets.
1	Highly Unsatisfactory (HU)	The objective/outcome has failed to achieve its midterm targets and is not expected to achieve any of its end-of-project targets.

Ratings for Project Implementation & Adaptive Management: (one overall rating)		
6	Highly Satisfactory (HS)	Implementation of all seven components – management arrangements, work planning, finance and co-finance, project-level monitoring and evaluation systems, stakeholder engagement, reporting, and communications – is leading to efficient and effective project implementation and adaptive management. The project can be presented as "good practice".
5	Satisfactory (S)	Implementation of most of the seven components is leading to efficient and effective project implementation and adaptive management except for only few that are subject to remedial action.
4	Moderately Satisfactory (MS)	Implementation of some of the seven components is leading to efficient and effective project implementation and adaptive management, with some components requiring remedial action.
3	Moderately Unsatisfactory (MU)	Implementation of some of the seven components is not leading to efficient and effective project implementation and adaptive, with most components requiring remedial action.
2	Unsatisfactory (U)	Implementation of most of the seven components is not leading to efficient and effective project implementation and adaptive management.
1	Highly Unsatisfactory (HU)	Implementation of none of the seven components is leading to efficient and effective project implementation and adaptive management.

Ratings for Sustainability: (one overall rating)		
4	Likely (L)	Negligible risks to sustainability, with key outcomes on track to be achieved by the project's closure and expected to continue into the foreseeable future
3	Moderately Likely (ML)	Moderate risks, but expectations that at least some outcomes will be sustained due to the progress towards results on outcomes at the Midterm Review
2	Moderately Unlikely (MU)	Significant risk that key outcomes will not carry on after project closure, although some outputs and activities should carry on
1	Unlikely (U)	Severe risks that project outcomes as well as key outputs will not be sustained

6.4 MTR mission itinerary

MTR mission (12-20 February 2020)

Date / Time	Organization	Name
Wednesday (12/02/2020)		
15:00	UNDP Port Moresby	Mr. Edward Vrkic, Head of Energy & Environment Portfolio and Senior Climate Change Advisor, UNDP Ms. Gretel Orake, Project Coordinator, FREAGER Ms. Momenat Al-Khateeb, Technical Specialist (Finance), PSU, UNDP

Date / Time	Organization	Name
		Ms. Linda Kapus-Barae, Programme Associate (Energy & Environment), UNDP.
Thursday (13/02/2020)		
9:00 – 9:30	CCDA	Courtesy Meeting with Implementing Partner Mr. Danny Nekitel, Manager, Low Carbon Growth and Mitigation Branch, CCDA Mr. Johnson Kilis, Senior Mitigation Officer, CCDA Ms. Gretel Orake, Project Coordinator, FREAGER Ms. Linda Kapus-Barae, Programme Associate (Energy & Environment), UNDP.
10:00 – 11:00	PNG Power Limited	Mr. Mairawesi Pulayasi, Senior Director Strategy & Innovation, PPL Mr. Damien Sonny, Renewable Energy and Carbon Specialist Mr. Manfred Stockmayer Mr. Tom Anayabere Mr. Johnson Kilis, Senior Mitigation Officer, CCDA Ms. Gretel Orake, Project Coordinator, FREAGER Ms. Linda Kapus-Barae, Programme Associate (Energy & Environment), UNDP.
Friday (14/02/2020)		
11:00	Eastern Highlands Provincial Administration, Lufa District and Daolo District	Representative of the Provincial Administrator Mr. Demo Imara, Acting District Administrator, Lufa Mr. Alex Bare, Planning Officer, Daolo District Mr. Manfred Stockmayer Mr. Tom Anayabere Mr. Johnson Kilis Ms. Linda Kapus-Barae
Monday (17/02/2020)		
10:00	East Sepik Provincial Administration and Maprik District	Meeting with Representative of Provincial Administrator's Office Mr. Godfried Raushem, Deputy Provincial Administrator Mr. Manfred Stockmayer Mr. Tom Anayabere Mr. Johnson Kilis Ms. Linda Kapus-Barae
Tuesday 18/02/2020		
13:00		Mr. Manfred Stockmayer Mr. Tom Anayabere

