



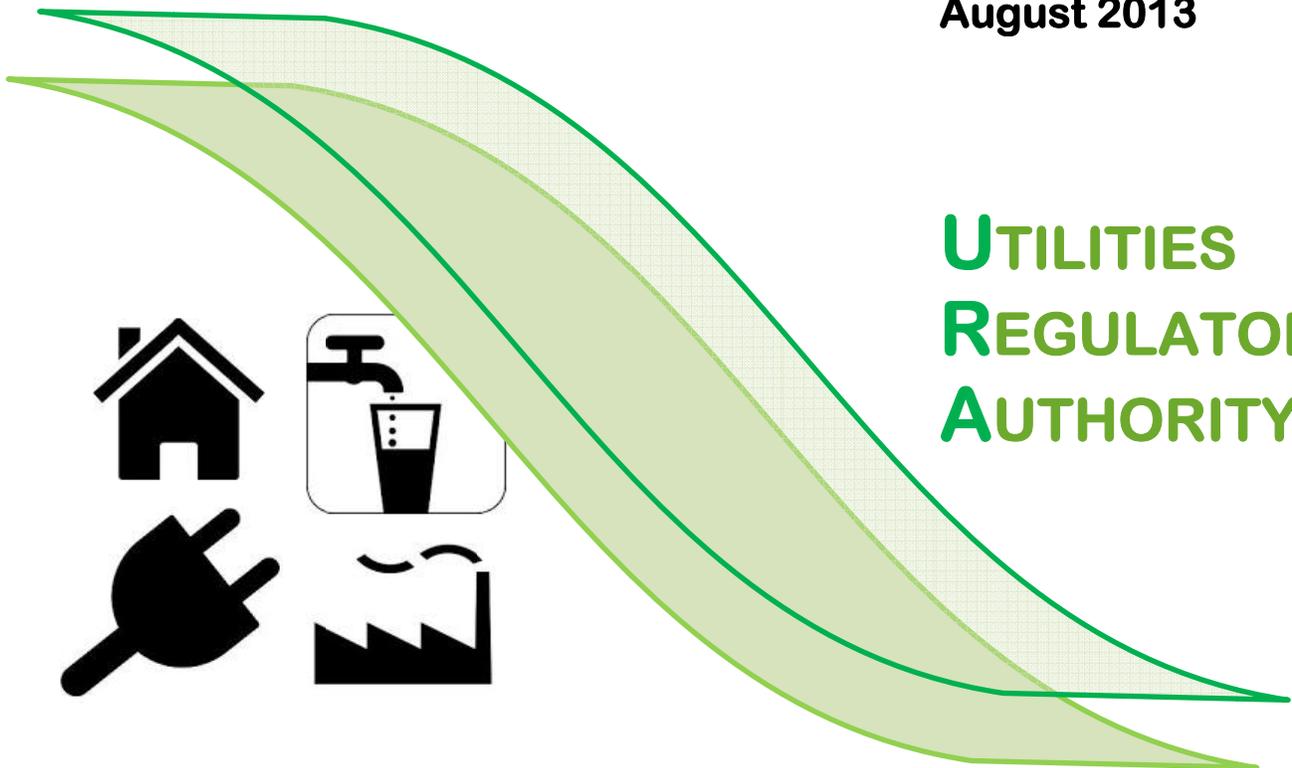
Pre-payment meters

Final Decision

ELECTRICITY SECTOR

August 2013

**UTILITIES
REGULATORY
AUTHORITY**



A letter from the Chairman

The regulator's role in approving new metering apparatus and new customer agreements is to protect the interests of customers. Regulatory approval is a required step to ensure against an unfair situation; it is not possible for customers to choose an alternative utility provider. In exercising these powers, the regulator's task is to ensure that the outcome is fair for customers and the utility company.

The key challenge for the regulator is determining how to make such a decision. Once sufficient information has been gathered about the proposal, the regulator must consider three questions: Is the proposal safe? Does the proposal represent good value? Is the proposal fair for customers? These are the principles that have guided this decision.

The safety of customers is paramount; the regulator and the utility company both have a clear duty to protect customers and employees from the risks of death or injury from the electrical system. Any new technology to be installed as part of the electricity network must be shown to be safe, and meet international safety standards. Appropriate trials and testing must be undertaken to ensure that the proposed new system is safe.

Another key principle at the heart of economic regulation is the overall cost efficiency of the network. Any change to the nature of electricity provision will have a potential impact on costs, and these must be carefully estimated. There is clear Government policy to try and reduce the cost of electricity in Vanuatu, and so any new system should be shown to provide economic benefit in the long run. This benefit can arise from reductions in operating costs or improvements in capital efficiency.

The third principle to be considered is fairness for customers. This is defined as ensuring that customers are not disadvantaged due to discriminatory pricing, undue inconvenience or excessive complexity. Pricing can be clearly analysed to determine any impact on customers – inconvenience and complexity, on the other hand, are subjective judgements. In order to properly inform these judgements a regulator must make a concerted effort to perform detailed consultation with customers and the public.

Based on these principles, the Authority has made a decision regarding UNELCO's proposal on pre-payment meters. I urge all interested parties to read this document to understand the detail of the decision and the reasoning behind it. As ever, the Authority invites comment and feedback from all stakeholders.

Yours sincerely,

Johnson NAVITI Matarulapa Marakipule

Chairperson

Executive Summary

The Utilities Regulatory Authority (the Authority) has reached its final decision regarding the proposed installation of new pre-payment meter technology in the Port Vila area. UNELCO are obliged to request approval from the Authority for any new metering apparatus and for any significant changes to the agreement between UNELCO and their customers. This decision has been informed by a detailed review of UNELCO's latest proposal, and an extensive consultation programme with customers and the public.

The Authority approves the following metering apparatus for use in the Port Vila concession area:

- Manufacturer: Shenzhen STAR Instrument Co. Ltd.
- Model number: DDSY23III-100
- Specifications: Mono phase - 220V - 50Hz - 5 to 60A - 1.1 to 6.6 kVa

The Authority also approves, subject to certain conditions, a set of special conditions supplementary to the customer agreement for pre-payment customers. The conditions of approval are:

- UNELCO and the Government sign an addendum to the Port Vila concession contract in order to:
 - Specify that customers using pre-payment meters will be charged the Small Domestic Customer tariff regardless of their consumption level, and
 - Enable pre-payment meter customers to be exempted from paying a security deposit¹;
- UNELCO provides a clear commitment to a customer service policy to inform a customer if an alternative metering technology may be cheaper for them at any time;
- UNELCO is to provide the Authority with a customer education plan for pre-payment customers that includes the following:
 - Examples of materials that will be used, which should include explanations of the step-tariff, retroactive adjustments, standby periods, and installation costs for new and existing customers;
 - A demonstration of how the materials will be presented or delivered to new and existing customers;
 - A roll-out plan for delivering customer education to the targeted areas.

