Terminal Evaluation Report

UNDP-GEF Project: "Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu" (FASNETT)

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Acronyms and Abbreviations

ADB	Asian Development Bank
CEO	Chief Executive Officer
CO	Country Office
COP	Conference of the Parties
COVID-19	Coronavirus disease of 2019
CSO	Civil Society Organization
DBT	Development Bank of Tuvalu
DOE	Department of Environment
DE	Department of Energy
DOE	Department of Environment
DOG	Department of Gender
EE	Energy Efficiency
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EU	European Union
EY	Ernst & Young
FAO	Food and Agricultural Organization of United Nations
FASNETT	Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu
GEF	Global Environment Facility
GEFSEC	Secretariat of the Global Environment Facility
GHG	Greenhouse Gas
GoT	Government of Tuvalu
IEO	Independent Evaluation Office
INDC	Intended Nationally Determined Contributions
IRR	Internal Rules and Regulations / Internal Rate of Return
KM	Knowledge Management
LC	Low Carbon
LDC	Least Developed Country

M&E	Monitoring and Evaluation
MOU	Memorandum of Understanding
MPWIE	Ministry of Public Works, Infrastructure and Environment
MTET	Ministry of Transport, Energy & Tourism
MTR	Mid Term Review
NDC	Nationally Determined Contributions
NGO	Non-Governmental Organisation
NIM	National Implementation Modality
NZAid	New Zealand Agency for International Cooperation
ODA	Official Development Assistance
PIR	Project Implementation Report
PMU	Program Management Unit
POPP	Programme and Operations Policies and Procedures
PRODOC	Project Document
PV	Photovoltaic
PWD	Public Works Department
RE	Renewable Energy
ROAP	Regional Office for Asia and the Pacific
RTA	Regional Technical Advisor
R2R	Ridge-to-Reef
SDG	Sustainable Development Goals
SESP	Social and Environmental Screening Template
SIDS	Small Island Development States
SMART	Specific, Measurable, Achievable, Relevant/Results-oriented and Time-bound
STAP	Scientific and Technical Advisory Panel
TA	Technical Assistance
TANGO	Tuvalem Association of Non-Governmental Organizations
TCAP	Tuvalu Coastal Adaptation Project
TEC	Tuvalu Electricity Corporation
TM	Task Manager

TNEP	Tuvalu National Energy Policy (TNEP)
TNPSO	Tuvalu National Private Sector Organization
TOR	Terms of Reference
TWG	Technical Working Group
UAE	United Arab Emirates
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USP	University of South Pacific

1. Executive Summary

The document 'Terminal Evaluation' (TE) report has been compiled to understand the United Nations Development Program-implemented and Global Environment Facility financed Project: Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT), track its progress and see the viability for such developments in future.

Table 1: Project Information Table

Project Details		Project Milestones	
Project Title	Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT)	PIF Approval Date:	Oct 21, 2015
UNDP Project ID PIMS#)	5613	CEO Endorsement Date (FSP)/ Approval date (MSP):	June 20, 2017
GEF Project ID	9220	ProDoc Signature Date:	Feb 13, 2018
UNDP Project Business Unit, Award ID, Project ID:	FJI, Project 00101338	Date Project Manager Hired:	Aug 1, 2018
Country/Countries:	Tuvalu	Inception Workshop Date:	Aug 22, 2018
Region:	Asia & Pacific	Mid-Term Review Completion Date:	May 10, 2021
Focal Area:	Climate Change - Mitigation	Terminal Evaluation Completion Date:	03 April 2023
GEF Operational Programme or Strategic Priorities Objectives:	CCM-1 Program 1	Planned Operational Closure Date:	June 20, 2023
Trust Fund:	GEF Trust Fund		
Implementing Partner (GEF Executing Entity):	Ministry of Public Utilities and Infrastructure/Energy Department		
NGOs/CBOs involvement:	Kaupules		
Private Sector Involvement:	Development Bank of Tuvalu		
Geospatial coordinates of project sites:	8.5211° S, 179.1962° E		

Table 2: Financing Table

Financing Plan	At Project Initiation Stage	At TE Stage
GEF Trust Fund	USD 2,639,725	USD 2,639,725
UNDP TRAC resources		

1) Cash co-financing to be administered by UNDP - Total Budget administered by UNDP	**USD 2,639,725**	**USD 2,639,725**
PARALLEL CO-FINANCING (all other co-financing that is not cash co-financing administered by UNDP)		
UNDP	USD 250,000	USD 250,000
Government of Tuvalu	USD 8,250,000	USD 8,250,000
Tuvalu Electricity Corporation	USD 7,400,000	USD 7,400,000
Romanian Government Funds	-	USD 16,892
2) Total co-financing	**USD 15,900,000**	**USD 15,916,892**
Grand-Total Project Financing (1)+(2)	**USD 18,539,725**	**USD 18,556,617**

The project has been dubbed as a step in the right direction because it aligns with Tuvalu's Intended Nationally Determined Contributions (INDC) of achieving 100 percent green energy in power generation by 2025. However, due to limitations and unforeseen circumstances Tuvalu is now aiming to achieve the goals by 2030. FASNETT takes into consideration the geographical constraints faced by Tuvalu, which is a small, independent island nation that is one of the least developed countries in the world, with limited resources and geographical isolation making it tough to achieve economies of scale. The country also suffered immensely during the Covid-19 pandemic, and FASNETT also faced the brunt, leading to many delays for the project's ideal implementation. Tuvalu is highly dependent on imported energy resources, mainly petroleum products, and has lacked alternative energy resources, which limit growth. The country has been aiming to move towards renewable resources like solar, wind, biomass, and ocean energy. Tuvalu's goal to eradicate consumption of renewable energy was ratified through the enactment of Climate Change Resilience Act 2019.

Addressing the growing demand for electricity, FASNETT aims to reduce annual petroleum-based electricity by 4,570.9 MWh/yr. by mid-2021 and contribute 8,796.3 MWh/yr. in 2025 from renewable energy sources. The project aims to eliminate barriers to the cost-effective application of renewable energy technologies and promote sustainable and environmentally friendly growth in the country. FASNETT is a novel project because it is incorporating new technologies like the Floating Solar and paving way for the Energy Bill that would determine the progress of clean energy implementation. Tuvaluans would be facilitated through activities such as advocacy and promotion of EE and RE applications in curriculum and otherwise, lobbying for policies and regulations to support their implementation, establishing a regulatory framework, highlighting community-based applications of EE and RE technologies, and improving access to financial resources for financing these initiatives.

The project has been divided into four components to achieve its objective namely creating awareness, improving policies, enhancing technical capacity within the energy sector and lastly financial inclusion for EE technology applications and schemes.

Some of the instruments used for the findings are the evaluation matrix, documentation review, a list of stakeholders to be interviewed, key informant interviews, and an achievement rating. The evaluator rated project achievements using the guidance provided in the TORs, including a six-point rating scale for progress towards results and project implementation and a four-point rating scale for sustainability. The methodology includes conducting in-depth document reviews, participating in focus group discussions and key information interviews, and engaging with stakeholders. It also takes into account gender parity and women empowerment, lessons from other relevant projects among other such aims.

The TE also had its own limitations based on a planned effort of 35 days. The evaluator collected necessary evidence through documents and interviewing key stakeholders to assess project's achievement as well as shortcomings to ensure its long-term sustainability in future. The report also throws light onto the delays owing to pandemic, gaps in the data provided by the Project Management Unit, and difficulties in team building, procurement, and rising costs.

An inclusive and participative approach was used to engage stakeholders especially the main ones namely Department of Energy - Ministry of Public Utilities and Infrastructure (MPUI), the Department of Environment and the Tuvalu Electricity Corporation (TEC), followed by other government entities, NGOs, social communities, island communities, and households. Gender mainstreaming has been one of the key aspects of FASNETT, with Tuvalu National Gender Policy being an important reference point for the project. The four key policy measures include women's economic empowerment, institutional strengthening, women in decision-making, and ending VAW. Gender indicators have also been used for evaluation and although progress has been made in that regard, there is a lot of potential for further gender mainstreaming.

Looking at some of the project's achievements, FASNETT has shown the potential of embracing new technologies like Floating Solar alongside the importance of legislation. Communities have been strengthened as their focus is shifting towards green energy as well as the government realising the benefits of low-carbon products and investing in them. Some outcomes are still in progress while others are in the queue to be fulfilled in future. Overall, the project has achieved some of its deliverables and is rated as *Moderately Satisfactory (4)*

Table 3: Terminal Evaluation Ratings and Achievement Summary Table

1. Monitoring & Evaluation (M&E)	Rating[1]
M&E design at entry	4
M&E Plan implementation	4
Overall Quality of M&E	4
2. Implementing Agency (IA) Implementation & Executing Agency (EA) Execution	Rating

[1] As per the Rating Scale provided 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)

Quality of UNDP Implementation/Oversight	4
Quality of Implementing Partner Execution	4
Overall quality of Implementation/Execution	4
3. Assessment of Outcomes	Rating
Relevance	4
Effectiveness	3
Efficiency	4
Overall Project Outcome Rating	4
4. Sustainability	Rating
Financial sustainability	2
Socio-political sustainability	3
Institutional framework and governance sustainability	3
Environmental sustainability	3
Overall Likelihood of Sustainability	3

However, there are recommendations, which can help FASNETT and other such projects in the future. In accordance with the findings of this terminal evaluation, the following recommendations are suggested below

Table 4: Recommendations

Rec #	TE Recommendation	Entity Responsible	Time frame
A	Category 1: Role of Government		
A.1	It is recommended that the government takes complete ownership of the project	Government of Tuvalu	Dec 2030
A.2	Carbon Credits	Government of Tuvalu	Dec 2024
B	Category 2: Capacity Building		
B.1	It is recommended that provisions are made for capacity building	Department of Energy	Dec 2023
C	Category 3: Project Sustainability		
C.1	It is recommended to have linkages with other ongoing projects	Government of Tuvalu – Department of Energy	Jan 2030
C.2	It is recommended that a follow-up project is planned	Government of Tuvalu and bilateral entities	Dec 2023
D	Category 4: Financial		
D.1	It is recommended that fiscal incentives be provided with special attention to private sector	Ministry of Finance /Development Bank of Tuvalu	Dec 2023
D.2	It is recommended that a viable financial model is adapted	Ministry of Finance	Dec 2023
E	Category 5: Education		
E.1	It is recommended that the curriculum at all levels should include importance of RE and EE	Ministry of Energy and Ministry of Education	Dec 2023
F	Category 6: Gender		
F.1	Serious consideration for Gender Parity	Ministry of Gender, Government of Tuvalu and Ministry of energy	Dec 2024

Some lessons learnt are as listed below:

- Assessing delays in procurement contracts beforehand can reduce costs, and procuring at scale reduces logistics costs.
- Understanding idiosyncratic challenges of the economic context is crucial for accurate cost estimates and budgeting.
- Early demonstrations provide valuable insights, inform decisions, and avoid missed opportunities.
- Actively incorporating the opinions and feedback of women reduces gender bias and scepticism, fostering a more inclusive environment.
- Off-grid solutions are suitable for regions like the Pacific, including Tuvalu, due to scattered populations and decentralized solar technology.
- Identifying pockets of demand and implementing self-contained installations in those areas can be more cost-effective than traditional grid systems.
- Well-capitalised financing schemes promote household adoption of renewable energy, enhancing affordability and accessibility.
- Establishing robust financing mechanisms catered to household needs facilitate the transition to renewable energy solutions.

2. Introduction

This report presents the findings of the Terminal Evaluation ("TE") of the UNDP-implemented and GEF financed Project: Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu ("FASNETT"). The report is thematically divided into 4 main sections. Section 1 provides the Executive Summary alongside respective project, rating and financing tables followed by concise findings and lessons learnt. This section also covers details the overall evaluation framework for the TE including the evaluation approach, methodology, evaluation instruments and limitations. Section 2 introduces the FASNETT project and provides a contextual background in Tuvalu and description of the project. The main section of the report, Section 3, presents the analysis and findings of the evaluation. The analysis has been split up in 3 main sub-sections under section 3 – Project Design & Formulation, Project Implementation, and Project Results & Impact. Lastly, Section 4 provides the summary of main findings, recommendations and lesson learnt from the evaluation of the FASNETT project.

This evaluation was conducted by an independent International Evaluator. The primary audience/users of the evaluation are UNDP, the project team, government agencies. This evaluation provides an in-depth assessment of project achievements and progress towards its objective and outcomes and learnings will be useful for other similar UNDP-supported and GEF-financed projects in the region and worldwide.

2.1 Terminal Evaluation Framework

This Terminal Evaluation (TE) - a requirement of UNDP and GEF procedures - has been initiated by UNDP-GEF PIMS ID Number 5613, the Commissioning Unit and the GEF Implementing Agency 9220 for this project. This review provides an in-depth assessment of project achievements and progress towards its objective and outcomes and recommendations for other similar UNDP-supported and GEF-financed projects in the region and worldwide.

2.2 Objective/Evaluation Purpose

The Terminal Evaluation (TE) report was conducted to verify and assess the project implementation and achievement of results against what was expected to be achieved. The evaluation will promote accountability and transparency, while probing the extent of project accomplishments to identify project successes that can be replicated and draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming. Furthermore, the TE report will provide actions necessary for consolidation and sustainability of results, and provide recommendations, based on lessons drawn, to inform design of future projects.

2.3 Scope of Evaluation

As indicated in the TORs[2]The scope of this TE was to conduct an assessment of achievements of project results and the extent to which the project has successfully carried out adaptive management, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of future UNDP programming. The Evaluator framed the evaluation effort using the evaluation criteria of relevance, coherence, effectiveness,

[2] Annex E, UNDP Project Document Project Title: Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT), Pg. 89

efficiency, sustainability, and impact, as defined, and explained in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects. Under each of these criteria, evaluation questions were identified and compiled in an evaluation matrix[3].

The scope of this evaluation is thematically divided into three parts in accordance with the Guidance for Conducting Terminal Evaluation of UNDP-Supported, GEF-Financed Projects. A summary of the scope of this TE is presented below:

Project Design and Formulation:

- National priorities and country drivenness
- Theory of Change
- Gender equality and women's empowerment
- Social and Environmental Standards (Safeguards)
- Analysis of Results Framework: project logic and strategy, indicators
- 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

Project Implementation

- Review how adaptive management was implemented during the implementation of the project
- Review overall effectiveness of project management as outlined in the project document
- Review the quality of execution of the Executing Agency/Implementing Partner(s)
- Review any delays in project start-up and implementation
- Review how Results-Based Management is being implemented
- Examine the use of the project's results framework/ log frame as a management tool
- Consider the financial management of the project, including cost-effectiveness.
- Review the changes to fund allocations as a result of budget revisions and assess the appropriateness and relevance of such revisions;
- Review the decision-making processes to align financing priorities and annual work plans
- Review the monitoring tools currently being used and the project progress reporting function as well as the feedback loop for adaptive management
- Review project partnerships arrangements

[3]Mid-term Review Report April 2021 of Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT), Pg xxii

- Review stakeholder's participation and country-driven project implementation processes
- Review project communications.

Project Results

- Review the progress made against the log frame indicators and the end-of-project targets;
- Assess the stakeholders' ownership of project achievements;
- Compare and analyse the GEF Tracking Tool at Baseline with the one completed at the time of TE;
- Highlight the extent of barrier removal to enable application of RE and EE for achieving the project objective;
- Assess risks to sustainability in terms of financial risks, socio-economic risks, institutional framework and governance risks, and environmental risks.
- Review and possibly identify ways in which the project can further expand its achievements;

2.4 Methodology

The methodology that was used to conduct this TE complies with international criteria and professional norms and standards; including the norms and standards adopted by the UN Evaluation Group (UNEG) and the Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects. The TE report aims to provide evidence-based information that is credible, reliable, and useful to the project team and relevant stakeholders.

The evaluation involves the rigorous application of five principles for assessing evidence/information collected through primary and secondary data sources, given as follows:

1. **Voice and inclusion**: Consulting all relevant stakeholders with a positive discrimination towards women, vulnerable and disadvantaged groups, and any external parties that are indirectly impacted by project activities. The consultation plan is designed to ensure that opinions of stakeholders are sufficiently and appropriately captured at each stage of the evaluation and reflected in the findings of the evaluation.