Date / Time	Organization	Name
		Mr. Johnson Kilis Ms. Linda Kapus-Barae
Wednesday **(19/02/2020)**		
10.00 – 11.00	National Institute of Standards and Industrial Technology	Mr. Dan Yansom, Executive Manager, Standards Development Division Mr. Manfred Stockmayer Mr. Tom Anayabere Ms. Gretel Orake, Project Coordinator, FREAGER
13:30 – 15:30	ICCC	Mr. Ricky Dobo, Analyst Mr. Manfred Stockmayer Mr. Tom Anayabere Ms. Gretel Orake, Project Coordinator, FREAGER
Thursday **(20/02/2020)**		
14.30 – 15.30	Economic and Social Infrastructure Program	Mr. Federico Tonelli, Program Management and Advisor, Off-Grid Electrification & Community Development Mr. Tom Anayabere Mr. Johnson Kilis, Senior Mitigation Officer, CCDA Ms. Gretel Orake, Project Coordinator, FREAGER Ms. Linda Kapus-Barae, Programme Associate (Energy & Environment), UNDP.
15:00	UNDP	End of Mission report Mr. Edward Vrkic, Head of Energy & Environment Portfolio and Senior Climate Change Advisor, UNDP Ms. Gretel Orake, Project Coordinator, FREAGER Ms. Momenat Al-Khateeb, Technical Specialist (Finance), PSU, UNDP Ms. Linda Kapus-Barae, Programme Associate (Energy & Environment), UNDP.

6.5 List of persons interviewed

Ms. Momenat Al-Khateeb	UNDP, Technical Specialist (Finance), PSU
Mr. Alex Bare	Planning Officer, Daolo District
Mr. Ricky Dobo	ICCC, Analyst
Mr. Demo Imara	Acting District Administrator, Lufa District
Mr. Johnson Kilis	CCDA, Senior Mitigation Officer
Mr. Danny Nekitel	CCDA, Manager, Low Carbon Growth and Mitigation Branch
Ms. Gretel Orake	UNDP Project Coordinator, FREAGER
Mr. Mairawesi Pulayasi	PPL, Senior Director Strategy & Innovation
Mr. Godfried Raushem	Deputy Provincial Administrator
Mr. Damien Sonny	PPL, Renewable Energy and Carbon Specialist

Mr. Manuel Soriano	UNDP RTA
Mr. Edward Vrkic	UNDP, Head of Energy & Environment Portfolio and Senior Climate Change Advisor
Mr. Dirk Wagener	UNDP, Resident Representative
Mr. Dan Yansom	NISIT, Executive Manager, Standards Development Division
Mr. Federico Tonelli	Program Management and Advisor, Off-Grid Electrification & Community Development

6.6 List of documents reviewed

In alphabetical order

Document	Document type
Annual Work Plan 2018	Pdf
Annual Work Plan 2019	Pdf
Board Meeting March 2018	Pdf
Board Meeting February 2019	Pdf
Board Meeting November 2019	Pdf
Delegation of Authority	Pdf
Expenses 2018	Excel
Expenses 2019	Excel
FREAGER Project Implementation Plan	Word
FREAGER SESP	Pdf
Guide Energy Efficiency	Word
Guide Renewable Energy	Word
Guide Solar PV	Word
Inception Report FREAGER	Pdf
Inception Report Mini-Hydro Demonstration Projects	Pdf
Letter of Agreement	Pdf
LPAC Meeting Attendance Sheet	Pdf
LPAC Meeting Minutes	Pdf
Management Report July 2019	Pdf
Management Report May 2019	Pdf
Monitoring and Evaluation Plan	Pdf
OCCD Approval	Pdf
Policy Gap Analysis	Pdf
ProDoc FREAGER	Pdf
PIR 2019	Pdf
Socio-Economic Analysis	Pdf
Technical Documents Samarai Solar PV Project	Pdf

6.7 Signed UNEG Code of Conduct form

Evaluators/Consultants:

1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage. Evaluators must respect people's right to provide information in confidence, and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals, and must balance an evaluation of management functions with this general principle.
4. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
5. Should be sensitive to beliefs, manners and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
6. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study limitations, findings and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

MTR Consultant Agreement Form

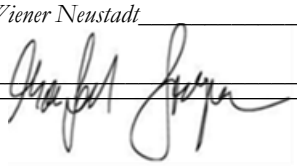
Agreement to abide by the Code of Conduct for Evaluation in the UN System:

Name of Consultant: Manfred Stockmayer_____

Name of Consultancy Organization (where relevant): _____

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at *Wiener Neustadt*_____ *(Place)* on *11 March 2020*_____ *(Date)*

Signature: 

