

Preliminary Decision And Notice of Request for Comments

Case U-0006-15

In the Matter of UNELCO's Electricity Tariff Review

September 2017

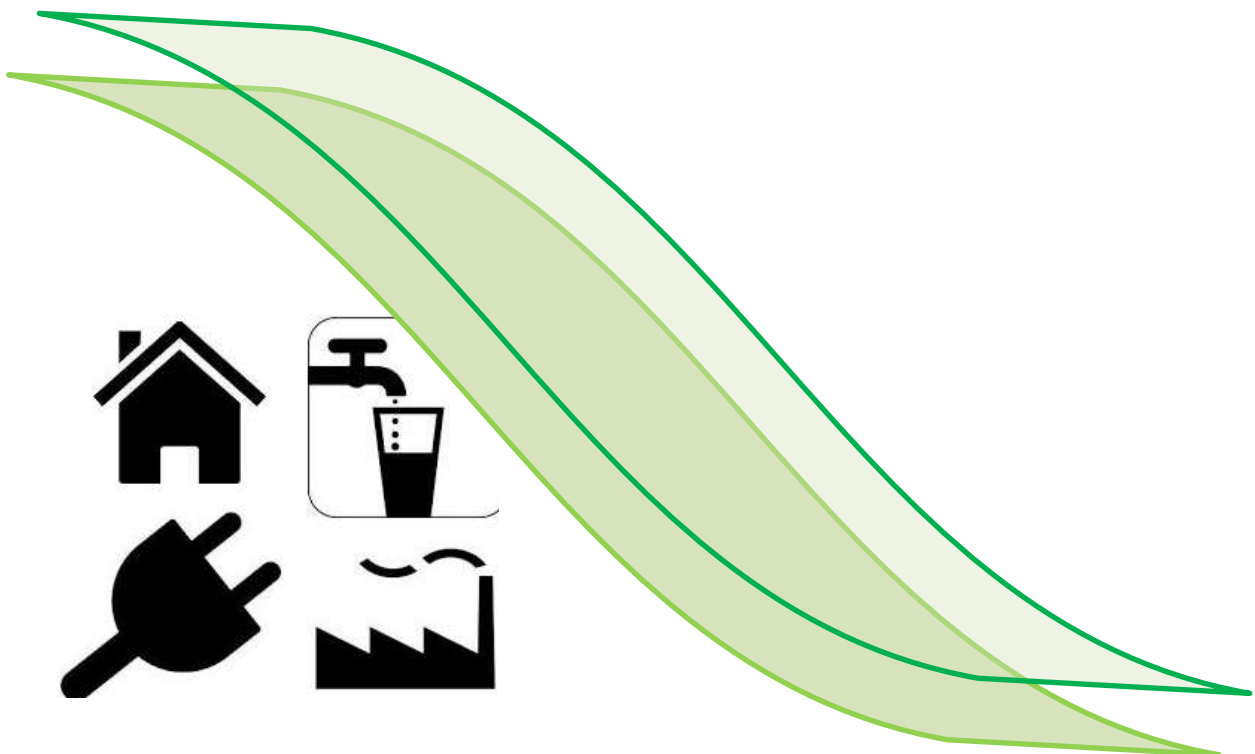


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Preliminary Decision

UNELCO GDF Suez , concessionaire for the generation and public supply of electric power in Port Vila, Malekula and Tanna purportedly in accordance with the concession contracts, submitted an application for a tariff review on 18th of August, 2016(subsequently a revised tariff application was submitted on 23rd December, 2016).

While generally outlining its cost of service projections, the tariff application did not recommend or propose the total Annual Revenue Requirement or the Base tariff Po, as required under the electricity concessions. During December 2016 and April 2017, URA Staff performed a detailed review of UNELCO's tariff application, its own analysis and investigation of appropriate costs, revenue required and base tariff. On 5th April 2017 Staff presented a comprehensive Staff Report to UNELCO and the Government incorporating the Staff findings on various cost elements and base tariff recommendations. The Staff Report was issued for the purpose of entering into discussions and negotiations with UNELCO in order to arrive at a mutually agreed Revenue Requirement and base tariff which would subsequently form the Commission's Preliminary Decision (PD) on Tariffs.

During the first meeting held on 24th April 2017, Staff requested UNELCO to provide responses (in the form of summary of disagreements on the actual building blocks of tariff) on the staff findings/determinations and recommendations in the Staff Report. No formal response was received from UNELCO. During May to June 2017, several meetings were held between UNELCO, URA and DOE to discuss and negotiate a fair and reasonable tariff for the ensuing tariff period (2016-2021). Negotiations however were not very productive as UNELCO insisted on first discussing issues that were outside the scope of the concession contracts (proposed guiding principles). Asserting perceived disagreements on discussions between UNELCO and URA on the so called "Proposed Guiding Principles" UNELCO tendered a Notice of Litigation on 28th June 2017 citing Section 17 of the Port Vila concession contract and Article 13 of the Malekula and Tanna Concessions. Notice was rejected by URA as being premature and contrary to the concession contract provisions as no meaningful negotiations on tariff review had taken place among the parties. On 28th July 2017, the Notice was rejected by the Government for the same reasons.

This Preliminary Decision is issued with the aim of rechanneling Parties' attention on discussing the actual building blocks of tariff and base price determination in accord with the concession provisions, and inviting comments and counter proposals from other stakeholders on the computation of Annual Revenue requirements, Base Price (Po), Monthly Adjustment Parameters and Tariff structures for three concessions, going forward. It should be noted that the last Tariff Review for three concessions was performed in 2010 and another review is long overdue.

Commission is pleased to issue this preliminary decision and accompanying staff report in the matter of UNELCO's tariff adjustment of electricity services in Port Vila, Tanna and Malekula (case U-0006-15) for the review period of 2016 to 2021. The key objective of this review is to determine reasonable costs and fair level of tariffs that UNELCO customers should be charged for the tariff period while maintaining and improving the delivery of reliable and affordable electricity services to its customers. At the same time it is important that UNELCO receives adequate, timely revenues from its customers to conduct its operations in a safe and reliable manner and achieves reasonable profit margin.

The Commission is issuing a Notice of Request for Comments in this matter, providing an opportunity for Vanuatu customers, government and other stakeholders to consider the service related requirements and review the electricity prices essential for reliable, safe and affordable electricity services. It also provides opportunity to the Utility (UNELCO) to provide its comments, feedback and any additional information that will assist the Commission to arrive at a fair and equitable Final Order.

As UNELCO's tariff application did not include the proposed new base price for the 2016-2021 tariff review period, it made comparison analysis between Staff determination and UNELCO proposal somewhat complicated. However, Application included cost projections for the next six years (2016-2021) which form the building blocks of the Revenue Requirement. Staffs have used UNELCO's average of 5 year projections (2016-2020) wherever required as a basis of comparison with the Staffs determination¹. While no base price was proposed by UNELCO, Staff calculated UNELCO's base price of 57.85 Vatu/kWh (based on the annual average cost and demand projections) which represents an increase of 21.4% from the current base rate.

Upon request by Government and URA, UNELCO submitted a calculation using 2016 actual data(as opposed to the averages used in the Application) showing base price of 52.44 vt/kWh with a caveat that it was only as a corollary to its submitted Application and not a recommended base price P₀, required under the concession contract. This is quite confusing. Perhaps UNELCO, in its responses to Preliminary Decision can explain the computations and its recommended base tariff and how it is derived.

UNELCO proposed several fundamental changes in its tariffs and cost recovery regime intended to protect UNELCO's shareholders from future cost variations and operational changes, largely transferring those risks onto its customers. Many of the changes proposed are out- side the normal regulatory practices or the concession provisions, including:

- Guaranteed returns by decoupling its profit margins from the kWh energy sales.
- Cost of capital recovery (reasonable compensation) subject to annual adjustment (to be calculated based on investments as per the financial statements with no provision for regulatory review of prudence or accuracy of the investments).
- Recovery of fuel costs, in particular copra oil costs even if not based on least cost generation.
- To redefine certain efficiency areas and targets setting lower efficiency standards than reasonable or prudent based on acceptable regulatory practices.
- Unit labor cost to follow the Vanuatu CPI.
- To use the actual risk free growth rate in the tariff formula every year.
- Proposed new parameters to the monthly adjustment formula of price P which eliminates the concept for base price (P₀) which is contrary to the concession provisions.
- Revision of current Tariff Structure

While Staff is not opposed to some adjustments even if outside the concession terms, such variations need careful consideration and analysis in order to protect customers from utilities' non-optimal and inefficient operations that could result from lack of oversight. Some of the proposed changes appear reasonable and valid; therefore Staff agreed to review and negotiate these to equitably protect the interests of the stakeholders within the context of the concession terms.

In April 2014 the Commission approved the Port Vila Municipality Council (PVMC) and UNELCO request to transfer all Street Lighting responsibility to UNELCO. The additional expenses and investments incurred by UNELCO have been allowed to accumulate in a Regulatory Asset Account approved by the Commission. Both parties have also been negotiating the transfer of PVMC SL assets to UNELCO. It is anticipated that this Asset transfer will be completed concurrent with the revision of UNELCO tariffs. The staff report has recognised this and made allowance for the recovery of SL expenditures accumulated in the Regulated Asset Account, amortized over 5 years.

UNELCO has highlighted a major concern that despite reasonable growth in customers its actual kWh sales growth has been inimical over the years. UNELCO attributes this slow growth to increased appliance efficiency, high oil prices, and overall slow economic growth in Vanuatu. Furthermore, UNELCO asserts that the effects of cyclone PAM will continue to linger for several more years resulting in insufficient sales growth. However, the Staff noted that the demand materially picked up in year 2016 and increased by 13% when

¹ Demand Projections are based on the average for the year 2017-2021

compared with the demand in year 2015. Furthermore, the total demand in year 2016 (59.8 GWh) recorded is highest over the past 10 years (2006-2015). Therefore, the Staff believes that UNELCO's demand growth has now stabilized and should not be a major concern for UNELCO.

In arriving at its preliminary recommendations, the URA Staff carried out a detailed investigation and analysis of UNELCO's financial and operating performance, made comparative analysis of past performances, engaged in ongoing discussions with UNELCO, and where necessary and relevant has drawn on best regulatory practices. The approach adopted by Staff reflects the objective of ensuring that the regime determined for the proposed tariff review period 2016-2021 provides incentives for UNELCO to deliver real benefits to its customers through improved efficiency, better quality of service and expanded coverage while maintaining healthy cash flows and profit margins.

Upon finalising the review of UNELCO's tariff application, the URA Staff has recommended reducing UNELCO's current base rate of 47.65 Vatu/kWh to 38.56 Vatu/kWh. This represents a 19.07% reduction in the contemporary base rate. The highlights of the major factors which have formed the basis of the Staffs recommended tariff are as follows:

- Continuous decline of the fuel price in the international fuel markets.
- Proposed reduction of 12% in UNELCO's cost per employee (to realign to a reasonable level) while allowing higher overall personnel costs over 2015.
- Labor productivity factor of 5.2% on an annual basis over the next 5 years and 5.4 % (annual averages) projected efficiencies proposed by UNELCO specifically from the now expanded prepaid meter system.
- Increase in the projected Energy Sales (kWh) at annual rate of 3% for the next 5 years (2017 – 2021) and Customer numbers by 6.2% (2017 – 2021) in all concessions².
- Third Party Services cost reduced by 37% based on the assumed level of prudent and reasonable services received from affiliated entities.
- Depreciation expenses adjusted based on the historical cost of the Concessionaire funded assets as required under the concession provisions.
- Provisions for replacement fund recalculated and allowed based on the Net Book Value of the assets.
- Adjustment for the charge of 511.7m vatu to the customers through the force majeure provision which is not required under the concession contracts. According to Article 9 of the Port Vila concession agreement such expenses if not covered by insurance shall be at the expense of the Concessionaire.
- Adjustment of 115.1m vatu for the non-regulated revenues.
- Reasonable compensation calculated based on the historical net book value of the Concessionaire funded assets adjusted for intangible assets, assets under construction and working capital requirement.

Based on Staff's analysis and determinations, the Staff proposes a 19.07% reduction in UNELCO's current base tariff of 47.65 Vatu/kWh. The recommended annual average Revenue Requirement by the Staff for the 2016-2021 regulatory control period is **2,507,352,228** vatu set out in table 1 below:

² Growth rates are calculated based on the Compound Annual Growth Rate

Table 1 : Staff Recommendation-Revenue Requirement

Building Block Cost(Million Vatus)	Actual Cost 2015	Avg Cost (2011-2015)	UNELCO Projections (Avg 2016-2020)	URA Determination
Fuel and oil	1140.91	1476.99	992.11	1310.42
Equipment and materials	35.00	68.54	88.89	64.58
Personnel expenses	356.41	386.41	431.64	364.57
Subcontracting and services	456.41	444.27	544.09	348.00
Tax and related expenses	19.39	21.51	25.58	21.93
Depreciation	290.88	258.88	407.68	299.86
Provisions	49.96	105.31	191.77	-11.97
Port vila street lighting Exp	0.00	0.00	13.04	3.13
Regulatory recovery	0.00	0.00	46.48	11.14
Reasonable compensation	269.86	275.44	476.76	210.80
Revenue Requirement	2618.81	3037.35	3218.05	2622.47
Less Non Regulated Revenues	117.44	143.04	86.75	115.11
Net Revenue Requirement	2501.37	2894.31	3131.30	2507.35

Data Source: UNELCO Audited Financial, UNELCO Tariff Application 2016-2021

Data Analysis: URA Staff

Table 1 above provides a summary of staff recommended Revenue Requirement, UNELCO's calculation based on the average for 2016-2020 projections, actual cost of services for the year 2015 and the average actual cost of services for the past 5 years(2011-2015). The recommended Revenue Requirement is 19.9% less than UNELCO's average projections(2016-2020), 0.24% higher than the actual cost of service³ for the year 2015 and 13.37% lower than the average actual cost of service⁴ for the past 5 years (2011-2015). Section 1 of the Staff Report (Financial, Economic and Technical Analysis) will discuss the cause of these variances and Staffs assessment of each of the building block cost, elements that drive these costs, relationship between the cost elements and the Staff's approach and methods used to determine the reasonable and prudent level of each component of the building block cost. Report also provides explanations on the investigation and analysis that underpin the recommended new tariff.

URA Commission has determined that the recommendations of the URA Staff should be adopted as a preliminary decision in this matter. A Final Decision shall be made upon review of comments and information submitted by the utility and other interested stakeholders during the consultation phase.

Upon the issue of Commission's final decision order, under section 27 of the URA Act, UNELCO may file a Notice of Grievance within 30 days. Upon review of the grievances, if URA is satisfied of any matters described under section 28(a) to (c) of the URA Act, it will revoke, amend or vary the action complained of accordingly. UNELCO will be informed of the outcome of the review within 30 days of the date of the notification.

In case of disagreement, UNELCO may file a notice of litigation as per section 17(71) of the Port Vila concession contract(Article 13 of the Malekula and Tanna Concessions) and if no agreement is reached within the three months following notice of litigation, the parties shall proceed to the nomination of their arbitrators. The arbitration process will be carried out in accordance with article 17 of the Port Vila concession contract.

The above process has been mutually proposed by both URA and UNELCO as per UNELCO letter dated 24th March 2016(ref: 705/16/U/YM/jw)

³ Actual cost as per UNELCO's 2015 Financial Statement figures

⁴ Actual cost as per UNELCO's Financial Statement figures for the year 2011-2015

Johnson Naviti Matarulapa Marakipule, Chairman

Hasso Bhatia, *PhD*, CEO and Commissioner

John Obed Alilee, Executive Commissioner

Notice of request for comments

UNELCO and interested persons are invited to comment on this Report. Responses and information received will be considered in the development of the Final Decision and Commission Order.

Written comments should be submitted to the URA no later than:

14th October 2017

Submissions can be:

- delivered in person at the
Office of the Utilities Regulatory Authority
VNPF Compound
Corner Pierre Lamy & Andre Ballande Street
Port Vila, Vanuatu
- mailed to
Case U-0006-15
Utilities Regulatory Authority
P.M.B 9093
Port Vila
Vanuatu
- or emailed to
breuben@ura.gov.vu

Any submission should be accompanied by a signed cover letter and address, indicating the case No U-0006-15 (scanned material is accepted) and addressed to Belinda Reuben, Office Manager.

Submissions shall be posted on the URA's website in accordance with the URA submission policy. Any information you may consider confidential should be marked as such, providing a brief explanation of the nature of the confidentiality.

The URA office can be contacted by telephone at +678 23335

1.0 Introduction

Table 2: Case Information

Case number	U-0006-15
Applicant	UNELCO GDF Suez
In the matter of	UNELCO Electricity Tariff Review(2016-2021)
Commencement date	18 th August 2016
Date of Preliminary Decision	13 th September 2017
Date of Final Order	TBA

1.1 Background

The Utilities Regulatory Authority Act No. 11 of 2007 (the Act) establishes the Utilities Regulatory Authority (the URA) of Vanuatu. The URA is a body corporate with perpetual succession, acting independently from the Government. The URA's Commission consists of three Commissioners, a Chairperson and two part-time Commissioners of which one is the Chief Executive Officer of the Authority.

The Act empowers the URA to regulate certain utilities, in particular, the provision of electricity and water services in Vanuatu. The URA's core functions with respect to existing water and electricity utilities include:

- Monitoring and enforcing existing concession contracts which include checking price adjustments made by the utility, monitoring service standards and technical performance, reviewing yearly financial reports and auditing operating report processes;
- Renegotiating tariffs with the utility in accordance with the relevant concession contracts;
- Manage consumer complaints by assisting consumers resolve grievances and/or complaints with the utilities;
- Advise Government on utility-related matters as requested; and
- Communicating with the Government, utilities, customers and the general public in order to provide information about matters or updates relating to utilities.

The Vanuatu Government has granted three electricity concessions for Port Vila, Malekula and Tanna to UNELCO (Concessionaire) respectively in 1986 and 2000 under various concession contracts. These contracts specify rules regarding service coverage, the quality of service to be provided, and the maximum tariffs that may be charged for these services. As the counterparty to each of these contracts, the Government has been responsible for monitoring UNELCO's compliance with the contractual provisions.

The Act empowers the URA to exercise the functions and powers of the Government relating to the existing concession contracts for electricity, which remain unchanged. Policies regarding electricity supply continue to be set by the relevant Government ministries and departments.

The most recent electricity tariff review of the three concessions was carried out in year 2010 by URA. The URA issued its Final Decision Order on 13th May, 2010, whereby the revised tariff was challenged by UNELCO and URA's final determination was therefore referred to arbitration by UNELCO as per its powers assigned under the concession contract. The major arbitration issue was the disagreement between the URA determined real WACC of 6% versus UNELCO proposed real WACC of 7.8%.

The Arbitration panel published its decision on the 28th of April 2011 approving a real Weighted Average Cost of Capital (WACC) of 7.76%. Therefore, the URA implemented the revised tariff on May 2011 incorporating the arbitration decision.

Section 20 of the *Utilities Regulatory Authority Act No 11 of 2007* sets out that the rights exercisable by the Government in the concession contracts described in Part B of Schedule 1 are assigned to the URA, but may only be exercised by the Authority upon receiving written approval of the relevant Minister. On 21st July 2015, the Vanuatu government provided its approval and assigned URA to conduct an electricity tariff review in Port Vila, Tanna and Malekula. URA subsequently informed UNELCO for the proposed tariff review and received the tariff application from UNELCO on 18th of August, 2016.

1.2 Purpose of this document

The purpose of this document is to present the results of the URA Staff's analysis and evaluation of UNELCO's electricity tariff review for the proposed period 2016 to 2021 and to set out the Commission's preliminary decision and the underlying principles informing these decisions.

The aim of this review is to determine the revised base rate that will ensure efficient delivery of reliable electricity services to the consumers in Port Vila, Tanna and Malekula, while at the same time ensuring the financial viability and sustainability of the service provider (UNELCO Limited) and the achievement of Government targets and priorities for the energy sector.

Feedback from UNELCO and interested persons will be collected by the Staff directly through written submissions as set in the Notice of Request for Comments. Based on the additional comments and feedback received, the Commission shall render its Final Decision and Order on the case.

1.3 Structure of document

The document is divided into two major sections, Section 1 and Section 2.

Section 1 sets out in summary UNELCO's tariff proposals and the URA Staff's financial, economic and technical analysis of the proposals and the resulting determinations.

Section 2 summarizes the issues and discussions on UNELCO's proposed principles to assess rate review, monthly adjustment parameters and New Tariff Structure.

1.4 Electricity Tariff Review Regulatory Framework

1.4.1 Utilities Regulatory Authority Act - Assigned Rights

The URA is empowered under section 18 of the Utilities Regulatory Authority Act No, 11 of 2007 (URA Act) to determine the maximum price which may be charged in relation to any aspect of a regulated service in any place. There are several Concession Agreements which were executed between the Government and UNELCO in respect of the supply of electricity in Vanuatu, namely, the Port Vila, Malekula and Tanna Electricity Concessions Agreements.

In respect of these concession agreements, the URA Act assigns several contractual rights of the Government, as Grantor of the Concession, to URA. Subsection 20(1) of the URA Act provides that "the rights exercisable by the Government in the contracts described in Part A of Schedule 1 are assigned to the Authority". Subsection 20(2) of the Act provides further that "the rights exercisable by the Government in the contracts described in Part B of Schedule 1 are assigned to the Authority, but may only be exercised by the Authority upon receiving the written approval of the relevant Minister".

The rights exercisable by the Government in the concession contracts described in Part A of Schedule 1 may be exercised by the URA without consulting or without any written approval from the Minister. However for rights outlined under Part B of Schedule 1 that are assigned to the URA, these can only be exercised by the Authority upon receiving written approval of the relevant Minister.

The rights of the Grantor in the Concession Agreement which are relevant to the current tariff review are presented as per table 3 below:

Table 3: Rights of the Grantor

	Rights assigned by subsection 20(1)	Rights assigned by subsection 20(2)
Port Vila Electricity Concession	Section 17 of the Specification	Section 5 of the Specification
Malekula Electricity Concession	Article 32, paragraph 160	Article 31, paragraph 157
Tanna Electricity Concession	Articles 32, paragraph 159	Article 31, paragraph 156

1.4.2 Electricity Concession Agreements

Pursuant to the requirement of the Electricity concession agreements, clause 7.5 (Specification Amendment of 1998) provides the condition(s) precedent that requires the triggering of a tariff review. The conditions include:

- If more than 5 years have elapsed since the date of effect of this amendment or since it was last reviewed;
- if the price P has increased or decreased by more than 25% compared to the reference price P_0 ;
- If the fiscal conditions used for the establishment of the reference price have been modified;
- If some new event cause major variations in the costs to the concessionaire such as the cost appears to necessary pass on the variation in cost due to the new conditions of power generation and distribution in an equitable manner on to the price of electricity.

The Government, as the Grantor, was satisfied that the pre condition has been met, and in addition to various factors affecting the supply of electricity such as variation of fuel prices, economics of coconut oil as fuel for generation, UNELCO's investment plan over the last five years, it is critical for such a review to take effect.

1.4.3 Grantor's Approval

Given that some of the rights of the Government in the Concession contracts can only be exercised by the URA with written approval of the Minister, on 21 July 2015, the URA wrote to the Minister of Climate Change Adaptation, Meteorology, Geo-hazards, Environment and Energy seeking approval to commence a review of electricity tariffs for Port Vila, Tanna and Malekula.

On 21 July 2015, the Minister by written confirmation gave his approval for URA to undertake the tariff review. It is therefore in accordance with the relevant rights of the Government under the respective concession contracts assigned to URA that URA commenced as part of the tariff review a revision of the base price and of the adjustment formula concerning all concessions and has requested UNELCO's assistance in providing the URA with all relevant accounts and statistical statements.

The URA notes also that in accordance with the ruling of the Court of Appeal on 18th November 2016 in UNELCO versus Republic & URA Appeal Case 3472 of 2016, UNELCO should be given the opportunity to evoke the arbitration clause in the Concession Contract should there be any dispute on final determination of the tariff made by the URA.

1.5 Current Base Rate & Tariff Structure

The current tariff structure adopted by UNELCO applies to all its electricity concessions; Efate, Malekula and Tanna. The current tariff structure contains separate customer categories and the tariff rates they pay are referenced to Price P. Each customer category has a different fixed and variable cost charges, whereby the fixed charges are only applicable to the High and Low Voltage, and Business License Holder categories that

are calculated according to their kVA subscription and the variable charges apply to all customer categories at the different rates per kWh consumed as can be observed in the table 4 below:

Table 4: Current Tariff Structure

Type of customers	Type of Variable Tariff	Variable Tariff level per kWh/month	Fixed Tariff per kVa/month
Small Domestic Customers (SDC)	1st Block (0-60kWh)	0.34 x P	0
	2nd Block (61-120 kWh)	1.21 x P	
	3rd Block (121 + kWh)	3.00 x P	
Other Low Voltage Users (TU)	Single Block	1.21 x P	5 x P
Business License Holders (TUP)	Single Block	0.87 x P	20 x P
Sports Fields (I)	Single Block	1.00 x P	0
Public Lighting (EP)	Single Block	0.54 x P	0
High Voltage (MT)	Single Block	0.70 x P	25 x P

Data source: UNELCO Tariff Application V2 2016-2021

The small domestic customers (SDC) are divided into 3 separate blocks, the first block is highly subsidised as it only pays 34% of the actual costs compared to the last block that pays 3 times the actual cost posed to the utility. There exists a huge gap between the SDC sub-categories which explains some bill shocks when moving from the first block to the second and third block. However, this is in line with the current government goals, increasing electricity access to rural areas therefore the first block acts as a life line to those consumers especially in rural areas with lower incomes to be able to afford electricity with in the first block.

1.6 Test Year and Methodology

The Staff has used the test period cost of service approach to determine the Revenue Requirements for UNELCO for the 2016-2021 tariff review period. An important factor in the determination of cost of service to be recovered in rates is the regulatory approach to the selection of the test period. Three basic approaches can be used in selecting a test period which is; the historic-average test year, the year end (point in time) approach and the projected test year. Staff believes that the combination of the above three approaches will provide the best determination of UNELCO's Revenue Requirement and therefore, have used a mixture of the above identified test year periods for its calculations.

The Staff calculated UNELCO's various building blocks cost for each year of the regulatory control period (2016-2021). In order to determine the annual Revenue Requirement to be used for base rate calculations, an annual average of year 2016 to 2020 was used so that the annual Revenue Requirements are smoothed across the tariff review period to reduce fluctuations between years.

1.6.1 Staff Limitations

Accounting based data serves as the basic information source to be used in the process of setting utility base rate. UNELCO's concession agreement defines certain accounting procedures that are used for valuation purposes and for the presentation of the audited financial statements. It provides very limited accounting guidelines for tariff review purposes and neither states the accounting standards to be used for the preparation and presentation of UNELCO's financial statements. This limited Staff's capacity to base its assessments on the best international accounting standards and practice. The Staff had no choice but to rely on the existing accounting standards of UNELCO as it was the best source of information available at the time of the tariff review.

URA Staff with reference to its letter dated 16th of June 2016, requested to conduct an audit of UNELCO's major cost items and fixed assets prior to receiving the tariff application. Terms of audit engagement were also attached to the letter and UNELCO was required to formally provide its acceptance and agreement to the proposed audit engagement in writing to the URA. The Staff did not receive a positive feedback and collaboration from UNELCO and as a result the on field audit was not possible to be carried out. The non cooperation by UNELCO on this matter limited the Staff's capacity to review any trends and anomalies in the major cost items, identify cost that were not related to the provision of electricity services, affiliated transactions, unregulated costs and the type of costs included and the reasonableness of these costs.

The secondary objective of carrying out the above audit was to ensure UNELCO's financial compliance with the relevant provisions of the concession agreement and also to ensure adherence to regulatory requirements. Since its establishment, URA did not have the opportunity to carry out a detailed investigation of UNELCO's financial records in order to verify UNELCO's real costs and profits. UNELCO's disinclination on accepting the terms of the audit engagement proposed by URA tends to support the suspicion of UNELCO's non compliance with the relevant provision of the concession agreement, regulatory requirements and the deviation from standard accounting principles and bookkeeping.

Following the above and subsequent to the receipt of the tariff application, the Staff requested UNELCO as per its letter dated 16th September, 2016 for the additional data and information in order to assist in the Staff evaluation of a prudent and reasonable level of cost of services to be allowed for the proposed tariff review period. To the date of drafting this Report, UNELCO did not provide the above information to which the URA is entitled as per our requirement, which further limited the Staff's ability to carry out an effective assessment of UNELCO's major cost items. Some of the issues and possible approaches in the face of the lack of information will be discussed in the relevant sections of the Staff report.

In light of the above limitations, the URA Staff has approached this review by applying the existing legal framework (in alignment with the concession agreement for Port Vila, Tanna and Malekula, URA Act and the Electricity Supply Act) and adopting the best international regulatory practices and methods.

STAFF REPORT

SECTION I: - Financial, Economic and Technical Analysis

2.0 Demand Forecast

2.1 Historical Growth of Electricity Demand and Customer Numbers

This section will review historical movements in electricity demand and customer numbers in UNELCO's concession areas over a ten year period (2006 - 2016). UNELCO currently operates in three concession areas - Port Vila, Malekula and Tanna. Combined electricity demand and customer numbers for all three concessions are presented in the Table 5 below⁵.

Table 5: Electricity Demand & Customer Numbers

Year	Demand, MWh	Customer numbers
2006	42,946	8,442
2007	47,076	9,107
2008	51,522	9,772
2009	53,237	10,325
2010	56,659	10,689
2011	55,994	10,938
2012	56,212	11,362
2013	57,422	12,167
2014	56,624	13,107
2015	53,022	13,989
2016	59,764	14,850

Data source: UNELCO, see footnote 4; Data analysis: URA staff

Table 6 below reflects growth rates observed over the last 10 years for each concession area⁶.

Table 6: Annual Demand and Customer Number Growth Rates (CAGR)²

Concession area	Annual kWh demand growth, %	Annual customer numbers growth, %
Port Vila	3.3%	5.8%
Malekula	2.0%	1.9%
Tanna	11.5%	8.2%
Total	3.4%	5.8%

Data source: UNELCO, see footnote 4

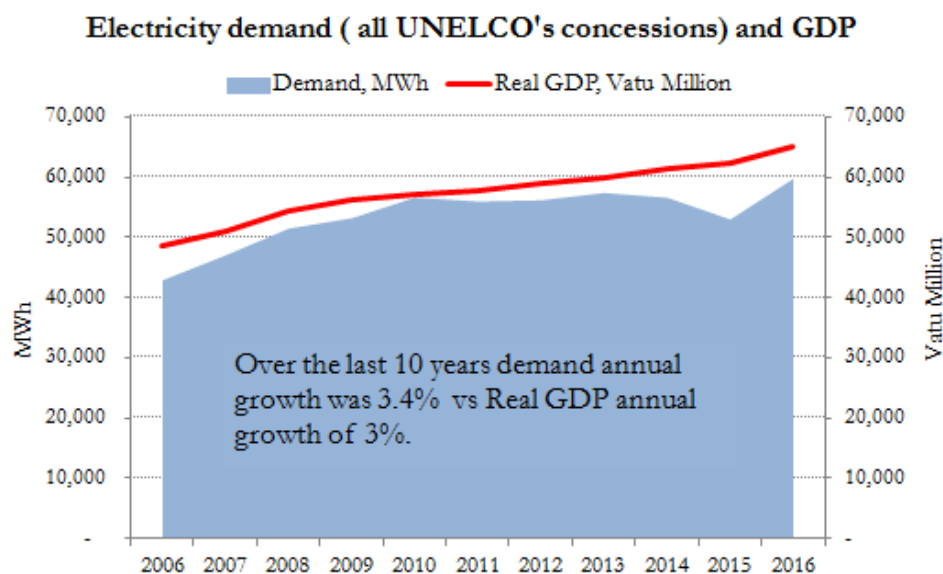
Data analysis: URA staff

Annual demand growth of 3.4% across all three concessions is to be compared with Vanuatu Real GDP growth rate of 3% over the same period which means one-for-one relationship between GDP growth and electricity demand growth. This indicates that over a ten year period 1% increase in GDP has been associated with on average 1.1% increase in electricity consumption.