The decision concerning these approvals has been made according to specific principles designed to ensure the proposal is in the long-term interests of consumers. These principles are:

- **Safety:** The proposal must ensure the continued provision of safe electricity services
- **Good Value:** The proposal must deliver a satisfactory return on investment for the utility and provide a benefit to customers
- **Fairness:** The proposal must not disadvantage any customers through differential pricing, inconvenience, or complexity of use.

The Authority's assessment of the proposal against these principles is summarised in the table below:

¹ A security deposit is an advance on consumption. This advance payment does not bear interest and will be refunded at the end of the customer supply agreement, subject to sums owed to UNELCO by the customer.

Assessment summary

Criteria	Assessment
Safety	The proposed single-phase meters are safe
Good Value	The proposed system shows a wide range of net benefit, depending on the assumptions used. On balance, the proposal is neutral to good value.
Fair – pricing	The proposed system is fair, as long as domestic customers can switch between post- and pre-payment meters at any time and at no additional cost
Fair – convenience	The proposed system is not unduly inconvenient, as long as the utility establishes multiple reselling points, warnings for low credit, and standby periods where customers will not be disconnected on days where it may not be possible to recharge
Fair – usability	The proposed system is usable, as long as the utility carefully explains the new system to customers during the marketing campaign, when they sign up for a pre-payment meter, provide helpful and clear instructional materials, and ensure that customer service staff are well trained to deal with queries

How to respond to this paper

This paper describes the Authority's Final Decision regarding UNELCO's proposed pre-payment meter system for the Port Vila area. If a utility feels aggrieved by this decision, it may request the Authority to perform an internal review of the decision by giving a Notice of Grievance within 30 days of the decision. The Notice of Grievance should contain:

- 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; and
- A detailed description of any relevant changed facts or circumstances since the decision.

Notices of grievances can be received until

20 September 2013

Submissions can be:

- made in person at the
Office of the Utilities Regulatory Authority
On the Ground Floor of the VNPF Building in Port Vila
- mailed to
Pre-payment Meters Review
Utilities Regulatory Authority
P.M.B 9093
Port Vila, Vanuatu
- emailed to
Romney Marum
Project Manager – Pre-Payment Meters Review
Utilities Regulatory Authority
rmarum@ura.gov.vu
- or called in by telephone to the
Utilities Regulatory Authority at
+678 23335

If the Authority receives a notice of grievance, it may revoke, amend or vary the decision, based on the merits of the grievance. Should this happen, the Authority will notify all stakeholders of any changes.

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1. Introduction

1.1 Purpose of this paper

The aim of this paper is to present the Utility Regulatory Authority's (the Authority) final decision regarding UNELCO's request to install pre-payment meters in the Port Vila area. This decision follows from the Authority's Revised Draft Decision June 2013, which was based on the most recent proposal from UNELCO, received on 3rd May 2013. Following subsequent consultations with all stakeholders, the Authority has arrived at its final decision on this matter.

This document describes the Authority's final decision, the reasons for its decision, and outlines key aspects of the revised proposal from UNELCO.

1.2 Structure of this paper

This paper is structured into the following sections:

- Chapter 2, "Final decision", presents the nature and scope of the decision.
- Chapter 3, "Reasons supporting the decision", defines the principles the Authority has used when considering the decision, and the results of the considerations.
- Chapter 4, "Implications of the decision", highlights the implications of introducing a new pre-payment technology and customer agreement for key stakeholders groups.
- Chapter 5, "Next steps", details the process following this decision by the Authority.

1.3 Review process

Table 1: Review process

Stage	Description	Status
Trial request	UNELCO makes request to run a trial of a new pre-payment meter system in the village of Melemaat.	Received May 2009
Trial approval	The Authority provides approval for trial	Provided June 2009
Issues paper	Paper describing key issues that should be investigated during the pre-payment meter trial	June 2009
Trial period	UNELCO installs 105 meters in the village of Melemaat	August 2009 to September 2010
Trial report	Report describing the trial carried out by UNELCO in Melemaat	September 2010

Consultation Stage 1	Extended period with various data requests and submissions between the URA and UNELCO. This is described in detail in the Position Paper and Draft Decision documents.	September 2010-March 2011
Position paper	Document describing the Authority's position	March 2012
Consultation Stage 2	Additional submissions from UNELCO, described in more detail in the Draft Decision document	May 2012
Draft decision	Document describing the Authority's draft decision	August 2012
Consultation Stage 3	After a request from UNELCO to extend the consultation period, the Authority and UNELCO established a temporary joint working group to provide rapid feedback on the nature of UNELCO's proposal.	March-April 2013. Consultation Stage 3 report published 7 June 2013
Revised proposal	Extensively updated proposal document received from UNELCO	Received May 2013
Revised draft decision	Document describing the Authority's revised decision based on UNELCO's updated proposal.	June 2013
Consultation Stage 4	Briefings to communities targeted for pre-payment meters and Government stakeholders.	Consultation period closed 21 June 2013. Report published August 2013
Final decision	Document describing the Authority's final decision on UNELCO's proposal.	This Paper

1.4 About the Utilities Regulatory Authority

The Utilities Regulatory Authority was established on 11 February 2008 under the *Utilities Regulatory Authority Act No 11 of 2007* (the URA Act). The URA Act established the Authority as an independent economic regulator for pricing, access, standards and monitoring of concession agreements. The regulated services defined in the URA Act are the supply of electricity and water services.

The Authority provides continued and expanded support to the Vanuatu Government's microeconomic reform program. This program was designed to improve the efficiency and competitiveness of Vanuatu's economy through the reform of the electricity and water sectors.

The Government perceived the establishment of an independent regulatory body as necessary to ensure that the benefits of the industry restructuring and concession arrangements were passed on to all residential, commercial and industrial customers.

The primary objective of the Authority is to improve access to electricity and water services and to promote the long-term interests of Vanuatu's consumers with regards to the price, quality and reliability of electricity and water services.

This objective is central to the framework of economic regulation that facilitates the efficiency and financial viability of regulated utilities, prevents abuse of monopoly power and ensures that customers benefit from quality improvements and efficiency gains over the longer term.

The functions of the Authority, as expressed in the URA Act under which it is constituted, are:

- to exercise the functions and powers conferred by the URA Act or by any other Act in furtherance of the purpose of the URA Act;
- to provide advice, reports and recommendations to the Government relating to utilities;
- to inform the public of matters relating to utilities;
- to assist consumers to resolve grievances;
- to investigate and act upon offences under the URA Act ;
- to advise the Minister on any other matter referred to the Authority by the Minister; and
- to administer and monitor compliance of Concession Agreements under the URA Act.