6.8 Signed MTR final report clearance form

6.9 Audit Trail

Author	Comm. No.	Comment/Feedback on the draft MTR report	MTR response and actions taken
RTA	1	Is this the National Project Manager mentioned in p. 56 of this report?	Clarification added
RTA	2	Please clarify what standards are these.	Clarification added
RTA	3	Please specify what these guides are for (e.g., design, installation, financing, etc.).	Clarification added
RTA	4	Is this because the demos are not yet implemented? Nothing to replicate.	Based on the implementation of demos, further replication projects were planned to be implemented until the MTR. This did not take place.
RTA	5	What adaptive management action was done to address these issues?	The CO has taken over some functions of the PMU to support the work under the project. It is difficult to qualify this as adaptive management, as the lack of capacity was caused by UNDP not providing sufficient co-financing.
CO	6	The project is full support to NIM. The CO based on audit observations has centralized the procurement functions, finance, and PMU to ensure appropriate quality assurance mechanism are in place. The national project manager is on board but maybe the project will require project assistant to support the project manager in day to day work. The project also could look at cost-sharing a communication officer.	Response to RTA comment 5.
RTA	7	Will the key outcomes be achieved but not be sustained?	Please check the detailed sustainability assessment in chapter 4.4. But, yes, there is a chance that key outcomes will be achieved, but sustainability is unlikely.
RTA	8	Please explain this in more detail in the main body of this report.	Please see chapter 4.4.
CO	9	The evaluator refers here to the core resources (TRAC), as per the RRF the project allocated 300k to support project management and he refers to this section.	Response to RTA comment 8.
RTA	10	Please explain this in more detail in the main body of this report.	Repetition of comment 8.
RTA	11	The program maybe ambitious. But based on the findings of the MTR, was it designed took into consideration PNG's limited capacity and experience in the implementation of RE and EE initiatives? Please elaborate the finding in the main body of the report.	As explained in section 4.1.1 on Project Design, the project did not adequately reflect the limited experience with RE and EE. The number of activities in combination with the work required under each of the activities was excessive.

RTA	12	Most likely, the decision regarding the duration of the project, was based on the findings and information gathered during the PIF and PPG stages. Nonetheless, does the MTR suggests a request for extension of the project implementation period? Please elaborate on this, including the rationale, in the main body of the report.	Yes, an extension is suggested, please see chapter 6 recommendations regarding the extension.
RTA	13	As far as I recall, the activities scheduling was partly because of the timing of the implementation of baseline activities that have been subsumed into the project. That's the reason for the parallel implementation of some of the project activities. Nonetheless, it is understood that because of the delays in the start-up of the project, the intended parallel implementation cannot be done. Considering this, there should have been adaptive management actions done at the inception stage and, where necessary during the course of the project implementation. It is expected that appropriate recommendations to address this have been provided in the main body of the report.	Delays in project implementation have no impact on the general problem of activities required to be carried out in parallel. If parallel carrying out of activities would have made sense, this could have happened even with delayed implementation. There was no adaptive management to solve that issue, which is based on lack of experience of the project manager and lack of project resources. Wording was added to make this point clearer.
RTA	14	I suppose this conclusion is in retrospect. What specific assumptions are these? Are these the assumptions stated in the footnotes of the project log frame (pp. 52-53 of ProDoc)? Perhaps the situation during the PPG stage when the demos where identified, sized, costed, etc., were different from this year. Please clarify this in the main body of the report.	Wording added to clarify that the specific assumption was on the timeline of demo project implementation.
RTA	15	I think the person to ask about this is still with PPL, and I hope he was able to explain about this. Nonetheless, if this became a shortcoming that is exacerbated further by the project start-up delays and changes in the baseline activities, it is expected that the MTR team has provided recommendations to address this in the main body of the report.	This is not about one person, but all experts involved in the preparation of the ProDoc. It is simply impossible to implement solar PV projects within 1 year and then generate benefits over 3 full years. This mistake should have been detected in the preparation or approval process. There are extensive recommendations on how to proceed with the various demos in chapter 5.2
RTA	16	The ProDoc mentions in p. 56 about a project inception workshop that will be held within two months after the ProDoc signing by all relevant parties; and an inception report to be prepared by the Project Manager no later than one month after the inception workshop.	Yes, this is correct and there was no comment about the inception phase not being considered in the ProDoc. But if the project team is busy with running inception activities in the first 3 months, then there is even 9 months left for all work on solar PV demos until successful implementation.

