Final Report

Terminal Evaluation

December 2022

Project Name:

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

Implementing party:

Climate Change and Development Authority (CCDA)

Evaluation: Terminal Evaluation

Report: Final Report

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Draft 0	August 29, 2022	MH, AR	Initial, internal Version
Draft 1	October 31, 2022	MH, AR	Incorporation of UNDP comments and finalization of analysis
Final 1	November 16, 2022	MH, AR	Final version incorporating all UNDP comments
Final 2	December 29, 2022	MH	Final version incorporating UNDP RTA comments

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Acronyms and abbreviations

Acronym	Definition
AWP	Annual Work Plan
CCDA	Climate Change and Development Authority
CEO	Chief Executive Officer
CO_2	Carbon Dioxide
CSO	Civil Society Organization
DOWI	Department of Works and Implementation
DEC	Department of Environment and Conservation
EE	Energy Efficiency
EOP	End of Project
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
GoPNG	Government of PNG
ICCC	Independent Consumer and Competition Commission
ILG	Incorporated Land Group
ISO	International Standards Organization
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 Modality
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)”

Acronym	Definition
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
SOE	State Owned Enterprise
ToR	Terms of Reference
UNDP	United Nations Development Programme
US$	US Dollar

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Executive Summary

Project Information Table

Project Details		**Project Milestones**	
Project Title	Facilitating Renewable Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction (FREAGER)	**PIF Approval Date:**	21.10.2015
UNDP Project ID (PIMS #):	5569	**CEO Endorsement Date:**	13.06.2017
GEF Project ID (PMIS #):	9273	**Project Document (ProDoc) Signature Date:**	20.10.2017
Project Country:	Papua New Guinea	**Inception Workshop date:**	18.05.2017
Region:	South-East Asia	**Terminal Evaluation Closing Date:**	30.11.2022
Focal Area:	Climate Change	**Planned closing date:**	20.10.2021
GEF Focal Area Strategic Objective:	CC-1 Program	**If revised, proposed op. closing date:**	20.10.2022
Trust Fund [indicate GEF TF, LDCF, SCCF, NPIF]:	GEF		
Executing Agency/ Implementing Partner:	Climate Change and Development Authority (CCDA)		

Project Financing	**at CEO endorsement (US$)**	**at Terminal Evaluation**
[1] GEF financing:	USD 2,840,640	USD 1,917,179.74
[2] UNDP contribution:	USD 300,000	USD 300,000
[3] Government:	USD 2,930,000 cash + USD 3,530,000 in-kind	USD 56,000 cash + USD 300,000 in-kind
[4] Other partners:	USD 16,000,000 cash + USD 2,000,000 in-kind	USD 644,765 cash + USD 1,000,000 in-kind
[5] Total co-financing [2 + 3+ 4]:	USD 24,760,000	USD 2,300,765
PROJECT TOTAL COSTS [1 + 5]	USD 27,600,640	USD 4,217,944.74

Project Description

The "Facilitating Renewable Energy & Energy Efficiency Applications for Green House Gas Emission Reduction (FREAGER)" project (PIMS #5569) started in October 2017 and has been originally planned to end by October 2021. An extension of 12 months has been granted for which the project end date is now 20.10.2022. The objective of the Project is to enable of the use of Renewable Energy (RE) and Energy Efficiency (EE) technologies for achieving greenhouse gas emission reductions in Papua New Guinea (PNG) and supporting the electrification efforts of the government. PNG's greenhouse gas (GHG) reduction efforts to date have focused on the forestry sector.

Despite low per capita energy use at present, with only 20 percent of the population having access to electricity, the adoption of RE and EE technologies in PNG has therefore been identified to have a 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 the establishment of community RE mini grid, replacing township diesel center and integrated township EE programs present particularly compelling win-win propositions for PNG. FREAGER has been designed to remove barriers in the field of RE and EE and to demonstrate the relevant technologies. The expected long term output is 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)

Main objective to achieve activation of RE and EE potential in PNG has been to remove barriers to these technologies in the areas of (a) policy and planning, (b) technical and commercial viability, (c) availability of financing, and (d) information and awareness.

In the policy and planning area, the project planned to promote these technologies via: design of policy incentives; development of standards; national road-maps for community RE mini-grids and township EE programs; and provincial level RE and EE plans.

To demonstrate the possibilities and advantages of the use of RE and EE technologies and to build Technical Personnel Capacity for RE and EE. It has been planned to achieve these objectives through the implementation of demo sites and through training and other capacity building activities.

The removal of barriers of access to financial instruments for RE and EE projects it has been planned to increase the availability of finance through e.g., the establishment of ESCO fund.

For the awareness enhancement a series of activities around the information on RE and EE has been planned.

The Program Management Unit (PMU) was established jointly by UNDP and CCDA and is located organization-wise 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) sitting 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 NISIT –National Institute of Standards and Industrial Technology etc.).

Evaluation Ratings Table

Monitoring & Evaluation (M&E)	**Rating**
M&E design at entry	S – Satisfactory
M&E Plan Implementation	S – Satisfactory
Overall Quality of M&E	**S – Satisfactory**
UNDP Implementation/Oversight & Implementing Partner Execution	**Rating**
Quality of UNDP Implementation/Oversight	MS – Moderately Satisfactory
Quality of Implementing Partner Execution	MS – Moderately Satisfactory
Overall quality of Implementation/Oversight and Execution	**MS – Moderately Satisfactory**
Assessment of Outcomes	**Rating**
Relevance	S – Satisfactory
Effectiveness	MS – Moderately Satisfactory
Efficiency	MS – Moderately Satisfactory
Overall Project Outcome Rating	**MS – Moderately Satisfactory**
Sustainability Dimension	**Rating**
Financial	MU – Moderately Unlikely
Socioeconomic	ML – Moderately Likely
Institutional framework and governance	L – Likely
Environmental	L – Likely
Overall likelihood	**ML – Likely**

Summary of Findings, Conclusions and Lessons Learned

Findings

The FREAGER project strategy has been the multi-pronged removal of barriers to the implementation of RE and EE in PNG. The objective was to Facilitate Renewable Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction in PNG. The project focused, in line with country priorities, on energy efficiency, renewable energy to achieve nationwide electrification, save fossil fuels and ultimately reduce GHG emissions. The key project outcome was the removal of several identified barriers that hinder the widespread implementation of RE and EE solutions in PNG.

General

All interviewed persons at the stakeholders meetings at CCDA, PPL and NISIT concluded that the project has been well designed and raised the right questions, correctly analyzing the multi-pronged barriers to be removed to enable the widespread applications of non-grid connected RE-based power generation and in the application of EE technologies in the country's energy end-use sectors.

The project was able to deliver in terms of analysis, papers, workshops, or installations, which have been received by the stakeholders positively. The technical studies and capacity building activities conducted under the project and the results produced have been recognized to have bring about positive impacts for the country.

Lack of fluid and continuous communication has been highlighted during nearly all interviews and is something that shall be critically assessed by UNDP PNG. COVID 19 public health measures made it extremely difficult for the PM to maintain contact with the project partners. However, a more fluid communication would have been possible even under such difficult conditions.

Several external and internal factors lead to a work overload of the PMU. From the start the PMU had only one instead of four professionals, Thus the PM had to work with ad-hoc support from the UNDP country office and the support from the project partners, such as CCDA and PPL. UNDP made attempts to recruit the specified personnel but that did not eventuate.

The indicators of the project’s Objective and Outcomes have been assessed as SMART, even though set too ambitious for the envisioned time frame. Especially for the installation of the demos, the time planned has been set too short. Here the COVID 19 pandemic played an important role, beside a very optimistic time frame.

Component 1

In Component 1, most of the activities have been implemented and the planned outputs have been produced.

The developed guidelines dealing with EE measures such as building codes and measures to make efficient use of electricity are seen to have high quality and will be integrated into the set of standards in use in PNG.

The Renewable Energy and Energy Efficiency Plans have been received well in the provincial governments of Eastern Highlands, East Sepik, and Milne Bay and are seen as a useful instrument for the energy development plans of the provinces.

With these analysis, guidelines, and regulations in hand, the project has contributed significantly to the Off Grid and EE development of the country.

With the delivery of the above-mentioned draft policies, guidelines, and regulations, it is fair to state that the planned actions to remove the policy/regulatory barriers have been initiated and the extent of barrier removal that was achieved depends on the final approval of the recommended policies, guidelines, and regulations.

Component 2

The PV-Diesel Hybrid System has been operational at the time of the TE. For the Mini Hydro systems in East Sepik and Eastern Highlands, these have reached Feasibility Study level only at this point. For the implementation of the PV-Diesel Hybrid System on Samarai Island, the installation of the demo unit was made possible by PPL's co-financing commitment. It could be shown that the PV generated electricity is less expensive than the Diesel generated one, reducing PPL's generation losses on Samarai Island.

On the beneficiary side, on Samarai Island some success stories have been reported. The technical staff at the PPL Diesel Power Station assumed that the fuel consumption and consequently the CO_2 emissions from the diesel power generation will dramatically drop. Interviewed project partners on Samarai Island stated to be happy that the noise level has significantly dropped after the installation of the PV-Battery system. Some islanders have established new businesses, offering refrigeration services to fishermen, so their catch can be kept fresh for longer hours.

There were no such success stories gathered from East Sepik and Eastern Highlands since the implementation of the demo Mini-Hydro systems there have not yet happened.

The installation of the demos was greatly hampered by the COVID 19 induced limitations, lack of co-financing from project partners and lack of project ownership of key stakeholders. This had a negative impact on the implementation of the activities under this component.

As consequence the technical and commercial viability-related barriers have not been entirely removed. Through the conducted training, theoretical and some practical knowledge have been built, but not at a sufficient level to consider that these barriers has been removed.

Component 3

The implementation of this component has suffered severely from a change in PPL policy, lack of funding from the GoPNG as a consequence of the COVID 19 pandemic and the little interest by Commercial Banks in offering RE and EE specific financing instruments. Thus, as per end of the project only some concept notes exist.

Here the removal of the financial barrier has not been achieved as no financing instruments could be established.

Component 4

Under Component 4, very little and visible to the public activities have been implemented by the project. Most of the workshops and seminars have been conducted, but the project website is still not filled with useful information as planned and the planned multi-channel media campaign did have only a few activities until now.

In that regard, the removal of information and capacity development barriers is only partly achieved through trainings and workshops conducted.

Conclusions

Despite significant delays in the formation of the PMU, the project has delivered some key deliverables, which, limited as they may be, are important contributions to the removal of the barriers to the implementation of RE and EE technologies and techniques in PNG.

The project succeeded partly in the removal of policy/regulatory barriers through the development of relevant policies, guidelines, and standards.

The removal of the technical and commercial viability barriers has only been partly achieved. The tools for Commercial and Technical Viability have been delivered in part, but only one of the demos was completed. The TE Team considers the removal of policy/regulatory barriers together with the financial barriers will enable further development of the RE and EE in PNG.

The project has not been able to remove the financial barriers to RE and EE technology applications yet. Among the factors leading to this are lack of funding from GoPNG, lack of interest from commercial banks and change in PPL policy.

The removal of Information and Awareness-related barriers has been partly successful. While trainings and workshops have been delivered and stakeholders see RE and EE solutions as viable, the expected multi-channel media campaign has not happened. Also, the website is not filled with information yet, so the expected dissemination of results is not happening to the wider public.

The lack of project ownership as communicated by the stakeholders to the TE Team is something worrying, especially as the project has been originally pushed by CCDA, NISIT and NEA staff. Here UNDP shall do a critical assessment on how to maintain project ownership for the good of the country and its development.

The analysis of the findings clearly shows that the overall project outcome rating is MU – Moderately Unsatisfactory.

Lessons Learned

- For such a large project like FREAGER, it must be assured by the management that the contracted staff do have the required skills and knowledge. Availability of the personnel that make up the PMU is key and has been the core implementation problem of the project.

- Timely establishment of the PMU is key to take advantage of the high motivation of all stakeholders at the beginning of the project.

- High levels of co-financing do bear the risk of not realizing such commitment. Lack of com-

mitment to the co-funding needs to be handled by stakeholders of the project by either adjusting the project targets to the available budget by cutting down activities for which no funding is available or by finding alternative funding through other donors to achieve the planned targets. The proposed and implemented mitigation measures have not been sufficient to ensure the committed co-financing though.

- The selection of proper experts and their involvement are essential for a successful know-how transfer, especially in projects with a strong focus on application of best international practices.

- Constant communication with the key implementation partner is vital on a weekly or day to day basis to ensure accountability and smooth implementation of the project deliverables. This shall also include that the PM must be physically located at the Implementation Partners office as specified in the ProDoc.

Recommendations Summary

# of Rec.	TE Recommendation	Responsibility	Time-frame
A	**Category 1: Immediate for PMU**		
A.1	Engage with the Implementing Partner CCDA on how to continue the implementation of the procedures, policies to support the sustainability of the results and to assure that the barrier removal achieved persists in time.	PMU	ASAP
A.2	Follow up with the project partners on the implementation of the developed guidelines and policies.	PMU	ASAP
A.3	Provide Lessons Learned Report based on TE report and own feedback from stakeholders.	PMU	ASAP
A.4	As part of Lessons Learned to be developed, structure the information also in a brief, easy to read summary information on benefits of each demonstrated technology.	PMU	ASAP
A.5	Assess with stakeholders what have been the Lessons Learned from their side and how future collaboration can be improved.	PMU	ASAP
A.6	Assess how the remaining funds can be spend during the wind down period for project activities if possible.	PMU	ASAP
A.7	Populate the existing website under the UNDP parent website with relevant project information.	PMU	ASAP
B	**Category 2: Follow-up for UNDP CO**		
B.1	The high dependency on co-financing for the achievement of the targets as set in the project results framework turned out to be a bottleneck for the project. Thus, UNDP CO should assess GoPNG commitment and capabilities for co-financing.	UNDP CO	No time-frame
B.2	The project relied for good reasons largely on international staff to be hired, especially to bring in international best practice and build capacities in PNG. However, in some cases it has not been possible to source this staff, for which as a last resort UNDP CO shall assess if that staff can be sourced nationally to cover at least part of the profile.	UNDP CO	No time-frame

# of Rec.	TE Recommendation	Responsi-bility	Time-frame
B.3	It has been seen during the TE that even though large delays happened, little has been changed in the implementation plan. Here the use Critical Path Method[1] for design and timely implementation of projects could be used more frequently to identify and remove possible bottlenecks.	UNDP CO	No time-frame
B.4	Assure that the PMU is located physically at the IP office if agreed in the ProDoc	UNDP CO	No time-frame
C	**Category 3: For UNDP/GEF**		
C.1	Consider recommendation/requirement to use a Critical Path Method in project design and implementation of GEF- financed projects.	UNDP	No time-frame

[1] A Critical Path Method identifies activities that, if delayed, would delay the entire project. It is a project management technique used to create a project schedule. It is also used continuously to adjust the implementation schedule as the critical path might change during project implementation.

1 Introduction and background

One of the last activities in any UNDP/GEF project cycle is the Terminal Evaluation, which shall be conducted by a team of national and international consultants. The main objective of this evaluation is to evaluate the implementation of the project, its sustainability and derive Lessons learned for other projects.

1.1 Purpose of the evaluation

This terminal evaluation was performed at the request of UNDP PNG CO as a standard mandatory requirement for all UNDP GEF-financed projects.

Terminal Evaluation provides a basis for learning and accountability for managers and stakeholders and for providing recommendations and lessons learned which can be applied when designing future relevant UNDP projects.

The objective of the terminal evaluation is to assess:

- Achievement of project results against what was expected to be achieved and draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming;
- Promotion of accountability and transparency and assesses the extent of project accomplishments;
- Broader project impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals;
- Recommendations for follow-up activities.

The updated 2020 UNDP/GEF "Guidance for Conducting Terminal Evaluations of UNDP- Supported, GEF-Financed Projects"[2] specifies four complementary evaluation purposes of GEF-financed projects:

- To promote accountability and transparency;
- To synthesize lessons that can help to improve the selection, design, and implementation of future UNDP-supported GEF-financed activities; and to improve the sustainability of benefits and aid in overall enhancement of UNDP programming;
- To assess and document project results, and the contribution of these results towards achieving GEF strategic objectives aimed at global environmental benefits;
- To gauge the extent of project convergence with other priorities within the UNDP country program, including poverty alleviation; strengthening resilience to the impacts of climate change, reducing disaster risk and vulnerability, as well as cross-cutting issues such gender equality, empowering women and supporting human rights.

The GEF and UNDP terminal evaluation guidelines specify five evaluative criteria:

1 **Relevance** is the extent to which the project's objectives are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donors' policies.
2 **Effectiveness** is the extent to which the project's objectives were achieved or are ex-

[2] UNDP, *Guidance for Conducting Terminal Evaluations of UNDP-Supported, GEF-Financed Projects*, 2020.

pected to be achieved. Effectiveness is also used as an aggregate measure of (or judgment about) the merit or worth of an activity, i.e., the extent to which an intervention has contributed to the delivery of its expected relevant output(s) and the consequent outcome efficiently in a sustainable fashion and with a positive institutional development impact.

3 **Efficiency** is a measure of how economically resources and inputs (funds, expertise, time, etc.) are converted to results. It is most commonly applied to the input-output link in the causal chain of an intervention.

4 **Overall Project Outcome.** The calculation of the overall project outcome rating will be based on the ratings for relevance, effectiveness, and efficiency, of which relevance and effectiveness are critical.

5 **Sustainability** is the continuation or likely continuation of positive effects from a project after it has come to an end, and its potential for scale-up and/or replication. UNDP-supported GEF-financed projects are intended to be environmentally as well as institutionally, financially, politically, culturally, and socially sustainable.

1.2 Key issues highlighted

Discussions during the start-up of the TE mission will identify some of the key issues that have affected project implementation and that need to be considered during the Terminal Evaluation. These may include some of the following challenges that have been identified in the preliminary review of available reports:

- Project's strategies relevance to national and local contexts;
- Project's achievement of the planned results?
    - *Analysis of reasons for the achievement or non-achievement of planned results;*
    - *Unexpected results or unintended consequences of the results both positive and negative;*
- Project timely adjustments to its strategy to maintain its relevance and effectiveness;
- Output level interventions contribution to progress towards outcomes;
- Financial and human resources allocation to achieve project outcomes;
- Changes by demo projects in their place of implementation;
- Capacity developed ensuring sustainability of efforts and benefits;
- Commitment of national partners to conduct the project or elements of the project.

Mechanisms developed and/or interventions linked with existing mechanisms at local and national levels to ensure continuation.

1.3 Methodology of the evaluation

The evaluation is guided by the Terms of Reference and the Evaluation Matrix (Annex 1). The methodology is based on the following data methods:

- Review of documents, reports that describe progress on project outputs, outcomes, and objectives as per indicators in the project design;
- Compilation of data on project deliverables and status of outputs, and the biodiversity conservation trends at the project sites;
- Email Survey of local project officers;
- Focus Group discussions;

- Discussion of key issues and lines of inquiry with project executive and management team regarding strengths and weaknesses of project design and execution,
- Self-assessment of achievements by project staff and participants,
- Interviews with project participants and stakeholders to verify achievements and to identify issues related to project design and implementation,
- Where feasible, group discussions to review project experiences and lessons learned,
- Site visits to compile evidence of achievements and to consult with beneficiaries and stakeholders, and in the final analyses,
- Triangulation and corroboration of comments by participants regarding project results, implementation, and lessons.

The evaluation includes quantitative and qualitative analyses of project achievements in relation to baseline conditions. It draws upon the conclusions and recommendations of the MTR report to provide advice on follow-up action needed to assist the project results. The first phase of the evaluation involves compiling detailed information on the indicators outlined in the Evaluation Matrix (Annex 1). Survey questionnaire has been used to collect data on the status of the project.

The evaluation tasks included:

- Data collection and compilation undertaken in cooperation with the PMU by completing background tables on project activities, outputs, and finances
- Interviews with project beneficiaries and participants, project management and partners, for the field level, assisted by an Interview Guide (see **Annex 5**), to assess results, implementation challenges and lessons learned;
- Analyses of the project design and assumptions, implementation performance and measurable results in comparison to the project management plans and results indicators and targets, and identification of any gaps between design and delivery.
- Field review of selected representative project sites and comparative before and after information, as available, to verify reported results on the key project interventions at selected sites.

In all of the discussions, an emphasis has been put on collegial and constructive dialogue and compiling reliable observations project performance and lessons. The conducted interviews have been assisted by an Interview Guide which provided lead questions that facilitated consistency and triangulation of responses from those interviewed. The evaluation involved an objective and independent review of the *weight of evidence* compiled from reports, interviews/group discussions and site visits. Reasons for conclusions, ratings and recommendations have been provided based on the evidence. The evaluation also draws out key lessons from the project that have implications for the exit strategy and/or for future climate change adaptation projects.

2 The Project and its Development Context

2.1 Project history

PIF approval date:	October 21, 2015
Project approved for implementation:	June 11, 2017
Project Document signed:	October 19, 2017
Planned project duration:	4 years (48 months)
Original operational closing date:	Aug 31, 2021
Actual operational closing date:	October 20, 2022
Actual project duration:	5.1 years (62 months)
Draft Terminal Evaluation Report was submitted on:	October 31, 2022
Final comments on the draft report were provided to evaluators on:	November 7, 2022
The final Terminal Evaluation Report was submitted on:	November 17, 2022

2.2 Development contexts

PNG's greenhouse gas (GHG) reduction efforts in the past have focused on the forestry sector. 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 been assessed to have a huge 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 showed 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.

The project aimed to do remove existing barriers to the implementation of RE and EE technologies. These barriers are those that are related to energy policy and planning, technical and commercial viability, availability and accessibility of financing, and information and awareness. In the policy and planning area, the project planned to 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 road-maps for community RE mini-grids and township EE programs; and provincial level RE and EE plans.

Technical and commercial viability was planned to be supported through capacity building for technical personnel on RE mini-grids and on building and industrial EE. It was also 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 planned 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) was planned to be developed in two townships that are fully powered by diesel. The project also planned to 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 included 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 included 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 further included a multi-channel media campaign for RE and EE and educational materials on RE and EE. It also included the establishment of a one-stop-shop website on RE and EE in PNG. This website should have presented information on PNG context specific RE mini-grid guidelines, collect data from RE resource assessments and present curriculum from various project workshops.

2.3 Problems that the project seek to address

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. Adopting RE and EE to an extent substantially greater than the very limited level described above will require that a number of barriers be removed.