In accordance with its Charter of Consultation and Regulatory Practice the Authority aims to be:

- independent, balanced and fair by ensuring its advice does not reflect undue influences and is consistent with its statutory objectives; and
- open and transparent by publishing its findings and conclusions.

1.5 Legal framework

UNELCO's proposal includes a request to install new metering apparatus and also to use new special conditions supplementary to the customer agreement with pre-payment customers. There are two clauses in the Convention Relating to the Concession for the Generation and Public Supply of Electric Power in Port Vila (Port Vila concession contract) that are relevant:

- Section 11, paragraph 57 states that "*Apparatus for measuring and controlling energy and power shall be of one of those approved by the competent authority of VANUATU and supplied by the CONCESSIONAIRE.*"
- Section 13, paragraph 65 states that "*The agreement for the supply of electrical energy shall be established in the format of a subscription form in conformity with the model which will be agreed upon by the CONCESSIONAIRE and the GRANTOR. The provisions stated in that model may be amended only by a special convention between the CONCESSIONAIRE and the customer.*"

In the URA Act, subsection 20(1) assigns various rights defined in the concession contract, including the two described above, to the Authority. These are the rights that the Authority is exercising in this review.

1.6 Useful documents and links

All sources of external information and data quoted in this paper are provided in subscript or footnotes. All other information originates from the Authority.

Readers of this report may also find it useful to review the following reports and documents, available on the Authority's website www.ura.gov.vu:

- Utilities Regulatory Authority Pre-payment Meters Consultation Stage 4 Report August 2013
- Utilities Regulatory Authority Prepayment Meters Revised Draft Decision June 2013
- Utilities Regulatory Authority Pre-payment Meters Consultation Report May 2013
- Utilities Regulatory Authority Electricity Prepayment Meter System Draft Decision August 2012
- Utilities Regulatory Authority Electricity Prepayment Meter System Position Paper March 2012
- Utilities Regulatory Authority Pre-payment Meter Technology Trial Review Issues Paper June 2009
- Convention relating to the Concession for the Generation and Public Supply of Electric Power in Port Vila, including Specifications and Amendments.
- Utilities Regulatory Authority Act No. 11 of 2007 and Amendment (2010)
- Utilities Regulatory Authority Charter of Consultation and Regulatory Practice
- Utilities Regulatory Authority Annual Report 2011

2. Final decision

The proposal contains two aspects that require approval by the Authority: a new metering apparatus, and also new special conditions that will be supplementary to the customer agreement for customers with a pre-payment meter. The Authority's decision regarding each of these aspects is described below.

2.1 Metering apparatus

Based on the information contained in the latest proposal from UNELCO, the Authority approves the installation of the new pre-payment meters, subject to the following scope of approval.

2.1.1 Approved apparatus

Manufacturer: Shenzhen STAR Instrument Co. Ltd.

Model number: DDSY23III-100

Specifications: Mono phase - 220V - 50Hz - 5 to 60A - 1.1 to 6.6 kVA

Accuracy class: Class 1

It is noted that UNELCO's proposal also includes the three-phase model of this meter. The trial that has been carried out only included the single-phase model of meter - there have been no trials of the three-phase model. The safety certificate provided with the proposal also only covers the single-phase meter. In the absence of clear evidence of safety and reliability, this approval is restricted to the single-phase model of meter specified above.

The new metering apparatus comes with a specific meter/fuse box. Therefore, the Authority understands that the replacement of existing post-payment metering apparatus will also require the meter/fuse boxes to be replaced. This approval also covers the meter/fuse box for the meter specified above.

2.1.2 Geographical scope

This approval is limited to the area defined in the Port Vila concession contract. In the event of a geographical extension of the concession area, this approval will continue to apply.

2.1.3 Approval period

The approval of the new metering technology will apply for the length of the concession contract established between UNELCO and the Government of Vanuatu for the provision of electricity in the Port Vila concession.

2.1.4 Revocation of approval

This approval will be revoked under the following circumstances:

- The technology is no longer in compliance with safety or reliability standards for the provision of electricity services in Vanuatu;
- The network specifications vary such as the technology is no longer compliant or safe;

- The concession contract between UNELCO and the Government of Vanuatu ceases or terminates for any reason; or
- Any part of the technical information, specifications or certification provided by UNELCO or any supplier regarding the metering apparatus is found to be misleading or false.

2.2 New customer agreement approval

UNELCO's proposal includes the addition of special conditions supplementary to the customer agreement to be signed by customers using pre-payment meters. The proposed new special conditions are included in Annexe 1. The Authority approves these special conditions, subject to the following scope and conditions.

2.2.1 Customer categories

The Authority approves the new special conditions for use with residential customers, at any level of consumption (i.e. customers currently in Small Domestic Customer and Other Low Voltage Customer categories). These special conditions are not approved for Commercial, High Voltage, Street Lights or Sports Fields customer categories.

2.2.2 Conditions of approval

The Authority's approval for the new special conditions for pre-payment metering technology is subject to the following conditions:

- A pre-payment metering technology must be approved by the Authority for the concession in which the special conditions will be used (this approval is granted in the above section, however should the meter apparatus approval be revoked for any reason, then approval for the special conditions will also be revoked);
- UNELCO and the Government sign an addendum to the Port Vila concession contract in order to:
 - Specify that customers using pre-payment meters will be charged the Small Domestic Customer tariff regardless of their consumption level, and
 - Enable pre-payment meter customers to be exempted from paying a security deposit;
- UNELCO provides a clear commitment to a customer service policy to inform a customer if an alternative metering technology may be cheaper for them at any time;
- UNELCO is to provide the Authority with a customer education plan for pre-payment customers that includes the following:
 - Examples of materials that will be used, that include explanations of the step-tariff, retroactive adjustments, standby periods, and installation costs for new and existing customers;
 - A demonstration of how the materials will be presented or delivered to new and existing customers;
 - A roll-out plan for delivering customer education to the targeted areas.

2.2.3 Approval period

The approval of the new customer agreement will apply for the length of the concession contract established between UNELCO and the Government of Vanuatu for the provision of electricity in the Port Vila concession.

3. Reasons supporting the decision

In order to make this decision, the Authority defined a set of principles that are applied to this approval. UNELCO's proposal was then carefully analysed against each of these principles. The sections below describe how the principles were defined, and how UNELCO's proposal measures against each one. A summary table is also provided that shows each of the key considerations used in this decision.