2. **Appropriateness of research methods**: Key evaluation criteria were selected in accordance with the requirements of UNDP, GEF-financed projects and the discretion of the TE expert. The criteria aim to discern the relevance of the project, the effectiveness of implementation, the achieved impact of the project, and also capture and analyse the project's performance in terms of gender mainstreaming, environmental and social safeguarding, value for money and sustainability of project impacts. The TE employs a range of methods for accessing information and data collection best suited to the key informants and respondents. This will include in-depth Document Review (DR), Focused Group Discussions (FDGs) and Key Information Interviews (KIIs).

3. **Triangulation of information:** The secondary data is triangulated with the primary information gathered from the project implementers, financiers, and from

direct and indirect stakeholders. This ensures that findings are corroborated and any weaknesses in the data can be compensated for by the strengths of other data, thereby increasing the validity and reliability of the results.

4. **Contribution:** Reasonable effort would be made to ascertain attribution of project outputs to outcomes. This will involve assessing the project's Theory of Change and assumptions to validate the outputs of each project component, and logically linking the outputs to the envisaged outcomes of the project.

5. **Transparency and confidentiality**: The TE team has remained transparent to UNDP and the stakeholders about our objectives of collecting information and ensured the confidentiality of information to protect the proprietary information about UNDP and stakeholders.

The TE methodology includes conducting in-depth DRs of 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, etc.), and all relevant evidentiary and M&E documents 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)

Furthermore, the evaluation adopted 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. Stakeholders have been consulted through a series of FDGs and KIIs. Stakeholder involvement includes interviews with stakeholders who have project responsibilities, including but not limited to 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.

Information collected has been triangulated and assessed against key criteria to evaluate project performance against the intended outcomes and provide explanations/justifications of the attribution of direct intended results and any indirect results of the project. The selected criteria for evaluation of the FASNETT project are provided as follows:

- **Relevance:** The extent to which the intervention objectives and design respond to beneficiaries, global, country, and partner/institution needs, policies, and priorities, and continue to do so if circumstances change.

- **Effectiveness:** The extent to which the intervention achieved, or is expected to achieve, its objectives, and its results, including any differential results across groups.

- **Efficiency:** The extent to which the intervention delivers, or is likely to deliver, results in an economic and timely way.

- **Impact:** The extent to which the intervention has generated or is expected to generate significant positive or negative, intended, or unintended, higher-level effects that contribute to the achievement of Tuvalu's goal of 100% RE share in the energy mix by 2025.

- **Gender:** The extent to which gender mainstreaming has been considered in project design, implementation, and results measurement.

- **Results Framework:** The extent to which the project results framework logically connects the project Theory of Change with the intended outcomes.

- **Challenges and Adaptive Management:** Overall project progress in light of various circumstances (such as COVID-19), risks and other challenges during implementation. In addition, discerning the extent of the management's ability to adapt to circumstances based on the evaluation of the adaptive management actions that the PMU/IP has carried out during the project implementation.
- **Financial Management:** How well was the financial planning and budgeting for the project. Furthermore, to what extent was the co-financing realised.

- **Sustainability:** The extent to which the net benefits of the intervention continue or are likely to continue.

- **M&E Design and Implementation:** The extent to which the project's M&E functions are suited capture the intended direct results and indirect results of the project.

- **Stakeholder Engagement:** The extent to which all relevant stakeholders were engaged during the project inception and implementation phases.

- **Social and Environmental Standards (Safeguards):** The extent to which the project has considered E&S safeguarding requirements during the design phase and how well have the safeguards be implemented during project implementation.

- **UNDP & GEF Additionality:** The extent to which achievement of FASNETT objectives can directly be attributed to the involvement of UNDP and GEF.

This terminal evaluation report documents the achievements of the project; it includes 4 chapters. Chapter 1 presents the main conclusions, recommendations, lessons learned and ratings; Chapter 2 presents an overview of the project; Chapter 3 briefly describes the objective, scope, methodology, and limitations of the evaluation; and Chapter 4 presents the findings of the evaluation. Relevant annexes are found at the end of the report.

2.5 Evaluation Instruments/Data Collection and Analysis

To conduct this evaluation the following evaluation instruments were used:

1. **Evaluation Matrix:** An evaluation matrix was developed based on the evaluation scope presented in the TORs, the project log-frame, and the review of key

project documents (see Annex 5). This matrix is structured along the six evaluation criteria and includes all evaluation questions; including the scope presented in the guidance. The matrix provided overall directions for the evaluation and was used as a basis for interviewing people and reviewing project documents.

2. **Documentation Review:** As part of the evaluation methodology, all relevant documents were reviewed in depth to extract information for delivering the objectives of the TE. A list of documents was identified during the inception phase and further documents were considered during the data collection and later phases. A list of documents reviewed as part of the assignment is provided in Annex A.

3. **List of Stakeholders Interviewed:** A list of Stakeholders interviewed was constituted during the preparatory phase of this TE (see Annex A). This list was reviewed to ensure that it represents all project Stakeholders and adequately, and appropriately captures a broad scan of Stakeholders' views during the data collection phase.

4. **Key Informant Interviews:** Stakeholders were interviewed, ensuring that a proper balance of men and women were selected (see Annex A). The semi-structured interviews were conducted using the interview protocol adapted for each interview. All interviews were conducted remotely. Confidentiality was guaranteed to the interviewees and the findings were incorporated in the final evaluation report.

5. **Achievement Rating:** The Evaluator rated project achievements using the "TE Ratings" guidance provided in the TORs. It included a six-point rating scale to measure progress towards results and project implementation and adaptive management and a four-point rating scale for sustainability (see Annex A).

2.6 Ethics of the Evaluation

While composing this report, the evaluator made sure of the ethical implications of the evaluation process. Confidentiality of all information was ensured including the identity of any participant as well as disclosure of sensitive information. Informed consent for all engagement related to evaluation and interviews was sought with an option given to opt out, if need be, and the evaluator remained unbiased and objective in all their proceedings making sure their opinions had no influence on the findings. Cultural sensitivities were also given immense importance and the well-being of all participants and stakeholders was ensured. The evaluator is aware that they would be responsible for any errors or inaccuracies. Transparency and accuracy have also been ensured during the completion of this report.

2.7 Limitations

The approach for this terminal evaluation is based on a planned level of effort of 35 days. It comprises an effort to collect evaluative evidence through documents and interviews of stakeholders. Within the context of these resources, the Evaluator was able to conduct a detailed assessment of actual results against expected results and successfully ascertains

whether the project has met its main objective - as laid down in the project document - and whether the project initiatives are, or are likely to be, sustainable after completion of the project. The Evaluator also made recommendations for any necessary corrections and adjustments to the overall project work plan and timetable for reinforcing the long-term sustainability of project achievements.

It has also been observed that there were multiple reasons for the delays that range from aftermath of the pandemic leading to travel restrictions in the region alongside considerable gaps in the information provided by the Project Management Unit. It became difficult to schedule and conduct interviews of the PMU and government representatives, which hampered the progression. The progress reports provided were also outdated and the data was incomplete and a challenge to work with.

3. Project Description

3.1 Tuvalu's Background:

Tuvalu is a small, independent island nation, with a land size of only 26 square kilometres. It is the third-least populous sovereign state in the world (approx. 12,000), and one of the Least Developed Countries (LDC). The island's small size coupled with limited resources and geographical isolation makes it almost impossible to achieve economies of scale in any sector. Tuvalu is one of the most environmentally fragile states in the Pacific and is extremely vulnerable to climate change owing to rising ocean level, beach erosion alongside natural disasters such as typhoons and tropical storms. The atoll country was successful in achieving an impressive GDP growth of 13.8% in 2019, which plummeted to 1.5% in 2020. However, it is now on a recovery trajectory as it posted GDP growth of 3% in 2021 closing 2022 with a GDP growth rate of 2.5% with expectations of touching 2.7% in 2023. A commodity super cycle also shook Tuvalu, as rising energy and commodity prices resulted in supply-driven inflation, as it increased from 1.6% in 2020 to almost 10% in 2022.

A major constraint on Tuvalu's development is the high dependency on imported energy resources, mainly petroleum products, whereas alternative national energy resources are poorly developed. High fuel prices and the volatility in the same have a destabilising effect on businesses and households, limiting growth, and reducing food security, especially in the outer islands. Moreover, given the country's vulnerability to climate risks, it has become imperative to ensure that efforts to support economic growth in the country are climate-smart and consider environmental and social sustainability.

Renewable energy (RE) resources such as solar, wind, biomass and ocean energy have been recognised as potential energy alternatives in the country. The Government of Tuvalu declared in the 2009 Tuvalu National Energy Policy (TNEB) that 100% of the country's electricity would be produced from renewable energy sources by 2020 — a goal that could not be reached.

In November 2015, after signing the Paris Agreement on Climate Change, the Government submitted its Intended Nationally Determined Contributions (INDC) to UNFCCC, confirming a national goal to reduce Greenhouse Gas (GHG) emissions through electricity generation by 100%, and reach almost zero emissions by 2025 using renewable energy sources and energy efficient technologies. The goal was ratified through the enactment of the Climate Change Resilience Act (2019).

3.2 Project FASNETT

Funded by the Global Environment Facility ("GEF"), and co-financed by the UNDP, the Government of Tuvalu ("GoT"), and the Tuvalu Electric Company ("TEC"), project 'Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu ("FASNETT")' came about. The project focused on facilitating development, and utilisation of feasible renewable energy resources as well as application of energy efficiency technologies. FASNETT aims to achieve the Government of Tuvalu's updated target of reducing GHG from

the power sector by 100 percent until 2025 based on the INDC proposed in November 2015. According to the Master Energy Plan for the period 2012-2020 formulated by the GoT, commencing from year 2020, the net electricity demand was expected to grow at 2% yearly, in line with the expected GDP growth. This has been considered starting from 2017, and until 2025, but only for Funafuti. For the outer islands, a more aggressive and perhaps realistic 4% annual growth rate has been considered to take into consideration that the outer islands only account for 15% of the total electricity consumption in Tuvalu and their inhabitants are more likely to acquire more appliances similarly to Funafuti.

FASNETT has been expected to reduce annual petroleum-based electricity by 4,570.9 MWh/yr. by mid-2021 or at the end of the project ("EOP") in Year 4. It targets to contribute 8,796.3 MWh/yr. in 2025 or 5 years after the EOP from RE-based electricity of 8,288.2 MWh/year.

The facilitation or enabling objective of the project was meant to address, i.e., eliminate the identified barriers to the cost-effective application of RE technologies using Tuvalu's indigenous RE resources. It also looks at the effective and extensive application of EE measures and techniques that are in line with low carbon development and involved in the sustainable development in the country, through an approach that removes barriers assuring a sustainable and environmentally friendly growth.

3.2.1 Immediate and development objectives

The project addresses the enhanced utilisation of feasible RE resources, alongside optimal and efficient utilisation of energy for supporting socio-economic development of Tuvalu, while also contributing to the realisation of the country's energy targets. This essentially covers the following:

● Design and implementation of an improved advocacy and promotional program to improve awareness and attitude towards EE and RE applications in the public and energy sectors;

● Formulation and advocacy work to lobby support for the approval and effective enforcement of policies, regulations, and projects on the application of EE and RE technologies in the energy sector;

● Establishment and implementation of an official institutional framework and mechanism for the regulation of the energy sector. It also aims at enforcement of energy policies and regulations that among others, support RE and EE applications, and facilitate low carbon development;

● Showcasing of more community-based application EE and RE technologies, as well as integrated energy planning and policy implementation, including the design and implementation of energy- related aspects of low carbon development; and,

● Improving the availability/access to financial resources (local and foreign) for financing RE and EE initiatives, including the implementation of a low carbon technology application program and other financial instruments.

The objective indicators are as follows:

- Percentage share of RE in the national power generation mix. The targets (%) have had to transition from 26% to 44% at project mid-term, followed by 67% at the end of project.
- Cumulative GHG (CO_2) emission reduction from power generation with targets (tons CO_2) transitioning from zero to 5,000 at project mid-term, to 15,000 by the culmination of project.
- Number of women actively involved in the planning and implementation of energy services provision in the outer islands. Their targets are from 0 to 5 at project mid-term, reaching 10 by end of project.

3.2.2 Problems that the project sought to address:

According to the Project Document, the FASNETT project aims to address the various challenges in the country which limited the adoption of cost-effective RE and EE technologies. The following barriers were identified:

- Low level of awareness and knowledge of local authorities and the public in Tuvalu both in the main island of Funafuti and in the outer islands.
- Lack of policy focus and regulatory initiative towards the sustainable promotion and application of low carbon development initiatives.
- Technical capacity gap of the energy sector (including public works and utility) in design, engineering, operation and maintenance of low carbon energy generation and supply infrastructures, as well as major energy consuming public infrastructure projects.
- Lack of access and available financing for low carbon development initiatives in Tuvalu.

3.2.3 Description of the project's Theory of Change

The Project Document[4] provides a strategy that maps out a definite pathway of developmental theory of change for realising the envisaged outcomes of the project. According to the project strategy, the FASNETT project aimed to facilitate the uptake of appropriate and cost-effective RE/EE technologies in Tuvalu through removing barriers to adoption by demonstrating the application of such technologies and developing and implementing policies, institutional and

[4] The UNDP Programme Project Document 'Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT)' gives a detailed description of the instances of theory of change, Pg 101-107

financing support mechanisms. Thereby, contributing to the achievement of the country's INDCs for 2025[5].

The FASNETT objective is anticipated to be achieved through the implementation of four project components which are aimed at addressing specific barriers to the adoption of efficient and cost-effective RE and EE Technologies in Tuvalu. Each project component and the problem it sought to address is described, as follows:

Component 1: Raising Awareness Regarding RE and EE Applications

This component intends to address the barriers related to the low level of awareness and knowledge of local authorities and the public in Tuvalu both in the main island of Funafuti and in the outer islands. The premise was to look at the concepts, principles, technologies, and practices associated with low carbon development, which are essential in meeting the country's EE and RE targets.

The envisaged outcome of this project component is to improve awareness and attitude towards sustainable RE and EE technology applications in the public, commercial and energy sectors.

Component 2: Energy Policy Improvement and Institutional Capacity Building.

This component aims to eliminate barriers related to policies and regulations that hinder sustainable promotion and application of low carbon development initiatives that will contribute to the achievement of Tuvalu's EE and RE targets. It also caters to the obstacles related to the weak institutional framework in the crosscutting areas of energy, utilities, and infrastructure in Tuvalu.

The envisaged outcome of this project component is to develop coherent and integrated implementation of enhanced policies, regulations and projects on energy development and utilisation with the country's energy act in support of national economic development.

Component 3: Applications of RE & EE Technologies & Techniques.

This component focuses on the need to enhance the technical capacity of the energy sector (including public works and utility) in design, engineering, operation and maintenance of low carbon energy generation and supply infrastructures, as well as major energy consuming public infrastructure projects. It also addresses the low level of knowledge of energy consumers in the viability of EE and RE technology applications in public sector infrastructures and services, which will contribute to the realisation of the EE and RE targets of the country.

The envisaged outcomes of this project component have been:

[5] Reduction of GHG emissions from the electricity generation (power) sector, by 100%, i.e., almost zero emissions by 2025 through the use of RE resources and EE technologies.

(1) Enhanced energy utilisation efficiency, development, and application of feasible renewable energy resources in support of national economic development;

(2) Increased application of viable climate resilient RE and EE technology applications in the country.

Component 4: Financing of RE and EE Initiatives.

This component will take into account barriers related to the lack of access and available financing for low carbon development initiatives in Tuvalu. Since the implementation of EE and RE initiatives is necessary in meeting the respective targets of the country, the availability of financing for such projects is important.

3.2.3 Expected results

(1)**:** Increased application of viable climate resilient renewable energy and energy efficiency technology applications in the country; and

(2) The Government of Tuvalu, the financial sector and donor agencies providing accessible financing for climate resilient renewable and energy efficiency projects.

3.3 Summary of Main Stakeholders

The project takes an inclusive approach to engage relevant stakeholders, including the Department of Energy - Ministry of Public Utilities and Infrastructure, Department of Environment, and Tuvalu Electricity Corporation, representing the Government of Tuvalu. Other key stakeholders identified include public works and infrastructure, water and sanitation sectors, financial institutions, and island communities. The project document defines the stakeholders' roles and involvement, which encompass government entities, NGOs, social and civic groups, island communities, households, local councils, and the Department of Gender and Tuvalu National Council of Women. Gender mainstreaming guidelines also prioritise engaging women stakeholders in project activities.

4. Terminal Evaluation Findings

4.1 Project Design/ Formulation

This section discusses the assessment of the formulation of the project, its overall design and strategy in the context of Tuvalu in the Pacific.