		There is also a budget for the inception workshop (M&E Plan). Hence, inception phase is included in the project implementation.	This was not considered, which makes the assumption even more unrealistic.
RTA	17	This needs further clarification. Is this saying that most of the indicators are based on the demos? The indicators are meant to manifest the achievement of the objective and outcomes. The level of achievement of the target of each indicator of the Objective indicates the level by which the Objective was achieved. Same with each Outcome. The value of the metric of the Outcome indicator indicates the level by which the Outcome was achieved. What additional indicators are proposed?	Yes, a good part of indicators is related to demos. See footnote 8 on page 52 of the ProDoc, which describes the targets to be achieved by MTR. Wording was added for clarification.
RTA	18	This should be elaborated in the main body of the report, mainly the reason for such issues and how were these resolved, assuming these are already resolved by the time of the MTR or earlier.	This is elaborated in detail in chapter 4.3.3 and in recommendations, as the issue of lack of co-financing by UNDP is not solved.
RTA	19	This should be elaborated in the main body of the report. What are the reasons behind such issues? How were these resolved, assuming these are already resolved by the time of the MTR or earlier?	This is elaborated in detail in chapters 4.3.1 and 4.3.3 and in recommendations.
RTA	20	Specify what guides are these. Are these for the design and implementation of solar PV, mini-hydro and EE projects?	Clarification added in chapter 4.2.1.
RTA	21	Please elaborate further on this – reasons and how is this being addressed.	This is elaborated in detail in chapter 4.3.1.
RTA	22	Does this mean that the activities in each component are not enough to remove the barriers, or does this mean that the implementation of the project activities in each component should be enhanced or expedited? If the former, what additional activities should be implemented and where will the budget for such activities will come from. If the latter, does the AWP 2020 takes into account the expedited or enhanced implementation of the project activities?	Clarification added.
RTA	23	Is it the management of the project or the funding for the project management tasks of the project that is the issue?	Clarification added that the comment is on resources.
RTA	24	How about the GEF-funded PMC, isn't that enough for funding the project management work?	GEF-funded PMC is way too little to cover project management. The majority of funds is for mid-term review and terminal

			evaluation, annual audits and travel costs. Budget note 23 also clearly mentions that "*the bulk of PMO staffing expenses will be covered by UNDP co-financing*".
RTA	25	What adaptive management action (if any) was done to address this issue? Please explain.	This has been raised with both entities by UNDP, however, there was limited positive response. Hence, there is recommendation #4 on improving stakeholder engagement.
RTA	26	Please comment on the performance of the Project Board. What has the PB suggested in addressing the issues that were mentioned earlier?	Evaluation of PB performance added.
RTA	27	Expected funds or allocated funds?	Clarification added
RTA	28	What does this mean? Does this mean "actual"? What did the MTR found out as to the reasons why only $2M of the total co-financing has materialized?	"Justified" deleted. Details on why co-financing is lower than expected can be found in chapter 4.3.3.
RTA	29	Does this mean no stakeholder engagements/consultations in the project activities implementation (e.g., capacity building activities, design and development of the demos, etc.)? Please clarify.	Clarification added. This is summary of chapter 4.3.5 Stakeholder engagement.
RTA	30	This is a MTR recommendation? Or this is one of the recommendation during one of the 3 PB meetings?	Clarification added.
RTA	31	It would be very useful to CCDA and UNDP-PNG if clear actions (based on the MTR findings) will be provided as recommendations. More importantly, it would be much appreciated if the "how to" aspect of each recommended action will be provided.	Clarification added as per detailed comments on the recommendations.
RTA	32	What would be the definitive immediate action(s) that can be recommended aside from just stressing the urgent need to address the co-financing issue? The CO and IP would benefit a lot if a definitive action (based on the MTR findings) will be recommended, particularly how will the recommended action will be carried out.	Clarification added.
RTA	33	Please clarify. Does this mean UNDP resources in the Asia-Pacific region?	The discussion on the reduced UNDP cash co-financing was delicate. It was reassured that UNDP CO is aware of the situation and is working on a solution.
RTA	34	Not only this, but how PPL will provide the remaining co-financing, and how the CCDA/PPL can find and secure alternative sources of co-financing.	Top management of PPL was not available for meetings during the MTR mission. The response from the people interviewed was that PPL is not aware of the co-financing commitment due to management changes. It is the task of the UNDP CO to raise co-financing with PPL and get clarity about the contributions available.

RTA	35	As commented earlier, perhaps the situation during the PIF and PPG stages was such that the project development team (together with PPL and CCDA) was confident that the project can be completed within 4 years. I suppose that they didn't expect that the identified project partners will face difficulties in the implementation and funding of the baseline activities. Nonetheless, it would be good if the MTR team recommends definitive actions to be taken during the proposed project extension period to address the delays to complete the project activities and avoid further protracted delays.	It is the combination of demos with all the other activities, which is unrealistic. I can only repeat my previous argumentation that assuming an implementation of a solar PV project within 9 months is just not working, even if partners are ready and co-financing is available. UNDP should have realized when preparing the ProDoc that the tendering process alone takes several months, permissions need to be given, material needs to be transported to PNG and the installation needs to be carried out. This recommendation is about extension of the project end-date, further recommendations are about actions to be carried out.
RTA	36	There are also other key stakeholders, such as the demo hosts. I suppose there's also a need to improve the engagement with them, particularly those that have also committed co-financing to the project. Is there a need to open up new stakeholder engagements with other potential partners, assuming such entities were also identified during the MTR? How will this be done?	Other key stakeholders are included in the PB, see next recommendation. Wording adapted to reflect this point.
RTA	37	This is more on the frequency of PB meetings. How about the quality of the meetings, does this need improvements too? Please elaborate. Considering the current global health concerns (7 cases in PNG to date), how will such meetings be organized and conducted?	Clarification added.
RTA	38	Looks like we have to emphasize this. Considering the current communication resources in the PMU/CCDA and that of the stakeholders, what would be the recommended action to carry out the remote tele/videoconferencing?	Clarification added.
RTA	39	Isn't this already provided? How about also enhancing the support from the project partners, e.g., data/results reporting on the project activities that they implement?	Clarification added.
RTA	40	Considering the findings of the MTR in regards project M&E, what is the recommended action to address this as well as the preparation of more detailed work plan?	Clarification added.
RTA	41	This seems to be an "easy way out" suggestion. Please note that Component 3 is for removing financial barriers. If the planned activities are not	Wording revised to keep more push on PPL implementing the ESCO concept. The majority of Outputs in Component 3 will be maintained, only Output 3.3 will be