3.1 Definition of the principles adopted by the Authority

The purpose of the URA Act is to regulate utilities to:

- Ensure the provision of safe, reliable and affordable regulated services;
- Maximise access to regulated services throughout Vanuatu; and
- Promote the long-term interests of customers.

In order to make this decision in a way that fulfils this purpose, the key principles that the Authority has used are as follows:

- **Safety:** The proposal must ensure the continued provision of safe electricity services
- **Good Value:** The proposal must deliver a satisfactory return on investment for the utility and provide a benefit to customers
- **Fairness:** The proposal must not disadvantage any customers through differential pricing, undue inconvenience, or excessive complexity of use.

The URA Act defines safety as “the risk of a serious injury or death to any individual, or serious environmental pollution, or serious damage to critical infrastructure”. In order to test whether or not the proposal from UNELCO is safe, the Authority has considered evidence of equipment certification under international standards, compatibility with the existing electricity network, and the results of the equipment trial.

The Authority has also considered whether or not this proposal represents good value. “Good value” is defined as a proposal that does not negatively impact the economic efficiency of the network. This means that the financial benefits for the utility must outweigh any additional costs over a reasonable timescale. The proposal also shows how this benefit will be shared between customers and the utility. In order to test the “good value” of the proposal, the Authority has considered a detailed financial projection of the impact of the proposal provided by UNELCO.

In addition to the safety and financial aspects of the proposal, the Authority has reviewed whether or not it is fair for customers. A “fair” proposal is one where no group of customers is unreasonably disadvantaged as a result, nor treated in a discriminatory way. An “unreasonable disadvantage” would include a system that is too complex or difficult to understand and operate. In considering whether or not this proposal is fair, the Authority has considered the proposed customer service policies, education plans, tariff structure, legal conditions and customer feedback during public consultations.

3.2 Safety

3.2.1 Evidence provided

The following evidence of safety has been included in the proposal:

- Certificate of compliance with European standards IEC 62052-11 and IEC 62053-21 for the single-phase meter;
- Confirmation that no safety issues have occurred during the trial installation of 105 single-phase meters in Melemaat village;
- Employee safety record of incidents where meter reading staff have been attacked by dogs; and
- A general statement on the risks of road accidents.

3.2.2 Assessment

Based on the evidence provided, the proposed single-phase metering technology appears to be safe and compatible with the electricity network in Port Vila. There is no evidence to support the safety of the three-phase version of the meter.

3.3 Good value

3.3.1 Evidence provided

The financial impact of UNELCO's proposal is estimated in a detailed model that was developed in conjunction with the Authority during Consultation Stage 3 of this review. The model contains forecasts of customer adoption of the new metering technology and shows the revenue, cost and asset value impact of installing the new meters. Forecasts are provided for ten years.

UNELCO has requested that the detailed model is not published in its entirety. Key figures are included in the proposal document from UNELCO, and further figures are included in the sections below. If stakeholders have any further questions regarding the financial model, they can direct their query to the Authority.

The following characteristics of the new metering system create a financial impact on the electricity network:

- Customers pay for electricity before consuming
 - **Impact on the utility:** This improves the cash flow of the utility by generating revenue before any costs of production are incurred. For post-paid customers, the mandatory advance on consumption is aimed at compensating for this cash flow impact. Also, losses on bad debt are substantially reduced for pre-payment customers.
 - **Impact on customers:** As a result of the new system, pre-payment customers will not have to pay an advance on consumption, and existing post-paid customers that switch to pre-payment meters will have their deposit returned.
- Customers are automatically disconnected and reconnected when the purchased credit expires
 - **Impact on the utility:** The utility no longer has to pay the costs of visiting customer properties to disconnect and reconnect the customers.

- **Impact on customers:** There are no disconnection or reconnection fees for pre-payment customers
- Customers will be more aware of electricity consumption and potentially reduce wastage
 - **Impact on customers:** Customers are generally more aware of their electricity consumption with a pre-payment system, and as a result there tends to be an overall reduction of electricity consumed
 - **Impact on the utility:** A reduction in consumption for pre-payment customers represents a reduction in revenue for the utility, and also a reduction in the costs of production.
- The pre-payment meters have a different cost to post-payment meters
 - **Impact on the utility:** The overall cost of the pre-payment meters and meter boxes are more expensive for the utility than the post-payment meters they are replacing. This means that infrastructure costs are increased as new meters are installed.
 - **Impact on customers:** For new connections, customers contribute to the cost of the new meter box, which is less expensive for pre-payment meters. The cost of new connections is therefore lower for new customers who choose a pre-payment meter.
- Early replacement of some assets
 - **Impact on the utility:** The initial roll-out of the pre-payment system will result in post-payment meters being replaced before the end of their normal useful life. While some can be re-used, there will be some meters that will be written-off and disposed of. This has a cost to the utility.
- There is no need for monthly bills, meter reading, but the utility will set up new reselling points and deliver a marketing campaign
 - **Impact on the utility:** The reduction in monthly billing and meter reading will reduce the operating costs of the utility. The new reselling points and marketing costs will be additional operating costs

The financial model estimates the scale of each of the above financial impacts, based on a set of assumptions that are described and reviewed in the section below. In order for the proposal to be considered “good value”, the assumptions must be reasonable, and the results of the model must show a financial benefit overall.

3.3.2 Review of assumptions

The estimate of the financial impact of the new pre-payment metering system is based on a set of assumptions around the future performance of the system. Where it has been hard to predict a single value for an assumption, the Authority has carried out a sensitivity analysis to compare the overall impact of using different values for that particular assumption. The table below lists the key assumptions used in the model, and shows which the Authority has included in the sensitivity analysis.

Table 2: Key assumptions in financial model

Assumption	Value	Assessment
Demand		
Number of new customers per month	30. This is based on UNELCO’s historic performance.	This assumption has a substantial impact on the performance of the model, and has been included as a

		variable in the sensitivity analysis
Customer conversions	30% of customers in Fresh Wota and Centreville areas, 80% in all other areas. This is based on expressions of interest received by UNELCO.	This assumption is reasonable
Number of meters installed per month	300. UNELCO have indicated that this assumption may be optimistic	This assumption has a substantial impact on the performance of the model, and has been included as a variable in the sensitivity analysis
Pre-payment impact on consumption	5% reduction for all customers. This assumption is based on UNELCO's experience in the trial in Melemaat	This assumption has a substantial impact on the performance of the model, and has been included as a variable in the sensitivity analysis
Operating costs		
Billing and meter reading costs	UNELCO has used the latest costs for billing and meter reading.	This assumption is reasonable
Bad debt	Based on current average bad debt losses amount for Small Domestic Customers	This assumption is reasonable
Number of disconnections	UNELCO has used the average disconnection rate for Small Domestic Customers	This assumption is reasonable
Assets		
Characteristics of assets, e.g. age, useful life	UNELCO has used average figures for these characteristics	This assumption is reasonable
Costs of pre-payment and post-payment meters and boxes	UNELCO has used the latest prices and costs of meters and boxes.	This assumption is reasonable
Costs of write-offs of concession assets	UNELCO have not included the costs of write-offs of concession assets.	This assumption has a substantial impact on the performance of the model, and has been included as a variable in the sensitivity analysis