⁵ Demand and customer numbers have been sourced from various sources submitted by UNELCO including annual technical reports, the Regulatory Reporting Requirement reports (RRR) and Electric Tariff Review 2016 - 2021 application. The figures have been adjusted by the URA to account for estimated demand and customer numbers for "Not Invoiced" category (Energies for staff, the offices, installations, etc.) 2016 figures may differ slightly from actual figures due to the use of preliminary data.

⁶ Annual Growth rate means Compound Annual Growth Rate (CAGR) unless stated otherwise.

Figure 1 : UNELCO's electricity demand and Vanuatu GDP

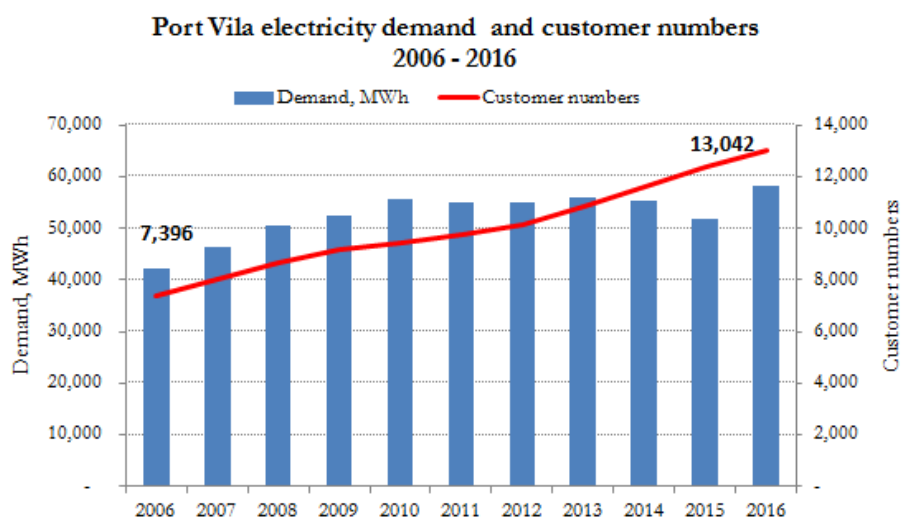


Data source: VNSO and RBV Macroeconomic Committee forecast (MEC), UNELCO's data
Data analysis: URA staff

The changes specific to every concession area will be discussed further. Please note, 2016 figures may differ slightly from actual figures due to the use of preliminary data.

Port Vila

Figure 2 : Port Vila historical electricity demand and customer numbers



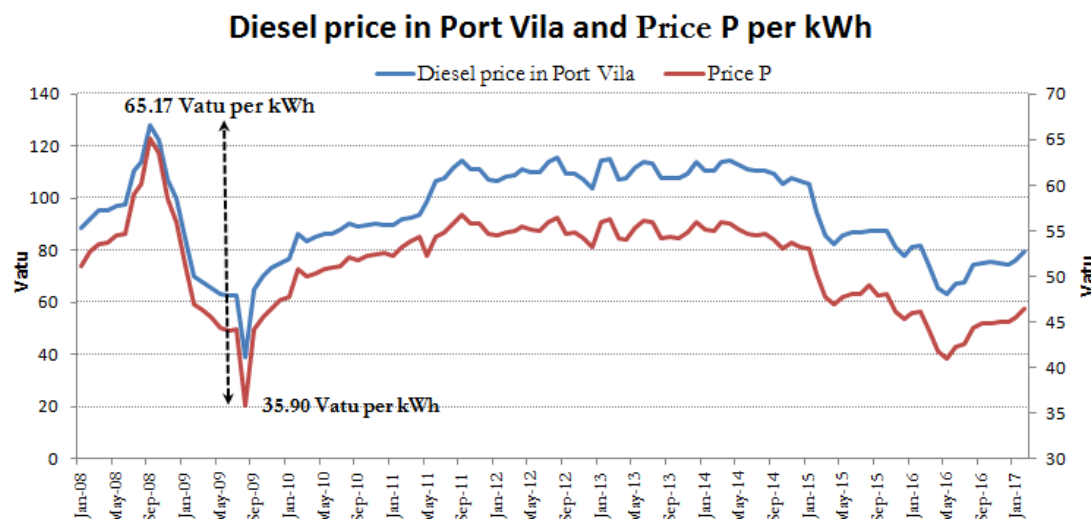
Data source: UNELCO, see footnote 4
Data analysis: URA staff

Over a ten year period:

- Customer numbers increased by 76% from 7,396 customers in 2006 to 13,042 customers in 2016. Annual growth rate was 3.3%.
- Energy consumption increased by 38% from 42GWh to 58GWh. Annual growth rate was 5.8%
- Electricity demand dropped by 6% after cyclone Pam hit Vanuatu in 2015 but recovered in 2016 reaching above historical levels.
- While customer numbers grew more or less consistently throughout the period, demand remained stagnant between 2010 and 2014. This can be explained by an overall low economic growth over this

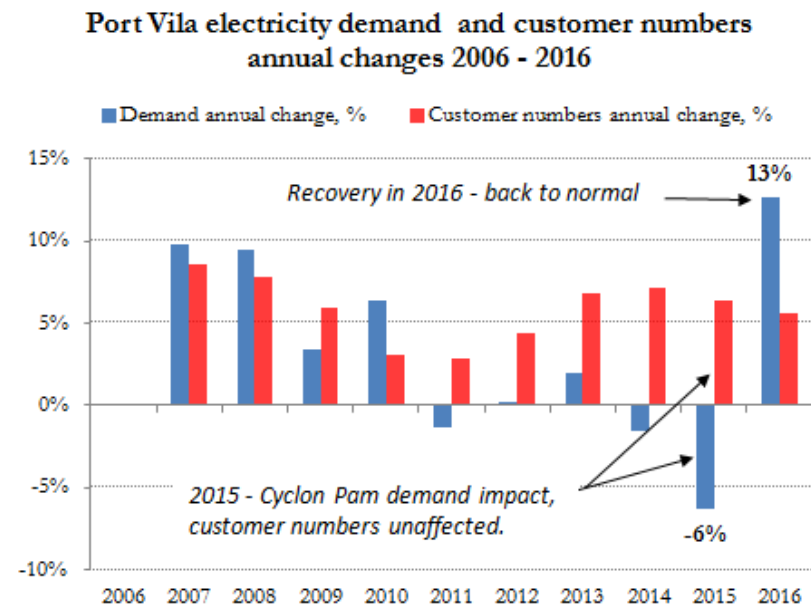
period, improvements in energy efficiency and the volatility of world oil prices. Over a short period of time price P has reached 65.17 Vatu per kWh in September 2008, dropped to 35.90 Vatu per kWh in August 2009 and gradually increased over the next two years to around 55 Vatu per kWh. Electricity price shocks driven by volatility of oil prices and overall uncertainty might have changed customer behaviour and prompted a reaction to manage it through lower electricity consumption in general.

Figure 3 : Port Vila historical diesel price and Price P per kWh



Data source: UNELCO
Data analysis: URA staff

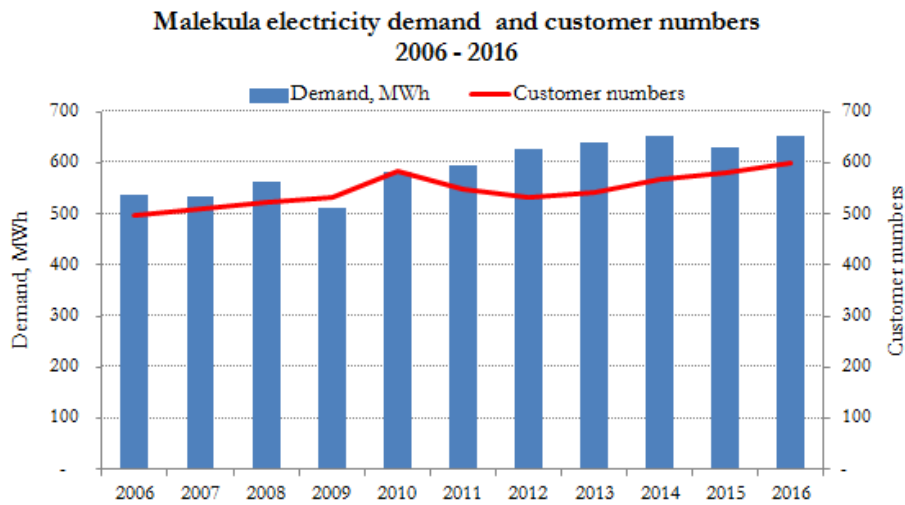
Figure 4 : Port Vila Annual Changes in Electricity Demand and Customer Numbers



Data source: UNELCO, see footnote 1 Data analysis: URA staff

Malekula

Figure 5 : Malekula Historical Electricity Demand and Customer Numbers



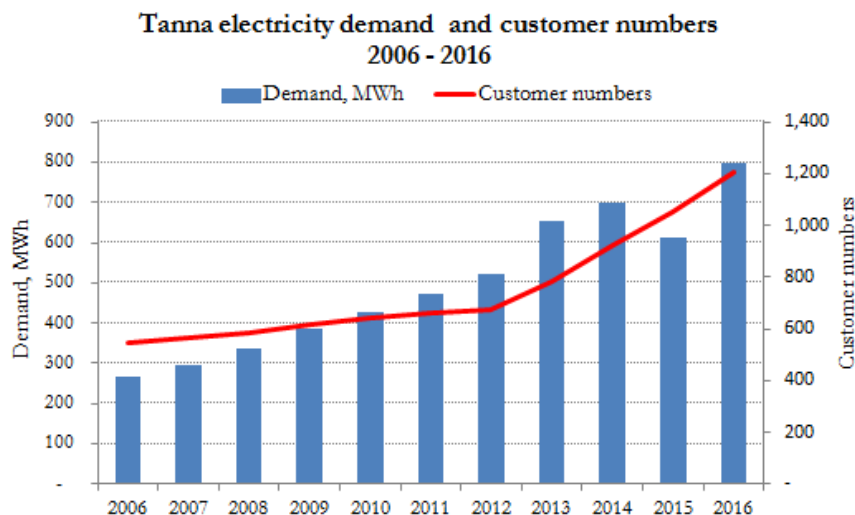
Data source: UNELCO, see footnote 1 Data analysis: URA staff

Over a ten year period:

- Customer numbers increased by 21% from 496 customers in 2006 to 601 customers in 2016. Annual growth rate was 1.9%, lowest among three concessions.
- Energy consumption increased by 21% from 538MWh to 653MWh. Annual growth rate was 2.0%, lowest among three concessions.
- Overall demand was unaffected by cyclone Pam.
- Overall no significant growth has been observed over the last 10 years.

Tanna

Figure 6 : Tanna historical electricity demand and customer numbers



Data source: UNELCO, see footnote 1

Data analysis: URA staff

Over a ten year period:

- Customer numbers increased by 120% from 551 customers in 2006 to 1,208 customers in 2016. Annual growth rate was 8.2%, highest among three concessions.
- Energy consumption increased by 197% from 268MWh to 797MWh. Annual growth rate was 11.5%, highest among three concessions.
- 13% drop in demand due to cyclone Pam in 2015, recovered in 2016.
- Steady, consistent growth over the last 10 years temporarily disrupted by cyclone Pam.

Comparison of Demand Growth in Tanna and Malekula

Tanna's electricity consumption over the last 10 years grew significantly overthrowing Malekula's total consumption in 2013 until 2016. Both islands are blessed with natural exotic beauties, rich custom and cultural practices that attract tourists. Malekula is a major producer of copra and cocoa while Tanna is the major coffee producer in the country. Despite both islands having many similarities in terms of economic development sources, the electricity demand growth pattern shows a contrasting picture. Potential reasons behind stronger growth in Tanna can be listed as follows:

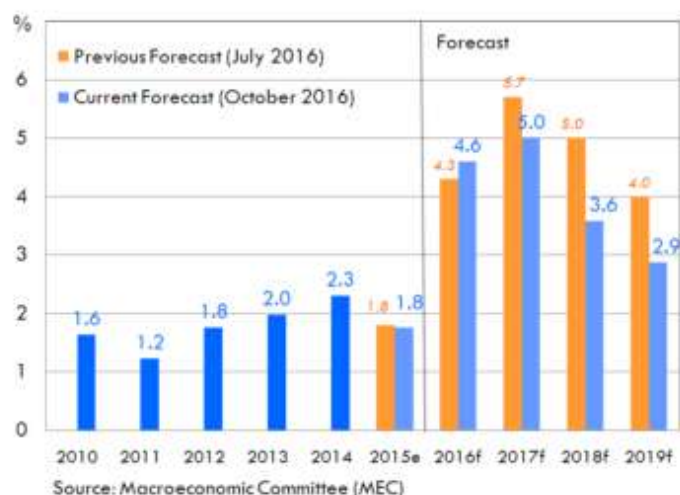
- Land disputes despite common in both islands would be deemed more pronounced for Malekula. It may be a major factor delaying development (e.g. recent land disputes concerning Norsup Airport resulting in cancelled flights to the island for a period of time);
- Another highly possible logic factor relates to the density of villages within concession boundary or close proximity to the concession areas. In Tanna, more densely populated villages are located within concession boundary while in Malekula the previous concession boundary covers two major villages (Tautu & LitzLitz) with other major villages spread out along the island (currently serviced through the north east extension on the island).
- Both islands accommodate local government headquarters. However to some extent and a number of reasons, Government buildings and housing quarters in Tanna outnumber those found in Malekula.
- It can be argued that more tourists visiting Vanuatu for the first time will have a tendency to visit Yasur Volcano (one of the most active and accessible Volcano in the world) in Tanna while a few would choose to visit Malekula. This can also be a contribution factor behind stronger demand growth in Tanna as compared to Malekula.

2.2 Vanuatu Economic Outlook: 2017 and Beyond

Economic growth was slow over the last five years but is expected to improve over the next years. The GDP forecast issued by the Reserve Bank of Vanuatu in the December 2016 Quarterly Economic Review estimates growth of 4.6% in 2016, 5% in 2017, 3.6% in 2018 and 2.9% in 2019 which is close to Vanuatu's long-term growth trend of 3%.

Figure 7 : Annual Real GDP Growth by RBV

Figure 8: Annual Real GDP Growth
(Annual Growth (percentage); MEC Forecast)



Asian Development Outlook 2017 projects GDP growth of 4.3% in 2017 and 3.8% in 2018 for Vanuatu⁷. This is in line with projections from the Regional Economic Outlook by IMF published in April 2017, 4.5% in 2017 and 4.0% in 2018⁸. Vanuatu GDP growth is forecasted to be above average GDP growth of Pacific Island countries and other small states (3.4% in 2017 and 3.8% in 2018).

Vanuatu's economy is gradually recovering from the extensive damages caused by cyclone Pam. In the medium term major infrastructure projects such as the ADB-funded Port Vila Urban Infrastructure Development Project, Port Vila Sanitation Project, Lapetasi International Wharf Upgrade, Port Vila Tourism Project and the road developments in the outer islands (specifically in Tanna and Malekula) will provide an important boost to domestic economic activity and drive the economic growth of the country.

The tourism industry is recovering at a slower pace. It is expected that once the international airport runway issue is settled, the tourism industry will start to pick up pace again.

2.3 Impact of Cyclone Pam on electricity demand

In March 2015 Vanuatu has been hit by Category 5 Cyclone Pam which had devastating effect on the country. Electricity demand has dropped significantly after the cyclone and stayed well below average levels for most of the year.

⁷ Asian Development Outlook 2017 Transcending the middle-income challenge. 2017, Philippines, CC BY 3.0 IGO, <https://www.adb.org/sites/default/files/publication/237761/ado-2017.pdf>

⁸ The Regional Economic Outlook: Asia and Pacific is published annually to review developments in the Asia and Pacific region, <https://www.imf.org/en/Publications/REO/APAC/Issues/2017/04/28/areo0517#>

As seen from the chart below, 2016 generation volumes were consistently above generation volumes for the previous years. The data suggests that electricity demand has fully recovered after cyclone Pam and continues to grow.

In addition by reviewing average annual consumption per customer per category for 2016 reveals that most electricity customer consumption (in particularly Port Vila and Tanna severely impacted by cyclone Pam) has materially picked up since 2015. Important to note that increase in consumption is not limited to a particular customer group (e.g. can be debated that as major donor funded projects materialising, rise in consumption can be pegged to such activities and can be concluded that sudden increase in electricity demand may be limited to project life of these donor funded projects) but is shared among all customer groups.

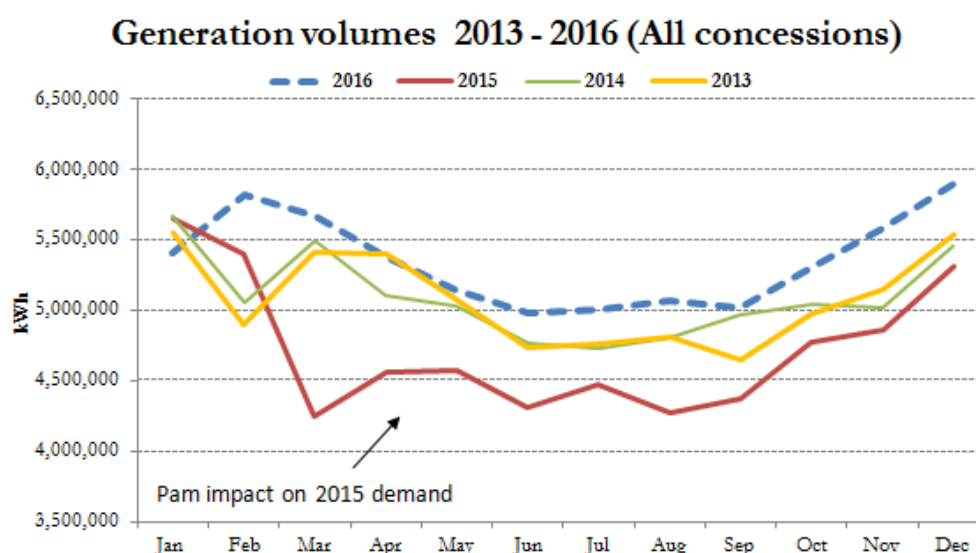
Table 7 : Electricity demand 2013 -2016 for UNELCO's concession areas

Year	2013	2014	2015	2016
Electricity demand, MWh	57,422	56,624	53,022	59,764

Data source: UNELCO

Data analysis: URA staff

Figure 8 : Generation volumes 2013 -2016 (All concessions)



Data source: UNELCO

Data analysis: URA staff

2.4 Forecasting methodology

There are many different approaches available to use in forecasting demand. In general, our choices have been driven by the data availability. The URA Staff has tried various methods which can be divided into three main categories:

1. Time-Series Forecasting and Projection method
2. Linear regression or Causal Forecasting method
3. Comparison against other available forecasts

Composite forecast

Forecasts above have been combined for the purpose of the final forecast. Combining forecasts, sometimes referred to as composite forecasts, refers to combining forecasts from alternative forecasting methods (such as times series, casual, and/or judgmental). By combining the forecasts, the objective is to develop the best

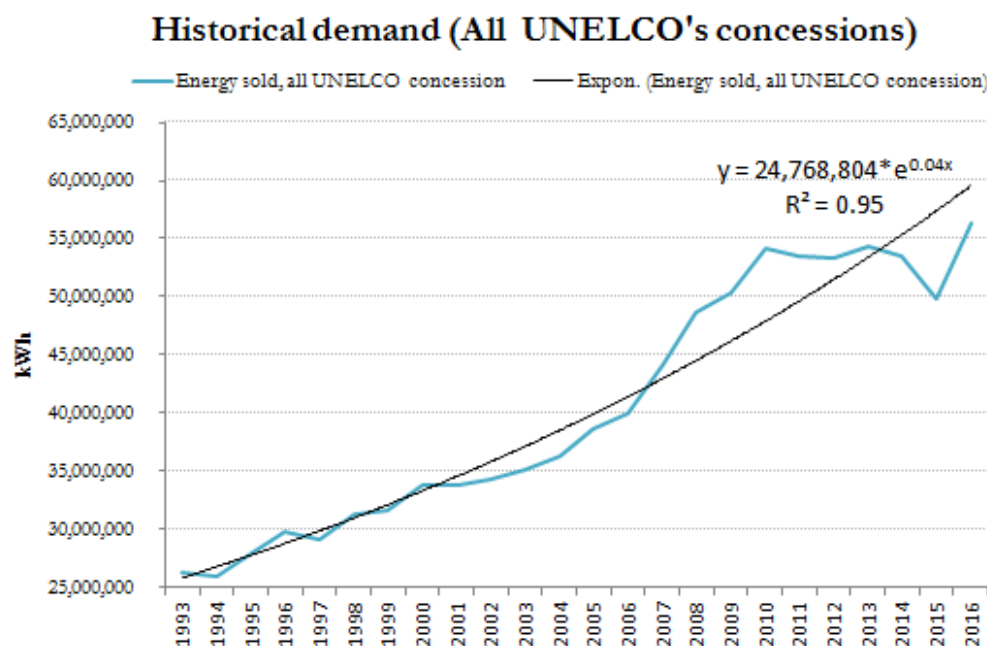
forecast possible. The composite forecasts of several mathematical and/or judgmental methods have been proven to out-perform the individual forecasts of any of those methods used to generate the composite. Combining forecasts is especially useful when you are uncertain about the situation, uncertain about which method is most accurate, and when you want to avoid large errors. Compared with errors of the typical individual forecast, combining reduces errors. Research shows that in 30 empirical comparisons, the reduction in ex ante errors for equally weighted combined forecasts averaged about 12.5% and ranged from 3 to 24 percent. Under ideal conditions, combined forecasts were sometimes more accurate than their most accurate components.⁹

The information below provides more details regarding components of the final composite forecast.

Time-Series Forecasting and Projection Method

Consistent with UNELCO, the URA Staff has projected demand and customer numbers using Compound Annual Growth Rate (CAGR). UNELCO's forecast was based on the historical data for the period 2010 – 2015. As seen from the chart below, while demand has been mostly flat during this period the overall trend is still up. This is in line with the latest GDP forecasts, Government objectives for the development of the country's energy sector reflected in the National Energy Roadmap and the list of planned and proposed generation and transmission projects. This has been also confirmed by strong demand recovery in 2016.

Figure 9 : Historical demand (All concessions)



Data source: UNELCO
Data analysis: URA staff

While we recognise recent changes in the demand pattern, we believe it's important to look at the overall historical trend as well. Therefore, our intention was to analyse longer historical period. Two scenarios have been covered – projections based on last 5 years compound annual growth rate (5 year CAGR) and projections based on 10 year CAGR. In our opinion, taking into account 2010-2015 periods only will translate into "doom and gloom" scenario.

⁹ Principles of Forecasting: A Handbook for Researchers and Practitioners, J. Scott Armstrong (ed.): Norwell, MA: Kluwer Academic Publishers, 2001.
<http://principlesofforecasting.com/paperpdf/Combining.pdf>

UNELCO's assumptions stated in the section "Next 5 years - Projected Demand" have been accepted and incorporated in the model. They are listed below:

- Port Vila Small Domestic Customers scheduled to grow at pace around 600 additional customers per year;
- Port Vila Private LV customers scheduled to grow at a pace of 4% based on the expansion towards more rural communities;
- Increased numbers of Malekula Small Domestic Customers due to Malekula electrification project;
- Tanna Prepaid Small Domestic customer scheduled to grow at a pace of 7.4%

All volume under "Not Invoiced" category (Energies for staff, the offices, installations, etc.) was included in the demand model. The volume has been estimated based on the data available. The URA Staff is happy to replace it with actual data, if requested.

Linear Regression or Causal Forecasting method

Linear regression analysis has been done based on Gross Domestic Product (GDP) growth forecast published by the Reserve Bank of Vanuatu in September 2016 Quarterly Economic Review. The forecast didn't change in December 2016 review. A significant volume of research has demonstrated relationship between energy consumption and economic growth. The relationship between use of energy and economic growth has been a subject of greater interest as energy is considered to be one of the important driving forces of economic growth in all economies. The dependence on energy by any sector of the economy justifies the link between energy consumption and the overall economic growth rate measured by GDP.

Energy demand is most likely inter-dependant with number of other economic variables and indicators. Only one predictor variable (GDP) has been used as unfortunately no forecasts for other economic indicators are available at the moment. The "Goodness-of-fit" validation suggests that the model can be used for forecasting purposes. Adjusted R Square is 0.96. Regression adjusted R square is improved by taking the natural logs of the variables. Variability in the residuals could be proof of structural breaks but could not be proven (2015 cyclone Pam), impact would be insignificant as the economy has recovered and improvements done to infrastructure.

Assumptions:

- RBV forecast is available up till 2019 only. The GDP growth for 2020 and 2021 has been estimated at 2.7% (compound annual growth rate for previous 10 years).
- Port Vila demand only has been forecasted using this methodology due to historical data availability.
- This methodology has been applied for the purpose of demand forecast only.

Comparison against other Available Forecasts

The final composite forecast has been compared against other available forecasts (in particular, 2016 report "Vanuatu Energy Demand Projections: Business As Usual Report (GGGI)¹⁰), checked for consistency with government objectives (National Energy Road Map 2016-2030) and planned generation and transmission projects.

Composite Forecast Weights

To summarise, three forecasts below have formed final composite forecast:

¹⁰ Report produced by Green Global Growth Institute (GGGI). URA assisted GGGI with data in producing this report.

- Customer numbers and demand projections using 5 year CAGR;
- Customer numbers and demand projections using 10 year CAGR;
- Linear regression using GDP as predictor variable.

The next step is to choose weights for each forecast. Current research shows that simple equal-weighted approach usually performs well. Based on the reasons below the URA has assigned following weights for individual forecasts:

Table 8: Composite Forecast Weights

Recommended weights for composite forecast	Demand	Customer numbers
5 year CAGR projection	48%	60%
10 year CAGR projection	32%	40%
Linear regression using GDP as predictor	20%	

Data analysis: URA staff

For demand forecast purposes forecast based on linear regression has been assigned weight of 20%. Historical projections forecasts were given preference as only one predictive variable was used in the regression model and overall number of observation was relatively low (19). Between two CAGR projections the 5 year CAGR projection has been weighted higher compared to 10 year CAGR projection (60% and 40% respectively) to reflect recent changes in the demand trend. Both methods use historical data that includes "flat demand" period therefore both forecasts take it into account anyway. For customer numbers forecast 5 year and 10 year CAGR projections have been waited at 60% and 40% consistently with the demand forecast approach.

2.5 Summary

For comparison purposes charts and tables below shows individual forecasts, final recommended composite forecast, forecast submitted by UNELCO in the "Electric Tariff Review 2016 - 2021" and forecast based on the "Vanuatu Energy Demand Projections: Business As Usual" report produced by Global Green Growth Institute. The forecast in the GGGI report covers whole Vanuatu, including on-grid and off-grid areas. Only relevant data has been used for comparison purposes.

Table 9: Demand Forecast 2017 - 2021 (Various forecasts)

Total demand - All concessions, MWh	2017	2018	2019	2020	2021	Average 2017-2021
5 year CAGR projections	61,281	62,742	64,167	65,658	67,209	64,212
10 year CAGR projections	61,659	63,494	65,276	67,116	69,006	65,310
Regression Analysis	64,946	67,649	69,852	72,055	74,352	69,771
UNELCO's submission	54,179	54,232	54,229	54,377	54,602	54,324
2016 GGGI report	61,954	63,900	65,907	67,978		
URA composite forecast	62,135	63,964	65,659	67,404	69,213	65,675

Data source: UNELCO, URA, the GGGI report

Table 10: URA Composite Forecast by Concession Area - Demand

Total demand - All concessions, MWh	2017	2018	2019	2020	2021	CAGR 2016 - 2021
Port Vila	60,445	62,047	63,583	65,141	66,729	2.7%
Malekula	805	929	963	1,000	1,041	9.8%

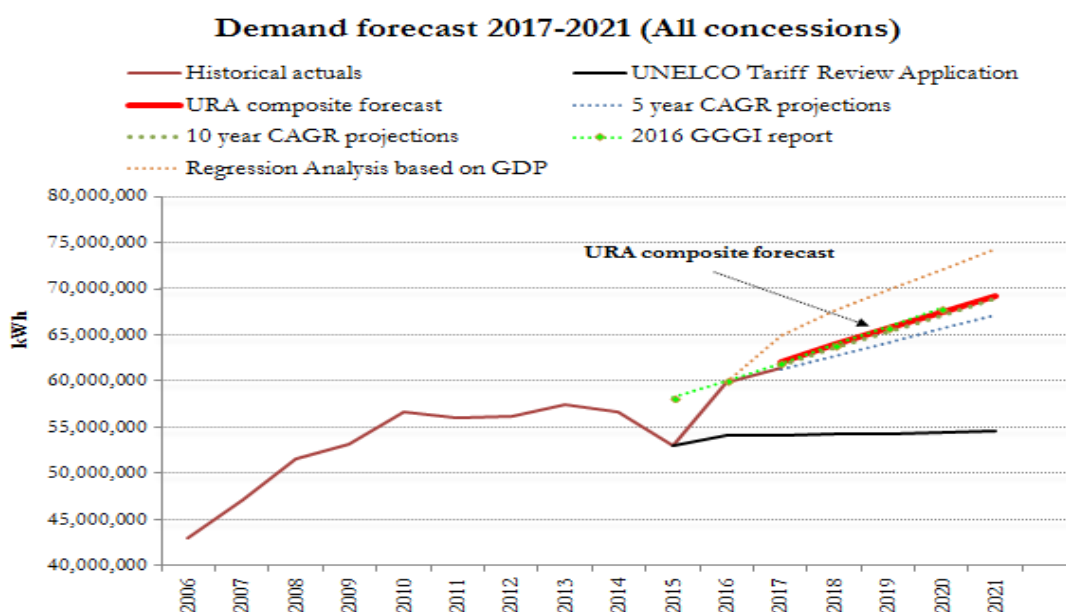
Tanna	884	989	1,113	1,263	1,442	12.6%
All concessions	62,135	63,964	65,659	67,404	69,213	3.0%

Data source: URA Staff Projections

Data analysis: URA staff

Based on the final composite forecast customer numbers across all three concessions are projected to grow at 6.2% rate. This is slightly higher than 5.8% growth rate for the 2006 - 2016 period. It is worth to point out that all forecasts for customer numbers do not differ significantly. Malekula customer numbers are expected to increase at 13.6% rate compared to 1.9% growth rate for the 2006 - 2016 period. This forecast is driven mainly by UNELCO's assumption adopted by the URA regarding increase in Malekula Small Domestic Customers due to Malekula electrification project.

