

# Utilities Regulatory Authority

## UTILITIES REGULATORY AUTHORITY ACT NO.11 OF 2007


### DETERMINATION OF MAXIMUM PRICE OF ELECTRICITY FOR LOLTONG MINI GRID, NORTH PENTECOST

Notice No. 48 of 2022

In the exercise of the powers conferred upon the Authority by section 18 of the Utilities Regulatory Authority Act No.11 of 2007 (as amended), the Authority makes the following Determination.

- 1 Maximum Price of Electricity to be charged by The Department of Energy (DoE)**  
The maximum price of electricity that the DoE is allowed to charge to its customers is set at 88.46 VT/kWh.
- 2 Application of the Determined Price**  
The maximum price outlined under sections 1 is to be applied to Lolton Mini Grid electricity customers from the commencement date of this Determination.
- 3 Expiry of the Determination**  
This Determination expires within 12 months from the Commencement Date.
- 4 Commencement date**  
This Determination commences on the date on which it is published in the Official Gazette.

Made at Port Vila this 13<sup>th</sup> day of May 2022.

  
Mr. Paul Kaun  
Chief Executive Officer & Executive  
Commissioner



  
Mr. John Chaniel  
Chairperson

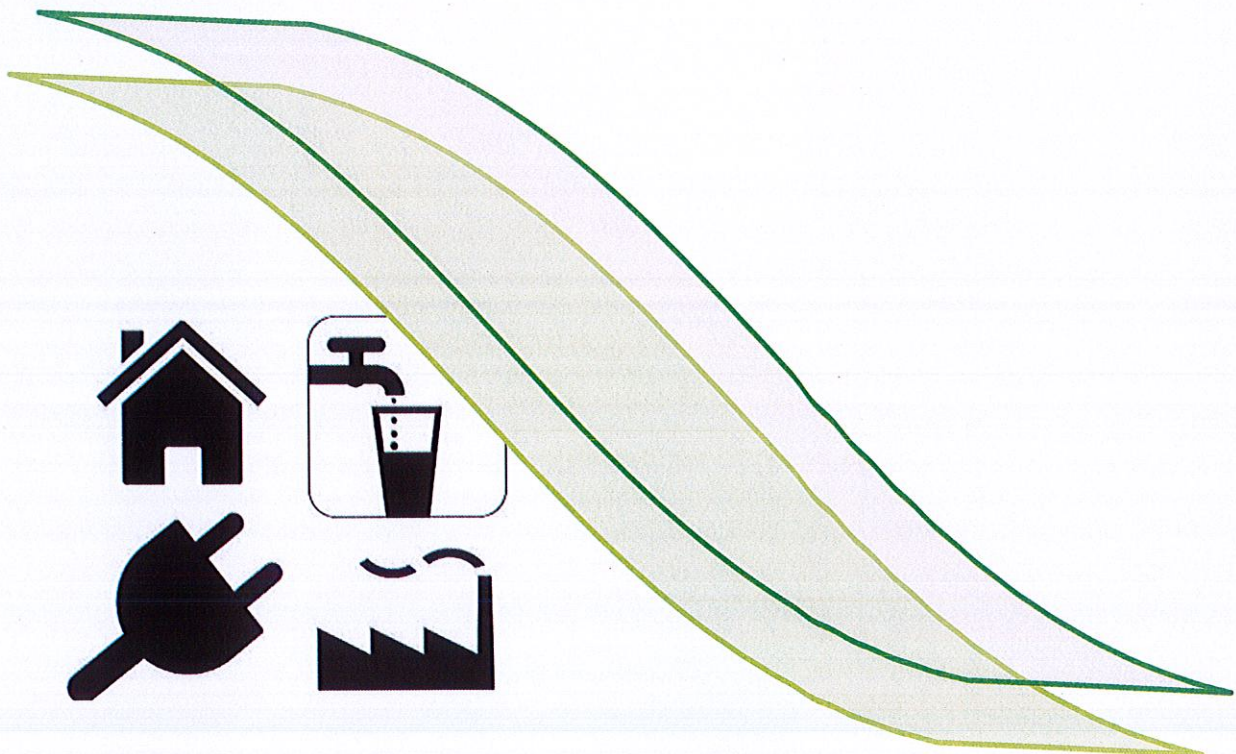
  
Mr. Lloyd M. Fikiasi  
Commissioner

# Authority's Commission Order

Case U-0001-22

**In the Matter of Tariff Calculation of Lolong Mini-Grid System**

May 2022





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# 1 Commission Order

The Utilities Regulatory Authority (the Authority) Commission is issuing this Commission Order under Section 18(1) of the Utilities Regulatory Authority Act No.11 of 2007 (as amended) following the request received by Department of Energy (DoE) on 27<sup>th</sup> April 2022 to determine and issue an approved electricity tariff for Lol tong mini grid in North Pentecost.

The mini grid has been operational since March 2022 under DoE's administration during the interim period while the process of identifying and selecting a suitable management is being formalized after which the administration side of the mini grid can be transferred. Therefore, this commission order is issued to the current administrator of the mini grid, the Department of Energy, for its implementation.