4.1.1 Project Strategy/ Theory of Change, Assumptions & Risks

The strategic considerations for selecting the appropriate RE/EE technologies for demonstration were addressed during the PPG Study and were explained in detail in the Project Document[6]. Several RE technologies were considered as demos under the FASNETT project including, solar PV, concentrating solar power generation, electricity generation from biomass combustion or gasification, and other similar technically and economically feasible RE technologies that exist in the region. Along with the expected demonstration results, replication initiatives for scaling-up of the application of RE/EE technologies were also included as part of the proposed project implementation[7].

Analysis of the project strategy indicates that the project was supposed to be country-driven by design. While the project demos were developed on strong technical grounds, a critical element that was not adequately factored in was that the country is yet to have an in-house capacity for such an approach to be viable. Insights from the KIIs revealed that the Department of Energy, which is the implementing partner, suffered from technical capacity gaps and did not have enough internal bandwidth to allocate enough people to remain focused on the project as there were other on-going commitments. Despite having carried out a capacity assessment of the project implementing partner during the PPG phase, which detected low institutional capacity, UNDP still agreed with the Government to go for the Nationally Implemented Modality (NIM) with DoE as executing agency. An important consideration for the project strategy should have been to build internal capacities of the partner institutions that were directly involved in the project implementation and other relevant stakeholders that would play a part in sustaining such initiatives in the future.

Moreover, there was limited evidence at the design stage to support the notion that impacts as a result of the project demos would sustain post-project closure. Given the heavy reliance on external expertise for the installation of the project demos, there is an obvious capacity gap at the local level. While the project does focus on capacity building of institutional stakeholders and communities, the extremely limited availability of technical expertise at the local level pose challenges and risk to the sustainability and replicability of such initiatives post-project closure. Similarly, as part of the project activities to address the financing barrier, there was adequate interaction with the Tuvalu Development Bank ("TDB") and knowledge sharing to

[6] Annex K in the UNDP Programme Project Document 'Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT)' explains in various tables the energy consumption and GHG emissions in Tuvalu alongside the results of projects installing RE and EE and possible reduction of GHG until 2025, Pg 125-144

[7] Scaling up is necessary for sustainability and ensuring that the costs are reduced for RE and EE to remain accessible in future, UNDP Programme Project Document 'Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT)', Pg 50-56

design appropriate financing facilities for supporting RE and EE technology adoption by the private sector. However, as also highlighted in the MTR, the financing needs of the private sector and individuals at the project design stage were not known . Given that the adoption of RE and EE technologies by the private sector entities has significant Capital Expenditure ("CAPEX") requirements, the quantum and type of financing required by individuals and businesses should have been more elaborately explored during the design stage to ensure the appropriateness and level of adequacy of the project activities that respond to the financing barriers.

Furthermore, the main assumptions of the project were that regional oil prices will be levels that make RE/EE technologies competitive and cost-effective, political stability in the country is sustained, there is acceptance of community of RE/EE application and financing institutions will continuously support RE/EE projects. However, the cost-effectiveness and competitiveness of RE and EE technology was significantly influenced by the costs related to logistics and procurement of technology from international suppliers, which were correlated with international oil prices. The same was further deteriorated by supply chain shocks post-pandemic which further increased logistics costs. Furthermore, the assumption that financial institutions would support RE and EE projects is not strong considering the low-risk appetite of financial institutions in Tuvalu and their aversion to engage in capital intensive project finance.

The underlying assumptions for the project outputs were made of an easy achievement of the national target based on an assessment in mid-2016 of RE contribution of 42% and existing baseline projects in 2017. Sector developments in pipeline (i.e.: Convention centre, rebuilding of Government houses, housing, institutional expansion including school renovations and hospitals branches in outer-islands, and private sector developments), existing competing land or property interests on Funafuti, and migratory patterns for population increase were also considered.

With regards to risk management, the project document identified some risks that could affect the realisation of the outcomes and objectives of the project and asserted that the project was designed to address and mitigate these risks. A key risk that was identified was the limited capacity of local stakeholders involved in project implementation, and over reliance on external expertise for the project demonstrations. Other risks that were highlighted were limited project ownership by the Government of Tuvalu and also acceptance by the local communities, and logistical challenges in procurement due to the geographical location of the country.

Overall, the project design was aligned with the national objectives of meeting Tuvalu's INDCs for 2025, however there was some level of disjunction between the project strategy and the contextual realities, at the design stage.

4.1.2 Analysis of the Strategic Results Framework

The logic model of the project is presented in the Strategic Results Framework as per standard UNDP-GEF format, with baselines, targets and data sources fully specified. The framework provides outcomes, under each project component, to be released for achieving the overarching objectives. Each project outcome is expected to be realised through the delivery of specific project outputs and the level achievement is tracked through outcome indicators and specified

targets for each. The summary of the results framework is provided in Annex G[8]. Reporting has been carried out through project implementation reports, which track progress against targets and provide recommendations for course correction.

The Strategic Results Framework clearly links the selected outputs and activities to the project's core strategy (theory of change) of removing barriers to the application of RE and EE technologies. The outputs are accompanied by SMART, results-oriented indicators that measure all of the key expected changes identified in the theory of change, each with credible data sources, and populated baselines and targets, including gender sensitive indicators. Lastly, the project has taken into account the contributions, impacts, and benefits of community-based EE and RE technology applications, including children and indigenous people, and gender mainstreaming impacts of the project. Performance on gender results was incorporated as part of the project monitoring.

However, a major weakness of the Strategic Results Framework is that, while the outputs contribute to the overarching project objective, the targets for the objective level indicators, specifically objective indicator 1 and 2, cannot be directly attributed and specifically tied to the FASNETT project, due to a number of factors discussed in the report. Also highlighted in the MTR[9], the objective level indicators can be the result of national policy and accumulated impact of multiple RE/EE projects (from ADB, WB, FASNETT, etc.) that are on going, planned and those that will be implemented as enabled by the enactment of the FASNETT-facilitated Energy Act and its IRR. However, the FASNETT project activities and outputs have limited direct contribution to the objective level indicators and are not at adequate levels to produce at such a scale on a national level. This is evident from the latest Project Implementation Report (PIR) as while the overall project implementation is moderately on-track, the objective level indicators have actually regressed from the initial baseline levels. While the initial Project Document presented a scenario for achieving the country's overall goal of 100% GHG reduction through RE/EE applications, based on assumptions and estimations that consider the direct results of FASNETT and other baseline projects[10] that would be augmented by the FASNETT, the considerable growth in energy demand along with the risks and challenges to implementations were not anticipated at the design stage.

As of now, a national energy planning methodology and analytical tool has been incorporated in the project and would build on the annual planning carried out by TEC and DOE.

4.1.3 Linkages between the Project and Other Interventions

The FASNETT project design benefited from the experiences of other RE and EE application and support projects in Tuvalu and subsumed specific activities of the ongoing TEC projects

[8] The UNDP Programme Project Document 'Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT)'

[9] Mid-term Review Report April 2021 of Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT), Pg 17

[10] Annex J: UNDP Programme Project Document 'Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT), Pg 118

to enhance and deliver them as part of the FASNETT activities. Several ongoing and planned projects were identified during the PPG phase[11] and a baseline scenario was presented.

Based on this, an integrated approach was developed by which the FASNETT incorporated and built-on the existing and planned projects related to RE and EE application. Details of the baseline projects and the estimation of generation capacity, energy generation, saving potential and GHG reduction of the Business-as-usual (BAU) were also provided in the Project Document[12]. The FASNETT project designed appropriate enhancements to the baseline projects; the Project Document provides a list of initiatives, which are incremental projects, envisaged to be delivered under the FASNETT project[13].

The FASNETT includes and involves many national systems and coordination mechanisms for its activities and outputs, particularly in: policy making (commitment in the 2015 INDC, Energy Law, National Energy Policy, National Gender Policy); RE/EE equipment procurement; monitoring and evaluation (adherence to the 100% GHG reduction goals); capacity development in the outer islands; information dissemination; resource budgeting; etc.,. Hence, by design the FASNETT provides a development pathway that directly influences, augments, and integrates other interventions related to RE and EE applications, building linkages and synergies for realising Tuvalu's INDC for 2025 (which is now moved to 2030 in view of the general slowdown brought by the aforementioned factors).

Although, given that the FASNETT is a national initiative in scope, building new linkages, beyond what were established during the initial design phase, should have been a key component of the project. However, activities that proactively focused on this aspect were not considered. As a result, there has been very limited interaction between the PMU and other on-going projects during project implementation, and new opportunities and potential synergies have not been taken advantage of. For instance, the Tuvalu Fisheries Department installed a biogas digester in the Funafuti Fish Market to convert fish waste into biogas for cooking and lighting. This project should have been selected as an incremental project as it deals with a major aspect of energy consumption in households, especially in the outer Island Communities.

A key recommendation would be that a research study is conducted that landscapes RE and EE initiatives in the country and identifies potential projects and interventions that can be linked to the FASNETT or tied into a future follow up project.

4.1.4 Lessons Learned from other Projects

The design of the project benefited from experiences in similar developing countries, particularly among the PICs in the Pacific region, in the development and utilisation of feasible renewable energy resources and application of energy efficiency technologies. A number of RE/EE projects are being implemented in this thematic area, taking into account not only national capacities, but also regional and global market opportunities. Tuvalu has signed a

[11] Annex L: Results of the PPG Study on possible RE/EE projects to be covered by the FASNETT, UNDP Programme Project Document 'Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT), Pg 145

[12] Annex K: UNDP Programme Project Document 'Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT), Pg 125

[13] UNDP Programme Project Document 'Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT), Pg 14

number of agreements on bilateral, regional, interregional, and multilateral bases in different levels of cooperation, including technology and knowledge transfer, research and development, and trade and investments.

The FASNETT project fosters cooperation in exchange of experiences (success and failures) and supports the implementation of national and regional RE and EE policies for the development and application of RE/EE technologies. Furthermore, the project considers, as part of its activity inventory, activities on policy research, analysis, and assessment on low carbon community development, as well as institutional mechanisms applicable to Tuvalu considering experiences in successful implementation and lessons learned in other similar small island developing states (SIDS) and their impacts (social, economic, and environmental). Tuvalu can also plan to package its carbon credits and mobilise it for RE as a similar move has been done in Vanuatu, which was able to catalyse U$6 million in this regard.

4.1.5 Stakeholder Participation

The project adopts a participative approach and inclusive strategy for engagement of relevant stakeholders. The main stakeholders of the project are the Department of Energy - Ministry of Public Utilities and Infrastructure (MPUI), the Department of Environment and the Tuvalu Electricity Corporation (TEC), which together are acting on behalf of and fully designated by the Government of Tuvalu (GOT), as the Implementing Partner (IP) in the National Implementation Modality (NIM).

The other key stakeholders in the public works and infrastructures, water and sanitation, the banks/financial institutions and island communities were also identified in the project initiation phase. A list of stakeholders and their roles/stakes in the project were defined in the project document. Along with concerned government entities, it included NGO, Social community and the other social/civic groups, Island communities and households, Kaupules (outer islands local councils), and also the Department of Gender, Tuvalu National Council of Women. Furthermore, as part of the gender mainstreaming guidelines, plans for engaging women stakeholders as part of each project activity were included in the project document.

During the project initiation phase, a Logical Framework Analysis workshop was conducted for the purpose of verifying and firming up the project results framework**,** i.e., the project planning matrix (log frame) presented in the GEF-approved FASNETT PIF. Most of the identified stakeholder and partners were engaged and their views and inputs on the project barriers, challenges, and risks, as well as opportunities were solicited and captured. Furthermore, the endorsed Project Initiation Plan included consultation of stakeholders and project partner coordination meetings to establish an appropriate project implementation, management arrangements and development of an organisational structure for governing the project.

However, as per the MTR, outer-island local government and island communities on Funafuti were not consulted during the Inception phase. Furthermore, based on the timeline presented in the Inception Report, there was no multi-stakeholder workshop to complement the findings during the PPG phase. Moreover, some key stakeholders were not included in the project design phase, especially the two key umbrella organisations Tuvalu Association of Non-Governmental Organisations and Tuvalu National Private Sector Organisation; the local project Saugavaka for Piggery Relocation; and the educational institutions University of the South Pacific (USP).

4.1.6 Gender Responsiveness of Project Design

The participation and involvement of women is one of the primary outcome indicators at the overall objective level, where a target is the "number of women actively involved in the planning and implementation of energy services provision in the outer islands." The project design referred to the Tuvalu National Gender Policy, including the Strategic Action Plan 2014-2016 that focused on four key policy measures: Institutional strengthening and capacity building, Women's economic empowerment, Women in decision-making, and Ending violence against women as a result of the Stock Taking and analysis in 2013.

In the design work, the PPG Team has referred to available gender analysis at the national level gender studies and assessments, e.g., Stock take of the Gender Mainstreaming Capacity of Pacific Island Governments – Tuvalu (SPC 2013) and the Tuvalu National Gender Policy (2014-2016). On this basis, the Logical Framework of the project included gender indicators, e.g., number of women actively involved in the planning and implementation of energy services provision in the outer islands, to make sure that the project attends to relevant gender issues at least at the Outcome level. The indicator/target can be expounded during the Inception phase when stakeholders meet and plan details since gender planning requirements need to be taken alongside other overarching national objectives contained in the National Gender Policy and Action Plan as mentioned above.

To reach the overarching goal of gender equality and empowerment of women, an important contribution should be application of RE/EE technologies in community-based projects. The FASNETT project design includes updating of relevant gender mainstreaming policy and guidelines in the project action plans and strategies during implementation.

The project document presents opportunities for involvement of women in both management and technical departments of the Tuvaluan Government and in implementation of the project. This was expected to be reached with gender-sensitive policies in the energy sector and the energy end-use, e.g., women's participation in projects that promote or enhance women-owned and women-operated businesses that make use of RE-based energy or energy efficient appliances. A specific annex to ProDoc covered gender mainstreaming and women as key stakeholders in the project[14].

A gender mainstreaming survey was planned during project implementation and had been carried out in May/June 2020. The purpose of the activity was to identify potential opportunities to further assess and enhance the role of women in the deployment of low carbon technologies and mitigation options. Another aim was to produce gender-sensitive policies in the energy sector and the energy end-use sectors, recognising the possible contributions of women in the management and implementation of climate change mitigation measures, for example, their participation in projects that will promote or enhance women-owned and women-operated businesses that will make use of RE-based energy, or energy- efficient appliances. Based on the findings and recommendations of the survey, the initial gender mainstreaming policies and guidelines would be updated and incorporated in the Project's

[14] Annex M- United Nations Development Programme Project Document: 'Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT), Pg 154-156

action plans and strategies. The survey also aimed to capture It also recognises the possible contributions of women in the management and implementation of climate change mitigation measures.

The survey was carried out in Funafuti owing to it being the busiest hub and 200 individuals were interviewed, 100 being women and the other 100 being men with their age groups being further divided equally into young and old, respectively. Focused Group Discussions and key informant interviews were conducted to gauge the response of the community members. It appears that young women are keen to partake in research about such projects and are happy about the benefits of solar as it gives stable electricity and thus access to the internet. The older women also echoed similar views but added that their views were not taken into account before the projects were launched. Both groups of younger and older men also felt that the research teams did not consult them before the projects were launched, although they are welcoming of the projects and would like the maintenance of products like solar. There was a unanimous consensus regarding consultation and awarding scholarships to TEC employees and Tuvaluans in energy subjects, especially women.

4.1.7 Environmental and Social Safeguarding

Similar to that in the other PICs, the environmental situation in Tuvalu may have some social and environmental factors that would affect the implementation of, and benefits from, the project. During the project design phase, an environmental and social assessment was conducted, and potential social and environmental risks were identified and described. The project's use of safeguards are reflected in the UNDP Social and Environmental and Social and Environmental Screening Template (SESP), which was presented as an annex to the project document. Furthermore, the annual PIR reporting to GEF included tracking of any environmental and social grievances during the project implementation to ensure they are appropriately addressed.

According to initial environmental and social screening, the project risk was rated low. Therefore, no EIA/ESIA was done for any of the demonstration project sites during the PPG phase, and no such study was carried out for the floating solar panels, and the two alternative sites of Niutao and Nanumaga were not considered. Similarly, no field scoping or assessment of the environmental management was conducted for the Tafua site, where the floating solar panels were planned. Although a light environmental assessment and development of an environmental management plan was included as part of the TOR for the procurement of the floating solar panels.