		implemented and the planned deliverables are not produced, how can we say that the financial barriers have been removed? Unless the planned activities are already redundant or irrelevant, I suggest that the MTR recommends adaptive management measures to facilitate the implementation of all of the Component 3 activities.	dropped, as the special loan fund is not feasible.
RTA	42	Is this even if the project implementation period will be extended?	Yes, even if the extension is taking place. It took almost 2 years from project start to finalize the inception phase (!!)
RTA	43	Based on the MTR, what were the reasons behind the meager response? What would it take to make the targeted entities to be more responsive (favorably)? Were the actions carried out under the project sufficient enough to get a better result?	A couple of reasons: capacity issues in PMU to work on this issue; general economic situation to provide additional funding is difficult; private banks are not interested in providing a loan facility at preferential terms;
RTA	44	Based on the MTR, what were the reasons behind the lack of interest of PPL on the ESCO scheme? As far as I recall, the FREAGER ESCO activity builds on what PPL intends to do in strengthening the institutional structure for its EE team and in designing the ESCO fund that will finance customer EE retrofits. To provide FREAGER EE retrofit funding, PPL will set up an "ESCO" fund. GEF funding, in turn, will be used to provide international experts both to train PPL personnel in new EE areas, such as refrigeration, air conditioning, and industrial energy audits, and to conduct energy audits alongside the PPL team. Has that original PPL plan changed? Can't an alternate plan of action that considers whatever current situation PPL is in, be recommended?	Since the preparation of the ProDoc, top management of PPL has changed, also staff involved with the preparation of the project has been shifted within PPL and is not pursuing the original ideas. It is doubted that the current management is interested/willing/ in honoring the commitments made a few years back. The contact point we talked to was not aware of the co-financing and implementation commitments PPL made. Also, the UNDP CO didn't manage/take the time up to now to re-establish the contact with PPL management, something the Project Manager cannot do. As recommended, the first step needs to be to re-establish the connection with PPL on top-management level.
RTA	45	This will not remove the financial barriers that FREAGER has to remove. In that case, the FREAGER objective will not be realized. I suggest that the MTR recommend action(s) that will lead to a clearer understanding of the issues behind what seems to be PPL's action to back out from the ESCO scheme; finding ways to address such issues; and if necessary, recommend alternative courses of action to remove the financial barriers that Component 3 activities are intended to remove.	Wording on recommendation 7 was modified, see comment above regarding commitment of PPL.

RTA	46	I suggest that the review also include assessment of potential substitute demos by considering other demo sites that were identified during the PPG phase, as well as other potential sites that provincial governments, CCDA, PPL, private sector entities, may suggest. What other adaptive management actions can be recommended in the light of the MTR findings regarding these demos?	From the MTR point of view, there is no point to start with new demos, as time will be too short. As described in detail in chapter 4.2.1 on Outcome 2B, there is a series of actions required for implementation of the demos. If there is fast and diligent work, there is a chance that the demos will be implemented until (extended) EOP. If new demos would be selected, this would be totally unrealistic.
CO	47	If there is an inception workshop conducted, why	Comment not clear, there seems to be text missing.
RTA	48	The MTR team should have consulted the people who were involved in the project design (particularly the local experts) to determine the reasons why the project implementation period was 4 years and not for a longer duration. One reason I could think of was the planned schedule of the baseline activities, to which the project activities have to build on. Obviously, if there are hiccups in the implementation of the baseline activities there will be repercussions in the implementation of the project activities that are dependent on them.	Local experts involved in project design were consulted during the MTR mission, but there was no logical explanation on this point. In any case, this shortcoming should have been identified by UNDP or GEF before submitting the ProDoc for approval.
RTA	49	I suggest that the assumptions be listed. These may be valid logical assumptions during the time of the project design. In retrospect, considering the delays that happened, and whatever cause such delays, one may conclude now that those assumptions are unrealistic.	The assumptions are listed in the next sentences. As already mentioned several times, it is fully unrealistic to assume implementation of solar PV and EE demos within one year, taking into account the work required (engineering, tender, transport/import, installation), even more so taking into account the lack of experience with these technologies in the country.
RTA	50	The MTR team should have consulted the people who were involved in the project design , particularly the demos, to ascertain whether these assumptions are valid or logical during the PIF and PPG phases.	See answer on comment 44.
RTA	51	There is an inception workshop and inception phase stated in the ProDoc, including budget for inception.	The text is not saying that there is no inception workshop and inception phase. The text is saying that the ProDoc doesn't take the inception phase into account, but assumes that from day 1 onwards implementation of demos is happening, which is unrealistic.
RTA	No number	COMMENT: There are no comments on the strategy that was proposed in the project design in implementing the project activities. Based on the MTR findings, and in retrospect, is the proposed strategy for the project	There is a comment on the strategy in section 4.1.1.