Source: UNELCO Pre-payment financial model, URA analysis

3.3.1 Assessment

The table below summarises the estimated financial impact of the new pre-payment meter system on customers:

Table 3: Financial impact on customers

	2013	2014	2015	2016	2017
Number of pre-payment customers	2,200	2,877	3,165	3,453	3,741
Reduction in electricity bills due to reduced consumption	1,499,046	5,407,601	5,995,524	6,564,832	7,134,140
Avoided disconnection fees	1,019,105	3,676,280	4,075,971	4,463,007	4,850,043
Installation savings for new customers	744,442	1,276,186	1,276,186	1,276,186	1,276,186
Deposits returned/avoided	7,964,590	2,567,632	1,092,287	1,092,287	1,092,287
Total customer benefit	11,227,182	12,927,699	12,439,967	13,396,311	14,352,654
Benefit per PPM customer	5,103	4,493	3,930	3,880	3,837

Source: UNELCO Pre-payment financial model

There is clear evidence to show a financial benefit to customers from the new pre-payment system. It is also important to establish that there is a financial benefit to the utility; if the new system increases the cost of service for the utility, then it may cause price increases at a future tariff review. Higher prices in the future may cancel out any short-term financial benefit to customers.

The table below summarises the estimated financial impact of the new pre-payment meter system for the utility, based on the base assumptions used in the financial model:

Table 4: Financial impact on the utility

	2013	2014	2015	2016	2017	2018
Total revenue impact	-1,499,046	-5,407,601	-5,995,524	-6,564,832	-7,134,140	-7,703,448
Total cost impact	-188,595	5,739,302	7,048,102	7,782,877	9,267,652	10,002,428
Total asset impact	-5,384,396	-6,791,363	-3,856,879	-3,135,464	-2,418,495	-1,704,565
Overall net impact	-7,072,037	-6,459,663	-2,804,301	-1,917,418	-284,982	594,415
	2019	2020	2021	2022	2023	2024
Total revenue impact	-8,272,755	-8,842,063	-9,411,371	-9,980,679	-10,549,987	-11,119,295
Total cost impact	11,487,203	12,221,978	12,956,753	14,441,529	15,176,304	15,911,079
Total asset impact	-1,972,473	-1,176,127	-375,492	433,690	3,312,252	6,207,566
Overall net impact	1,241,974	2,203,788	3,169,890	4,894,539	7,938,569	10,999,350

Source: UNELCO Pre-payment financial model

As the above table shows, the operational cost savings outweigh the negative revenue impact after the first year, and the negative asset impact reduces every year, becoming a benefit in 2022. The system provides the first net benefit in 2018, and the cumulative net impact becomes positive in 2023.

The scenario detailed above is based on the assumptions used by UNELCO in their base case. The Authority has carried out a sensitivity analysis to test how variations in key assumptions impact the overall result of the financial model. The variables used in the sensitivity analysis were:

- **Change in consumption.** The scenarios tested were: 5% reduction for all customers (base scenario), 5% reduction weighted towards lower consumption tranches, and no consumption impact.
- **Number of meters installed per month.** The scenarios tested were: 300 meters installed per month (base scenario), and 150 meters installed per month.
- **Number of new customers per month.** The scenarios tested were: 30 new customers per month (base scenario), 50 new customers per month, and 20 new customers per month.
- **Disposal cost of concession assets.** The scenarios tested were: the costs of disposing of concession assets are not included (base scenario), and the costs of disposing of concession assets are included.

Changing each of the variables listed above creates 36 different scenarios. For each of the scenarios, the following information was recorded:

- **Net impact over 10 years:** the total cumulative benefit/loss for the utility after ten years.
- **First breakeven month:** the time when the new system first delivers a net positive financial contribution to the utility.
- **Cumulative breakeven month:** the time when the accumulated additional costs are outweighed by the accumulated benefits.

The following table shows the results of the sensitivity analysis.

Table 5: Sensitivity analysis results

	Disposal cost of conc. assets	Change in consumption	Meters installed per month	New customers per month	Net impact over 10 years	First breakeven month	Cumulative breakeven month
1	No	5% for all	300	20	10,639,138	Dec-17	Dec-23
2	No	5% for all	300	30	11,735,245	Dec-17	Oct-23
3	No	5% for all	300	50	13,927,458	Dec-17	Aug-23
4	No	5% for all	150	20	7,334,927	Dec-17	Mar-24
5	No	5% for all	150	30	8,383,682	Dec-17	Feb-24
6	No	5% for all	150	50	10,364,004	Dec-17	Dec-23
7	No	5% weighted	300	20	55,658,832	Dec-14	Feb-19
8	No	5% weighted	300	30	63,971,558	Dec-14	Oct-18
9	No	5% weighted	300	50	80,597,010	Dec-14	Apr-18
10	No	5% weighted	150	20	51,367,212	Dec-14	Jul-19

	Disposal cost of conc. assets	Change in consumption	Meters installed per month	New customers per month	Net impact over 10 years	First breakeven month	Cumulative breakeven month
11	No	5% weighted	150	30	59,540,555	Dec-14	Mar-19
12	No	5% weighted	150	50	75,719,337	Jan-15	Jul-18
13	No	0%	300	20	63,940,925	Dec-14	Jun-18
14	No	0%	300	30	73,581,673	Dec-14	Mar-18
15	No	0%	300	50	92,863,168	Dec-14	Sep-17
16	No	0%	150	20	59,467,599	Dec-14	Dec-18
17	No	0%	150	30	68,952,028	Dec-14	Aug-18
18	No	0%	150	50	87,743,649	Dec-14	Jan-18
19	Yes	5% for all	300	20	-4,913,983	Dec-17	10+ years
20	Yes	5% for all	300	30	-4,116,986	Dec-17	10+ years
21	Yes	5% for all	300	50	-2,522,993	Dec-17	10+ years
22	Yes	5% for all	150	20	-13,826,504	Dec-17	10+ years
23	Yes	5% for all	150	30	-13,076,859	Dec-17	10+ years
24	Yes	5% for all	150	50	-11,557,665	Dec-17	10+ years
25	Yes	5% weighted	300	20	40,105,712	Dec-14	Aug-21
26	Yes	5% weighted	300	30	48,119,328	Dec-14	Mar-21
27	Yes	5% weighted	300	50	64,146,560	Dec-14	Jun-20
28	Yes	5% weighted	150	20	30,205,781	Dec-14	Jul-22
29	Yes	5% weighted	150	30	38,080,014	Dec-14	Feb-22
30	Yes	5% weighted	150	50	53,797,668	Dec-15	Apr-21
31	Yes	0%	300	20	48,387,804	Dec-14	Dec-20
32	Yes	0%	300	30	57,729,442	Dec-14	Jul-20
33	Yes	0%	300	50	76,412,718	Dec-14	Nov-19
34	Yes	0%	150	20	38,306,168	Dec-14	Dec-21
35	Yes	0%	150	30	47,491,487	Dec-14	Jun-21
36	Yes	0%	150	50	65,821,980	Dec-15	Sep-20