Having identified these barriers, the project aimed to act on the following spheres: (1) policy, planning, and institutions; (2) technical and commercial viability; (3) financing; and (4) information and awareness. During the project development phase, a total of 4 project components have been designed, each of which has been tailored to work specifically on each type of barriers and in an integrated manner, remove the existing barriers:

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.

2.4 Objective and expected outcomes

The Project Development Objective is to enable the application of feasible renewable energy and energy efficiency technologies to achieve greenhouse gas emission reductions in PNG.

The project is comprised of four components, each of which is addressing a major barrier category: (1) Energy Policy, Planning, and Institutional, (2) Renewable Energy and Energy Efficiency Technology Applications (commercial and technical viability), (3) Financing of Renewable Energy and Energy Efficiency Projects; and (4) Energy Development and Utilization Awareness Enhancement (RE and EE information and awareness). These components are briefly described in Chapter 2.3.

The project is expected to bring about the following outcomes:

- 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.
- Enhanced technical-commercial viability and capacity in the application of energy efficiency technologies and development of feasible RE-based energy systems in the country.
- Increased installed capacity of RE based power systems and implementation of viable EE technology applications in PNG.
- Improved availability of, and access to, financing for renewable energy and energy efficiency initiatives in the energy generation and end-use sectors and
- Improved awareness of, attitude towards, and information about renewable energy and energy efficiency applications in the energy generation and end-use sectors.

2.5 Main stakeholders

Throughout the project implementation several main stakeholders have been involved in this project. These stakeholders have played a more or less active role in the project. The main stakeholders of this project are:

- **Climate Change and Development Authority** (CCDA) as the lead implementation partner key stakeholder in the field of RE and EE policies in PNG;

- **Papua New Guinea Power Limited** (PPL) as technical service provider for development of the demo sites technical solutions;

- **National Institute of Standards and Industrial Technologies** (NISIT) as key project partner in RE and EE standards and certification, being the government body developing standards and certifications in PNG;

- **National Energy Authority** (NEA), which was the former Department of Petroleum and Energy, is also a main stakeholder, being part of the PB and beneficiary of the activities under Component 1.

- **Independent Consumer and Competition Commission** (ICCC) has initially been stakeholder during the development of guiding principles for the off-grid code. This has then later been transferred to NEA and developed into Regulation for Off-Grid power systems. ICCC has been part of the PB until NEA was formed.

- **Provincial Governments** of the provinces in which demos sites are installed and with which RE and EE plans have been developed (Milne Bay Province, Eastern Highlands Province, East Sepik Province and Morobe Province);

- **District Administrations** of the districts in which demos sites are installed (Samarai Murua (Milne Bay), Daulo and Lufa (Eastern Highlands), Wewak and Maprik (East Sepik), Kabwum and Wasu (Morobe)).

Beside these key stakeholders, some minor stakeholders have been identified such as PNG customs.

2.6 Theory of Change

The project used and included a Theory of Change (ToC). The underlying assumption is that addressing one area alone will not reliably generate progress towards achieving the project objective, but that a multi-pronged approach will. For that reason, the project has been designed to (a) support the formulation of policies and plans, (b) to make RE and EE interventions visible through the demo sites and (c) improve financing of RE and EE by that making use of synergies between progress in these multiple areas to move the dial to a level at which substantial replication can occur.

3 Evaluation Findings

3.1 Project Formulation

3.1.1 Results framework and project strategy

The design of the FREAGER Project is very complex and it addresses the removal of barriers to the implementation of RE and EE initiatives in PNG. These barriers are categorized as : (1) policy/ regulation, planning, and institutional; (2) technical and commercial viability; (3) financing; and (4) information and awareness. The four components of the project are each designed to remove a specific type of barrier. This approach has been selected as based on the underlying theory of change that acting only on one type of barrier will not be enough to achieve the objectives of the project. In that regard, the removal of barriers to the application of RE and EE technologies has to be done in an integrated manner.

The four components of the project are presented in Chapter 2.3.

This application of the barrier removal strategy is manifested in the defined project activities that will deliver the expected outputs that will collectively bring about the expected outcome in each project component. These Outcomes and Outputs have been identified through a logical framework analysis (LFA) process.

Rationale for the project and the project strategy and design are clearly and logically formulated. During the analysis of the ProDoc it has been noted that a very large number of activities were planned to achieve the outputs and outcomes within a rather short time frame of only 4 years. The FREAGER Project is comprised on baseline and incremental activities. The baseline activities are from ongoing and planned projects that are CCM-related and are also aimed towards reducing GHG emissions. In essence, the FREAGER is a consolidation of national and local CCM, RE and EE initiatives supplemented or augmented by incremental activities that are funded by the GEF. The overall planning and resource allocation has been seen as sufficient for the planned activities, taking into account that large amount of the resources in terms of budget and human resources were planned to be sourced from the stakeholders.

As mentioned above the designed timing and funding of the project was initially sufficiently high for its complex scope. The project strategy was appropriately designed for reaching expected project results, as well as for enabling post-project sustainability and replication. Yet in the MTR it has been pointed out that due to lack of resources and funds and a massive underestimation of the challenges and resources needed to implement the demo site activities has led to some planned key activities of the project unattended and the expected outcomes not achieved until now. This lack of achievement of the targets can also be attributed to non-appropriate adaptive management after the MTR.

The project was designed to create an effective framework for continuous implementation and foster the investment in energy efficient applications and renewable energy production infrastructure after project termination (post-project, or consequential investment). It has been planned that the development of (national) policies and frameworks will go hand in hand with the implementation of demo site mini grids to showcase the implementation of renewable energy projects.

3.1.2 Indicators quality and utilization

As stated above the Project Results Framework was clearly structured and specified in the Project Document. This includes well-defined indicators meeting the requirements of GEF to be “SMART” (Specific, Measurable, Achievable, Relevant, Time-bound).

Clear and measurable targets have been defined for the MTR as well as the TE, with at least 2 indicators per Outcome. These indicators are considered adequate to measure. For each of the Outcomes at least 2 indicators have been identified, which are adequate to measure the achievements made in project implementation. According to the ProDoc the project has gender equality as an objective. The relevant targets are disaggregated by gender, with a target of ate least 20% participation of women or women-headed households.

Most indicators are directly related to the implementation of the RE demos, which would lead to significant GHG emission reduction that can then be measured as well as number of newly installed RE Mini Grids The indicators linked to those outcomes are emission reductions achieved, capacities installed, financing secured, or jobs created.

What is noted here is that the envisioned targets to be met are challenging even for a fully deployed PMU. Thus, during the MTR it has been highlighted that the ProDoc assumed unrealistic short implementation periods. However, the MTR was still optimistic that the targets could be met by end of the project and only recommended to review the indicator of outcome 4 and to drop workload for component 3. The reduction of workload has been rejected by the project management in the Management Response to the MTR, while the revision of outcome 4 has not been attended at all. The TE assumes that this decision was taken as the focus has been laid on increasing the stakeholders engagement and by that measure assure the achievement of the end of project targets.

The Project Results Framework is structured into four components and for each component outcomes and its indicators are specified. There is an explicit hierarchical link between project outcomes and outputs, being the first a clear result of the later. Indicators have been defined for project objective and project outcomes. There are specific indicators for project outcomes, which do measure the state of implementation of the activities and outputs. Gender has not been mainstreamed in the results framework.

The project team did its best to interpret the targets and reported project achievements against these targets. It is hereby noted that the targets have not been modified during the Inception Workshop, but all targets for outcome 4 have been dropped or have not been reported in the Inception Workshop Report. As no indication in the text is given that the targets have been dropped on purpose it is assumed that this is a mistake in the Inception report only.

3.1.3 Assumptions, risks, and lessons from other projects

The ProDoc specified ten risks in four categories (Environmental, Financial, Organizational, Political, Social and Regulatory). The identified risks include:

- Government does not commit to promoting clean and affordable energy development in Papua New Guinea;
- Government institutions at national and sub-national levels do not communicate and cooperate effectively to plan and develop energy sector;

- Government budgetary allocation for energy development is not sustained;
- National technical capacity in renewable energy and energy efficiency is inadequate;
- Project Staff not mobilized in a timely manner;
- Construction of solar PV mini-grids and micro/ mini-hydro mini-grids results in negative environmental and social impacts;
- Complex community social systems and landownership arrangement become counterproductive to promoting community leadership and ownership on communally agreed community initiatives;
- Non-enforcement of formulated and approved energy policies negatively affects sectoral policy direction and commitment towards RE/EE development in PNG;
- The high cost operating environment in PNG negatively affects the allocated project budget;
- Provision of costing information on RE mini-grids negatively affects the market by providing cost estimates that are either too high or too low.

For each risk, its probability and impact have been evaluated, and countermeasures specified, as well as responsible party. Relevant project risks and mitigation countermeasures were properly specified, as well as their probability and impact were adequately rated. All ratings of risk probability and impact have been rated between 1 to 4 on a 5-point scale (least to most). Risks with highest rated probability and impact of 4 included risks #2, #3 and #4.

The level of governmental co-financing is out of direct control of the project. Countermeasures specified in the ProDoc for this risk included ad hoc adaptive management. This included “building of government capacity in energy planning and budgeting to advocate and generate interest among decision-makers.” The impact of COVID 19 measures on the originally planned co-financing was huge. The government focused since the outbreak of the pandemic on the COVID 19 measures. None of the agencies were able to meet the promised co-financing of nearly $US 25 Mio., but only reaching PGK 200,000 from CCDA by the end of 2021. These topics have been properly tracked via the Issue Tracker, established in October 2021 to track critical issues of the project. Else assumptions and risks are well-articulated and logical and they account also for external factors (high cost environment – Risk 9).

In summary the assumptions are properly defined in the project results framework for project objective and for each of four project components. Due to lack of evidence, it is not possible to evaluate if assumptions and risks were used for specification of project outputs and activities, or vice versa.

3.1.4 Stakeholder participation

The project planned to involve all main relevant stakeholders. Due to a strong role of the state in this sector in Papua New Guinea, most of the stakeholders include governmental bodies and state owned companies such as PNG Power. All project stakeholders identified in the ProDoc and during the Inception Workshop together with their planned role in the Project are summarized in the below table.

STAKEHOLDER GROUP	DESCRIPTION	ROLE IN PROJECT
Climate Change and Development Authority (CCDA)	CCDA is the lead government agency responsible for coordinating climate change initiatives in the country.	As lead implementing partner, leading implementation with responsibility for the achievement of overall project goals and objectives. Overall, management oversight during implementation of project activities will be undertaken by CCDA. Executive member of Project Board.
Papua New Guinea 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.	Providing technical engineering assistance, design, development, and supervision. Provision of co-financing in cash and in kind to support implementation of the project components, particularly the Samarai Island PV mini-grid project and Milne Bay Province replications and the East Sepik Township Energy Efficiency Programs. Member of Project Board.
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 pricing, subsidies, and renewable energy resources.	Actively participating in project's policy related activities. Working with project-retailed consultants to develop and revise draft policies related to energy efficiency and renewable energy. Involvement in project's coordination mechanism for energy efficiency and renewable energy.
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.	Participating in project activities related to developing policies for the licensing and regulation of organizations who provide power via RE mini-grids. Revising, adopting, and enforcing such policies.
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	Encouraging and providing guidance to PPL and ICCC in their participation in project activities and to PPL in the replication of project demos based on benefits to its bottom line. Participating in financing aspects of project.
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.	Serving as key project partner in RE and EE standards and certification related activities.

STAKEHOLDER GROUP	DESCRIPTION	ROLE IN PROJECT
Provincial Governments: Milne Bay Province, Eastern Highlands Province, East Sepik Province, and Morobe Province	Provincial governments in PNG are subject to the organic laws of PNG and are governed by the Provincial Executive Council (PEC). The main function of a provincial government is to implement the laws and policies made or adopted by the relevant provincial assembly as well as those laws made by the National Government but applying to the provinces.	Participating actively in provincial-level project activities, including capacity building, demos, and provincial level RE and EE plans. Providing co-financing to project demos located in the respective province. Supporting replication of the project demos via use of PSIP. Provision of oversight and coordination at the provincial level during implementation of project activities.
District Administrations: Samarai Murua (Milne Bay), Daulo and Lufa (Eastern Highlands), Wewak and Maprik (East Sepik), Kabwum and Wasu (Morobe)	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.	Supporting the project demos as needed, including making specific recommendation to the PEC to support the project via co-financing and oversight functions. Providing liaison for coordination between CCDA, PPL, the provinces, and the communities.
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. It has significant land and properties and has three top officials that administer its operations: the Head Bishop, Assistant Head Bishop, and General Secretary.	Overseeing of the administration and management of the project initiatives in Wasu and Kabwum (Morobe Province). Participating in capacity building program in Morobe. Cooperation with the project in developing community RE mini-grid plan for the ELC. Replication of project demos.
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. IEPNG provides services for about 1,400 members, who are classified into various membership classes according to their levels of education and extent of experience in engineering practice. IEPNG is governed by an elected Board, chaired by the President, and having eight other members. This Board sets strategy and employs the Chief Executive Officer, who manages the day to day operations of the Institute to provide services to members and to fund activities as defined by the Corporate Plan.	Facilitating verification of engineering expertise in country. Participation in project technical capacity building program. Cooperation with project in promoting the development of a corps of “honest community mini- grid” engineers who develop projects at reasonable prices (without excessive profit taking) with good quality and therefore to the benefit of the communities.

STAKEHOLDER GROUP	DESCRIPTION	ROLE IN PROJECT
PNG Customs	PNG Customs was established in 1888 and draws its powers from the Customs Act of 1951 to control, supervise and authorize all forms of conveyances, persons, and cargo that move in and out of Papua New Guinea. PNG Customs also has jurisdiction under the Customs and Excise Tariff Acts to charge and collect duties and taxes. PNG Customs has an important responsibility to work collaboratively with a number of key partner agencies including both other Government agencies and industry. The Commissioner of Customs is the principle officer in the organization and is responsible to the Treasurer and Minister for Finance.	Providing support to the project in activities related to waiving the customs tax for RE and EE related equipment imports. Cooperating with the project in ensuring that sub- standard, low efficiency equipment that does not meet required standards is effectively barred from entering the country.
Incorporated Land Group (ILG) Division, Department of Lands and Physical Planning (DLPP)	The Incorporated Land Group (ILG) Division is under Customary Land Services within the Department of Lands and Physical Planning. The core function of the division is to register customary landowning units, giving them legal recognition under the ILG Act. The Act empowers customary groups for greater participation in the national economy. Following recommendations in March 2009 by the NEC on land reform of the customary land tenure system, the Land Groups Incorporation (Amendment) Act, 2009 was passed as a step towards land reform and become operational in March 2012 with the realignment of the division and operations with the new legislation.	Cooperating with the project in its work to develop policy and regulations for local people to set up ILGs for the purpose of developing and running community RE mini-grids.
Department of Works and Implementation (DOWI)	The Department of Works and Implementation (DOWI) is Papua New Guinea Government's implementing agency for infrastructure development in the country with offices in every province in the country all linked together through the wide area network. The DOWI provides government services in civil construction, architecture and building, geotechnical services, and research and materials. They also have a training institute.	Serving as a key provider to the project demos for low- cost, high quality technical services, particularly with regard to feasibility study and civil works. Participating in the project's technical capacity building on RE and EE.
Department of Environment and Conservation (DEC)	The Department of Environment and Conservation (DEC) was established in 1985. Its mission (approved by the National Executive Council on 22 August 1989) is to ensure natural and physical resources are managed to sustain environmental quality and human well-being. Efforts are currently underway to amalgamate three legislations (Environment Planning Act, Environment Contaminants Act, and Water Resource Act) to provide an effective and efficient environmental regulation process. The system is intended to provide for a one-stop-shop environmental approval.	Participating in or provision of guidance for development of environment and social impact assessment recommended content for RE mini-grids, beginning with the project demos.

STAKEHOLDER GROUP	DESCRIPTION	ROLE IN PROJECT
Indigenous Peoples and Local Communities	Indigenous peoples and local communities live in the areas in which the project demos will be implemented. Often, they live in small natural villages consisting of clan members and larger administrative villages consisting of multiple clans.	The project will actively involve indigenous peoples and local communities during project implementation. Already during the PPG phase, the project has carried out consultations with the indigenous communities in villages in which the two mini-hydro stations are envisioned to be located. Before implementation of the demos, further, more detailed consultations will be carried out via the FPIC process as part of the limited, site-specific environmental and social assessments. During project implementation, indigenous peoples and local communities will be actively involved in efforts to make productive use of renewable energy to raise incomes. This will occur at both the mini-hydro and the PV mini-grid demo sites. Outreach will insure that women and other marginalized groups have ample opportunity for involvement. Lastly, local communities in the two township EE demo locales will be involved in efforts to improved household EE via refrigerator and lighting replacement$

Table 1: Stakeholders Involvement Plan

Main project partners were consulted and involved in the project development phase to comment on the project draft and clarify their potential role in the project. It is also noted that implicitly some of the stakeholders have been set as key stakeholders. This is also reflected in the project management structure in which these stakeholders appear, while others, such as PNG Customs and ILG have been set more as a key service provider to the project rather than one of the stakeholders or not been considered as no project demos or other interventions were planned in their area of action, which was the case for the ELC PNG.

The project suffered from the limitations implemented as reaction to the COVID 19 pandemic. Especially CCDA and PPL highlighted during the TE interview that the coordination between UNDP and them was suboptimal and not very fluid. This has led to a low level of ownership of and identification with the project.

CCDAs expectation was to have the Project Manager sitting in their premises as originally planned. This would have allowed a more proactive and direct implementation of the project. While during the first waves of COVID 19 induced measures the lack of presence of the PM at CCDA premises was understandable as in compliance with covid restrictions. The later decision to locate the PM in UNDP CO has been seen by CCDA as having a negative impact on the project itself, but also on possible future cooperation between CCDA and UNDP.

PPL made comments in a similar direction, showing little identification with the project. The impression has been that PPL has been sidelined for most of the activities, questioning the added value of UNDP here. TE team has concluded that here probably a misperception of PPL role and contribution exist, being PPL service provider rather than implementation partner.

Another stakeholder that has not been included in the ProDoc, but later through the revision via the Inception Workshop is the University of PNG in Port Moresby. This institution has been added as stakeholder in this process as during the Inception Workshop it has been analyzed that the involve-

ment of an academic institution would be beneficial for the project. Consequentiality UPNG has been involved through their department of Renewable Energies, playing a very important role in the development of guidelines, implementation of training courses and workshops and through that in the dissemination of knowledge.

3.1.5 Replication approach

The project was designed foster and support the widespread adaption of renewable energy and energy efficiency in PNG through an innovative and cost efficient implementation and showcasing of RE and EE projects in combination with raising awareness (component 1), developing financial instruments (component 3) and awareness raising and capacity building (component 4). Beside that the project planned to use media channels to promote the project interventions and its benefits to the communities and the country.

According to the ProDoc the project will support replication of the project demos in all four of its components. To achieve this strong emphasis was planned to be laid on its demo provinces of Eastern Highlands Province, Milne Bay Province, and East Sepik Province as channels for achieving replication of the project demos. In that sense capacity building work with government officials in the planning, policy, and institutional component of the project takes a “learn by doing” approach in which actual pipeline projects will be the results of training, which were planned to be held also in the project partner provinces with district officials in attendance. Another key element to achieve the replication was to support the preparation of provincial level RE and EE plans, which include specific pipeline projects and funding sources for them.

Due to the (a) delay in the project, (b) lack of co-financing and (c) the impact of the measures taken to fight the COVID 19 pandemic the project was not able to replicate any of the outputs as planned.

3.1.6 UNDP comparative advantage

There is no analysis in the ProDoc of the comparative advantages of UNDP to implement this project. From the discussions with CCDA and other stakeholders it has been learned that UNDP has originally been seen as an ideal project partner working on non-grid connected RE solutions, something that has not been focused on by other donors.

On a more general level, UNDP is a power-house for the implementation of RE and EE projects with decades long track record in the Asia-Pacific region and globally. The advantage working with UNDP is also that any project can source experts and materials from the international market that are not immediately available to national stakeholders in the same way. Other donors active in the field of RE in PNG, such as the WB also do have access to this pool of experts, but most of them are on off-grid RE systems.

3.1.7 Linkages between project and other interventions within the sector

Bulk of the project activities are linked to ongoing and planned RE and EE related activities of the project partners (e.g., PPL and provincial governments). That is main reason why bulk of the co-financing of the project is from such activities. The Project also work with other UNDP projects such as the EU-funded STREIT Program. Nonetheless, the ProDoc only general linkages between the project and other interventions within the sector have been mentioned. Also, in the Inception workshop no linkages have been identified, but recommended to the project to undertake investigation

of possible linkages and synergies with other projects[3].

The PM for FREAGER also oversaw the UNDP component of the EU funded STREIT Program. That component involved the installation of solar-based power systems in public facilities in the East and West Sepik. That component was designed as a result of learning from the FREAGER Project. The PM was also involved in the USAID PNG Electrification Partnership consultations when they were designing their program in 2019. Currently the USAID PEP program show a replication of the FREAGER Project with a more elaborate set of activities.

3.1.8 Management arrangements

According to the ProDoc the PMU is established jointly by UNDP and the CCDA as implementing partner and has the role to oversee, support, administer and coordinate the implementation of the project under the guidance of the NPD. Initially it was planned that the PMU would be led by a national project manager (NPM), supported by an international technical advisor, a communications officer and a procurement and administration assistant. However, this support has not been in place and the NPM had to lead the project alone, only supported by the regular UNDP staff. Additionally support by regular personnel of CCDA and PPL to the PMU has been envisioned by the ProDoc.

As analyzed during the MTR the PMU was not set-up as planned, mainly due to lack of UNDP co-financing. In consequence the NPM only has received ad-hoc support from UNDP staff for specific tasks. The support by CCDA and PPL has been limited throughout the project lifetime. These limitations are due to (a) resource constraints and (b) lack of communication between the NPM and the CCDA and PPL staff. The later has been highlighted in the interviews with CCDA and PPL staff and it has been pointed out that the communication towards these main stakeholders was very limited and erratic.

In that sense until the end of project the established working structure between CCDA and UNDP has been assessed by CCDA and also PPL as unsatisfactory.

