



## MADD VANUATU –Solar Power Electrification Programme

### Basic information

Transferring Country	<i>Vanuatu</i>
Mitigation Activity Name	<i>Electrification of Vanuatu's Inhabited Islands through Solar Power ITMO Programme</i>
Mitigation Activity Participants	<i>National Green Energy Fund Department of Energy, Ministry of Climate Change United Nations Development Programme</i>
Sector	<i>Renewable Energy</i>
Summary	<i>The proposed mitigation action supports Vanuatu to roll out decentralized solar power installations that can supply reliable, scalable, and low-cost electricity across Vanuatu's inhabited islands.</i>
Version of document	<i>10</i>
Date and place	<i>27th January 2023, Vanuatu, and New York</i>
Total Number of ITMOs for authorization	<i>97,217 tCO<sub>2</sub>e until 2030</i>
Programme start date	<i>1<sup>st</sup> April 2022</i>
Start date and end date of the crediting period	<i>1<sup>st</sup> April 2022 – 31<sup>st</sup> December 2030</i>

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## 1. Executive Summary

### 1a. Programme Description

Vanuatu's geography creates natural barriers to centralized systems, including energy supply. As a result, many communities and islands in Vanuatu do not have access to electricity, severely hampering development and leading to the inefficient use of fossil fuels for basic needs such as lighting. Despite only 20 percent of Vanuatu's rural residents having access to electricity, Vanuatu's GDP grew from US\$ 267 million in 2001 to US\$ 914 million in 2018, leading to graduation from the status as a least developed country by December 2020. This shows the potential for continued growth, if further income generating opportunities are unlocked through energy access in rural communities. Furthermore, as Vanuatu is ranked as the "most at-risk country to extreme natural hazards" by the World Risk Report, it is imperative that energy supply is robust and can be reliable in the face of extreme weather.

#### 1b. Why is the ITMO part crucial for the financial model?

The persistent and structural barriers to electrification of rural Vanuatu are high costs, scalability restrictions due to the Vanuatu islands' geography and population dispersion, reliability and complexity of conventional technologies and low awareness of energy supply potential.

Investing in scaling up distributed solar powered electricity in Vanuatu is currently too risky for private sector actors. A lack of visible demand and purchasing power in the communities presents too high of a risk for any purely commercial solar investment.

In order to make the financial proposition for solar installations reasonable to public and private beneficiaries, a financial support mechanism has been set up. The National Green Energy Fund (NGEF) has been established and seed funded by the Government of Vanuatu to facilitate capital investment opportunities to improve energy access for households and businesses in rural and peri urban areas. This is achieved through the issuance of concessional loans and subsidized solar devices. The bilateral agreement with Switzerland was signed with the expectation that ITMO revenues will facilitate a green transition in Vanuatu, contributing to the achievement of the NDC targets, including the financial sustainability on the NGEF operations. ITMO revenues will allow the NGEF to provide subsidized equipment to enhance the affordability by its customers namely public institutions, businesses, and households to connect following the 100% access policy of the updated National Energy Road Map for Vanuatu of which the NGEF is a key instrument.

#### 1c. How does it contribute to sustainable development?

The National Energy Road Map Implementation plan (2019) prioritizes energy projects that strategically contribute to the achievement of the Vanuatu National Sustainable Development Plan, the Peoples Plan (2016-2030) goals and the National Energy Road Map 2016-2030 targets. The "*Electrification of Vanuatu's Inhabited Islands through Solar Power ITMO Programme*" has significant sustainable development impacts and will be directly covering at least 9 Sustainable Development Goals.

By the end of the 8.7 years of the programme, it will have:

- Provided energy access to currently un- or under-electrified communities.
- Generated new jobs and new income through productive use.
- Increased capacity of the local renewable energy companies.
- Provided internet connectivity for tele-medicine (virtual health consultations) and other uses such as remote education.

#### 2d. Is the activity covered by the unconditional NDC?

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yes  no

2e. *Does the activity receive international climate finance?*

yes  no

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## 2. Activity Overview

Based on the updated Vanuatu National Energy Road Map (NERM<sup>1</sup>) 2016 – 2030, electricity access levels in Vanuatu are unusually low, and stand out in relation to the country’s level of development. Hence, the NERM identifies access to electricity as one of Vanuatu’s five development priorities.

The goal of the Internationally Transferred Mitigation Outcomes (ITMO) programme is to supply solar powered electricity to rural communities of Vanuatu. The proposed ITMO programme aims to achieve direct total GHG emissions reductions of 97,217tCO<sub>2</sub>e over 8.7 years by enabling the roll out of solar systems that can supply reliable, low-cost solar powered electricity to rural communities across Vanuatu.