4.1.8 Management Arrangements

The project is implemented and managed following UNDP's National implementation modality (NIM) according to the Standard Basic Assistance Agreement (SBAA) between UNDP, the Government of Tuvalu, and the Country Programme), but supplemented by UNDP Country Office (CO) support arrangement covered by applicable guidelines and manual of procedures for such arrangements. The management arrangements for the FASNETT were:

- The project has its office in Funafuti and is supported by two UNDP offices. The UNDP Pacific Office in Fiji (Suva) provides programmatic oversight while UNDP Bangkok Regional Hub provides technical oversight and ensures fiduciary compliance of UNDP/GEF. The Government of Tuvalu has the overall role as the Implementing Partner in the National

Implementation Modality (NIM). According to the project document, the designated implementing partners of the project are, additional to ED/MPUI (now Department of Energy/Ministry of Transportation, Energy and Tourism or DE-MTET) and the Tuvalu Electricity Corporation (TEC). After the MTR, the roles DE-MTET and TEC were further clarified regarding the project implementation, i.e., DE-MTET was maintained as the Implementing Partner of UNDP (being one of the Implementing Agencies of GEF) on behalf of GoT, while TEC takes the role of Responsible Party[15] as worded in the Project Document, considering its technical, implementation and management capabilities and interest in the RE power projects. It highlighted the following:

- The Implementing Partner for the FASNETT project is the Government of Tuvalu (GOT) represented by the Department of Energy under the policy umbrella of the Ministry of Public Utilities and infrastructure (ED/MPUI). The Implementing Partner is responsible and accountable for managing this project, including the monitoring and evaluation of project interventions, achieving project outcomes, and for the effective use of UNDP resources.
- The IP will designate a Responsible Party who will take charge of the project operations.
- The Responsible Party for this Project is the Tuvalu Electricity Corporation (TEC), which will act on behalf of and as designated by the Implementing Partner on the basis of a written agreement or contract defining specific roles, duties, and responsibilities to act also as the Project Manager purchase goods or provide services using the project budget consistent with project goal and objective.

After the MTR, a Memo Order was issued by MTET to clarify roles of DOE and TEC in project implementation and the sharing of project areas/components assignments to fast track the progress. The General Manager of TEC assumed the role of Project Manager starting January 2022 (with the discontinuance of the services of the acting Project Manager) and has continued to take increased involvement in project implementation. A Project Support Coordinator was assigned by UNDP Pacific Office to augment the lean PMU staff.

- The Project Board consists of representatives of UNDP Pacific Office, UN Joint Presence Office in Tuvalu, Ministry of Transportation, Energy and Tourism - Department of Energy (DE-MTET), and Tuvalu Electricity Corporation (TEC). The Board is the decision-making body at policy level, and responsible for review of the project implementation, endorse the annual work plans, and decide on major and significant changes e.g., in the results framework, including governance and management arrangements.
- The Senior Beneficiary, DE-MTET, TEC and the Outer Islands represent the interests of the project beneficiaries. The Project Board is responsible for ruling by consensus, but in case this cannot be reached, final decision rests with the UNDP Pacific Office Resident Representative. Project Board decisions should be made in accordance with

[15] The definition and responsibilities of Implementing Partner and Responsible Party are provided and elaborated in the FASNETT Project Document, pg. 60-61.

standards that shall ensure management for development results, best value for money, fairness, integrity, transparency, and effective international competition.

The Evaluation finds that the management arrangements were inadequate for the implementation of the project. While clear roles and responsibilities for all parties were provided, the implementing partner, the DOE, suffered from severe technical capacity gaps and institutional bandwidth to manage the implementation of the project. Furthermore, TEC had more technical capacity and was initially supposed to be the main implementing partner but was later appointed as 'responsible party' and with a limited supportive role of providing information.

A major problem that occurred since the inception and caused a delay was regarding the Project Management Unit because the leadership had to be changed. The new person was not deeply aware about the project and had to be guided through every step, which slowed the initial timeline in 2019 especially finding the appropriate technical expertise to achieve the demonstrations. By early 2020, a revised plan regarding the design and implementation for operations and installations was ready.

Furthermore, the PMU budget is 5 percent of the total budget cost, which means that it takes a hit when unforeseen circumstances, like COVID-19 in FANNETT, occur. Whenever projects are extended, there is almost no remaining cost for PMU. When governments are approached for supporting the PMU, they often do not have the means. For an LDC, a PMU budget of at least 20 percent should be considered to factor unforeseen costs that can arise due to systematic events and also idiosyncratic risks such as low technical capacity.

On the other hand, the Project Board provided an effective way to communicate and raise concerns regarding the implementation issues and challenges of the project, while also advising on strategies as resolutions to the issues raised and providing possible course corrections. Overall, the project board effectively monitored the overall progress of the project and in overseeing the implementation.

4.2 Project Implementation

This section discusses the assessment of how the project has been implemented. It assessed how efficient the management of the project was and how conducive it was to contribute to a successful project.

4.2.1 Adaptive Management

Project execution was delayed significantly due to the emergence of a pandemic that led to a lockdown across the globe and a breakdown in global logistics supply chains. The pandemic was effectively a force majeure event that affected the timelines of the project, while also significantly delaying procurement that had to be done. Furthermore, travel lockdowns significantly reduced mobility. The relevant stakeholders did certainly adapt to the change in circumstances and were able to push through pending tasks once the lockdowns eased, and supply chains normalised.

4.2.2 Risk Management

With regards to the inadequate local capacities for implementation, the risk was underestimated. One new risk factor that could not have been foreseen at the moment of design is the COVID-19 pandemic. However, a risk that should have been considered was related to

implementation delays due to logistical challenges and limited external accessibility to the country. More importantly, another risk that should have been identified earlier was lack of scale, due to which costs per unit of equipment, or interventions is higher, thereby necessitating strategic procurement to benefit from economies of scale.

The biggest risk associated with the project remains that of sustainability, and how the learnings from this project can be carefully repackaged and leveraged for attaining the long-term goals of the project. Management capacity at the government level was also another risk that was mitigated by the implementation team, however, ensuring that the same continues post completion of the project remains to be seen. It is critical that management capacity is developed at the government level such that the goals can be achieved through utilisation of local human capital, with effective support from various developmental agencies. The risks associated with the sustenance of the project remain high, and any new programs that are designed must carefully consider sustenance and development of local capacity in the future.

Environmental and Social Risk Management

During project implementation, in December 2020, two other demonstrations were approved to be subsumed in and supported by the FASNETT Project: 1) Funaota Solar Home Systems Project; and 2) Biogas demonstration activity. Given that no screening was conducted for these demonstrations initially, the E&S risks should be screened to discern whether an EIA or EISA would be required.

During the project implementation, the MTR team reviewed and proposed an updated version of the SESP, with change in the overall risk categorisation to Low-moderate impact with probability score of 2. However, there was no response from the project management to this MTR suggestion. [*Note: The SESP for the Floating Solar PV Demo was updated in coordination with the EPC Contractor for the Demo and a compliance report was discussed and submitted by PMU to the Department of Environment in line with the latter's ESIA guidelines and requirements and likewise consistent with UNDP's requirements for such type of demo facilities that will involve significant construction and installation works classified to have moderate risks. The other demos were not required by the Department of Environment to have such ESIA.*]

4.2.3 Partnerships and Gender Mainstreaming

The Department of Gender and Tuvalu National Council of Women were expected to be present and provide advice regarding gender-sensitivity development activities for the project including the representation of women in demonstration activities, RE based livelihoods and energy conservation. The inclusion of a woman in the newly operationalised project in Funaota and the plans to involve women in the upcoming work on demo technology will also hopefully bring some changes. Their contributions are to also impact the current gender policies.

4.2.4 Actual Stakeholder Consultations

Stakeholder consultations revolved around interviews with representatives of the Government of Tuvalu, Tuvalu Development Bank, UNDP, and other stakeholders. The consensus view was that the project was largely successful in demonstrating the importance of moving towards the goal of 100% renewable energy, and that also included buy-in from the Government of Tuvalu. The stakeholders were also of the view that considering the unique geography of Tuvalu, and absence of scale, it is cost prohibitive to launch renewable energy projects on a

piecemeal basis. There was consensus that there needs to be a shift towards renewable energy which can be supported by scale, such that logistics and execution costs can be reduced, thereby reducing overall cost of potential investment, while heightening overall impact.

The Energy Bill remains critical in pushing Tuvalu towards 100% renewable energy, as following the same in its true spirit will allow development of necessary capacity to plan, execute, and manage renewable energy projects across the various islands. Considering the geography and unique circumstances of Tuvalu, it also makes economic sense to transition towards a decentralised electricity grid, and off-grid solutions such that efficiencies can be attained given the circumstance.

Although a thriving private sector is absent, through the bill it is possible to incentivise investments in renewable energy, and a decentralised grid in Tuvalu, such that the projects can be managed effectively while the governments can facilitate the same through an enabling regulatory framework. Finally, there is also a possibility to introduce carbon credits, and mobilise the same for investment in renewable energy, similar to what has been done by Vanuatu. The capital raised through such credits can catalyse investment in renewable energy and enable accelerated achievement of targets.

4.2.5 Project Finance

The project finance component was largely related to procurement to various demonstrations, which were scheduled for the tail-end of the project and were delayed due to the pandemic. However, a key component that can catalyse adoption of equipment energised by renewable energy was a financing facility through the Tuvalu Development Bank. The amount allocated to such a facility was not adequate to really drive adoption across the country and was barely sufficient for a few pilots. Going forward, it remains critical that a financing plan is in place through availability of a dedicated capital fund to encourage adoption of various renewable energy equipment, whether that be solar panels for rooftop, or solar powered refrigerators, and so on.

Availability of such schemes would also ensure that there is buy-in from the people of the country, and that they can assist in pushing towards achievement of the goal, rather than it being a top-down directive. Any program designs in future must take into consideration a core fund to support financing of relevant equipment, as well as any risk guarantees to de-risk potential lending, and enable access to finance, and eventually renewable energy for households in Tuvalu.

The break-up of co-financing data was not available for further review, and the information provided otherwise has been incorporated in the report alongside the table below:

Table 5: Confirmed Sources of Co-Financing at TE Stage

Sources of Co-financing	Name of Co-financier	Type of Co-Financing	Investment Mobilised (US$)	Amount (US$)
Recipient Government	Ministry of Foreign Affairs, Trade, Tourism, Environment and Labour / Department of Environment	Recurrent expenditure	1,116,000	6,700,000
Recipient Government	Ministry of Foreign Affairs, Trade, Tourism, Environment and Labour / Department of Environment	Recurrent expenditure	40,000	750,000
Recipient Government	Ministry of Public Utilities and Infrastructure/Energy Department	Recurrent expenditure	50,000	240,000
Recipient Government	Ministry of Public Utilities and Infrastructure/Energy Department	Recurrent expenditure	92,400	560,000
Recipient Government	Tuvalu Electricity Corporation (TEC)	Recurrent expenditure	13,680,000	7,350,000
Recipient Government	Tuvalu Electricity Corporation (TEC)	Recurrent expenditure	76,756	50,000
Recipient Government	United Nations Development Programme	Recurrent expenditure	250,000	250,000
Total Co-financing		15,305,156		15,900,000

4.2.6 Monitoring & Evaluation: design at entry, implementation, overall assessment of M&E.

The Monitoring & Evaluation (M&E) framework is in accordance with the UNDP-GEF format, with baselines, targets and data sources fully specified. The framework provides outcomes, under each project component, to be released for achieving the overarching objectives. Each project outcome is expected to be realised through the delivery of specific project outputs and the level achievement is tracked through outcome indicators and specified targets for each. The outputs are accompanied by SMART, results-oriented indicators that measure all of the key

expected changes identified in the theory of change, each with credible data sources, and populated baselines and targets, including gender sensitive indicators

Reporting, as per the committed timelines and reporting intervals, was carried out through project implementation reports, which tracked progress against targets and provided recommendations for course correction. Performance on gender results was incorporated and carried out as part of the project monitoring.

However, as highlighted in the preceding section, while the outcome level indicators track progress against set outputs, the overall wide-ranging impact on barrier removal is not adequately or appropriately captured. This has made it difficult to establish attribution to the intended overarching project objectives.

Review of documents reveals that while adequate budget and resources were allocated for results monitoring, the monitoring plan excluded regular field and community visits. These were crucial to capture experiences of direct beneficiaries in the island communties, Moreover, the MTR did not capture these either. While this was a key consideration as part of the TE, travel restrictions to Tuvalu and the absence of a national consultant posed major limitations towards this end. Therefore, the tracking and evaluation of achievement of impacts, and benefits of community-based EE and RE technology applications, including children and indigenous people is lacking.

Also, while the GEF core indicators were updated as part of this TE and also in the MTR. More frequent monitoring of these indicators should be considered in future project programming as they serve as crucial data points for project steering during implementation.

Monitoring and Evaluation (M&E)	Rating
M&E design at entry	3
M&E Plan implementation	5
Overall Quality of M&E	4

4.2.7 Contribution of UNDP and Implementing Partner Execution

The UNDP was instrumental in driving the project, assigning resources, and enabling effective project management throughout the lifecycle of the project. The implementing partner certainly had constraints in terms of ability to originate, manage, and deploy renewable energy-oriented solutions, and took advice of UNDP carefully in structuring various interventions. The contribution of UNDP was certainly positive and would play a fundamental role in assisting Tuvalu in achieving its goals through a mix of bigger programs in the future, and internal capacity development.

Implementing Agency (IA) Implementation & Executing Agency (EA) Execution	Rating
Quality of UNDP Implementation/Oversight	4
Quality of Implementing Partner Execution	4
Overall quality of Implementation/Execution	4

4.2.8 Summary of Mid-Term Review (MTR)

1. The Mid-Term Review (MTR) of FASNETT concluded that the project was well aligned with Government priorities for the energy sector and Tuvalu's INDC with the goal of 100% power generation from RE by 2025.

2. The progress on overall national-level targets reflected in the results framework was 60.7% at mid-term. However, the project's own internal progress is generally low, with on average 65% progress on the outputs under outcome 1, 20% under outcome 2, 9.4% under outcome 3, and 13.3% under outcome 4.

3. Some weaknesses were identified in the project design, especially related to institutional capacity, awareness, and stakeholder participation. The project management and reporting structure was discerned to be unclear for the PMU and the Government staff. This had to do with institutional weaknesses, but also that international projects lay a heavy burden on a small government structure. There were capacity gaps within the PMU, which was identified as the main factor that has caused serious delays of the project. The PMU staff lacked project management experience in the administrative, financial, and technical areas. It also lacked initiative and interaction with relevant stakeholders, especially those engaged in confronting the barriers to the energy sector. There were many lost opportunities for collaboration with the private sector, educational institutions, NGOs, civil society, and other projects, e.g., the UNDP-GEF R2R project.

4. At the mid-term stage the FASNETT had few concrete results, and with low possibility of impact and sustainability. However, it was anticipated that the situation would improve after installation of the FSPV, through strengthened focus on awareness and capacity building, and especially interaction with other stakeholders.

5. The MTR posed 12 recommendations for improving project performance on outcomes and implementation progress. A management response was developed to review the recommendations and provide a management response on how each recommendation would be addressed. While some recommendations were rejected by the management, for the rest, an action plan was developed under which activities have been completed and some are under implementation.

4.3 Project Results and Impacts

This section discusses the assessment of project results, what are the remaining barriers limiting the effectiveness of the project, how efficient was the project to deliver its expected results, and how sustainable and replicable these achievements will be over the long-term.

4.3.1 Relevance & Country Ownership

The national ownership of the project is reflected in the relevance for the priorities in Tuvalu's policy and strategies for climate change mitigation. The 2009 National Energy Policy defined a target of 100 percent renewable energy for power generation by 2020. This goal was reaffirmed in Tuvalu's INDC, submitted prior to COP21, with the target date extended to 2025.

The FASNETT intervention delivers and caters to the country's energy, environmental and gender mainstreaming goals.

The problems Tuvalu is confronting are mentioned in the project document and summarised in 3.1 and 3.2, including the high dependence on energy from diesel. To confront this specific problem, renewable energy (RE) resources such as solar, wind, biomass and ocean energy are recognised as potential energy alternatives for the country. Tuvalu's INDCs (2015) defined the objective to reduce GHG emissions from power generation to almost zero by 2025 (which was moved to 2030) through the use of RE and energy efficient (EE) technologies. This also requires overcoming important barriers such as RE & EE awareness, Policies, and regulations, as well as institutional, technical, and financial barriers.

The Project has been designed to use the inclusive approach and considered the needs of the communities and remote populations (specially disadvantaged families, etc.) in the Outer Islands that should be prioritised, particularly in economic and social activities that need energy as a basic input, viz., in education, communications, infrastructure development, disaster management, livelihood, domestic household requirements, recreation and other basic human needs.