3.2 Project Implementation

3.2.1 Adaptive management

As per UNDP TE guideline the following conditions can be reasons for adaptive management:

1. Original objectives were not sufficiently articulated;
2. Exogenous conditions changed, due to which a change in objectives was needed;
3. Project was restructured because original objectives were overambitious;
4. Project was restructured because of a lack of progress;

During the project life-cycle three main challenges have been identified that required an action by the Project Management: The COVID 19 pandemic that had shifted PNG government short term priorities and as a consequence had a negative impact on project finance because of the resulting lack of co-funding capacity with which the project originally has been designed. Lastly, the delays and shortfalls in co-financing made the original planned 4 years project time frame to be too ambi-

[3] These are the: (a) World Bank-GEF Energy Sector Development Project; (b) IFC's multi-country Pacific Renewable Energy Generation Project; and (c) New Zealand's development of a 1 MW mini/small hydro station in PNG's Enga Province.

tious. In other words, there were too much project activities planned in a shortened implementation time frame. This topic has been highlighted by the UNDP PMU as well as other key stakeholder representatives from CCDA and PPL. In the end, the lack of time is not seen as a key problem of the project implementation, but rather the effect of the COVID 19 pandemic and the resulting lack of co-financing.

The above problems have been highlighted during the MTR, which has been completed in 2020. Actions to be taken recommended in the MTR have been initiated by UNDP to ensure a successful implementation of the project. The recommended actions included the following actions:

1. Immediate action to secure cash co-financing from all key stakeholders
2. Extend project end-date by 12 months
3. Increase capacity of the PMU
4. Improve key stakeholder engagement
5. Improve number of Project Board meetings
6. Provide support to PMU in project management and M&E
7. Reduce work input on Component 3
8. Critically review progress of mini-hydro projects

It is noted that except Recommendation 7, all other recommendations have been implemented at least partially. The reason for rejecting Recommendation 7 was that Component 3 is a very important pillar of the project and that without the completion of all interventions under it, the project would not be successful. Nevertheless, that analysis did not take into account that the lack of co-financing and the little response from the commercial banks on the idea to offer specially designed credit schemes for RE and EE projects would make it even harder to carry on the activities under Component 3. Thus, being probably the right decision at that moment in retrospect it would have been better to reduce the workload and concentrate the available resources on achievable outputs.

It must be noted that (a) no significant additional cash from co-funding could be secured, (b) the increased capacity of the PMU did not lead to a smoother and more fluid project implementation, (c) the number of PB meetings has not significantly increased and (d) the project management and M&E have not been improved significantly (e) lack of CCDA's ability to take ownership of the project. All these challenges has impacted the quality at implementation of the FREAGER project when making reference to the MTR recommendations. However, efforts were made to recruit technical personnel on numerous occasions but that did not eventuate. Instead, the project sought to build a renewable partnership program between STREIT and FREAGER which was exceptional. From the interviews conducted with the main stakeholders it could be deduced that the lack of further and more proactive stakeholder engagement has been a missing project ownership. CCDA were not supportive in the project especially with the absence of the Project Director for more than 12 months. The project is seen in CCDA and PPL not as their own project, but a project implemented by UNDP, something that has not been foreseen on the ProDoc.

Reasons for little project ownership of CCDA and PPL do have several components and have been communicated during the stakeholder interviews:

1. Internal reasons how CCDA and PPL have been involved in the project and how priority to the project have been given internally. PPL for example had experienced a shift in internal policy, which hindered the implementation of the ESCO fund;
2. Lack of funding from CCDA and PPL side, which translate to lack of funding from GoPNG

side[4]. This lack of funding led to the suspension or considerable delays in the implementation of project components;

3. Late establishment of PMU, which had a negative impact on the original momentum of the project implementation;
4. Furthermore, on a more general level UNDP has been perceived as a development partner that had little experience in the field of RE and EE technologies compared to other donors such as WB or EU[5].

The above list reflects from TE Team's point of view about some important points as seen by the main project partners that shall be taken into account. Those are also aspects that shall have been taken into account as part of the adaptive management approach to steer the project towards a path on which either the targets as set out in the Project Results Framework could have been achieved or a revision of these targets should have been made.

The perception of the PMU however is that with little response and support from CCDA the project implementation and management suffered. From CCDA side reason has been that the project has been perceived as a project implemented solely by UNDP.

3.2.2 Stakeholder participation and partnership arrangements

In terms of management arrangements, UNDP led the Project's implementation under National Implementation Modality, with CCDA as the Executing Agency, in partnership with PPL as Senior Supplier and other national stakeholders, such as NISIT, DPE (now NEA) and ICCC as implementing partners.

The Project was managed by a Project Management Unit supported by Provincial Implementation Units. Implementation was organized through one Project Management Unit at central level.

Below table provides a summary of the role and planned involvement of stakeholders identified in the ProDoc and of their actual participation in the Project.

Stakeholder	Roles and Responsibilities according to ProDoc	Actual Roles and Responsibilities
Climate Change and Development Authority (CCDA)	As lead implementing partner, leading implementation with responsibility for the achievement of overall project goals and objectives. Overall, management oversight during implementation of project activities will be undertaken by CCDA. Executive member of Project Board	Engagement via PB as well as the day-to-day operations of the project. PMU is supported by the Low Carbon and Mitigation Branch of CCDA for meetings and field missions. A lack of ongoing, continuous communication between PMU and CCDA lead to lack of project ownership by CCDA.
Papua New Guinea Power Limited (PPL)	Providing technical engineering assistance, design, development, and supervision. Provision of co-financing in	Intermittent engagement throughout project implementation. PPL has been involved with the Milne Bay solar project. Has participated in the energy efficiency audit by seconding technicians in the field to

[4] Bringing own money to a project as contribution has the potential to create ownership. Here the lack of funding from CCDA and PPL left the project as something that is implemented by UNDP (with their resources) and CCDA and PPL have communicated that the money is better invested in their other activities.

[5] Because other players in the field are seen as much more competent, so it made sense for CCDA and PPL to concentrate their limited (financial and staff) resources to those projects.

Stakeholder	Roles and Responsibilities according to ProDoc	Actual Roles and Responsibilities
	cash and in kind to support implementation of the project components, particularly the Samarai Island PV mini-grid project and Milne Bay Province replications and the East Sepik Township Energy Efficiency Programs. Member of Project Board.	work with consultant in East Sepik province. Provided oversight of the feasibility studies for mini-hydro consultancies. PPL has informed the TE Team of restructuring of the entity to unbundle its business units to now separate out generation, transmission, distribution and retailing of electricity. The above leads to delay in the establishment of an ESCO fund. Co-financing of the FREAGER project is done in-kind through the contributions made in the setup of the Samarai Solar project. Future commitments for RE is demonstrated in the 15-year Power Development Plan 2022-2038. PPL has done the implementation of the Samarai PV project by upgrading the existing Diesel powered Mini Grid. The added value of this project is however not visible to that stakeholder as it has been communicated during the TE interview. This non-recognition of the GEF contributions through the FREAGER Project is indeed a manifestation of the lack of ownership of the project by PPL, let alone the CCDA.
Department of Petroleum and Energy (DPE) (This entity as of April 2021 is now split into Department of Petroleum as one entity and the National Energy Authority the other entity).	Actively participating in project's policy related activities. Working with project-retailed consultants to develop and revise draft policies related to energy efficiency and renewable energy. Involvement in project's coordination mechanism for energy efficiency and renewable energy.	Department of Petroleum and Energy was represented at the PB Meeting nearly every year. In April 2021, the National Energy Authority Bill of 2020 was enacted and the National Energy Authority was established. The former DPE was consulted in preparation for the solar and hydro policy consultancies. The National Energy Authority is now the government agency responsible for energy related policies and regulation. The new NEA is not fully established, and this is affecting the progress of the solar and hydro policies. As of April 2022, a new Acting Managing Director was appointed to NEA and again a reshuffle of staff has occurred. Executive officers have been appointed as of June 2022. The NEA is now operational, however not fully staffed. This is affecting the processing of various pieces of regulation and policy instruments recommended by FREAGER project. The project has appointed a technical advisor to assist NEA with implementation of the different policies. An intensive engagement is planned for the months of August and September 2022.
Independent Consumer Consumption Commission (ICCC)	Participating in project activities related to developing policies for the licensing and regulation of organizations who provide power via RE mini-grids. Revising, adopting, and enforcing such policies.	ICCC had been engaged with the project on developing the Off-Grid Electricity Code in 2019 as per project document arrangements. It is also a member of the project board and actively participates at the project board. The enactment of the National Energy Authority Act and the amendments to the Electricity Industry Act, had caused uncertainty on how to progress the work on the Off-Grid Electricity Code for some time. The laws now have transferred the regulatory responsibility to the NEA from ICCC. The project continued to keep an open communication between the two government entities to ensure a smooth transition of work from ICCC to NEA for the establishment of the PNG Off-Grid Electricity Code. In

Stakeholder	Roles and Responsibilities according to ProDoc	Actual Roles and Responsibilities
		February 2022, ICCC had advised UNDP of a legal issue relating to the establishment of NEA. UNDP had sought further guidance from both NEA and ICCC on how to proceed with the development of the Off Grid Code. NEA advised that it was seeking to rectify the legal issues and clarified that the Off-Grid code be concluded as a regulation to be adopted under the National Energy Authority Act. The ICCC has not responded to the NEA stand. NEA has gone to Parliament to rectify the matter. The project continues to keep an open communication with ICCC.
Department of Public Enterprise	-	-Not required as entity no longer exist.
National Institute of Standards and Industrial Technologies (NISIT)	Serving as key project partner in RE and EE standards and certification related activities.	NISIT has always been represented on the Project Board and have provided insight on how to progress the development of energy efficiency building standards etc. It is still an important stakeholder to FREAGER. NISIT is working on adopting appropriate International Standards to compliment the National Building Energy Efficiency Code developed by FREAGER for NISIT and the Department of Works. NISIT has been very active in the development of EE building guidelines, which have been part of Component 2 activities of the project. The perception of the received results is very positive as the developed guidelines could be used directly and put into the PNG approval process for new guidelines.
Provincial Governments: Milne Bay Province, Eastern Highlands Province, East Sepik Province, and Morobe Province	Participating actively in provincial-level project activities, including capacity building, demos, and provincial level RE and EE plans. Providing co-financing to project demos located in the respective province. Supporting replication of the project demos via use of PSIP. Provision of oversight and coordination at the provincial level during implementation of project activities.	All provincial governments have identified focal points and the project is able to communicate directly with the focal points to get information on the ground. Milne Bay, East Sepik, and Eastern Highlands Provinces are represented on the PB and are active participants of the project implementation. The focal point for Morobe like others is also actively involved in other GEF and GCF funded projects with UNDP. The engagement of these stakeholders has severely suffered from connectivity to the provinces due to low internet bandwidth in the provinces. The quality of Component 1 project outputs has been received very positive by the officials of the Provincial Governments and will be incorporated into the upcoming multiyear plans.
District Administrations: Samarai Murua (Milne Bay), Daulo and Lufa (Eastern Highlands), Wewak and Maprik (East Sepik),	Supporting the project demos as needed, including making specific recommendation to the PEC to support the project via co-financing and oversight functions. Providing liaison for coordination between CCDA, PPL, the provinces, and the communities.	The Samarai-Murua District is often contacted via the Provincial Planning Office's in Milne Bay has been involved with organizing the capacity building exercise and identification of participants for the financial literacy training to develop productive use of electricity on Samarai island. In East Sepik supported the FREAGER project through its administration.

Stakeholder	Roles and Responsibilities according to ProDoc	Actual Roles and Responsibilities
Kabwum and Wasu (Morobe)		
Evangelical Lutheran Church PNG (ELC PNG)	Overseeing of the administration and management of the project initiatives in Wasu and Kabwum (Morobe Province). Participating in capacity building program in Morobe. Cooperation with the project in developing community RE mini-grid plan for the ELC. Replication of project demos.	The engagement with the Evangelical Lutheran Church of Papua New Guinea was delayed due to a late start with the capacity building program. The Morobe provincial EE and RE plan development was delayed and the ELC PNG inputs would have been useful. ELC PNG was engaged in May 2022 during a mission to Morobe Province to discuss the RE and EE Plan for the province. ELC has a dedicated arm that works on community projects especially for improving village water supplies using solar and agriculture irrigation systems in Morobe. The engagement of ELC PNG has not been further assessed.
Institute of Engineers	Facilitating verification of engineering expertise in country. Participation in project technical capacity building program. Cooperation with project in promoting the development of a corps of "honest community mini-grid" engineers who develop projects at reasonable prices (without excessive profit taking) with good quality and therefore to the benefit of the communities.	The Institute of Engineers were consulted during the various stakeholder consultation sessions for the Off-Grid Code as well as the development of the draft National Energy Efficiency road-map and building standards. The engagement of the Institute of Engineers has not been assessed in detail through interviews as there has been only limited engagement by the IP/PMU with this entity.
PNG Customs	Providing support to the project in activities related to waiving the customs tax for RE and EE related equipment imports. Cooperating with the project in ensuring that sub-standard, low efficiency equipment that does not meet required standards is effectively barred from entering the country.	The project had only little engagement with PNG Customs except during the initial policy gap analysis phase when import tariffs on renewable energy technology was reviewed. PNG Customs will need to be engaged for future standards enforcement at the borders. The engagement of PNG Customs has not been assessed in detail through interviews as there has been only limited engagement by the IP/PMU with this entity.
Incorporated Land Group (ILG) Division, Department of Lands and Physical Planning (DLPP)	Cooperating with the project in its work to develop policy and regulations for local people to set up ILGs for the purpose of developing and running community RE mini-grids.	The ILG Division of the Department of Lands and Physical Planning is yet to be engaged with by the project. They will be consulted during the external stakeholder consultation forums for the solar and hydro policies. Up to the stage of the TE, there was very limited engagement with ILG during the project implementation phase.
Department of Works and Implementation (DOWI)	Serving as a key provider to the project demos for low-cost, high quality technical services, particularly with regard to feasibility study and civil works. Participating in the project's technical capacity building on RE and EE.	DoWI were consulted during the initial stakeholder consultation for the development of the National EE road-map and the EE Building Standards. They will be owners of the EE Building Standards as they regulate the building industry. As of the time of the TE, the EE Building Standard has not been implemented yet. No further analysis on DOWI's involvement in the project has been performed.
Conservation	Participating in or provision of	CEPA has been engaged during the stakeholder

Stakeholder	Roles and Responsibilities according to ProDoc	Actual Roles and Responsibilities
and Environment Protection Authority (CEPA) (Formerly, Department of Environment and Conservation)	guidance for development of environment and social impact assessment recommended content for RE mini-grids, beginning with the project demos.	engagement for the development of the PNG Off-Grid Electricity Code. They are a key stakeholder to the development of the technical guidelines for environment that would form part of the Code. By developing the environmental technical guideline for the off-grid electricity sector, this would also improve the regulatory framework for the management of the environment in PNG which CEPA administers under the Environment Act.
Indigenous Peoples and Local Communities	The project will actively involve indigenous peoples and local communities during project implementation. Already during the PPG phase, the project has carried out consultations with the indigenous communities in villages in which the two mini-hydro stations are envisioned to be located. Before implementation of the demos, further, more detailed consultations will be carried out via the FPIC process as part of the limited, site-specific environmental and social assessments. During project implementation, indigenous peoples and local communities will be actively involved in efforts to make productive use of renewable energy to raise incomes. This will occur at both the mini-hydro and the PV mini-grid demo sites. Outreach will insure that women and other marginalized groups have ample opportunity for involvement. Lastly, local communities in the two township EE demo locales will be involved in efforts to improved household EE via refrigerator and lighting replacement.	The project has engaged with indigenous people in Milne Bay, Eastern Highlands and East Sepik provinces through the local level governments and community organizations. Further engagement will be made during the implementation of mainly component 4 activities when awareness campaigns on RE and EE are rolled out. Initial engagements for capacity building has indicated that in most communities, women requested that their trainings and meetings be held separately without men so that women can express themselves freely. Project will ensure community consultations and training are held separately for men and women to create a conducive environment for input from women and men. The engagement of indigenous, local community on Samarai Island has been minimum. This was due to the facts that (a) the PV plant was built on land made available to PPL free of cost; and (b) the implementation of the project was not interfering in a way that made other consultations necessary.

Table 2: Actual Stakeholders Involvement

3.2.3 Project Finance and Co-Finance

As per original project design the co-financing component of this project is very large and is close to 90% of the overall financing. While UNDP administered a total budget of $US 3,140,640 the parallel co-financing amount has been planned to reach $US 24,460,000.

In 2019 a multiyear budget plan has been agreed, which has been included in the Inception Report and made operational through consecutive AWP between 2018 and 2022.

Nearly since the start of the project in 2019, the COVID 19 pandemic outbreak since early 2020 curtailed progress on many of the GEF-funded project activities, more specifically the field-level un-

dertakings and engagements requiring in person interaction. Beside these operational challenges, the pandemic also had a negative impact on the budget commitment of the project partners, as the Government of PNG focused on necessary pandemic measures.

In this context the UNDP-GEF FREAGER project was not able to accelerate the project implementation nor to source key staff necessary for the implementation of the project activities stated in the ProDoc. This lack of resources led to significant delays in the project implementation.

The next chart illustrates the misalignment between the initial budget, the consecutive AWP budget, and actual expenditures, highlighted by the associated data points for 2018 to 2022.

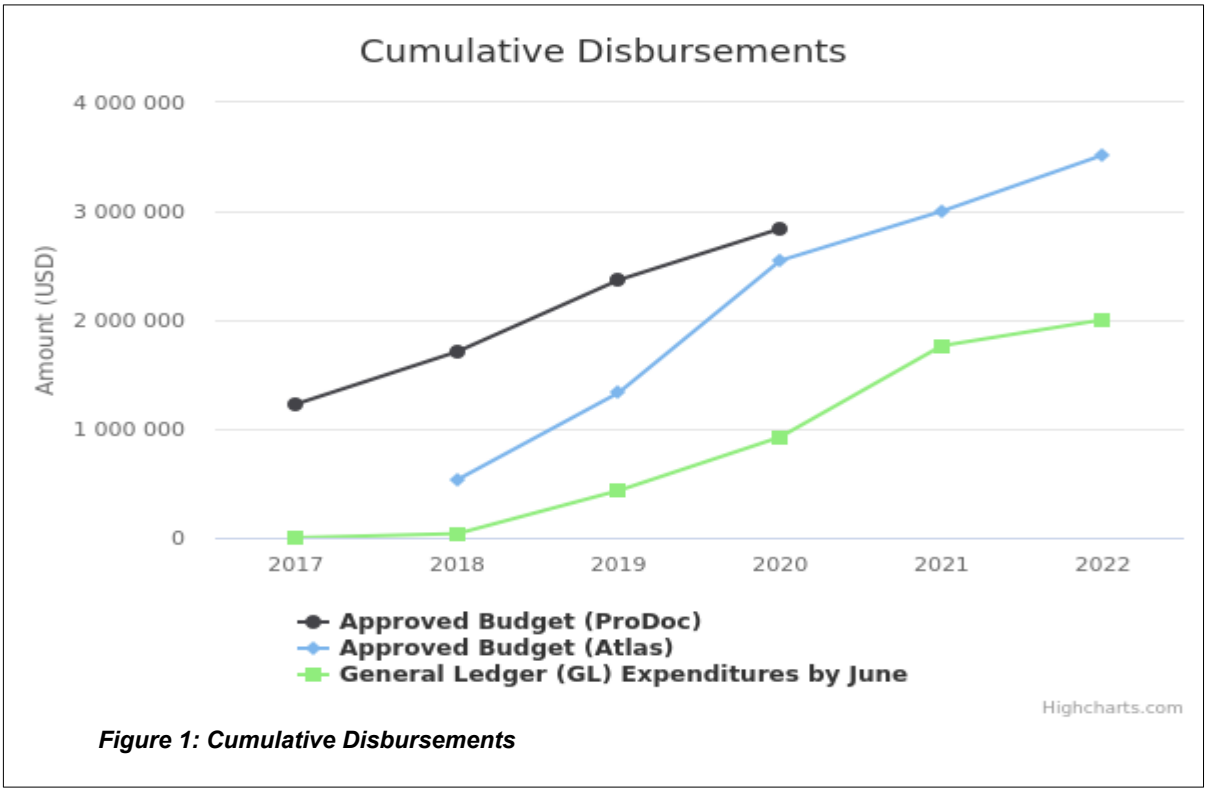

Figure 1: Cumulative Disbursements

The above chart reflects only the non-co-financed part of the budget, i.e., the GEF budget. In the chart, the late start and the difficult startup of the project can be clearly seen. As of mid-2022 only slightly less than 71% of the overall budget has been used.

3.2.4 Monitoring and evaluation design and implementation

The ProDoc describes in sufficient detail required monitoring and evaluation procedures at the project start and annual monitoring reporting requirements, periodic monitoring through site visits, mid-term, and terminal evaluation, as well as learning and knowledge sharing, and communication and visibility requirements.

Project's monitoring and evaluation plan specified responsible party, time frame and budget for each M&E activity, including technical evaluation of demonstration projects and Project Board meetings. Project Board meetings were held once or twice a year.

Formally the M&E implementation has been fulfilled. While the PM did the day-to-day project management, the PB met on a regular basis (once per year), CCDA as implementing partner provided input data to the evaluations and UNDP engaged the CO as well as its UNDP-GEF RTA. The

CCDA/PMU did monitor and report the results of the subsumed baseline/parallel activities that the project partners implemented through the corresponding GEF/UNDP templates. The project partners in charge of implementing the subsumed baseline/parallel activities of the project did submit reports of the results of their activities to the CCDA/PMU. The TE team found that the CCDA/PMU was aware that they should also monitor and report on the results of the subsumed baseline/parallel activities of the project. Project partners (co-financers) have been aware that they should also report the results of their activities to the CCDA/PMU.

The M&E budget planned sufficient funds for performing all necessary monitoring and evaluation activities. Total M&E budget was $US 349,050 USD. Project evaluation costs have not been budgeted explicitly in the Total Budget Plan & Work Plan.

Methodology on data calculations for achievements reporting and target evaluation were outlined in the ProDoc and further fine-tuned during the course of project implementation. Specific achievements were regularly reported against targets.

Project Implementation Reviews were prepared regularly. Reporting period of the PIR covers the period between the middle of the previous calendar year till the middle of current year. Latest PIRs include description of the results of activities conducted during previous PIR reporting period in the “Level at June 30” column and in the progress in the next column of “Cumulative progress”.

Monitoring of project results were developed with support of the project staff and presented regularly to main project stakeholders at Project Board meetings. Monitoring of project results was primarily based on technical analysis, monitoring methodology developed and on calculations. Monitoring thus required primarily technical expertise, rather than inclusive and participatory monitoring systems. Monitoring was primarily used for reporting.