According to the “Eligible Sectors and Sub-sectors Aligned to Conditional NDC” identified in the “Vanuatu ITMOs Guidance Manual-V1.1-draft -Clean”, all GHG mitigation projects are eligible for ITMOs generation in the following cases and applicable to the “*Electrification of Vanuatu’s Inhabited Islands through Solar Power ITMO Programme*”:

The following technologies are listed in the list approved by the NAB with Vanuatu’s specific list of technologies and activities in the Energy Sector, for the following subsectors:

- Energy Industry /Electricity Generation
- Transport
- Other Sectors -Commercial, Institutional and Residential
- Manufacturing

### **Scope**

Vanuatu is an archipelago, consisting of 82 islands, 65 of which are inhabited. Like other Small Island Developing States (SIDS), Vanuatu’s geographical characteristics create natural barriers to markets and centralized systems of commerce, including energy supply. As a result, many communities and islands in Vanuatu don’t have access to energy, severely hampering development. However, with climate change impacts already prevalent and set to intensify, Vanuatu needs to accelerate its development and build a robust and resilient economy. Energy access through renewable sources is essential for building this resiliency and Vanuatu’s Nationally Determined Contributions (NDC<sup>2</sup>) outlines a “*sector specific target of transitioning to close to 100% renewable energy generation in the electricity sector by 2030*”. Furthermore, as Vanuatu is ranked as the “*most at-risk country to extreme natural hazards*” by the World Risk Report<sup>3</sup> (2019), and not for the first time, it is imperative that energy supply is robust and can be reliable in the face of extreme weather.

Port Vila, Vanuatu’s capital and largest city, is electrified through a stand-alone grid system, powered mainly by diesel and a small portion of wind power. There are two other islands in Vanuatu that each have a hydro-powered mini-grid. Apart from these three isolated grids, no other islands have formalized energy distribution systems. A small percentage of the population living outside of these three grids have access to some form of energy supply, however, they have no access to electricity for productive uses (i.e., to generate income).

<sup>1</sup> <https://www.nab.vu/vanuatu-national-energy-road-map>

<sup>2</sup> <https://www.nab.vu/document/vanuatu%E2%80%99s-enhanced-nationally-determined-contributions-ndc-2020-2030>

<sup>3</sup> [https://reliefweb.int/sites/reliefweb.int/files/resources/WorldRiskReport-2019\\_Online\\_english.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/WorldRiskReport-2019_Online_english.pdf)

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The proposed ITMO programme will enhance the adoption of solar technologies, that are reliable in the face of extreme weather. The programme will empower rural communities through the provision of energy and engage local renewable energy companies through learning by doing so they can effectively engage in the expansion of solar technologies. NGEF will work with communities to identify new income generating activities that enhance sustainable livelihoods into the future. In particular, the programme will facilitate robust market growth of sustainable energy through the provision of additional revenue streams to the NGEF.

The NGEF has been set up by the Government of Vanuatu to address the lack of access to energy and all its socio-economic consequences. The NGE facilitates capital investment opportunities to improve energy access for households and businesses in rural areas resulting in improved livelihoods, job creation and greater opportunities for income generation. The proposed ITMO programme will increase the NGEF's financial sustainability by providing an additional revenue stream through carbon finance. This will allow the NGEF to enhance its operations, increase scale and scope of its activities and offer attractive subsidies for solar devices which would otherwise be too expensive for rural users.

The ITMO programme will roll out solar energy investments across Vanuatu within the framework of the bilateral Article 6.2 agreement between Vanuatu and the Swiss government. It will primarily provide electrification, but also include replacement of existing diesel generators by solar systems.

### ***Technology***

The programme will accept solar energy technologies that have been successfully applied in Vanuatu or other countries with similar climatic conditions and are listed in the NGEF product brochure as approved equipment.

### ***Participants***

Through the policy alignment of this ITMO programme with Vanuatu's NDC and National Energy Road Map (NERM) for 2016 – 2030 which identifies access to electricity as one of the country's five development priorities, the Government of Vanuatu through the Department of Energy and the National Green Energy Fund are key stakeholders in this programme along with the technology suppliers. The ITMO programme follows a nationally aligned approach towards achieving the long-term climate goals of the government. Furthermore, community empowerment is core to this programme as solar power will open significant new income-generating activities for the rural communities and stimulate the rural economy. Local communities will therefore be the key stakeholders in every project. Finally, sub-national governments will be closely involved in the implementation of the programme to ensure its sustainability.

The legal ownership of the ITMOs generated from the activities will be transferred from the end-beneficiaries to the Government of Vanuatu through the loan agreement signed between the NGEF and the clients. The transfer of ownership will be captured in the loan agreements. This will facilitate the transfer of ITMOs by the Government of Vanuatu to Switzerland.

## **3. Baseline setting**

The baseline scenario for the proposed ITMOs programme has been established under the NDC of Vanuatu. The baseline scenario for the proposed ITMO programme has been assessed using the approach and values from the following methodology:

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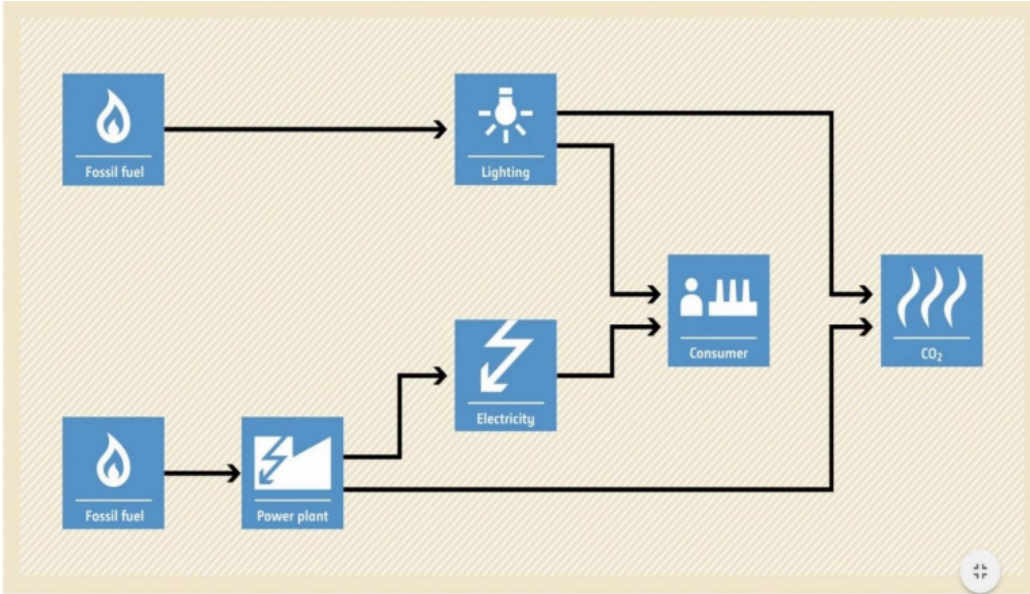
The CDM approved small-scale methodology “AMS I.L.: Electrification of rural communities using renewable energy<sup>4</sup>, Version 03.0”. The methodology AMS I.L. is applicable to electrification of a community achieved through the installation of renewable electricity generation systems that displace fossil fuel use, such as in fuel-based lighting systems, stand-alone power generators. The category of applicable ITMO programme activities under this methodology is the implementation of individual, renewable energy systems.

The baseline scenario is the same as the business-as-usual-scenario (BAU scenario i.e., continuation of current practices) i.e., in the absence of the project activity, the end users would have had continued suppressed demand of energy or used fossil fuel based lighting and stand-alone fossil fuel based (Petrol/diesel) electricity generators for appliances other than lighting.

The spatial extent of the project boundary includes the project renewable electricity generation systems and the physical sites of the consumers served by the project activity, visualized in the figure below.

<sup>4</sup> [\*CDM: Electrification of rural communities using renewable energy --- Version 3.0 \(unfccc.int\)\*](#)

Figure 1: Baseline Scenarios for an ITMO Project under the Programme:



The key parameters to determine the baseline scenario and baseline emissions are the amount of renewable electricity utilized by the consumers served by the project renewable electricity generation systems and the number of consumers supplied with renewable electricity by the project activity.

Table 1: Baseline Emission Factors for Electricity System

	tCO2e/MWh
(a) For the first 55 kWh of renewable electricity consumed per year	6.8
(b) For the consumption between 55 kWh and 250 kWh per year	1.3
(c) For the consumption beyond 250 kWh	1

The baseline emissions for individual renewable energy systems are calculated based on the methodology AMS I.L:

$$BE_y = BE_{55,y} + BE_{250,y} + BE_{250 plus,y} \tag{Equation 1}$$

Where:

- $BE_y$  = Baseline emissions in year y (t CO<sub>2</sub>)
- $BE_{55,y}$  = Aggregate baseline emissions for consumers that consumed equal to or less than 55 kWh of renewable electricity from project renewable electricity systems in year y (t CO<sub>2</sub>)
- $BE_{250,y}$  = Aggregate baseline emissions for consumers that consumed more than 55 kWh but equal to or less than 250 kWh of renewable electricity from project renewable electricity systems in year y (t CO<sub>2</sub>)
- $BE_{250 plus,y}$  = Aggregate baseline emissions for consumers that consumed more than 250 kWh of renewable electricity from project renewable electricity systems in year y (t CO<sub>2</sub>)

For consumers that consumed equal to or less than 55 kWh, baseline emissions are calculated as:

$$BE_{55,y} = \sum_x^N EG_{x,y} \times EF_{CO_2,55} \quad \text{Equation (2)}$$

Where:

- $EG_{x,y}$  = Electricity delivered by project renewable electricity generation system to consumer  $x$ , where the electricity delivered to that facility is equal to or less than 55 kWh in year  $y$  (MWh)
- $EF_{CO_2,55}$  = 6.8 (t CO<sub>2</sub>/MWh)
- $x$  = Consumer supplied with renewable electricity from operating project renewable electricity generation systems consuming equal to or less than 55 kWh in year  $y$
- $N$  = Number of consumers in the project activity consuming equal to or less than 55 kWh/year

For consumers that consumed more than 55 kWh but equal to or less than 250 kWh, baseline emissions are calculated as:

$$BE_{250,y} = \sum_z^M ((EG_{z,y} - 0.055) \times EF_{CO_2,250} + C) \quad \text{Equation (3)}$$

Where:

- $EG_{z,y}$  = Electricity delivered by project renewable electricity generation system to consumer  $z$  in year  $y$ , where the electricity delivered to the facility is more than 55 kWh but equal to or less than 250 kWh in year  $y$  (MWh)
- $EF_{CO_2,250}$  = 1.3 (t CO<sub>2</sub>/MWh)
- $Z$  = Consumer supplied with renewable electricity from operating project renewable electricity generation systems consuming more than 55 kWh but equal to or less than 250 kWh in year  $y$
- $C$  = 0.374 (t CO<sub>2</sub>), a constant calculated as (0.055 MWh x 6.8 t CO<sub>2</sub>/MWh)
- $M$  = Number of facilities in the project activity consuming more than 55 kWh but equal to or less than 250 kWh/year