Figure 10 : Demand Forecast 2017 - 2021 (Various forecasts)



Data source: URA, UNELCO, the GGGI Report

Table 11: Customer Numbers Forecast 2017 - 2021 (Various Forecasts)

Customer numbers - All concessions	2017	2018	2019	2020	2021	Average 2017-2021
5 year CAGR projections	16,045	17,158	18,096	19,053	20,028	18,076
10 year CAGR projections	16,074	17,217	18,186	19,175	20,182	18,167
UNELCO's submission	16,244	17,352	18,324	19,354	20,443	18,343
2016 GGGI report	16,121	16,947	17,816	18,730		
URA composite forecast	16,053	17,177	18,128	19,096	20,083	18,107

Data source: UNELCO, URA, GGGI report

Table 12: URA Composite Forecast by Concession area - Customer Numbers

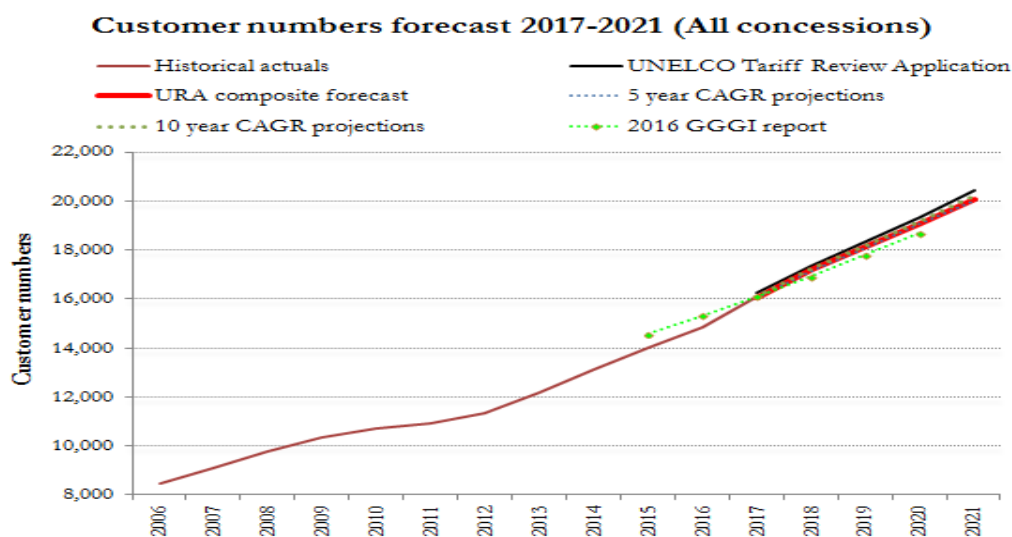
Customer numbers	2017	2018	2019	2020	2021	CAGR 2016 - 2021
Port Vila	13,860	14,685	15,518	16,362	17,214	5.7%
Malekula	899	1,101	1,112	1,123	1,134	13.6%
Tanna	1,298	1,396	1,501	1,617	1,741	1,298
All concessions	16,057	17,181	18,132	19,102	20,089	6.2%

Based on the final composite forecast customer numbers across all three concessions will grow at 6.2% rate. This is slightly higher than 5.8% growth rate for the 2006 - 2016 period. It is worth to point out that all forecasts for customer numbers do not differ significantly. Malekula customer numbers are expected to increase at 13.6% rate compared to 1.9% growth rate for the 2006 - 2016 period. This forecast is driven mainly by UNELCO's assumption adopted by the URA regarding increase in Malekula Small Domestic Customers due to Malekula electrification project.

There is a huge potential for growth in the concession areas of Tanna and Malekula as there are un-electrified villages within proximity of the current concession boundaries including subdivisions currently sold that are well within the concession boundaries. In accordance with UNELCO's extension plans for the next 5 years, the North East extension in Malekula covering a distance of 25 km will provide electricity access to 4 major villages and potentially 700+ customers most of which are residential. Extension plans for Tanna includes electrification of 4 major villages which will support the significant addition of residential customers for the next 5 years.

In Vila the Efate ring-road project undertaken over the last 5 years (an est. 50 km extension completed as per UNELCO's distribution and transmission historic plan) has significantly contributed to the increase in residential customers. It is certain that not only the ring-road project boost customer numbers but further un-electrified population within the concession boundaries. The ring-road project is expected (UNELCO's proposed distribution and transmission plan) to be completed by 2020 covering an approximate distance of 51 km. According to the "Business As Usual Report" by GGGI, the anticipated number of additional customers to be connected as part of this ring-road project on completion is an estimated 1,058 customers/households. That said one must not lose sight of present households around Vila urban areas or within the concession areas that are not electrified and the continual growth in urban migration/birth.

Figure 11 : Customer numbers forecast 2017 - 2021 (All concessions)



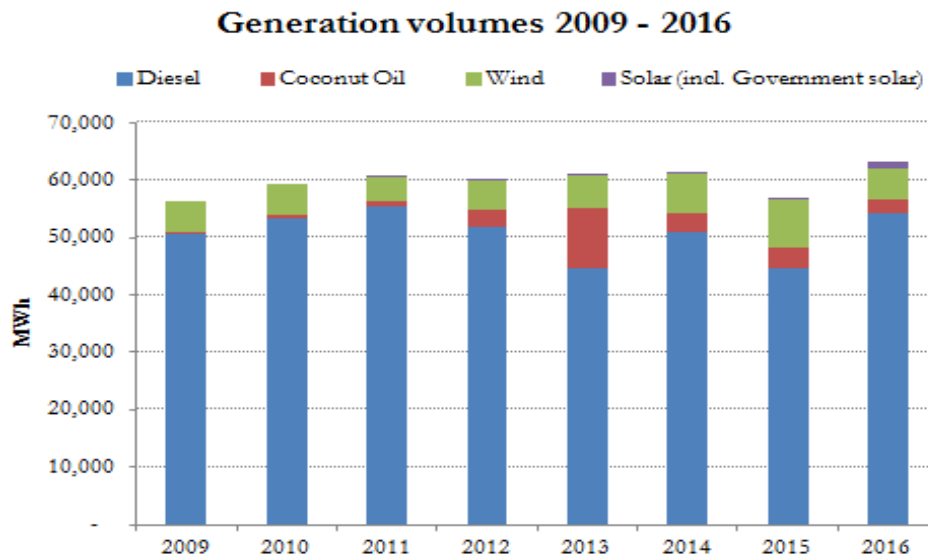
Data source: URA, UNELCO

3.0 Generation Volume Forecast

3.1 Historical Generation Volumes

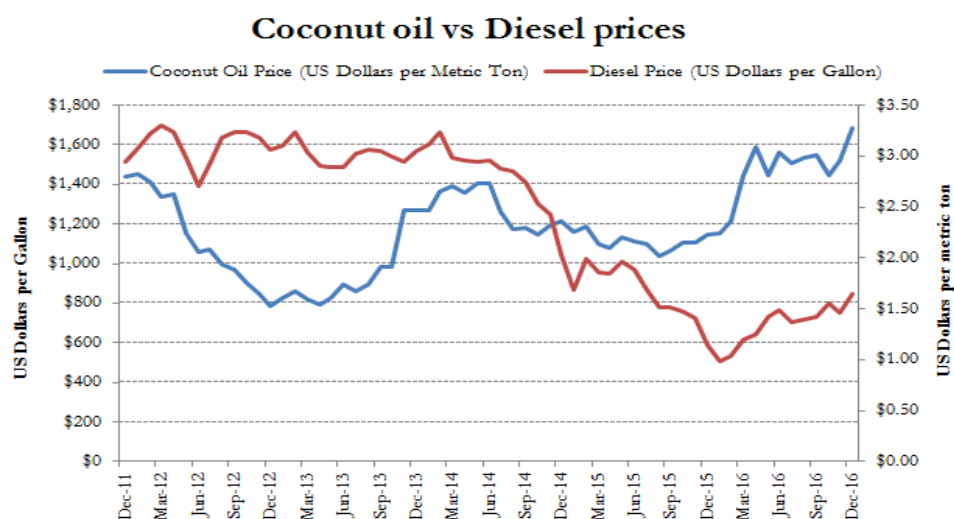
The chart below reflects generation volumes and generation mix over the last 8 years. In the past diesel generation contributed 79% to 91% to the total generation mix. The rest of the mix have been covered by combination of renewable generation (coco-fuel, wind and solar). Highest proportion of renewable generation in the total mix has been achieved in 2013 with 27% of total volumes supplied by renewable generation. As seen from the Figure 12 below, 2013 was the year of low world coconut oil prices and high diesel prices. Since that time up until now, coconut oil and diesel prices have been moving in the opposite direction making coco-fuel based generation uneconomical compared to diesel generation. Wind generation contributed its fair share in the overall portfolio (on average 10% of the total generation mix). Solar volumes were insignificant (around 0.3%) up till 2016 when solar contribution increased to 3% of total generation with two new solar farms being operational, UNELCO's 510 kW Undine bay solar farm and Government 767 kW solar farm at the Parliament premises and the Vanuatu Meteorology and Geo-Hazards Department building at Nambatu Area.

Figure 12 : Historical Generation Volumes (All concessions)



Data source: UNELCO
Data analysis: URA staff

Figure 13 : Global commodity prices: Coconut oil and Diesel



Data source: <http://www.indexmundi.com/commodities/?commodity=coconutoil&months=60&commodity=diesel>

3.2 Next 5 years – Generation Volumes and Installed Capacity

Installed capacity

The URA staff have based their assumptions regarding available generation capacity in UNELCO's concession areas for the next 5 year period on the information submitted by UNELCO in the Electricity tariff review application, the Regulatory Reporting Requirement reports (RRR) and other internal sources of information.

At the moment there is only one confirmed project that URA is aware of – 1MW solar farm at Devil's point on Efate Island expected to be commissioned at the end of 2017. This has been reflected in the URA forecast. All other capacity remained the same as reported in the 2016 Regulatory Reporting Requirement report (RRR) by UNELCO.

Table 13 : Installed capacity 2017 - 2021

	Installed Capacity, MW	2017	2018	2019	2020	2021
UNELCO	Thermal	22.5	23.0	23.3	23.3	23.3
	Wind	3.6	3.6	3.6	3.6	3.6
	Solar	3.4	3.4	3.9	3.9	3.9
	Total	29.5	30.0	30.8	30.8	30.8
URA	Thermal	22.6	22.6	22.6	22.6	22.6
	Wind	3.6	3.6	3.6	3.6	3.6
	Solar	1.4	2.4	2.4	2.4	2.4
	Total	27.6	28.6	28.6	28.6	28.6
	Variance, MW					
	Thermal	-0.1	0.4	0.6	0.6	0.6
	Wind	0.0	0.0	0.0	0.0	0.0
	Solar	2.0	1.0	1.5	1.5	1.5
	Total	1.9	1.4	2.2	2.2	2.2

Data source: UNELCO, URA Data analysis: URA staff

The table above reflects variances between available generation capacity based on this approach and UNELCO's figures supplied in the tariff review application. While UNELCO has forecasted an increase in installed capacity for thermal and solar generation over the next 5 years, there was no supporting information to explain changes in the installed capacity. It would be expected that increased solar capacity would drive a better price per kWh for the customer. The URA is happy to take these changes into consideration once more details provided to explain them. In addition, it's important to see how these capacity changes reflected in UNELCO's Investment plan. The level of details provided in the current submission is not enough to make reasonable judgement.

Investment plan

On 24th May 2017 the URA has requested UNELCO to provide comprehensive Investment plan to support figures provided in the Electric Tariff review Submission. In response to the letter from the URA on 14th June 2017 UNELCO has provided "Master plan for Efate Distribution network" in French ("Plan Directeur Distribution Electrique de la concession d'Efate Vanuatu actualisation 2015) and PowerPoint slides "UNELCO's 2016 - 2021 Electricity Master Plan presentation"

Transmission and Distribution investments

Efate

UNELCO's Master plan for Efate Distribution network is a comprehensive document that includes Master Plan objectives, the analysis of the network and changes in the main network parameters over the last years, CYMDST simulations of various network scenarios. The information related to future investments is contained in the section VI. "Les investissements a prévoir". No guidance has been provided by UNELCO as to how to reconcile figures provided in the supplied documents with figures in the Electric Tariff review Submission. The URA assumed that the Table VI.5 "Tableau detaille et recapitulatif des previsions d'investments" contains planned investments for the period 2015 to 2020. Unfortunately the URA staff couldn't reconcile numbers from the table with numbers for Efate T&D investments in the Electric Tariff review Submission. It wasn't clear as well what is the source of funding for planned projects (UNELCO's equity, debt, third party financing, provisions, etc.)

Tanna and Malekula

UNELCO's PowerPoint slides "UNELCO's 2016 - 2021 Electricity Master Plan presentation" contained a couple of tables that covered planned network extension and network upgrade projects in Tanna and Malekula. There was no particular reference to the timing, source of funding and other details of the projects. Similar to Efate T&D investments, the URA staff couldn't reconcile numbers from the tables with numbers for Tanna & Malekula T&D investments in the Electric Tariff review Submission.

Generation investments

UNELCO didn't supply any additional financial information related to generation investments as part of the documents supplied. Summary tables included in the PowerPoint slides were identical to the tables submitted in the Electric Tariff review Submission. No additional details have been provided apart from the total amount of planned annual generation investment per concession area for the next tariff period.

Generation volumes

Based on the installed capacity assumptions described above and forecasted demand, generation volumes and generation mix for the next five year period are as per the table below. The variances against UNELCO projections are included in the table as well.

Table 14 : Generation volumes 2017 - 2021

	Generation volumes, MWh	2017	2018	2019	2020	2021	Total 2017-2021
UNELCO	Thermal	50,944	50,955	50,258	50,421	50,686	253,263
	Wind	6,078	6,078	6,078	6,078	6,078	30,388
	Solar	4,745	4,801	5,501	5,515	5,515	26,075
	Total	61,766	61,833	61,836	62,013	62,278	309,726
URA	Thermal	58,284	58,857	60,681	62,561	64,510	304,893
	Wind	6,365	6,365	6,365	6,365	6,365	31,823
	Solar (incl. Gov solar)	1,975	3,375	3,375	3,375	3,375	15,477
	Total	66,624	68,597	70,421	72,301	74,250	352,193
	Variance, MW						
	Thermal	-7,341	-7,902	-10,423	-12,140	-13,824	-51,432
	Wind	-287	-287	-287	-287	-287	-1,435
	Solar	2,769	1,425	2,125	2,139	2,139	10,598
	Total	-4,859	-6,764	-8,585	-10,288	-11,972	-42,269

Data source: UNELCO, URA Data analysis: URA staff

Thermal generation required has been calculated by difference between gross generation requirements and the contribution from wind and solar generation. This is consistent with UNELCO's treatment.

Hours of Operation for Solar and Wind Generation

Hours of operation for wind generation (1,780 hours per year) were estimated as an average of operational hours during the entire period of farm's operation at full capacity (2009 - 2016).

Hours of operation for solar generation have been estimated using historical data when available (1,347 hours for Tanna and 1,553 hours for Malekula). UNELCO's estimation has been used in the absence of relevant historical data (1,700 hours for Port Vila).

Coco-fuel

UNELCO didn't include any coco-fuel generation volumes in their projections for the next 5 years. We assume this is to reflect UNELCO's opinion below.

- **Coco-fuel generation is currently also not competitive based on the market price of fossil fuels vs. that of CNO. The compelling overall economic advantages of coco-fuel however warrant maintaining a baseline from which production can be ramped up when price arbitrage becomes favorable.**

The URA doesn't have full information regarding UNELCO's coconut oil suppliers and related pricing arrangements. Based on information supplied by UNELCO until 2016 Cofely Vanuatu Limited was UNELCO's main supplier of coconut oil. In 2016 UNELCO began to purchase bio-fuel directly from suppliers. Both UNELCO and Cofely Vanuatu Limited are subsidiaries of ENGIE Group. Average price paid by UNELCO for coconut oil was 116 Vatu per litre in 2015 and 83 Vatu per litre in 2016 based on the information in the Regulatory Reporting Requirement reports (RRR). At this level it is uneconomical to use coconut oil instead of diesel after taking into account difference in the calorific efficiency. (Port Vila diesel price was around 80 Vatu per litre in July 2017). The URA Staff has opted not to include any coco-fuel generation volumes in their projections for the next 5 years as short-term forecast of diesel price by EIA (US Energy Information Administration) doesn't support use of coconut oil. While it obviously contradicts Government objectives and renewable energy targets, the economic case for coconut oil just doesn't stack up at these price levels. At the moment, there is not enough information to establish if coconut oil prices charged by UNELCO's suppliers reflect local market price.

Outcome of the last Tariff Review - Treatment of Coconut oil in the price adjustment formula

The Arbitration Panel appointed in respect of disputes between UNELCO and the Government during last tariff review was not satisfied that there are sufficiently reliable global world market reference prices available to be able to assign an appropriate price to coconut oil because of the difficulty of ensuring that the oil for which the reference price is obtained is of the correct standard and quality and being confident that import costs, duties etc can be sufficiently accurately estimated to arrive at an appropriate equivalent local cost. The approach where the coconut oil quantity is converted to an equivalent quantity (in litres) of diesel oil on the basis of relative calorific efficiencies and then priced as if it were actual diesel oil at the particular power station has been considered as being the best available approach that is able to be calculated on a certain and reasonable basis.

The Arbitration Panel has stated that while this approach does not pass on to consumers any cost benefit of locally producing coconut oil, it does have the important property (of concern to the URA) that UNELCO cannot gain from any internal transfer pricing and, in that respect, does not have an incentive to use coconut oil to increase prices to consumers.¹¹

The URA Staff proposes to make changes as to how coconut oil purchases are being treated in the monthly tariff adjustment formula. Instead of converting the coconut oil quantity to an equivalent quantity of diesel oil, it is proposed that coconut oil purchases are treated in a same way as diesel purchases. At the moment the price for diesel for the purpose of the monthly adjustment formula is derived from actual invoices provided by UNELCO. The URA Staff proposes that the price for the coconut oil should be derived from actual invoices as well. In addition, in the absence of any prior agreement between UNELCO and the Government/the URA in order to protect customer's interests and ensure least cost generation coconut oil price should be capped by diesel price for the same period adjusted by the ratio of calorific value between diesel and coconut oil. This approach is better suited to pass any potential benefit of using coco-fuel to the customer. It will also add transparency to the whole process and provide timely information on actual coco-fuel costs incurred by UNELCO. In the future if coco-fuel prices from alternative suppliers will become available it would be possible to compare it against UNELCO's costs to ensure that any potential benefits are passed to consumers.

¹¹ Arbitration panel conclusion on the C.APM formula, Luganville concession contract, wind farm benefits and price adjustment formula – treatment of coconut oil, dated by 28 April 2011

4.0 Cost of Capital

UNELCO is entitled to the opportunity to make a reasonable return on its investment through the tariff that is charged to its customers. This return is compensation for its cost of capital which is invested in the utility operations and is computed by the application of a rate of return to the asset base of the company. Both the rate of return and the regulated asset base of UNELCO must be approved by the URA. The rate of return used in determining the base tariff should provide a return which is commensurate with the prevailing conditions in the market for raising funds and the risk involved in delivering the utility services. The overall rate of return is the Weighted Average Cost of Capital (WACC) which is the weighted average cost of debts and the rate of return on equity. Debt and equity form the total investment by the utility to create the regulatory asset base.

4.1 Capital Structure

UNELCO's capital structure is a representation of how it has financed its investment (Regulated Asset Base). The capital structure utilized in the rate of return determination process should be based on an appropriately adjusted capital structure which ensures a fair, optimum and a balanced capital financing for the benefit of both the Customers and Investors.

As at 2015, UNELCO's actual Capital Structure and Gearing ratio is depicted as per table 15 below:

Table 15 : UNELCO Actual Capital Structure as at 2015

UNELCO - Actual Capital Structure & Gearing Ratio as at 2015	
Total Bank Loans(including short term loans)	572,363,249
Issued Capital	525,773,650
Retained Earnings	1,043,400,411
Total Shareholders Equity	1,569,174,061
Total Capital Employed	2,141,537,310
Debt to Equity Ratio	36.48%
Actual Gearing Ratio(debt/total capital)	26.73%

*Date Source: UNELCO 2015 Audited Financial Statements;
Data Analysis: URA Staff*

The debt to equity and gearing Ratio for UNELCO as at 2015 is 36.48% and 26.73%, respectively. This indicates that a greater percentage of UNELCO's investments (73.27%) are financed through equity which is an expensive source of capital financing when compared to debt financing. UNELCO's existing capital structure is determined to be out of line with industry standards (50% gearing ratio). In addition, UNELCO's actual debt to equity ratio is also below optimum levels.

As per its tariff application, UNELCO has proposed a 50% gearing ratio which was determined during the 2011 arbitration proceedings and UNELCO has maintained this initial assessment. The Staff agrees that 50% gearing ratio would provide us with an optimal level of capital structure; however, the Staff would like to propose a capital structure of 60% equity and 40% debt based on the explanation below:

- The Staff has used the actual weighted average borrowing cost to calculate the cost of debt component of WACC and the cost of equity component is calculated using the CAPM model which is based on estimation. Therefore, the proposed capital structure would allow certain level of consistency and a fair and balanced capital structure that would equally benefit both the customers and UNELCO (further discussed in section 4.3).

UNELCO's Regulated Asset Base is not only financed by the bank loans (debt) and equity but also by the Customer advance/security deposits and accumulated provisions/reserves, part of which is used by UNELCO for its cash management purposes. These additional sources of funds are derived by UNELCO at zero cost. UNELCO's total investment into the Regulated Asset Base as at 2015¹² was 4,721,708,517. As per

¹² Please note that this is the RAB determined by UNELCO which is unadjusted for regulatory purposes
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its 2015 Financial Statements, the stated investment has been funded through total capital employed by UNELCO of 2,141,537,310 (Bank Loan: 572,363,249 & Shareholders Equity: 1,569,174,061) and the remaining investment of 2,580,171,207 funded via cash generated through the provision funds. The investments funded through provisions constitute 54.6% of UNELCO's total investment into the Regulated Asset Base.

UNELCO's proposed Capital structure does not include the additional sources of funds acquired at zero cost (which will reduce the overall WACC) and therefore imposes an unfair burden on the consumers. The staff will make adjustments to incorporate the zero cost financing sources to UNELCO's overall capital structure to determine a prudent and bona fide Weighted Average Cost of Capital. The adjusted capital structure for UNELCO is presented as per table 16 below:

Table 16 : URA Determined Capital Structure

Capital Financing Sources	Amount	Ratio	Narration
Total Bank Loans	856,614,924	34%	Allowed 40% Gearing Ratio(40% of Total Capital Employed)
Total Shareholders Equity	1,284,922,386	51%	Allowed 60% Gearing Ratio(60% of Total Capital Employed)
Provisions for Fixed Asset Renewal	226,016,096	9%	Assumed 30% of Accumulated Balance(2015) towards Capital Financing
Provisions for Natural Disaster	79,398,627	3%	Assumed 30% of Accumulated Balance(2015) towards Capital Financing
Provisions for Severance & Retirement	96,963,422	4%	Assumed 30% of Accumulated Balance(2015) towards Capital Financing
Total Capital Financing	2,543,915,454	100%	

Date Source: UNELCO 2015 Audited Financial Statements;

Data Analysis: URA Staff

The URA Staff has not adjusted the Capital structure to take into account the capital financing towards nonutility operations. Reason being, the stated adjustment will be made through reducing the revenue requirement by the amount of revenues generated from nonutility operations which will self adjust the tariff base. In addition, the adjusted capital structure does not incorporate the source of funding from Customer advance & Deposits as this will be offset against the working capital requirements and is discussed in detail under Regulatory Asset Base section.

The above adjusted capital structure will be used to determine the Weighted Average cost of Capital for UNELCO as per section 4.4 below.

4.2 Return on Equity (ROE)

The cost of equity proposed by UNELCO was estimated with the use of the Capital Asset Pricing Model (CAPM). This methodology is widely used and is accepted by the URA staff in deriving the cost of equity.

The CAPM is represented as follows:

$$\text{Return on Equity} = R_f + \beta_e (\text{MMRP}) + \text{CRP}$$

Where:

R_f	= Risk free rate
β_e	= Equity beta
MMRP	= Mature Market Risk Premium
CRP	= Country Risk Premium

The following sub-sections deals with the measurement of the parameters of the CAPM.

4.2.1 Risk Free Rate (R_f)

The Risk-free rate is the interest rate that can be obtained by investing in financial instruments with no default risks. UNELCO has determined the risk free rate of 3.91% by assessing the composition of the Vatu currency basket and multiplying the relative weight of the currencies by the average 10 year bond rates for

four different countries. URA staff has rejected this approach and considers the above methodology used by UNELCO to be an unrealistic measure of the risk free rate. The following reason explains the rejection of the approach used by UNELCO to calculate the risk free rate:

1. Assessing the Composition of the Vatu Currency Basket

- A currency basket is commonly used as a technique to avoid or minimize the risk of currency fluctuations and also functions as a benchmark for regional currency movements.
- Used to forecast different spot exchange rates for the vatu currency and also to adjust Vanuatu's exchange rate.
- Used as a system for currency speculation.
- Estimates the different weights of the currency basket by taking into account the relative weights of the current account transaction of Vanuatu and its major partner countries or by measuring the relative shares of Vanuatu's trade with its major partners. Focusing on Vanuatu's main trade partners(both for exports and imports)

2. Using 10 Year Average of the Interest of 10 year Bond Rates

UNELCO is using 10 year weighted average for the ten year bond rate of 4 different countries (US, EUR, AUD, NZD) to calculate the risk free rate. Countries such as Australia and New Zealand are facing pressures on the downward grade of their sovereign rating from AAA to AA. According to the recent announcement by Standard & Poor's on 8th July, 2016, they have revised rating outlook for Australia and New Zealand to negative from stable because of the country's high level of external indebtedness¹³. Therefore, their government bond rates should not be used to calculate risk free rates.

The risk free rate is the return that an investor can expect on an investment without default risk. The common factor in the calculation of the Risk Free rate is the consideration of default risk and not the exchange rate risk (as per methodology used by UNELCO).

URA staff recommends using the yield to maturity 10 year US Treasury bond as an estimate of the risk free rate. This is a standard practice and US is a highly ranked country under S&P 500 which has never defaulted on its debts. Given the type of assets that UNELCO invests in, this would lead to the decision to use mostly longer term debt instruments to finance these investments. In light of this, the 10 year US Treasury bond is an appropriate measure of a long term risk free rate of return.

The most appropriate risk-free rate to be used in the computation of the ROE is the point in time estimate as opposed to an average historical average rate. The CAPM is a forward looking technique and as such the values chosen for the variables in the CAPM should generally be prospective even if they are estimated using retrospective data. Shapiro and Balbirer (2000, pg. 329) state that one of the common errors in using the CAPM to calculate the risk-adjusted cost of capital is "using the historical average Treasury bond or Treasury bill return as the risk-free rate in the CAPM instead of using the actual (current) rate. You must use the current risk-free rate." Therefore, in order to calculate the risk free rate that best reflects the prospective market of the US 10 year Treasury bond for the next 5 years, URA staff has calculated an overall average of the 10 year US bond rates based on allocating a higher percentage composite weighting to the current and forecasted bond rates of 90% and lower percentage composite weighting of 10% to the average historical bond rates. Table 17 below presents the Staff calculations:

¹³ <http://www.interest.co.nz/bonds/82497/sp-fires-warning-over-potential-downgrade-australias-aaa-credit-rating-catches-big-4>
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Table 17 : URA Determination Risk Free Rate

URA Determination of Risk Free Rate	Interest Rates	Composite Weighting	Recalculated Interest Rate
Current 10 Year US Bond Rate as at 24th March, 2017	2.40%	60%	1.44%
Average 10 Year US Bond Rate (Jan 2017 to Mar 2017)	2.45%	10%	0.25%
Average 10 Year US Bond Rate for past 10 years (2007 to 2016)	2.70%	10%	0.27%
Forecast 10 Year US Bond Rate for 5 years (2016 to 2020)	2.95%	20%	0.59%
Total			2.55%

Date Source: <http://www.tradingeconomics.com/united-states/government-bond-yield/forecast>

<https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield&year=2016>

The Staff determines that the applicable and reasonable Risk Free Rate of return for UNELCO is **2.55%**.

4.2.2 The equity beta (β_e)

According to the theory underlying the CAPM, utility investors should be concerned only with systematic or non-diversifiable risk since non-systematic risk can be diversified away by adding securities to their investment portfolio. Non-diversifiable risk is measured by the beta coefficient. The equity beta is a measure of the volatility, or systematic risk, of a security or a portfolio in comparison to the market as a whole. The market portfolio of all investable assets has a beta of exactly one (1). The more sensitive a business is to overall economic conditions, the higher is its equity beta.

UNELCO is not a publicly traded company and, as a result, the data available for a robust regression analysis is limited. Therefore, in calculating the equity beta, we calculate an equity beta for a group of similar companies via regression, and then adjust the resulting equity beta of comparable countries to UNELCO's capital structure. Professor Damodaran publishes data sets for companies in all sectors and all countries. To do this, he compiles data from more than 80,000 companies in the world. Professor Damodaran publishes betas for more than 95 sectors, including the power sector and the utilities sector. For each sector, Professor Damodaran publishes datasets for US-listed companies, emerging market companies, and worldwide companies. Therefore, URA recommends using the data sets that Professor Damodaran publishes on his website (http://www.stern.nyu.edu/~adamodar/New_Home_Page/data.html).

In using the above approach, the URA Staff computes an equity beta of 0.91 which is analogous to what UNELCO has proposed in its tariff application (0.90). Therefore, URA staff agrees to use 0.90 as the equity beta.

4.2.3 Mature Market Risk Premium (MMRP)

The mature market risk premium (MMRP) is the expected return over the risk-free rate that investors require in order to invest in risky assets in a mature market. UNELCO has applied the same approach it used as for the Risk Free rate in order to obtain a weighted average risk premium based on the currencies that compose the vatu basket. The weighted average market risk premium calculated by UNELCO is **5.72%**.

The URA staff does not accept the above methodology used by UNELCO to calculate the MMRP (reasons were identified under section 4.2.1 above) and will base its calculation on the theories and explanation by Professor Damodaran. There are two approaches used in arriving at the MMRP, the implied equity risks approach and the historical equity risk approach.