These concerns were articulated by stakeholders in the consultation done during the LFA Workshop and island visitations and are fully considered in the project design. Furthermore, projects in the energy sector from different donors were reviewed during the design phase, including the World Bank, EU, New Zealand Aid, UAE-Pacific Partnership Fund, and Finland. It was decided to complement other agencies (World Bank, ADB, bilateral cooperation).

4.3.2 Country Ownership

While the project does align with the national objectives, it seems that the on-ground ownership is yet to have the momentum needed to achieve the goals, due to lack of capacity in the country to provide full support. For instance, the Department of Energy (DoE) faces its issues due to limited staff and relies heavily on Project Management Unit (PMU) to aid them. The work required is at implementation level and the ownership seemed missing in that aspect. Bilateral agreements with friendly countries alongside help provided by ADB, WB and other such donor agencies goes to show that the energy program is donor driven. This goes to show that the government is yet to take full ownership of the program, and due to the dependency, it is unable to determine the alignment. While the help is much appreciated, the needs of both the public and private sector must be focused instead of just the demands of the donor program, and those demands should be in line with the master plan. Government of Tuvalu should be the pilot behind all such projects instead of the donor agencies to ensure success.

4.3.3 Attainment of Project Outcomes

As presented in Sections 2, the project has 3 main objectives that will be achieved through the implementation of 4 components with 41 activities. The implementation progress is measured through a set of outcome indicators, each one with its respective target to be achieved by the end of the project. Below is a table listing key results achieved by the project against each expected outcome, using the corresponding targets to measure the progress made.

Table 6: Expected Results, Project Targets and Results

Expected Results	Project Targets	Results
Outcome 1: Improved awareness and attitude towards sustainable RE & EE technology applications in the public, commercial and energy sectors. The Outputs under this Outcome are: ● Report on impact analysis of previous EE/RE capacity development activities. ● Completed capacity needs assessment in the area of EE/RE applications. ● Completed design and implementation of suitable EE/RE capacity development programs for key stakeholder groups. ● Comprehensive evaluation report on implemented capacity building programs. ● Published and disseminated information on RE/EE application. ● Established and operational information exchange network and website for the promotion and dissemination of knowledge on low carbon development. ● Established and operationalised energy supply and consumption monitoring and reporting and data banking system.	No. of communities that are capable of organising, planning, designing, implementing, operating, and maintaining RE- based power generation systems. The targets are from 0 to 2 at mid-term, reaching 4 at the end of the project.	3
	No. of households, schools, public buildings on RE/EE application and commercial establishments that are using low carbon technologies (by RE- and EE-based energy systems}. The targets are from 396 (at baseline) to 400 at mid-term, reaching to 410 at the end of the project.	2,747
Outcome 1 Rating: The implementation progress is on-track, and rated MS		
Outcome 2: Coherent and integrated implementation of enhanced policies, regulations and projects on energy development and utilisation with the country's energy act in support of national economic development. The Outputs under this Outcome are: ● Completed policy research, analysis, and assessment on low carbon community development, as well as institutional mechanisms compatible to the Tuvaluan context. ● Recommended standards, policies and implementing rules and regulations (IRRs) to be embodied in an energy bill based on	No. of planned RE & EE projects benefiting from the policies and regulations supported by the Energy Act. The targets are from 0 to 50 at mid-term, reaching to 100 at the end of the project.	0

completed research as well as results of implemented low carbon (EE/RE) technology application demonstrations in Tuvalu and other similar SIDS. ● Formulated and enforced policies by well-informed legislators and administrators on the provision of energy services, including the publication and dissemination of guides and reference documents for the integrated energy planning and low carbon development in the context of Tuvalu. ● Formulated and enforced institutional framework that supports the implementation of low carbon development policies, and IRRs. ● Adopted and enforced: (a) sustainable low carbon standards, policies, and IRRs; and (b) suitable institutional mechanisms that integrate low carbon development with the socio-economic, climate change and disaster management objectives of the country. ● Performance evaluation report on the adopted policy and institutional framework and mechanisms. ● Approved follow-up and sustainability plan for the enforcement of consistent government policies on RE/EE applications to support national development.		
Outcome 2 Rating: The implementation progress is off-track, and rated U		
Outcome 3.1: Enhanced energy utilisation efficiency and development and application of feasible renewable energy resources in support of national economic development. The outputs under this outcome are: ● Completed evaluation report on applicable LC development technologies including applicable RE sources and EE	No. of companies adopting the established standards in supplying or producing RE/EE system equipment or component parts. The targets are from 0 to 1 at mid-term, reaching to 2 at the end of the project.	0

Technologies that can be feasibly applied in the small island environment in Tuvalu. ● Completed designs, plans of demonstrations of approved EE and RE technologies that promote and support LC development in the country. ● Successful demonstration of approved EE and RE technologies that promote and support LC development in the country and comparative evaluation report from monitoring with other existing RE/EE installations. ● Published energy performance and impacts reports on implemented LC projects; including action plan for community-supported LC energy initiatives in island communities. ● Completed technical information packages and guidelines based on RE/EE project implementation experience for use in the capacity development program. ● Completed design and implementation plans for the replication of demonstrated successful LC energy projects.	% users of RE/EE system equipment and component parts that are satisfied with the quality, cost, and operating performance of these items. The targets are from 0 to 25 at mid-term, reaching to 80 at the end of the project.	50% (estimated)
Outcome 3.2: Increased application of viable climate resilient renewable energy and energy efficiency technology applications in the country. The outputs under this outcome are: ● Completed and operational LC development technology application demonstrations in accordance with established quality standards in pilot tropical coastal communities enhancing market opportunities for RE/EE applications. ● Implemented LC projects in selected communities.	Increased no. of low carbon technology projects (new, or replication, or scale-up). The targets are from 16 to 20 at mid-term, reaching to 26 at the end of the project	17
Outcome 3 Rating: The implementation progress is off-track, and rated MU		

Outcome 4.1: Improved availability of, and access to, financing for climate resilient renewable energy and energy efficiency. The outputs under this outcome are: ● Completed design and development of feasible inclusive financing models and schemes to facilitate financing of EE and RE projects. ● Completed capacity building for the existing banks (including the Development Bank of Tuvalu) on financing residential/ commercial EE and RE projects.	No. of established and operational financing schemes for RE/EE projects the targets are from 0 to 1 at mid-term, reaching to 2 at the end of the project.	1
	No. of private sector RE/EE projects financed by commercial banks and/or by the private sector. The targets are from 0 to 1 at mid-term, reaching to 2 at the end of the project.	2
Outcome 4.2: GoT, the financial sector and donor agencies providing accessible financing for climate resilient renewable energy and energy efficiency projects. The outputs under this outcome are: ● Established and operational low carbon technology application support program. ● Developed and recommended financing schemes for implementation and capitalisation by the GoT and/or private sector financial institutions. ● Completed RE and EE technologies application projects financed either through the established financing scheme or by private sector investments. ● Completed evaluation and continuing enhancement of suggested financing policies and schemes for supporting initiatives on low carbon development.	Increase in government budget for low carbon technology-based projects, US$. The targets are from 0 to 200,000 at mid-term, reaching to 400,000 at the end of the project.	755,000
Outcome 4 Rating: The implementation progress is on-track, and rated MS		

Activities under Outcome 1 are on-track to achieving the envisaged results before EOP. Three (3) communities, Niulakita, Funafala and Funaota are now operational. Some remaining activities under implementation are expected to be completed before EOP.

Activities under Outcome 2 severely off-track. The Energy bill has been drafted but not yet enacted. Around 266 projects have been identified that will benefit from the Energy Bill.

Although, it is unlikely that the target for Outcome 2 will be achieved during project implementation.

Activities under Outcome 3 are off-track. The target for the first indicator was not achieved partly because the Energy Act/Bill is not yet enacted. That of the second indicator appeared to have been almost achieved but the reported level of achievement is just an estimate. The target indicator under Outcome 3.2 has also not been achieved.

There were five demos involved in the project. Out of these, the FSPV facility through the SLA arrangement was completed - the solar-powered capacitive deionization (CDI) Water Treatment Demo facility hardware has been delivered and ready for installation by the technical personnel. The demand management and response system (DMRS) demo has been installed in coordination with the contractor of the ongoing ADB project to facilitate a more cost-effective means of implementing said energy efficiency system for RE-based generation and distribution; the enhanced community-based Solar PV home systems under the SASH Project has been installed and made operational.

Currently, two demonstrations have the equipment, which is just now waiting to be installed. The first sample regarding the water treatment scheme powered by renewable energy capacity is ready, and the technical expertise from Australia is to arrive to install it. The Floating Solar PV system is due by next month; however, it may not be completed until May or June. The next month was the termination of the project with the demos, but it is highly unlikely for it to happen before mid-2023. Funaota small village level electrification project has also been added as another demo.

Activities under Outcome 4 are on track. The Year 4 targets of the two Output 4.1 indicators were already reported achieved during the previous reporting period. The achievement of the Year 4 target of the first indicator is manifested by the implementation of the FASNETT-supported enhanced financing scheme of the Development Bank of Tuvalu (DBT). At the end of 2021, this was the only activity (out of 2) of Component 4.1 that was implemented. The other activity was planned to be implemented during the 2nd half of the PIR 2022 reporting period.

In the activity that was implemented, the first tranche of incremental funding for the financing scheme was disbursed in 2019. It was later found out during the current reporting period that the financing scheme was almost non-performing. There was also the slow liquidation by the DBT of the first fund tranche, which delayed the replenishment of the fund for the scheme, resulting further to the financing scheme's non-performance.

Hence, instead of proceeding with the next tranche, the budget allocation for the financing scheme was reallocated to Component 3.2 to support the financing of the shortfall in the budget of the floating solar PV demo. Regarding Component 4.2, at the end of 2021, none of the 4 planned activities were implemented. These are all planned for implementation during the 2nd half of the PIR 2022 reporting period. Despite this, because of the government's follow through of the RE & EE promotional activities of the project with the allocation of yearly budgets for low carbon technology-based power generation projects, the Year 3 target of the sole Outcome 4.2 indicator (increased government budget for low carbon technology-based projects) is achieved. Nonetheless, the manifestation of this from the private sector still remains to be seen.

Overall, the project is slightly off-track to deliver its outcomes and the implementation of activities is rated *Moderately Satisfactory* (4).

4.3.4 Attainment of Project Objectives / Effectiveness

This section evaluates the overall effectiveness of the project in delivering its intended impact and achieving its objectives.

Table 8 documents the impact achieved against the targets set for each objective indicator at the project initiation stage:

Table 7: Project Objectives, Targets and Impact Achieved

Project Objectives	Targets	Impact Achieved	
Project Objective: Facilitation of the development and utilisation of feasible renewable energy resources and application of energy efficiency technologies in Tuvalu for achieving realistic energy targets in Tuvalu. The project components for achieving the objectives are: 1. Raising Awareness Regarding RE and EE Applications. This component aims to realise **Outcome 1**. 2. Energy Policy Improvement and Institutional Capacity Building. This component aims to realise **Outcome 2**. 3. Applications of RE & EE Technologies & Techniques. This component aims to realise **Outcome 3.1 and 3.2**. 4. Financing of RE and EE initiatives. This component aims to realise **Outcome 4.1 and 4.2**.	Percentage share of RE in the national power generation mix. The targets (%) have had to transition from 26% to 44% at project mid-term, followed by 67% at the end of project.	19%	
	Cumulative GHG (CO_2) emission reduction from power generation. With targets (tons CO_2) transitioning from zero to 5,000 at project mid-term, to 15,000 by the culmination of project.	3,000	
	Number of women actively involved in the planning and implementation of energy services provision in the outer islands. The targets are from 0 to 5 at project mid-term, reaching 10 by end of project.	11	
GEF Tracking Tool Indicators		Expected	Achieved

6.2 - Emissions avoided Outside AFOLU	Expected metric tons of CO2e (direct)	95,370	3,825*
	Expected CO2e (indirect)	286,109	14,840
6.3 Energy Saved	MJ (direct)	403,415	32,097,500
	MJ (indirect)	1,210,241	24,073,127
6.4 - Increase in installed RE capacity per technology	Solar Thermal Technology Capacity (MW)	0.05	2
11. No of beneficiaries disaggregated by Gender that co-benefitted GEF's investment	Male	1200	3,055
	Female	1300	4,700

*Attributable CO_2 emission reduction for FASNETT in terms of sustainability support (capacity building of DOE and TEC in the energy planning, monitoring, operation and maintenance and technical support for the cumulative RE PV energy generation for existing RE capacities and minimal energy generation from the SASH village electrification demo. This totals to cumulative of 3,450 tons CO_2. In addition to this, an estimated net 5% reduction in power generated from Diesel generation due to energy management and use of efficient appliances and devices in Funafuti amounts to 1,7000,951 kwh or equivalent to 375 tons CO_2 reduction. Therefore, the total expected cumulative ER_{RE} and ER_{EE} is 3,450 + 375 = **3,825** tons CO_2.

- Annual Direct Emission Reduction at EOP = 2,103,856 kwh /1000* 0.627 = 1,319 tons
- Lifetime Direct Emission Reduction $_{TOTAL}$ = DER $_{AVE}$ X 15 = 1,319 X 15 = 19,787 tons CO_2
- Top- down approach (indirect CER)

CER_{TDA} = Lifetime Indirect CO_2 Emission Reduction = ERT_{DA} X CF = 19,787 X 0.75 = 14,840 tons CO_2

Energy Saved

- Cumulative (2018-2022) Direct Energy Supplied by PV at EOP = 8,915,973 kWh X 3.6 MJ / kW h = 32,097,500 Mj

- Cumulative indirect Energy Savings = 32,097,500 X 0.75 = 24,073,127 MJ

The reported levels of achievement of the Objective Level Targets show that two of the three project objectives were not achieved. The level of achievement of the main indicator (% share of RE in the national power generation mix) remained at 19% which is below the baseline value. The target for the second Objective indicator (cumulative GHG CO2 emissions reduction from power generation) was also severely under-achieved. Only the target for the third Objective (number of women actively involved in the planning and implementation of energy services provision in the outer islands) was achieved. The result on gender mainstreaming has been further assessed in section 4.3.4.

The project was designed to address barriers to the application and adoption of RE and EE technologies, and by extension, increase the share of RE in Tuvalu's energy mix and reduce GHG emissions. Reviewing the overall project strategy that links the outputs to the objectives, and the implementation of activities, it was discerned that barrier removal was only partially achieved. While there are key achievements, and much work needs to be done on certain fronts, for the project to realise its intended impacts.

The share of RE in the energy mix remained stagnant as no significant new RE-based power generation capacities were added since the previous reporting period of the PIR due to circumstances, especially related to the COVID-19 Pandemic that were beyond the control of the PMU. The RE contribution came from the existing RE capacities only. The power demand increased but was served by diesel power generation or not at all. Moreover, the low level of reduction in GHG emissions resulted from the incomplete implementation of the project demonstrations.

Apart from the factors that were beyond control, implementation was severely impacted by insufficient capacities of the implementing partners. It should be noted that when there is a capacity gap at the implementation level, the error is in the design, not in the PMU, because the weakness should have been captured during the design phase and led to another implementation modality or stronger measures of capacity building. It was a high risk to add a project in Tuvalu, especially under the national implementation modality (NIM), due to the low national capacity and because the project intends to introduce new technology (floating solar panels) that had never been used in the Pacific region before.

A key opportunity for developing national level capacity is to collaborate with higher educational institutions. As recommended in the MTR, educational capacity seems to be good in the country to develop the curriculum needed. Therefore, the response should have been to 'teach' about renewable energy and energy efficiency appliances. Exploring partnerships with educational institutions such as USP Tuvalu and the Public Library would have assured worthy investment and capacity building. There are available regional resources to design local certificates in sustainable energy or offer scholarships for such courses to be undertaken at USP Tuvalu. It is a well justified response due to the geographical restraints and limited land area. Staff of the Energy. Department could have been mandated to undertake such courses.

With regards to the financing scheme, it was noted that the revolving fund for clean energy was inadequate to support green buildings due to the exorbitant equipment and technical costs. Furthermore, an assessment of the DBT Financing Window concluded the low utilisation of the FASNETT fund advances due to small market, low availability, and high prices of RE and

EE devices and restrictive lending terms that limited the number of qualified borrowers. There is no categorisation to map out low-income households. It is highly unlikely that members of such households would attempt to use the scheme or purchase these appliances from the stores. Poverty is an existing factor in Tuvalu reflected in its LDC status[16].