For facilities that consumed more than 250 kWh baseline emissions are calculated as:

$$BE_{250 plus,y} = \sum_w^P ((EG_{w,y} - 0.250) \times EF_{CO_2,250 plus} + D) \quad \text{Equation (4)}$$



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Where:

$EG_{w,y}$	=	Electricity delivered by project renewable electricity generation system to consumer $w$ in year $y$ such that the electricity delivered to the facility is more than 250 kWh in year $y$ (MWh)
$EF_{CO_2,250 plus}$	=	1.0 (t CO <sub>2</sub> /MWh)
$w$	=	Consumer supplied with renewable electricity from operating project renewable electricity generation systems consuming more than 250 kWh in year $y$
$D$	=	0.6275 (t CO <sub>2</sub> ), a constant calculated as (0.055 MWh x 6.8 t CO <sub>2</sub> /MWh + 0.195 MWh x 1.3 t CO <sub>2</sub> /MWh)
$P$	=	Number of consumers in the project activity consuming more than 250 kWh/year

While the ITMO programme is fully embedded in the sectoral policies and the NDC, the government of Vanuatu has defined its NDC targets as conditional, including all NDC activities in the energy sector. Consequently, all activities identified in Vanuatu's NDC require technical, financial, and capacity building support in order to be successfully implemented. The ITMO Programme could not be implemented without technical support as well as direct financial incentives through the ITMO collaboration with Switzerland. After 2030, once the transition to 100% renewable energy is completed, Vanuatu will no longer be able to transfer ITMOs.

The programme crediting period is 8.7 years from 1<sup>st</sup> April 2022 to December 2030. The programme start date is April 2022 with rolling installations throughout 2030. The individual, aggregated projects generate emission reductions throughout the 8.7 years of the crediting period up to a total of 97,217tCO<sub>2</sub>e.

#### 4. Avoiding double claiming

The Government of Vanuatu, Department of Energy and ITMO participants will ensure the transparency, credibility and robustness of ITMOs generated from this ITMO programme and will avoid double counting<sup>5</sup>/claiming of ITMOs. Typically, the potential for double counting/claiming may arise where there is a government-regulated system/programme for the constraint and monetization of GHG emissions (such as international emissions trading, cap and trade or carbon tax mechanisms etc.). For this ITMO programme, there are no overlaps and interactions with other public or private climate finance sources, carbon market projects or national government programmes supporting the roll-out of decentralized solar power installations on Vanuatu's inhabited islands. Further, the Government of Vanuatu has established an ITMO registry system in order to track the ITMOs issued/transferred/cancelled from each ITMO activity and established protocols for corresponding adjustment in the national inventory system.

<sup>5</sup> *Double Counting/Claiming: The scenario wherein the benefit of a single ITMOs i.e. GHG Emission Reductions (ERs) unit is used on more than one occasion to: (a) Sell to third parties for the purpose of financial gain, offsetting or to achieve regulated targets (domestic or internationally) AND/OR (b) Be included in an account or inventory to avoid the requirement to purchase emission reductions units under a regulated/non-regulated system (domestic/internationally). Double Counting of ITMOs (ERs) is therefore defined as the benefit or value of one ER unit being inadvertently (or indeed intentionally) used twice or more.*

## 5. Promoting sustainable development

The proposed ITMO programme will undergo a UNDP’s SDG Impact Assessment through the Climate Action Impact Tool which is embedded in the integrated monitoring, reporting and verification (MRV) Tool developed/implemented by the Government of Vanuatu. The assessment under the MRV Tool requires a thorough screening for potential negative impacts before assessing the projects positive impacts. During this screening, risks are identified, and commensurate management approaches defined. The section “Social and Environmental Risk Screening” is compliant with UNDP’s social and environmental screening procedures. The impact and probability of an event occurring will need to be graded from 1 to 5 with 1 being low (e.g., low level of impact or low probability of event occurring) and with the level of significance automatically calculated. Only those indicators that are defined as significantly high will need to be provided with additional information on a proposed risk mitigation approach.







The impact assessment will be applied to identify the significant sustainable development impacts, focuses on consolidating the direct impacts resulting from the activity. The tool provides the flexibility to define which impact can be considered significant and direct – and the outcomes (short-term or long term, intended or unintended) of the proposed action.




Over the lifetime of the project, the ITMO programme is expected to have the following impacts:

- Provided energy access to people in Vanuatu who are currently without electricity.
- Generated new jobs and income generated through productive use
- Led to direct GHG emission reductions of up to 97,217tCO<sub>2</sub>e over 9 years.
- Enhanced engagement of private sector, in particularly local solar power companies.