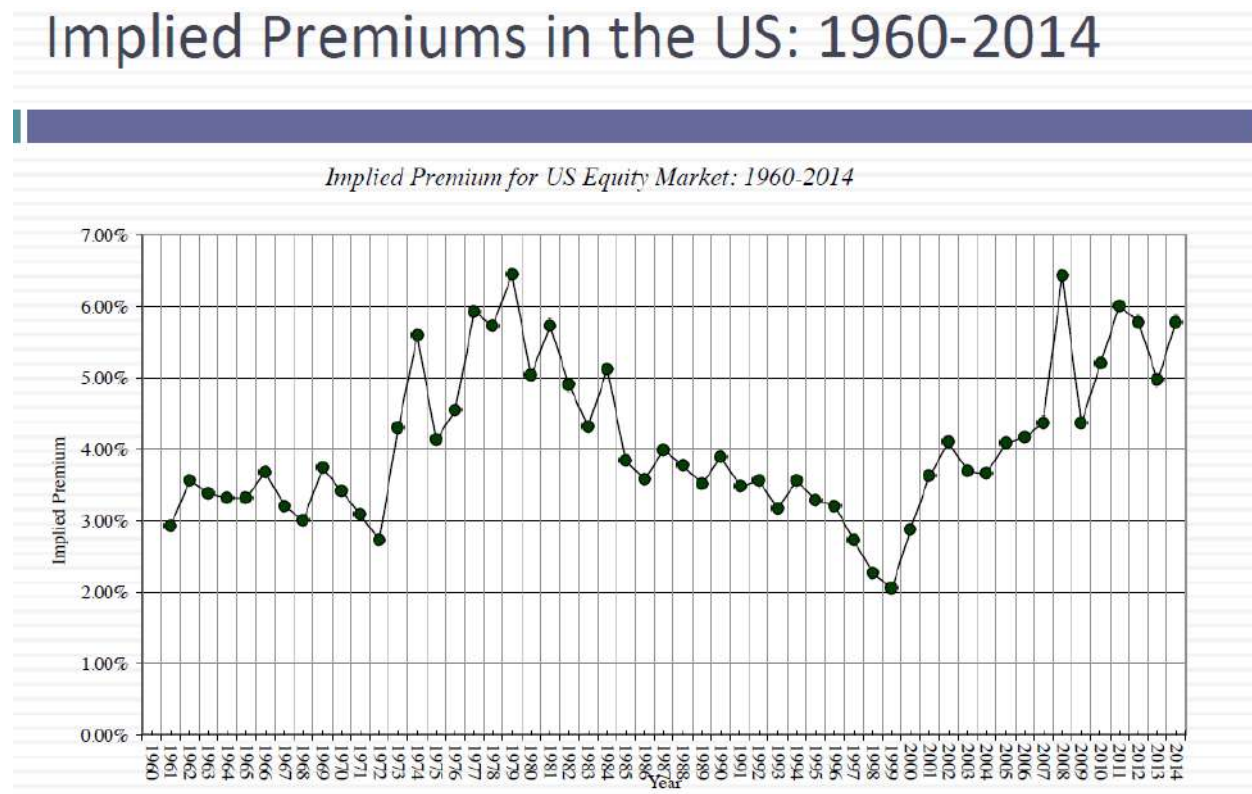
According to Professor Damodaran, there are a few advantages to the implied equity risk approach. The first is that it does not rely on historical data which may not hold relevance in the current market and secondly, because it does not rely on historical data, it is also more sensitive to changing market conditions. Professor Damodaran also pointed out that the implied equity risk premium approach has a high predictive power.

The historical equity risk approach uses the mean of historical returns above the risk-free rate in the US market. There are two options for estimating the MMRP based on the historical equity risk approach; the arithmetic mean or the geometric mean. According to Damodaran, the arithmetic mean is only preferred if annual returns are uncorrelated over time and the objective is to estimate the risk premium for the next year. However, empirical studies have found that returns on stocks are negatively correlated over time and that

arithmetic means are likely to overstate the premium. Furthermore, asset pricing models tend to be used to get expected returns over a period longer than one year, thereby further supporting the case to use geometric mean. Therefore, if the historical equity risk approach is chosen, the value should be estimated with a geometric mean. Another problem with this approach is that it relies on historical data which may not hold relevance in the current market.

Please refer to figure 16 below for the implied equity risk premiums for the US market for the period 1960 to 2014 which has been analyzed and published by Professor Damodaran. For the year ended 2014, the risk premium has been just under 6.00%.

Figure 14 : Extract of Implied Premiums in US (1960 – 2014)



Source: <http://people.stern.nyu.edu/adamodar/podcasts/valfall15/valsession5.pdf>

The URA Staff recommends using the implied equity risk premium approach due to its high predictive power. The Staff was not able to obtain reliable source of information on the implied equity risk premiums for other comparable countries, and believes that the implied premium for the US Equity market is a better and more reliable estimate for calculating UNELCO's mature market risk premium. The Staff determines the MMRP of **5.39%** based on papers and recent data published by Damodaran using an implied equity premium (Last updated March 1, 2017)¹⁴.

4.2.4 Country Risk Premium (CRP)

A country risk premium is usually included for emerging economies in order to attract investors to less stable and riskier countries. Country risk relates to the likelihood that changes in the business environment will occur that reduce the profitability of doing business in a country. Macro-socio-economic factors such as political instability, volatile exchange rates and economic instability (which may be induced, inter alia, by such factors as the possibilities of social disruptions and adverse weather conditions) are considerations which lead investors to be wary of overseas investment opportunities. These factors can adversely affect operating profits as well as the value of assets and thus require a premium for investing. Consequently, any added

¹⁴ <http://www.stern.nyu.edu/~adamodar/pc/implprem/ERPhymonth.xls>

element or incremental risk that is specific to a country or specific grouping of countries will be considered by potential investors and would be embedded in the CRP.

UNELCO has proposed to use the same rate for the country risk premium that was established during the arbitration proceedings in 2011. They have proposed to use the following rates:

- Equity Country Risk Premium : 4.1%
- Debt Country Risk Premium : 2.7%

In this component of the CAPM, we are required to only calculate the country risk premium for the return on equity. Therefore, UNELCO's calculation of the country risk premium on the debt component is irrelevant and will be disregarded for our calculation purposes in this section.

There are a number of ways of estimating country risk premiums. Economic literature suggests that of the many ways the two most widely used measures are:

1. "Synthetic" spread – country's sovereign credit rating assigned by a relevant rating agency (S&P, Moody's, Fitch); and
2. Sovereign bond spread – market-based measures.

In view of the uncertainties surrounding the "synthetic" spread approach, the URA staff will not accept this methodology for the computation of the CRP and instead will use the Sovereign bond spread approach in determining the country risk premium. Actual bond spreads instantly reflect market changes and they have a wider scope. Godfrey and Espinosa (1996), and many others, such as Damodaran (2011) and Porras (2011), proposed quantifying country risk from the actual bond spread¹⁵. The country risk premium is the difference between the higher interest rates that less stable and riskier countries must pay and the imposed market interest rates for the government of a given benchmark country. The benchmark country is a country with a stable, well-respected and developed business environment. These countries are often referred to as "low risk" or "developed". The USA is an example of a benchmark country.

The URA Staff computes the CRP as the difference between the yields of the Vanuatu risk free asset, i.e. the government bond¹⁶, and the comparable mature market risk free asset, the US government bond. This result is a CRP of **4.05%** which is depicted as per table 18 below:

Table 18 : URA Determination Country Risk Premium

Sovereign Bond Spread	Interest Rate
Yield on Vanuatu 10 year Government Bond Rate(22/07/2016)	7.00%
Yield on US 10 year Government Bond Rate(Forecasted 2016-2020)	2.95%
Projected Country Risk Premium	4.05%

Date Source: <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2016>

¹⁵ brca.srce.hr/file/143742

¹⁶ Latest 10 year Vanuatu Government Bond allotted on 22/07/2016 at 7% p.a.

4.2.5 Comparison Analysis – Return on Equity

Table 19 : ROE Comparison Analysis

CAPM - Components	2011 Determination	UNELCO Current Proposal	URA Determination
Risk Free Rate	4.34%	3.91%	2.55%
Market Risk Premium	5.00%	5.72%	5.39%
Country Risk Premium	4.10%	4.10%	4.05%
Equity Beta	0.90	0.90	0.90
Return on Equity	12.94%	13.16%	11.45%

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements, RRR Reporting

Data Analysis: URA Staff

4.3 Cost of Debt

The cost of debt represents the costs that a company must pay to borrow from commercial lenders to fund its operations. In general terms, the cost of debt depends on the default risk that lenders perceive on the firm. As per the 2015 financial statements, UNELCO's total remaining bank loan for all three concessions is 572.4m vatu.

UNELCO has proposed a cost of debt of 8.61% which has been calculated as follows:

Risk Free Rate (3.91%) + CRP Debt (2.70%) + Debt Margin (2%) = 8.61%

The Cost of Service Rates Manual issued by the Federal Energy Regulatory Commission of the United States of America¹⁷ and Accounting for Public Utilities (Release No. 30 November 2013)¹⁸ written by R.L Hahne and G.E Aliff recommends that the cost of debt should be calculated by using the actual imbedded cost of debt in the capital structure which is the weighted average of all the debt issued and the cost at which the debt was issued. In addition, the actual interest payments on debt already have been committed by contracts in the past and do not fluctuate with the current interest rate. Therefore, the Staff has calculated UNELCO's cost of debt based on the actual weighted average borrowing cost of its existing loans presented in table 20 below:

Table 20 : URA Determination - Cost of Debt

Loan Details	Concession	Loan Date	Amount(EUR)	Interest Rate	Expiry Date	Weighted Avg Interest Cost
BRED Bank	Port Vila	08-Dec-08	2,200,000	5.93%	31-Dec-23	1.64%
BEI Bank	Port Vila	20-Oct-09	4,300,000	2.08%	15-May-24	1.12%
AFD Bank	Tanna	03-Jul-00	593,789	1.50%	31-Oct-21	0.11%
AFD Bank	Malekula	03-Jul-00	854,477	1.50%	31-Oct-21	0.16%
Total			7,948,266			3.04%

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements; 2015 RRR Reporting

Data Analysis: URA Staff

In computing the cost of debt, the Staff has relied on information provided by UNELCO on all its long term debt obligations submitted under its 2015 RRR reporting. The cost of debt determined by URA staff is **3.04%**. The following issues were taken into consideration upon calculating the cost of debt for UNELCO:

- UNELCO's actual capital structure discussed in section 4.1 above depicts that the majority of UNELCO's Regulated Asset Base has been financed through equity (73.27%), while debt financing only constitutes 26.73%. The higher the level of borrowing (gearing), the higher are the risk to a business, since the payment of interest and repayment of debts are not "optional" in the same way as dividends. In UNELCO's case, its actual gearing (debt financing) and debt to equity ratio is low; which means lower financial risk and therefore should demand a lower risk premium to the investors (Market Risk Premium). Since, UNELCO has maintained a lower cost of debt over the years and in order to maintain UNELCO's financial sustainability; the Staff has not made this specific adjustment to reduce the market risk premium (calculated in section 4.2.3 above).

¹⁷ <https://www.puc.texas.gov/agency/rulesnlaws/subrules/electric/25.231/25.231.pdf>

¹⁸ Accounting for Public Utilities, 2013, Volume 1, page number 9.03(2)

- Noting a large proportion of UNELCO's equity financing, Staff has been concerned about the issue of double leveraging. UNELCO's holding company may use debt raised on its books and inject it as equity capital to its subsidiary – UNELCO. Since debt financing is cheaper than equity financing, in this case the objective of double leveraging can be to increase the cost of capital for tariff review purposes or to adjust the capital structure of UNELCO. Due to lack of information, Staff has not been able to determine the holding company's source of financing for its investments in its subsidiary- UNELCO and has not made any adjustments for this situation. Staff's view is that this adjustment will be compensated with the lower cost of debt.

UNELCO's actual cost of debt will probably change as a result of any future borrowings during the 2016-2021 tariff review period. Therefore, the Staff has recommended to make one-off adjustments to tariff base for any actual borrowings by UNELCO during the 2016-2021 tariff review period.

4.4 The Weighted Average Cost of Capital (WACC)

The overall rate of return is the WACC and is calculated as the weighted average cost of both the debts and the equity components of the capital structure. Table 21 below shows the comparison of the URA determined WACC, against UNELCO's Proposal and the 2011 Determination.

Table 21 : URA Determination - WACC

WACC Components	2011 Determination	2016 UNELCO Submission	2016 URA Determination
Risk Free Rate	4.34%	3.91%	2.55%
Market Risk Premium	5.00%	5.72%	5.39%
Country Risk Premium	4.10%	4.10%	4.05%
Capital Financing Ratio - Debt	50%	50%	33.67%
Capital Financing Ratio - Equity	50%	50%	50.51%
Capital Financing Ratio - Other Sources	0%	0%	15.82%
Cost of Debt	9.04%	8.61%	3.04%
Equity Beta	0.90	0.90	0.90
Return on Equity	12.94%	13.16%	11.45%
Corporate Tax Rate	0%	0%	0%
Inflation Rate	3.00%	2.10%	2.00%
Nominal WACC	10.99%	10.89%	6.80%

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements

Data Analysis: URA Staff

The URA Staff determines that the Nominal Weighted Average Cost of Capital for UNELCO for the tariff review period of 2016 – 2021 is **6.80%**.

5.0 Regulatory Asset Base

The Regulatory Asset Base (RAB) represents the assets financed/supplied by the Utility and other investments required to provide utility services to the customers. The principles applied in determining the value of the RAB calculation are as follows:

- The Regulatory Asset Base includes only the assets currently providing or capable of providing utility services to the consumers.
- The Regulatory Asset Base is based on the Net Book Value of the fixed assets at historical cost
- The Regulatory Asset Base includes an allowance for working capital requirements
- The Regulatory Asset Base only includes assets financed by the Concessionaire

5.1 Limitations to Staff Assessment of Regulatory Asset Base

The URA staff planned to perform an on - field regulatory audit of UNELCO's (request sent to UNELCO as per URA letter dated 16th June, 2016) fixed asset register as at 2015(in addition to the other major cost components relevant to the tariff analysis) to carry out a detailed investigation of its regulatory fixed assets. The Staff did not receive a positive feedback and cooperation from UNELCO and as a result the on field audit was not possible to be carried out.

Following the above, UNELCO was requested to provide the following information as per URA letter dated 16th September, 2016 which specified the format and the type and extent of the data required in order to assist in the Staff analysis/determination of the Regulatory Asset Base:

- Detailed Fixed Asset Register as at Dec 2015(including only the concession and private assets funded by UNELCO, asset class, purchase date, historical cost, asset useful life, salvage value, accumulated depreciation and the Net Book Value of the assets) and the net book value of which should reconcile with the net book value of the 2015 audited financial statements. UNELCO did provide the requested information on 9th Feb, 2017, however the major information; historical cost of Port Vila concession assets and the corresponding ordinary accumulated depreciation were not provided.
- Separate list of those assets(funded by UNELCO) that are obsolete and no longer in use
- Summary list of those assets that are been shared by related or third parties(Affiliated companies)
- Accounting treatment of Revaluation surplus.

To the date of drafting this Staff Report, UNELCO did not provide the above information as per our requirement, which limited the Staff's ability to carry out effective assessment of UNELCO's Fixed Asset Register. Nevertheless, based on the available data/information, the Staff adopted the best international regulatory practices, principles and applied reasonable judgements wherever required in determining UNELCO's Regulated Asset Base for the 2016-2021 tariff review period.

5.2 UNELCO Determination - Regulated Asset Base

Table 22 : UNELCO Calculation Actual RAB as at 2015

UNELCO Calculation Actual Regulated Asset Base - 2015	
Gross Value of Assets(Vatus)	
Assets Under Construction & Prepaid Deposit	186,187,636
Intangible Assets	305,930,967
Non Concession Asset - Reevaluated	723,383,608
Licensee Financing	7,051,984,879
Total	8,267,487,090
Accumulated Depreciation	
Acc Dep - Intangible Assets	180,262,812
Acc Dep - Non Concession Assets	560,242,367
Acc Dep - Licensee Financing	3,101,173,394
Acc Dep - Assets Under Construction & Dep	-
Total	3,841,678,573
Net Book Value	
Intangible Assets	125,668,155
Non Concession Asset - Reevaluated	163,141,241
Licensee Financing	3,950,811,485
Assets Under Construction & Prepaid Deposit	186,187,636
Total	4,425,808,517
Add Actual Working Capital Requirement	
Inventory & Work in Progress(Gross)	554,800,000
Prepaid & Deposits	6,300,000
Trade & Other Receivables(Gross)	541,400,000
Prepayment	5,800,000
Advances & Deposits	(362,400,000)
Trade & Other Payables	(450,000,000)
Total	295,900,000
Regulated Asset Base as at 2015	4,721,708,517

Data Source: UNELCO Tariff Application (2016 – 2021)

Table 22 above illustrates how UNELCO has calculated its actual Regulated Asset Base (RAB) for the year ended 2015. Upon staff review of the above calculations, it was identified that UNELCO has performed its computations based on the revalued carrying amount of the concession and non-concession (private) assets financed by UNELCO.

Article 4, subsection 10 and article 7, subsection 32 of the Port Vila convention agreement requires the concession and private assets, irrespective of the way they are financed to appear in the accounts of the Concessionaire at their revalued carrying amount¹⁹. On the other hand, Article 6, section 21 of the Malekula convention agreement and Article 6 section 20 of the Tanna convention agreement requires the concessionaire funded assets to be recorded at the value for which they were acquired or constructed.

The concession contracts contain detailed provision on how various asset categories should be valued. The contracts do not explicitly state that these values are to be used in setting the asset value in tariff reviews. Apart from specifying how UNELCO is to keep its accounts, their only explicit contractual purpose is to define how the termination payment to UNELCO is to be calculated if the concession is terminated.

¹⁹ Article 6, section 21 of the Malekula convention agreement and Article 6 section 20 of the Tanna convention agreement requires the concessionaire funded assets to be recorded at the value for which they were acquired or constructed.

However, for the purposes of tariff review article 4 subsections 13, 14, 15 and 16 (for private assets article 7 subsections 33 and 34) requires UNELCO to maintain separate classifications for the revaluation transactions and disallows the Concessionaire to record the difference at the end of each financial year between the “Revalued asset transfer fund” and the aggregate of the “Asset transfer fund” to be included as an expense debited to the trading account and restricts the Concessionaire to incorporate the impact of revaluation when reviewing the tariff prices²⁰.

Table 23 : UNELCO Projected Regulated Asset Base

Million Vatus	2016	2017	2018	2019	2020	2021
Net Book Value	4,416.1	4,593.0	4,727.2	4,836.5	4,912.8	4,940.2
Working Capital Requirement	393.3	406.6	422.7	433.4	447.1	461.3
Regulated Asset Base	4,809.4	4,999.6	5,149.9	5,269.9	5,359.9	5,401.5

Data Source: UNELCO Tariff Application (2016 – 2021)

Table 23 above provides the summary of the proposed Regulated Asset Base by UNELCO for the upcoming tariff period which has been projected for the next six years (2016 to 2021).

UNELCO’s projected Regulated Asset Base is not determined based on a test year period but is forecasted over the next 6 years based on its future investment plans. The RAB should only include property, assets or other investments which are deemed to be in service and is providing a benefit to customers at the current time, rather than in the future. The consumers should not be paying the carrying cost of those assets which are not presently providing any service and are based on future projections.

Furthermore, UNELCO’s projections are also based on the revalued assets (the actual RAB as at 2015 forms the basis of UNELCO’s projections) which inflates the estimated regulated asset base (UNELCO’s reasonable return will be high as it will be calculated based on the inflated RAB) and will result in the higher tariff prices charged to the ratepayers. This creates an unfair burden on the customers and the approach adopted by UNELCO to calculate the RAB for tariff purposes is not prescribed by the concession agreement and the principles of prudent regulatory practice. UNELCO should be allowed to earn a return on their actual ‘out of pocket’ investment and similarly the customers should not be required to pay an amount in excess of the cost when the asset was originally devoted to utility service. The revaluation increment adjustment to the assets is not considered to be an asset which is prudently purchased or constructed by UNELCO and therefore should not form part of the regulatory asset base. Revaluation is performed solely for financial reporting purposes.

5.3 URA Determination - Regulated Asset Base

The staff adopted the original investment cost approach to determine the projected regulated asset base for the tariff review period. The investment cost approach is the most commonly used costing methods largely because of its simplicity, consistency, accuracy and reasonableness. It generally limits the amount included in the regulated asset base to the historical/original cost of the asset. It is widely used by nearly all regulatory bodies for tariff review purposes, even if some other methodology is applied for accounting and reporting purposes.

As stated in the preceding sections, the RAB should only include those assets which are deemed to be in service and is providing a benefit to customers at the current time, rather than in the future. Therefore, the Staff required an up to date Fixed Asset Register (FAR) for UNELCO as at 2015 to assess the correct net book value of the assets based on the historical cost, to determine the remaining value of those assets which are obsolete and no longer in use, to identify assets shared by related and third parties, to identify assets under construction and lastly to identify those assets which are not in service. The Fixed Asset Register (FAR)

²⁰ Refer article 4 section 16 and article 7 section 34 of the Port Vila Convention agreement

provided by UNELCO was in French language which made staff assessments difficult and was incomplete with no proper reporting of the historical cost of the assets and the related ordinary accumulated depreciation. Due to these limitations, the Staff determined the projected RAB for tariff review purposes based on the actual net book value of UNELCO financed assets as per the 2015 financial statements.

The actual Regulated Asset Base calculated by UNELCO as per table 22 above was examined and verified against the 2015 test year audited financial statement. Section 17(75) of the appended specifications of the Port Vila concession contract requires the concessionaire to prepare their balance sheet as per the format outlined in appendix 1. The model of the contractual balance sheet provided as per appendix 1 requires the concessionaire to present the values of the fixed assets financed by the concessionaire at both historical cost and at revaluation. In addition, the concessionaire is also required to present the accumulated depreciation calculated on both the historical cost and at revaluation (to be classified as asset transfer depreciation & revalued asset transfer depreciation). UNELCO failed to present its balance sheet in compliance with the requirements of the concession contract. The 2015 audited financial statements of UNELCO only presents the assets and accumulated depreciation at revaluation with no information on the historical cost.

Table 24 : URA Determined Regulated Asset Base

URA Determination - Regulated Asset Base for 2016 - 2021 Tariff Review Period	
Net Book Value of Assets(Concessionaire funded) as at 2015 Audited Financial Statement	Vatu
Intangible Assets	125,668,155
Non Concession Asset - Reevaluated	163,141,241
Licensee Financing	3,950,811,485
Assets Under Construction & Prepaid Deposit	186,187,636
Total	4,425,808,517
Exclusions from the Regulated Asset Base	
Intangible Assets	105,453,124
Assets Under Construction & Prepaid Deposit	186,187,636
Revaluation Surplus - Non Concession Assets funded by Concessionaire	107,016,138
Revaluation Surplus - Concession Assets funded by Concessionaire	990,599,325
Total	1,389,256,223
Add Working Capital Allowance	
Working Capital Requirement based on 45 - day standard formula approach	283,698,640
Off-set to Working Capital Requirement - Customer Advance/Deposits	- 222,418,000
Net Working Capital Requirement	61,280,640
Net Assets(Regulated Asset Base)	3,097,832,934

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements, RRR Reporting
Data Analysis: URA Staff

Table 24 above provides the details of the URA determined rate base for the tariff review period in the total amount of VT 3,097,832,934. The actual regulated asset base of VT 4,425,808,517 calculated as per 2015 audited financial statements was reduced by the amount of VT 1,389,256,223 to determine the projected rate base for the proposed tariff review period. The stated reduction is the result of the following adjustments:

1. Exclusion of VT 1,097,615,463 of capital reserves accumulated from revaluation surplus, which represents the difference between the carried value of fixed assets (revalued assets) and the historical cost of these fixed assets. Furthermore, Article 4 section 16 and article 7 section 34 of the Port Vila

convention agreement requires the difference between the revalued accumulated depreciation and the ordinary accumulated depreciation to be accounted for, through the profit and loss account as a charge against the asset revaluation reserve. Therefore, the above amount represents the net revaluation increment of the assets (which also takes into account the accumulated depreciation variances due to revaluation).

2. Exclusion of the amount of VT 186,187,636 which represents the value of assets under construction and prepaid deposit. This exclusion was based on the premise that RAB should only include those assets or property that is used and useful. The inter-period equity requires an allocation of costs (and the rates they generate) to those specific periods when the costs actually provide service to the customers. In other words, the present customers should be required to pay only for construction costs directly incurred in providing their specific service.
3. Exclusion of the amount of VT 105,453,124 which represents the net book value of those intangible assets (start-up cost & Land lease assets-concession) which has not been subject to amortisation by UNELCO. These assets by now should have been fully amortised having a zero net book value similar to other land lease assets of UNELCO. The Staff sees no reason as to why these intangible assets were not amortized and concludes that UNELCO has already earned sustainable amount of return on these assets. Therefore, these assets will not be allowed to form part of the RAB.

5.3.1 Future Investment Plan

UNELCO's investment plan was poorly submitted and not appropriately addressed in its tariff application. There was no proper details or information provided by UNELCO on the type of investment, estimated cost for each investment, completion timeframe, source of funding and the justification and need for the proposed investment for each category of assets for the next 5 years. UNELCO's proposed investment plan only summarised the amount of investment required for each category of assets and is presented in table 25 below:

Table 25 : UNELCO Proposed Investment Plan

Million Vatus	2016	2017	2018	2019	2020	2021	Average(2016-2021)
Generation	291.4	316.3	284.5	280.4	336.0	344.9	308.9
T&D	194.0	175.2	211.3	219.4	160.9	164.8	187.6
Private Assets	59.1	47.6	48.4	45.4	48.7	19.2	44.7
Total	544.5	539.1	544.2	545.2	545.6	528.9	541.3

Data Source: UNELCO Tariff Application V2 (2016-2021)

Staff compared UNELCO's proposed investment plan for the 2016-2021 tariff review period with the actual investments for the past 5 years (2011-2015) presented in table 26 below:

Table 26 : UNELCO Actual Investment (2011-2015)

Million Vatus	2011	2012	2013	2014	2015	Average(2011-2015)
Port Vila	241.9	127.6	334.5	502.3	233.0	287.9
Tanna	56.6	35.8	17.9	10.2	30.2	30.1
Malekula	11.4	26.7	2.2	4.8	5.9	10.2
Total	309.9	190.1	354.6	517.3	269.1	328.2

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements

Data Analysis: URA Staff

UNELCO's proposed annual average investment plan for the 2016-2021 tariff review period is 65% more than the actual annual average investment for the past 5 years (2011-2015). Therefore, it is highly likely that UNELCO's proposed investment plan is inflated.

The calculated regulated asset base for UNELCO is subject to reduction in the future Net Book Value of UNELCO's current financed assets (which is based on the increase in the future accumulated depreciation of the existing assets) and increment based on the increase in the Net Book Value of the future assets that will be procured and added to UNELCO's regulated asset base (which is based on UNELCO future investments

in assets). Both the adjustments will offset each other based on the justification that the increase in the annual average accumulated depreciation based on the current assets of 299.9m vatu (URA determined depreciation expense for the 2016-2021 tariff review period) is almost equivalent to UNELCO's actual annual average investment for the past 5 years(2011-2015) of 328.2m vatu(Staff has not used UNELCO's proposed investment plan as it was not properly addressed by UNELCO in its tariff application and is highly likely to be inflated).

UNELCO has proposed to use the actual certified Regulated Asset Base in the tariff formula every year. The Staff considers UNELCO's proposal to use the actual RAB for the purposes for calculating and adjusting the reasonable compensation each year to be feasible, however is concerned with the distortionary factors which may encourage UNELCO to exploit the proposed principle in a political and bureaucratic manner. Section 8.4 in the following document provides further discussion on this proposal and if agreed between both the parties, the URA Staff has recommended an alternative formula to determine the value of RAB to be included in the annual tariff formula to calculate the annual reasonable return component of the Revenue Requirement.

5.3.2 Working Capital Requirement

As stated in section 5 above, Regulatory Asset Base includes an allowance for Working Capital requirement. It is the average amount of capital, over and above the investment in assets and other separately identified rate base components, provided by the Utilities to bridge the gap between the time expenditures are made to provide service and the time collections are received for that service.

For the purposes of projecting the working capital requirement, UNELCO has used the 2011-2014 average working capital requirements as a percentage of revenue requirements, which is 13.5% and proposed the working capital requirement of VT 393.3m under its 2016 projections. The average working capital requirement calculated by UNELCO is based on the gross value of the current assets which has no rational relationship with Revenue Requirement, and includes the accumulated provisions which unreasonably inflates the working capital requirement. Therefore, the Staff rejects the methodology adopted by UNELCO.

The URA Staff projected the working capital requirement of **VT 283.7m** for UNELCO using the 45- day standard formula approach. The stated formula is currently adopted by the majority of the regulatory commissions and it is determined to be a reasonable estimate of what a lead-lag study would produce. The 45-day formula approach uses a simple, "rule of thumb" which calculates $\frac{1}{8}$ (45/365 days) of operating expenses inclusive of fuel cost and material & supplies as the estimate of working capital requirements. Table 27 below provides the staff calculation of the projected working capital requirement which is based on a 5 year average period:

Table 27 : URA Determination – Working Capital Requirement

Working Capital Requirement - 45 day Standard Formula Approach						
Operating Expenses(Million Vatus)	2011	2012	2013	2014	2015	Avg(2011 - 2015)
Fuel and Oil	1,492.07	1,567.22	1,602.58	1,582.18	1,140.91	1,476.99
Purchases(Material & Supplies/Other Serv	551.80	528.60	505.80	486.40	491.40	512.80
Taxes and related expenses	23.80	20.90	23.30	20.10	19.40	21.50
Personnel expenses	284.70	271.80	313.40	291.00	288.20	289.82
Total OPEX	2,352.37	2,388.52	2,445.08	2,379.68	1,939.91	2,301.11
Workng capital ratio (45/365 days)	0.123	0.123	0.123	0.123	0.123	0.123
Required Working Capital	290.02	294.48	301.45	293.38	239.17	283.70

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements

Data Analysis: URA Staff

5.3.3 Off-Sets - Customer Advance/Security Deposits

Customer deposits generally represent funds received from ratepayers as security against potential losses arising from failure to pay for service. It is treated as liability for UNELCO to repay the funds received either after a specified period or upon satisfaction of certain requirements. The customer advances/deposits represents a cost – free source of capital which is available to UNELCO for use in support of its rate base investment. Therefore, the staff proposed to off-set VT 222.4m which represents 70% of the average balances in customer advance/deposits for the past 5 years (VT 317.7m)²¹ against the working capital requirement²².

²¹ Staff has not made any adjustments for the 197M vat funds received from Donors(EU Facility II)

²² Customer Advance Deposit was not adjusted to the Capital Structure – please refer to section 5.3(discussion under cost of capital component)

6.0 Cost of service

Cost-of-service is defined as the amount of revenue a regulated utility must collect from rates charged to consumers in order to recover fair and reasonable cost of doing business. These costs include operating and maintenance expenses, fuel expenses, depreciation expense, taxes and a reasonable return.

This section is devoted to defining each major element of the cost-of-service, explaining how each element is computed and explaining the relationship between the various components used to compute the cost-of-service.