Only 20 loans have been disbursed for the purchase of EE technologies, the rural areas and outer islands need to be tapped. The funds are largely for people who are working on the main island, and the outreach for the non-employees' families is restricted. Therefore, the accessibility of the loan schemes need to be enhanced. Moreover, concessional financing instruments need to be explored. With interest rates as high as 8%, it would be worth exploring a government-driven refinancing scheme for climate-smart housing to encourage RE and EE adoption.

Funds from the discontinued financing scheme were re-allocated towards the new added project demonstration of rooftop solar. Rooftop solar is an important aspect and work is being done toward utility grid solar which is land based. However, according to the analysis it cannot support 100% RE share due to high costs and the limitations due to the small availability of land area. A key achievement of the project, which will likely improve the project effectiveness in this regard, was the development of the Floating Solar demo technology. It is novel in Funafuti because it is difficult to deploy solar, as land space is an issue.

Hence, the floating solar on a pond is a breakthrough. It has not been completed as yet but once it reaches fruition, this demonstration has the potential to bring about the greatest impact through promoting the application of floating solar technology in a land restricted context like Tuvalu. Overall, project demonstrations are under implementation and are expected to deliver the envisaged impact once completed. Furthermore, the GoT has mobilised additional USD $325,000.00 from the Clean Energy Project funded by the Taiwan Government for this year. With the fund, the additional RE-based energy system capacities that are expected to be funded are: Solar Home systems, 10 KW on-grid power system for Fetuvalu High school; 5KW on-grid power system for Funafuti Primary School and a 2KW on Grid Power System for Seventh Day Adventists Primary School.

The enactment of the energy bill is anticipated to help guide legislation and policy towards paving ways and creating opportunities for the private sector to participate in the application of RE technologies. Moreover, simply influencing the adoption of energy efficient technology by the private sector, which is less technical and resource intensive compared to the application of RE technology, will significantly improve the project's efficiency in terms of GHG reduction. However, currently, the Energy Bill has not been tabled in the parliament and therefore no new projects are being secured in the absence of an Energy Act.

The Energy Bill was supposed to be passed in December, but it has been pushed to April 2023 as more points are to be added. The Energy Bureau is working to develop implementation rules and regulations with their consultants. It is recommended that regulation should be designed considering the local context that the private sector operates in; for this matter, the regulations should support innovative approaches to the provision of energy services. Some of the aims of

[16] Mid-term Review Report Review of Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT), Pg 14

the bill are to:

- Consolidate the legal framework for the energy sector in Tuvalu
- Promote clean and renewable energy
- Facilitate the achievement of the energy targets
- Coordinate the energy activities across the sectors of the Government;
- Provide a mechanism for the development of energy policies in Tuvalu
- Facilitate compliance with obligations under an international, regional, or bilateral agreement
- Contribute to the economic growth and development
- Promote public awareness on RE

To elaborate more, laying down regulations for a micro-grid system is an important consideration. Given that the population of Tuvalu is dispersed among small island communities, a micro-grid system would be more apt from an economic perspective and more energy efficient through avoiding line losses. Such a system can allow for the cost-effective integration of generation resource owners (for e.g., solar PVs), and thereby enable the communities to meet their respective demand and supply requirements through participation in grid services. Furthermore, micro-grids can generate income for the value they provide to the grid and benefits can be shared amongst participants in communities, thereby further incentivising the adoption of RE and EE technologies.

Similarly, some of the enabling activities under capacity building are still under implementation, which can potentially drive up RE and EE adoption; although the attribution to the FASNETT is not clear in this case. The evaluation of the capacity building and publication on RE and EE technologies needs to be conducted. This can shed light on the overall effectiveness of such activities and also procure key learnings that can be assimilated to inform future intervention programming and also course correction for the ongoing FASNETT. In particular, the communication and outreach strategy of the project should benefit from this activity to ensure that there is adequate awareness and capacity building in the outer island communities and rural areas.

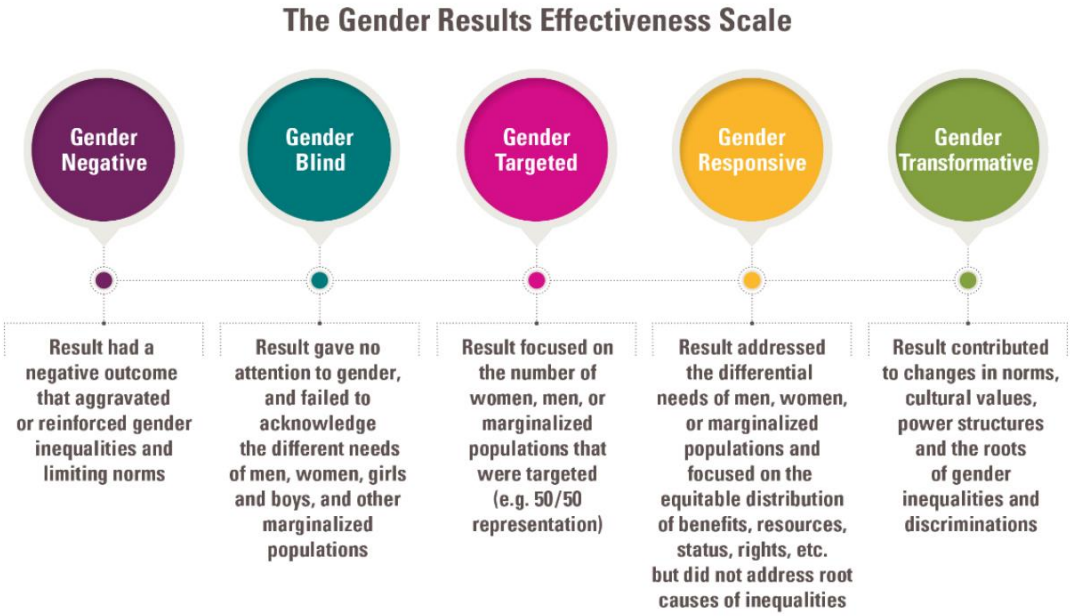
There needs to be increased focus on developing sustainable business models that are suitable to be adopted by private sector businesses in Tuvalu. Certain barriers need to be addressed. For instance, logistics related to bringing in RE and EE equipment in Tuvalu is extremely difficult and costly. Moreover, replacement of depreciating RE and EE technology is also an issue; breakdown of equipment can lead to the loss of confidence by adopters. Therefore, building efficiencies on the supply-side is imperative to catalysing sustainable businesses in Tuvalu.

Overall, the evaluation of the attained project objectives concludes that the project is effective at a *moderately satisfactory* (4) level in terms of facilitating the development and utilisation of feasible renewable energy resources and application of energy efficiency technologies for realising the national energy targets of Tuvalu.

4.3.5 Gender Mainstreaming

Women participation and involvement is one of the primary outcome indicators at the overall objective level. The project has slightly over performed against the targeted objective indicator. However, this section will assess the effectiveness of the gender results, i.e., to what extent does the gender result of the project actually bring a transformative change in terms of gender mainstreaming in the application and implementation of RE services provision in Tuvalu.

This is done by evaluating each relevant project activity/output that contributes to the achievement of the objective level target of gender mainstreaming, according to the Gender Results Effectiveness Scale (GRES). Each project activity will be assessed in terms of its gender consideration and assigned a GRES rating score accordingly. The combined rating score of each activity will ultimately determine the overall GRES rating of the project's gender result. The GRES[17] is provided below:



Source: Adapted from the Evaluation of UNDP Contribution to Gender Equality and Women's Empowerment, IEO, UNDP, 2015

Table 8: Assessment of results against the GRES

Relevant Project Activity	Description	Gender Consideration	GRES Rating

[17] Source: Adapted from the Evaluation of UNDP Contribution to Gender Equality and Women's Empowerment, IEO, UNDP, 2015

1.2: Conduct of capacity needs assessment in RE/EE technology applications for key stakeholder groups.	Capacity needs assessment in the area of EE/RE applications	The differential needs of women as a stakeholder group were considered particularly in their role in the appreciation, acquisition and financing of RE/EE devices and appliances.	Rated as 'Gender responsive,' with a score of 2.
1.3.1: Design, organisation and conduct of a suitable capacity development program on the provision of energy services for RE/EE systems.	Attendance and participation in training and orientation activities	Women were invited as participants in the training courses. The report on Capacity Development Evaluation has been submitted. (	Rated as 'Gender responsive,' with a score of 2.
1.4: Evaluation of implemented capacity building programs establishing the resulting level of decision-making capability within the government and stakeholders on RE/EE	Application of knowledge gained in capacity building programs	Women were among the respondents to the evaluation of the capacity building programs regarding how they apply the knowledge gained. The report on Capacity Development Evaluation has been submitted.	Rated as 'Gender responsive,' with a score of 2.

1.5.2: Updating information on EE & RE technology applications in island communities and results of project activities particularly from the EE/RE technology and commercial application pilots and demonstrations and of information on household survey on usage of EE appliances and devices.	Information dissemination on RE/EE technology applications	Women were included among the stakeholder groups.	Rated as 'Gender Targeted,' with a score of 1.
1.5.4: Conduct of public awareness workshops and radio programs on RE/EE.	Mass media information drive for RE/EE applications	Women will be trained as providers of information	Rated as 'Gender Transformative,' with a score of 3.
2.5: Formulation and implementation of applicable policies, standards, institutional mechanisms and incentives in the promotion and application of RE/EE technologies.	Development and implementation of RE/EE policies	While qualified and trained women could take active part in the policy making, planning and implementation in relevant areas. There was no equal representation requirement, and the activity was not responsive to the differentially needs and capabilities of women.	Rated as 'Gender Blind,' with a score of 0.

3.2.2.1: Formulation and implementation of a technology development and application program for RE/EE in government, community–based and private business projects for selected island communities.	Application program in community-based and own acquisition of RE/EE-based appliances and devices	While women who have relevant background and training were given the opportunity to be involved in technical activities and support services in RE/EE applications. There was no equal representation requirement, and the activity was not responsive to the differentially needs and capabilities of women.	Rated as 'Gender Blind,' with a score of 0.
4.1.1: Preparation of design and development of feasible inclusive financing models and schemes to facilitate financing of EE and RE projects	Design and development of feasible inclusive financing models and schemes to facilitate financing of EE and RE projects	Ensured participation and involvement for women and youth sectors in the outer islands of the country in the acquisition and use of RE- and EE-based appliances or devices.	Rated as 'Gender Targeted,' with a score of 1.
4.2.3: Implementation of EE and RE technologies application projects financed either through the established financing scheme; or by private sector investments.	RE and EE technologies application projects financed either through the established financing scheme or by private sector investments	Carried out assistance and support work for encouraging women in owning or operating climate-resilient livelihood or businesses that are powered by RE-based power generation units.	Rated as 'Gender Transformative,' with a score of 3.

Each activity has been assigned equal weightage and the overall rating has been deduced by taking the total average score. Therefore, the objective level result of the project has been rated as 'Gender Targeted,' i.e., the result only focuses on the targeted number of women for gender mainstreaming.

Table 9: GRES Rating

Objective Level Result	Targeted	Achieved	GRES Rating
Number of women actively involved in the planning and implementation of energy services provision in the outer islands	10	11	Gender Targeted

4.3.6 Efficiency

This section aims to assess how efficiently were outputs delivered for achieving the intended objectives. The latest PIR reported that as of June 2022, the cumulative project delivery rate was only 45%. The planned actions for the implementation of the project demos during the PIR 2022 reporting period did not materialise due to contractual issues, decision-making delays by the IP and PMU, and further exacerbated by the pandemic.

The biggest hurdle was about the implementation, which also points to developing national capacity as the political will was constantly changing. The DOE, the implementing partner, was under one ministry and was later tossed to another ministry followed by yet another. Such changes in the policies affected its overall functionality and the energy developments. The targets to achieve renewable based power generation are very much there but one does not see them getting translated into policies or regulations which paints a bleak picture for their achievement. A major problem that occurred since the inception and caused a delay was regarding the Project Management Unit because the leadership had to be changed. The new person was not deeply aware about the project and had to be guided through every step, which slowed the initial timeline in 2019 especially finding the appropriate technical expertise to achieve the demonstrations.

By early 2020, a revised plan regarding the design and implementation for operations and installations was ready. However, the Pandemic further exacerbated issues relating to procurement of equipment for the project demos and overall implementation. It became difficult to rope in contractors, and it took a while until IN Fiji eventually sought help. However even UNDP does not have the capability to engage foreign suppliers within the allocated budget, and the project kept getting stalled until the contractors from Copenhagen came through. Due to the suppliers being far away from Tuvalu, the distance played an important role in increasing the cost of the logistics, and the lockdown meant that the site inspection could not be done in the way it was envisioned. Furthermore, there was a dearth of technical expertise who had done floating solar, and a well-rounded engineer was also hired to cater to that problem. However, other teams were not comfortable with his management style, so he was removed, and the contractor took advantage of this situation, dragging the process for a long time and the panel cost which was initially 386,000 went up to 500,000. The panel cost also

soared due to Covid as supplies were running out. The budget also had to undergo significant changes because of these reasons.

With regards to implementation, the COVID-19 pandemic led to a complete halt of the project due to global travel restrictions. The head of utility, hailing from New Zealand was unable to arrive and provide assistance. Similarly, most help, which had been outsourced to regions outside Tuvalu, could not be physically present to lead the project, and the on-ground teams were relying on Zoom meetings.

Also, the targets also depend on funds from donors that would be required for the infrastructure needed for the shift to 100 percent RE. PMU budget is 5 percent of the total budget cost, which means that it takes a hit when unforeseen circumstances, like COVID-19 in FANNETT, occur because whenever projects are extended, there is almost no remaining cost for PMU. When governments are approached for supporting PMU, they often do not have the means.

As of now, the project stands under utility with suitable plans for overseeing the demonstrations which have been properly designed, and the arrival of technical experts responsible for installation is being awaited which may see delay due to Chinese New Year. Similarly, equipment procurement for the floating system may also be stalled due to the Chinese New Year so while technical aspects are now properly covered for the installation of demos, the timing of the event can hinder the timeline. Moreover, there is still the risk of some of the co-financed activities not being implemented in time with the planned demos. There is also the risk of not achieving the target GHG emission reductions of the project if not all demos will be implemented. There is still the potential of non-availability of, or reduction in, co-financing because of re-scheduling of project activities, as well as the schedule of the co-financed/baseline activities.

While it is understood that project implementation was severely impacted due to circumstances, especially related to the COVID-19 pandemic, that were beyond the PMU's control. It was initially assumed due to the project requirements, especially nationally implemented modality, that the stakeholders would be able to carry out the project themselves with the guidance provided but it turned out that there were many limitations and supervision was needed every step of the way. Also, Tuvalu, is new to the RE technology and took longer to familiarise itself with the possible technologies at hand. The evaluation concludes that the overall project efficiency was *Moderately Unsatisfactory* (MU).

4.3.7 Progress Towards Impact

A successful FASNETT project would have been able to impact on some of the indicators, but all results would be the outcome of the national effort with support from different donors, such as the World Bank, ADB, and NZAid. The project can therefore not be unilaterally blamed for the low progress but could also not have considered a potential success as only the product of its own work.

Another project implementation period extension is no longer a feasible option. Barring other unexpected challenges, it is still realistic to complete the installation and commissioning of all project demos before EOP. Hence, the PMU has to now focus on this. Moreover, it is better late than never for the PMO to further improve the documentation of both the baseline and incremental activities of the project as well as the monitoring/tracking and/or quantification of the energy savings and GHG emission reductions that are attributable to the project.

4.3.8 Sustainability

The sustainability of the project is at risk, given the capital, and technical capacity required to ensure sustenance and push towards achievement of goals as envisaged. It is extremely important that FASNETT is followed up by a bigger, more structured program that is more focused on infrastructure investment, and mobilising investment to develop the necessary renewable energy capacity. The project provided the necessary roadmap, and laid foundations of a regulatory framework that can catalyse investment in renewable energy. Design of a more structured, and more capital-intensive program would certainly assist in ensuring sustainability, while driving the country towards achievement of the desired goal of complete transition to renewable energy.

Sustainability	Rating
Financial sustainability	2
Socio-political sustainability	3
Institutional framework and governance sustainability	3
Environmental sustainability	3
Overall Likelihood of Sustainability	3

4.3.9 GEF Additionality

The GEF funds projects in such a way that they attract additional resources, pursue strategies that have a greater result than the project itself, and/or accelerate a process of development or change. It recognises that its support is catalytic in nature: "it does not achieve impact on its own but rather in collaboration with its partners, especially through follow-up actions by governments and other agents at different scales." The GEF's catalytic role is characterised as a three-phased approach consisting of foundational activities, then demonstrations, and finally investments.