The proposed ITMO programme will directly and positively impact at least 9 SDGs, summarized in the table below:

Table 2: Positively impacted SDGs

	<b>SDG1</b> – Generate additional income
	<b>SDG2</b> - increase in agriculture production/ crop yields since using their off-grid solar water pump, local processing and storage of food for longer period
	<b>SDG3</b> - Replacing kerosene with solar lighting/home system (SLS/SHS) brings health benefits
	<b>SDG4</b> – contributes to inclusive and equitable education by unlocking study hours/productive hours, accessing online educational materials and improve viable internet access
	<b>SDG7</b> - Access to clean and affordable energy
	<b>SDG8</b> - By improving electricity access, local businesses thrive and bring employments

	<b>SDG9</b> - <i>Enabling access to affordable solar power with new finance and tech innovations</i>
	<b>SDG13</b> - <i>Fights climate change by replacing carbon-intensive energy sources</i>
	<b>SDG17</b> - <i>Governments, development partners, investors, funders and businesses working together to build an off-grid solar market</i>

## 6. Environmental and Social Impact Assessment

Environmental Impact Assessment (EIA) Regulations<sup>6</sup> for Vanuatu are designed to provide procedures and EIA content specifications for nationwide application. The regulations are a component of the Environmental Management and Conservation Act and describe the requirements for EIA submission to the Department of Environmental Protection and Conservation (DEC), Vanuatu.

The Environmental Impact Assessment Regulations<sup>7</sup> Order No. 175 of 2011, include the list of the projects, proposals or development activities specified in Schedule 1 which are subject to the EIA provisions of the Act. Further, the schedule-1, paragraph-9 enlists the activities requiring preliminary environmental assessment from energy generation facilities and other infrastructure services, including the construction or alteration of any of the following: (a) hydropower facilities; (b) power stations; (c) wind energy facilities; (d) geothermal activities; (e) pipelines.

The individual, small-scale solar systems are not categorized under the energy generation facility and other infrastructure services as per para-9 of schedule-1 and therefore don't require the application of an EIA as per Vanuatu's laws.

However, a waste disposal Act developed by the Department of Environment is currently in effect, however, solar and battery has been added and awaits the amendment approval by parliament before it is implemented.

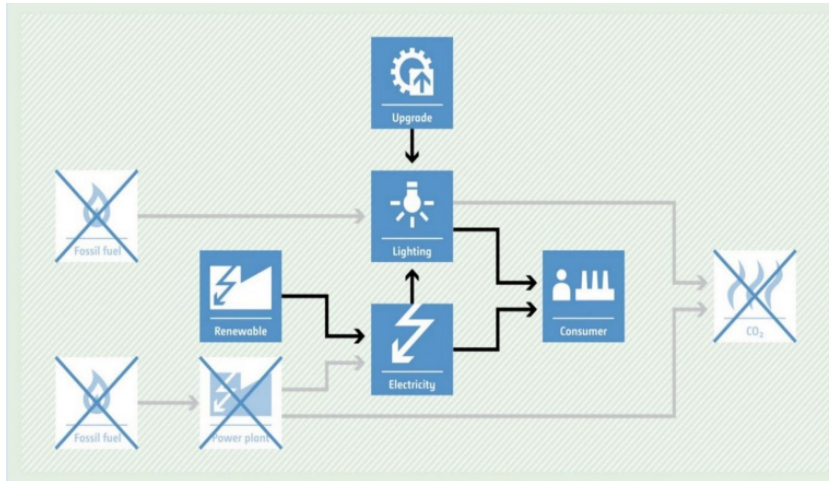
### Determination, monitoring and reporting of mitigation outcomes

The programme scenario is the roll out of solar technology that can supply reliable, scalable, and low-cost solar powered electricity to rural communities across Vanuatu. The illustration of the project scenario details the project boundary.

<sup>6</sup> <https://environment.gov.vu/index.php/environment-conventions-and-agreements/laws/laws-depc/eia-regulation>

<sup>7</sup> [http://www.paclii.org/vu/legis/sub\\_leg/emacaeiar2011871/](http://www.paclii.org/vu/legis/sub_leg/emacaeiar2011871/)

Figure 2: The project scenario for each ITMO project:



For the purpose of GHG emission reductions estimations, it is assumed that the majority of the installations will be scaled-up during the crediting period across Vanuatu.

**GHG Emission reductions:** Emission reductions on annual basis ( $ER_y$ ) are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (\text{Equation 7})$$

Where:

$ER_y$  = Emission reductions in year  $y$  ( $tCO_2e/y$ )

$BE_y$  = Baseline Emissions in year  $y$  ( $t CO_2/y$ )

$PE_y$  = Project emissions in year  $y$  ( $tCO_2/y$ )

$LE_y$  = Leakage emissions in year  $y$  ( $t CO_2/y$ )

As per the applied CDM methodology AMS I.L, the project and leakage emissions are calculated as follows:

- Project emissions are considered zero ( $PE_y = 0$ )
- Leakage emissions are considered zero ( $LE_y = 0$ )

Accordingly:  $ER_y = BE_y$

Table 3: The ITMO programme emission reductions over 8.7 years calculated for individual installations:

Year	Baseline GHG emissions (tCO <sub>2</sub> e)	Project GHG emissions (tCO <sub>2</sub> e)	GHG emission reductions (tCO <sub>2</sub> e)
2022	658	0	658
2023	3,711	0	3,711
2024	5,678	0	5,678
2025	8,207	0	8,207
2026	10,735	0	10,735
2027	13,264	0	13,264
2028	15,792	0	15,792
2029	18,321	0	18,321
2030	20,850	0	20,850
<b>TOTAL</b>	<b>97,217</b>	<b>0</b>	<b>97,217</b>

### Monitoring & Reporting

The monitoring of the mitigation activity “Solar Power for Vanuatu’s Inhabited Islands through ITMO Programme” follows the approved small-scale methodology AMS I.L. - Electrification of rural communities using renewable energy<sup>8</sup> (Version 03.0 Sectoral scope(s): 01).