Gender aspects and specific impacts on various social groups were not assessed in the project monitoring in detail. The reason for this is unclear though. Environmental and social risks identified in the SES were considered during project monitoring to the extent feasible for the project implementation.

PIR self-evaluation rating was consistent with both MTR and TE ratings. Both MTR and TE also include some additional findings not covered by the PIRs.

Even though recommended during the MTR, the project did hardly adjust targets and activities to the limited resources. This would have meant a revision of the project activities and outputs, focusing on key achievements thus far, in every component, rather than changing the overall strategy of the project.

The Project Board was regularly informed on project progress. Project Board was not actively involved in monitoring activities.

3.2.5 Monitoring and Evaluation Rating

Monitoring & Evaluation (M&E)	Rating
M&E design at entry	S – Satisfactory
M&E Plan Implementation	S – Satisfactory
Overall Quality of M&E	**S – Satisfactory**

Table 3: Rating of Monitoring and Evaluation

Rating	Description
6 = Highly Satisfactory (HS)	Quality of M&E design/implementation exceeds expectations and/or no shortcomings
5 = Satisfactory (S)	Quality of M&E design/implementation meets expectations and/or no or minor shortcomings
4 = Moderately Satisfactory (MS)	Quality of M&E design/implementation meets more or less the expectations and/or some shortcomings
3 = Moderately Unsatisfactory (MU)	Quality of M&E design/implementation somewhat below expectations and/or significant shortcomings
2 = Unsatisfactory (U)	Quality of M&E design/implementation below expectations and/or major shortcomings
1 = Highly Unsatisfactory (HU)	Severe shortcomings
Unable to Assess (U/A)	Available information does not allow an assessment

Table 4: Monitoring and Evaluation Rating Scale

3.2.6 Management by the UNDP Country Office

The project is implemented by the CCDA in accordance with the UNDP's National Implementation Modality (NIM), supported by a PMU sourced and paid from UNDP budget. Nevertheless, Covid restrictions forced the PMU to relocate to UNDP while the absence of the CCDA Project Director and lack of overall coordination from CCDA had negatively impacted the overall management of the project.

The project development phase lasted more than 2 years. The Project Identification Form (PIF) was GEF-approved on 21.10.2015, the Project Document was GEF CEO-endorsed on 13.06.2017 and signed by CCDA and UNDP on October 19, 2017.

Actual project implementation started after ProDoc signature. A Project Manager was recruited in June 2018, while none of the project specialists could be hired until the end of the project.

Project inception phase lasted for 19 months (October 2017 – May 2019) after ProDoc signature, which is extremely long. Final Inception Report was issued in May 2019 after the first meeting of the Project Board held on February 12, 2019.

Mid-Term Review was performed in January – May 2020, nearly three years after ProDoc signature, i.e., in the middle of planned four-years project implementation period, counted from June

2018 onward.

No Chief Technical Advisor could be hired until the end of the project despite numerous attempts made to do so. Main reason was that no adequate specialist willing to move to PNG could be identified and since early 2020 the COVID-19 induced restrictions made it impossible to hire someone.

The project faced serious delays in launching the project in general and the demonstration projects in particular due to the lack of human and financial resources on top of external factors (COVID-19 related restrictions). Consequently, and based on recommendations given during the MTR it extended for 12 months until October 20, 2022.

There was a serious delay in the preparation of the Inception Workshop as well as the Inception Report. While the first was attributed to the late setup of the PMU the later was responsibility of the PM. This delay led to further delay of the project implementation, which conducted to frustration on the partner side of UNDP.

Facing the different challenges of the project, most of the project outputs were from the activities of Component 1. Under this component, an impressive amount of (draft) policies and (draft) guidelines were produced. Some of these, such as the Off-Grid Regulation have been passed to the parliament for approval, being reported by CCDA to have the back up from all major parties. The Building EE code have been accepted by NISIT to be implemented as mandatory guideline for buildings in PNG.

Even though designed to address all 4 barriers in an integrated manner, the TE Team thinks that the barrier removal process should be done in a certain hierarchical fashion. In that view the establishment of Component 1 can be seen as more Important in the long run compared to the other barriers since the widespread application of non-grid connected RE-based power systems in PNG is influenced by supportive policies/regulations. In that regard, the TE Team consider the removal of policy/regulatory barriers as more beneficial for the further widespread use of RE and EE technologies if more focus is given to the delivery of Component 1 outputs.

3.2.7 Coordination and operational issues

There has been lack of coordination and support from the implementing agency to effectively spearhead the project as identified in the MTR as one of the main reasons for the delay in the implementation of the demos. This analysis has been confirmed during the TE.

It is also noted that the lack of coordination led to a lack of project ownership by the Implementing Partner CCDA and key Service Provider PPL.

3.2.8 Project Implementation/Oversight and Execution Rating

UNDP Implementation/Oversight & Implementing Partner Execution	Rating
Quality of UNDP Implementation/Oversight	MS – Moderately Satisfactory
Quality of Implementing Partner Execution	MS – Moderately Satisfactory
Overall quality of Implementation/Oversight and Execution	**MS – Moderately Satisfactory**

Table 5: Assessment of Project Implementation/Oversight and Execution

Rating	Description
6 = Highly Satisfactory (HS)	Quality of implementation/execution exceeds expectations and/or no shortcomings
5 = Satisfactory (S)	Quality of implementation/execution meets expectations and/or no or minor shortcomings
4 = Moderately Satisfactory (MS)	Quality of implementation/execution meets more or less the expectations and/or some shortcomings
3 = Moderately Unsatisfactory (MU)	Quality of implementation/execution somewhat below expectations and/or significant shortcomings
2 = Unsatisfactory (U)	Quality of implementation/execution below expectations and/or major shortcomings
1 = Highly Unsatisfactory (HU)	Severe shortcomings
Unable to Assess (U/A)	Available information does not allow an assessment

Table 6: Implementation/Oversight and Execution Ratings Scale

3.3 Project Results

The project has defined targeted outcomes, indicators with baselines and targets which were specified for four project components. Based on that the project achievements are evaluated against project objective and components targets as specified in a Project Results Framework, final revision after the MTR.

3.3.1 Progress towards objective and expected outcomes

Project objective and outcome level results and rating are summarized in the below table as per Log Frame Targets.

Description of Indicator	Baseline Level	End of project target level	End of project achievements	Rating	Justification
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	16,878.5	0 → Target not achieved.	HU	**Samarai Solar Project.** • During the site visit it has been checked that the Samarai Solar Project is installed and already in operation. However, the final take over and the upgrade to full capacity has not happened yet. • Thus, no GHG emission data available for this project yet. Once the final take over has taken place the GHG emission reduction shall be tracked. **Mini-hydro Projects in Eastern Highlands Province.** • During the site visits it has been confirmed that none of the two projects is installed yet. • Thus, no GHG emission data available for this project yet. Once the final take over has taken place the GHG emission reduction shall be tracked. **Energy Efficiency Retrofitting in Maprik and Wewak.** • During the site visits it has been confirmed that none of the EE Retrofits have been implemented yet. • Thus, no GHG emission data available for this project yet. Once the final take over has taken place the GHG emission reduction shall be tracked.
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	7,550 (with at least 20% woman-headed households)	0 → Target not achieved.	HU	As none of the demos sites have been installed finally and commissioned no new households have been connected to the grid or could make use of EE programs.
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	8,839,034	0 → Target not achieved.	HU	As none of the demos sites have been installed finally and commissioned no reduction in Diesel consumption could be tracked yet.

Description of Indicator	Baseline Level	End of project target level	End of project achievements	Rating	Justification
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 road-maps, including both equity and loan funding (USD)	$0.0	$20 million	0 → Target not achieved.	HU	Even though PNG Power Ltd (PPL) is developing a plan to replace diesel powered plants by solar-diesel hybrid systems this plan has not been implemented yet. The project has drafted Provincial RE & EE Plans for four provinces of East Sepik, Eastern Highlands, Milne Bay and Morobe. During the site visits and interviews it has been confirmed that all provincial governments have a great interest in implementing the proposed plans. However, all the activities have not materialized yet the planned $US 20 Mio commitment as planned originally.
Number of areas in which newly adopted policies and standards (since project launch) promote RE and EE.	0	9	9 (even though final approval pending) → Target achieved. However further follow up is needed to monitor	S	The project has made some progress in the development of new standards and policies on national as well as on provincial level. The Papua New Guinea Regulation for Small Power Systems (≤1MW) has been drafted and is according to CCDA information in the lawmaking process. Hydro policy recommendations have been drafted to be endorsed by the national parliament. Solar Policy, Solar Regulations and Rules have been developed and recommended. Even though the term gender is introduced in the Hydro as well as the Solar Policy it remains unclear how this will have practical effects on ground. No further measure in the policies to be gender sensitive are mentioned nor implemented. A National Energy Efficiency Road-map (NEER) finished the draft at end of 2021. Also, one national standard has been drafted to regulate Energy Efficient Building by NISIT and has been recommended to NEA for implementation. Provincial RE & EE Plan for East Sepik has been completed and made avail-

Description of Indicator	Baseline Level	End of project target level	End of project achievements	Rating	Justification
					able to the provincial administration. Provincial RE & EE Plan for Eastern Highlands has been completed and made available to the provincial administration. Provincial RE & EE Plan for Milne Bay has been completed and made available to the provincial administration. The Provincial Administration is committed to integrate the recommendations into the upcoming provincial government planning. Provincial RE & EE Plan for Morobe has been completed and made available to the provincial administration. All provincial RE & EE plans do have a chapter on "Gender Considerations." These chapters are only generic and do not take into account particular aspects of the environment in which they are developed.
Outcome 2A: Enhanced technical-commercial viability and capacity in the application of energy efficiency technologies and development of feasible RE-based energy systems in the country					
No. of new jobs created (or no. of new entrants in the labor force) in the RE or EE sectors in areas such as project development, engineering design, costing and business aspects, and operations and maintenance.	0	100 (of which, at least 20% are women)	2 → Target not achieved.	U	According to the project documentation there has not been a systematic assessment of the number of jobs directly created through the project activities. From the information made available it was not possible to determine how many jobs have been created. UNDP reports that it is aware of 2 persons that are now engaged in EE and RE consultant activities.
Number of cases of high quality RE mini-grid systems achieved at low end international cost benchmarks	0	12	1 → Target not achieved.	U	Samarai Island Diesel PV Hybrid plant is the only Mini-Grid that has been upgraded within the project. The Hydro Demo plants have not advanced from the Feasibility Phase yet. Reasons are that (a) COVID-19 had a huge impact on the availability of the international experts and (b) the projects needed to be designed from scratch.
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	4,650	0 → Target is not achieved.	HU	Even if considering Samarai Island Diesel-PV Hybrid station the target is not achieved.
No. of homes and other buildings that are supplied with power from RE mini-grid	0	22,500 (of which, at least	0	HU	The Samarai Diesel-PV Hybrid station is an upgrade of an existing Diesel station. Beside the existing consumers hardly any new consumers have been con-

Description of Indicator	Baseline Level	End of project target level	End of project achievements	Rating	Justification
projects that have received financing or permits		20% are owned by women)	→ Target not achieved.		nected to the existing Mini-Grid. As the Hydro Demo sites have not been installed yet no further expansion has taken place.
No. of proposed township EE programs that are financed by PPL and/or provincial governments	0	10	0 → Target not achieved.	HU	ESCO Fund could not be set up within PPL. Furthermore, the delays in the completion of supporting policies and regulatory framework and the lack of financing mechanism did not allow the implementation of the proposed township EE programs.
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	$75 million	0 → Target not achieved.	HU	No new debt and equity financing is available at this stage. Preliminary works and studies are done.
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	$10 million	0 → Target not achieved.	HU	No new debt and equity financing is available at this stage. Preliminary works and studies are done.
No. of banks or other entities (aside from donors) that are providing debt financing for community RE mini-grids and EE technology application projects in PNG	0	3	0 → Target Progress towards objective and expected outcomes not achieved.	HU	Preliminary assessment of PNG based banks has been undertaken. The conclusion from the consultations with the banks were that no specific debt financing for RE and EE measures are needed.
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	0	40	0 → Target not achieved.	HU	No data was collected on the number of RE and/or EE project developers and investors.

Description of Indicator	Baseline Level	End of project target level	End of project achievements	Rating	Justification
projects					
Number of relevant policy makers that support and endorse RE and EE initiatives in development plans	0	20	10 → Target partly achieved.	**MS**	According to the project documentation 10 policy makers do support and endorse RE and EE initiatives in development plans. The share of women and men has not been reported.
Number of manufacturers in PNG profitably producing RE and/or EE related equipment	0	5	0 → Target not achieved.	**HU**	No data has been collected to measure the achievement of this target.

Indicator Assessment Key

Green = Targets Achieved **HS, S**	Yellow = Target not achieved, some shortcoming **MS, MU**	Red = Target not achieved important shortcoming **U, HU**

Rating used

HS – Highly Satisfactory, S – Satisfactory, MS – Moderately Satisfactory, MU - Moderately Unsatisfactory, U – Unsatisfactory, HU – Highly Unsatisfactory

3.3.2 Relevance

3.3.2.1 National policies

The project and its objective are highly relevant to the top priorities of PNG as defined in the PNG National Energy Policy 2016 – 2020 and the PNG National Energy Policy 2017 – 2027. Both plans published by the Department of Petroleum and Energy underline among other topics the importance of (a) closing the gap of electrification, (b) increasing the use of abundantly available energy from renewable Energy Sources and (c) promote Energy Efficiency to save energy, but also to improve Energy Security. None of these policies is gender sensitive, but makes some general statements that gender is a dimension that needs to be considered, among others.

In that context the FREAGER project played in important role by focusing on the development of RE and EE policies hand in hand with the installation of demo projects and supporting the development of national and provincial RE and EE policies.

3.3.2.2 UNDP and GEF strategic priorities

The project is also fully in line with both, UNDP and GEF strategic priorities. The latest CPD for PNG cover the period from 2018 to 2022 and by that the whole project period. This CPD identifies the access to clean and affordable energy as one of the key development challenges for PNG and thus as one of the priorities for UNDP country program. The associated target defined in the CPD is the number of men and women benefiting from and participating in interventions related to Renewable Energy, among others.

The project addresses directly Sustainable Development Goal 7, which aims to “Ensure access to affordable, reliable, sustainable and modern energy for all”. Beside this SDG 1 (“End poverty in all its forms everywhere”), SDG 5 (“Achieve gender equality and empower all women and girls”), SDG 8 (“Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”), SDG 9 (“Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation”), SDG 10 (“Reduce income inequality within and among countries”), SDG 11 (“Make cities and human settlements inclusive, safe, resilient, and sustainable”) and SDG 13 (“Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy”) directly or indirectly through the project interventions.

The project used and included a Theory of Change (ToC). The underlying assumption is that addressing one area alone will not reliably generate progress towards the project objective, but that a multi-pronged approach will. For that reason, the project has been designed to (a) support the formulation of policies and plans, (b) to make RE and EE interventions visible through the demo sites and (c) improve financing of RE and EE by that making use of synergies between progress in these multiple areas to move the dial to a level at which substantial replication can occur.

3.3.2.3 Stakeholder engagement

The project was planned to be implemented in close cooperation between CCDA and UNDP PNG and PPL as Technology Provider. Being formulated in close collaboration with CCDA and PPL the project formulation reflected governmental strategic priorities, as well as specific needs and relevant interests of governmental stakeholders. Unfortunately, the COVID-19 pandemic and cut in funds had a huge impact on the implementation of the project and on the stakeholder engagement.

3.3.2.4 Relevance and complementarity with other initiatives

The project has been designed to build upon earlier interventions in this sector in PNG, but also to act as a forerunner in the development of the RE and EE sector in PNG. Relevant lessons learned gained from previous projects implemented in PNG and elsewhere have been taken into account in the formulation of the ProDoc and the project design.

3.3.3 Achievement of Outcomes

According to the ProDoc the following are the project outcomes:

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.

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.

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

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

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

The project yielded through its intervention the below mentioned achievements.

3.3.3.1 Outcome 1

Outcome 1 turned out to be too ambitious to be realized within the designed implementation time frame for Component 1 activities. As of per end of project, the planned national and provincial energy policies, plans and strategies have been drafted and entered into the approval process. During the evaluation, it was learned that all relevant stakeholders and decision makers are committed to put the proposed policies and plans into work. Unfortunately, as the project is coming to an end it is not possible for UNDP to assess if the outcome will be achieved by end of this project. Furthermore, it has been planned to measure government commitment on Component 1 by measuring the budget dedicated to RE and EE. Due to the delays suffered throughout the project implementation period this has not yet been achieved since the formulated and recommended policies and guidelines are not fully implemented and operational by end of project.

3.3.3.2 Outcome 2

On the one hand the project has somehow shown that technical and commercially viable solutions for the PNG context exist. On the other hand, this has been achieved only in one project demo. This is the one on the micro-hydro system at Samarai Island. The PPL has strong interest to invest in this demo, which is intended to bring down fossil fuel costs. This is the only RE mini grid demo that was completed. That of the 2 other micro-hydro mini grids demos are still pending.

The results of the demos have direct impact on the achievement of outcome 2, which is increased installed capacity of RE based power systems and implementation of viable EE technology applications in PNG. Here the conclusion is that little has been achieved so far as the demo installations are not yet done and are not operational. Also, there is no legislative or regulatory framework in place yet, which could foster the achievement of Outcome 2. Overall, it must be admitted that the

outlook is good as the project's newly developed legislation and plan do have the potential to support and catalyze the development of RE and EE projects in the country.

3.3.3.3 Outcome 3

The project has worked on the improvement of the availability of and the access to financing for renewable energy and energy efficiency initiatives in the energy generation and end-use sectors. This outcome has not been achieved so far. As of 2022, no new financing instruments nor the planned ESCO fund has been implemented yet. Some preparatory works have been undertaken, but the response from the commercial banks has not been positive on the provision of RE and EE specific financing instruments.

3.3.3.4 Outcome 4

Improvements and awareness of, attitude towards, and information about renewable energy and energy efficiency applications in the energy generation and end-use sectors have not been achieved sufficiently until the end of the project. Neither the project website is functional, nor has there been much end user communication on the project objective and outcomes. However, the government is well aware of the achievements and contributions of the project and it can be expected that this information will find its way to the general public and the end users.

3.3.4 Efficiency and (cost-)effectiveness

3.3.4.1 Efficiency

Expenditures in all four project components have been in accordance with planned budget. As of August 31, 2022, expenditures per component 1 - 4 have been 70% of component budgets as per the total budget and work plan designed in the project document.

Bearing in mind that the PMU is a one person unit comprised only of the PM and that large part of the co-financing was not available, the provided financial and human resources have been used reasonably efficiently to at least implement most of the activities under Component 1 and some of the activities under Component 2.

Expected project results on energy policy and planning, RE and EE demo sites construction and GHG savings were not fully met due to (too) aggressive project implementation schedule (highlighted also in the MTR), problems regarding lack of resources for the PMU, lower than expected committed financing by project partners and impact of COVID 19 measures, which lead to very slow implementation of the demos installation. Actual project implementation period was extended by 12 months from originally planned project termination date.

3.3.4.2 Effectiveness

The project design as well as implementation with its focus on barrier removal for the implementation of RE and EE in PNG, including technology demonstration and further replication contributed to the achievement of UNDP country program outcomes and outputs, the SDGs, the UNDP Strategic Plan, GEF strategic priorities, and national development priorities.

To a large extent, and only taking the set end of project targets, the project has not fully achieved all expected results, which has been the removal of the four identified barrier categories. The project achieved setting up new policies and regulations for Solar and Hydro Power energy, Provincial RE & EE plans and capacity building efforts that will have an impact on the RE & EE sector

in PNG in the coming years.

It should be noted that, as highlighted in the MTR, the targets set for the project outputs during project formulation have turned out to be too ambitious. Beside the problems caused by co-financing of the project, which was never fully met, a revision of these targets after the MTR or a further strengthening of the PMU would have led to better results for the project. There has been no alternative strategy identified that would deliver project's objective more effectively.

Gender responsive and human rights-based approach was incorporated into the project design and its implementation. The project is considered to have a general, unspecific gender perspective and focus on (energy) equality, empowerment of women, and human rights. However, as the demo installations has not reached a level other than purely technical, for which gender and vulnerable groups consultations have happened. For the Samarai Island Project no gender specific analysis has been done.

3.3.5 Overall Outcome Rating

Assessment of Outcomes	Rating
Relevance	S – Satisfactory
Effectiveness	MS – Moderately Satisfactory
Efficiency	MS – Moderately Satisfactory
Overall Project Outcome Rating	**MS – Moderately Satisfactory**

Table 7: Assessment of Overall Outcome Rating

Rating	Description
6 = Highly Satisfactory (HS)	Level of outcomes achieved clearly exceed expectations and/or no shortcomings
5 = Satisfactory (S)	Level of outcomes achieved meet expectations and/or no or minor shortcomings
4 = Moderately Satisfactory (MS)	Level of outcomes achieved meet more or less the expectations and/or some shortcomings
3 = Moderately Unsatisfactory (MU)	Level of outcomes achieved somewhat below expectations and/or significant shortcomings
2 = Unsatisfactory (U)	Level of outcomes achieved below expectations and/or major shortcomings
1 = Highly Unsatisfactory (HU)	Negligible level of outcomes achieved and/or there were severe shortcomings
Unable to Assess (U/A)	Available information does not allow an assessment

Table 8: Outcome Ratings Scale - Relevance, Effectiveness, Efficiency

3.3.6 Country ownership and mainstreaming into government systems

This project has a rather weak country ownership. This can be seen by the lack of funding of demo projects that has not materialized in large part during project implementation period. On the other

hand, the softer interventions in terms of policy development and drafting of guidelines showed a rather strong country ownership as the policymakers and stakeholders in PNG did become active drivers of the development of those policies and regulations.

Especially the drafting of the provincial RE and EE plans have involved the provincial and national government and administration. As it has been witnessed during the site visits and the interviews with national and provincial stakeholders the implementation of RE and EE measures, understood as a cross sectional topic for the administration has yet been achieved.

3.3.7 Gender equality and women's empowerment

The ProDoc laid a focus on gender topics and defined a high minimum participation of women in the different activities and interventions. For the indicators gender sensitive, sex-disaggregated indicators have been defined. Unfortunately, none of the outcomes that have sex-disaggregated indicators have achieved their end of project targets so far.