Within this context, the review of the catalytic role of this project is to consider the extent to which the project has demonstrated: a) the production of a "public good," b) demonstration(s), c) replication, and d) scaling up of the project achievements.

Considering the GEF definition of the catalytic role and its four-point scale, this project has demonstrated a certain catalytic role focusing on two phases: foundational activities and demonstrations. Through its activities the project has demonstrated a) the production of public goods and b) the demonstrations of these public goods.

The review indicates that the project has produced a good list of "public goods" such as innovative and cost-effective RE and EE technologies, and also implemented demonstrations. However, the challenges during implementation should be taken as key lessons when considering future programming and replication in other contexts. Also, before scaling up, the identified risks in this review such as technical capacity gaps of implementing stakeholders should be a major consideration. Replication and scaling efforts need to incorporate capacity building activities and also, design should appropriately factor the context specific economic risks and geographic challenges.

4.3.10 Catalytic Role

The GEF defines the catalytic role of projects as one of the ten operational principles for the development and implementation of the GEF work program. As of the time of this evaluation, the project is closing. From a catalyst role point of view, the project has developed "public goods," and demonstrated the usability and effectiveness of the RE and EE technologies. The project has also incorporated capacity building elements and supported knowledge creation around RE and EE technologies in Tuvalu's context, which is anticipated to enable the implementation of future replication projects at a much more efficient and effective pace. Furthermore, since the FASNETT builds on incremental projects and has been developed to create synergy with other ongoing RE and EE interventions by design, there is huge potential for scaling up the project's achievements. However, as discussed earlier, this is contingent upon some of the main project activities being implemented successfully, such as the enactment of the Energy Bill and completion of project demonstrations. Overall, this evaluation finds that scaling up the impact is quite possible with a well-designed follow up project which assimilates learnings from the FASNETT.

4.3.11 Project Outcome Rating

Assessment of Outcomes	Rating
Relevance	4
Effectiveness	3
Efficiency	4
Overall Project Outcome Rating	4

5. Main Findings, Conclusions, Recommendations, Lessons Learned

5.1 Main Findings

Importance of the Project

This project is aligned with, and contributes to the government's priorities, especially Tuvalu's INDC goal of achieving 100 percent power generation through renewable energy by 2025. It takes into account Tuvalu's geographical limitations and aims to incorporate new technologies like floating solar to provide clean energy to the country's population. Another important feat of the project would be the work on the Energy Bill which is to be passed by the parliament very soon. The Energy Bill addresses many aspects such as the importance of RE and EE in curriculum, empowering women and youth towards clean energy and the public-private partnerships to pave the way for economic growth in Tuvalu. The impact on policy making has been dubbed as one of the most important results of the project especially, to raise the country's ambition so it may achieve its futuristic energy goals. However, in line with the present scenario, the target for 100 percent shift to renewables has been moved to the year 2030.

Progress of the Project

As of the TE period, some of the outcomes expected from the project have been achieved while some are progressing towards completion, and some have a long way to go. For instance, strengthening communities to operate and maintain RE based power systems, application of EE and RE technology in the country, established financial schemes for renewable energy usage, increase in government budget for low carbon-technology based products, etc.. The involvement of women in the sector has also seen a gradual increase in order to achieve gender parity. Another important achievable goal is evaluation and continuing enhancement of suggested financing policies and schemes for supporting initiatives on low carbon development is another deliverable, among others. Some outcomes are directly linked to the passing of the Energy Bill and are yet to be fulfilled.

These can be viewed in detail in 4.3.2 of the TE report. All in all, the project has not been able to achieve all the deliverables as expected and is rated *Moderately Unsatisfactory* (MU).

Ownership by the Government

The project, even though welcomed by the government, was not able to progress with the desired speed, largely due to a potential conflict of interest, as the project head also looked after Tuvalu Electrical Corporation (TEC), and the body is already occupied with many other projects. Considering heavy reliance on the donors instead of the government, there was diffusion of responsibility, as the government avoided taking complete charge, raising doubts regarding the future sustainability of the demonstrations without external support.

Delay in Execution

Despite its strengths, the project also has its weaknesses, owing to both internal and external issues. It appears that the Project Management Unit had some technical capacity gaps and needed external technical support, which impacted implementation. Later on, due to COVID-19, the resources supposed to arrive and execute the project could not do so due to global

lockdown and assisted from a distance, further affecting project speed. There was also an increase in procurement costs because of a delay in finalisation of contracts for the project demonstrations. These were mainly due to the unforeseen circumstances that arose as a result of the COVID-19 pandemic.

Inclusion of Women

While there has been representation of women in the project it has been revealed that according to the Gender Results Effectiveness Scale (GRES) that has been elaborated in a subsequent section, the project is certainly gender targeted but not transformative and needs increased focus on activities that will directly enhance capacities of women to enable participation in RE and EE interventions in Tuvalu. Involvement of women in the project was limited as there was no quota for women to be involved in the designing and implementation of RE and EE applications. While there was equal opportunity for technical personnel to be involved, capacity building was required for women to be involved. Capacity enhancement can be done in areas of renewable energy value chain, including designing, installation, and technical services, etc.

Capacity Building:

This has been identified numerous times that limited awareness in the country and lack of scale which leads to a gap between internal and external technical assistance.

5.2 Conclusion:

FASNETT project has made progress in adopting new technologies like Floating Solar and emphasizing legislation. Communities and the government are increasingly embracing green energy, but some outcomes are still pending. The project aims to reduce petroleum-based electricity, promote renewable energy, and facilitate access to financial resources. It incorporates new technologies like Floating Solar and advocates for the Energy Bill. However, if the government takes complete ownership of the project and ensures its implementation in form of different initiatives especially focusing on viable RE models, public-private partnerships, curriculum design, gender inclusivity, it can have a lasting impact on future of the country.

5.3 Recommendations:

Following are the recommendations listed initially and explained in detail for any such projects in future:

Table 10: Detailed Recommendations

Rec #	TE Recommendation	Entity Responsible	Time frame
A	Category 1: Role of Government		
A.1	**It is recommended that the government takes complete ownership of the project** The government of Tuvalu should be committed to ensure that the project implementation is not heavily reliant on the	Government of Tuvalu	Dec 2030

	initiatives and direction of donor groups because the dependence would hamper sustainability of the project in the end. It is imperative that FASNETT is implemented as a national initiative and disconnect between PMU and stakeholders is addressed to create synergies for realising the intended impacts of the FASNETT. At the very least, there should be clarity about the role and responsibility of the governing body and implementing partner to be responsible for the project, especially the DoE to be aware of the developments in the projects. The DOE must be coordinating the implementation of all project activities, especially those that are implemented by project partners (e.g., WB, ADB). The needs of both the public and private sector must be focused instead of just the demands of the donor program, and those demands should be in line with the master plan. Government of Tuvalu should be the pilot behind all such projects instead of the donor agencies to ensure success.		
A.2	**Carbon Credits** Tuvalu must also plan and package its carbon credit and mobilise it for renewable energy resources to be able to achieve 100 percent green energy. A good example can be of Vanuatu, another south Pacific Ocean nation that was able to catalyse US$ 6 million through the credits. Structuring of such carbon credits would enable crowding-in of capital requirement to achieve the ambitious goal of complete transition towards renewable energy.	Government of Tuvalu	Dec 2024
B	Category 2: Capacity Building		
B.1	**It is recommended that provisions are made for capacity building** It has been reiterated that there is definitely a need for internal capacity building, such that delays can be avoided, and sustainability can be ensured. Capacity building activities as part of the FASNETT should be catalytic and there need to be mechanisms established that extend benefits to stakeholders beyond what was initially targeted at the design stage. Moreover, to address the sustainability risk, proper training should be provided to the PMU, and the PMU should be able to train others so that the pieces can be picked from where they have been left off. The people and institutions that have relevance to the project's thematic area need to be identified and trained to become technicians and develop their capacity to take on the challenges without an absolute reliance on external help. The evaluation of the capacity building and publication on RE and EE technologies needs to be conducted.	Department of Energy	Dec 2023

C	Category 3: Project Sustainability		
C.1	**It is recommended to have linkages with other ongoing projects** The FASNETT project was a national initiative, but it did not include activities to build new linkages with other ongoing projects. As a result, there was limited interaction between the project management unit (PMU) and other projects, and potential synergies were missed. For example, the Tuvalu Fisheries Department installed a biogas digester that could have been included in the FASNETT project as an incremental project to address energy consumption in households, especially in outer island communities. A recommendation is to conduct a research study to identify RE and EE initiatives in the country and potential projects that can be linked to FASNETT or a future project.	Government of Tuvalu – Department of Energy	Jan 2030
C.2	**It is recommended that a follow-up project is planned to ensure sustainability of the various setups in place** To measure the success of FASNETT it is recommended that a rigorous follow-up project be planned out, to build on the learnings of the project. The demonstration equipment would need maintenance, alongside the technical aspects to ensure that there are no difficulties in future once the project winds up. During the withdrawal phase, UNDP should consider possible initiatives that can facilitate national stakeholders in this regard, and the presence of an international project manager answerable to UNDP would be critical for the accomplishment, sustainability, and eventual continuation of the project through a subsequent program. The purpose for the follow-up project would also be to sustain the current achievements of the project alongside propelling them further. Since the FASNETT builds on incremental projects and has been developed to create synergy with other ongoing RE and EE interventions by design, there is huge potential for scaling up the project's achievements. However, as discussed earlier, this is contingent upon some of the main project activities being implemented successfully, such as the enactment of the Energy Bill and completion of project demonstrations. Overall, this evaluation finds that scaling up the impact is quite possible with a well-designed follow up project which assimilates learnings from the FASNETT.	Government of Tuvalu and bilateral entities	Dec 2023
D	Category 4: Financial		
D.1	**It is recommended that fiscal incentives be provided with special attention to private sector**	Ministry of Finance /Development Bank of Tuvalu	Dec 2023

	As mentioned earlier, private companies should be roped in through concessional financing schemes and the private sector funds should also be leveraged through innovative financing mechanisms such as credit guarantees. There should be fiscal incentives so there is interest in the sector other than by TEC. Creating room for private-public partnerships should be a major consideration for a follow up project. Such financing incentives would also enable households to contribute towards achievement of renewable energy goals, while also enabling buy-in of the population. Although a thriving private sector is absent, through the bill it is possible to incentivise investments in renewable energy, and a decentralised grid in Tuvalu, such that the projects can be managed effectively while the governments can facilitate the same through an enabling regulatory framework. Finally, there is also a possibility to introduce carbon credits, and mobilise the same for investment in renewable energy, similar to what has been done by Vanuatu. The capital raised through such credits can catalyse investment in renewable energy and enable accelerated achievement of targets.		
D.2	**It is recommended that a viable financial model is adapted** Although pandemic played a role in increasing the procurement cost, it would be beneficial for the project to have a dedicated, sustainable fund which would be driven by the people of Tuvalu through purchases of RE equipment like solar. One of the main obstacles is the high cost and difficulty of logistics related to bringing in renewable energy and energy-efficient equipment to Tuvalu. Additionally, the replacement of depreciating renewable energy and energy-efficient technology is challenging, as equipment breakdown can lead to a loss of confidence by adopters. Therefore, it is essential to build efficiencies on the supply-side to promote sustainable businesses in Tuvalu.	Ministry of Finance	Dec 2023
E	Category 5: Education		
E.1	**It is recommended that the curriculum at all levels should include importance of RE and EE** There needs to be awareness at the grassroots level with activities addressing energy efficiency, renewable energy, and climate because it is not just the older people who are adapting to newer ways of technology, it is also the youth who do not have the awareness needed for such measures to be taken on a	Ministry of Energy and Ministry of Education	Dec 2023

	national level. The curriculum at all levels must be revised so that the young minds are ready to take up the challenges surrounding climate change and the importance of using RE because they would be acquiring knowledge about the importance of energy efficiency at a basic level.		
F	Category 6: Gender		
F.1	**Serious consideration for Gender Parity** In line with the gender surveys and FGDs carried out, the previous gender mainstreaming policies should be revisited, and the role and contributions of women, both young and old, in measures to mitigate climate change should be incorporated for future actions. This can be done by giving them important roles as community leaders and encouraging them to raise awareness as well. There should be more provisions for women in scholarships for RE and EE research.	Ministry of Gender, Government of Tuvalu and Ministry of energy	Dec 2024

5.4 Lessons Learned

- Technical working groups appeared to be beneficial for the project, and it would have been even better if those groups were developed earlier so that the country could adapt to the technology quickly.

- Procurement is a necessary element of the project implementation. However, the delay in contracts for procurement could have been assessed beforehand in order to reduce the cost. Furthermore, it is important to do procurement at scale, to reduce logistics cost. Such a learning is critical for design of future projects.

- Idiosyncratic challenges of a specific economic context need be delineated and understood thoroughly when developing cost estimates and budgets for projects, in order to provision appropriately for the risks. As observed in Tuvalu, the geographic position of the country made it prone to extreme import price shocks, which as a result, caused the budget to over exceed as the price for importing solar technology had exorbitantly increased.

- An early setup of demonstrations is crucial for assessing the situation and taking appropriate action. By organizing demonstrations sooner, valuable insights could have been gained, alongside informed decisions, and avoidance of missed opportunities. Proactive planning, timely action, and evaluation for achieving optimal outcomes helps in the longer run.

- An important aspect that emerged and is a great learning point is the importance of actively incorporating the opinions and feedback of more women to address gender bias and reduce scepticism. By ensuring that women's perspectives are included in decision-making processes and discussions, we can work towards eradicating gender bias and creating a more inclusive environment. By valuing and incorporating diverse viewpoints, we can challenge preconceived notions and foster a greater sense of trust and acceptance.

- It can be deduced that off-grid solutions are the way for the Pacific and Tuvalu is no different. Currently the scattered population of Fiji is using off-grid private sector solutions to provide electricity. In addition, with a country like Tuvalu, the nature of solar technology is a decentralised configuration.

- One important lesson learned is the significance of identifying pockets of demand and adopting a self-contained installation approach in those areas. This is particularly relevant in regions like the South Pacific, where the traditional grid system may not be the most cost-effective solution due to inadequate demand. While the grid system offers integration and maintenance benefits, it is essential to recognize that a decentralized system can also prove to be more efficient. By understanding, the specific needs and demand patterns of each area tailored energy distribution solutions that are economically viable and better suited to local requirements can be implemented.

- A valuable lesson is the pivotal role played by sufficient and well-capitalized financing schemes in promoting the adoption of renewable energy equipment at the household level. It was witnessed that the availability of such financing options can significantly enhance the affordability and accessibility of renewable energy technologies for households. These schemes empower individuals to invest in clean energy solutions, leading to a wider adoption of sustainable practices and a reduction in reliance on traditional energy sources. Recognizing the importance of accessible financing, we now understand the need to establish and promote robust financing mechanisms that cater to the specific needs of households, enabling them to transition to renewable energy solutions with ease.