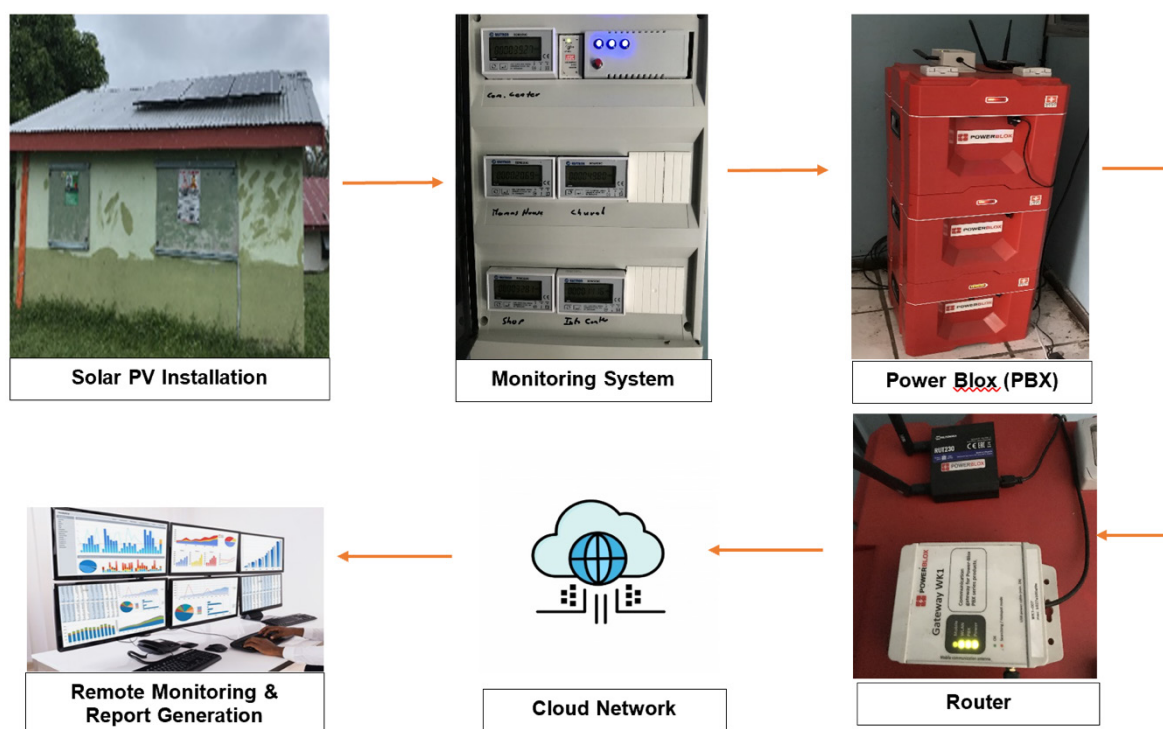
For individual installations, the annual amount of renewable electricity supplied to a facility is monitored as per Option 1: Measure the net amount of renewable electricity delivered to each consumer connected to the project renewable electricity generation system(s). Such measurements shall be made continuously and recorded at least on a monthly basis. Annual calibrations will have to be conducted and continuous maintenance of the meters is required. The monitored parameters are sent to the NGEF via routers installed on the modules. In addition, NGEF also undertakes monitoring and evaluation spot checks of installed equipment once a year.

A consolidated quarterly report will be generated and will be submitted to the Department of Energy for record keeping. For convenience of GHG emission reduction calculations and monitoring, the recording frequency will be set once in a quarter. The schematic diagram of the project monitoring system (location of the monitoring meters) has been presented in the following picture. The records will be kept at least until the corresponding adjustments have been made in 2034.

The direct metering will be confirmed through monitoring and reporting of the NGEF’s loan disbursement and sales numbers of NGEF approved products.

<sup>8</sup>[CDM: Electrification of rural communities using renewable energy --- Version 3.0 \(unfccc.int\)](https://unfccc.int/)

Figure-3: Illustrative Mitigation Activity Monitoring System



Illustrative Picture: Monitoring System for Electricity Delivered to Consumers

For convenience of GHG emission reduction calculation and monitoring, the recording frequency will be set once in a year for each period of 1<sup>st</sup> of January - 31<sup>st</sup> of December.

Data and Parameters monitored:

Data / Parameter Table 1.

Data / Parameter	ED <sub>tot,y</sub>
Data unit	MWh/y
Description	Electricity delivered to consumers
Measurement procedures	An electricity meter shall be installed as part of the project activity to measure total gross electricity supplied to all connected consumers (new and existing) from the project renewable electricity generation system.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
Any comment	-

Data / Parameter Table 2.