In acknowledging the current system administrator, the Authority's Commission hereby makes the following orders:

1. The approved tariff is 88.46 VT per kWh of energy sold.
2. The tariff period is identified to be a period of 1 year and effective on the day on which the tariff determination is officially gazetted by the Office of the Attorney General.
3. The allowable Required Revenue that will cover the cost of providing electricity for the tariff period is a sum of VT 1,097,785 to be generated by the approved tariff of 88.46 VT/kWh as the service charge.
4. During the tariff period, the DoE is to notify the Authority of any changes to the administration of the mini grid.

The data and information used in computing the 88.46 VT/kWh tariff is sourced from the following reports:

1. ADV2020-003E-BRANTV Hydro – Indicative electricity tariff for Pico Hydro Solar PV hybrid mini-grid at Lol tong Demo Site, North Pentecost.
2. Lol tong Hybrid Mini-Grid Project in North Pentecost BRANTV – Tariff Feasibility Study Report.
3. Lol tong Pico Hydro PV Hybrid Demo Site Detailed Design Report.

These reports in addition to further information and data provided by DoE has allowed the Authority to complete its analysis and derive each of the below listed main components of the tariff building block,

Table 1: Lol tong Mini Grid Tariff Components

Tariff Components	Unit	Annual VUV
<b>Operational Cost</b>	VUV	<b>1,097,785</b>
Fuel	VUV	-
Non-Fuel	VUV	1,097,785
Personnel Expense	VUV	906,093
Office Expenses	VUV	72,000
O&M Expense	VUV	119,692
O&M Diesel Expense	VUV	-
FM Fund	VUV	-
<b>CAPEX</b>	VUV	-
Asset Recovery	VUV	-
<b>Required Revenue</b>	VUV	<b>1,097,785</b>
<b>Demand</b>	kWh	<b>12,410</b>
<b>Lol tong Tariff</b>	VUV/kWh	<b>88.46</b>

The individual components are to be reviewed by the Authority at the end of the tariff period upon which they may be adjusted to reflect actual system operational costs and demand growth.



## 2 Introduction

Table 2: Case Information

<b>Case number</b>	U-0001-22
<b>Applicant</b>	Vanuatu Government – Department of Energy
<b>In the matter of</b>	Tariff Calculation of Lolong Mini-Grid System
<b>Date of Decision</b>	13 <sup>th</sup> May 2022
<b>Related Authority Document</b>	ADV2020-003E-BRANTV Hydro – Indicative electricity tariff for Pico Hydro Solar PV hybrid mini-grid at Lolong Demo Site, North Pentecost.

### 2.1 Background

On April 27<sup>th</sup> 2020, the Utilities Regulator Authority (the Authority) had received a request from the Department of Energy (DoE) through the BRANTV project team requiring the Authority to compute an Indicative Tariff and recommend a Management System for a proposed Pico Hydro PV Solar (hybrid) mini-grid system in Lolong, North Pentecost.

Upon completion of the Authority's tariff determination process based on available data and information, the Authority through its Advisory on Lolong Indicative Electricity Tariff issued in August 2020 (Lolong Advisory) had proposed an indicative tariff of 74.68 VT/kWh for the hybrid mini-grid system and a recommended management model based on a set of criteria.

On February 28<sup>th</sup> 2022, the Authority received another request from DoE requiring the Authority to validate its tariff calculation of the Lolong mini-grid system. Trama TecnoAmbiental (TTA) is the consulting firm hired by BRANTV through DoE to conduct Lolong's Tariff and Feasibility Study (Lolong Report) resulting in a report<sup>1</sup> and tariff model which have been submitted to the Authority to initiate its tariff review process. Due to covid travel restrictions, the Authority has not been able to conduct a site verification of the mini-grid system assets and users connected, however TTA consultant has provided the Authority with sufficient data and information allowing it to complete its tariff review process.

Whilst the Authority's tariff determination process was on foot, in the month of April, the DoE had requested the Authority to issue an Interim Tariff for the Lolong mini-grid system to allow the now operating mini-grid system to generate revenue to meet operational and maintenance costs incurred. On 26<sup>th</sup> April 2022 the Authority responded to DoE's request highlighting the pre-requisites for an interim tariff, one of which is the establishment of a formal entity to manage the mini-grid system so that there is assurance that the tariff implemented is properly accounted for and reported. Furthermore, the Authority provided options to address DoE's need for an interim tariff, one of which was for the DoE to provide temporary management of the mini grid while its proposed management system is being set up. In response to the Authority, the DoE on 27<sup>th</sup> April 2022, provided confirmation that it will be providing temporary management oversight of the Lolong mini grid system.

### 2.2 Purpose & Structure of this document

The purpose of this document is to present the Authority's tariff determination for the Lolong mini grid, located in North Pentecost.

<sup>1</sup> Lolong Hybrid Mini-grid Project in North Pentecost BRANTV – Tariff and Feasibility Study Report, December 28<sup>th</sup> 2021.