Source: UNELCO Pre-payment financial model, URA analysis

Out of 36 scenarios tested, the proposal is predicted to deliver a positive cumulative net impact within 10 years in over 80% of cases (30/36). There is a wide range of results across the different scenarios, depending on the assumptions used. The analysis shows that this proposal may deliver a financial benefit to the utility, but the performance is highly dependent on the impact on consumption, and the efficiency of the roll-out programme.

The financial projections show a clear benefit for a substantial number of customers, and a reasonable likelihood that there will be a long-term financial benefit for the utility. On balance, the Authority views the new pre-payment system as neutral to good value.

3.4 Fairness of the proposal

For the purposes of this decision, the “fairness” of the proposal is defined as the extent to which customers are not disadvantaged due to:

- Discriminatory pricing, i.e. some customers being charged a higher price when a lower price is available to other customers;
- Using the system being unduly inconvenient; and
- Using the system being difficult for customers to manage properly due to undue complexity

UNELCO’s proposal contains extensive information on the arrangements for customers using the system. The sections below describe key aspects of the proposal that have been used to inform the Authority’s decision.

3.4.1 Pricing

3.4.1.1 Evidence provided

UNELCO’s proposal states that the price charged to customers using the new pre-payment system is the same as the price charged to the post-paid Small Domestic Customers category, which tariff variable on the amount of electricity consumed, shown in the table below:

Table 6: Tariff for pre-payment customers

Consumption	Tariff charged
First 60 kWh used in month	0.34 x P (19 vatu*) per kWh
Next 60 kWh used in month	1.21 x P (68 vatu*) per kWh
Each subsequent kWh used in month	3 x P (168 vatu*) per kWh

* Based on the electricity base price, P of 55.97 vatu/kWh for July 2013

For post-payment customers, if consumption exceeds 120kWh per month for three consecutive months, the customer will be switched to the “Other Low Voltage Customer” tariff. This tariff category consists of a monthly fixed charge of 5 x P (280 vatu*) per installed kVA, plus 1.21 x P (68 vatu*) per kWh consumed. Due to the difficulties of having a monthly fixed charge with a pre-payment meter, this will not apply to pre-payment customers. Pre-payment customers will remain on the pricing structure shown in Table 6, regardless of their consumption level.

In UNELCO’s proposal, for customers who consume less than 120kWh in a month, the price charged is the same for both pre- and post-paid customers. For customers who consume more than 120kWh in a month, the price is different between pre-paid customers and post-paid customers in the “Other Low Voltage Customer” tariff category. Depending on the kVA rating of the connection, there is a consumption level

above which it is financially beneficial for the customer to be using the post-paid “Other Low Voltage Customer” tariff, rather than the pre-payment tariff. These cut-off points are shown in the table below:

Table 7: Optimal tariff consumption levels

Rating of connection	Consumption level above which the “Other Low Voltage Customer” tariff is cheaper than the pre-payment tariff
1.1kVA (5A)	153 kWh per month
2.2kVA (10A)	156 kWh per month
3.3kVA (15A)	159 kWh per month
4.4kVA (20A)	162 kWh per month
5.5kVA (25A)	165 kWh per month

With the introduction of the pre-payment system, there will be some customers currently on the “Other Low Voltage Customer” tariff who will financially benefit from switching to a pre-payment meter. Customers will be free to switch, and there will be no additional charges for switching. Each customer will be responsible for weighing up any potential financial benefits (which will depend on monthly consumption) with any potential inconvenience and risk of disruption of supply when deciding to switch. The utility will also inform customers when it may be financially worthwhile for the customer to consider switching from post- to pre-payment or vice-versa.

3.4.1.2 Customer perception

When presented with the proposed prepayment meter pricing arrangement during Consultation Stage 4, the general public were satisfied that the pricing was fair. In their view, the absence of a charge for switching between pre-paid and post-paid meters provided customers with the flexibility to use the system that is most financially beneficial to them.

With regards to the overall cost of electricity, existing customers had the view that prepayment will be of lower cost as it would help reduce their electricity consumption. This is because prepayment meters provide customers with a better opportunity to monitor their consumption on a regular basis.

3.4.1.3 Assessment

Based on the fact that for the target group of customers the price will be the same, and that customers will be free to switch between pre- and post-payment at anytime and at no cost, the Authority views the pricing arrangements of the proposed new system to be fair. This is also consistent with the public response during public briefings.

3.4.2 Convenience

The main difference between the proposed new pre-payment system and the existing post-payment system is the fact that customers will not receive a monthly bill to pay. Instead, the customer will use a chip card to recharge the meter with credit. If the credit is exhausted, the meter will automatically cut off the electricity supply. In order to avoid being cut-off, customers must monitor the level of remaining credit, and regularly recharge the meter.

UNELCO's proposal states that during the trial at Melemaat, customers recharged an average of 2 times per month. This indicates that typical customer behavior is to pay smaller amounts more regularly. For customers, this will mean more frequent travel to places where recharge is possible. UNELCO's proposal includes the establishment of "reselling" points (remote offices where recharge is possible) in each of the more remote areas where pre-payment customers may live.

Another aspect of the proposed pre-payment system is an increased risk of disruption. The meter will automatically disconnect the electricity supply when the credit is exhausted. If a customer does not effectively monitor and manage the level of credit and consumption, it is more likely that they will suffer from disruptions in their electricity supply.

In the proposed system, the amount of remaining credit will be displayed on the meter. Also, a warning sound and light will indicate when credit is below 300 vatu, with a further warning when credit is below 200 vatu. Also, the supply will not be cut off during certain "standby periods", which are defined as weekends and public holidays. If customers exceed their available credit during a standby period, they will accrue a negative credit, which must be paid before new credit can be recharged to the meter.