<b>Data / Parameter</b>	<b>EC<sub>T1,2,3,i,y</sub></b>
Data unit	MWh/y
Description	Electricity metered at Type 1-3 consumer i
Measurement procedures	Measurements are undertaken using electricity meters at the consumer electricity service entrance
Monitoring frequency	Continuous monitoring, hourly measurement, and at least monthly recording
Any comment	-

Data / Parameter Table 3.

<b>Data / Parameter</b>	<b>Type 1-3 consumers electricity access</b>
Data unit	-
Description	Check for continued access to electricity
Measurement procedures	Annual/biennial checks that installations are still working, done with a census or a statistically significant sample of consumers. Use 90/10 and 95/10 precision for annual and biennial checks, respectively
Monitoring frequency	Annual
Any comment	Through these checks it will also be verified that only one meter or PV installation per household is installed.

Data / Parameter Table 4.

<b>Data / Parameter</b>	<b>Recycling</b>
Data unit	-
Description	Provision of proof of recycling
Measurement procedures	
Monitoring frequency	At time of disposal
Any comment	-

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**Independent Plausibility Checks**

The programme roll out will be documented by video or photo recordings of the local electricity use and impact. Videos and photo documentations will be uploaded to the Platform for Voluntary Bilateral Cooperation<sup>9</sup>. The Platform for Voluntary Bilateral Cooperation is hosted by UNDP and made available to host countries such as Vanuatu to manage the ITMO workflow from programme development to request for issuance. These ITMO process flow is managed by each country in a secure, private space which is only accessible upon invitation by the host country administrator.

Further, NGEF is tracking all loan payments made and compared to the measured electricity delivery.

**National MRV focal points**

The following focal points in the Government are responsible for Mitigation Action Tracking and Reporting:

Georgewin Garae	National Green Energy Fund
Matthew Tasale	Department of Energy
Nelson Kalo	Department of Climate Change
Leana Williams	National Advisory Board on Climate Change

**7. Transformational change**

The energy access delivered through this ITMO programme will create jobs and bring several development benefits associated with economic development, significantly contributing to the Sustainable Development Goals (SDGs) and Vanuatu’s National Sustainable Development Plan (NSDP: 2016-2030). Moreover, it directly contributes to Vanuatu’s NDC target of supplying close to 100 percent renewable energy in its electricity sector by 2030.

Market barriers restricting increased access to energy at scale are often persistent and structural- particularly in SIDS, where the island geography and population dispersion make scale of renewables impossible. Therefore, electricity cost is higher on average than in other geographies. Although the benefits to rural electrification are clear, neither private sector investment nor rural adoption of the available technologies are happening at the scale needed. Therefore, only through concessional loans and equipment subsidies provided by NGEF offtake is facilitated. A higher capitalized NGEF through the generation of additional revenues from carbon finance will increase offtake of solar power by public and private end users.

<sup>9</sup> [Platform for voluntary bilateral cooperation \(undp.org\)](https://platformforvoluntarybilateralcooperation.org/)



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## 8. Institutional set-up

The owner of the mitigation activity is the National Green Energy Fund. The Department of Energy is responsible for the coordination of the mitigation activity and for ITMO reporting to the Department of Climate Change.

### ***Implementation of the mitigation activity***

Below is a schematic overview of the institutional/contractual arrangements and financial flows for the mitigation activity, through which the core entities and their critical roles can be identified.

#### **Federal Office of the Environment, Switzerland**

- Pays UNDP ex-ante for facilitation of development services to obtain ITMOs
- Pays UNDP ex-post for third party verified ITMOs

#### **United Nations Development Programme**

- Provides development services to FOEN for the generation of ITMOs
- Facilitates payment to National Green Energy Fund through the Government of Vanuatu
- Facilitates transfer of ITMOs to Switzerland through Department of Climate Change

#### **Department of Energy**

- Facilitates implementation through coordination between government stakeholders
- Engages public and private beneficiaries
- Reports mitigation outcomes to Department of Climate Change and initiates the transfer of ITMOs to Switzerland

#### **National Green Energy Fund**

- Provides concessional loans and subsidized solar equipment to beneficiaries
- Utilizes carbon revenues to increase its scale and scope
- Follows the monitoring requirement as per MADD
- Ensures sustainable recycling of disposed equipment

### ***Key ITMO programme focal points***

1. To revise this Mitigation Activity Design Document:
  - *National Green Energy Fund*
  - *Department of Energy*
  - *United Nations Development Programme*
2. To submit monitoring data
  - *National Green Energy Fund*
3. To aggregate monitoring data and request ITMO issuances

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- *Department of Energy*

4. To communicate matters relating to the development and operation of the programme

- *Department of Energy*
- *United Nations Development Programme*

***Focal points for grievance mechanism***

All stakeholders shall be engaged during the ITMO programme implementation and operations, including through a grievance mechanism and shall have the opportunity to confidentially submit complaints to the host/buying country.