This document is structured as follows:

**Section 3** provides the Authority's tariff review approach and methodology followed through in determining the Loltong tariff for the tariff period.

**Section 4** provides the Authority's computation and assumptions taken in deriving the individual components of the tariff model required to determine the Loltong tariff for the tariff period.

**Section 5** presents the outline of the Authority's tariff determination for the Loltong mini grid during the tariff period.

## 2.3 Legislative Requirements & Framework

The legislative requirement and framework are provided for under the Utilities Regulatory Act No. 11 of 2007 (as amended).

Section 2 of the URA Act provides the purpose of the Act which is, among others, to ensure the provision of safe, reliable, and affordable regulated services.

Section 12 provides for the functions of the Authority which includes under paragraph 12(1)(a) the exercise of the functions and powers conferred by the Act or by any other Act in furtherance of the purposes of the Act.

Section 18 of the URA Act provides the authority to determine the maximum price which may be charged in relation to any aspect of a regulated service in Vanuatu.

This Commission Order is issued under Section 18 (1) of the URA Act determining the effective tariff for the tariff period defined in this document.



## 3 Tariff Review Approach and Methodology

This section provides the approach and methodology followed by the Authority in conducting Lolong mini grid tariff review.

### 3.1 Tariff Review Approach

#### 3.1.1 Tariff Review Process

Given the current Covid-19 situation in the country and the travel restrictions during which this tariff review process has been conducted, the Authority's extensive review process involving site inspections has been limited. This has increased the Authority's reliance on accurate and complete data and information provided by the TTA consultant through the BRANTV program who is responsible for Lolong Report, and the DoE.

As outlined above, while there is this limitation encountered during the review process by the Authority. It has not been used to delay the tariff process as there have been substantive work previously conducted by the Authority and the TTA consultant that is reflected in the respective reports previously outlined including additional data received during the review process that has given sufficient detail, and a reliable pool of data and information from which the reasonable tariff can be determined.

Furthermore, the Authority is aware that these demo sites as identified by the BRANTV<sup>2</sup> project team for RE systems are pilot projects, therefore current assumptions made in determining this tariff may not be valid in the future. This inherent risk requires close monitoring of the mini-grid operations even with a proper determined tariff.

#### 3.1.2 Interim Mini Grid Management

The interim management is the identified management held accountable by the Authority to be responsible for overseeing and setting up processes for the operations of Lolong mini grid until a formal private management is set up. Currently, the mini grid has been in operation under DoE supervision since March 2022, therefore has been incurring operational costs not covered by the BRANTV project funding and without a tariff in place, has not been able to generate any revenue to meet these costs.

This situation has forced DoE to request from the Authority an interim tariff, while obligated to do so under Section 18 of its Act, it must also consider sections,

1. 12(1)(b) to provide advice, reports and recommendations to the Government relating to utilities;
2. 12(2) The Authority must exercise its functions in a way that considers the interests of, and impact on, consumers and utility businesses as well as any Government policy.

Therefore, the Authority had strongly recommended that a pre-requisite for a tariff is the implementation of a proper management system as prescribed under Section 4.3 of Lolong Advisory with a formal and competent management to ensure the mini-grid's sustainability. On 27<sup>th</sup> April, DoE confirmed its responsibility for managing the mini grid to meet this pre-requisite.

While the interim management period by DoE is undefined, the Authority is aware that DoE is currently in the process of formalizing the identified management<sup>3</sup>, therefore the Authority is confident that this process will

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<sup>2</sup> The Barrier Removal to Achieve Energy Road Map Targets of Vanuatu (BRANTV) project is carried out by DoE through the National Implementation Modality Agreement between the Government and GEF/UNDP allowing access to a total grant of USD 2.6 million for a duration of 4 years.

<sup>3</sup> Currently identified in the Lolong Report, Section 3.1, as the existing hydro committee. However, this management is yet to be formalized with assistance from DoE.



fall within the tariff period upon which DoE is to hand over the administration of the mini grid to the new management and notify the Authority.

## 3.2 Tariff Methodology

### 3.2.1 Tariff Building Blocks

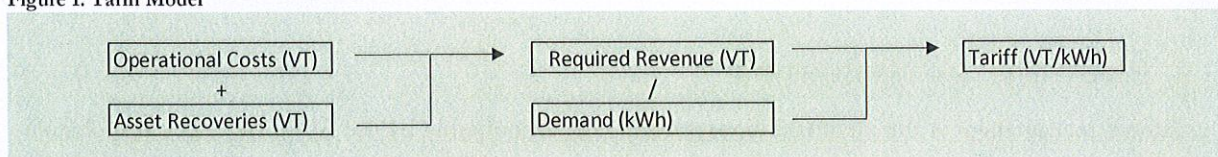
The Authority uses a cost reflective approach to constructing the cost components of its tariff model as highlighted under Section 4.2 of the Loltong Advisory. The mini grid costs components considered are deemed reasonable and prudent, forming the annual Required Revenue base used in determining the tariff. A brief description of the cost components is outlined below,

- Operational Costs – These are costs incurred as a result of operating the system, includes personnel costs, administration costs, operation and maintenance costs, and provisions such as Force majeure funds provision.
- Asset Recoveries – These are annual recoveries associated with assets included in the regulatory asset base. Asset recoveries are necessary for project funded mini grid systems as it is a one-off financing, therefore replacement of assets need to be factored into the tariff ensuring mini grid sustainability.