UNELCO's proposal also describes certain types of vulnerable customers, e.g. customers who require electrically-operated medical support equipment. As disconnection of electrical supply would be unsafe for such customers, the pre-payment system would not be appropriate. UNELCO notes that they currently have two such customers on record.

The proposed pre-payment meter system increases the risk of inconvenience for customers through more frequent recharges and a higher risk of disruption to their electricity supply. UNELCO's proposal includes features that are designed to mitigate this inconvenience, including establishing multiple reselling points, warnings for low credit, and standby periods where customers will not be disconnected on days where it may not be possible to recharge.

3.4.2.1 Customer perception

Feedback received during public consultations indicated that lower-income customers positively viewed the ability to "re-fill" in small amounts throughout the month and the provision of resell points within more remote communities. These customers also raised the possibility that the network of resell points should expand as more communities connect to the electricity grid.

The possibility of disruption of supply due to exhausted credit was clearly understood due to the nature of a pre-payment system. In addition, customers at the public consultations indicated that the warnings for low credit and the standby periods were viewed as appropriate ways of helping to manage their credit levels and supply.

An additional important benefit that was mentioned by customers that attended public consultations was the reduction in the risk of accumulating large debts from electricity usage, followed by a long period of disconnection as they re-paid the debt.

3.4.2.2 Assessment

On balance, the Authority's view is that the proposed mitigating arrangements mean that the proposed system is not unduly inconvenient for customers. In addition, if a customer feels that the pre-payment system is too inconvenient, the customer is free to switch to a post-paid arrangement.

3.4.3 Usability

The proposed pre-payment system has some characteristics that increase the complexity for customers. These are:

- A variable price at different times of the month according to consumption;
- The possibility of accruing negative credit; and
- Retroactive adjustments to credit due to monthly price variations.

The tariff charged to pre-payment customers varies during the month according to the amount of electricity consumed. The first 60 kWh of consumption has the lowest price, so credit will be depleted at a slower rate. If a customer's consumption in one month exceeds 60 kWh, the price charged will be more than three times higher, resulting in credit being depleted at a much higher rate. If a customer's consumption in one month exceeds 120kWh, the price charged then more than doubles again. When a new month starts, the tariff reverts to the lowest level again.

If customers pay the same amount with each recharge, their credit may expire much faster later in the month. This may make it more difficult for customers to proactively manage their credit levels to avoid disruption. This system will require clear explanation, and customers may take some time to adapt to budgeting differently for electricity at different times during the month.

An implication of the "standby period" described in section 3.4.2 above is that customers may accrue a negative credit before being disconnected. The customer will be disconnected when the standby period ends. When the customer goes to recharge, they must clear the negative credit before new credit can be purchased.

The base price of electricity is revised every month according to a formula defined in the concession contract. The price data used by the meter is updated when the chip card is inserted in the meter after a recharge. At the first recharge of a new month, the new base price will be updated in the meter. For any electricity already consumed that month, an adjustment amount for the amount over- or under-paid will be calculated. This adjustment will then be applied the next time the customer recharges.

Due to possible negative credit and retroactive price adjustments, a customer may receive a different amount of credit than the amount they pay. For example, if a customer has a 200 vatu negative credit after a standby period, and a 50 vatu retroactive price adjustment, after paying 500 vatu, the customer will only receive 250 vatu credit. This must be clearly explained to the customer when they recharge, so the customer is able to actively manage their credit and consumption through the month.

The characteristics described above create complexity in the proposed system that makes it more difficult for customers to manage their credit levels to avoid disruption in their electricity supply. It is very important that the utility carefully explains the new system to customers during the marketing campaign, when they sign up for a pre-payment meter, provide helpful and clear instructional materials, and ensure that customer service staff are well trained to deal with queries. It is likely that the characteristics listed above will mean that the

number of queries received during the initial roll-out will be high as customers learn and adapt to the new system.

UNELCO's proposal contains the following actions related to customer education:

- UNELCO will conduct public meetings and presentation of the prepayment apparatus and arrangements with the communities in each targeted areas.
- During the trial scheme, UNELCO has developed educational material to be updated and used to accompany the new prepayment users.
- A dedicated team within UNELCO will be trained to manage customers choosing prepayment system and address their queries and requests at main office.
- A promotional campaign will be designed to accompany the launch of prepayment metering technology pending approval from the Authority.
- A web site is currently under design and will dedicate a page to prepayment metering technology and conditions applying.

3.4.3.1 Customer perception

The step tariff was a difficult concept for the public to understand. During the public briefings the Authority was requested on many occasions to explain further how customer bills are determined using the step tariff.

The impact of retroactive price adjustments on customer credits was another difficult concept for the public to understand. Even though it was explained in detail during the consultation, it was evident that there is a need for UNELCO to educate its customers on the nature retroactive price adjustments to reduce customer confusion once the prepayment system is implemented.

The standby periods of weekends and public holidays were perceived in general as appropriate and convenient by the public. The impact of negative credit that may be accrued during a standby period was accepted by the public. However, the end time of the standby period (7am the next day) was seen as insufficient by some members of the public. They anticipated that with limited resell points, queues were going to form resulting in delays to refill for customers who run out of credit during standby periods.

Another aspect of the proposal that was not easily understood when explained during the public consultations was the difference in cost between new customers (who will need to pay for the meter) and existing post-paid customers (who will receive a pre-paid meter for free if they want to switch).

3.4.3.2 Assessment

The public consultation has shown that extra effort is required to help customers understand certain aspects of the pre-payment system. Therefore, the Authority views the proposed system as fair, subject to UNELCO providing a customer education plan that includes the following:

- Examples of materials that will be used, which should include explanations of the step-tariff, retroactive adjustments, standby periods, and installation costs for new and existing customers;
- A demonstration of how the materials will be presented or delivered to new and existing customers;
- A roll-out plan for delivering customer education to the targeted areas.

3.5 Summary table

The table below summarises the Authorities assessment of UNELCO's proposal:

Table 8: Assessment summary

Criteria	Assessment
Safety	The proposed single-phase meters are safe
Good Value	The proposed system shows a wide range of net benefit, depending on the assumptions used. On balance, the proposal is neutral to good value.
Fair – pricing	The proposed system is fair, as long as domestic customers can switch between post- and pre-payment meters at any time and at no additional cost
Fair – convenience	The proposed system is not unduly inconvenient, as long as the utility establishes multiple reselling points, warnings for low credit, and standby periods where customers will not be disconnected on days where it may not be possible to recharge
Fair – usability	The proposed system is usable, as long as the utility carefully explains the new system to customers during the marketing campaign, when they sign up for a pre-payment meter, provide helpful and clear instructional materials, and ensure that customer service staff are well trained to deal with queries

4. Implications of the decision

This decision has implications for various stakeholders. These are described below.