Furthermore, it has been assessed whether the participation of women in the trainings has been measured. This was not done. Hence, no evaluation of gender specific impacts was possible. Also, no assessment impact of the project on gender equality, e.g., the level of women and other vulnerable groups access to RE, reduction of time poverty, use the energy to unlock economic opportunities to access income and employment have been possible as the Hydro demos are not built yet and on Samarai Island such data has not been raised, nor has it been possible to raise these data during the TE. The policies developed do address in general terms the needs of women and men in the energy sector, but do not derive any particular actions from this.

3.3.8 Sustainability of Project Results

The sustainability of projects has different dimensions. GEF recommends to assess the following aspects of sustainability: financial, socioeconomic, institutional framework and governance and environmental sustainability.

3.3.8.1 Financial sustainability

This project as originally planned with a budget of over $US 27 Mio. The GEF Trust Fund and UNDP contribution is US 3.1 Mio and the parallel co-financing is $US 24.5 Mio from PPL and CCDA as Service Provider and Implementation Partner and also from the provincial governments. Even though committed through official letters nearly no co-financing has been materialized until the end of the project due to several factors.

Given the fact that up to date only around $US 2.0 Mio. of committed co-financing materialized, it is highly unlikely that financial resources will be available after project termination. However, PPL stated that there is a significant large interest in further investing in RE resources and also to finalize the two hydro demos .

3.3.8.2 Socioeconomic sustainability

There were no socioeconomic risks identified that would undermine the longevity of project results. The importance of implementation of RE and EE solutions is mainstream among all stakeholders and deeply implemented into government policy and actions of main stakeholders in the field. Main indicator for this assessment is that the RE and EE policies are on the way to be approved by the parliament and that PPL itself is planning to use RE Mini-Grid technologies to meet the require-

ment of 70% of households electrified by 2030.

3.3.8.3 Institutional framework and governance sustainability

The newly developed regulatory framework on RE and EE is expected to strengthen replication of project results. Mechanism for technical knowledge transfer and dissemination, as well as for institutional strengthening has been established (training of experts, curricula for students). However, the need for information and knowledge dissemination and for capacity strengthening is a long-term multi-source process. Thus, one cannot expect that with some mechanisms in place the country-wide need for capacity and institutional strengthening and information and knowledge dissemination could be fully saturated.

Project results are on the way to be incorporated into the provincial planning. These plans have been drafted as one of the activities by the project and are about to be incorporated into provincial planning for the upcoming years.

3.3.8.4 Environmental sustainability

There have been no environmental factors identified that could undermine future flow of project benefits, including environmental ones. This applies despite the fact that climate change, including higher temperatures and lower water availability impose significant risk to the hydro demo stations in PNG. The project and its results will, because of its nature, always decrease this negative impact of climate change by reducing the amount of GHG that will be emitted.

There have been no probable factors identified that would pose a threat to a long-term sustainability and replication of project outcomes. The scope of replication might vary depending on various factors, but it is not expected that replication itself would be affected. Insufficient maintenance of demonstration projects might potentially undermine long-term results of demonstration projects, but not the overall replication.

3.3.9 Overall Sustainability Rating

Sustainability Dimension	**Rating**
Financial	MU – Moderately Unlikely
Socioeconomic	ML – Moderately Likely
Institutional framework and governance	L – Likely
Environmental	L – Likely
Overall likelihood	**ML – Likely**

Table 9: Likelihood of Sustainability

Rating	Description
4 = Likely (L)	Negligible risks to sustainability
3 = Moderately Likely (ML)	Moderate risks to sustainability
2 = Moderately Unlikely (MU)	Significant risks to sustainability
1 = Unlikely (U)	Severe risks to sustainability
Unable to Assess (U/A)	Unable to assess the expected incidence and magnitude of risks to sustainability

Table 10: Sustainability Ratings Scale

3.3.10 Catalytic effect and impacts

The project has a scaling up catalytic effect in development of methodologies for RE and EE planning and efficient regulations that have been adopted and legally required on a national level.

4 Main Findings, Conclusions, Recommendations & Lessons

4.1 Main Findings

The FREAGER project strategy has been the multi-pronged barrier removal for the implementation of RE and EE in PNG. The objective was to Facilitate Renewable Energy & Energy Efficiency Applications for Greenhouse Gas Emission Reduction in PNG. The project focused, in line with country priorities, on energy efficiency, renewable energy to achieve nationwide electrification, save fossil fuels and ultimately reduce GHG emissions. The project approach was the removal of identified barriers that hinder the widespread implementation of RE and EE solutions in PNG.

The TE included desktop review of the provided documents, interviews with the project stakeholders and site visits to the provinces that benefited from the project.

4.1.1 General

All interviewed persons at CCDA, PPL and NISIT concluded that the project has been well designed and raised the right questions, correctly analyzing what the multi-pronged barriers are to be removed to enable the widespread applications of non-grid connected RE-based power generation and in the application of EE technologies in the country's energy end-use sectors.

What the project achieved was able to deliver in terms of analysis, papers, workshops, or demo installations, these have been received very positively. The high quality of the studies and guidelines sourced through UNDP has been recognized as a positive impact for the country.

For accountability purposes, criticism on the project have been raised by nearly all stakeholders. Lack of fluid and continuous communication has been highlighted during nearly all interviews and is something that shall be critically assessed by UNDP PNG. It has been recognized by the interview partners that the COVID 19 measures made it extremely difficult for the PM to maintain contact with them, however it has been highlighted that a more fluid communication would have been possible even under these difficult conditions.

Late establishment of PMU, lack of experience of the PM and the lack of human resources in the PMU also contributed to a work overload of the PMU despite efforts made to recruit key technical personnel. Instead of having a PMU composed of four professionals (a Project Manager, an International Technical Advisor, a Communications Officer and a Project Administration, Finance, and Procurement Officer) the project built a renewable partnership program between STREIT and FREAGER which was exceptional with support from UNDP country office and the project partners CCDA and PPL. In part this has been implemented by concentrating on activities which could be implemented by UNDP alone such as the trainings and the development of studies. This TE acknowledged that UNDP made attempts to recruit the specified personnel but that did not eventuate.

The selected indicators have been assessed as SMART. Nevertheless, it turned out during the TE that the targets have been set too ambitious for the envisioned time frame. Especially for the installation of the demos the time planned has been set too short. Again COVID 19 measures played an important role here, but also a very optimistic time frame, especially for the installation of the Mini Hydro demos, something that is even under ideal conditions challenging.

4.1.2 Component 1

In Component 1 most of the activities have been implemented having produced as outputs (1) a draft Building Energy Efficiency Code, handed over to NISIT, (2) a gap analysis for the hydro policy as well as a (3) concept note on policy, regulation and implementation, a proposal for Off-Grid regulation, which NEA is developing further and putting it into the regulatory process, a (4) proposal for a Solar Policy and (5) the provincial RE and EE plans.

Especially during the interview with NISIT, it has been learned that the developed guidelines dealing with EE measures such as building codes and measures to make efficient use of electricity are seen to have high quality and will be integrated into the set of standards in use in PNG.

The Renewable Energy and Energy Efficiency Plans have been received well in the provincial governments of Eastern Highlands, East Sepik, and Milne Bay. The developed plans, although still draft, are seen as a useful instrument for the energy development plans of the provinces.

With these analysis, guidelines, and regulations in hand the project has contributed significantly to the PNG Off Grid and EE development of the country. In the ProDoc Component 1 has been deigned to remove Policy, Planning and Institutional Barrier and the activities under Component 1 have been designed to achieve this goal.

As per ProDoc the project supported development of the above mentioned guidelines and regulations, so that at least part of the barrier removal has succeeded and the final removal of barrier has been initiated and depends on the approval of the policies, guidelines, and regulations. These outputs of the project have been well received by NEA and NISIT as main clients of these products. Ultimately the project had planned to have the guidelines and regulations passed the corresponding approval processes by end of the project, something that has not been achieved yet, but has a positive outlook to happen in the near future.

4.1.3 Component 2

With regards to Component 2 only the PV-Diesel Hybrid System has been operational at the time of the TE. For the Mini Hydro systems in East Sepik and Eastern Highlands have reached Feasibility Study level only at this point. For the implementation of the PV-Diesel Hybrid System on Samarai Island the project benefited from PPL commitment and the clear cost benefit of the proposed solution as being the PV generated electricity less expensive than the Diesel generated one and by that reducing PPL losses on Samarai Island.

On the beneficiary level, especially at Samarai Island some success stories have been reported. As an obvious result the technical staff met at the Diesel Power Station assumed that the fuel consumption and in consequence the CO_2 emissions will dramatically drop. All people met on the island also reported to be happy that the noise level has significantly dropped as the Diesel Generators are only connected in case the PV-Battery system is not able to deliver sufficient energy. In terms of economic benefit, it has been mentioned that some islanders have established new business, offering refrigerating services to fishermen, so the fish can be kept during longer hours fresh. The community administration on Samarai Island also reported that there is an increasing interest from the neighboring islands to implement a similar system on those islands too.

For East Sepik and Eastern Highlands no such success stories could be collected as the implementation of the Mini-Hydro plants have not happened yet.

As per ProDoc, the project strategy to achieve its objective, thereby on contributing to the achievement of its ultimate goal is GHG emission reduction in PNG from the energy production and energy end use sectors in PNG. The key components of this component have been among other trainings, development of business plans and the installation of demos to demonstrate the technical and commercial viability of RE and EE solutions. Especially the installation of the demos suffered from the COVID 19 induced limitations, lack of co-financing from project partners and lack of project ownership of key stakeholders had a negative impact on the implementation of this component.

In that sense this barrier has not been entirely removed. Trainings and theoretical and some practical knowledge has been built, but not at a sufficient level to consider that this barrier has been removed.

4.1.4 Component 3

The implementation of this component has suffered severely from a change in PPL policy, lack of funding from the GoPNG as consequence of the COVID 19 pandemic and little interest by Commercial Banks in offering RE and EE specific financing instruments. Thus, as per end of the project only some concept notes exist.

Here the removal of Financing barrier has not been achieved as no financing instruments could be established. Reasons are again the limitations introduced by the COVID 19 pandemic and the lack of co-financing, which is also linked to the effects of the COVID 19 pandemic.

4.1.5 Component 4

Under Component 4 very little visible to the public has been implemented by the project. While most of the workshops and seminars have been conducted the website is still not filled with useful information as planned and the planned multi-channel media campaign did have only a few activities until now.

In that sense the removal of barrier is only partly achieved through trainings and workshops, while the widespread dissemination of information is still lacking.

4.2 Conclusions

Despite significant delays in the formation of the PMU the project has delivered some key deliverables, which are an important contribution to the barrier removal for the implementation of RE and EE techniques into PNG.

As the project has been designed to remove key barriers for the widespread use of RE and EE in PNG the project has succeeded in the removal of barriers related to policies, guidelines, and standards, which have either not been in place before the start of the project or have been at a very premature state. In that sense the project has contributed to remove one barrier, which has been seen by the TE team as one of the key barriers as removing this barrier (together with the financial barrier) has the potential to push the implementation of RE and EE in PNG.

With regards to Commercial and Technical Viability the project has at least partly not been able to remove that barrier. While the tools for Commercial and Technical Viability have been delivered in part, large portion of the demos are still not installed and even far from entering into operative

stage. This is something that UNDP PNG shall analyze internally and derive lessons learned for future projects as delays in project implementations is something that the project management needs to deal with.

The project has not been able to remove the barrier to the Financing of RE and EE yet. Factors include the lack of funding from GoPNG, lack of interest from commercial banks and change in PPL policy.

The removal of barrier to the Information and Awareness has been partly successful. While trainings and workshops have been delivered and stakeholders see RE and EE solutions as viable the multi-channel media campaign has not happened at a level as expected. Furthermore, the website is not filled with information yet, so the dissemination of results is not happening to the wider public as expected.

The lack of project ownership as communicated by the stakeholders is something worrying, especially as the project has been originally pushed by CCDA, NISIT and NEA staff and in the beginning seen as their project, but lost ownership after the start of the project. Here UNDP shall do a critical assessment how to maintain project ownership for the good of the country and its development.

The analysis of the findings clearly shows that the overall project outcome rating is MU – Moderately Unsatisfactory.

4.3 Lessons Learned

- The envisioned barrier-removal for RE and EE technologies is a complex process that requires a project team (i.e., project management unit) that is comprised of personnel with strong management skills and a strong organization to support the team to implement the project and achieve the project objective. Thus, for such a large project like FREAGER, it must be assured by the management that the contracted staff do have the required skills and knowledge. Availability of this staff to form the PMU is key and has been the core problems for the project.

- Timely establishment of the PMU is key to take advantage of the high motivation of all stakeholders at the beginning of the project.

- High level of co-financing does bear the risk for non-landing of that commitment. Even though identified in the risk assessment in the ProDoc the project could not assure the co-financing. This situation needs to be handled by stakeholders of the project by either adjusting the project targets to the available budget by cutting down activities for which no funding is available or by finding alternative funding through other donors to achieve the planned targets. The proposed and implemented mitigation measures have been high level liaison with the stakeholders CCDA, PPL and the provincial governments. This has turned out not to be sufficient to ensure the corresponding co-financing level.

- Such ambitious projects, like the FREAGER Project do benefit from highly qualified international experts with practical experience in relevant fields. The selection of proper experts and their involvement are essential for a successful know-how transfer, especially in projects with a strong focus on application of best international practices.

- Even though COVID 19 had a serious impact constant communication with the key implementation partner is vital on a weekly or day to day basis to ensure accountability and smooth implementation of the project deliverables. This shall also include that the PM must be physically located at the Implementation Partners office as foreseen in the ProDoc.

4.4 Recommendations

# of Rec.	TE Recommendation	Responsibility	Time-frame
A	**Category 1: Immediate for PMU**		
A.1	Engage with the Implementing Partner CCDA on how to continue the implementation of the procedures, policies to support the sustainability of the results and to assure that the barrier removal achieved persists in time.	PMU	ASAP
A.2	Follow up with the project partners on the implementation of the developed guidelines and policies.	PMU	ASAP
A.3	Provide Lessons Learned Report based on TE report and own feedback from stakeholders.	PMU	ASAP
A.4	As part of Lessons Learned to be developed, structure the information also in a brief, easy to read summary information on benefits of each demonstrated technology.	PMU	ASAP
A.5	Assess with stakeholders what have been the Lessons Learned from their side and how future collaboration can be improved.	PMU	ASAP
A.6	Assess how the remaining funds can be spend during the wind down period for project activities if possible.	PMU	ASAP
A.7	Populate the existing website under the UNDP parent website with relevant project information.	PMU	ASAP
B	**Category 2: Follow-up for UNDP CO**		
B.1	The high dependency on co-financing for the achievement of the targets as set in the project results framework turned out to be a bottleneck for the project. Thus, UNDP CO should assess GoPNG commitment and capabilities for co-financing.	UNDP CO	No time-frame
B.2	The project relied for good reasons largely on international staff to be hired, especially to bring in international best practice and build capacities in PNG. However, in some cases it has not been possible to source this staff, for which as a last resort UNDP CO shall assess if that staff can be sourced nationally to cover at least part of the profile.	UNDP CO	No time-frame
B.3	It has been seen during the TE that even though large delays happened, little has been changed in the implementation plan. Here the use Critical Path Method[6] for design and timely implementation of projects could be used more frequently to identify and remove possible bottlenecks.	UNDP CO	No time-frame
B.4	Assure that the PMU is located physically at the IP office if agreed in the ProDoc	UNDP CO	No time-frame

[6] A Critical Path Method identifies activities that, if delayed, would delay the entire project. It is a project management technique used to create a project schedule. It is also used continuously to adjust the implementation schedule as the critical path might change during project implementation.

# of Rec.	TE Recommendation	Responsi-bility	Time-frame
C	**Category 3: For UNDP/GEF**		
C.1	Consider recommendation/requirement to use a Critical Path Method in project design and implementation of GEF- financed projects[7].	UNDP	No time-frame

[7] In the TE Team's opinion, finish this project and start an entirely new one. Maybe taking the outcomes of Component 1 as a basis and build demos following the implemented standards and guidelines.

5 Annex

Annex 1 ToR of the Terminal Evaluation

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.

The project has the following Goal, Objective and Outcomes:

Goal: Reduction in Green House Gas emissions from the energy production and energy end use sectors in PNG

Objective: Enabling the application of feasible renewable energy and energy efficiency technologies for achieving greenhouse gas emission reduction in PNG.

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.

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.

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

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

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

3. TE PURPOSE

The TE report will assess the achievement of project results against what was expected to be achieved and draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming. The TE report promotes accountability and transparency and assesses the extent of project accomplishments.

The TE is also being conducted to document best practices, challenges and capacities that are at hand and that are missing that can inform UNDP CO Programing going forward. The UNDP CO Management and the Implementing Partner/Executing Agency will act on the TE Results. The TE is in line with the UNDP PNG's current evaluation plan.

The TE will assess project performance against expectations set out in the project's Logical Framework/Results Framework (see ToR Annex A). The TE will assess results according to the criteria outlined in the Guidance for Terminal Evaluations of UNDP-supported GEF-financed Projects.

4. TE APPROACH & METHODOLOGY

The TE report must provide evidence-based information that is credible, reliable, and useful. All relevant evidentiary documents must be presented/provided to the TE evaluators to confirm the reported results of the project's baseline/co-financed and incremental activities, delivery of agreed component outputs and levels of achievement of the end-of-project targets of the objectively verifiable indicators that are set out in the project results framework (log frame). It is important to also provide explanations/justifications of the attribution of any indirect results (e.g., energy savings, GHG emission reductions, etc.) of parallel/associated activities of the project. In this regard, the TE Team must state in the TE report if the team has checked, evaluated, verified and confirmed all the evidentiary documents during the terminal evaluation and provide comments regarding, and where necessary, pertinent recommendations to improve, the credibility, reliability and usefulness of such documents.

The Project Management Office/Unit and the commissioning UNDP country office must provide all relevant sources of information including documents prepared during the preparation phase (i.e. PIF, UNDP Initiation Plan, UNDP Social and Environmental Screening Procedure/SESP) the Project Document, project reports including annual PIRs, project budget revisions, lesson learned reports, national strategic and legal documents, and any other materials that the team considers useful for this evidence-based evaluation. The TE team shall review all of these sources of information, including the baseline and midterm GEF focal area Core Indicators/Tracking Tools submitted to the GEF at the CEO endorsement and midterm stages and the terminal Core Indicators/Tracking Tools that must be completed before the TE field mission begins.

The TE team is expected to follow a participatory and consultative approach ensuring close engagement with the Project Team, government counterparts (the GEF Operational Focal Point), Implementing Partners, the UNDP Country Office(s), the Regional Technical Advisor, direct beneficiaries and other stakeholders.

Engagement of stakeholders is vital to a successful TE. Stakeholder involvement should include interviews with stakeholders who have project responsibilities, including but not limited to UNDP PNGCO Management, Climate Change Development Authority and PNG Power Limited; the executing agencies, senior officials and task team/component leaders, key experts and consultants in the subject area, Project Board, project beneficiaries, academia, local government and CSOs, etc. Additionally, the TE team is expected to conduct field missions to *Alotau in the Milne Bay Province, Goroka in Eastern Highlands Province and Wewak in East Sepik Province* , including the following project sites namely Samarai Island, Gotomi, Miruma and Maprik.

The specific design and methodology for the TE should emerge from consultations between the TE team and the above-mentioned parties regarding what is appropriate and feasible for meeting the TE purpose and objectives and answering the evaluation questions, given limitations of budget, time and data. The TE team must use gender-responsive methodologies and tools and ensure that gender equality and women's empowerment, as well as other cross-cutting issues and SDGs are incorporated into the TE report.

The final methodological approach including interview schedule, field visits and data to be used in the evaluation must be clearly outlined in the TE Inception Report and be fully discussed and agreed between UNDP, the Implementing Agencies, stakeholders and the TE team.

The final report must describe the full TE approach taken and the rationale for the approach making explicit the underlying assumptions, challenges, strengths and weaknesses about the methods and approach of the evaluation.

- Since the FREAGER Project strategy is barrier removal, one of the main conclusions of the TE must be on the extent of barrier removal that the Project has achieved. Explain in detail (based on the project results) for each project component of the barrier(s) is/are removed, and to what extent the barrier removal was achieved.
- Recommendations should provide concrete, practical, feasible and targeted recommendations directed to the intended users of the evaluation about what actions to take and decisions to make. The recommendations should be specifically supported by the evidence and linked to the findings and conclusions around key questions addressed by the evaluation.
- The TE report should also include lessons that can be taken from the evaluation, including best practices in addressing issues relating to relevance, performance and success that can provide knowledge gained from the particular circumstance (programmatic and evaluation methods used, partnerships, financial leveraging, etc.) that are applicable to other GEF and UNDP interventions. When possible, the TE team should include examples of good practices in project design and implementation.
- It is important for the conclusions, recommendations and lessons learned of the TE report to incorporate gender equality and empowerment of women.

The TE report will include an Evaluation Ratings Table, as shown below:

ToR Table 2: Evaluation Ratings Table for Facilitating Renewable Energy and Energy Efficiency Applications for Greenhous Gas Emission Reduction

Monitoring & Evaluation (M&E)	Rating[1]
M&E design at entry	
M&E Plan Implementation	
Overall Quality of M&E	
Implementation & Execution	Rating
Quality of UNDP Implementation/Oversight	
Quality of Implementing Partner Execution	
Overall quality of Implementation/Execution	
Assessment of Outcomes	Rating
Relevance	
Effectiveness	
Efficiency	
Overall Project Outcome Rating	
Sustainability	Rating
Financial resources	
Socio-political/economic	
Institutional framework and governance	
Environmental	
Overall Likelihood of Sustainability	

[1] Outcomes, Effectiveness, Efficiency, M&E, Implementation/Oversight & Execution, Relevance are rated on a 6-point scale: 6=Highly Satisfactory (HS), 5=Satisfactory (S), 4=Moderately Satisfactory (MS), 3=Moderately Unsatisfactory (MU), 2=Unsatisfactory (U), 1=Highly Unsatisfactory (HU). Sustainability is rated on a 4-point scale: 4=Likely (L), 3=Moderately Likely (ML), 2=Moderately Unlikely (MU), 1=Unlikely (U)

5. DETAILED SCOPE OF THE TE

The TE will assess project performance against expectations set out in the project's Logical Framework/Results Framework (see ToR Annex A). The TE will assess results according to the criteria outlined in the Guidance for TEs of UNDP-supported GEF-financed Projects Guidance for Terminal Evaluations of UNDP-supported GEF-financed Projects.

The Findings section of the TE report will cover the topics listed below. A full outline of the TE report's content is provided in ToR Annex C.

The asterisk "(*)" indicates criteria for which a rating is required.