### 3.2.2 Tariff Model

Based on the tariff building blocks, the tariff model is designed to ensure that the service charge allows the mini grid management to recover sufficient revenue to meet costs incurred during the tariff period.

Figure 1: Tariff Model



(Source: Authority Staff)

As can be observed from Figure 1 above, determined reasonable and prudent operational costs have been added together with the computed annual asset recovery to arrive at the required revenue for the tariff period. Annual demand for the tariff period is divided by the required revenue base to arrive at the service charge tariff applicable during the tariff period.



## 4 Tariff Model Components

This section provides an overview of the individual tariff model components and assumptions utilized in deriving these components.

### 4.1 General Parameters

This sub-section highlights key assumptions and parameters guiding the computation of the tariff model components.

1. Tariff period is a one-year period beginning on the day the commission order is gazetted. Therefore, the required revenue base is to be computed taking into consideration all costs to be incurred within the tariff period.
2. The mini grid system will be operational 24/7. Therefore, required system output is computed to meet demand over this period.
3. The land on which the mini grid system has been constructed is acquired through a Voluntary Land Donation (VLD) agreement<sup>4</sup> between the landowners and DoE. Therefore, no land acquisition cost has been considered as part of capital expenditure.
4. All assets have been financed by a grant through the BRANTV project. Therefore, all assets are to be considered as Zero Cost Capital, where no return is expected.
5. Recovery of Assets is to be computed as a function of the assets cost and its expected useful life. This will ensure that the system is sustainable and able to replace assets once they have reached the end of their useful life.
6. The meters installed are prepaid meters therefore limits the risk associated with unpaid bills that may result in bad debts, the requirement for working capital and connection/disconnection charges.

### 4.2 Demand and Generation

This sub-section provides the mini grid generation requirements to meet demand load and consumption levels.

#### 4.2.1 Demand and Consumption

Demand is driven by the number of users currently connected to the mini grid, the Lol tong Report identified 88 users that are ready to connect out of the 97 users initially identified<sup>5</sup>. The users identified are listed below,

Table 3: Mini grid Potential Users

Type of User	Quantity
Households	66
Workshops	3
Retail Shops	3
Kava Bar	2
Guest House	3
Health Center	1
School	3
Church	3
Government Institution	4
<b>Total</b>	<b>88</b>

(Source: Lol tong Report)

Given the potential number of users, it has been estimated that each user will be consuming an average of 0.77 kWh/day, totalling to 68 kWh/day. However, because the mini grid is a new electricity system and the first of its kind in the Lol tong community, there is expected to be some lag in user connection and high consumption

<sup>4</sup> Refer to Section 2.6 of the Lol tong Report.

<sup>5</sup> Refer to Section 2.3 of the Lol tong Report.



during the initial years. This ramp up period is estimated in the Lolong Report to be 3 years, where consumption is expected to reach the amount forecasted in year 3, with 50% in year 1, and 75% in year 2. Based on recent consumption data received by the Authority from DoE, the current number of users connected, and consuming electricity is 60, with total average daily consumption of 32.1 kWh. This consumption level is 47% of the estimated daily consumption of 68 kWh. Therefore, the Authority has accepted and adopted the ramping up period assumptions for consumption used in the Lolong Report.

Based on this assumption and current consumption levels, demand for the tariff period is computed and displayed below,

Table 4: Demand for Tariff Period

Description	Unit	Amount
Expected daily Consumption	kWh/day	68
Y1 50% expected consumption	kWh/day	34
Tariff Period Demand	kWh/year	12,410

(Source: Authority Staff)

#### 4.2.2 Generation and Distribution

This part of the report provides the Authority's view on the generation and distribution requirements of the Lolong mini grid and the simulated production of the grid considering the required demand, as outlined above, for the tariff period.

##### Generation

The Lolong grid as provided by Lolong Report<sup>6</sup> is a Pico hydro PV hybrid system primarily made up of the main electricity generation sources of hydro, Solar PV, and generator. Currently the installed generation of the system is 3.6kW (hydro & PV array) as detailed below. It is to be noted that the 10kW generator is yet to be purchased and installed.

Table 5: Generation Source Data

Generation detail type	Unit	Quantity
Hydro	kW	7
PV Array	kWp	2.6
Backup Generator - Biofuel	kVA	10
Battery Inverter charger	kVA	15
Battery Capacity	kWh	33

(Source: Lolong Report)

The Authority noted that though the grid was designed primarily to use hydro as the main source of energy, it needs to have Solar PV, battery storage and back-up generator as part of the generation to cater for low hydro production during dry season expected in the months of May to October in a year. This design consideration is accepted by the Authority as it will ensure that electricity is always provided to users.