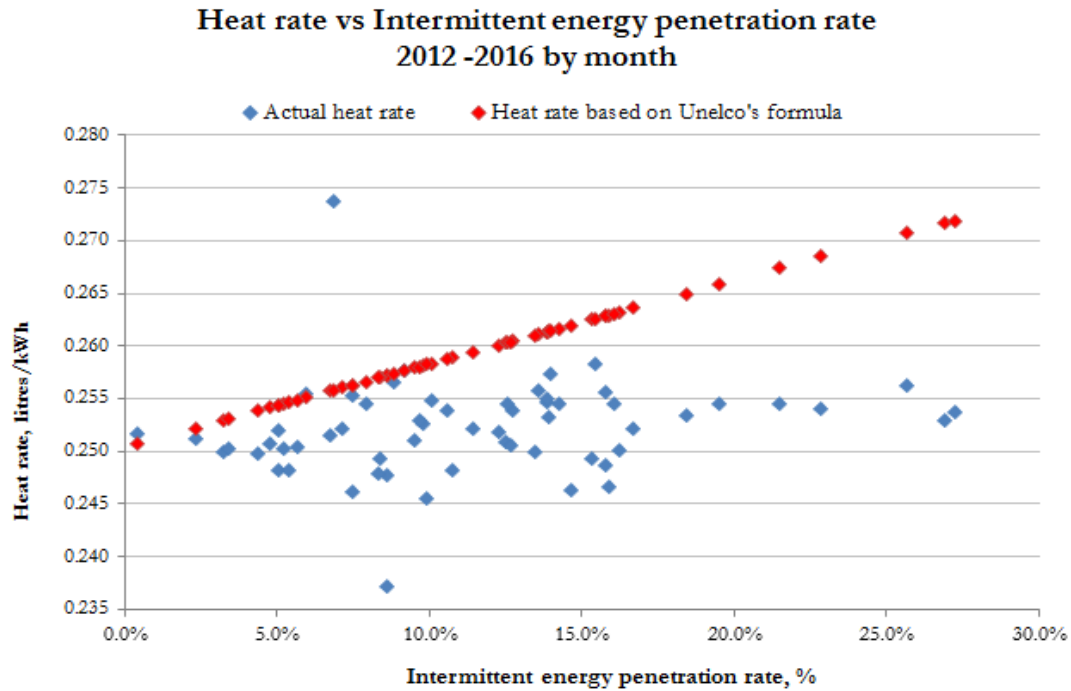
6.1 Fuel Cost

Heat Rate

Heat rate is defined as the level of efficiency from which fuel is converted into energy (kWh) and has been forecasted based on historical heat rates. UNELCO has stated in their submission that "the increased penetration and variability associated to the intermittent renewables will increase heat rates as a higher level of spinning reserves will be required to compensate the volatility of intermittent generation. The higher level of spinning reserves increases fuel consumption (additional groups and sub-optimal levels)". UNELCO has proposed the formula to calculate the impact of intermittent energy compensation on the heat rate. The details of the formula and further information can be found in UNELCO's tariff review submission.

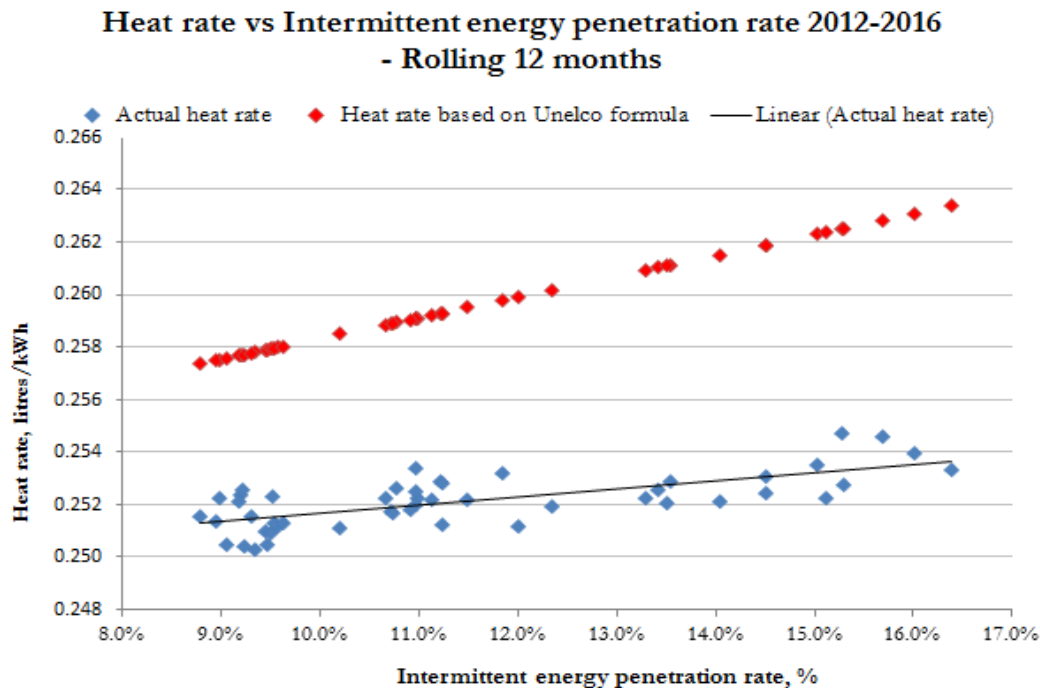
The impact of higher share of intermittent generation on the heat rate has been analysed using historical data. Two charts below show historical heat rates against intermittent energy penetration rates. Over the past years there were a number of months when intermittent energy penetration rates have reached 15% to 25% levels. Actual heat rates observed have been compared against heat rates calculated using proposed UNELCO's formula. The heat rates based on the proposed formula have been significantly higher compared to actual heat rates for the relevant penetration rate. It appears that while the heat rate increases with higher rate of intermittent generation it doesn't reach levels suggested by the formula. The impact of higher penetration rates have been taken into consideration using actual historical data rather than proposed formula. Considering that proposed formula results in much higher fuel costs and, as a consequence, higher price for the customer the URA expects that any significant changes proposed by UNELCO will be adequately supported by data and studies. The URA invites UNELCO to submit more information for further discussion.

Figure 15 : Heat Rate and Intermittent energy penetration rate by month, 2012 - 2016



Data source: UNELCO
 Data analysis: URA staff

Figure 16 : Heat rate and Intermittent energy penetration rate – rolling 12 months, 2012 - 2016



Data source: UNELCO
 Data analysis: URA staff

Heat Recovery System

UNELCO has stated in their Tariff Review application that one of the planned projects for 2017 is the installation of the Heat recovery system (600 kW) in Port Vila (page 34 of the submission). There were no more details provided. It is not clear from the submission what is the purpose and what are the benefits of the system. Heat Recovery Systems may be used to improve performance of the diesel plant. The URA staff requests UNELCO to provide more information regarding the purpose of this installation and cost-benefit analysis for this investment (and other generation investments for that matter).

Targets for improvements in the efficiency of diesel generation

The Government of Vanuatu's comprehensive action plan for developing the energy sector is reflected in the National Energy Road Map (NERM). The Road Map directly responds to the highest priority objectives in the energy sector from a national development perspective. Affordable and Sustainable energy are two of five main priorities for the energy sector. The Road Map has identified that affordability can be improved by increasing the efficiency of electricity that continues to be generated from diesel engines. Energy efficiency is also discussed under the "sustainable energy" priority due to its potential to reduce GHG emissions and local pollution. Updated Vanuatu Energy Road map sets 2020 and 2030 targets for improvements in the efficiency of diesel generation, see the table below.²³ According to the Road Map the target for 2020 is 20% improvement from 2010 levels.

Table 4.1: Updated NERM Targets

Priority	Target	Indicator	Current ²⁶	2020 Target	2030 Target
Accessible energy	Increase electricity access by households in and near concession areas	% of households with access	62%	90%	100%
	Increase electricity access by households in off-grid areas	% of households with access	9%	100%	100%
	Increase electricity access by public institutions (on- and off-grid)	% with access	54%	100%	100%
Affordable energy	Improve the efficiency of diesel generation	Grams of diesel fuel per kWh of electricity	2% improvement from 2010 (248.33 g/kWh)	20% improvement from 2010 (202.41 g/kWh)	20% ²⁷ improvement from 2010 (202.41 g/kWh)
	Reduce the cost of distributing petroleum products in Vanuatu	Vatu per litre	No data ²⁸	10% reduction from 2012	15% ²⁹ reduction from 2012
Sustainable energy	Increase the proportion of electricity generated from renewable sources	% of grid-based electricity from renewable sources	29%	65%	100% ³⁰
	Improve electricity sector end-use efficiency	% saving on BAU projection ³¹	n/a	5%	13.5%

²⁶ As at end-2015 or based on latest available data (which may be earlier than 2015).

²⁷ Assumes limited further progress can be made without capital-intensive investments or reducing the use of renewable energy for electricity generation (see commentary above).

UNELCO has included the comment below in the section 8.2 "Fuel, consumables and third party energy feed-in" of the Electricity Tariff Review Submission:

- The expected changes to the thermal generation configuration. Based on the investment and renewal plan presented in the previous chapter, there are no incremental improvements to be expected to the historical heat rates.

It is hard to analyse potential improvements that may be achieved by UNELCO due to lack of information related to generation investments discussed earlier. At the same time, it is important that URA will incorporate energy sector targets set up by the Government. As a start, the URA Staff proposes to incorporate target of 1% annual incremental improvements in the diesel efficiency per concession area. By 2021 this will result in approx. 5% improvement in the diesel efficiency compared to 2010 levels. It is well

²³ Updated Vanuatu Energy Road Map 2016 - 2030, June 2016, page 37

below 2020 target (20%) in the National Energy Road Map. This proposal and further potential improvements can be discussed in more details with the participation of the Government and clarity re generation investment plan.

Diesel Cost

The total fuel cost has been calculated by Staff based on projected diesel price of 82.00 Vatu per litre. This price reflects URA forecast of average 2017 diesel price for Port Vila based on actual price in December 2016 and short term energy outlook forecast for retail diesel fuel by US Energy Information Administration published in February 2017 (<http://www.eia.gov/outlooks/steo/index.cfm>).

Future changes in diesel price will be passed to customers through the monthly tariff adjustment formula. As such in the fuel cost projections, the forecasted annual average diesel cost of 82.00 vatu per litre has been applied uniformly throughout the forecasted years to determine the overall diesel cost.

Diesel prices for Tanna and Malekula were calculated based on Port Vila price adjusted by freight costs (26.67 Vatu per litre for Malekula and 35.00 Vatu per litre for Tanna) and the filling rate (3Vatu per litre) charged by the supplier as preparation cost to prepare diesel drums to be shipped to respective islands.

Table 28 below presents the diesel litres projected to be utilized per concession area based on the anticipated electricity production from thermal generation and the relevant cost based on the projected 82.00 Vatu per litre. Tanna and Malekula diesel price per litre has been adjusted as per above paragraph.

Table 28 : Projected diesel cost per concession

Port Vila	Unit	2017	2018	2019	2020	2021	Average
Diesel to use, 000'	Litres	14,112	14,079	14,336	14,592	14,849	14,393
Cost/litre	Vt/litre	82.00	82.00	82.00	82.00	82.00	82.00
Total Cost, Million Vatus	Vt	1,157	1,154	1,176	1,197	1,218	1,180
Malekula							
Diesel to use, 000'	Litres	310	355	365	376	388	359
Cost/litre	Vt/litre	111.67	111.67	111.67	111.67	111.67	111.67
Total Cost, Million Vatus	Vt	35	40	41	42	43	40
Tanna							
Diesel to use, 000'	Litres	285	317	355	401	455	363
Cost/litre	Vt/litre	120.00	120.00	120.00	120.00	120.00	120.00
Total Cost, Million Vatus	Vt	34	38	43	48	55	44
All Concession							
Diesel to use, 000'	Litres	14,707	14,752	15,056	15,369	15,691	15,115
Total Cost, Million Vatus	Vt	1,226	1,232	1,259	1,287	1,315	1,264

*Data source: UNELCO Tariff Application V2-2016-2021; UNELCO RRR Reporting
Data Analysis: URA Staff*

Lubricant cost

Lubricant oil is vital in the functioning of generator sets used in electricity production as it promotes life span of the equipment, ensures smooth running and improves performances. Thus it is appropriate to also estimate the lubricant oil litres to use and the associated cost based on the demand projections.

As per UNELCO's tariff submission, the historical cost per litre of lubricant is three to four times the cost per litre of diesel. URA accepted UNELCO's proposal detailing the historic ratio of price difference between lubricant oil and diesel per concession.

Table 29 : UNELCO lubricant oil cost per litre as compared to diesel cost per litre

Concession	Average Historical Multiple of each Islands Cost of Gasoil
Efate	3.43 X
Malekula	3.20 X
Tanna	4.10 X

Data Source: UNELCO Tariff Application V2 (2016-2021)

In projecting the lubricant oil cost, the above weights in table 29 is applied to respective concession diesel cost per litre.

As per table 29 above, table 30 below summarises URA's estimation on lubricant oil cost based on the required litres to use in generation and the related cost per concession area.

Table 30 : Projected lubricant cost per concession

Efate	Unit	2017	2018	2019	2020	2021	Average
Lubricant oil to use (000's)	Litres	77.4	77.8	80.1	82.4	84.7	80
Cost/litre	Vt/litre	281.26	281.26	281.26	281.26	281.26	281.26
Total Cost (Millions)	Vt	21.8	21.9	22.5	23.2	23.8	22.6
Malekula							
Lubricant oil to use (000's)	Litres	2.0	2.3	2.4	2.5	2.6	2.3
Cost/litre	Vt/litre	357.34	357.34	357.34	357.34	357.34	357.34
Total Cost (Millions)	Vt	0.70	0.81	0.84	0.88	0.91	0.83
Tanna							
Lubricant oil to use (000's)	Litres	1.2	1.4	1.5	1.7	2.0	1.6
Cost/litre	Vt/litre	492.00	492.00	492.00	492.00	492.00	492.00
Total Cost (Millions)	Vt	0.59	0.67	0.75	0.86	0.98	0.77
All Concessions							
Lubricant oil to use (000's)	Litres	80.6	81.5	84.0	86.6	89.3	84.4
Total Cost (Millions)	Vt	23.1	23.4	24.1	24.9	25.7	24.2

Data source: UNELCO Tariff Application V2-2016-2021; UNELCO RRR Reporting

Data Analysis: URA Staff

Overall Fuel & Lubricant Projected Cost

Based on projected generation volumes, lubricant oil price and diesel price, the overall generation costs for the next 5 years are stated in the table below.

Table 31 : Fuel costs 2017 - 2021

	2017	2018	2019	2020	2021	Average 2017-2021
Fuel costs, million Vatus	1,249	1,256	1,283	1,312	1,341	1,288

Data source: UNELCO Tariff Application V2-2016-2021; UNELCO RRR Reporting

Data Analysis: URA Staff

Third Party Energy Expenses

Third party cost energy is the cost of energy UNELCO pays to the government for the energy contributed by the Government solar farms at the Meteo department compound and the Parliament Building respectively to UNELCO's electricity grid. Based on the PPA between government and UNELCO, the cost per kWh to be paid to the Government based on the Solar power (kWh) contributions is pegged to corresponding monthly diesel cost per litre based on the heat rate approved within the context of the Tariff Review.

For this current tariff review, third party energy expenses were calculated based on the projected 82.00 Vt/litre cost of diesel, heat rate of 0.254 /kWh and a total of 1,400 Solar operational hours per annum for the next five years.

Based on the above, URA's estimation the third party energy expenses are as follows:

Table 32 : Third Party Energy Expenses

	2017	2018	2019	2020	2021	Average 2017-2021
Government Solar Capacity (kW)	767	767	767	767	767	767
Hours of Operation (hours)	1,400	1,400	1,400	1,400	1,400	1,400
Heat Rate ²⁴ (l/kWh)	0.257	0.257	0.257	0.257	0.257	0.257
Costs, million Vatus	22.6	22.6	22.6	22.6	22.6	22.6

Data source: UNELCO Tariff Application V2-2016-2021; UNELCO RRR Reporting

Data Analysis: URA Staff

Overall fuel cost, lubricant oil and third party energy cost

Table 33 : Overall fuel cost, lubricant oil and third party energy cost

	2017	2018	2019	2020	2021	Average 2017-2021
Costs, million Vatus	1,271	1,278	1,305	1,334	1,364	1,310

Data source: UNELCO Tariff Application V2-2016-2021; UNELCO RRR Reporting

Data Analysis: URA Staff

6.2 Personnel Expenses

Personnel expenses are the wage and salary costs of staff, and other labor-related costs such as employee training, social security expenses, provision for severance & retirement, annual leave etc which is directly incurred in the provision of the electricity service. It does not include personnel costs related to capital projects and therefore are adjusted from the salary expenses and capitalized. UNELCO's 2015 audited financial statements reported personnel expenses of 356.4m vatu with an average cost per employee of 3.6m vatu, which accounts for approximately 30.07% of UNELCO's total operating expenses excluding fuel and capital cost (reasonable return).

UNELCO has estimated its personnel expenses for the proposed tariff review period based on the current cost per employee for the year 2015(including efficiencies for prepaid meter system) and applying the following cost drivers for the respective departmental employees:

Table 34 : UNELCO Resource Drivers Used for Personnel Cost Projections

Function	Projection Cost Drivers
Generation	Number of installed MW managed
Transmission & Distribution	Number of meters of T&D networks managed
Commercial	Number of Customers Served
Malakula	Number of Customers Served
Tanna	Number of Customers Served
Management and SG&A	Number of Customers Served

Data Source: UNELCO Tariff Application V2 (2016-2021) – table 81

Table 35 below summaries the overall personnel cost projections by UNELCO for the period 2016 to 2021:

²⁴Heat rate is inclusive of both diesel efficiency, l/kWh and lubricant efficiency, l/kWh

Table 35 : UNELCO Projected Personnel Expenses by function 2016-2021

Million Vatus	2016	2017	2018	2019	2020	2021
Generation	43.5	45.9	46.8	48.0	48.0	48.0
Transmission and distribution	86.1	89.5	94.3	96.9	99.4	102.0
Commercial	41.7	44.2	46.6	48.7	50.8	53.2
Malakula and Tanna	14.0	15.8	17.3	17.8	18.2	18.7
Management and SG&A	195.2	205.0	213.9	221.7	230.0	238.8
Regulatory relations	15.8	15.8	15.8	15.8	15.8	15.8
Projected Personnel Expenses	396.3	416.2	434.7	448.7	462.3	476.4
Projected Employee Numbers	108.7	115.1	120.8	124.7	128.3	132.0
Projected Cost per Employee	3.65	3.62	3.60	3.60	3.60	3.61

Data Source: UNELCO Tariff Application V2 (2016-2021) – table 97 & 98

Taking a five year average of UNELCO's projections (2016-2020), the annual average personnel cost is 431.64m vatu with an annual average cost per employee of 3.61m vatu.

URA Determination

The URA staff espoused two methods to forecast the personnel expenses of UNELCO for the proposed tariff review period. The application of both the methods, specific adjustments and Staffs determination of the personnel expenses are discussed as follows:

Method 1 – Multiple Regression Analysis

Multiple Regressions is a very advanced statistical tool which is used to derive the value of a criterion from several other independent, or predictor, variables. It uses simultaneous combination of multiple factors (cost drivers) to assess how and to what extent they affect a certain outcome (personnel expenses).

The Staff used the multiple regression analysis to mathematically express the relationship between UNELCO's personnel cost and the following five independent cost drivers:

1. Energy Sales(MWh)
2. Customer Numbers
3. Network Line Meters(km)
4. Generation(MWh)
5. Generation Installed Capacity(MW)

The regression model was tested using several combinations of the above cost drivers (General to Specific modelling) in order to maximize the goodness of fit. A sample size of 10 years data and more than one independent variable (cost driver) was used in the modelling to make more accurate predictions about the dependent variable (personnel cost). The final results of the regression modelling are presented below:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.982999367
R Square	0.966287756
Adjusted R Square	0.949431634
Standard Error	12.5046925
Observations	10

ANOVA					
	df	SS	MS	F	Significance F
Regression	3	26891.5663	8963.85544	57.3256266	8.2746E-05
Residual	6	938.204008	156.367335		
Total	9	27829.7703			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-207.375622	44.1598933	-4.6960173	0.00333993	-315.43099	-99.320256	-315.43099	-99.320256
Energy Sold(MWh)	0.007728568	0.00118896	6.50030203	0.00063107	0.0048193	0.01063784	0.0048193	0.01063784
Customer Numbers	-0.038069549	0.01084228	-3.5112112	0.01265279	-0.0645997	-0.0115394	-0.0645997	-0.0115394
Network Line Meters(km)	1.201672908	0.28833729	4.16759448	0.00589431	0.49613697	1.90720884	0.49613697	1.90720884

Dependent Variable(Y) = Personnel Cost

a - Intercept(Constant) = **-207.38**

b₁ - Slope - Cost Driver 1 = 0.01

b₂ - Slope - Cost Driver 2 = **-0.04**

b₃ - Slope - Cost Driver 3 = 1.20

Y = a + b₁X₁ + b₂X₂ + b₃X₃

Linear Cost Function

Y = (207.38) + 0.01(X₁) + (0.04)(X₂) + 1.20(X₃)

The above summary output shows that the linear cost function; $Y = (207.38) + 0.01(X_1) + (0.04)(X_2) + 1.20(X_3)$ estimated using the regression approach has excellent goodness of fit ($r^2 = 0.97$) and appears to be well specified. In addition, the P-Values for the remaining cost drivers are below 0.05 which concludes a highly statistically significant relationship (the other two cost drivers Generation and Installed Capacity were removed from the regression due to higher P-Value of above 0.05 resulting in an insignificant relationship). Subsequent to projecting UNELCO's personnel expenses using the derived cost function, Staff proposed the following specific adjustments:

Adjustment 1 - Labor Productivity Improvement

UNELCO believes that with the promotion of prepaid meters, the development mid-period of an online platform, it can achieve some economies of scale. Therefore, UNELCO has proposed on average annual efficiency savings of 5.4 % (average annual projected employee cost savings divided by average annual projected personnel cost by UNELCO) for its commercial, Tanna & Malekula and Management(SG&A) staff. No other efficiencies or productivity improvement have been proposed by UNELCO.

The URA staff considers that a plausible approach to the setting of an expected labor productivity factor is to make projections based on past performance behavior and adjust for any specific efficiencies to be achieved (in UNELCO's case promotion of prepaid meters). In order to measure the chronological/historical performance of the labor productivity, staff used energy sales, customer numbers and network line meters as the output variables (derived from the regression analysis-major cost drivers affecting personnel cost). Table 36 below shows the annual changes in the labor productivity calculated independently of the three output variables over a 10 year period:

Table 36 : Labor Productivity Historical Trend Analysis

LABOR PRODUCTIVITY Per Employee				
<i>Year</i>	<i>No. Of Employees</i>	<i>Energy Sales per Employee(MWh)</i>	<i>Customer Numbers per Employee</i>	<i>Network Line Meters per Employee(km)</i>
2006	96.60	414.29	89.63	4.17
2007	95.60	462.19	97.54	4.32
2008	96.60	503.63	103.38	4.44
2009	96.60	521.67	107.95	4.54
2010	94.02	575.79	112.59	5.14
2011	95.70	558.35	114.92	5.26
2012	95.80	557.11	120.52	5.47
2013	93.80	579.39	133.40	5.91
2014	95.10	562.68	141.83	6.00
2015	99.00	503.51	144.76	6.13
Annual Changes Labor Productivity				
<i>Year</i>	<i>Energy Sales per Employee(MWh)</i>	<i>Customer Numbers per Employee</i>	<i>Network Line Meters per Employee(km)</i>	<i>Overall Average Productivity</i>
2007	11.6%	8.8%	3.6%	8.0%
2008	9.0%	6.0%	2.8%	5.9%
2009	3.6%	4.4%	2.2%	3.4%
2010	10.4%	4.3%	13.2%	9.3%
2011	-3.0%	2.1%	2.4%	0.5%
2012	-0.2%	4.9%	4.0%	2.9%
2013	4.0%	10.7%	8.0%	7.6%
2014	-2.9%	6.3%	1.6%	1.7%
2015	-10.5%	2.1%	2.1%	-2.1%

Productivity AAGR(10 Years)	4.90%
Productivity CAGR(10 Years)	5.53%
Overall Average(AAGR & CAGR)	5.22%
Annual Specific Productivity Improvement(Prepaid Sys)	5.36%
Projected Productivity Improvement	10.58%

From the above productivity analysis, it can be observed that the overall labor productivity of UNELCO grew by an annual average growth rate (AAGR) of 4.90% and a compounded annual growth rate (CAGR) of 5.53%. Taking an average of both the outcome, UNELCO's labor productivity improved at an annual rate of 5.22%²⁵. UNELCO has only proposed labor efficiency specifically for the promotion of the prepaid meters but have not provided any future efficiency/productivity growth for its overall employees. The Staff considers the efficiencies resulting from the promotion of prepaid meters as the actual reduction in the amount of labor hours required (thus the cost savings) rather than an improvement in the labor productivity (ratio of outputs for a given set of inputs).

The Staff accepts the proposed annual cost savings of 5.4% by UNELCO resulting from the promotion of prepaid meters and after making its assessment of the historic productivity while also giving due recognition for the scope of continued and heightened productivity recommends an annual productivity growth rate of 5.22%. The recommended productivity growth rate by staff is also intended to take into account any future developments in technology and improved management practices and will also place some pressure on UNELCO to remain alert, efficient and agile in a dynamic environment.

Adjustment 2 – Cost per Employee

For the past 5 years (2011-2015), UNELCO had on average approximately 96 employees (including 7 senior managers) working for the electricity services and the average cost per employee was 4.03m vatu. The current

²⁵ 2015 data has been excluded from the calculation of the overall average as it is considered to be an outlier due to the impact of cyclone Pam.

cost per employee as at year 2015 was 3.6m vatu (99 employees) and table 37 below provides the breakdown of UNELCO's cost per employee by each department:

Table 37 : UNELCO Cost per Employee by Dept – Year 2015

Department	2015 - Actual Salary	No. Of Employees	Cost per Employee	Proportion of Total Personnel Cost
Generation	39,500,000	15	2,668,919	11%
T&D	84,800,000	26	3,274,131	24%
Commercial	37,270,000	21	1,809,223	10%
Malakula	7,620,000	8	1,016,000	2%
Tanna	5,770,000	4	1,442,500	2%
<u>Management & SGA</u>				
Management	101,000,000	7	15,303,030	28%
Human Resource	14,700,000	3	5,653,846	4%
Finance dept	65,700,000	17	3,842,105	18%
Total	356,360,000	99	3,595,964	100%

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

UNELCO has projected its personnel expenses based on the 2015 current cost per employee. The URA Staff noted its concern on the high average cost per employee for UNELCO and carried out a benchmark analysis (presented as per table 38 below) to compare the cost per employee for other comparable/similar utilities. The staff used Fiji Electricity Authority and VUI for comparison.

Table 38 : Personnel Cost Benchmark Analysis (2011-2015)

Year	No of Employees			Cost per Employee(Million Vatus)			Comparision with UNELCO		% Difference VUI Vs FEA
	UNELCO	FEA	VUI	UNELCO	FEA	VUI	FEA	VUI	
2011	96	661	31	4.01	1.58	2.26	-154.2%	-77.1%	30.3%
2012	96	703	35	4.11	1.58	2.13	-160.2%	-92.8%	25.9%
2013	94	736	45	4.55	1.57	2.13	-190.3%	-113.6%	26.4%
2014	95	703	37	3.91	1.27	2.10	-207.2%	-86.3%	39.4%
2015	99	725	38	3.60	1.71	2.35	-110.5%	-53.5%	27.1%
Avg(2011-2015)	96	706	37	4.03	1.54	2.19	-164.5%	-84.7%	29.8%

Data Source: UNELCO Tariff Application V2 (2016-2021); FEA annual reports, VUI audited financial statements

Data Analysis: URA Staff

From the above benchmark analysis, UNELCO's average cost per employee (4.03m) is 164.5% and 84.7% higher than the FEA and VUI cost per employee, respectively. It can be argued that in the above benchmarking analysis, consideration has not been given to factors such as the nature of the area and population been served, the cost of living in Vanuatu, network design and topology and the differing inflation rates in different countries. Despite these factors not taken into account, UNELCO's cost per employee is not justified to deviate by the above percentages. In addition, Fiji's employees salaries are subject to income tax (above calculations for FEA staff are based on gross salary) and VUI operates in a similar environment to UNELCO, therefore the benchmark analysis is not skewed from incomparable baseline salaries.

To further support the Staffs assertion and in addition to the above benchmark analysis, the URA Staff would like to make reference to other studies, reports and analysis outlined below which demonstrates that UNELCO's cost per employee is unreasonably high:

1. UNELCO Tariff Review(2009-2014)

During the last tariff review (2009-2014), the both URA and UNELCO agreed to and implemented an efficiency savings of 331.8m vatu for the personnel cost to be achieved over the consecutive period of 5 years(annual average 66.3m vatu from year 2010 to 2014) in order to reduce average cost per employee of UNELCO to 2.42m. UNELCO was not able to achieve the set target and in fact the cost per employee of UNELCO further increased from year 2010 to 2014. Table 39 below provides the comparative analysis of UNELCO's actual cost per employee for the last tariff review period (2010 to 2014), set target and UNELCO's percentage deviation from the target.

Table 39 : UNELCO Tariff Review 2010-2014(Personnel Cost)

Personnel Cost Component(Million Vatus)	2010	2011	2012	2013	2014
UNELCO Tariff Application-staff Cost	316.74	326.92	337.26	347.58	358.01
Less Approved Efficiencies	-39.24	-55.54	-65.44	-82.98	-88.56
Net Personnel Cost	277.49	271.37	271.82	264.60	269.45
No. Of Employees	107.42	104.84	102.78	106.89	111.16
Set Target(Cost per Employee)	2.58	2.59	2.64	2.48	2.42
Actual Cost per Employee	4.04	4.01	4.11	4.55	3.91
% Deviation from Target Cost per Employee	56.4%	54.7%	55.3%	84.0%	61.2%

Data Source: UNELCO Tariff Application V2 (2016-2021); Arbitration Outcome Excel template 2010

Data Analysis: URA Staff

2. Castalia Report – July 2009

In 2009, Castalia Strategic Advisors were engaged by URA to review service standards, the cost of service, and structure of tariffs for water and electricity services in Port Vila, and electricity services in Luganville, Tanna and Malekula. Figure 5.6 of the Castalia report presents the benchmarking analysis of average annual cost per employee of UNELCO and the report concludes that UNELCO's average cost per staff is 19.19% higher than the industry average²⁶.

3. Tonga Power Ltd – 2016 Audited Financial Statements

The Staff compared the current cost of employee for Tonga Power Ltd; a utility which is very similar to UNELCO (installed capacity of 17.9MW, Customer numbers of 21,000, Network line meters of 1070km, covers 4 islands and is a fully integrated company). The company currently employees 193 employees (both local and international employees) and based on the 2016 audited financial statements²⁷, its cost per employee converted at an exchange rate of 49.64 vatu²⁸ is 1.37m vatu which is 163% lower than UNELCO's average cost per employee of 3.60m vatu for the year 2015(recent year).