Findings

i. Project Design/Formulation

- National priorities and country driven-ness
- Theory of Change
- Gender equality and women's empowerment
- Social and Environmental Standards (Safeguards)
- Analysis of Results Framework: project logic and strategy, indicators
- Assumptions and Risks
- Lessons from other relevant projects (e.g. same focal area) incorporated into project design
- Planned stakeholder participation
- Linkages between project and other interventions within the sector
- Management arrangements

Evaluate whether the project design (e.g., approach, activities and outputs) was adequate/sufficient and appropriate to achieve the project objective and outcomes that were set out in the project results framework.

ii. Project Implementation

- Adaptive management (approved changes to the project design and project outputs during implementation, whether such changes were adequately and properly implemented, and impacts/results of the implemented changes)
- Actual stakeholder participation and partnership arrangements (in addition, also cite issues/challenges encountered, impacts of such issues/challenges on project implementation and results; and the resolution of these)
- Project Finance and Co-finance (evaluate actual project financing, actual realization of committed co-financing, and any leveraged financing – provide evidentiary documents to support the evaluation)
- Monitoring & Evaluation: design at entry (*), implementation (*), and overall assessment of M&E (*)
- Implementing Agency (UNDP) (*) and Executing Agency (*), overall project oversight/implementation and execution (*)
- Risk Management, including Social and Environmental Standards (Safeguards)

Evaluate whether the actual project implementation did or did not facilitate the provision of the necessary resource inputs for the implementation of project activities and the delivery all the required project outputs.

iii. Project Results

- Assess the achievement of outcomes against indicators by reporting on the level of progress for each objective and outcome indicator at the time of the TE and noting final achievements.
  Evaluate the following: (a) whether all the approved project outputs were delivered. These include outputs in the original project design and other approved outputs that were included based on adaptive management; (b) how these outputs contributed to the achievement of the end-of-project targets of the project; and (c) actual resource inputs that were utilized to deliver each output.
- Evaluate the results of the project activities (i.e., GEF-funded and baseline/co-financed activities that were carried out by project partners) that are contributing towards the end-of-project target of the objective indicator and each outcome indicator. This may also include monitored results from indirect activities that were facilitated, enabled or influenced by the FRAGER Project's activities. The relevant evidentiary documents on these activities must be evaluated to verify and confirm potential attribution of the results to the FREAGER Project.
- Relevance (*), Effectiveness (*), Efficiency (*) and overall project outcome (*) - For "effectiveness", evaluate to what extent the barriers that the project is designed to remove were actually removed.
- Sustainability: financial (*) , socio-political (*), institutional framework and governance (*), environmental (*), overall likelihood of sustainability (*) – For overall likelihood of sustainability, evaluate whether the removed barriers will recur or not, and suggest ways of ensuring that the removed barriers will not recur.
- Country ownership
- Gender equality and women's empowerment
- Cross-cutting issues (poverty alleviation, improved governance, climate change mitigation and adaptation, disaster prevention and recovery, human rights, capacity development, South-South cooperation, knowledge management, volunteerism, etc., as relevant)
- GEF Additionality
- Catalytic Role / Replication Effect
- Progress to impact

One important issue that must be considered in the reported results that are contributing to the achievement of the project targets is their attribution to the FREAGER Project. Make sure that all declared results are attributable to the Project. Where necessary, explain the attribution or non-attribution.

Main Findings, Conclusions, Recommendations and Lessons Learned

- The TE team will include a summary of the main findings of the TE report. Findings should be presented as statements of fact that are based on analysis of the data, and evidentiary documents. One important issue that must be considered in the reported results that are contributing to the achievement of the project targets is their attribution to the FREAGER Project. Make sure that all declared results are attributable to the Project. Where necessary, explain the attribution or non-attribution.
- The section on conclusions will be written in light of the findings. Conclusions should be comprehensive and balanced statements that are well substantiated by evidence and logically connected to the TE findings. They should highlight the strengths, weaknesses and results of the project, respond to key evaluation questions and provide insights into the identification of and/or solutions to important problems or issues pertinent to project beneficiaries, UNDP and the GEF, including issues in relation to gender equality and women's empowerment.

- Since the FREAGER Project strategy is barrier removal, one of the main conclusions of the TE must be on the extent of barrier removal that the Project has achieved. Explain in detail (based on the project results) for each project component of the barrier(s) is/are removed, and to what extent the barrier removal was achieved.
- Recommendations should provide concrete, practical, feasible and targeted recommendations directed to the intended users of the evaluation about what actions to take and decisions to make. The recommendations should be specifically supported by the evidence and linked to the findings and conclusions around key questions addressed by the evaluation.
- The TE report should also include lessons that can be taken from the evaluation, including best practices in addressing issues relating to relevance, performance and success that can provide knowledge gained from the particular circumstance (programmatic and evaluation methods used, partnerships, financial leveraging, etc.) that are applicable to other GEF and UNDP interventions. When possible, the TE team should include examples of good practices in project design and implementation.
- It is important for the conclusions, recommendations and lessons learned of the TE report to incorporate gender equality and empowerment of women.

The TE report will include an Evaluation Ratings Table, as shown below:

ToR Table 2: Evaluation Ratings Table for Facilitating Renewable Energy and Energy Efficiency Applications for Greenhous Gas Emission Reduction

Monitoring & Evaluation (M&E)	Rating[1]
M&E design at entry	
M&E Plan Implementation	
Overall Quality of M&E	
Implementation & Execution	Rating
Quality of UNDP Implementation/Oversight	
Quality of Implementing Partner Execution	
Overall quality of Implementation/Execution	
Assessment of Outcomes	Rating
Relevance	
Effectiveness	
Efficiency	
Overall Project Outcome Rating	
Sustainability	Rating
Financial resources	
Socio-political/economic	
Institutional framework and governance	
Environmental	
Overall Likelihood of Sustainability	

[1] Outcomes, Effectiveness, Efficiency, M&E, Implementation/Oversight & Execution, Relevance are rated on a 6-point scale: 6=Highly Satisfactory (HS), 5=Satisfactory (S), 4=Moderately Satisfactory (MS), 3=Moderately Unsatisfactory (MU), 2=Unsatisfactory (U), 1=Highly Unsatisfactory (HU). Sustainability is rated on a 4-point scale: 4=Likely (L), 3=Moderately Likely (ML), 2=Moderately Unlikely (MU), 1=Unlikely (U)

6. TIMEFRAME

The total duration of the TE will be approximately *35 Working days* over a time period of 8 weeks starting on 01 August 2022. The tentative TE timeframe is as follows:

Timeframe	Activity
28 February 2022	Application closes
28 March 2022	Selection of TE team
25 July 2022	Preparation period for TE team (handover of documentation)
01 August 2022 - 4 days	Document review and preparation of TE Inception Report
05 August 2022(2 days)	Finalization and Validation of TE Inception Report; latest start of TE mission
09 August 2022 (10 days)	TE mission: stakeholder meetings, interviews, field visits, etc.
23 August 2022	Mission wrap-up meeting & presentation of initial findings; earliest end of TE mission
25 August 2022 (05 days)	Preparation of draft TE report
01 September 2022	Circulation of draft TE report for comments
08 September 2022	Incorporation of comments on draft TE report into Audit Trail & finalization of TE report
12 September 2022	Preparation and Issuance of Management Response
14 September 2022	Concluding Stakeholder Workshop (optional)
23 September 2022	Expected date of full TE completion

Options for site visits should be provided in the TE Inception Report.

7. TE DELIVERABLES

#	Deliverable	Description	Timing	Responsibilities
1	TE Inception Report	TE team clarifies objectives, methodology and timing of the TE	No later than 2 weeks before the TE mission: 05 August 2022	TE team submits Inception Report to Commissioning Unit and project management
2	Presentation	Initial Findings	End of TE mission: 23 August 2022	TE team presents to Commissioning Unit and project management
3	Draft TE Report	Full draft report *(using guidelines on report content in ToR Annex C)* with annexes	Within 3 weeks of end of TE mission: 01 September 2022	TE team submits to Commissioning Unit; reviewed by RTA, Project Coordinating Unit, GEF OFP
4	Final TE Report* + Audit Trail	Revised final report and TE Audit trail in which the TE details how all received comments have (and have not) been addressed in the final TE report *(See template in ToR Annex H)*	Within 1 week of receiving comments on draft report: 15 September 2022	TE team submits both documents to the Commissioning Unit

*All final TE reports will be quality assessed by the UNDP Independent Evaluation Office (IEO). Details of the IEO's quality assessment of decentralized evaluations can be found in Section 6 of the UNDP Evaluation Guidelines.[2]

8. TE ARRANGEMENTS

The principal responsibility for managing the TE resides with the Commissioning Unit. The Commissioning Unit for this project's TE is *UNDP PNG Country Office.*

The Commissioning Unit will contract the evaluators and ensure the timely provision of per diems and travel arrangements within the country for the TE team. The Project Team will be responsible for liaising with the TE team to provide all relevant documents, set up stakeholder interviews, and arrange field visits.

9. TE TEAM COMPOSITION

A team of *two independent evaluators* will conduct the TE – *one team leader with experience and exposure to projects and evaluations in other regions and one team expert, who is a national*. The team leader will *be responsible for the overall assessment of the project results and improve sustainability of project gains including design and writing of the TE Inception Report, lead the TE mission, supervise the national consultant and write the final TE report, etc*. The team expert will *report to the Team Leader and support the TE lead consultant to assess the extent to which the project is achieving project results and improve sustainability of project gains. He/She will also work with the Project Team in developing the TE itinerary of the mission including meeting appointments and schedules.*

The evaluator(s) cannot have participated in the project preparation, formulation and/or implementation (including the writing of the project document), must not have conducted this project's Mid-Term Review and should not have a conflict of interest with the project's related activities.

The selection of evaluators will be aimed at maximizing the overall "team" qualities in the following areas:

Education

- Master's degree in *Engineering (preferably Energy, Electrical, or Mechanical) or other closely related field such as Environment or Natural Resources Management* or other closely related field from an accredited College or University. Additional training in Renewable Energy and Energy Efficiency including Climate Change related fields is an advantage.

Experience

- Relevant experience with results-based management evaluation methodologies;
- Experience applying SMART indicators and reconstructing or validating baseline scenarios;
- Competence in adaptive management, as applied to *Renewable Energy and Energy Efficiency and Biodiversity Conservation.*
- Experience in evaluating Renewable Energy and Energy Efficiency projects;
- Experience working in Papua New Guinea, Asia Pacific Region or Developing Country;
- Experience in relevant technical areas for at least *10 years;*
- Demonstrated understanding of issues related to gender and renewable energy and energy efficiency sector, biodiversity conservation/community conservation and natural resources management; experience in gender responsive evaluation and analysis;

[2] Access at: http://web.undp.org/evaluation/guideline/section-6.shtml

- Excellent communication skills;
- Demonstrable analytical skills;
- Project evaluation/review experience within United Nations system especially GEF funded projects will be considered an asset.

Language

- Fluency in written and spoken English

Competencies

Corporate Competencies:
- Demonstrates integrity by modeling the UN's values and ethical standard
- Promotes the vision, mission, and strategic goals of the UN
- Displays cultural, gender, religion, race, nationality, and age sensitivity and adaptability
- Treats all people fairly without favoritism.

Functional Competencies:
- Thorough knowledge of GEF Monitoring and Evaluation Policy
- Familiarity with the challenges developing countries face in sustainable natural resource management and biodiversity conservation including communities
- Conceptual thinking and analytical skills
- An independent, reliable, responsible self-motivator able to work under time pressure
- Excellent communication, team-building and diplomatic skills to develop partnerships.

10. EVALUATOR ETHICS

The TE team will be held to the highest ethical standards and is required to sign a code of conduct upon acceptance of the assignment. This evaluation will be conducted in accordance with the principles outlined in the UNEG 'Ethical Guidelines for Evaluation'. The evaluator must safeguard the rights and confidentiality of information providers, interviewees and stakeholders through measures to ensure compliance with legal and other relevant codes governing collection of data and reporting on data. The evaluator must also ensure security of collected information before and after the evaluation and protocols to ensure anonymity and confidentiality of sources of information where that is expected. The information knowledge and data gathered in the evaluation process must also be solely used for the evaluation and not for other uses without the express authorization of UNDP and partners.

11.PAYMENT SCHEDULE

- 20% payment upon satisfactory delivery of the final TE Inception Report and approval by the Commissioning Unit
- 40% payment upon satisfactory delivery of the draft TE report to the Commissioning Unit
- 40% payment upon satisfactory delivery of the final TE report and approval by the Commissioning Unit and RTA (via signatures on the TE Report Clearance Form) and delivery of completed TE Audit Trail

  Criteria for issuing the final payment of 40%[3]:

[3] The Commissioning Unit is obligated to issue payments to the TE team as soon as the terms under the ToR are fulfilled. If there is an ongoing discussion regarding the quality and completeness of the final deliverables that cannot be resolved between the Commissioning Unit and the TE team, the Regional M&E Advisor and Vertical Fund Directorate will be consulted. If needed, the Commissioning Unit's senior management, Procurement Services Unit and Legal Support Office will be notified as well so that a decision can be made about whether or

- The final TE report includes all requirements outlined in the TE TOR and is in accordance with the TE guidance.
- The final TE report is clearly written, logically organized, and is specific for this project (i.e. text has not been cut & pasted from other TE reports).
- The Audit Trail includes responses to and justification for each comment listed.

12. APPLICATION PROCESS[4]

Recommended Presentation of Proposal:

a) **Letter of Confirmation of Interest and Availability** using the template[5] provided by UNDP;
b) **CV** and a **Personal History Form** (P11 form[6]);
c) Brief description **of approach to work/technical proposal** of why the individual considers him/herself as the most suitable for the assignment, and a proposed methodology on how they will approach and complete the assignment; (max 1 page)
d) **Financial Proposal** that indicates the all-inclusive fixed total contract price and all other travel related costs (such as flight ticket, per diem, etc.), supported by a breakdown of costs, as per template attached to the Letter of Confirmation of Interest template. If an applicant is employed by an organization/company/institution, and he/she expects his/her employer to charge a management fee in the process of releasing him/her to UNDP under Reimbursable Loan Agreement (RLA), the applicant must indicate at this point, and ensure that all such costs are duly incorporated in the financial proposal submitted to UNDP.

All application materials should be submitted to the address *United Nations Development Programme, Level 14, Kina Bank House, Douglas Street, PO Box 1041, Port Moresby, Papua New Guinea* in a sealed envelope indicating the following reference "Consultant for Terminal Evaluation of *Facilitating Renewable Energy and Energy Efficiency Applications for Greenhouse Gas Emission Reduction*" or by email at the following address ONLY: *procurement.pg@undp.org* by *28 February 2022 at 1700 hours*. Incomplete applications will be excluded from further consideration.

Criteria for Evaluation of Proposal: Only those applications which are responsive and compliant will be evaluated. Offers will be evaluated according to the Combined Scoring method – where the educational background and experience on similar assignments will be weighted at 70% and the price proposal will weigh as 30% of the total scoring. The applicant receiving the Highest Combined Score that has also accepted UNDP's General Terms and Conditions will be awarded the contract.

Technical Criteria for Evaluation for internationals (Maximum 70 points):

- Criteria-01: At least Master's degree in Engineering (preferably Energy, Electrical or Mechanical) or other closely related field such as Environment or Natural Resource Management or other closely related field from accredited college or University. Additional trainings in Renewable Energy and Energy Efficiency including Climate Change related fields is an advantage - **Max Point 5;**

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not to withhold payment of any amounts that may be due to the evaluator(s), suspend or terminate the contract and/or remove the individual contractor from any applicable rosters. See the UNDP Individual Contract Policy for further details:
https://popp.undp.org/_layouts/15/WopiFrame.aspx?sourcedoc=/UNDP_POPP_DOCUMENT_LIBRARY/Public/PSU_Individual%20Contract_Individual%20Contract%20Policy.docx&action=default

[4] Engagement of evaluators should be done in line with guidelines for hiring consultants in the POPP
https://popp.undp.org/SitePages/POPPRoot.aspx

[5] https://intranet.undp.org/unit/bom/pso/Support%20documents%20on%20IC%20Guidelines/Template%20for%20Confirmation%20of%20Interest%20and%20Submission%20of%20Financial%20Proposal.docx

[6] http://www.undp.org/content/dam/undp/library/corporate/Careers/P11_Personal_history_form.doc

- Criteria-02: Minimum 10 years of relevant professional experience of results – based management evaluation methodologies, particularly GEF financed project evaluations - **Max Point 25;**
- Criteria-03: Previous experiences in evaluating Renewable Energy and Energy Efficiency Projects -**Max Point 25;**
- Criteria-04: Experience of working in Papua New Guinea, Asia Pacific Region or a Developing Country especially having technical knowledge in the targeted focal area(s) is an advantage - **Max Point 10**;
- Criteria-05: Demonstrated understanding of issues related to gender and renewable energy and energy efficiency sector, biodiversity conservation/community conservation and natural resources management; experience in gender responsive evaluation and analysis – **Max Point 5** ;

Technical Criteria for Evaluation for national candidates (Maximum 70 points):

- Criteria-01: At least Master's degree in Engineering (preferably Energy, Electrical or Mechanical) or other closely related field such as Environment or Natural Resource Management or other closely related field from accredited college or University. Additional trainings in Renewable Energy and Energy Efficiency including Climate Change related fields is an advantage - **Max Point 5;**

- Criteria-02: Minimum 10 years of relevant professional experience of results – based management evaluation methodologies, particularly GEF financed project evaluations - **Max Point 25;**
- Criteria-03: Previous experiences in evaluating Renewable Energy and Energy Efficiency Projects -**Max Point 25;**
- Criteria-04: Proven experiences in field level data collection with adequate knowledge of data collection tools, including KIIs and FGDs - **Max Point 10**;
- Criteria-05: Demonstrated understanding of issues related to gender and renewable energy and energy efficiency sector, biodiversity conservation/community conservation and natural resources management; experience in gender responsive evaluation and analysis – **Max Point 5**;

Financial Evaluation (Total 30 marks)

All technical qualified proposals will be scored out 30 based on the formula provided below.
The maximum points (30) will be assigned to the lowest financial proposal. All other proposals received points according to the following formula:

p = y (μ/

Where:

- p = points for the financial proposal being evaluated;
- y = maximum number of points for the financial proposal;
- μ = price of the lowest priced proposal;
- z = price of the proposal being evaluated.

Please combine all your documents into one (1) single PDF document as the system only allows to upload maximum one document.

UNDP is committed to achieving workforce diversity in terms of gender, nationality and culture. Individuals from minority groups, indigenous groups and persons with disabilities are equally

encouraged to apply. All applications will be treated with the strictest confidence.

UNDP does not tolerate sexual exploitation and abuse, any kind of harassment, including sexual harassment, and discrimination. All selected candidates will, therefore, undergo rigorous reference and background checks.

13.TOR ANNEXES

(Add the following annexes to the final ToR)

- ToR Annex A: Project Logical/Results Framework
- ToR Annex B: Project Information Package to be reviewed by TE team
- ToR Annex C: Content of the TE report
- ToR Annex D: Evaluation Criteria Matrix template
- ToR Annex E: UNEG Code of Conduct for Evaluators
- ToR Annex F: TE Rating Scales
- ToR Annex G: TE Report Clearance Form
- ToR Annex H: TE Audit Trail

Annex 2 TE Itinerary

Day/Date	Activity
Fri 20.05.22	Signature of TE consultant contract
Mon 01.08.22	Start of Assignment
Fri 05.08.22	Draft version of Inception Report
Thu 11.08.22	Final version of Inception Report
Tue 23.08.22	Start of Field Mission
Mon 05.09.22	End of Field Mission
Mon 31.10.22	Draft version of Final Report
Mon 29.08.22	Final version of Final Report

Day/Date	Activity	Interviewee
Tue 23.08.22	*Arrival of international consultant* *Travel from POM to Alotau*	-
Tue 23.08.22	Meeting with Milne Bay Provincial Administration	Milne Bay Provincial Administration staff
Wed 24.08.22	Visit of PV Mini Grid demo site on Samarai Island	Beneficiaries on Samarai Island
Thu 25.08.22	Team Travels back to POM from Samarai Island via Alotau	-
Thu 25.08.22	Meeting with CCDA project team	Interviews with staff from CCDA
Fri 26.08.22	*National Holiday*	*National Holiday*
Sat 27.08.22	*Weekend*	-
Sun 28.08.22	*Weekend*	-
Mon 29.08.22	Meeting with UNDP project team	PSU
Mon 29.08.22	Meeting with UNDP project team	Deputy Resident Representative
Mon 29.08.22	Meeting with UNDP project team	PMU
Tue 30.08.22	Meeting with UNDP project team	PMU
Tue 30.08.22	Meeting with NISIT	NISIT project coordinator
Tue 30.08.22	*Outbound flight from POM for Int. Consultant*	-
Wed 31.08.22	Meeting with beneficiaries and Maprik DDA	Beneficiaries and Maprik DDA
Thu 01.09.22	East Sepik Provincial Government Meeting	East Sepik Provincial Government
Fri 02.09.22	Travels back to Wewak to POM to Goroka	-
Mon 05.09.22	Eastern Highlands Administration Meeting	Eastern Highlands Provincial Administration staff

Annex 3 List of Persons Interviewed

Name	Designation	Organization
UNDP		
Gretel Orake	Project Manager	UNDP
Michael Sembenombo	PSU	UNDP
Dhiraj Singh	PSU	UNDP
Edward Vrkic	Deputy Resident Representative	UNDP
Manuel Soriano	UNDP NCE RTA	UNDP
CCDA (Port Moresby)		
Gwen Sisiou	National Project Director	CCDA
Johnson Kilis	Analyst	CCDA
Emily Mulina	Analyst	CCDA
PPL		
Bruce Hogan	Manager	PPL
NISIT		
David Veiyoke	Director	NISIT
UPNG		
Dr. John Duguman	Director CCCSD	UPNG
Samarai Island/Milne Bay		
Misa Lionnel	Disaster & Climate Change Advisor	Milne Bay Provincial Government
Michael Viola	Deputy Provincial Administrator	Milne Bay Provincial Government
Robby Magam	Area Manager	Samarai Island
Bonny Pipidai	Elementary Educator	Samarai Island
Bernard Dabero	Officer In Charge	PNG Power Samarai Island
Cyprian Kaisa	Ward Councilor	Samarai North Ward
East Highlands Province		
Danny Benjamin	Project Officer	Eastern Highlands Provincial Administration
Maprik Province		
Isaac Tseraha	Business Manager	PNG Power Maprik Branch
East Sepik Province		
Godfried Raushem	Deputy Provincial Administrator	East Sepik Provincial Administration