The Authority further acknowledges the thoroughly designed considerations on the generation components of the grid such as catchment, penstock, turbine, battery, powerhouse, and control room included in the System Design Report<sup>7</sup> (Lolong Design Report) submitted by DoE to the Authority. These considerations were vital in ensuring that these assets are functional throughout their life span.

##### Distribution

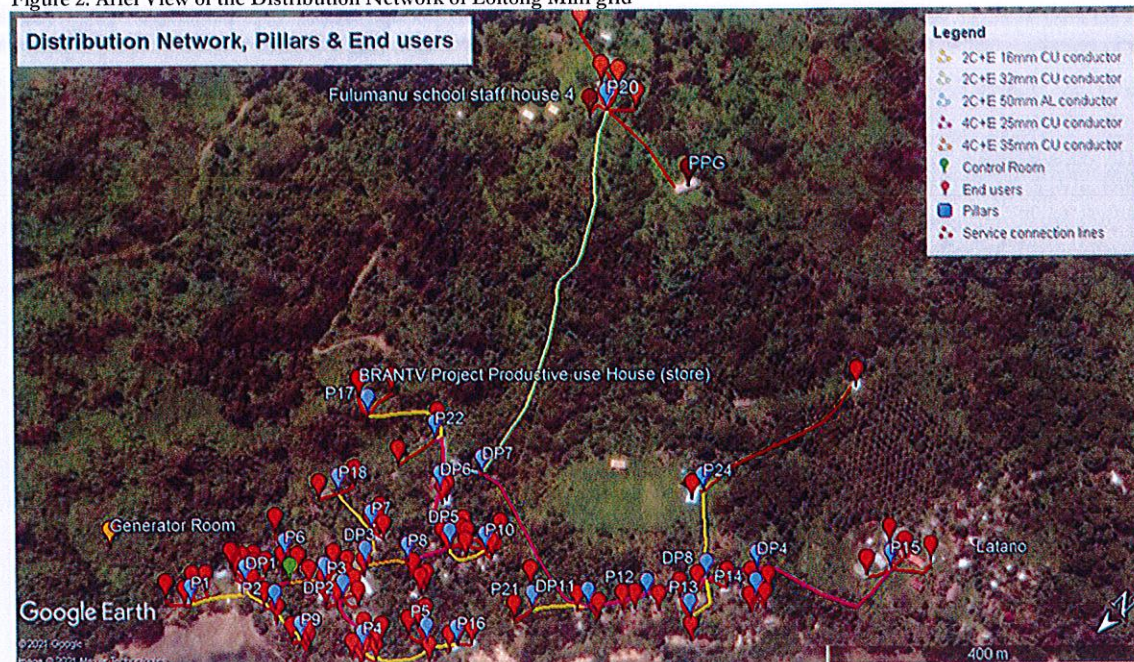
<sup>6</sup> Refer to Section 2.4 of the Lolong Report.

<sup>7</sup> Section 6.1.1 – 6.1.13 of the Lolong Design Report.



Furthermore, the Loltong Design report<sup>8</sup> states that the distribution component of Loltong mini grid to be installed will be an underground system of 3.4km, 230V 50Hz that will begin on the main switch board located in the control room and divided into 3 branches to connect a total 97 users in the Loltong community. To date, the Authority learned that most of the mini grid distribution system has been constructed allowing the expected 88 users to be connected. Below is a Google view on the layout of the distribution network, pillars, and end users.

Figure 2: Ariel View of the Distribution Network of Loltong Mini grid



(Source: Loltong Design Report)

The Authority noted the in-depth design considerations on the sizing of cables, minimum trenching depth and requirements, section across creek, and distributions pillars on the component of the distribution system; and acknowledges those considerations as vital to the setting up of a robust distribution system of the grid.

### Energy Production and System Losses

The Authority noted from the Loltong Report<sup>9</sup> that the production of the current generation sources of the grid were simulated with Homer software as per the table below.

Table 6: Production of Hydro and Solar PV

Simulated generation production	Unit	Quantity	Analysis
PV production per year	kWh/yr	3406	Production is 67% of the utilization rate
Hydro production per year	kWh/yr	40471.2	Average daily production of 3.5 hours

(Source: Authority Staff)

Despite being simulated data, the Authority views that for now the production data are quite reasonable to use for this tariff determination as they are quite conservative in comparison to similar benchmarks observed by the Authority.

Generation and storage system losses have been estimated in the Loltong Report to range from 12 – 14% annually, with distribution losses to be an annual average of 5% which have been used to compute the production output above. The Authority has accepted these system loss estimates during this tariff period as

<sup>8</sup> Section 6.1.14 of the Loltong Design Report.

<sup>9</sup> Refer to Section 2.4 of the Loltong Report.



they demonstrate a worst case scenario, which will assist the Authority to accurately determine the required energy generating sources for the tariff period to meet the demand load.