4. Electric Power Corporation of Samoa– 2015 Audited Financial Statements

The Staff also compared the current cost of employee for Electric Power Corporation of Samoa, a utility which is almost twice the size of UNELCO (Customer numbers of 36,431, and total generation of around 132GWh). The company currently employees 306 employees (both local and international employees) and based on the 2015 audited financial statements²⁹, its cost per employee converted at an exchange rate of 43.21 vatu³⁰ is 1.74m vatu which is 107% lower than UNELCO's average cost per employee of 3.60m vatu for the year 2015.

From the above analysis and references, the URA Staff is certain that UNELCO's cost per employee is very high when compared to other utilities operating in a similar environment and capacity. In addition, it was also

²⁶ A copy of the Castalia report can be obtained from the URA Office for review purposes

²⁷ <http://www.tongapower.to/Portals/2/Docs/TPL%202016%20Audited%20FS.pdf>

²⁸ Current exchange rate dated 16.03.2016(1 TOP = 49.64 vatu)

²⁹ <http://www.palemene.ws/new/wp-content/uploads/105/Annual%20Reports/EPC/EPC-Annual-Report-2014-2015.pdf>

³⁰ Current exchange rate dated 16.03.2016(1 Samoan Tala = 43.21 vatu)

identified from UNELCO's financial statement analysis that UNELCO provides on average an annual provision of 96.5m vatu (34% of annual average salary cost) for severance, retirement and social security expenses which have accumulated a total balance of 405.8m vatu as at year ended 2015. As a result, UNELCO has provided accumulated salary related provisions of 4.10m vatu per staff (99 employees as at year 2015) which means that each Staff has accumulated on average accumulated employment benefits of around 14 months of their salary(which is 114% of their annual salary). It can be depicted from this analysis, that UNELCO's salary related provisions are overly inflated, not provided at a reasonable level and is one of the main factors resulting in the high cost of UNELCO's cost per employee.

It is imperative that UNELCO reduce its cost per employee overtime in order to minimize the increasing unfair burden on the electric customers and to bring down UNELCO's cost per employee to a reasonable level. Therefore, the Commission proposes a reduction of 12% to bring UNELCO's current cost per employee of 3.6m vatu (in year 2015) down to 3.2m (in year 2020). The reduction of 12% will be adjusted on a gradual basis for the next 5 years under both the personnel cost projection methods and can be mainly achieved by UNELCO through realigning the excessive salary provisions to a reasonable level.

Incorporating the adjustments for the labor productivity and the cost per employee, the projected personnel cost of UNELCO for the next 5 years under method 1-Regression Analysis is presented as per table 40 below:

Table 40 : Projected Personnel Cost (Method 1 – Regression Analysis)

Year	Energy Sold(MWh)	Customer Numbers	Network Line Meters(km)	Estimated Cost Function $Y = (207.38) + 0.01(X1) + (0.04)(X2) + 1.20(X3)$	Efficiency Factor	Projected Personnel Cost(Net of Efficiencies)	Regulatory Relations - Projected Personnel Expense	12% adjustment - Cost per Employee	Total Projected Personnel Cost
2016	59,765	14,820	635.66	454.18	10.58%	406.12	12.77	54.50	364.38
2017	62,178	16,021	666.07	463.65	10.58%	414.58	13.02	55.64	371.97
2018	64,009	17,144	697.93	473.34	10.58%	423.25	13.41	56.80	379.86
2019	65,705	18,094	731.32	490.42	10.58%	438.52	13.95	58.85	393.62
2020	67,449	19,061	766.31	509.10	10.58%	455.23	14.65	61.09	408.78
Average 2016 - 2020(Million Vatus)									383.72

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

Method 2 – Activity Based Quantitative Analysis

Method 2 adopts a similar approach used by UNELCO to project the personnel cost for the next 5 years. The employees are categorized and their salaries are allocated according to their respective departments. Projections are based on the specific cost drivers affecting the particular departments employee cost. Table 41 below provides a summary of the personnel cost projections under method 2 (please refer to the URA Financial Model- O&M Expenses to view the detail calculations):

Table 41 : Projected Personnel Cost (Method 2 – Quantitative Analysis)

Departmental Employees	Personnel Cost Calculated under different Cost Drivers					Overall Average
	Electricity Generated	Energy Sales	Installed Capacity(MW)	T&D Network Length	Customer Numbers	
Generation	39.78		37.87			37.87
Transmission & Distribution		71.08		79.94	89.78	80.27
Commercial	36.72		32.51		35.57	34.93
Tanna & Malekula		12.91		11.84	14.57	13.11
Management and SG&A		165.20		180.65	194.28	180.04
Regulatory Department						13.56
TOTAL(Million Vatus)						359.78

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

Note: Overall Average is not taken for Generation Employee Cost as Electricity Generation does not have a strong correlation with the personnel cost and employee numbers.

The following assumptions were used to project the personnel cost under method 2:

- The different cost drivers used to project respective departmental personnel cost were analyzed under correlation test to establish a strong relationship. Correlation test were performed for both the employee numbers and employee cost with their respective cost drivers.
- Where more than one cost driver is established to drive the particular departmental employee cost, an average is calculated.
- Cost per employee for all departments has been adjusted down by 12% as per justified in the above sections.
- Target Labor productivity factor has been established separately for each department employees in a manner similar to method 1.
- The Staff determined the projected salary of the proposed regulatory department employees by reducing UNELCO's proposed projections by 10% for the Regulatory Manager, 20% for the Technical & Financial Analyst and 40% for the Regulatory Relations assistant position. The adjustments were made to bring down UNELCO's proposed salary to a reasonable level for these three positions. Table 42 below presents the abstract of personnel cost projections under both the methods:

Table 42 : URA Determination Projected Personnel Cost

URA PROJECTION - Method 1			URA PROJECTION - Method 2			
Year	Total Employees	Personnel Cost	Year	Total Employees	Personnel Cost	Cost per Employee
2016	na	364.38	2016	104.15	339.56	3.26
2017	na	371.97	2017	107.61	349.55	3.25
2018	na	379.86	2018	111.72	360.57	3.23
2019	na	393.62	2019	114.86	369.82	3.22
2020	na	408.78	2020	117.98	379.37	3.22
Average	na	383.72	Average	111.26	359.78	3.23
Overall Average(Method 1&2)		364.57 (Million Vatus)	<i>(Composite Weighting 20% Method 1 & 80% Method 2)</i>			
Average Cost per Employee		3.28 (Million Vatus)				

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

The projected personnel cost of UNELCO calculated under both the methods results in a similar output (only 6% variance). The Staff has proposed to project UNELCO's personnel cost by calculating an overall average for both the methods, however allocating a greater composite weighting of 80% to method 2, since it is deemed to be a superior approach. Overall, the Staff has determined UNELCO's annual average personnel cost to be **VT 364.57m** for the proposed tariff review period with an annual average cost per employee of 3.28m vatu.

6.3 Equipment & Materials

Equipment & Material expenses are the costs incurred by UNELCO in maintaining and operating its generation, transmission, distribution and general plant assets. The equipments and materials that are been purchased for capital projects, used for construction and third party works or are associated with any other asset investment works are capitalized and not treated as an E&M expense.

UNELCO has stated that their E&M cost are essentially linked to the transmission and distribution network and as such the total projected cost should follow the evolution in the number of kilometres of T&D lines with respect to volume effect. Table 43 below presents UNELCO's projection of E&M expenses over the next 5 years:

Table 43 : UNELCO Projection – E&M Expenses

UNELCO Analysis Equipment and Materials 2016-2021							
Million Vatus2015	Projection basis	2016	2017	2018	2019	2020	2021
2011-2015 average	71.5						
Projected T&D line meters	620,774	698,193	736,193	780,193	809,193	836,193	863,193
Equipment & Materials		80.4	84.8	89.8	93.2	96.3	99.4

Data Source: UNELCO Tariff Application V2 (2016-2021)

URA Determination

The Staff does not agree with UNELCO that the E&M expenses are highly driven by the extension of their network line meters. The actual E&M expenses for UNELCO over the past 5 years(2011-2015) has been significantly decreasing on an annual average rate of 22% while the network line meters in the same period increased on an annual average rate of 5%. Table 44 below presents the actual cost of Equipment and Materials over the past 5 years (2011-2015), with the additional columns of prospective cost drivers that are likely to drive the E&M cost:

Table 44 : URA Determination – E&M Expenses

URA Analysis Equipment and Materials 2016-2020							
Actual Results							
Year	E&M Actual Cost	Line Meters	Energy Sold	Customer No.s	Generation(MWh)	Correlation Test	
2011	113.80	503.20	53,434	10998	60,632		<i>E&M Actual Cost</i>
2012	86.10	524.10	53,371	11546	60,131	E&M Actual Cost	1
2013	74.10	554.40	54,346	12513	60,976	Line Meters	-0.932976164
2014	33.60	570.90	53,511	13488	61,200	Energy Sold	0.503794621
2015	35.00	606.63	49,848	14331	56,821	Customer Number	-0.960567886
						Generation(MWh)	0.408749211
URA Projections							
Avg(2012-2015)	AAGR(2014-2015)	2016	2017	2018	2019	2020	Avg(2016 - 2020)
57,208,349	4.07%	59,535,173	61,956,636	64,476,586	67,099,030	69,828,136	64,579,112

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

As per the results of the correlation test, none of the identified cost drivers seemed to have a strong relationship with the E&M cost, therefore it is not reliable to base our projections on any of the prospective cost drivers identified above. The staff used the average of 2012 to 2015³¹ as the projection basis to forecast the E&M expenses and allocated an annual average growth rate of 4.07%(AAGR 2014-2015) to accommodate for any increase in the additional requirements for equipment and materials for the next 5 years. UNELCO claims no further efficiency gains to be expected in this cost item as it is already leveraging

³¹ The actual cost of 2011 was excluded from the average it was considered to be unreasonably high and may have contained capitalized cost due to incorrect allocation by UNELCO and is regarded as an outlier.

ENGIE procurement agreements when possible so as to benefit from economies of scale on procurement contracts. Therefore, the Staff has not proposed efficiency gains on this cost item and has determined UNELCO's annual average E&M cost to be **VT 64.58m** for the proposed tariff review period.

6.4 Subcontracting and Services

As per UNELCO's 2015 audited financial statement, Subcontracting and Services expense (456.4m vatu) accounts for the highest proportion(38%) of UNELCO's total Operating and Maintenance expenses(1,208m vatu) excluding fuel cost. Table 45 below provides the breakdown of the actual cost components of the subcontracting and services expense over the past 5 years:

Table 45 : Breakdown of Subcontracting & Services Expense

Breakdown - Subcontracting & Services	2011	2012	2013	2014	2015
Subcontractors	19,606,581	17,575,303	18,804,762	25,259,648	23,840,085
Other purchases	23,497,117	23,132,535	19,859,574	24,974,557	29,572,954
Third party services	394,373,164	399,357,582	389,156,308	398,933,047	392,165,045
Other operating expenses	480,719	2,427,373	3,859,294	3,658,362	10,832,641
TOTAL	437,957,581	442,492,793	431,679,938	452,825,614	456,410,725

Source: URA Staff Analysis – UNELCO 2015 Audited Financial Statements

6.4.1 Third Party Services

As shown in the above table, third party services are the major component of UNELCO's total subcontracting and services expenses and it includes expenses such as general subcontracting, outsourced IT services, rent, repairs & maintenance, insurance, intellectual service fees, marketing and communication, professional services etc. Table 46 below provides the breakdown of the third party expenses over the past 5 years:

Table 46 : Breakdown of Third Party Expenses

Breakdown of Third Party Expenses	2011	2012	2013	2014	2015
General Subcontracting	85.0	87.9	98.6	110.4	195.3
IT Services	56.6	55.3	65.4	55.8	42.4
Real Estate & Other Rentals	65.2	61.1	69.6	67.8	108.3
Maintenance & Repairs	33.3	35.3	18.1	16.9	23.5
Insurances	19.2	19.8	18.8	18.6	13.0
Research & Development	0.1	0.2	9.3	1.6	1.6
Detached Labor & temporary workers	1.0	1.2	1.1	0.4	12.2
Professional Services(legal,consulting,audit,notaries, resell point fees)	69.8	69.2	38.4	69.2	49.3
Transportation, travel & logistics	34.2	28.7	22.3	25.9	47.4
Marketing & Communication	23.6	33.0	29.7	32.0	29.8
Postage & Telecoms	11.1	10.7	11.2	12.6	14.0
Other: Vegetation, trimming, security, building and grounds, docum	21.1	25.3	18.1	20.3	21.2
Capitalized Portion of third party services	(25.8)	(28.5)	(11.4)	(32.6)	(165.7)
Total(Million Vatus)	394.4	399.2	389.2	398.9	392.3

Source: UNELCO Tariff Application V2 (2016-2021)

UNELCO believes that the projected third party services expense will increase progressively with the increase in the customer numbers and therefore has used the future customer growth rate to project the third party expenses which is summarized in table 47 below:

Table 47 : UNELCO Projected Third Party Expenses

Million Vatus	2016	2017	2018	2019	2020	2021
Third Party Services	432.4	457.6	480.5	500.5	521.8	544.2

Source: UNELCO Tariff Application V2 (2016-2021)

This particular cost component was not appropriately addressed in UNELCO's tariff application, which brings into focus the issue of known and measurable cost. The Staff needs to ascertain that the constituent

third party transactions cost represent legitimate expenditures and are reasonably incurred in connection with the provision of electricity services.

UNELCO's letter dated 23rd of May, 2016 informed URA Staff that UNELCO would file its application for the tariff review (2016-2021) on the 24th of July 2016. Being informed on this matter and prior to receiving UNELCO's tariff application, the URA Staff proactively issued a letter to UNELCO dated 16th of June 2016, requesting to conduct an audit of major cost items (of which third party service cost was of prime focus) and fixed assets. Terms of audit engagement was also attached to the letter and UNELCO was required to formally provide its acceptance and agreement to the proposed audit engagement in writing to URA. The Staff did not receive a positive feedback and cooperation from UNELCO and as a result the on field audit was not possible to be carried out.

The above non cooperation by UNELCO limited the Staffs capacity to evaluate the historical records of UNELCO's third party transaction cost (including the related party transactions with its affiliate companies), review any trends and anomalies in the expenses, identify cost that were not related to the provision of electricity services, unregulated costs and the type of costs included and the reasonableness of these costs.

Following the above, the Staff further requested UNELCO as per its letter dated 16th September, 2016(in regards to additional data/information request) to provide the following detailed information on the sub contractor and third party services expense in order to assist in the Staff evaluation of a prudent and reasonable level of third party cost to be allowed for the proposed tariff review period:

- Breakdown of third party costs into sub-categories for the past 5 years (2011-2015) and the cost to be divided between related (affiliate) and unrelated parties.
- List and details of shared resources or in kind services received or performed between related and unrelated parties.
- The above breakdowns to include the type of service, frequency of transactions, total cost and unit price at which the transactions are carried out.

To the date of drafting this Staff Report, UNELCO did not provide the above information as per our requirement, which further limited the Staff's ability to carry out an effective assessment of UNELCO's third party services cost. The only information provided by UNELCO on the third party transactions was the breakdown of the financially related entities, the nature of services and the corresponding transaction value presented under the 2015 RRR reporting. Table 43 below provides the details:

Table 48 : UNELCO Financially Related Entities

Related entities by ownership		
Related entity name	Nature of operations/products/services provided	Total transactions in VUV
COFELY VANUATU LTD	Coconut oil supply, Service Delivery & Rentals	235,116,665
Related entities by subcontracting		
Related entity name	Nature of operations/product/service provided	Total transactions in VUV
SSP	Gasoil+Oil	1,135,281,880
SUNZIL PACIFIC	Solar panel supplier	109,599,980
ELECTRICITE ET EAU DE CALEDONIE	Service delivery + material provided	85,649,621
CAILLARD & KADDOUR	Premises rentals	73,725,133
VATE ELECTRICS	Electric connections Works	70,348,915
GENERAL MAINTENANCE SERGIO DESO	Pruning, maintenance & electrification works	52,431,614
BLUESCOPE WATER TANKS	Water Tanks	45,109,156
LIXIN TOP POWER	Prepayment meters, readers and cards	44,757,949
MAN DIESEL & TURBO AUSTRALIA	Maintenance Electric Production Group	37,748,066
ELYO PACIFIQUE INFORMATIQUE	IT services	35,692,791
MINTERELLISON LAWYERS	Lawyers fees	34,803,959
COFELY SOCOMETRA NC	Service delivery	32,079,942
SWITCHED-ON ELECTRICAL	Disconnections, Return to service after disconnection	31,991,726
NEXANS CABLES	Cable supplier	29,980,052
SDV-TTI	Freight services	28,089,226
SCHNEIDER ELECTRIC INTERNATIONAL	Electric material supplier	22,257,421
ERAPO DIGGER SERVICES	Sliced works	21,707,324
THRIFTY AUTO CENTER	Vehicule supplier and maintenance services	20,151,489
RETIS SOLUTIONS	Electric material supplier	18,929,191
ALBARTAIN FRANCE SAS	Materials electrification	17,420,420
COFELY ENDEL GDF SUEZ	Service delivery	17,240,109
STATION AU BON MARCHE	Vehicle fuel	15,333,746
MECELEC INDUSTRIES	Electric meter supplier	14,957,928
ENT TRAVERSO SANDRINO	Truck leasing	14,064,812
ELECTRICITE DE TAHITI	Service delivery	13,363,252
ENGIE ENERGIE SERVICES	Insurance RC & Services	13,005,689
AON VANUATU LIMITED	Insurance	12,360,712
TELECOM VANUATU LTD	Telecommunication	12,352,328
TRANSFIX	Electric Transformer supplier	10,520,260

Data Source: 2015 UNELCO RRR Reporting

As a result of UNELCO's non cooperation with the planned URA audit and failure to provide the additional data/information as per our requirements, the Staffs were not able to carry out an effective determination of UNELCO's cost allowance for the third party services. Staffs major concern in this area is the related party transaction with UNELCO's sister company Cofely, since with other third party suppliers, the staff believes that a market price or competitive environment exists that allows UNELCO to find the best available price. However, it is still subject to verification by Staff.

UNELCO is one of a number of subsidiaries of its parent company, and the terms of their intercompany agreement allow the parent and other subsidiaries such as Cofely in Vanuatu to charge unspecified fees for services rendered to UNELCO. Under these circumstances, a thorough audit cannot determine real profits unless the auditors have access also to the accounts of any associate companies to whom large payments have been made. Upon information request from UNELCO, Staff was able to obtain the financial statements of Cofely for the years 2013 to 2016 with the details of other intercompany/affiliated transactions between UNELCO and Cofely since January, 2013.

Since UNELCO supplied the above information on 9th of March, 2017, the URA Staffs are in the interim process of conducting a detailed investigation on the affiliate transactions which will also require a regulatory audit. With the currently available information and at the initial stage of Staff analysis, it was identified that, as per Cofely's 2015 financial statement, approximately 94% of Cofely's revenue is generated through transactions with its sister company, UNELCO. Staff also identified certain intercompany/affiliate transactions with supporting source documents in the area of real estate and other rentals, wind farm

maintenance, IT services, consultancies, solar farm maintenance, truck rentals, bio fuel developments, water services etc which may not represent an "arm's-length" transaction. UNELCO seems to be vertically integrated with its sister company Cofely in its organizational structure, and because of the close relationship that exists between the utility and its affiliate company, the URA Staff must carefully scrutinize the transactions in order to determine whether expenses are reasonable, prudent and carried out at an "arms length" (seeking cooperation from UNELCO on the regulatory audit).

UNELCO must affirmatively demonstrate the reasonableness of its transactions carried out with Cofely and must meet a higher standard of proof of reasonableness. Due to the limitations discussed in assessing the reasonableness of UNELCO's third party services cost, Staff decided to determine UNELCO's projected third party service cost by taking an average for the past 5 years (2011-2015) and implementing specific adjustments based on staff assumptions of imprudent and unreasonable cost. Table 49 below provides the summary of the staff determination of UNELCO's third party services cost:

Table 49 : URA Determination – Third Party Services

URA Determination	Million Vatus
Average Third Party Expenses (2011 - 2015)	394.8
<u>Less: Assumed Level of imprudent & unreasonable cost</u>	
General Subcontracting - Assumed 15%	17.32
IT Services - Assumed 15%	8.27
Real Estate & Other Rentals - Assumed 15%	11.16
Professional Services - Assumed 90% reduction	53.26
	90.00
<u>Less: Expenses Not Allowed</u>	
Detached Labor & temporary workers	3.2
Net Determination	301.62

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

The staff has applied an adjustment of 15% to the general subcontracting, IT services and real estate rentals as its believes that the greater portion of these transaction are carried out with UNELCO's affiliate companies and part of the expenses may not been carried out at an arm's length transaction or reasonably incurred in the provision of electricity services (verified from the invoices received from UNELCO). However, URA would be happy to change this determination if UNELCO agrees to proceed with regulatory audit engagement and audit results will justify different determination.

A further adjustment of 90% is made for the professional fees as the Staff believes that a significant proportion of this cost component is related to the litigation expenses which have been incurred by UNELCO to defend its rights to Luganville electricity concession and disputes between UNELCO and URA. These expenses should not be charged to the customers as it is not reasonably incurred in the provision of electricity services but to protect the private interest of UNELCO. Therefore, based on the regulatory principle of known and measurable cost, the above adjusted expenses were not allowed and excluded from the proposed third party expenses for the revenue requirement. The URA Staff has determined UNELCO's third party services cost for the proposed tariff review period to be on an annual average of **VT 301.62m**.

The purpose of imposing this higher burden is to safeguard against illegitimate profits acquired by the utility through excessive payments to affiliates, payments that are ultimately made by utility consumers. Currently there are no rules governing relationships between utilities and their affiliates in Vanuatu, therefore the inherent risk of self-dealing, evading regulatory limits on profits is high. The Staff has made the above assumed reductions based on the initial assessment of currently available data for UNELCO's affiliate transactions with Cofely which identified various levels of anomalies and unreasonable costs in the areas discussed above. The investigation and assessment of UNELCO's affiliate/intercompany transactions will be

treated as a separate review by URA Staff and once the report is finalized, a one-off adjustment will be made to the new base price which will be based on the redetermination of UNELCO's third party services cost.

6.4.2 Subcontractors

This line item includes other subcontracting expenses that are not of a capital nature. The average cost of the subcontracting operational expenses over the past 5 years (2011-2015) was 21.01m vatu and UNELCO assumes that the future cost will be driven by the increase in the customer numbers. Therefore, UNELCO has projected its subcontracting expenses in linearly to its increase in the future customer numbers. Table 50 below provides the forecast by UNELCO:

Table 50 : UNELCO Projections – Subcontracting Expense

Million Constant Vatus2015	Projection basis	2016	2017	2018	2019	2020
Reference cost	21.7					
Number of customers	13,860	15,021	16,244	17,352	18,324	19,354
Projected Subcontracting Expense		23.5	25.4	27.2	28.7	30.3

Source: UNELCO Tariff Application v2 (2016-2021)

The Staff reviewed the projections by UNELCO and accepts UNELCO's assertion that the customer numbers is the major cost driver of the subcontracting expense (also proven under the correlation test). However, the staff noted that UNELCO has included the materials and equipment cost in its projections. The E&M cost has already been calculated and allocated in the above sections, therefore the staff regards this expense to be double counting and has been removed from the Staff projections. Table 51 below provides Staff projections for the subcontracting expenses:

Table 51 : URA Determination – Subcontracting Expense

URA Analysis Subcontracting								
Year	Actual Cost	Energy Sales	Customer No.	Generation	Correlation Test			
2011	19,606,581	53,434	10,998	60,632	<u>Subcontracting</u>			
2012	17,575,303	53,371	11,546	60,131	Subcontractin	1		
2013	18,804,762	54,346	12,513	60,976	Energy Sales	-0.494889147		
2014	25,259,648	53,511	13,488	61,200	Customer Nu	0.806497233		
2015	23,840,085	49,848	14,331	56,821	Generation	-0.307476749		
URA Projections								
Average(2011 - 2015)		2015	2016	2017	2018	2019	2020	Avg(2016 - 2020)
11,957,276	Customer Numbers	14,331	14,820	16,021	17,144	18,094	19,061	
	Projected Cost		12,365,228	13,367,385	14,304,460	15,096,820	15,904,192	14,207,617

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

The Staff determines UNELCO's subcontracting expenses to be on an annual average of **VT 14.2m** for the proposed tariff review period.

6.4.3 Other Purchases

Other purchases include SG&A expenses such as office furniture, consumables, minor building maintenance, workshop equipment and upkeep of grounds etc. UNELCO believes that the employee numbers are the major cost driver for this cost item and has projected the other purchases in proportion to the increase in the future employee numbers. UNELCO's projected other purchases expense is detailed below:

Table 52 : UNELCO Projections – Other Purchases

Million Constant Vatus	Projection basis	2016	2017	2018	2019	2020	2021
Reference cost	25.0						
Number of employees	99.0	116.6	125.3	133.2	138.7	144.1	149.7
Projected Other Purchases		29.4	31.6	33.6	35.0	36.4	37.8

Source: UNELCO Tariff Application v2 (2016-2021)

The Staff accepts the methodology used by UNELCO to project the other purchases expense. However, the Staff has recalculated UNELCO's projections based on nominal vatus and staff determined employee numbers. For the proposed tariff review period, the Staff has determined the other purchases expense for UNELCO to be on an annual average of **VT 27.2m** which is presented in table 53 below:

Table 53 : URA Determination – Other Purchases

URA Analysis Other Purchases								
Year	Other Purchases	Energy Sales	Customer No.s	Generation	Employee No.s	Correlation Test		
2011	23,497,117	53,434	10,998	60,632	95.70	<i>Other Purchases</i>		
2012	23,132,535	53,371	11,546	60,131	95.80	Other Purcha	1	
2013	19,859,574	54,346	12,513	60,976	93.80	Energy Sales	-0.931765052	
2014	24,974,557	53,511	13,488	61,200	95.10	Customer Nu	0.653428417	
2015	29,572,954	49,848	14,331	56,821	99.00	Generation	-0.826047656	
						Employee No	0.937170418	
URA Projections								
Average(2011 - 2015)		2015	2016	2017	2018	2019	2020	Avg(2016 - 2020)
24,207,347	Employee Numbers	99.00	104.15	107.61	111.72	114.86	117.98	
	Projected Cost		25,465,923	26,312,761	27,318,116	28,084,636	28,848,773	27,206,042

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

6.4.4 Other Expenses

This line item includes small damages, rounding in disfavour of UNELCO and have been projected based on the evolution of customer numbers. Table 54 below provides UNELCO projections:

Table 54 : UNELCO Projections – Other Expenses

Million Constant Vatus	Projection basis	2016	2017	2018	2019	2020	2021
Reference cost	4.3						
Number of customers	13,860	15,021	16,244	17,352	18,324	19,354	20,443
Projected Other Expenses		4.6	5.0	5.3	5.6	5.9	6.3

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

The Staff accepts the methodology used by UNELCO to project the other expenses. However, the Staff has recalculated UNELCO's projections based on nominal vatus and staff determined number of customers. For the proposed tariff review period, the Staff has determined the other expenses for UNELCO to be on an annual average of **VT 5.05m** which is presented in table 55 below:

Table 55 : URA Determination – Other Expenses

URA Analysis Other Expenses								
Year	Other Expenses	Energy Sales	Customer No.	Generation	Employee No	Correlation Test		
2011	480,719	53,434	10,998	60,632	95.70		<i>Other Expenses</i>	<i>Energy Sales</i>
2012	2,427,373	53,371	11,546	60,131	95.80	Other Expenses	1	
2013	3,859,294	54,346	12,513	60,976	93.80	Energy Sales	-0.86996	1
2014	3,658,362	53,511	13,488	61,200	95.10	Customer Nu	0.881226	-0.649165053
2015	10,832,641	49,848	14,331	56,821	99.00	Generation	-0.87557	0.972619169
						Employee No	0.753483	-0.977535343
URA Projections								
Average(2011 - 2015)		2015	2016	2017	2018	2019	2020	Avg(2016 - 2020)
4,251,678	Customer Numbers	14,331	14,820	16,021	17,144	18,094	19,061	
	Projected Cost		4,396,734	4,753,074	5,086,272	5,368,013	5,655,093	5,051,837

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

6.5 Taxes and Other Related Items

Taxes and Other Related Items includes professional tax, real estate taxes, vehicle taxes, airport levies, road taxes, custom duties, visas, work permits, exemptions, land registrations, VFSC, Article 6 fund etc which are annual compulsory expenses for UNELCO. The annual allocations of the Article 6-Investment Support fund forms the major proportion of this cost item. As per the concession agreement, the amount of this allocation shall be indexed to price “P”. UNELCO has assumed that fossil fuel costs will increase by 2.5% p.a and therefore based on other assumption of the increase in price “P”, UNELCO has projected its increase in annual allocations of Article 6 fund by an annual average growth rate of 6% over the next 6 years (2016-2021). For other taxes and related items, UNELCO has made its projections based on the evolution of customer numbers. UNELCO’s projections for the next 5 years are as follows:

Table 56 : UNELCO Projections – Taxes & Other Related Items

Million Vatus	Projection basis	2016	2017	2018	2019	2020	2021
Article 6 fund	8.1	10.0	10.1	10.3	10.4	10.5	10.6
Other Taxes		13.3	14.4	15.4	16.3	17.2	18.1
Projection basis	12.3						
No of customers	13,860	15,021	16,244	17,352	18,324	19,354	20,443
TOTAL		23.3	24.5	25.7	26.7	27.7	28.7

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

The Staff does not accept UNELCO’s above methodology used for projections. The allocations for Article 6 funds cannot be based on the projections for an annual growth rate of 6% for price “P” as the future determinants of price “P” are quite uncertain, therefore may either result in an increase or decrease in price “P”(decrease in price “P” will result in a reduction of the annual allocations). This is well proven from the historical analysis of the annual actual allocations of the Article 6 funds whereby the actual allocations was reduced by 2% in year 2012, increased by 5% in year 2013 and from there on faced a continuous decline by 5% and 14% in year 2014 and 2015, respectively. Therefore, the Staff believes that due to the high uncertainty of the future price “P”, the best approach is to determine the annual allocations of Article 6 funds based on the average for the past 5 years (2011-2015). URA Staff understands that Art. 6 fund is currently under review between Govt. and UNELCO. If the Fund is discontinued or revised then appropriate adjustments to the Rev. Requirements will be made.

In addition, the other taxes and related items should also be determined based on the average for the past 5 years with a provision of 2% increase in future taxes(customer numbers does not drive the cost of taxes to that extent as these cost are normally regarded has having a higher fixed cost component). The Staff determines UNELCO's Taxes and Other Related items to be on an annual average of **VT 21.93m** for the proposed tariff review period. Table 57 below outlines Staff calculations:

Table 57 : URA Determination – Taxes & Other Related Items

Breakdown of Taxes & Related Items	2011	2012	2013	2014	2015	Avg(2011-2015)
Professional Taxes	1.1	1.1	1.1	1.1	1.1	1.1
Real Estate Taxes	6.4	3.3	2.7	3.1	2.9	3.68
Vehicle taxes	1	1	1.7	1.1	1.1	1.18
Other Miscellaneous Taxes	6	6.5	8.3	6	7.3	6.82
Capitalized Portion of taxes	-0.6	-0.6	-0.6	-0.8	-1.1	-0.74
Article 6 fund	9.8	9.6	10.1	9.6	8.2	9.46
Total	23.7	20.9	23.3	20.1	19.5	21.5
URA Determination						
Average(2011-2015)	21.5					
2% provision for Inc in annual taxes	0.43					
Total(Million Vatus)	21.93					

Data

Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

6.6 Depreciation, Provisions & Allowances

6.6.1 Depreciation and Amortization

In public utility regulation, depreciation is generally defined as the loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of utility plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in demand and requirements of public authorities.