Annex 4 List of Documents Reviewed

A. Project Identification Form

I. 2015-07-30_PIF_FREAGER.pdf

II. 2015-09-14_PIF-GEF-Approval-FREAGER.pdf

B. Final UNDP-GEF Project Document with all annexes

I. 2017-10-19_Project-Document_GEF_Renewable Energy_Approved.pdf

C. UNDP SESP

I. SESP_FREAGER_approved.pdf

D. Inception Workshop Report

I. 2019-05-15_Report_Inception Phase_FREAGER.pdf

E. Mid Term Review report with management response to MTR Recommendation

I. Management Response to MTR clean.docx.pdf

II. MTR Final Report 200505 clean.pdf

F. All Project Implementation Reports (PIR)

I. 2019-GEF-PIR-PIMS5569-GEFID9273.pdf

II. 2020-GEF-PIR-PIMS5569-GEFID9273.pdf

III. 2021-GEF-PIR-PIMS5569-GEFID9273.pdf

IV. 2022-GEF-PIR-PIMS5569-GEFID9273 Draft.docx

G. Progress Reports (quarterly, semi-annual, annual)

I. 1.FREAGER Activities Inventory a.o. 15May2019.doc

II. 1.FREAGER Activities Inventory a.o. 22Feb2019.doc

III. 1.FREAGER Activities Inventory a.o. 31May2019.doc

IV. 1.FREAGER Activities Inventory a.o. 5August2019.doc

V. 1.FREAGER Activities Inventory a.o. 8August2019.doc

VI. 1.FREAGER Activities Inventory a.o. 8July2019.doc

VII. 2.FREAGER Activities Inventory a.o. 30August2019.doc

VIII. 2.FREAGER Activities Inventory a.o. 8August2019.doc

IX. 2021-09-22_Bi-weekly report FREAGER.docx

X. 3.FREAGER Activities Inventory a.o. 10December2019.doc

XI. 3.FREAGER Activities Inventory a.o. 10October2019.doc

XII. 3.FREAGER Activities Inventory a.o. 15March2020.doc

XIII. 3.FREAGER Activities Inventory a.o. 28October2019.doc

XIV. 4.FREAGER Activities Inventory a.o_08Sep2021.doc

XV. 4.FREAGER Activities Inventory a.o_11May2022.doc

XVI. 4.FREAGER Activities Inventory a.o_30June2021.doc

XVII. 4.FREAGER Activities Inventory a.o_30June2022.doc

XVIII. 4.FREAGER Activities Inventory a.o_31Dec2021.doc

XIX. 4.FREAGER Activities Inventory a.o_31May2021.doc
XX. 4.FREAGER Activities Inventory a.o_5May2021.doc
XXI. 4.FREAGER Activities Inventory a.o_7Jan2021.doc
XXII. 4.FREAGER Activities Inventory a.o. 03Nov2020.doc
XXIII. 4.FREAGER Activities Inventory a.o. 17Oct2020.doc
XXIV. 4.FREAGER Activities Inventory a.o. 18Dec2020.doc
XXV. 4.FREAGER Activities Inventory a.o. 26Oct2020.doc
XXVI. 5569 Delivery by Activities 2021-02-26_01-12-54.xlsx
XXVII. FREAGER Activities Inventory a.o. 31Dec2018.doc
XXVIII. FREAGER Project Implementation Issues Tracker - 02February2022.docx
XXIX. FREAGER Project Implementation Issues Tracker - 02March2022.docx
XXX. FREAGER Project Implementation Issues Tracker - 02March2022.pdf
XXXI. FREAGER Project Implementation Issues Tracker - 05May2022.docx
XXXII. FREAGER Project Implementation Issues Tracker - 06Oct2021.docx
XXXIII. FREAGER Project Implementation Issues Tracker - 11May2022.docx
XXXIV. FREAGER Project Implementation Issues Tracker - 13April2022.docx
XXXV. FREAGER Project Implementation Issues Tracker - 14Dec2021.docx
XXXVI. FREAGER Project Implementation Issues Tracker - 15Dec2021.docx
XXXVII. FREAGER Project Implementation Issues Tracker - 17Nov2021.docx
XXXVIII. FREAGER Project Implementation Issues Tracker - 19January2022.docx
XXXIX. FREAGER Project Implementation Issues Tracker - 1Dec2021.docx
XL. FREAGER Project Implementation Issues Tracker - 25February2022.docx
XLI. FREAGER Project Implementation Issues Tracker - 27April2022.docx
XLII. FREAGER Project Implementation Issues Tracker - 30March2022.docx
XLIII. FREAGER Project Implementation Issues Tracker - 31Dec2021.docx
XLIV. FREAGER Project Implementation Issues Tracker.docx
XLV. Next steps with RTA 2020.docx

H. Minutes of Project Board Meetings

I. 98601_LPAC Meeting Minutes 27Jul2017.pdf
II. 2019-02-12_Minutes of Meeting_PB.pdf
III. 2019-11-01_Minutes of Meeting_PB.pdf
IV. 2020-03-30_Minutes of Meeting_PB.pdf
V. Board Meeting Minutes_1-2021.pdf
VI. 2021-05-19_Minutes of Meeting_PB.pdf
VII. 2021-12-17_Minutes of Meeting_PB.pdf

I. UNDP Country Programme Document (CPD)

I. PNG CPD 2018-2022.pdf

J. List and contact details for project staff, stakeholders ...

I. Stakeholder Engagement Report 30 June 2022.docx

II. Stakeholder Engagement Report 30 June 2021.docx

III. Stakeholder Plan.docx

K. Project Deliverables that provide documentary evidence

I. Activity 1

a. Energy Efficiency

i. Private Companies_GreenMax.docx

ii. UNDP_PNG_Building EE Code_June 2022.pdf

iii. UNDP_PNG Draft National Energy Efficiency Roadmap_March 2021_Final.pdf

b. Hydro policy Work

i. Final Edition - Policy Gap Analysis Report - G SAHA.pdf

ii. G SAHA - CONCEPT NOTES ON POLICY^J REGULATION^J AND IMPLEMENTATION.pdf

iii. G SAHA - IMPLEMENTATION PPT.pdf

iv. G SAHA - POLICY FRAMEWORK FOR HYDRO ENERGY POLICY GAP ANALYSIS REPORT.pdf

v. G SAHA IMPLEMENTATION REPORT.pdf

vi. G SAHA Strengthening Policy Framework PowerPoint .pdf

vii. G SAHA Strengthening Policy Framework PowerPoint JUNE 2021.pdf

viii. October - Policy Recommendations Presentation - G SAHA (1).pdf

ix. October - POLICY RECOMMENDATIONS REPORT - G SAHA.pdf

x. Policy Recommendations Presentation - G SAHA (1).pptx

xi. POLICY RECOMMENDATIONS REPORT - G SAHA.pdf

xii. REVISED POLICY FRAMEWORK FOR HYDRO ENERGY INCEPTION REPORT G.P. SAHA.pdf

c. Off-Grid Regulation

i. 00_Stakeholder Engagement

- 01_1st Stakeholder Consultation
  - 2020.07.03_Progress Report n1_v1.0.pdf
- 02_2nd Stakeholder Consultation
  - 2021.05.31_2nd Stakeholder Consultation Report v1.0.pdf
- 03_3rd Stakeholder Consultation
  - 2021.12.22_Presentation to Stakeholders v1.0.pdf
  - 2022.03.04 Comments Log v.1.0 – REGULATOR.xlsx
  - 2022.03.04 Comments Log v.1.0 – PUBLIC.xlsx
- 04_4th Stakeholder Consultation
  - 2022.03.11_Presentation to Stakeholders v1.0.pdf

ii. 01_GUIDELINES

- 2021.02.21 Off-Grid Code Guidelines_v2.0.pdf

iii. 02-PNG OFF-GRID REGULATION

- PNG Off-Grid Regulation_v7.0.docx
- PNG Off-Grid Regulation_CONTRACTS_v7.0.docx
- PIMS_5569_Regulation-Small-Power-Sys-Final-recommendations.pdf
  - PNG Off-Grid Regulation_FORMS_v7.0.docx

d. Solar Policy work
   i. *4a-UNDP-SolarPolicy-FINAL REPORT-23.11.21.pdf*
   ii. *4b-Stakeholder Outcome-FINAL-CONSULTATION-REPORT-23.11.21.pdf*
   iii. *Annex 1-PNG Solar Energy Policy Document-FINAL-23.11.21.pdf*
   iv. *Annex 2-DG Interconnection Standards-FINAL-23.11.21.pdf*
   v. *Annex 3-Standards-and-Requirements-for-Solar-FINAL-23.11.21.pdf*
   vi. *Annex 4-Grid-Integ-Req-VRE-FINAL-23.11.21.pdf*
   vii. *Annex 5-PNG-Tech-Guide-Grid-intercon-PV Power-Gen-FINAL-23.11.21.pdf*
   viii. *Annex 6-FIT Best Pract-Impl-Prog-FINAL-23.11.21.pdf*
   ix. *Annex 7-REFIT Calc-Guide-PNG-FINAL-23.11.21.pdf*

e. Provincial RE & EE Plans
   i. *Final Report*
      - Provincial RE and EE Plans
        - Eastern Highlands Province
          - UNDP_PNG_Eastern Highlands Province_RE-EE Plan_June 2022.pdf
          - UNDP_PNG_Eastern Highlands Province_RE-EE Plan_June 2022.docx
        - East Sepik Province
          - UNDP_PNG_East Sepik Province_RE-EE Plan_June 2022.pdf
          - UNDP_PNG_East Sepik Province_RE-EE Plan_June 2022.docx
        - Milne Bay Province
          - UNDP_PNG_Milne Bay Province_RE-EE Plan_June 2022.pdf
          - UNDP_PNG_Milne Bay Province_RE-EE Plan_June 2022.docx
        - Morobe Province
          - UNDP_PNG_Morobe Province_RE-EE Plan_June 2022.docx
          - UNDP_PNG_Morobe Province_RE-EE Plan_June 2022.pdf
   ii. *UNDP_PNG_Eastern Highlands Province_Draft RE-EE Plan_April 2022.docx*
   iii. *UNDP_PNG_East Sepik Province_Draft RE-EE Plan_April 2022.pdf*
   iv. *UNDP_PNG_Milne Bay Province_RE-EE Plan_June 2022.pdf*
   v. *UNDP_PNG_Morobe Province_Draft RE-EE Plan_April 2022.docx*

II. Activity 2

a. EE Demos
   i. *EE Audits East Sepik*
      - Maprik reports
        - 12.06.2020 Attachment A _Maprik EE Audit Master Record Sheet.xlsx
        - 12.06.2020 Maprik Town EE Audit Report.pdf
        - 12.06.2020 Attachment B_ Maprik Cost & Energy Savings Calculation.xlsx
        - 12.06.2020 Maprik Town EE Audit Report_minus5.pdf
      - Wewak reports
        - 01.04.2020 Attachment A _ESP EE Audit Master Record Sheet.xlsx
      - 01.04.2020 Attachment B_ Wewak Retrofit Cost & Energy Savings Calculation.xlsx
        - 30.03.2020 Wewak Town EE Audit Report.pdf

- 30.03.2020 Wewak Town EE Audit Report.pdf
- PNG EE Audit Inception Report.v1.pdf

ii. Mini-Hydro Demos

- Gotomi
  - 20341_Gotomi_Drawings_rev0.pdf
  - 20341_J_rev0 - ER of Gotomi HEPP and GRID.pdf
  - 20341_L_rev0 - ER of Gotomi HEPP and GRID_Technical Specifications and cost.xlsm
  - Gotomi dwg file.dxf
- Miruma
- 20341_I_rev0 - ER of Miruma HEPP and GRID.pdf
- 20341_K_rev0 - ER of Miruma HEPP and GRID_Technical Specifications and cost.xlsm
- 20341_Miruma_Drawings_rev1.pdf
- Miruma_Profile.dxf
- 20341_A_rev1 - Inception report.pdf
- 20341_B_rev0 - Feasibility report of Gotomi HEPP.pdf
- 20341_B_rev1 - Feasibility report of Gotomi HEPP.pdf
- 20341_C_rev0 - Prefeasibility report of Miruma HEPP.pdf
- 20341_C_rev1 - Prefeasibility report of Miruma HEPP.pdf
- 20341_D_rev0 - Feasibility report of Gotomi HEPP.pdf
- 20341_E_rev0 - Feasibility report of Miruma HEPP.pdf
- 20341_E_rev1 - Feasibility report of Miruma HEPP.pdf
- 20341_G_rev0 - Gotomi Feasibility study.pdf
- 20341_H_rev0 - Miruma Feasibility study.pdf
- 20341_D_rev0 - Feasibility report of Gotomi HEPP.pdf
- 20341_E_rev0 - Feasibility report of Miruma HEPP.pdf
- 20341_F_rev0 - Inception report.pdf
- 20341_G_rev0 - Gotomi Feasibility study.pdf

iii. Solar Demo

- Design
  - 1. Samarai 75kW PV Solar System Outline.pdf
  - 2. Samarai 75kW PV Solar Circuit Diagram.pdf
  - 3. Samaris 75kW PV Solar Technical Specification.pdf
  - SSPBD C25819110110141.pdf
- Technical Specifications
  - 2. Samarai 75kW PV_Technical Specification_v2.pdf
  - 3. Samarai 75kW PV_Installation drawing.pdf
  - 07 PAE PSR_08-01-20 to 10-01-20.pdf
  - Samarai Solar PV Technical Review Report.pdf
- 04 PAE PSR_25.10.19 to 15.11.19.pdf
- INCEPTION REPORT_PPLUNDPsigned.pdf
- Letter of Approval – PAE.pdf
- PAE PSR_14.09.19 to 24.09.19.pdf
- PAE PSR_27.09.19 to 11.10.19.pdf

III. Activity 4

a. Communications

i. Comms strat_UNDP PNG.pdf

ii. *SH interview report (004).pdf*

iii. *UNDP_Inception report.pdf*

b. Resource Mapping

i. *RE and EE Guides*

- EE Guide FORMATED DRAFT AP MR 18-03-2020.docx
- MHP Guide FINAL FORMATED DRAFT AP 10-03-2020.docx
- SPV3_Guide_March_2020-rev2_APformat2_MR_270320_dpl.docx

ii. *21398_A_rev0 - Energy mapping in PNG - Inception report.pdf*

iii. *21398_B_rev0 - Energy mapping in PNG - 1st progress report.pdf*

iv. *21398_C_rev0 - Energy mapping in PNG - 2nd progress report.pdf*

L. Annual Work Plans

I. *2018_AWP_FREAGER-2018.pdf*

II. *2019-03-07_AWP_FREAGER_2019.pdf*

III. *2020-05-29_AWP_FREAGER-2020.pdf*

IV. *2021-07-12_AWP_FREAGER-2021.pdf*

V. *2022 AWP_FREAGER-b.pdf*

Annex 5 Summary of field visits

Day/Date	Activity	Interviewee
Tue 23.08.22	*Arrival of international consultant* *Travel from POM to Alotau*	-
Tue 23.08.22	Meeting with Milne Bay Provincial Administration	Milne Bay Provincial Administration staff
Wed 24.08.22	Visit of PV Mini Grid demo site on Samarai Island	Beneficiaries on Samarai Island
Thu 25.08.22	Team Travels back to POM from Samarai Island via Alotau	-
Thu 25.08.22	Meeting with CCDA project team	Interviews with staff from CCDA
Fri 26.08.22	*National Holiday*	*National Holiday*
Sat 27.08.22	*Weekend*	-
Sun 28.08.22	*Weekend*	-
Mon 29.08.22	Meeting with UNDP project team	PSU
Mon 29.08.22	Meeting with UNDP project team	Deputy Resident Representative
Mon 29.08.22	Meeting with UNDP project team	PMU
Tue 30.08.22	Meeting with UNDP project team	PMU
Tue 30.08.22	Meeting with NISIT	NISIT project coordinator
Tue 30.08.22	*Outbound flight from POM for Int. Consultant*	-
Wed 31.08.22	Meeting with beneficiaries and Maprik DDA	Beneficiaries and Maprik DDA
Thu 01.09.22	East Sepik Provincial Government Meeting	East Sepik Provincial Government
Fri 02.09.22	Travels back to Wewak to POM to Goroka	-
Mon 05.09.22	Eastern Highlands Administration Meeting	Eastern Highlands Provincial Administration staff

Annex 6 Co-financing Template

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

PLEASE COMPLETE FOR ALL PROJECTS AT MTR AND TE STAGES

Please include evidence for co-financing for the project with this form (please add rows as necessary)

Sources of Co-financing	Name of Co-financier	Type of Cofinancing	Investment Mobilized	Amount ($)
Donor Agency	GEF	Grant	Investment mobilized	2,840,640
Recipient Country Government	Climate Change & Development Authority (Formerly Office of Climate Change & Development)	Grant	Investment mobilized	56,000
Recipient Country Government	Power PNG Ltd.	In-kind	Investment mobilized	1,000,000
Recipient Country Government	PNG Power Ltd (PPL)	Grant	Investment mobilized	644,765
Total Co-financing				2,300,765

Annex 7 GEF Core Indicators

GEF Core indicators

Project Title: Facilitating Renewable Energy and Energy Efficiency Applications for Greenhouse Gas Emission Reduction
Project PIMS #: 5569

Core Indicator 6	**Greenhouse gas emission mitigated**					***Metric tons CO_2e***
			Expected metric tons of CO_2e (6.1+6.2)			
			PIF stage	Endorsement	MTR	TE
	Expected CO2e (direct)		*4,795,000*	159,879	*0*	*0*
	Expected CO2e (indirect)		*19,181,000*	4,409,597	*0*	*0*
Indicator 6.1	**Carbon sequestered or emissions avoided in the AFOLU sector**					
			Expected metric tons of CO_2e			
			PIF stage	Endorsement	MTR	TE
	Expected CO2e (direct)					
	Expected CO2e (indirect)					
	Anticipated start year of accounting					
	Duration of accounting					
Indicator 6.2	**Emissions avoided Outside AFOLU**					
			Expected metric tons of CO_2e			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
	Expected CO2e (direct)		4,795,000	*159,879*	*0*	*0*[8]
	Expected CO2e (indirect)		19,181,000	*4,409,597*	*0*	*0*[8]
	Anticipated start year of accounting					
	Duration of accounting					
Indicator 6.3	**Energy saved (megajoules)**					
			MJ			

[8] Mini hydros in design phase. PV Solar grid installed, but not commissioned. Energy Audits done, but no changes implemented yet.

		Expected		Achieved	
		PIF stage	Endorsement	MTR	TE
	Lifetime direct energy saved		*1,172,959,582*	*0*	*0*[9]
	Lifetime indirect energy saved		*43,399,504,532*	*0*	*0*[10]
Indicator 6.4	**Increase in installed renewable energy capacity per technology**				
Technology		Capacity (MW)			
		Expected		Achieved	
		PIF stage	Endorsement	MTR	TE
Increase in Installed RE capacity per technology (MW)					
Direct increase in installed RE capacity - mini-hydro			*0.400*	*0*	*0*[11]
Direct increase in installed RE capacity - PV mini-grid			*0.05*	*0*	*0*[12]
Indirect increase in installed RE capacity			*8.95*	*0*	*0*[13]
Lifetime RE production per technology (MWh)					
Lifetime RE production for mini-hydro (MWh) - direct			*82,752.80*	*0*	*0*[14]
Lifetime RE production for PV mini-grid (MWh) - direct			*4,161.00*	*0*	*0*[15]

[9] Energy Audits completed but financing not available

[10] Work started on scaling up mini-hydro and PV demonstrations. But no installations for mini-hydro yet, PV recently installed no data yet.

[11] Mini hydro design completed, funding required

[12] PV mini grid at Samarai designed and constructed but not commissioned

[13] Pending installation of mini hydro and commissioning of PV solar

[14] (Mini hydro designed, pending funding for construction and commissioning)

[15] PV solar constructed but not commissioned.

Lifetime RE production (MWh) - indirect				*1,456,696.3*	*0*	*0*[16]
Core Indicator 11	**Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment**					***(Number)***
			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE[17]
		Female		21,925	*0*	870
		Male		23,375	*0*	930
		Total		45,300[18]	*0*	1,800

[16] Pending installation of mini hydro and commissioning of PV solar.

[17] No new households connected to the PV mini grid on Samarai Island. A total of 300 households is currently connected to the grid on Samarai, but no gender dis-aggregated information available, Estimated disaggregation is based on the average household size of 6 pax in the partner provinces of the project, and the ratio of male-female in PNG as of 2020.

[18] Based on 7,550 households in the project partner provinces, with average household size of 6 pax and 1.041 male-female ratio in 2017.

Annex 8 Evaluation question matrix

Evaluation question 1: To what extent were the project's strategies relevant to national and local contexts?				
Evaluation Criterion covered by this Evaluation Question: Relevance				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
1.1. Alignment of project with the UN SDG (scale 1-3, where 1 is not aligned, 2 is partially aligned and 3 is fully aligned)	- How does the project support the objectives of the relevant UN SDG?	- UNDP SDG - Level of commitment with project relevant UN SDG (SDG 1, SDG 3, SDG 5, SDG 7, SDG 8, SDG 9, SDG 11, SDG 12, and SDG 13)	- Project Documents - Relevant UNDP and National Project staff	- Document Review - Interviews with project team, UNDP staff and others
1.2. Alignment of project with the CPD for PNG and other relevant policies as reported by the national government (scale 1-3, where 1 is not aligned, 2 is partially aligned and 3 is fully aligned)	- How does the project support the objectives of the CPD? - Does the project support National Policies? - Does the project support other international conventions, such as the Paris Agreement?	- CPD Priorities - Commitments of the Government of PNG according to the Paris Agreement	- Project Documents - Relevant National Project staff	- Document Review - Interviews with project team, UNDP staff and others
1.3. Alignment of project with local priorities, as reported by local government officials (scale 1-3, where 1 is not aligned, 2 is partially aligned and 3 fully aligned)	- How does the project support the objectives of the corresponding local governments?	- Project Inception Report - Changes in local Government policies throughout project lifecycle	- Project Documents - Relevant Local/Provincial Project staff	- Document Review - Interviews with project team, UNDP staff and others

1.4. Alignment of project with needs of local context as perceived by local civil society organizations implementing the project (scale 1-3, where 1 is not aligned, 2 is partially aligned and 3 fully aligned)	- How does the project support the objectives of the local corresponding local governments?	- Project Inception Report - Local stakeholders group priorities	- Project Documents - Relevant local population representatives	- Document Review - Interviews with project team, UNDP staff and others

Evaluation question 2: To what extent did the project reach the planned results? Sub questions:

a. What were the reasons for the achievement or nonachievement of planned results?
b. Were there any unexpected results or unintended consequences of the results both positive and negative?