### Monthly Production and Demand

The Authority further conducted the analysis of the monthly production of the grid versus its demand to verify if the generation by Hydro and Solar PV per month will be sufficient to meet the demand of the grid during the tariff period. The Authority conducted this analysis by using demand information as provided by the Lolong Report. The result of the analysis is displayed below.

Table 7: Analysis of the Monthly Production Vs Demand

	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
Flow rate(l/s)	7.5	7.5	5	2.5	2.5	5	7.5	10	10	12	12	12	7.5	7.5	5	2.5	2.5	5	7.5	10	10	12	12	12
Ratio of flow rate to production	0.080214	0.080214	0.053476	0.026738	0.026738	0.053476	0.080214	0.106952	0.106952	0.128342	0.128342	0.128342	0.080214	0.080214	0.053476	0.026738	0.026738	0.053476	0.080214	0.106952	0.106952	0.128342	0.128342	0.128342
Flow rate produced by Hydro	3246.353	3246.353	2164.235	1082.118	1082.118	2164.235	3246.353	4328.471	4328.471	5194.165	5194.165	5194.165	3246.353	3246.353	2164.235	1082.118	1082.118	2164.235	3246.353	4328.471	4328.471	5194.165	5194.165	5194.165
Production kWh	283.8333	283.8333	283.8333	283.8333	283.8333	283.8333	283.8333	283.8333	283.8333	283.8333	283.8333	283.8333	255.45	255.45	255.45	255.45	255.45	255.45	255.45	255.45	255.45	255.45	255.45	255.45
Total production-Hydro + PV kWh	3530.186	3530.186	2448.069	1365.951	1365.951	2448.069	3530.186	4612.304	4612.304	5477.998	5477.998	5477.998	3501.803	3501.803	2419.685	1337.568	1337.568	2419.685	3501.803	4583.921	4583.921	5449.615	5449.615	5449.615
Demand kWh	1041.667	1041.667	1041.667	1041.667	1041.667	1041.667	1041.667	1041.667	1041.667	1041.667	1041.667	1041.667	1562.5	1562.5	1562.5	1562.5	1562.5	1562.5	1562.5	1562.5	1562.5	1562.5	1562.5	1562.5
Excess (%) kWh	52.08333	52.08333	52.08333	52.08333	52.08333	52.08333	52.08333	52.08333	52.08333	52.08333	52.08333	52.08333	78.125	78.125	78.125	78.125	78.125	78.125	78.125	78.125	78.125	78.125	78.125	78.125
Excess kWh	2436	2436	1354	272	272	1354	2436	3519	3519	4384	4384	4384	1861	1861	779	-303	-303	779	1861	2943	2943	3809	3809	3809

(Source: Authority Staff)

The analysis based on demand for year 1 shows that there will still be excess energy produced during the month of July and August when dry season conditions are expected to severely impact hydro production. However, during this same period in the following year, based on demand growth assumptions, there will be negative excess energy. This means that during those times there will be need for an additional source of energy to assist the hydro and PV sources in meeting demand.

Therefore, for the tariff period it can be safe to assume that the generator will not be required to meet demand load, however the generator may be required in year 2 of grid operation outside of the current tariff period.

## 4.3 Operational Cost

This sub-section provides the reasonable and prudent Lolong operational costs for the tariff period.

Table 8: Summary of Lolong Annual Operational Costs

Operational Costs	Annual (VUV)
<b>Fuel Cost</b>	-
1 Fuel Cost	-
<b>Non Fuel Cost</b>	<b>1,097,785</b>
2 Village technician (part time)	283,046
3 Village client relation officer / treasurer (part time)	283,046
4 O&M level 3: Local contractor - two visits per year from Port Vila	340,000
5 Office costs: Printing, fees (elec/internet), communication, small material	72,000
6 Small material to conduct preventive maintenance. Fuses, small cables, connectors, lights bulbs...	119,692
7 FM Fund	-
8 Diesel O&M + small repairs	-
<b>Total Operational Costs</b>	<b>1,097,785</b>

(Source: Authority Staff)

### Fuel Costs

Fuel costs is the variable cost which considers the cost of required diesel or coconut oil litres to operate the diesel generator during the dry seasons when water levels drop reducing the energy generated by the hydro system, therefore generation support is required to meet demand.



However, during the tariff period, it has been identified that installed hydro and Solar PV capacity is sufficient to cater for current demand load including assumed system losses, therefore fuel costs is estimated to be zero. Depending on consumption growth and water levels utilized by the hydro, the need for diesel generation may eventuate in the next tariff period.