The concession contracts for UNELCO are specific as to how depreciation expenses should be calculated for tariff review purposes for all three concessions (Port Vila, Malekula, Tanna). Article 4, subsection 16 of Port Vila concession states that the difference at the end of each financial year between the Revalued Asset Transfer Fund (Revalued Accumulated Depreciation) and the aggregate of the Asset Transfer Fund (Accumulated depreciation at historical cost) shall not constitute an expense to be debited to the trading account and shall not be taken into account when reviewing the prices. The similar provision also applies to UNELCO's private assets whereby article 7, subsection 34 of Port Vila concession states that “the difference between the amount of ordinary depreciation revalued and the aggregate of the provisions made shall not constitute an expense to be debited to the trading account and shall not be taken into account in the calculation of the rates, but shall be accounted for, through the profit and loss account as a charge against the “Private fixed assets revaluation reserve”. Furthermore, the concession contracts for Malekula and Tanna Island requires the assets to be entered and depreciated at both the historical cost.

UNELCO's projected depreciation expenses for the proposed tariff review period were not appropriately addressed in its tariff application. UNELCO only provided a table consisting of numbers representing depreciation expenses associated to the existing and additional assets to be added during the 2016-2021 period. There was no explanation or justification provided by UNELCO on how these numbers were calculated and projected. Table 58 below provides UNELCO's projections for the depreciation expense:

Table 58 : UNELCO Projections – Depreciation Expense

Dep by Concession	2016	2017	2018	2019	2020	2021
E.faté depreciation	295,957,848	331,318,319	370,214,652	397,850,724	428,679,819	462,271,816
Malicōlo depreciation	15,635,913	18,515,923	21,422,423	21,626,018	25,809,614	25,220,205
Tanna depreciation	13,589,118	18,653,889	25,490,818	26,642,880	27,015,448	29,244,699
Projected Dep Exp	325,182,879	368,488,131	417,127,893	446,119,623	481,504,881	516,736,719

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

As per Article 4, subsection 12 of the concession agreement, UNELCO is required to maintain a separate account to be known as “Asset transfer fund” to record accumulated depreciation calculated at historical cost of the assets. The Staff requested UNELCO in its letter dated 16th September, 2016(in regards to the request for additional data/information) to provide the depreciation expense and accumulated depreciation calculated at historical cost. UNELCO did not provide the information as requested, however provided a fixed asset register which included assets and accumulated depreciation reported at revaluated amounts.

Article 4, subsection 14 further states “Annual Allocations calculated on historical cost in vatu and credited by the CONCESSIONAIRE to the “Asset transfer fund” shall be revalued in the same way, by applying the appropriate revaluation coefficient based on the materials and equipment index for industrial products to the actual allocation of a given year. The aggregate of such revalued asset transfer depreciation allocations shall appear in the CONCESSIONAIRE’s balance sheet under the heading “Revalued asset transfer fund”. Therefore, according to the provisions of Article 4, subsection 12 and subsection 14, UNELCO is required to maintain two separate accounts in its books (Asset Transfer Fund a/c & Revalued Asset Transfer Fund a/c).

In order to ascertain if UNELCO is following the provisions of Article 4 subsection 16 and Article 7 subsection 34, where both the provisions require UNELCO to determine the depreciation expense based on historical cost, Staff calculated the difference between the revalued accumulated depreciation for the year ended 2015(2,971,320,272) and for the year ended 2014(2,739,806,093). The difference of 231,514,179 vatu was calculated and this is exact amount recorded as the depreciation expense for concession assets in UNELCO’s 2015 audited financial statements (Year 2015 was used as there were no reversals in the accumulated depreciation for this period).

Therefore, the Staff has determined that UNELCO is acting contrary to the concession agreements in calculating and allocating its annual depreciation expense based on the revalued assets rather than at historical cost. The Staff was required to recalculate the depreciation expense for the year 2015 based on the historical cost for tariff purposes. Table 59 below provides Staffs calculations of adjusting the Revalued depreciation expense to be based on historical cost:

Table 59 : Staff Recalculation of Depreciation Exp at Historical Cost

Adjustment for Revalued Asset Transfer Depreciation as at 2015	
Gross Value of Assets as at 2015	8,267,487,090
Less: Total Revaluation Surplus as at 2015	1,097,615,463
Gross Value of Assets at Historical Cost	7,169,871,627
Percentage Increment Revaluation	15.31%
Depreciation Expense - Intangible Assets	1,644,601
Depreciation private assets serving the concession(Port Vila Concession only)	31,345,149
Depreciation concession assets - Financial impairment (Port Vila Concession)	231,514,179
Total Revalued Asset Transfer Depreciation	264,503,929
Dep Exp at Historical Cost- Port Vila Concession(Adjusted for Revaluation @ 15.31%)	224,011,767
Add: Depreciation concession assets - Technical (Mallicolo and Tanna)	20,508,807
Depreciation private assets serving the concession(Mallicolo and Tanna)	5,867,850
Less: Adjustment for Depreciation Exp for Intangible Assets	(1,168,782)
Depreciation Expense at Historical Cost as at Year 2015	249,219,642

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements

Data Analysis: URA Staff

The Staff has recalculated the depreciation expense for the year 2015 based on historical cost (using the calculated revaluation increment of 15.31%) and has determined the depreciation expense to be 249.2m in contrary to UNELCO's revalued depreciation expense of 290.9m for the year 2015. The Staff has made an additional adjustment of depreciation expense for the intangible assets as it does not consider such depreciation to be the real cost necessarily incurred in the provision of electricity service and has reduced it down to the level of approved(proportional) amount of intangible assets allowed under the regulatory asset base.

The depreciation rates are not intended for the purpose of achieving objectives other than the recovery of capital invested in a manner properly related to the useful life of the plant. The staff will not make any objections on the depreciation rates used by UNELCO as it is mandated by the concession contracts, and so must be used regardless of whether or not they are reasonable.

The allocation of depreciation expense calculated for tariff purposes must be systematic and rational. It is a process of allocation and not of valuation and should be calculated based on the current assets in operation. It should also be noted that depreciation expense is provided for the purposes of recovering the original investment in the assets concerned and not for providing for their replacement. Therefore, the Staff has used the actual (current) depreciation expense for the year 2015 as its projection basis and has allocated a compounded annual growth rate of 6.23%(calculated based on historical growth rate of actual depreciation expense for the year 2011-2015) to allow for any increases in the depreciation expenses. No provisions has been made for the depreciation expenses arising from the investment of additional assets as these will be offset with the reduction in the depreciation expenses of those assets which will exhaust its useful life in the next 5 years. However, incremental provision of 6.23% has been provided for any unexpected increase in the depreciation expense and to cater for the high depreciation expense for the new assets. Table 60, below presents Staff's projections for the depreciation expense determined on an annual average amount of **VT 299.8m** for the proposed tariff review period:

Table 60 : URA Determination – Depreciation Expense

2015(Adj for Historical Cost)	CAGR(2011-2015)	2016	2017	2018	2019	2020	Average(2016-2020)
249,219,642	6.23%	264,748,531	281,245,026	298,769,419	317,385,757	337,162,080	299,862,163

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements

Data Analysis: URA Staff

6.6.2 Renewal Provisions (Replacement Assets)

The annual renewal provisions are only made for Port Vila concession and are mandated by article 5 of the Port Vila concession agreement which states that the annual allocations of the renewal provisions shall be calculated as percentages of the revalued value of the assets as tabled in the books of the concessionaire at the end of each financial year. Table 61 below provides UNELCO's projections for the renewal provisions:

Table 61 : UNELCO Projections – Renewal Provisions

Million Vatus	2016	2017	2018	2019	2020	2021
Efaté renewal provision	120.8	126.9	132.9	139.1	145.7	152.5

Data Source: UNELCO Tariff Application v2 (2016-2021)

UNELCO did not provide proper calculations and basis for projecting its renewal provisions; therefore the Staff had to carry out additional analysis in order to validate the accuracy and reasonability of UNELCO's projections. The staff calculated UNELCO's Revalued Net Book Value of both the Concessionaire, Grantor (including third party) funded assets and compared with the actual annual renewal provisions to determine the appropriate allocation percentages. On average, the annual allocation percentage calculated was 2.19%. The same calculation was carried out, however based on the Gross Revalued value of the assets and on average the annual allocation percentage calculated was 1.22% which was very similar to average percentage allocations prescribed in the concession agreement of 1.17 % (Buildings 1%, T&D Network 1% and Generation assets 1.5%). Therefore, it was certain that UNELCO was calculating the annual renewal provisions based on the percentages of the Gross revalued value of the assets which is contrary to the concession agreements. Article 5, subsection 5.2 of the concession agreement does not stipulate UNELCO to calculate renewal provisions based on the Gross revalued assets.

Therefore, the staff has adjusted UNELCO's future annual renewal provisions based on the Revalued Net Book Value of the assets at a composite average allocation percentage of 1.25 % (as stated in the concession agreement; buildings 1%, distribution & transmission assets 1%, generating equipment at 1.5% - providing composite weighting based on the proportion of generation, T&D and other concession assets). The Staff has also provided for an increase of 3.18% in the future annual provisions based on the increase in the compounded annual growth rate of assets (calculated based on the historical growth rate of the assets). The Staff has determined UNELCO's annual renewal provisions to be **VT 72.4m** which is presented in table 62 below:

Table 62 : URA Determination – Renewal Provisions

Staff Calculations & Projections of Annual Renewal Provisions							
Annual Renewal Provisions	2010	2011	2012	2013	2014	2015	
Gross Revalued Port Vila Concession Assets	8,097	8,833	8,850	9,050	9,278	9,506	
Less Revalued Accumulated Dep	3,586	4,005	3,937	4,026	4,000	4,231	
Revalued NBV	4,511	4,828	4,914	5,024	5,278	5,275	
UNELCO Annual Renewal Provision	99.34	108.75	108.43	110.21	112.53	114.93	Avg(2010-2015)
% Annual Renewal Provision based on Gross Value of Ass	1.23%	1.23%	1.23%	1.22%	1.21%	1.21%	1.22%
% Annual Renewal Provision based on Net Book Value	2.20%	2.25%	2.21%	2.19%	2.13%	2.18%	2.19%
<u>Annual Allocation Percentages(Category of Assets) As per Concession Agreement</u>				<u>Composite Weighting(RRR Reporting)</u>			
Generating Equipment		1.50%		49.98%			
Distribution & Transmission Network		1.00%		33.92%			
Buildings		1.00%		16.09%			
Composite Average				1.25%			
Cost Driver - CAGR - NBV Assets(2011 - 2015)				3.18%			
	2015	2016	2017	2018	2019	2020	
NBV PV Concession Assets	5,275	5,443	5,616	5,794	5,978	6,168	
Annual Renewal Provision		68.03	70.19	72.42	74.72	77.10	
URA Determination(Avg 2016 - 2020)	72.49 (Million Vatus)						

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements

Data Analysis: URA Staff

6.6.3 Force Majeure Provision

UNELCO has established a force majeure provision account to cover its cost of repairs in case of damage from unforeseen events. UNELCO claims that its insurance only covers the generation assets and as a result it must collect the necessary funds for other expenses not covered by insurance through this provision. UNELCO has proposed an increase in its annual force majeure provision to 25m vatu per year, on the justification that UNELCO will have enough funds to cover damage from a cyclone such as Pam within the next 10 years. UNELCO's actual expenses (damages) incurred as a result of cyclone Pam in the year 2015 was 256.5m vatu which was paid from the accumulated balance of the force majeure provision. The remaining accumulated balance for the force majeure provision now stands at 264.7m vatu as at year ended 2015.

The Staff noted that UNELCO has breached article 9 of the Port Vila concession agreement which states that "Expenses relating to repairs of damages caused by events of force majeure which are not covered by insurances (such as damages to the aerial distribution network caused by cyclones) shall be at the expense of the Concessionaire". Prior to the repeal of sub section 42 of article 9 of the concession agreement, all repair expenses following force majeure events such as floods, earthquakes, volcanic eruptions, etc were to be debited to the replacement fund(therefore charged to the customers). However, sub section 42 was repealed on 25th of September, 1997 and the amended article 9 requires such expenses if not covered by the insurance to be borne by the Concessionaire. UNELCO has not adhered to the active provisions of article 9 and has transferred the total cost of **VT 511.7m** (current balance as at year 2014 which has been accumulated in its provision for force majeure account for the past years) to the customers through the tariffs.

Noting the large amount of the accumulated balances in the force majeure provision, it is highly certain (awaiting UNELCO's confirmation) that the provision account for the force majeure was created by UNELCO before the repeal of sub section 42 of article 9 which required UNELCO to charge all expenses related to a force majeure event to the replacement fund. UNELCO did not adhere to this provision at the time when sub section 42 was active and created a separate provision for the force majeure event resulting in a double charge to the customers.

As stated in UNELCO' tariff application, the provision for the force majeure was established by UNELCO mainly to cover damages for the transmission and distribution assets, since it is not covered by the insurance. Excluding the withdrawal of 256.5m vatu from the force majeure provision for the cyclone Pam expenses, as

at year 2014 the total accumulated balance in the force majeure account was approximately 41% of UNELCO's total historical net book value of the T&D assets.

Furthermore, the force majeure expense is a non regular expense item of the Utility business (disastrous event such as cyclone Pam may happen once in 20 years) and is a long term financial risk for investment which has been compensated to UNELCO under its cost of capital through the allocation of country risk premium. Country risk relates to the likelihood that changes in the business environment will occur that reduce the profitability of doing business in a country. Macro-socio-economic factors such as political instability, volatile exchange rates and economic instability (which may be induced, interalia, by such factors as the possibilities of social disruptions and adverse weather conditions) are considerations which lead investors to be wary of overseas investment opportunities. These factors can adversely affect operating profits as well as the value of assets and thus require a premium for investing. Consequently, any added element or incremental risk that is specific to a country or specific grouping of countries will be considered by potential investors and would be embedded in the CRP.

The premium for the country risk is allocated to UNELCO determined on an annual average basis, therefore during the years when there is no force majeure event; UNELCO is already receiving its returns for this particular risk which did not prevail. However, article 9 further states that if the amount of such expenses for the current financial year should result in operating losses, the parties shall define the necessary remedial action by common accord to balance the books of the concessionaire.

The Staff has determined to freeze further provisions to the force majeure account and has issued a letter to UNELCO on the non-compliance to its concession agreement and to discuss the remedial actions on the impact to the customers. In the interim period of the proposed tariff review, the Commission has decided to adjust the illegitimate charge of 511.7m vatu to the customers by implementing a 10 year spread recovery period adjusted for the future dollar value(at URA determined cost of capital). Table 63 below presents the annual cost recovery calculations:

Table 63 : URA Determination – Cost Recovery Force Majeure Provision

Accumulated Bal - 2014	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Average(2017-2026)
511.70	54.65	58.37	62.34	66.59	71.12	75.96	81.12	86.65	92.54	98.84	74.82

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements

Data Analysis: URA Staff

On an annual average, **VT 74.82m** will be deducted from UNELCO's Revenue Requirement.

6.6.4 Allowance for Inventory Obsolescence

UNELCO has maintained its level of obsolete inventory at a minimum and reasonable level. On average, UNELCO's annual Inventory obsolescence expense was 8.7m vatu per year. UNELCO has proposed to project the Inventory obsolescence based on the 5 year average cost which is presented in table 64 below:

Table 64 : UNELCO Projections – Inventory obsolescence

Million Constant Values	2011	2012	2013	2014	2015	Average
Inventory Obsolescence Provision	11.4	29.9	7.7	8.5	1.3	11.76
	2016	2017	2018	2019	2020	
Projected Inventory Obsolescence Exp	11.76	11.76	11.76	11.76	11.76	

Data Source: UNELCO Tariff Application v2 (2016-2021)

The Staff noted that UNELCO has not adjusted the annual reversals of the Inventory obsolescence expense to report the net expenses. Therefore, the Staff has accepted to forecast the Inventory obsolescence based on UNELCO's method of using the 5 years average, however will make the adjustment for reversal provisions in

order to reflect the actual expenses for the particular year. Table 65 below presents Staff's calculations and determination of the inventory obsolescence expense:

Table 65 : URA Determinations – Inventory obsolescence

Million Nominal Values	2011	2012	2013	2014	2015	Avg(2011 - 2015)
Inventory Obsolescence Provision	10,750,067	28,487,900	7,465,332	8,267,016	1,319,137	
Reversal of inventory obsolescence provision	(3,423,711)	(6,682,066)	(17,132)	(1,708,321)	(826,824)	
Net Expenses	7,326,356	21,805,834	7,448,200	6,558,695	492,313	8,726,280

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

The Staff has determined the Inventory obsolescence expense for the proposed tariff review period to be **8.7m** vatu.

6.6.5 Allowance for Doubtful Debt/Write-off Expense

The allowance for doubtful accounts represents management's best estimate of the amount of accounts receivable that will not be paid by customers. UNELCO has projected its bad debt expense by calculating an overall average for the past 5 years and increasing the calculated amount by an annual growth rate of 1.95% p.a (to account for the increase in demand and reference price P). Table 66 below presents UNELCO's projections:

Table 66 : UNELCO Projections – Bad Debt/Doubtful Debts

Million Constant Values	2016	2017	2018	2019	2020	2021
Projected Bad Debt Expense	21.1	21.5	21.9	22.4	22.8	23.2

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

Staff noted that UNELCO has not taken into account the annual reversals for the provision of doubtful debts while reporting its bad debt/doubtful expenses. Therefore, UNELCO's actual bad debts/doubtful debt expense was recalculated by adjusting the annual reversals and is represented with Staffs projections as per table 67 below:

Table 67 : URA Determination – Bad Debt/Doubtful Debts

Million Nominal Values	2011	2012	2013	2014	2015	Avg(2011 - 2015)
Provision for doubtful debt and write off	18.48	17.75	13.10	42.17	8.52	20.00
Reversal of provision for doubtful debt	-25.16	-5.07	-3.91	-17.81	-4.43	-11.28
Net Expenses(Bad Debt/DD)	-6.68	12.69	9.18	24.36	4.09	8.73
Electricity Sales	2998.70	3008.99	3073.66	3014.22	2527.32	2,924.58
Accounts Receivable	481.98	505.05	585.77	535.23	467.39	515.08
% of AR to Total Sales	16.07%	16.78%	19.06%	17.76%	18.49%	17.63%
% Bad Debt/DD to AR	-1.39%	2.51%	1.57%	4.55%	0.87%	1.62%
Projected Bad Debt/Doubtful Debt Exp	2016	2017	2018	2019	2020	
Projected Accounts Receivable	477.87	480.77	483.27	485.53	487.80	Avg(2016 - 2020)
Projected % Bad Debt/Doubtful debts	1.64%	1.65%	1.67%	1.68%	1.69%	
Projected Bad Debt/Doubtful Debt Expen	7.83	7.94	8.05	8.16	8.27	8.05

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

It can be depicted from the above table that UNELCO's Accounts Receivable balance has decreased by 20% from year 2013 and 13% from year 2014 when compared to its current accounts receivable balance as at year 2015. Year 2015 has recorded the lowest Accounts Receivable balance (467.39m) and bad debts expense (4.09m) when compared with the past 4 years. The Staff believes that the best method that can be used to project the bad debts/doubtful debts expense is to calculate the percentage of accounts receivable balance that were converted to bad debts/doubtful debts for the past 5 years and use the same percentage to forecast

the future provisions. This method works best for large numbers of small account balances and shows detailed calculation in the above table. The Staff has determined UNELCO's bad debt/doubtful debt expenses to be **VT 8.05m** for the proposed tariff review period.

6.7 Street Lighting Expenses

As per the commission order (Case U-0010-14) issued by URA and commenced dated 25th March, 2014 and the Street Lighting(SL) contract between UNELCO and the Municipality, the responsibility of operating and maintaining SL services has been transferred to UNELCO under the existing conditions prescribed in the above two mentioned documents. One of the major conditions under both the formal documents is the requirement for UNELCO to create a special account called "Regulatory Asset Account" to record and book all accrued expenses related to operating and maintaining SL services during the interim period and until such time transfer of SL assets from Port Vila Municipal Council (PVMC) to UNELCO is formalised.

Once the above mentioned transfer has taken place, UNELCO will be permitted to recover its accumulated expenses in the Regulatory Asset Account through a 5 year spread recovery period in the proposed tariff review. UNELCO has advised to URA via its letter dated 24th January, 2017 that the transfer of street lighting assets from PVMC to UNELCO is likely to be concluded at the date of the effective new electric tariff implementation. Therefore, based on this latest update on the transfer of SL assets, the Staff would allow UNELCO to recover its accumulated expenses in the Regulatory Asset account. However, if the transfer is still not finalized at the effective date of the new tariff, the URA Staff would revise the new tariff to reflect the current status of the SL transfer.

The Staff has accepted UNELCO's claim for the cost recoveries assuming that UNELCO has presented the actual cost accumulated in the Regulatory Asset account, however has made the following changes to determine the correct amount of cost recovery:

- UNELCO's cost recoveries were re-calculated to Vat Exclusive price. The Staff has already advised UNELCO in its letter dated 8th September, 2016 that the need and requirement to provide new SL posts at various locations requested by PVMC and any operations and maintenance carried out is to necessitate the proper operations and functions of the street lighting services which ultimately forms part of the prevailing SL agreement and the commission order. Therefore, UNELCO does not require issuing any invoice to PVMC for providing the new SL posts or for any repairs and maintenance, as this will possibly jeopardize the contemporary agreements that are in place. The supply and installation of new SL posts (including other maintenance & repairs) is not regarded as a sale transaction and charging of VAT to PVMC is not permissible. This is regarded as an internal transaction and in which case UNELCO is permitted to claim any VAT paid on the SL related cost under its electricity concession.
- The Staff has recalculated UNELCO's reasonable return associated to the accumulated balances in the regulated assets from April 2014 to October 2016 based on the URA determined cost of capital of 6.80% p.a.

Table 68 below provides the Staff determination of the cost recoveries of UNELCO's SL related cost accumulated in the Regulatory Asset account to be on an average of **VT 11.1m** per year after making the above two adjustments:

Table 68 : URA Determination – Street Lighting Related Cost Recoveries

URA Analysis STREET LIGHTING - Regulatory Asset Account						
Cost Category	2014 Actual(Apr-Dec)	2015 Actual	Actual 2016(Jan-June)	2016(4m Estimated)	Total	
Electricity Consumption	4,599,198	3,831,295	2,277,091	1,586,309	12,293,893	
Maintenance & Inspection	2,577,372	2,865,885	2,006,915	1,241,695	8,691,867	
Replacement & Improvement	0	3,973,883	2,255,222	1,311,391	7,540,496	
Renewal After Cyclone Pam	0	0	18,572,563		18,572,563	
Total(Recoveries)	7,176,570	10,671,063	25,111,791	4,139,395	47,098,819	
Total Recoveries(Converted to VEP)	6,379,173	9,485,389	22,321,592	3,679,462	41,865,617	
Reasonable Return(URA Determined WACC)	325,565	1,079,544	1,299,237	949,617	3,653,964	
Total Recoveries	6,704,739	10,564,934	23,620,829	4,629,080	45,519,581	
URA Projected Recoveries(SL RAA)	2017	2018	2019	2020	2021	Avg(2017-2021)
Port Vila SL RAA Recovery	9,723,415	10,385,070	11,091,748	11,846,514	12,652,641	11,139,878

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

Based on the premise that the SL assets will be transferred to UNELCO on the effective date of the new tariff, UNELCO has also incorporated the projected expenses for the operations of street lighting services to be included as part of its cost of services. Table 69 below provides UNELCO's projections for the street lighting related operational expenses:

Table 69 : UNELCO Projections – Street Lighting Expenses

Street Lighting Expenses	2016	2017	2018	2019	2020	2021
Electric Consumption	8,348,484	9,679,038	10,218,780	10,878,098	11,815,340	12,387,331
Maintenance and inspection	1,968,048	2,603,304	2,877,336	3,184,584	3,695,280	3,961,008
Total	10,316,532	12,282,342	13,096,116	14,062,682	15,510,620	16,348,339

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

The staff has accepted UNELCO's projections for the maintenance and inspection cost and have determined an average of **VT 2.9m** per year (based on the average of 2016-2020-UNELCO projections) for the proposed tariff review period. However, the Staff has rejected UNELCO's allowance for the electric consumption as this has been factored in the generation cost projections.

6.8 Other Recoveries

UNELCO has proposed the following cost recoveries to be adjusted to the Revenue Requirement for the proposed tariff review period:

Table 70 : UNELCO Proposed Summary of Other Recoveries

Million Vatus	2016	2017	2018	2019	2020	2021
Tariff Adjustment Formula error recovery	4.1	4.5	5	5.6	6.2	6.8
Misapplication of arbitration decision profit shortfall recovery	5.9	6.5	7.2	8	8.9	9.7
Force Majeure Profit Shortfall recovery	14.8	16.4	18.2	20.2	22.5	24.5
Tariff Review preparation cost recovery	2	2	2	2	2	2
Total Recoveries	26.8	29.4	32.4	35.8	39.6	43.0

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

The Staff has rejected UNELCO's proposal for the backdated cost recoveries as the claims submitted by UNELCO constitutes an impermissible retroactive rate making. This rule is consistent with the prospective nature of the Commission's legislative function in ratemaking. The Utilities cannot recover revenue deficiencies caused by insufficiency of prior rates because rate making is necessarily present and prospective. Furthermore, the fundamental principle of utility regulation is that utility rates are set for the future, and not

the past, therefore the generally accepted principle of public utility law recognizes the prospective nature of utility ratemaking and prohibits regulatory commissions from rolling back rates which have already been approved and have become final. Notably, during last tariff review the Arbitrator specifically disallowed retroactive adjustment of cost savings from the windmill farm and ruled that those could not be accrued to the customers.

6.9 Return on Investment

UNELCO is entitled to a reasonable return on its investment (RAB) through the tariffs that is charged to the customers. This return is compensation for capital which is invested in the regulated asset base and is computed by the application of a rate of return (Cost of Capital determined as per section 4 of the staff report) to the approved regulated asset base of UNELCO.

Table 71 below presents UNELCO's proposed and URA's determined parameters for the computation of return on investment:

Table 71 : Return on Investment (UNELCO Proposed & URA Determination)

Item(Million Vatus)	UNELCO (2016 Projection)	URA Determination
Regulated Asset Base	4809.4	3097.8
Rate of Return	8.79%(Real WACC)	6.80%(Nominal WACC)
Reasonable Return	422.7	210.8
Add: Third Party Asset Management Fee	28.9	0
Total Reasonable Return	451.6	210.8

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements

Data Analysis: URA Staff

UNELCO proposed to claim an additional VT 28.9m (based on 2016 projection) as a third party asset management fee to manage assets that were financed by the Grantor, donors, customers and other third parties. UNELCO asserts that the concessionaire has to endorse the responsibilities and risks associated with operating these assets and these responsibilities should be paid for through a management fee.

The Staff considers the inclusion of the third party asset management fee in the calculation of the reasonable return to be inadmissible. The rate of return determined as per section 4 of this order is calculated based on the Capital Asset Pricing Model (CAPM) which takes into account major components of risk identification and measurement (i.e. market risk premium, country risk premium, systematic risk etc) to ensure that the projected cost of equity for UNELCO adequately compensates the investors for the risk they incur. In addition, UNELCO is also allowed under its cost of services, the remuneration cost of its human resources for managing the third party funded assets. Therefore, the Staff declines this request from UNELCO and determines the reasonable return compensation of **VT 210.8m** for the 2016-2021 tariff review period.

6.10 Revenue Associated to Non-Regulated Services

The tariff base rate should only include those cost incurred by UNELCO in providing the electricity services to the customers (regulated services). However, UNELCO also generates revenues from non – regulated services for which the corresponding cost is included in the tariff base price (through cost of service component) and borne by the customers. Therefore, it is important that revenues from non-regulated activities are excluded from the Revenue Requirement in order to determine the Net Revenue Requirement which reflects the prudent cost of providing the electricity services. Table 72 below provides the summary of UNELCO's revenues from non-regulated services (Non-electricity sales revenue) for the past 5 years:

Table 72 : Summary of UNELCO's Non Regulated Revenues (2011-2015)

Million Vatus	2011	2012	2013	2014	2015	Avg(2011-2015)
Merchandise	2.53	4.20	3.43	0.16	0.05	2.07
Work	92.39	91.91	71.20	46.81	53.43	71.15
Services	4.12	4.35	3.23	8.95	8.99	5.93
Related activities	16.05	14.11	15.54	19.64	9.97	15.06
Other revenues	4.22	11.89	6.39	6.91	9.82	7.85
Short Term Investment	0.00	0.00	0.00	0.00	0.00	0.00
Long Term Investment	0.03	0.03	0.01	0.04	0.02	0.03
Other Interest & Related Income	21.17	6.40	10.03	7.29	4.53	9.88
Net Exceptional Income	1.98	15.63	0.85	1.86	-4.60	3.15
Total	142.49	148.51	110.69	91.66	82.22	115.11

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements

Data Analysis: URA Staff

UNELCO has proposed a reduction of 86.7m vatu (85% of the average cost of 102.1M vatu which excludes the average of interest and exceptional income) to be reduced from its revenue requirement. UNELCO has stated in its tariff application that in accordance to the concession contract UNELCO is allowed a 15% mark-up on non-tariff activities; therefore only 85% of these revenues are to be subtracted from the cost basis.

The Staff disagrees with UNELCO's assertion that it is allowed a 15% mark-up on non-tariff activities. Section 10 of the Port Vila Concession contract Specifications requires a supplement of 15% for pricing purposes to be added to the initial establishment expenses stipulated in section 7 and 9 to cater for the indirect expenses (such as office related expenses, studies, plans, provisions etc). The concession contract does not require the 15% to be classified as UNELCO's profits (mark-up). Therefore, the Staff has determined to reduce UNELCO's revenue requirement by the average cost of the non-regulated revenues for the past 5 years which is calculated at **VT 115.11m** per year.

7.0 Base Tariff

7.1 Revenue Requirement

Revenue Requirement represents the total annual revenues required by the utility to recover its reasonable and necessary cost incurred in providing the electricity services to the customers and to allow the utility to earn a fair rate of return in order to be financially viable.

The components of the revenue requirement which are ultimately approved for inclusion will be those determined by the URA Commission to be prudently incurred costs and other costs which are determined to be reasonably incurred costs in connection with UNELCO's licensed Business and in conformance with concession contract, URA Act, the Electricity Supply Act and subsequent implementing regulatory rules and regulations. The components of the revenue requirement have already been defined and determined in the preceding chapters of Section 1 of the Staff report.