ANNEX A: List of Interviewees

S. No	Name	Position	Organisation
1	Phattemon Jantalae	Programme Associate	UNDP
2	Manuel Soriano	Senior Technical Advisor	UNDP-GEF
3	Asaeli Sinusetaki	Consultant - Coordination Support Officer for the Tuvalu FASNETT Project Management Unit	UNDP
4	Roger Aldover	CTA	FASNETT
5	Yemesrach Workie	Deputy Resident Representative UNDP Pacific Office in Fiji	UNDP
6	Temukisa Pesega Siale	General Manager	Development Bank of Tuvalu
7	Mafalu Lotolua	General Manager	Tuvalu Electricity Corporation

ANNEX B: List of Documents

22_UNDG HACT Micro-Assessment_TDE Report
2019 Project Board Minutes
Activities Inventory (As of: 31 March 2022)
Assessment Report For Solar Home Systems in Funaota 2312
BTOR_TUVALU_FASNETT_Dec 2022updated
CDR 2018-2022
Design report Revised Draft_CDI project Tuvalu_SP9(revised draft for approval
Energy Bill FINAL FINAL 3 Dec 2021
Evaluation Question Matrix
FASNETT MTR Management Responses (2022-01-26)
FASNETT - Gender Report- FINAL
FASNETT 2017-Final HACT Micro-Assessment Report
FASNETT AWP 2022
Financial Audit Report, TV FASNETT (GEF6STAR), {Project Id: 00097730 (Output No.: 00101338)} 06 April 2022
GEF_UNDP_ co-financing template for MTR or TE
GOV Letter to UNDP
Signed version_ Addendum (India proposal).pdf
Mid-term Review Report April 2021
Minute PB Meeting 08 June 022
Minute PB Meeting 15 Dec 021
Pictures from the mission
PIMS 5613 TUV FASNETT ProDoc 131117 for DOA Clearance
PIMS 5613 TUV FASNETT Social and Environmental Screening 191115
PIMS 5613 TUV FASNETT Social and Environmental Screening 191115 (3)
ProDoc 4-13-017
Project Implementation Report 2022
Project Inception Report November 2019
Sub Regional Programme Document Pacific 2018-2022
Signed 2020 AWP
Signed Contracts UNDP
IC_RLA ToR for ExpRes_International Consultant Tuvalu FASNETT Terminal Evaluation
Tuvalu Project Initiation Plan
Tuvalu FASNETT Project Initiation Plan_endorsed cpy
UNPacific Strategy 2018-2022

ANNEX C: UNEG Code of Conduct for Evaluators

Independence entails the ability to evaluate without undue influence or pressure by any party (including the hiring unit) and providing evaluators with free access to information on the evaluation subject. Independence provides legitimacy to and ensures an objective perspective on evaluations. An independent evaluation reduces the potential for conflicts of interest which might arise with self- reported ratings by those involved in the management of the project being evaluated. Independence is one of ten general principles for evaluations (together with internationally agreed principles, goals, and targets: utility, credibility, impartiality, ethics, transparency, human rights and gender equality, national evaluation capacities, and professionalism).

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.

Evaluation Consultant Agreement Form

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

Name of Evaluator: Ammar Habib Khan

Name of Consultancy Organization (where relevant): _____

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

for Evaluation. Signed at_____(Place) on_____(Date)

Signature: 

ANNEX D: Evaluation Consultant Agreement

Evaluators/Consultants:

10. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.
11. 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.
12. 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.
13. 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.
14. 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.
15. 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.
16. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.
17. Must ensure that independence of judgement is maintained, and that evaluation findings and recommendations are independently presented.
18. 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.

Evaluation Consultant Agreement Form

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

Name of Evaluator: Ammar Habib Khan

Name of Consultancy Organization (where relevant): _____

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

for Evaluation. Signed at_____(Place) on_____(Date)

Signature: 

ANNEX E: TE Report Clearance Form

Terminal Evaluation Report for *(Tuvalu FASNETT & UNDP PIMS ID* 5613)

Reviewed and Cleared By:

Commissioning Unit (M&E Focal Point)

Name: Merewalesi Laveti

Signature: DocuSigned by: 6D905C21A253476... Date: 01-May-2023

Regional Technical Advisor (Nature, Climate and Energy)

Name: DocuSigned by: Manuel Soriano B01FE800169D418...

Signature: DocuSigned by: Manuel Soriano B01FE800169D418... Date: 04-May-2023

ANNEX F: TE TOR

Terms of Reference for ICs and RLAs through /GPN ExpRes Services/Work Description: Team Leader, Tuvalu FASNETT Terminal Evaluation Terminal Evaluation

Project/Programme Title: Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT)

Consultancy Title: Team Leader,

Duty Station: Home Based (travel to Tuvalu prohibited by Government restrictions)

Duration: 25-35 working days

Expected start date: 8 November – 31 December

1. BACKGROUND

The FASNETT project was designed to achieve the following objectives through the realization of the following key outcomes:

Objectives and Key Outcomes

FASNETT has the objective of facilitation of the development and utilization of feasible renewable energy resources and application of energy efficiency technologies in Tuvalu for achieving realistic energy targets in Tuvalu. The objective indicators are as follows:

· % share of RE in the national power generation mix. The targets (%) are from 26% to 44% at project mid-term, to 67% by end of project.

· Cumulative GHG (CO2) emission reduction from power generation. The targets (tons CO2) are from 0 to 5,000 at project mid-term, to 15,000 by end of project.

· No. of women actively involved in the planning and implementation of energy services provision in the outer islands. The targets are from 0 to 5 at project mid-term and 10 by end of project.

The overarching objective will be achieved through six interrelated outcomes of FASNETT: · Outcome 1. Improved awareness and attitude towards sustainable Renewable Energy (RE) and Energy Efficient (EE) technology applications in the public, commercial and energy sectors.

· Outcome 2. Coherent and integrated implementation of enhanced policies, regulations and projects on energy development and utilization with the country's Energy Act in support of national economic development.

· Outcome 3.1. Enhanced energy utilization efficiency and development and application of feasible renewable energy resources in support of national economic development. · Outcome 3.2. Increased application of viable climate resilient renewable energy and energy efficiency technology applications in the country.

· Outcome 4.1. Improved availability of, and access to, financing for climate resilient renewable energy and energy efficiency.

· Outcome 4.2. Government of Tuvalu, the financial sector and donor agencies providing accessible financing for climate resilient renewable energy and energy efficiency projects.

NOTE, per the Project Implementation Review (PIR) Report; the project has continued to be seriously affected by the slowdown of activities due to COVID-19-related factors including: closing of borders, long quarantine requirements for traveling consultants and contractor's technical personnel, longer shipping schedules, longer manufacture and assembly of RE/EE equipment for demos, and prevailing high prices. This has resulted to very significant delays that necessitated the one-year implementation period extension to February 2023. The delays and increased costs needed reallocations to meet requirements beyond budgeted levels. The Project has consumed allocated Project Management Cost (PMC) and has to adjust to the additional costs required for the extension and increased demo costs as decided in the Project Board meetings. The project continued to have on-line weekly Project Team oversight coordination meetings and more focused group meetings to speed up the implementation and put it on-track. The remaining activities and outputs were identified and corresponding TORs and contracts have been prepared and advertised for implementation until EOP at mid-February 2023.

By end of the reporting period, by 30 June 2022, the cumulative project delivery rate was around 45%. In spite of the slowdown, the increase in the delivery rate from last year's 25% marks the continued improvement in project implementation of the four (4) demos which carry the bulk of unspent budgets which are programmed for use in the implementation of the remaining project activities during the project extension period.

Location and Justification

Tuvalu is a small island nation located in the Pacific Ocean and is the third-least populous sovereign state in the world (about 10,000 as of end 2014). In terms of physical land size, at just 26 km2, it is the fourth smallest country in the world. The country belongs to the category of Least Developed Countries and is one of the most environmentally fragile states in the Pacific region due to its low lying land (the highest elevation at 5 meters above sea level); its geographical isolation, lack of fertile land and inability to reap economies of scale also affects provision of goods and services. Like most of the Pacific Island Countries (PICs), Tuvalu has many constraints to development and among these is the high dependency on imported energy resources (primarily petroleum products), and it too has to hurdle and eliminate barriers to the optimal utilization of its limited indigenous energy resources. Tuvalu has no conventional energy resources and is heavily reliant on imported oil fuels for transport, electricity generation and household use. High fuel prices and fluctuations have a destabilizing effect on businesses and households, limiting growth and reducing food security, especially in the most isolated outer islands.

Renewable energy (RE) resources such as solar, wind, biomass and ocean energy are recognized as potential energy alternatives in the country. In response to such situation in the world oil market and ensure the country's energy security, and in line with its commitment to contribute to the global effort to reduce greenhouse gas (GHG) emissions, the Government of Tuvalu (GOT) committed to get 100% of its electricity from renewable energy sources by 2020 as declared in the 2009 Tuvalu National Energy Policy (TNEP). The Energy Strategic Action Plan defined and directed current and future energy developments so that Tuvalu can achieve the ambitious target of 100% RE for power generation by 2020. The initial efforts towards this were supported by the e8, a group of 10 electric utilities from developed countries, i.e., G8 countries1. This commitment to implement power generation at 100% RE between 2013 and 2020 would be through Solar PV (95% of demand) and biodiesel (5% of demand). But other feasible RE resources in the country such as biomass (biofuels and biogas) and wind were also to be tapped.

In November 2015, the Government of Tuvalu submitted its Intended Nationally Determined Contributions (INDC) to UNFCCC, in updating the goal set in the country's 2009 TNEP,

has now sets out the objective to reduce emissions of greenhouse gases from the electricity generation (power) sector, by 100%, i.e. almost zero emissions by 2025 through the use renewable energy sources and energy efficient technologies. With the current economic development situation in the country and the actions that are ongoing and are being planned towards the achievement of this target, there is a need to re-evaluate the target to either confirm or reset it to a more realistic level and lay down the detailed plan that can be achieved by 2020, and beyond up to 2025, in line with the INDC commitments. Furthermore, once this goal is reaffirmed, there is a need to facilitate the achievement of target through the removal of barriers and filling in of the gaps that would bridge the achievement of said RE target initially in what could be realizable in four to five years up to 2020 and then lay the next five year program up to 2025 to finally reach the end goal. The renewable energy and energy efficiency technology applications are expected to support the economic development of the country while minimizing GHG emissions.

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.

Further to this, the objectives of the evaluation will be to:

· assess the achievement of project results supported by evidence (i.e., progress of project's outcome targets),

· assess the contribution and alignment of the project to relevant national development plans or environmental policies.

· assess the contribution of the project results towards the relevant outcome and output of the Sub Regional Programme Document (SRPD) & United Nation Pacific Strategy (UNPS/UNDAF)

· assess any cross cutting and gender issues using the gender scale effective scale (GRES) · examination on the use of funds and value for money

· assess the impact of COVID19 on project's implementation

· and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming

1The Group consists of the following countries: Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States of America.

The TE will be conducted according to the guidance, rules and procedures established by UNDP and GEF as reflected in the UNDP Evaluation Guidance for GEF Financed Projects.

1. 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 Unit (PMU) and the UNDP Pacific Office must provide the TE team 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 will review these sources of information documents, as well as 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 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 the following project sites: · Tafua Pond, Fogafale, Funafuti – this is the proposed site for demonstration activity on the 100kW Floating Solar Photo-Voltaic (FSPV);

Public Works Department (PWD), Fogafale, Funafuti – the site for the standalone solar powered Capacitive De-Ionization (CDI) water treatment technology for purifying drinking water that are carted and sold to households on Funafuti;

Tuvalu Electricity Corporation (TEC), Fongafale, Funafuti – to see the site of the newly installed demonstration activity on Demand Management/Response System, which involve the high-electricity consuming refrigeration storage containers (called Reefers);

Also, TEC's Standalone Solar Home Systems (SASH) demo site in Funaota, the site that was co-funded by FASNETT PMU. The site helps the islet of Funaota reduce the reliance on fossil fuel for electricity generation, thus reducing greenhouse gases (GHG) emission;

The supplementary rooftop solar at the Demo Fale that will help stimulate increased application of EE and RE technologies in the country, and help put the Project and the TEC on track in facilitating increased share of RE electricity in Tuvalu; and

Development Bank of Tuvalu (DBT), Fongafale, Funafuti – the DBT has an existing financial scheme for RE and EE, which FASNETT is complementing.

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, 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.

❖ Additional Text to incorporate into this section, as relevant (please adjust as needed):

As of 11 March 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic as the new coronavirus rapidly spread to all regions of the world. Travel to the country was restricted and now open for travel in the country. The TE team should develop a methodology that takes this into account the conduct of the TE virtually and remotely, including the use of remote interview methods and extended desk reviews, data analysis, surveys, and evaluation questionnaires. This should be detailed in the TE Inception Report and agreed with the Commissioning Unit.

If all or part of the TE is to be carried out virtually then consideration should be taken for stakeholder availability, ability or willingness to be interviewed remotely. In addition, their accessibility to the internet/computer may be an issue as many government and national counterparts may be working from home. These limitations must be reflected in the final TE report.

If a data collection/field mission is not possible then remote interviews may be undertaken through telephone or online (skype, zoom etc.). International consultants can work remotely with

national evaluator support in the field if it is safe for them to operate and travel. No stakeholders, consultants or UNDP staff should be put in harm's way and safety is the key priority.

A short validation mission may be considered if it is confirmed to be safe for staff, consultants, stakeholders and if such a mission is possible within the TE schedule. Equally, qualified, and independent national consultants can be hired to undertake the TE and interviews in country as long as it is safe to do so.

2. SCOPE OF WORK, RESPONSIBILITIES AND DESCRIPTION OF THE PROPOSED WORK

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 (http://web.undp.org/evaluation/guideline/documents/GEF/TE_GuidanceforUNDP-supportedGEF financedProjects.pdf).

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 drivenness

· 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 of 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 FASNETT Project's activities. The relevant evidentiary documents on these activities must be evaluated to verify and confirm potential attribution of the results to the FASNETT 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 FASNETT 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 FASNETT 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 Facilitation of the Achievement of Sustainable National Energy Targets of Tuvalu (FASNETT)

Monitoring & Evaluation (M&E)	Rating2
M&E design at entry	
M&E Plan Implementation	
Overall Quality of M&E	

2 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)

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	

]

2. TIMEFRAME

The total duration of the TE will be approximately (average 25-35 working days) over a time period of (8 weeks) starting on 8 November – 31 December. The tentative TE timeframe is as follows:

Timeframe	Activity
31 October	Application closes – GPN Roster
5 November	Selection of TE team
8 November	Preparation period for TE team (handover of documentation)
(15 November) 3 days (recommended 2-4)	Document review and preparation of TE Inception Report

(16 November) 4 days	Finalization and Validation of TE Inception Report; latest start of TE mission
(17 -28 November) 12 days (recommended 7- 15)	TE mission: virtual stakeholder meetings, interviews.
30 November	Mission wrap-up meeting & presentation of initial findings; earliest end of TE mission
(10 December) 10 days (recommended 5-10)	Preparation of draft TE report
15 December	Circulation of draft TE report for comments
20 December	Incorporation of comments on draft TE report into Audit Trail & finalization of TE report
5 January	Preparation and Issuance of Management Response
6 January	Concluding Stakeholder Workshop (optional)
10 January	Expected date of full TE completion

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

3. 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: (by 16 November)	TE team submits Inception Report to Commissioning Unit and project management
2	Presentation	Initial Findings	End of TE mission: (30 November)	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: (15 December)	TE team submits to Commissioning Unit; reviewed by RTA, Project Coordinating Unit, GEF OFP
5	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: (by 20 December)	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.3

3. Institutional arrangements/reporting lines

The principal responsibility for managing the TE resides with the Commissioning Unit.
The Commissioning Unit for this project's TE is the UNDP Country Office's Integrated Results and Management Unit (IRMU). Liasion will be conducted directly with the Country Office's Monitoring and Evaluation Officer. This is in collaboration with the Regional Technical Advisory for clearance and approval of the deliverables.

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.

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 national consultant expert, from Tuvalu. The team leader will leader will be responsible for the overall assessment of the project results and

3 Access at: http://web.undp.org/evaluation/guideline/section-6.shtml

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. The team expert will report to the Team Leader and support the TE team leader to assess the extent to which the project is achieving project results and improve sustainability of project gains. The team expert 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.

1. Experience and qualifications

Education

· Master's degree in Engineering, preferably in Energy, Electrical or Mechanical or other closely related field; 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 energy efficiency

· Experience in evaluating projects.

· Experience working in the Pacific

· Experience in relevant technical areas for at least 10 years.

· Demonstrated understanding of issues related to gender with experience in gender responsive evaluation and analysis.

· Excellent communication skills.

· Demonstrable analytical skills.

· Project evaluation/review experience within the United Nations system will be considered an asset.

Language

· Fluency in written and spoken English.

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.

2. Payment Modality

· 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%4:

· 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.

In line with the UNDP's financial regulations, when determined by the Commissioning Unit and/or the consultant that a deliverable or service cannot be satisfactorily completed due to the impact of COVID-19 and limitations to the MTR, that deliverable or service will not be paid.

Due to the current COVID-19 situation and its implications, a partial payment may be considered if the consultant invested time towards the deliverable but was unable to complete to circumstances beyond his/her control.

ANNEX G: TE Rating Scales

Ratings for Outcomes, Effectiveness, Efficiency, M&E, Implementation/Oversight, Execution, Relevance	Sustainability ratings:
6 = Highly Satisfactory (HS): exceeds expectations and/or no shortcomings 5 = Satisfactory (S): meets expectations and/or no or minor shortcomings 4 = Moderately Satisfactory (MS): more or less meets expectations and/or some shortcomings 3 = Moderately Unsatisfactory (MU): somewhat below expectations and/or significant shortcomings 2 = Unsatisfactory (U): substantially below expectations and/or major shortcomings 1 = Highly Unsatisfactory (HU): severe shortcomings Unable to Assess (U/A): available information does not allow an assessment	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