The following focal points will address concerns raised:

**Vanuatu:**

Antony Garae, Head of Energy Department, Ministry of Climate Change Adaptation, Meteorology, Geohazards, Energy, Environment and National Disaster Management Office

**Switzerland:**

Edi Medilanski, Policy Advisor, Compensation Office, Federal Office of the Environment

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## 5. Additionality

The NGEF has been established and seed funded by the Government of Vanuatu to facilitate capital investment opportunities to improve energy access for households and businesses in rural and peri urban areas. The bilateral agreement with Switzerland was signed by Vanuatu to facilitate a rapid green transition also through the NGEF. The expected ITMO revenues will allow the NGEF to provide subsidized equipment to end users to enhance their affordability and connect their customers. The NGEF customers, namely public institutions, businesses, and households are connected following the 100% access policy of the updated National Energy Road Map for Vanuatu of which the NGEF is a key instrument. Without the ITMO revenues, the sustainability of the NGEF would be at risk and its key instruments such as the subsidized equipment would no longer be available for its customers.

Poverty and the impossibility to enforce debt collection on Vanuatu's remote islands make commercial investments financially not viable. Currently, there is no commercial investment in renewable energy happening in Vanuatu. The NGEF is providing concessional loans and subsidized solar systems to households, micro-small and medium enterprises, and public institutions across the country. The NGEF's operations are seed funded by the Government of Vanuatu but require a stable revenue stream to ensure their sustainability. The carbon revenues generated through the ITMO programme allow the NGEF to not only sustain its operations but also increase loan disbursement, continued subsidization of solar equipment, wider geographical reach, and the inclusion of new solar products in their product catalogue.

The Department of Energy has included solar powered rural electrification in the positive list of ITMO activities. The programme is therefore deemed automatically additional for participation in Article 6.2 mechanisms. The Government has strategically positioned the NGEF as key counterpart in this programme to increase the adoption of solar power and mainstream as key energy source across the islands.

## 6. Business model

It is obvious from the continuous absence of private sector investments in solar power that solar power has not taken off commercially on Vanuatu's islands. The Government of Vanuatu has therefore established the NGEF, and seed funded its operations.

The NGEF offers targeted financial incentives through concessional loans and subsidized solar equipment to make solar systems more affordable for rural users. Equipment subsidies in particular are a critical instrument for the NGEF as Vanuatu is one of the most expensive markets for solar equipment due to high shipment costs to Vanuatu and within Vanuatu's islands. Through the ITMO programme, the NGEF operations become more scalable due to continued provision of subsidized equipment. With the roll-out of new solar power installations, carbon revenues grow over time and strengthen the economic development of each village and island. Economic growth at the same time increases the offtake of new solar systems and the interest in affordable finance to access these systems.

The repayments to the NGEF are deposited in the NGEF Bank account or through the Government Financial Services Bureaus located in each province. NGEF is offering concessional rates at 6 percent. NGEF is not making profit as their mandate is to electrify 100% of Vanuatu's population by 2030 using renewable energy. The roll-out of solar PV installations across the islands requires targeted awareness raising and strategic capacity building for end-users. This is in particularly necessary for the smallest off-takers such as households which are estimated to be around 90% of the target beneficiaries. These

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capacity building costs are a key barrier for large-scale commercial investments. It is estimated to be up to \$ 7,500 per installed system. The ITMO programme allows the NGEF to overcome these commercial barriers and scale-up the installation of solar equipment for a wide range of consumers across the islands.

The NGEF provides also subsidized equipment and access to concessional finance at 6% interest. So far, NGEF has not experienced any default in repayment. The NGEF repayments by cooperatives are scheduled monthly, primary and secondary schools are paying every six months and area councils are repaying the loan annually. Without carbon revenues, the subsidized equipment would not be available and equipment costs would increase by 27 to 60 percent. This would also increase the loan amounts for the beneficiaries by up to US\$ 3,001 per installation, thereby decreasing the willingness to pay for solar equipment due to lack of affordability, in particular in the case of smaller consumers such as council buildings or primary schools. Thus, the success of the NGEF depends to a large extent on the subsidy programme for its equipment.

On the islands of Vanuatu there is a lot of economic potential, for example in the tourism sector, where cooled drinks and souvenirs are produced and sold, but also in the agricultural sector, for livestock and fisheries. Electricity can be used for cold storage and transportation of food, for ice production, as well as in the post-harvest processing of cassava, drying of mangos or the production of rugs, fabrics and carpets from banana leaves. This economic development in the provinces will increase energy consumption make solar power financially also more attractive for potential future private investors once a critical mass of installations is reached and energy consumption strengthened.

### **Recycling strategy**

The Waste Disposal Act is expected to be amended to include solar and batteries to provide the legal framework for disposals of systems after end of life. While the programme focuses on new electrifications, the MADD also covers displacement of diesel generators and in the unlikely case that an existing generator is displaced, the company installing solar PV will have to provide proof that the diesel generator has been disposed through a local recycling company which can break down large machinery and ship overseas for recycling. The company will have records of equipment dismantled and shipped overseas.

NGEF also contributes annually 6,000,000 VUV to a Disaster Recovery Fund for maintenance of systems after disasters. Furthermore, NGEF provides annual training workshops on solar maintenance and repairs to new clients and refreshers to old clients. The annual budget allocated for these trainings is VUV 2,000,000.

The vendor replacing systems or system components such as batteries is handing them over to a local recycling company for free and the local recycling company will break down equipment and ship overseas.

Each project will be set up in a way that, on the one hand, as little waste as possible is generated and as environmentally friendly products as possible are used and, on the other hand, where unavoidable, all materials are recycled at the end of the programme.

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Annex: Emission Reduction Calculation Sheet