		implementation appropriate? Was the strategy closely followed by the project implementers and PMU?	
RTA	52	Were the mid-term targets achieved or not? There is an Annual Targets table in the ProDoc. Based on that table, were the end Year2 targets realized? If not realized, are the delays the main reason for the non-achievement? Please clarify.	It is correct that there are annual targets, but for only 1 indicator out of 16 there is a value for end of year 1. The indicators for year 2, which are also the mid-term targets in the Project Results Framework were taken as the basis for the evaluation. The Progress towards Results Matrix in chapter 4.2.1 analyses for each indicator whether the MTR targets were achieved.
RTA	53	There's an Annual Targets table in the ProDoc, which should be used evaluating whether the actual level of achievement during mid-term was lower, the same, or better than the Year2 targets. Not clear why there should be additional indicators. What are the recommended additional indicators?	The point made here is that the indicators selected made it difficult for the PMU to monitor progress until the MTR. As implementation of demos is underway, o changes in indicators or additional indicators are necessary.
RTA	54	Is this in retrospect? As explained above, the conditions during the PIF and PPG stages could have been different, and the MTR team should have been adequately informed about such conditions by the local experts who were involved in the project design..	Yes, this is in retrospect, as the comment is referring to "project preparation". As mentioned several times before, this should have been picked up by UNDP or GEF.
RTA	55	The assumption was "Local equipment manufacturers have the capacity and interest to expand their product scope". The assumption is not that they will manufacture RE/EE equipment or components. That they will manufacture RE/EE equipment or components is an indication that Outcome 4 is realized.	Clarification added that the indicator is under Outcome 4.
RTA	56	Is it not realistic because the activities that are supposed to facilitate that are not or are not yet implemented by the project? The local manufacturers have the capacity to manufacture equipment and component parts, not necessarily related to RE and EE technologies. But if they are provided training, capacitated, adequately made aware and enabled to manufacture RE/EE related equipment and components, they may become interested and venture into such business. Has the project done the relevant capacity building and enabling actions to make that happen?	See previous comment on change of indicator. Work on Component 4 hasn't started yet.
RTA	57	This is OK as a substitute indicator. However, please recommend the relevant activities for the relevant targets that will contribute to the tally.	The activities don't change, only the indicator.

RTA	58	Standards on what? Are these standards for off-grid power generation and distribution?	Clarification added.
RTA	59	Please specify what kind of standards, and standards for what	Clarification added.
RTA	60	Please specify what the step-by-step guides are for.	Clarification added.
RTA	61	Are the step-by-step guides on these?	Clarification added.
RTA	62	Is this even if the project implementation period is extended for another year? If yes, please recommend courses of action to, for example expedite the preps for the other demos; adjust the demos; replace the demos; etc. If only one demo will be implemented by EOP, the very least that should happen is that the other demos are ready for implementation by EOP.	This section is not on the demos, but on the efforts on publishing and disseminating information on findings from monitoring. As only solar PV and EE will finish before EOP (even if there is an extension), there should be a focus on these technologies. For hydros there is a risk that implementation is finishing too close to the EOP to allow monitoring. Clarification added.
RTA	63	If the forecast of the MTR is that only the Samarai solar PV demo will be implemented, why will there be no changes to be done on the other demos (e.g., modify, adjust, redesign, replace)	See previous response. There is an extensive analysis of the progress of other demos in the following paras and recommendations in section 5.2.
RTA	64	Will they invest money on the demos? I assume they will provide funding. But in case they will not, should this intention be considered? The time-consuming process seems to be a barrier. Is the project doing something to address this issue?	The ILGs will not provide funding, but provide access to land to allow implementation of the hydro power projects. The PMU has only limited understanding of all steps necessary to implement the demos, that is why Demo Project Managers are suggested (see recommendation #3).
RTA	65	What does this mean? The EHPA is financing the baseline activities of the demo, while the GEF funding is for the incremental features of the demo.	I am not sure whether the differentiation in baseline and incremental components makes sense here. The plan is to implement 2 hydro power projects, where part of the funding will be provided by GEF, the remaining funds need to be provided by the provincial governments, as mentioned in their co-financing letters.
RTA	66	Is the insufficient coordination between stakeholders the reason for the delay of the demo? Does it have something to do with the issue of financing of the demo?	Insufficient coordination has definitely contributed to the delays. The PMU lacks capacity (time and specific technical know-how) to push the preparation and implementation of the hydro demos. That is why Demo Project Managers are suggested (see recommendation #3)
RTA	67	Please state here the reasons why the activities on this have not yet been done and why PPL seems to be digressing away from the ESCO idea, which they supported during the project design.	Clarification added.
RTA	68	I would think that the MTR would find out the reasons behind the delays in, or non-implementation of, the planned Component 3 activities and come up	Wording on recommendations for Component 3 was modified to reflect the importance of the ESCO approach. The feedback from the limited talks with