### Non-Fuel Costs

Non-fuel costs are regarded as fixed costs that are considered during the tariff period. Personnel costs for the tariff period are items 2 – 4 in Table 9 above, a detailed breakdown is provided below,

Table 9: Personnel costs

Detailed Description	Monthly (VUV)	Annual (VUV)
2 Part-time dedication based in Loltong. 84 hours a month at 270 VUV per hour + 4% VNPF	23,587	283,046
3 Part-time dedication based in Loltong. 84 hours a month at 270 VUV per hour + 4% VNPF	23,587	283,046
4 1 visit each 6-months including labour and travel cost from Port Vila and Loltong	28,333	340,000

(Source: Loltong Report)

Other fixed costs include the following,

- Item 5: Office Costs – includes internet, phone, electricity, and other minor office expenses. The current arrangement does not require a rental expense as the admin duties are conducted from the control room of the system a few days per week. Furthermore, the system is prepaid therefore the office costs are assumed to be marginal.
- Item 6: Operation and maintenance (O&M) costs – these costs are associated with minor inventory kept on-hand to address maintenance and preventative requirements for the generation and distribution system of the mini grid. The benchmark utilized for this estimation is 0.5% of capital expenditure<sup>10</sup>.
- Item 7: Force Majeure Fund – given the unique nature and associated risks facing utility systems in general, it is difficult to acquire insurance to cover generation and distribution assets, especially for mini grids often located outside of the main towns. To address this issue, the Authority often allows utilities to contribute a portion of revenue generated from their customers to a fund that can be utilized to address necessary repairs required after a force majeure event<sup>11</sup>. This pre-defined amount has not been included in the current tariff period. However, based on demand growth and the system's performance, may be included in the following tariff period.
- Item 8: Diesel O&M plus small repairs – These are costs incurred directly because of utilising the generator. However, the generator is not required in the current tariff period therefore its associated costs are removed from operational costs.

## 4.4 Asset Recovery

This sub-section provides the Authority's treatment of the mini grid's capital costs.

### 4.4.1 Capital Cost

The mini grid's summary of capital expenditure is provided in Table 11 below,

<sup>10</sup> Refer to Section 2.7.2 of the Loltong Report.

<sup>11</sup> A force majeure event is defined as unforeseeable circumstances that prevent someone from fulfilling a contract. These circumstances refer to cyclones, earthquakes, tsunamis, and other destructive acts of nature that are common in Vanuatu and are outside of the utility's control.



Table 10: Summary of Lolong Capital Costs

<b>Lolong Assets</b>	<b>Costs (VUV)</b>
<b>Generation</b>	<b>11,327,900</b>
PV	509,336
Converter	1,172,527
Battery	3,098,166
Generator	900,000
Turbines	1,595,651
Penstock	3,313,673
Protections, cabling and accessories generator and control room	738,547
<b>Transmission and Distribution</b>	<b>12,607,146</b>
Distribution network	11,386,181
Meters	1,220,965
<b>Productive Use Assets</b>	<b>243,478</b>
Electrical Mould	243,478
<b>Total Capital Costs</b>	<b>24,178,524</b>

(Source: Lolong Report and DoE)

#### 4.4.2 Regulatory Asset Base and Recoveries

The regulatory asset base differs from the general mini grid asset base as it is the base defined by the Authority that meets the following regulatory principles of reasonable and prudent costs and used and useful. The used and useful regulatory principle requires that assets included in the regulatory asset base are being used by customers of the service therefore they are required to meet the asset's associate costs during the tariff period.

Based on the demand requirements, the generator usage is not required in the current tariff period so any associated costs have been deferred to the tariff period when the asset will be used. Therefore, the regulatory asset base is augmented as follows,

Table 11: Summary of Lolong Regulatory Asset Base

<b>Lolong Assets</b>	<b>Costs (VUV)</b>
<b>Generation</b>	<b>10,427,900</b>
PV	509,336
Converter	1,172,527
Battery	3,098,166
Turbines	1,595,651
Penstock	3,313,673
Protections, cabling and accessories generator and control room	738,547
<b>Transmission and Distribution</b>	<b>12,607,146</b>
Distribution network	11,386,181
Meters	1,220,965
<b>Total Capital Costs</b>	<b>23,035,046</b>

(Source: Authority Staff)

Note that the productive use asset has also been removed from the regulatory asset base, this is because the asset while purchased as part of the system, its usage varies from that of the system as it will only be used by few individuals, therefore the Authority has determined that it will be the responsibility of the management to determine a sufficient fee to generate revenue to replace the asset once it reaches the end of its useful life.

Furthermore, as there are no financing costs for these assets because they have been financed through the BRANTV project grant, they are considered as zero cost capital for regulatory tariff setting purposes. However, to ensure a sustainable mini grid, the tariff computed is required to recover the cost of assets so they can be



replaced<sup>12</sup> once the asset has reached the end of its useful life. The annual recovery is computed similar to depreciation using the straight-line method, whereby asset cost less any salvage value is divided by asset life.

The Table below displays the required annual recovery.

Table 12: Lolong Annual Asset Replacement Cost

Lolong Assets	Useful Life	Annual Recovery (VUV)
<b>Generation</b>		<b>582,444</b>
PV	25	16,299
Converter	12	97,711
Battery	12	206,544
Turbines	12	132,971
Penstock	30	110,456
Protections, cabling and accessories generator and control room	40	18,464
<b>Transmission and Distribution</b>		<b>386,402</b>
Distribution network	40	284,655
Meters	12	101,747
<b>Total Capital Costs</b>		<b>968,846</b>

(Source: Authority Staff)

#### 4.4.3 Tariff Period Recoveries

During the current tariff period, the Authority has determined that there will be no recoveries as it may result in higher tariffs affecting affordability of mini grid customers, especially during the early stages of the system's operations.