4.1 For customers

Upon the launch of the proposed system, domestic customers will be able to choose pre-payment as an option. Pre-payment customers will be responsible for managing their credit and consumption, and must comply with the terms of their customer agreement including the supplementary special conditions. If another tariff category or metering technology is financially advantageous for a customer, they are responsible for requesting the change.

Customers with billing arrears who want to switch to pre-payment metering are responsible for the payment of outstanding debt according to the conditions described in the arrangement agreed with the utility. Failure to comply may result in disconnection and further debt recovery procedures from the utility.

Customers are responsible for the pre-payment metering apparatus installed in their house or premises and its management, including credit recharge and interactions with the chip card. Any incident, theft or degradation of the material should be reported to the utility without delay.

4.2 For the utility

The approval of prepayment metering apparatus and implementation will require the utility to take appropriate measures to train its commercial, technical and management staff in a timely manner to provide adequate customer service for the new system. In order to avoid delays in maintenance and replacement of faulty apparatus or equipment related to the connection of prepayment system, the utility must take appropriate actions to have a reasonable stock of spare parts available when rolling-out the new technology across the concession.

The utility is responsible for informing its customers on the conditions specific to the prepayment metering and management of the metering apparatus, including the description of information displayed on the meter. The utility is expected to create and produce informational and educational material to run training sessions and demonstrations for the customers as described in the proposal. Customers should be informed about how and where to get support and access to customer service for prepayment meter related enquiries.

In line with the proposal, the concessionaire is expected to open and equip additional resell points to facilitate recharging for customers. The resell points will be equipped to produce invoices and bills at first top-up every month or at the customer's request.

The utility is committed to switch existing customers on post-paid meters to pre-payment meters and vice versa free of charge.

The utility must work with the government to make the necessary updates and changes to the concession contract as described in the proposal and in section 2.2.2 above.

4.3 For other concession areas

This approval has a geographical scope limited to the Port Vila concession. Should any utility wish to use similar apparatus or customer agreement in other areas, a proposal should be submitted to the Authority for review. Should prepayment metering technology be used in other concessions with approval predating the URA Act, the conditions under which they are operated can be reviewed separately at the discretion of the Authority.

4.4 For other pre-payment technologies

The Authority's approval is specific to the type of meter described in the proposal and cannot be extended to other metering apparatus with similar functions and operability without approval from the Authority.

4.5 For the Authority

Following approval of the proposed metering apparatus, customer agreement and proposal, the Authority will review and update existing standards in line with the technology.

For any future tariff review for electricity prices in the Port Vila concession, although the Authority has reviewed UNELCO's proposal for this approval, the Authority is not bound by any financial data or assumptions used in UNELCO's base case scenario.

Based on the experience of this review and the process followed, the Authority will consider an update to existing consultation guidelines to facilitate future reviews of a similar nature.

In order to ensure that customers are being treated fairly, the Authority will monitor the implementation of the proposed new system to ensure customers are given appropriate information and support.

5. Next steps

Following this Final Decision, UNELCO may proceed with the roll-out of the proposed pre-payment meter system, subject to the conditions described in section 2.2.2 above. The expected process between this approval and the project implementation is as follows:

1. UNELCO and/or the Government confirm the signing of the required addendum to the Port Vila concession contract
2. UNELCO provides a written commitment to a customer service policy to inform a customer if an alternative metering technology may be cheaper for them at any time
3. UNELCO provides the Authority with the required education plan, materials and demonstration
4. The Authority informs UNELCO in writing that the conditions of the approval have been satisfied
5. UNELCO may proceed with the proposed roll-out

If any stakeholders have any comments or questions regarding any aspect of this approval, then they may contact the Authority using the details provided under the heading “How to respond to the paper” above.

Annexe I. New customer agreement

SPECIAL CONDITIONS FOR PREPAID SERVICE AND AGREEMENT

CUSTOMER AGREEMENT N°

I the undersigned

Address

Name of Landlord

By signing these special conditions for prepaid Electricity Service I agree to enroll in UNELCO's prepaid metering service subject to the term and conditions herein.

ARTICLE . – Exclusion :

Articles 10 and Article 11 of the General Conditions of supply do not apply for prepayment metering service.

ARTICLE . Connection and activation

Standard charges will apply for all new connections. There will be no cost for the prepayment meter and no deposit required at the commencement of the prepaid metering contract.

To activate the prepaid metering account a minimum credit amount of 300 vatu is required.

Fees and Charges

Any fees and charges imposed under this Contract may be debited from the credit on your prepaid meter.

Prepaid account's do not receive paper invoices, monthly prepaid history is available on demand, and will be provided to the customer at his/her request.

No charges will be applied for a transfer from

ARTICLE -Standby Period

Electricity service will not be disconnected for insufficient credit on weekends.

Electricity service will not be disconnected for insufficient credit on public holidays.

If all credit is exhausted supply will continue during the standby period (weekends and public holidays) any electricity consumed will result in a negative credit balance and will be payable prior to purchase of any top up credit.

ARTICLE – Service Termination

Upon request of a service termination from the customer any remaining credit on the account will be refunded upon the return of the prepaid metering card. If there is an outstanding balance at the time of termination the customer will be required to make payment to clear arrears.

ARTICLE . – Meter Tampering

Customer shall not in any way damage, interfere with or misuse the prepayment meter. Customer may be held liable for any such damage.

If a customer believes their meter has been tampered with they must immediately report to

post paid metering to prepay metering or vice versa, subject to modifications to the metering. UNELCO to investigate.

If a prepaid card is lost or damaged the customer will be charged 465 vatu fee to replace the card; except if replacement is due to an inherent fault.

* Price subject to change from time to time

A penalty charge of 100 000 vatu will be enforced and subject to amendment from time to time and will be payable before any Tamper reset.

ARTICLE . – Disconnection

Automatic disconnection will occur if the customer's credit is exhausted, subject to standby periods.

Customers who have insufficient credit will not be charged disconnection and/or reconnection fees.

If an account is disconnected and does not reactivate within 90 days the account will be considered closed. Customers will be alerted by the prepayment metering system when the remaining credit is at 300 vatu and a second alert warning at 200 vatu.

Upon use of all credit the electricity supply will be disconnected excluding standby period.

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Utilities Regulatory Authority

Vanuatu

You can access the Pre-payment Meters Final Decision August 2013 on our website www.ura.gov.vu, or by contacting us by telephone (+678) 23335, email: rmarum@ura.gov.vu or regular mail at Pre-Payment Meters Review, Utilities Regulatory Authority, PMB 9093, Port Vila, Vanuatu.