		with recommendations on how to expedited the implementation process. Or if necessary, come up with alternative activities that will deliver the planned outputs, or suggest alternative outputs to deliver, so that the expected Component 3 outcome will be realized. Component 3 is for addressing the financial barriers. If the barriers are not removed, then the project objective will not be realized. At the very least, come up with alternative activities that will deliver by EOP tangible outputs that could enable the financing of RE/EE projects after the FREAGER Project completion.	financial institutions was that one bank was willing to provide loans to RE and EE projects under the standard loan schemes they are offering. These are fully commercial loans. Setting up a special loan fund, as suggested in the ProDoc, is in my opinion not realistic at the moment. As per the ProDoc, the fund would provide upfront finance, but there is no indication how this should work. The government doesn't have the funds, a commercial bank will not be interested in providing upfront financing at full risk. The concept in the ProDoc is only a rough sketch and lacks various details, most importantly who is providing funds.
RTA	69	If there will be similar projects say in the next 2 years, can these be attributed to the FREAGER Project?	If the projects are based on FREAGER activities or have a traceable connection to the project, yes.
RTA	70	If there will be similar projects say in the next 2 years, can these be attributed to the FREAGER Project?	If the projects are based on FREAGER activities or have a traceable connection to the project, yes.
RTA	71	Not necessarily replication of demos. These could be RE mini-grid projects that will be developed and financed as influenced by FREAGER activities (capacity building or awareness raising). It can be a biomass-based power generation mini-grid project.	Biomass is not mentioned in the FREAGER strategy or activities, so a connection between the FREAGER project and biomass will be difficult to establish.
RTA	72	Will this be removed or replaced? Please refer back to the comment on this.	Wording revised.
RTA	73	These statements are referring to the major barrier categories to the application of RE and EE technologies in PNG. The last sentence indicate that these barriers are still present, at various degrees. This means that the FREAGER project activities have to be expedited to remove these barriers. Now there are other barriers the PMU/IP have to address – the barriers to achieving the objective of the FREAGER Project, let alone completing the project.	Wording revised for clarification.
RTA	74	This is a serious problem to address. It would be good for the MTR to provide recommendations on how to address this.	There are very clear recommendations in section 5.2 on how to address the issue of lack of co-financing.
RTA	75	There's nothing mentioned about this in the paragraphs below. Does that mean that the PMU/CCDA didn't do nor even attempt to do something (e.g., modify, adjust.) to adapt the project implementation to changing/actual	There is little evidence of adaptive management. It was mentioned by the CO in an earlier comment that the CO has taken over some functions of the PMU to support the work under the project. It is difficult to qualify this as adaptive

		conditions? If yes, why was that? It is expected that the MTR will provide appropriate adaptive management recommendation.	management, as the lack of capacity was caused by UNDP not providing sufficient co-financing. For adaptive management recommendations, please see the entire chapter 5.2.
CO	76	Based on audit observations, the CO has centralized the procurement functions to ensure quality assurance and best value for money are fully adhered to. I suggest the recommendation of having project assistant to support the project manager in day to day work and follow up with procurement to ensure full documentations are available to conduct the assessment required by procurement team.	Relevant wording added in chapter 5.2, recommendation #3.
RTA	77	MOU on what? Please specify.	Defining the contribution of each party to the FREAGER Project, as mentioned in the second part of the sentence.
RTA	78	Maybe the MoU is not about that. Perhaps there should be another MoU (or better MOA) on the co-financing.	The MoU is about the contribution of each party to the FREAGER Project. As co-financing is an important contribution, this should have been covered by the MoU.
RTA	79	Considering the implementation problems and delays in conduct of the project activities, please comment on the effectiveness of these previous PB meetings. Please suggest how the effectiveness of the PB Meetings can be improved.	Clarification added.
RTA	80	Will these meetings be seriously impacted by the current health situation in the country? Where is the budget for such meetings coming from?	Clarification added.
RTA	81	Is this recommendation on the premise that decision making has to be delegated to the PB because of the lack of capacity of the PMU?	The MTR showed a lack of coordination between stakeholders. Clearer decisions in PB meetings will help the PMU as well as the project in general.
RTA	82	This is OK. Based on the MTR findings, how will this be facilitated?	Clarification added.
	No nr.	Question: Based on the above findings regarding the implementation of the project, what are the recommended adaptive management changes/adjustments?	Please see section 5.2 on recommendations.
RTA	83	There is no Activity 1.4. There is an Output 1.4, and there are 5 specific activities (1.4.1 to 1.4.5) to deliver such output.	Number corrected.
RTA	84	The project implementation plan should have been prepared during the inception phase and included in the inception	This is not about the project implementation plan, but about detailed management of activities in the project. As explained in this