Recoveries are to be adjusted and included in future tariffs depending on consumption levels and operational costs so that it does not impair the mini grid customer's ability to afford electricity service.

<sup>12</sup> This may also include estimated reduction in asset replacement costs due to technological advances that have reduced the cost of production for these assets resulting in a lower replacement cost.



## 5 Authority's Tariff Determination

This Section provides the Authority's tariff determination and service affordability analysis for Loltong mini grid.

### 5.1 Loltong Tariff Determination

Based on the computations of the tariff components for the tariff period, the Authority has determined the Loltong mini grid tariff to be **88.46 VT/kWh**, computed as displayed in Table 14 below,

Table 13: Loltong Mini grid Tariff

Tariff Components	Unit	Annual VUV
<b>Operational Cost</b>	VUV	<b>1,097,785</b>
Fuel	VUV	-
Non-Fuel	VUV	1,097,785
Personnel Expense	VUV	906,093
Office Expenses	VUV	72,000
O&M Expense	VUV	119,692
O&M Diesel Expense	VUV	-
FM Fund	VUV	-
<b>CAPEX</b>	VUV	-
Asset Recovery	VUV	-
<b>Required Revenue</b>	VUV	<b>1,097,785</b>
<b>Demand</b>	kWh	<b>12,410</b>
<b>Loltong Tariff</b>	VUV/kWh	<b>88.46</b>

(Source: Authority Staff)

### 5.2 Service Affordability Analysis

Based on the Authority's determined per unit electricity service charge of 88.46 VT/kWh, an estimation of the average customer monthly bill has been computed to identify any affordability issues using the Authority determined benchmark established as 10% of an average net income of VT 20,773 identified in the Loltong Advisory<sup>13</sup>.

These following additional charges have been excluded in the simulation of the customer average monthly bill,

- URA surcharge – this is the Authority's fix surcharge of 1.75% in addition to customer service charge, excluding VAT. The Authority has considered to waive the URA surcharge during this tariff period to assist in lowering tariffs during the ramping period.
- VAT – value added tax of 15% is in addition to customer service charge, excluding URA surcharge. The mini grid required revenue base for the tariff period is under VT 4 million therefore it is optional for the current mini grid administrator to be registered for VAT<sup>14</sup>.

Therefore, given the above parameters, the computation of a Loltong customer average monthly bill is displayed in the Table below,

<sup>13</sup> Refer to Section 4.4 of the Loltong Advisory.

<sup>14</sup> <https://customsinlandrevenue.gov.vu/index.php/taxes-and-licensing/taxes/value-added-tax-vat/introduction>



**Table 14 Estimated Customer Monthly Bill**

Customer Average Monthly Consumption	kWh	11.75
Loltong Tariff	VUV/kWh	88.46
Monthly Bill Net of URA surcharge & VAT	VUV	1,040
HH Mean Net Income	VUV	20,773
Electricity proportion to HH Net Income	%	6%

*(Source: Authority Staff)*

Based on the customer average monthly consumption, the estimated bill falls well below 10% of the mean net income affordability threshold. Therefore, the Authority is satisfied that the tariff determined is suitable for the Loltong mini grid during the tariff period.



## 6 Notice of Grievance

If the utility or any affected person is aggrieved by the Determination in this Order, it may request the Authority to reconsider the decision on issues aggrieved upon. A Notice of Grievance must be submitted within 30 days of the Order's gazettal. The Notice should contain:

- The issue or issues being contested
- A detailed description of any facts or matters supporting the grievance
- Copies of any documents supporting the grievance
- A detailed description of any alleged error of law or fact
- A detailed description of any relevant change in facts or circumstances since the Authorities Final Decision.

A Notice of Grievance can be addressed to:

Paul Kaun  
Chief Executive Officer  
Utilities Regulatory Authority

The Notice may be:

- Delivered in person at:  
  
Office of the Utilities Regulatory Authority  
VNPF Compound  
Corner of Pierre Lamy & Andre Ballande Street  
Port Vila, Vanuatu
- Mailed to:  
Case U-0003-20  
Utilities Regulatory Authority  
P.M.B 9093  
Port Vila  
Vanuatu
- Emailed to:  
breuben@ura.gov.vu

If the Authority receives a timely Notice of Grievance, it will conduct a review in accordance with Section 27 of the URA Act. If upon review the Authority determines that the grievance is justified, then it shall revoke, amend or vary the decision on the matter complained of.



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**Utilities Regulatory Authority**

**PMB 9093 Cnr Pierre Lamy & Andre Street | Port Vila Vanuatu**

**Tel: (678) 23335 | Website: [www.ura.gov.vu](http://www.ura.gov.vu)**