Evaluation Criterion covered by this Evaluation Question: Effectiveness

Evaluative Criteria	Question	Indicators	Data Sources	Methodology
2.1. Enabling of the application of feasible renewable energy and energy efficiency technologies for achieving greenhouse gas emission reduction in PNG	- How many tons of GHG emissions have been reduced due to projects activities?	- 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)	- PIR - MTR report - UNDP staff - Project staff	- Document review - Semi structured interviews
	- How many new households have access to RE mini-grid generated electricity or make use of established EE programs?	- 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		
	- How much has the use of Diesel dropped since the start and through the project activities since the project has started?	- 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 im-		

Evaluation question 2: To what extent did the project reach the planned results? Sub questions:

a. What were the reasons for the achievement or nonachievement of planned results?
b. Were there any unexpected results or unintended consequences of the results both positive and negative?

Evaluation Criterion covered by this Evaluation Question: Effectiveness

Evaluative Criteria	Question	Indicators	Data Sources	Methodology
		proved EE in industrial plants, commercial and institutional buildings, homes, and street lighting achieved via township EE programs (liters diesel per year)		
2.2. 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	- Which budget has been allocated by the national and provincial government for the promotion and implementation of RE and EE projects? - In which areas the implemented policies and standards do promote RE and EE?	- Government funding allocated for pipeline community RE minigrid and township EE programs designated in national and provincial level RE and EE plans or roadmaps, including both equity and loan funding (USD) - Number of areas in which newly adopted policies and standards (since project launch) promote RE and EE.	- PIR - MTR report - UNDP staff - Project staff	- Document review - Semi structured interviews
2.3. Enhanced technical-commer-	- How many jobs have	- No. of new jobs cre-	- PIR	- Document review

Evaluation question 2: To what extent did the project reach the planned results? Sub questions: a. What were the reasons for the achievement or nonachievement of planned results? b. Were there any unexpected results or unintended consequences of the results both positive and negative?				
Evaluation Criterion covered by this Evaluation Question: Effectiveness				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
cial viability and capacity in the application of energy efficiency technologies and development of feasible RE-based energy systems in the country	been created in the RE and EE sector - Which cost level for RE mini-grid systems have been achieved?	ated (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. - Number of cases of high quality RE mini-grid systems achieved at low end international cost benchmarks	- MTR report - UNDP staff - Project staff	- Semi structured interviews
2.4. Increased installed capacity of RE based power systems and implementation of viable EE technology applications in PNG	- How many community RE mini-grid systems are financed (by banks) or approved by local government? - How many homes and other buildings are	- Total capacity of proposed community RE mini-grid systems that are financed (by banks) or approved by local government (for installation permit), kW - No. of homes and	- PIR - MTR report - UNDP staff - Project staff	- Document review - Semi structured interviews

Evaluation question 2: To what extent did the project reach the planned results? Sub questions: a. What were the reasons for the achievement or nonachievement of planned results? b. Were there any unexpected results or unintended consequences of the results both positive and negative?				
Evaluation Criterion covered by this Evaluation Question: Effectiveness				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
	supplied with power from RE mini-grids? - How many township EE programs are proposed to be financed by PPL and/or provincial governments?	other buildings that are supplied with power from RE mini-grid projects that have received financing or permits - No. of proposed township EE programs that are financed by PPL and/or provincial governments		
2.5. Improved availability of, and access to, financing for renewable energy and energy efficiency initiatives in the energy generation and end-use sectors	- How much funds, other than from government, is available for community RE mini-projects in PNG? - How much funds, other than from government, is available for community town-	- 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) - Total committed new debt and equity financing of township EE retrofits in PNG,	- PIR - MTR report - UNDP staff - Project staff	- Document review - Semi structured interviews

Evaluation question 2: To what extent did the project reach the planned results? Sub questions: a. What were the reasons for the achievement or nonachievement of planned results? b. Were there any unexpected results or unintended consequences of the results both positive and negative?				
Evaluation Criterion covered by this Evaluation Question: Effectiveness				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
	ship EE retrofits in PNG? - How many banks are providing debt financing for RE and EE projects?	including PPL, bank, private/commercial sector, or other international funding, but not including government funding (USD) - No. of banks or other entities (aside from donors) that are providing debt financing for community RE mini-grids and EE technology application projects in PNG		
2.6. Improved awareness of, attitude towards, and information about renewable energy and energy efficiency applications in the energy generation and end-use sectors	- How many of RE and/or EE project developers and investors made use of project generated information provided by the project to develop and implement RE and EE projects?	- 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-	- PIR - MTR report - UNDP staff - Project staff	- Document review - Semi structured interviews

Evaluation question 2: To what extent did the project reach the planned results? Sub questions: a. What were the reasons for the achievement or nonachievement of planned results? b. Were there any unexpected results or unintended consequences of the results both positive and negative?				
Evaluation Criterion covered by this Evaluation Question: Effectiveness				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
		shop information base or elsewhere to develop and implement RE and EE projects		
	- How many relevant policy makers support and endorse RE and EE initiatives in development plans? - How many companies in PNG are profitably involved in RE and/or EE projects?	- Number of relevant policy makers that support and endorse RE and EE initiatives in development plans - Number of companies in PNG profitably involved in RE and/or EE projects		

Evaluation question 3: To what extent did the project make timely adjustments to its strategy to maintain its relevance and effectiveness?				
Evaluation Criterion covered by this Evaluation Question: Effectiveness				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
3.1. Capacity of the project to adjust to the circumstances to maintain relevance as assessed by key stakeholders (scale 1-3, where 1 is no capacity, 2 partial capacity and 3 is full capacity)	- Have the outer circumstances of the project changed and how? - Which adjustments have been implemented to maintain relevance? - How have the requirements by key stakeholders been taken into account?	- Circumstances of the project that have changed since the start of the project - Process of adaption of the project - Quality of consultation process of key stakeholders	- PIR - MTR report - UNDP staff - Project staff	- Document review - Semi structured interviews
3.2. Capacity of the project to adjust to the circumstances to maintain effectiveness as assessed by key stakeholders (scale 1-3, where 1 is no capacity, 2 partial capacity and 3 is full capacity)	- Have the outer circumstances of the project changed and how? - Which adjustments have been implemented to maintain effectiveness?	- Circumstances of the project that have changed since the start of the project - Process of adaption of the project - Quality of consultation process of key stakeholders	- PIR - MTR report - UNDP staff - Project staff	- Document review - Semi structured interviews
3.3. Capacity of the project to adjust to monitor gender and human rights topics (scale 1-3, where 1 is no capacity, 2 partial capacity and 3 is full capacity)	- Has women participation been monitored an evaluated throughout the life of the project?	- Monitoring process of gender und human rights related topics. - Measures taken (if	- GEF Tracking tool - UNDP staff - Project staff	- Document review - Semi structured interviews

Evaluation question 3: To what extent did the project make timely adjustments to its strategy to maintain its relevance and effectiveness?				
Evaluation Criterion covered by this Evaluation Question: Effectiveness				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
	- Did the project take measures to increase women participation and monitor Human Rights related topics?	any) to deal with Gender and Human Rights related topics.		

Evaluation question 4: To what extend did the output level interventions translate into progress towards outcomes?				
Evaluation Criterion covered by this Evaluation Question: Effectiveness				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
4.1. Training participants perception of the received training (scale 1-3, where 1 it has not helped, 2 it has partially helped and 3 is has fully helped).	- Is the knowledge acquired in the trainings used in the day to day work of the training participants?	- Number of projects in which the knowledge is used.	- PIR - Training participants	- Document review - Semi structured interviews
4.2. Local population perception of the implemented demo projects (scale 1-3, where 1 it has not helped, 2 it has partially helped and 3 is has fully helped).	- Have the implemented demo projects made a difference in daily life of the target population? - Is the impact positive or negative?	- Perception of the project activities by the target population.	- PIR - Target population	- Focus group discussion
4.3. Women's participation in project activities (scale 1-3, where 1 women participation much below expected value, 2 women participation slightly below expected value and 3 women participation as foreseen in ProDoc)	- How many women have participated in the offered trainings and workshops? - Are women actively involved in demo-site activities?	- Number of woman participating in workshops and trainings. - Women participation in demo site activities.	- Evaluation of trainings - Target population	- Document review - Focus group discussion

Evaluation question 5: Have financial and human resources been allocated sufficiently and strategically to achieve project outcomes?				
Evaluation Criterion covered by this Evaluation Question: Efficiency				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
5.1. Whether the budget was sufficient and adjusted as needed in a cost-efficient manner (in a scale 1-3 where 1 budget was not sufficient and not adjusted, 2 budget was partially sufficient and adjusted and 3 where budget was sufficient and adjusted as needed).	- Which amount have been allocated to the project by the different stakeholders? - Has the budget been sufficient to comply with the proposed tasks?	- Budget amount allocated to the different tasks - Project spending compared to initial cost estimates	- Project Documents - UNDP Project Staff - Local Government staff - Annual Work Plan	- Document review - Semi structured interviews
5.2. Whether the staffing was adequate and adjusted based on partner perception on the technical capacity of the project staff (in a scale 1-3 where 1 staff was not adequate and not adjusted, 2 staff was partially adequate and adjusted and 3 where staff was adequate and adjusted as needed).	- How many staff have been allocated to the project by the different stakeholders? - Has the time budget per staff member been sufficient to comply with the proposed tasks?	- Amount of staff allocated to the different tasks - Time dedicated by project staff to the assigned tasks	- Project Documents - UNDP Project Staff - Local Government staff	- Document review - Semi structured interviews

Evaluation question 5: Have financial and human resources been allocated sufficiently and strategically to achieve project outcomes?				
Evaluation Criterion covered by this Evaluation Question: Efficiency				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
5.3. Whether sufficient time was allocated for implementation and adjusted as needed based on perception of key stakeholders (in a scale 1-3 where 1 time was not adequate and not adjusted, 2 time was partially adequate and implementation adjusted and 3 where time was adequate and implementation adjusted as needed).	- Which implementation time has been foreseen for the different project activities? - Was the time allocation and implementation planning adequate?	- Allocated time for the different project activities - Planned implementation time per project activity compared to actual implementation time	- Project Documents - UNDP Project Staff - Local Government staff	- Document review - Semi structured interviews
5.4. To what level the coordination and collaboration mechanism for planning and implementation of the project worked well (in a scale 1-3 where 1 coordination and collaboration mechanisms were not adequate, 2 coordination and collaboration mechanisms were partially adequate and 3 where coordination and collaboration mechanism was adequate)	- How has the coordination between different stakeholders been implemented? - How good that structure could adapt to changing circumstances?	- Level of coordination between different stakeholders in terms of regular meetings and intermediate coordination - Efficiency of structure to adapt to changing circumstances	- Project Documents - UNDP Project Staff - Local Government staff - Project Board Meeting Minutes - PIRs	- Document review - Semi structured interviews

Evaluation question 5: Have financial and human resources been allocated sufficiently and strategically to achieve project outcomes?				
Evaluation Criterion covered by this Evaluation Question: Efficiency				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
5.5. Were the results observed worth the monies spent? (Value for money)	- How much of the proposed tasks have been implemented? - How high is the quality of the implemented solution?	- Achievements as per Progress towards results matrix - Quality of RE mini grids and EE solutions	- Project Documents - UNDP Project Staff - Local Government staff - PIRs and other Project reports	- Document review - Semi structured interviews

Evaluation question 6: What measurable changes do the demo projects have in their place of implementation?				
Evaluation Criterion covered by this Evaluation Question: Impact				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
6.1. Usage of installations in target population	- Are the installations in constant use by the target population?	- Level of usage of the installations - Perception by the target population of the offered services/solutions	- Local target population	- Focus group discussion
6.2. Level of ownership of the demo site installations	- Who deep is the ownership of the installations at the demo sites?	- Perception by the target population of the offered services and solutions	- Local target population	- Focus group discussion
6.3. Gender sensitive project implementation	- Have Gender aspects been considered during the implementation?	- Number of Woman participating in workshops and trainings - Share of beneficiaries of demo site project activities	- Local target population	- Focus group discussion

Evaluation question 7: To what extent was capacity developed in order to ensure sustainability of efforts and benefits?				
Evaluation Criterion covered by this Evaluation Question: Sustainability				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
7.1. Government officials reporting change in attitude and concrete actions towards perception and usage of RE (in a scale 1-3 where 1 there were no changes, 2 there were partial changes and 3 there was a complete change)	- To which extend the acquired knowledge is used in lawmaking and administration?	- Administrative actions that consider the use of RE and EE on national and provincial level	- Government officials	- Semi-structured interviews
7.2. Technical personnel reporting use of new knowledge on RE mini grids and EE measures after taking part in training (in a scale 1-3 where 1 no use of new knowledge, 2 limited use of knowledge, 3 considerable use of knowledge)	- To which extend the technical personnel is committed to the use of RE technologies and EE measures? - Is the knowledge been used in day to day working environment by the trained personnel?	- Knowledge of technical personnel of RE and EE - Project examples in which the acquired knowledge has been used.	- Participants of training workshop	- Focus Group Discussions

Evaluation question 8: Are national partners committed to continuing the project or elements of the project? Sub question: Are there any mechanisms developed and/or interventions linked with existing mechanisms at local and national levels to ensure continuation?				
Evaluation Criterion covered by this Evaluation Question: Sustainability				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
8.1. Resources allocated to continue work in this area by the national and provincial government.	- How many own resources have been allocated to continue with the project activities after project end? - Have additional funds been secured to continue with the implementation of RE and EE? - How is the cashflow in the future assured?	- Resources allocated to continue work in this area by the national and regional government. - Which (inter-)national donors have been approached to further fund the project activities either by UNDP or the national stakeholders? - Cash flow planning of the project for the coming years	- UNDP staff - Government officials	- Document Review - Semi-structured interviews

Evaluation question 8: Are national partners committed to continuing the project or elements of the project? Sub question: Are there any mechanisms developed and/or interventions linked with existing mechanisms at local and national levels to ensure continuation?				
Evaluation Criterion covered by this Evaluation Question: Sustainability				
Evaluative Criteria	**Question**	**Indicators**	**Data Sources**	**Methodology**
8.2. Allocation of the use of RE and EE within the government structure (in a scale 1-3, 1 coordination managed by third or other levels of government authority within the ministry 2 coordination managed under second level government authority 3 close to the president or highest ministerial authority)	- At which level RE and EE topics are dealt with within the national and provincial government or the national utility?	- Level at which RE and EE related topics are treated.	- UNDP staff - Government officials	- Document Review - Semi-structured interviews
8.3. Structures, protocols, or interventions created as a result of the project.	- Which structures and procedures are implemented by the project and have a good projection to be maintained in the future?	- Structures and procedures implemented by national and provincial stakeholders in the framework of the project.	- UNDP staff - Government officials	- Document Review - Semi-structured interviews

Annex 9 Questionnaire used

This is a reference guide only, intended to assist interviews as needed and in conjunction with the evaluation criteria/matrix. It is not a questionnaire. It serves as an informal aid in prompting discussion during the interviews and will be supplemented with additional questions.

Project Formulation

- Did you observe any problems or gaps in the project design or approach that affected project implementation?
- Was there adequate participation of stakeholders and beneficiaries in the project formulation? (How were you involved?)
- Has the project strategy – technical support/training and RE and EE piloting, been effective? How could it have been improved?

Project Implementation

- How effective and efficient was the Project Structure in facilitating project coordination, communications, and implementation at national, provincial, and local levels? Would you have changed anything in hindsight?
- Has annual work planning and budgeting been effective? Have actual disbursements been in line with annual budgets, work plans and schedules (discuss Fin. Tables)? Were there any delays in administrative processes?
- Have the project management bodies and partners been sufficiently active in guiding and responding to issues? (examples?) Are any MTR responses incomplete?
- Have the project monitoring Indicators been effective and feasible for reporting on progress? Have they provided reliable measures of change?
- What have been the major challenges or issues in implementing the project? Are there lessons for design of future projects?

Project Results

- What aspects of the project have been most successful, and which least successful? Are there specific measures that have affected the potential for replication?
- Can you identify *the Key Factors* that have affected the project results – either positive or negative?
- What has been the most apparent change in biodiversity conservation that you have seen from the project? What gaps remain in capacity development?
- What is the most important learning or skill, if any, that you have acquired from the project trainings or demonstrations? Any post-training data?
- How have the decision support tools been used in decision making? Is there a long term vi-

sion for these tools?

- Are there any expected results that have not been completely achieved or are not fully satisfactory?

Sustainability

- Do you think that the use of RE technologies will be continued after the project closes? Why? Why not?

- Are there any exit strategies for the project? What actions could be considered to enhance sustainability? How will lessons be shared within PNG and with other countries?

Impact

- Should any further changes in government policy or regulations be considered to assist mainstreaming incentives into RE and EE implementation strategy?

- Are there any specific examples of alternative livelihoods that have succeeded in conjunction with conservation that could provide models for replication?

- Is there any empirical evidence of project impact on government RE and EE budget allocations?

Annex 10 TE Rating scales

In accordance with UNDP/GEF evaluation requirements, Project Relevance, Effectiveness and Efficiency has been rated in terms of:

6= Highly satisfactory (HS):	Level of outcomes achieved clearly exceeds expectations and/or there were no shortcomings
5 = Satisfactory (S):	Level of outcomes achieved was as expected and/or there were no or minor shortcomings.
4 = Moderately satisfactory (MS):	Level of outcomes achieved more or less as expected and/or there were moderate shortcomings.
3 = Moderately unsatisfactory (MU):	Level of outcomes achieved somewhat lower than expected and/or there were significant shortcoming.
2 = Unsatisfactory (U):	Level of outcomes achieved are lower than expected and/or there were major shortcomings.
1 = Highly unsatisfactory (HU):	Only a negligible level of outcomes achieved and/or there were severe shortcomings.

Sustainability will be rated according to the following scale:

4 = Likely (L):	There are little or no risks to sustainability
3 = Moderately Likely (ML):	There are moderate risks to sustainability
2 = Moderately Unlikely (MU):	There are significant risks to sustainability
1= Unlikely (UL):	There are severe risks to sustainability.

Annex 11 Signed Evaluation Consultant Agreement form

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United Nations Development Programme

Empowered lives. Resilient nations.

WHEREAS such Amendment will not result in a change of the **total contract value as: $19,910.00 USD**

NEVERTHELESS, all other terms and conditions of the Contract, except as amended herein, shall remain unchanged and shall continue to be in effect.

IN WITNESS WHEREOF, the Parties hereto have executed this Amendment to the Contract.

AUTHORIZING OFFICER: **United Nations Development Programme**		**INDIVIDUAL CONTRACTOR:**	
Signature:	DocuSigned by: C40FC6F4E6A34B5...	Signature:	Digital unterschrieben von HOELZER MATHIAS - Y0461862J DN: c=ES, serialNumber=IDCES-Y0461862J, givenName=MATHIAS, sn=HOELZER, cn=HOELZER MATHIAS - Y0461862J Datum: 2022.10.06 00:04:47 +02'00'
Name:	Milka Okiddy	Name:	
Title:	Operations Manager	Title:	
Date:	28-Sep-2022	Date:	

DocuSign Envelope ID: 9F4B0CED-6945-41F6-9008-3370D0F4A467

United Nations Development Programme

Empowered lives. Resilient nations.

In witness whereof, the Parties hereto have executed this Contract.

By signing below, I, the Individual Contractor, acknowledge and agree that I have read and accept the terms of this Contract, including the General Conditions of Contracts for Individual contractors available on UNDP website at www.undp.org/procurement **and attached hereto in Annex II which form an integral part of this Contract, and that I have read and understood, and agree to abide by the standards of conduct set forth in the Secretary-General's bulletins ST/SGB/2003/13 of 9 October 2003, entitled "Special Measures for Protection from Sexual Exploitation and Sexual Abuse" and ST/SGB/2002/9 of 18 June 2002, entitled "Regulations Governing the Status, Basic Rights and Duties of Officials other than Secretariat Officials, and Experts on Mission".**

□ The Individual Contractor has submitted a Statement of Good Health and confirmation of immunization.

AUTHORIZING OFFICER: **United Nations Development Programme**		**INDIVIDUAL CONTRACTOR:**	
Signature:	DocuSigned by:	Signature:	
Name:	MILKA OKIDDY	Name:	ALOIS RALAI
Title:	Operations Manger	Title:	Individual Consultant
Date:	2022-03-31	Date:	2022-03-31

Annex 12 Signed UNEG Code of Conduct form

12.1. Signed UNEG Code of Conduct form Mathias Hoelzer

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 imitations, findings, and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.
8. Must ensure that independence of judgement is maintained, and that evaluation findings and recommendations are independently presented.
9. Must confirm that they have not been involved in designing, executing, or advising on the project being evaluated and did not carry out the project's Mid-Term Review.

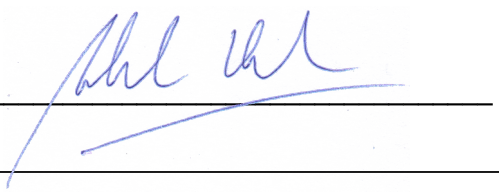
Terminal Evaluation Consultant Agreement Form

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

Name of Evaluator: **Mathias Hoelzer**

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

Signed at **Madrid** on **14 November 2022**

Signature: 

12.2. Signed UNEG Code of Conduct form Alois Ralai

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 imitations, findings, and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.
8. Must ensure that independence of judgement is maintained, and that evaluation findings and recommendations are independently presented.
9. Must confirm that they have not been involved in designing, executing, or advising on the project being evaluated and did not carry out the project's Mid-Term Review.

Terminal Evaluation Consultant Agreement Form

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

Name of Evaluator: **Alois Ralai**

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

Signed at **Goroka EHP** on **14 November 2022**

Signature: 

Annex 13 Signed TE Report Clearance form

Terminal Evaluation Report for the Facilitating Renewable Energy & Energy Efficiency Applications for Green House Gas Emission Reduction Project (PIMS# 5569) was Reviewed and Cleared by:

Commissioning Unit (M&E Focal Point)

Name: _____

Signature: _____

Date: _____

Regional Technical Advisor (Nature, Climate and Energy)

Name: _____

Signature: _____

Date: _____