		report. A procurement plan should also be prepared. Most likely, project management activities like preparing TORs, procurement of inputs, etc., are implied to be carried out during the implementation schedule of the project activities. Is the MTR recommending the preparation of these detailed project management plans for the 2nd half of the FREAGER Project implementation? Please specify what are these recommended PM plans, and at least what are covered in such plans. Take note of the capacity of the PMU/CCDA.	section, it is not clear how an activity can be managed properly, if there are various sub-activities, but there is no list of these sub-activities and about the timeline for implementation.
RTA	No nr.	Question: What would be the adaptive management measures that should be recommended considering the above findings/	Please see section 5.2 on recommendations.
RTA	85	What is meant by this? Is this saying that no GEF funds were used for the demos? What is being discussed in the table is the GEF budget. There is GEF budget for the demos. Isn't it also the fact that because some of the demo activities are not yet being implemented, only less than a quarter of the GEF budget for Component 2 has been spent? Or is "no contribution" referring to co-financing. Please include a table on that (same as the GEF budget table) but showing Co-financing budget expenditures.	That is exactly the point I am making. The budget showed planned expenditure for demos. This was unrealistic, as demos cannot be implemented within one year, hence the comment. Co-financing is covered in the following paras.
RTA	86	This is OK. But what would be more helpful is a table of the actual realization of the co-financing (by component) by the mid-term of the project. Are there any additional confirmed co-financing since the start of the project implementation?	Please see table 5, which confirms co-financing at CEO endorsement and at MTR.
RTA	87	Do you mean actual confirmed/realized?	Wording adapted.
RTA	88	Please recommend how the PMU/CCDA will do this.	See recommendation #1 in chapter 5.2.
RTA	89	Stated by who and when?	Clarification added.
RTA	90	What does this mean? Does this mean, PPL could limit the in-kind contribution to US$ 1M and turn the rest of the US$ 4M to cash co-financing?	This means that the USD 4 million is considerably exaggerated. Based on their USD 2 million commitment at CEO endorsement, their work input and the results so far, a maximum of USD 1 million is justified to be counted as in-kind contribution. On top of that, PPL provided

			USD 644,000 as cash co-financing.
RTA	91	This is OK. But it would be good to see where the actual realized co-financing by component. Or at least indicate in Table 5, where the actual co-financing was utilized. For example, US$ 644,765 – Samarai Solar PV demo.	This is clearly mentioned in the text above the table.
RTA	No nr.	Question: Considering the findings presented above regarding project finance and co-financing, what would be the recommended adaptive management measures?	Please see section 5.2 on recommendations.
RTA	92	What does this mean? Please elaborate. Note that aside from the project log frame, there is also an Annual Targets table in the ProDoc.	Clarification added.
RTA	93	In view of the previous paragraph, is it recommended to come up with a more detailed M&E Plan?	There is no point to have a more detailed M&E plan now, but to work on collecting information required to monitor each of the indicators.
RTA	94	Is this as stated? Or is this monitoring and evaluation system?	Reworded.
RTA	95	How about the private sector, are the private sector entities interested in RE/EE investments? Are they aware of the benefits of RE/EE? Do they know how to implement RE/EE projects? How effective are the implemented capacity building activities of the project in enhancing the private sector interests and attitude towards, RE/EE initiatives?	PPL is private sector and is actively contributing to FREAGER, both with cash and in-kind contributions. For other private sector participants, activities under Component 3 and 4 will be carried out.
RTA	96	Please refer also to the comments on the concise summary of conclusions in the Executive Summary.	Comments considered.
RTA	97	Is this the Project Manager mentioned in p. 8 of this report?	Text deleted, as it was leftover from a draft.
RTA	98	Looks like there's some missing texts here.	Text deleted, as it was leftover from a draft.
RTA	99	Please refer to the comments on this section in the Executive Summary.	Comments considered.