7.1.1 Summary of UNELCO's Revenue Requirement Request

UNELCO's tariff application did not provide the proposed annual revenue requirement to be used for calculating the new base tariff. However, UNELCO provided a forecast of its revenue requirement for the years 2006 to 2021 and is presented in table 73 below:

Table 73 : UNELCO Projected Revenue Requirement

Million Vatus	2016	2017	2018	2019	2020	2021
Fuel and oil	1001.4	986.9	991.8	986.4	994.3	1005.1
Equipment and materials	80.4	84.8	89.9	93.2	96.3	99.4
Personnel expenses	396.1	416	434.6	448.6	462.1	476.3
Subcontracting and services	490.1	519.7	546.7	570	594.5	620.4
Tax and related expenses	23.3	24.5	25.7	26.7	27.7	28.7
Port vila street lighting expenses(future)	10.3	12.3	13.1	14	15.5	16.3
Regulatory recovery	37.8	41.6	46	50.8	56.2	60.7
Depreciation, Provisions & Allowances	503.9	553.7	608.7	644.4	686.8	729.2
Total Electricity Cost	2543.3	2639.5	2756.5	2834.1	2933.4	3036.1
Non-Regulated Revenues	-86.7	-86.7	-86.7	-86.7	-86.7	-86.7
Total Tariff Cost	2456.6	2552.8	2669.8	2747.4	2846.7	2949.4
Reasonable Compensation	451.6	467.4	479.6	489.1	496.1	498.8
Projected Revenue Requirement	2908.2	3020.2	3149.4	3236.5	3342.8	3448.2

Data Source: UNELCO Tariff Application V2 (2016-2021)

Data Analysis: URA Staff

7.1.2 URA Determination – Revenue Requirement

Table 74 below provides the URA determined annual average Revenue Requirement that will be used to calculate the new base tariff for UNELCO's tariff review period 2016-2021:

Table 74 : URA Determination Revenue Requirement

Million Vatus	URA Determination	% of Total Revenue Required
Fuel and oil	1310.42	52.26%
Equipment and materials	64.58	2.58%
Personnel expenses	364.57	14.54%
Subcontracting and services	348.00	13.88%
Tax and related expenses	21.93	0.87%
Depreciation	299.86	11.96%
Provisions	-11.97	-0.48%
Port vila street lighting expenses (future)	3.13	0.12%
Regulatory recovery	11.14	0.44%
Reasonable compensation	210.80	8.41%
Revenue Requirement	2622.47	104.59%
Less Non Regulated Revenues	115.11	-4.52%
Net Revenue Requirement	2507.35	100%

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements; UNELCO RRR Reporting

Data Analysis: URA Staff

7.2 Proposed Base Tariff

The base price P_o is used for setting the maximum billing price of electricity per kWh and fixed charges in KVA. It is applied via the tariff structure and indexation formula to determine the charges for individual customers. The proposed base tariff is calculated by dividing the projected average annual Revenue Requirement by the projected average annual demand (energy sales).

Demand Adjustment to Reflect Revenue Generating Volume

As mentioned earlier, the transfer of the Port Vila Municipality street lighting assets to the Port Vila electric concession is likely to be concluded at the date of the electric tariff implementation. Total costs of street light electricity consumption are to be recovered through overall customer base. To reflect this fact, total demand has been adjusted downward by street light consumption to reflect actual revenue generating volume. In addition, demand has been reduced by the portion of the volume under "Not Invoiced" category (Energies for the offices and installations only). Energy for staff remained to be part of the revenue base. The split is estimated at this stage and can be updated with actual data when available. The adjusted demand that will be used to compute the base tariff is presented in table 75 below:

Table 75: Adjusted Demand for Calculating Base Tariff

Demand for Revenue Base, MWh	2017	2018	2019	2020	2021	Average 2017-2021
URA composite forecast	61,506	63,324	65,007	66,739	68,533	65,022

UNELCO has not provided its calculations for the proposed new base tariff but has merely provided forecast for the base rate determinants. Therefore, for comparison purposes only, Staff will use UNELCO's annual average forecasted revenue required for the next 5 years (2016-2020) and the corresponding annual average forecasted demand to determine the likely base rate according to UNELCO calculations (will be referred to as UNELCO proposed base tariff). Table 76 below provides the current base tariff and the new base tariff calculated from UNELCO's³² tariff application and determination by URA Staff.

³² Please note that UNELCO did not propose any Base Price in their Tariff application and URA Staff is just using the projected Revenue Requirement and demand projections by UNELCO to determine the likely base price that would have been calculated by UNELCO. This calculation is only carried out for comparison purposes.

Table 76 : URA Determination New Base Tariff

	Current Base Tariff	UNELCO Calculated Base Tariff	URA Determination - New Base Tariff
Revenue Requirement	3,072,551,043	3,131,299,992	2,507,352,228
Demand - Energy Sold	64,475,193	54,125,744	65,021,779
Base Rate(Vatu/kWh)	47.65	57.85	38.56

The Staff recommends setting the base tariff for providing electricity services by UNELCO in Port Vila, Tanna and Malakua for 2016-2021 tariff review period at:

VUV 38.56/ kWh

This new tariff represents a reduction of 19.07% from the base tariff determined in the Final Order of May 2011 and a reduction of 33% when compared with UNELCO's calculated base rate. This new tariff shall be applied to compute the revised tariff in each block of the tariff structure. Table 77 below provides the cost of service component per kWh for the Staff determined base rate of 38.56 vatu/kWh.

Table 77 : Cost of Service Component per kWh – New Base Tariff

COST OF SERVICE COMPONENT	VUV/kWh
Fuel & Oil	20.15
Equipments & Materials	0.99
Personnel Expenses	5.61
Subcontracting & Services	5.35
Depreciation	4.61
Provisions	-0.18
Reasonable Compensation	3.24
Other Cost	0.56
Adjustment for Non-Regulated Revenues	-1.77
URA DETERMINATION-BASE TARIFF	38.56

Data Source: UNELCO Tariff Application V2 (2016-2021); UNELCO Audited Financial Statements; UNELCO RRR Reporting

Data Analysis: URA Staff

Note: The total provisions shows a negative balance due to the adjustment of force majeure provision – Cost Recovery spread for 10 years



SECTION II: - UNELCO's Proposed Principles to Assess Rate Review, Monthly Adjustment Parameters and New Tariff Structure

8.0 Guiding Principles Proposed by UNELCO to Assess Rate Review

UNELCO submitted its tariff application based on the so called “guiding principles” which drive’s the tariff calculations and the adjustment formula proposed by UNELCO for the upcoming tariff period. UNELCO asserts as per its tariff application that the objective for such proposal is to ensure that it achieves the allowed rate of return in light of the adverse changes in business and economic conditions and to align UNELCO’s interest to the objectives of the Government.

The URA Staff upon assessment determined that the “principle based framework” proposed by UNELCO is outside the scope and boundaries of the contemporary Concession Contract and is designed to largely protect UNELCO’s interest by purportedly transferring the major segment of the business and financial risk to the electricity consumers. All businesses have their fair share of difficulties and UNELCO is no different or unique with economic challenges. The after-effects of the global financial crisis, high volatility in commodity markets and political instability are some factors that all commercial and business entities are currently facing in Vanuatu. UNELCO is in a better position than most of these entities because of the following reasons:

- Its monopoly control over an essential utility product.
- Both the business and financial risk are adequately factored in the cost of capital allowance provided to UNELCO and the other concession related risk are adequately covered in the specific provisions allowed in the concession contracts.
- The electricity tariffs are subject to monthly price adjustment formula based on the macroeconomic factors which are beyond the control of the Utility.

The Commission expects UNELCO to file rate applications based on the principles consistent with the provisions of the Concession Contract, common regulatory principles and in alignment with the Vanuatu National Energy Road Map objectives. UNELCO’s proposals should justify values that would align the interest of the major stakeholders and more specifically should demonstrate alignment of the utility’s strategic objectives with its current and future customers’ expectations for reliable and reasonably priced service, accomplishment of government objectives (NERM’s objectives) in the electricity sector and should reflect best international practice in Utilities operations.

The purpose of this section is to present and summarise the set of proposed principles by UNELCO and URA recommendations. Discussion on each proposal contains a brief description of the issue, intended objectives the proposal aims to achieve, financial risk assessment, impact on customer tariffs, operational effectiveness, and alignment to government objectives and cost/benefit assessment. Although, the proposed principles are outside the bounds of the Concession provisions, with good faith URA Staff agreed to review the same in order to identify and negotiate the guiding principles that would best serve the interest of the major stakeholders and at the same time will be cautioned (and will not consider) those principles causing a major deviation from the provisions of the Concession Contract.

Important Disclaimer Notice

This section of the Staff Report (Section 8) is **non-binding** and should be used for **exploratory** purposes only. The objective of this section is to reach an agreement on Port Vila Electricity Tariffs for the upcoming tariff review period by establishing mutual understanding between parties and exploring potential tradeoffs within the bounds of the concession contract. The parties will not be bound by any proposals made herein in any circumstance, until a final agreement is reached between them.

8.1 Revenue Decoupling

UNELCO as part of its tariff submission has proposed Revenue Decoupling as one of its key principles and seeks to decouple the utility's compensation from volumes sold and customer mix due to the following reasons:

- Incapacity to accurately predict sales volumes because it is based on too many exogenous factors
- Need to eliminate the financial disincentive for utility to promote customer energy efficiency
- Need to cover grid fixed costs regardless of potential decentralized intermittent generation
- Need to increase flexibility to introduce or test new tariff schemes without bottom line risk to the utility

UNELCO has not supported its proposed option for Revenue decoupling with a proper plan incorporating energy efficiency targets, cost benefit analysis of each program/project, cost effective conservation plans, voluntary utility programs, projected annual energy savings, reduction in per capita electricity use etc which can demonstrate that the option for revenue decoupling would be most effective in achieving Regulator/Commission objectives, needs of the Utilities and provides greatest benefit to Customers. The above objectives stated by UNELCO seem to be mainly in the interest of the Utility. Decoupling represents a departure from common regulatory practice and should be considered with appropriate care.

Decoupling is primarily understood as a critical pillar of an alternative regulatory business model that enables utilities to fully embrace aggressive energy efficiency programs that would otherwise erode revenues. To the extent of our knowledge UNELCO does not have any significant energy efficiency programs. There are also no current programs or policies in place to promote integration of renewable distributed generation into overall generation mix. There are no mandatory targets related to energy efficiency or renewable distributed generation that UNELCO should achieve. UNELCO has proposed "Fair Solar program" in their Tariff Review Submission. While it is definitely a step forward, the overall program has very limited capacity of 500kWc. This cap means that potential increase in the share of renewable generation due to this program is limited to approx. 1% of total demand. This is a positive movement overall but hardly enough to achieve current renewable targets. Pricing and other details of this program should be discussed and consulted with stakeholders in order to understand if the program will manage to generate enough interest from customers considering very high capacity charge proposed. In some way the discussion regarding potential use of Decoupling may be more appropriate and timely when UNELCO is in a better position to offer and promote relevant programs with attractive pricing in place, the scale significant enough to make meaningful impact on Government's renewable targets and the Grid Stability issue being sorted.

The following also summaries the risk and impacts of accepting UNELCO's proposal for Revenue decoupling:

1. Since decoupling adjusts actual revenues to align them with revenue requirements, it reduces regulatory lag. Revenue decoupling appears to eliminate or significantly reduce the positive effect of regulatory lag which provides an incentive for utilities to operate efficiently in order to maximise profits. For a monopoly like UNELCO, this concept is very important, and any new rate design adopted by URA should not forgo the benefit of this traditional ratemaking principle.
2. A very large potential risk of revenue instability is shifted from UNELCO to Customers. It shifts all risk of under recovery to rate payers, typically with no recognition of the reduced risk through a reduction on return on equity. The theory and practice of ratemaking is that rates are set to enable a utility the reasonable opportunity to earn its allowed return. Decoupling and high customer charges give a utility the virtual certainty that it will earn the allowed rate of return. The risk that UNELCO will over earn is shifted to the customers (and particularly to the lower usage customers). With high customer charges recovering all or most fixed costs, customers provide the full revenue requirement, regardless of UNELCO's performance. While decoupling mechanism adjustments yield both

refunds and surcharges, research shows that surcharges are more likely than refunds. The research conducted by Pamela Morgan states that after decade of Decoupling experience across all US electric and gas utilities 62% of adjustments were surcharges and 38% were refunds.³³ Since the Company's risk is lowered significantly if recovery of fixed costs is done through high charges, the utility's required return should also be lowered by a meaningful amount to reflect the reduced risk.

3. Revenue decoupling will result in imposing a hefty customer charge while reducing volumetric rates which are in contrary to the goals of energy affordability and energy conservation. Indeed, such a rate design discourages conservation, as usage is not tied to cost for the customer, thereby taking away an incentive to conserve. At the current stage, high customer charges will be harmful to low income customers who already struggle with energy affordability.
4. Will incentivise UNELCO to focus mainly on cost minimisation initiatives(which may not be economical in the sense of reduction in the quality of services provided by UNELCO) in order to achieve a level of cost of services which is below the level of allowed C.O.S to obtain further increases to bottom line profitability. Another side effect could be that UNELCO will feel less pressure to offer services tailored to customer needs.
5. Potential change in management behaviour that makes them less likely to respond quickly to avoid sales disruption. For example, Brennan (2012) notes that after Hurricane Isabel, the electric utility may have been slow to respond because they knew they would receive their revenue requirement regardless of whether their sales took a hit from the storm.
6. Many experts argue that, although decoupling mechanisms will eliminate the incentive to actively increase energy consumption, utilities will still fail to pursue energy efficiency because supply side investments will continue to be more attractive to them than DSM investments (Kihm 2009). Historically, utilities have gained from supply side investments because traditional rate setting has de facto allowed more than a normal rate of return on these investments. If investments in DSM do not provide comparable returns, for instance because they cause decreased future demand for utility service, it would presumably be more difficult for a utility to attract funding for DSM investments than for supply side investments (EPA 2007). Kihm (2009) argues that even if DSM performance incentives for utilities were large enough to provide comparable rates of return for DSM and supply side investments, many utilities would continue to prefer supply side investments because they are larger in scale. Utilities have historically preferred larger scale investments to smaller scale investments, a concept known as the Averch Johnson (AJ) hypothesis. This preference often remains even with choices involving a largescale investment with a lower rate of return than an alternative small scale investment such as DSM investments. Kihm argues that decoupling only works for utilities not subject to the AJ effect, or utilities with allowed rates of return close to the cost of capital, and it is unlikely that most utilities fall into this category. Finally, utility managers and regulators have historically backed expansions in future electricity generation capacity because the risks to the utility of future inadequate electricity supplies are higher than the risk of having excess capacity. (Kihm 2009)
7. Relative to other countries (including in the Pacific Region), electricity access levels in Vanuatu are unusually low. Accessible energy is one of the top priorities in the National Energy Road Map (NERM). Throughput incentive (removed by full Decoupling) refers to the financial incentive for utilities to increase electricity sales as means to increase revenue and profits. While throughput incentive works against energy efficiency programs it is aligned in that regard with NERM's priority to significantly improve energy access levels in Vanuatu as these are ultimately translated into increased electricity sales. More granular approach may be required.
8. Decoupling will also reduce UNELCO's incentive to ensure that customers with distributed generation stay on the grid and contribute to the cost of maintaining grid rather than losing these customers to off-grid business models. With full Decoupling UNELCO's return will not be impacted

³³ A Decade of Decoupling for US Energy utilities: Rate impacts, Designs, and Observations by Pamela Morgan, Graceful Systems, LLC
Utilities Regulatory Authority – U-0006-15 URA Preliminary Decision Order, September 2017

if a customer decides to go off the grid as price charged to the customers will be adjusted to incorporate the impact of the lost revenue associated with this customer. While utility's financials won't be impacted the remaining customers would have to pay higher price to replace contributions from the customer lost. As capital costs of renewable distributed energy and storage solutions moves down, more customers may be encouraged to leave the grid which, in turn, will push grid costs even higher for the remainder of the customers. It is important to make sure that customers with distributed generation are presented with all possible options to stay on the grid that are viable and fair for the system, the customer with distributed generation, the utility and remaining customers on the grid. Utility is the key player to find and implement the best solution therefore it will not be a right approach to reduce utility's incentive to find optimal ways to integrate these types of customers. To the extent of our knowledge as of today there is only one grid connected customer with distributed generation in all three concessions operated by UNELCO - Government's solar plant installed at the Parliament House grounds and the VMGD Building.

When considering the proposed option for Revenue decoupling initiated by UNELCO, due consideration should be given to the impact on utility bills, especially lower usage and low income customers, public policy goals that needs to be advanced (remove disincentives to invest in energy efficiency and promote renewable distributed generation), level of risk to customers and the appropriateness of decoupling mechanism at the current stage. Currently, the issue of high electricity prices is posing a major hindrance to Vanuatu's overall economic development and specially is cutting to the throat of low income earners. With the recent increase in inflation and cost of living in Vanuatu, affordability of electricity services is a prime concern for the Low income earners and they should be able to count on lowering their bills if they consume less energy. That is an outcome that truly aligns the customer and utility interest at the current stage of Vanuatu's economy.

We do not agree that energy efficiency programs and other objectives stated by UNELCO are dependent on the adoption of full revenue decoupling. Utilities can still provide energy efficiency programs without a full revenue decoupling mechanism in place. Nevertheless, URA's intention is to seek mechanisms that will address utility's concerns and help to remove disincentives to invest in energy efficiency and promote renewable distributed generation. At the same time it is important that any new mechanisms are evaluated with regard to any potential positive and negative impact it may have on customers and any unintended consequences.

UNELCO has highlighted five facts and requirements behind its Decoupling proposal.

- **Incapacity to accurately predict sales volumes because it is based on too many exogenous factors**

In general, regulated utility business is not a risk-free business. It is exposed to certain business and financial risks. They may be similar to risks faced by other unregulated businesses but the level of exposure may be different.

The demand risk is one of the risks that regulated utilities are exposed to. Future demand cannot be forecasted with 100% accuracy and can fluctuate based on changes in economic conditions, weather patterns, changes in usage patterns, customer mix and customer numbers, etc. The exposure to this risk and other risks is part of the regulated utility business and compensated through the weighted average cost of capital. UNELCO has expressed its concern that deviation of actual sale volumes from forecasted volume may potentially result in significant impact on UNELCO's Reasonable Compensation.

To address this concern URA proposes to consider three options below. All of them will limit UNELCO's potential exposure to demand risk.

Option 1

First option is to increase frequency of the tariff review process from five years to three years. The impact of any demand variance over the three year period will be significantly lower than over the five year period.

Option 2

Second option is to allow both parties to the contract to request review of the demand forecast at the end of the three year period. Base price P_0 and the revenue requirement for the remaining two years of the tariff review period will be adjusted based on the updated demand forecast. The portion of the revenue requirement subject to the adjustment is the fixed portion of non-fuel costs. All other components will remain the same. The split between fixed and variable part of the non-fuel costs is to be agreed at the beginning of the tariff review period. Any disputes related to updated demand forecast should not be subject to the arbitration process. Proposed mechanism to resolve potential disputes is to be discussed between two parties.

Option 3

Third option is to have a trigger for sales volume that deviates by a certain percentage from projected sales.

Section 7.5 of "Specifications relating to the Concession for the Generation and Public Supply of Electric Power in Port Vila" stipulates conditions for review of the reference Price P_0 , the coefficients, the base indices and the monthly price adjustment formula. Additional clause (see the draft below) can be added to the list of the existing ones to allow both parties to request review of the demand forecast if actual demand differs significantly from the forecasted one. Base price P_0 for the remaining part of the tariff review period will be adjusted based on the updated demand forecast similar to Option 2.

- if annual variance between actual and forecasted electricity sales volumes used for the purpose of calculating Price P_0 accumulated through the tariff period has exceeded "10%"

- **Need to eliminate the financial disincentive for utility to promote customer energy efficiency**
- **Need to cover grid fixed costs regardless of potential decentralized intermittent generation**

The Government of Vanuatu's comprehensive action plan for developing the energy sector is reflected in the NERM. The Road Map directly responds to the highest priority objectives in the energy sector from a national development perspective. Both energy efficiency programmes and integration of renewable distributed generation are consistent with NERM's priorities for Green growth, Sustainable energy and Secure reliable supply.³⁴ They will contribute to achieving NERM's targets below:

- achieve a greater diversity of energy sources
- promote green energy as a catalyst for sustainable development
- increase the use of renewable energy as a way to reduce GHG emissions
- promote energy efficiency across the public and private sectors
- promote the use of renewable energy sources in Vanuatu's main economic sectors

The Government of Vanuatu has set a target of 65 percent power generation from renewable energy by 2020, given that UNELCO covers the majority of electricity customers within the country, it is expected to contribute to the greater share of the target.

³⁴ Updated Vanuatu National Energy Road Map, page 12 <http://www.nab.vu/sites/default/files/documents/NERM2016-30.compressed.pdf>
Utilities Regulatory Authority – U-0006-15 URA Preliminary Decision Order, September 2017

In accordance with NERM's targets and priorities URA would be interested to consider revenue adjustment mechanisms that enable energy efficiency programmes and integration of the renewable distributed generation.

URA proposes to introduce Lost Revenue Adjustment Mechanism (LRAM) or limited form of decoupling as an alternative to full decoupling proposed by UNELCO. The purpose of LRAM would be to allow UNELCO to recover revenues that are reduced specifically as a result of UNELCO's energy efficiency programs or PV customers that joined UNELCO's "Fair Solar Program". For the avoidance of doubt, volumes lost due to off-grid PV customers are not subject to LRAM. The exact mechanism can be discussed further with UNELCO. The capital cost of energy efficiency programs may be capitalised and, if financed by UNELCO, will be included in the Regulated Asset Base to provide Reasonable return on investment. The energy efficiency program eligible for LRAM should be pre-approved based on costs benefit analysis, overall budget and duration of the program to make sure that benefits to customers from implementing the program justify cost to customers. Relevant evaluation, measurement, and validation processes should be established and agreed before the implementation of the program. The revenue adjustment will be annual. It will only be allowed if actual return achieved by UNELCO for the year does not exceed Allowed Reasonable Return +5 % (additional % is to provide for any savings in operational costs that UNELCO can achieve through internal cost savings programs)

As this mechanism is quite new it is proposed that it will be piloted for the next tariff period review only. At the end of the trial period both parties to the contract should conduct thorough review of the mechanism proposed to accommodate any potential changes and adjustments, to review consistency with NERM's targets and priorities and decide on possible extension of the mechanism.

Price adjustment will be valid for one year only and adjusted price may not deviate from the base price P_0 by more than 1.5%. The portion of the revenue requirement subject to the adjustment will be fixed portion of non-fuel costs and the split between fixed and variable part of the non-fuel costs is to be agreed at the beginning of the tariff review period.

Revenue received from customers that will participate in the programs subject to LRAM will be taken into account for the revenue requirement calculation purposes. LRAM adjustments will be calculated for the 5 year tariff period only. LRAM lost volumes will be zeroed out at the end of the 5 year tariff period. For the avoidance of doubt, LRAM adjustment based on revenues lost in year 5 will be recovered in year 6.

Annual targets

Annual targets for the five year period should be established for the programs. Proposed targets for Energy efficiency program will be based on energy savings per year. Proposed targets for "Fair Solar program" will be based on total subscribed kW.

Size of the programs and capital expenditure

URA proposes that "Fair Solar Program" capacity is gradually expended to at least 1,000kW (and possibly higher if the program proves to be successful and sustainable for the grid) over the tariff review period as current proposed capacity of 500kWc is just too small. Maximum system capacity per customer is to be limited to 10kW for domestic customers and to 25kW for business customers.

URA proposes that total private capital expenditure by the utility for Energy Efficiency programs will be capped at 100 million vatu over the five year period and capped at 35 million vatu per year, subject to Government's approval. Energy Efficiency programs implemented through the tariff review period are to be evenly allocated between all customer groups. Initial capital expenditure limitations are due to lack of experience with implementation of these programs in Vanuatu and their potential benefits to customers.

Further details for "Fair Solar Program" LRAM

Please note that new tariff proposed by UNELCO as part of the "Fair Solar Program" proposal is to be discussed separately in more details. As mentioned above, pricing and other details of this program should be subject to consultation with stakeholders in order to understand if the program will manage to generate enough interest from customers considering very high capacity charge proposed. For LRAM purposes customers should be with UNELCO for at least 12 months on standard tariffs before joining "Fair Solar Program".

- **Need to increase flexibility to introduce or test new tariff schemes without bottom line risk to the utility**

URA believes that any potential risks associated with introducing new tariffs can be managed by testing new tariff schemes initially as a pilot. Proper cost allocation should also limit any significant financial risks.

Nevertheless, if based on satisfactory evidence and analysis the tariff scheme in question proves to be beneficial to customers and consistent with NERM priorities and targets URA, subject to Government approval, will be open to discuss on a case by case basis possible ways to limit potential negative impact on UNELCO's allowed Reasonable compensation as a result of testing new tariff scheme. In the long term it is highly desirable that any tariff scheme reflects actual cost of service.

8.2 Support for Local Copra based renewable generation through the Tariff

In order to balance the Government's commitment to achieve its renewable energy targets, UNELCO proposed to increase the usage of coconut bio-fuel as a viable alternative to conventional diesel fuel by suggesting using coconut oil instead of diesel fuel even at times when coconut oil is more expensive than diesel (cost up to 20% higher). The net excess cost of this solution will be limited to 60 million vatu and passed to the customer through tariffs. The impact of the proposed principle (considering the highly likely situation where coconut oil is more expensive than diesel) is estimated to increase the proposed base tariff by 0.92 vatu/kWh or an increase of around 2.36%.

The above scheme does contribute towards the achievement of Governments renewable energy targets, however at the expense of increased tariffs to the consumers and in contra to the provisions of the URA Act and NERM's guiding principles adopted in the road map.

Section 18(4) of the URA Act requires the maximum price to be determined in respect of the supply of electricity by a utility to a consumer taking into account least cost generation for that utility. Moreover, under the "Least - Cost approaches"(which is one of the guiding principles adopted under section 1.2 of the road map) the Government wants to achieve the objectives and priorities set out in the Road Map at the lowest total lifecycle cost from amongst the technically feasible options. Implicit in the least-cost approach, the Road Map recognizes that differing qualities of energy services will be provided in different locations (i.e. urban, rural, and remote), reflecting economic and financial feasibility issues, affordability of services and the consumers' willingness to pay.

The above scheme provides an incentive for UNELCO to produce renewable energy, but it is expected to drive up the overall cost of energy to the consumers. The Commission will support the renewable energy development only when it is cost effective and efficient, thus reducing cost per kilowatt hour in the medium to long term. UNELCO's proposal does not provide a sustainable solution and there are certainly better ways to achieve renewable targets in a cost effective and efficient manner which will both align the regulatory and Government objectives.

Staff recommendation is not to accept UNELCO's proposal as it does not provide a financially viable and sustainable solution and requests UNELCO to submit a revised proposal to the Commission that would suggest ways to better achieve renewable targets in a cost effective and efficient manner that would align the Regulatory and Government objectives.

8.3 Create a Dual Compensation System for UNELCO

UNELCO proposes to create dual compensation system by getting return on investment for assets acquired by the Concessionaire and O&M management fee for assets acquired by third parties but managed by the Concessionaire. UNELCO claims that the Concessionaire has to endorse the responsibilities and risks associated with operating these assets and the share remaining to be compensated is the risk associated to the management of third party assets. Therefore, UNELCO has calculated an asset risk premium of 2.58% as an additional rate of compensation to be claimed on the third party funded assets.

URA considers the inclusion of the additional third party asset management fee in the calculation of the reasonable return to be inadmissible due to the following reasons:

1. The standard regulatory principles³⁵ suggest that no profit beyond the cost of capital is anticipated or provided for in a regulated utility. The risk premium allocated to the Cost of Capital (WACC) is calculated based on the risk assessment of the overall utility operations and not just the component of the operations funded by the Utility. Therefore, UNELCO's claim that the share remaining to be compensated for the risk associated to the management of third party assets is unjustified and has already been compensated for in the cost of capital allocation.
2. The third party assets are provided to UNELCO at zero capital cost and all the necessary expenses required for operating and maintaining these assets are also provided in the tariffs. There are no such provisions in the concession contract that penalises the utility for improper management of the third party assets. Penalties only apply to interrupted services (subject to no proper justification) under section 18 of the specifications to the concession contract and such penalties are also financially immaterial. Therefore, the Utilities risk exposure to financial risk associated with the management of third party assets is minimum and has been adequately incorporated in the cost of capital calculation. Furthermore, URA Staff has not apportioned risk assessment (WACC) separately for the management of third party assets and UNELCO funded assets. If this has been the case, the risk premium allocated to UNELCO would have been reduced taking into account the minimum risk associated with the management of third party assets. UNELCO is currently at an advantage of being having its risk premium calculated at the overall business level.
3. The proposal is outside the bounds of the concession contract which provides the rights and obligates the Concessionaire to take possession of all the land and facilities (third party funded assets) necessary for the production and distribution of energy and earn reasonable compensation through optimal use of these assets. It would not be possible for UNELCO to generate the optimal level of returns without the use of the third party funded assets which has been provided at zero cost. In other sense, the part of the revenues generated through the utilization of third party assets does not incur a corresponding capital cost to UNELCO. Moreover, the concession contract does not require dual compensation to be paid to the concessionaire for undertaking the rights of the concession.

Staff recommendation is not to accept this proposal as the mechanism is considered to be a speculation by UNELCO to secure an unjustified additional compensation.

³⁵ Accounting for Public Utilities 2013, Volume 1, Hahne, Aliff, page 3.02

8.4 Use Actual Certified Regulated Asset Base in the Tariff Formula every Year

UNELCO has proposed to use the actual certified Regulated Asset Base in the tariff formula every year based on the justification that the renewable technology and prices are fast evolving and the increasing PPP arrangements create timeframe uncertainties.

The Staff considers UNELCO's proposal to use the actual RAB for the purposes for calculating and adjusting the reasonable compensation each year to be feasible, however is concerned with the distortionary factors which may encourage UNELCO to exploit the proposed principle in a political and bureaucratic manner. The foremost potential pessimistic impact of using the actual RAB is the Averch-Johnson effect. The Averch-Johnson effect is produced when fair rate of return regulation encourages a Utility to invest more than is consistent with the minimization of its costs. This can happen when the allowed rate of return exceeds the actual cost of capital, since the difference between the two represents pure profit. Companies have an incentive to over invest in facilities when the estimated/allowed cost of capital is greater than the company's actual cost of capital at the margin and under invest when the situation is reversed. Thus, the actual outcome depend as much on political and bureaucratic necessity as they do on economic analysis and 'rational' cost-benefit analysis.

Another potential source of distortion identified from the use of actual RAB would be that the Utilities would be encouraged to mainly confine their investments to assets with longer lifetimes. The use of actual RAB may lead to Utilities retaining a higher share of the benefits from under spending capex on assets with shorter lifetimes compared to those with longer lifetimes (eg poles and wires). This arises because capex will generally be a higher proportion of RAB for short life assets compared to long life assets. As asset life shortens, spending on the asset becomes more akin to being fully expensed and a higher proportion of the RAB will have to be spent each year to simply maintain the size of the RAB. This means that under spending on a very short life asset compared to a very long life asset will lead to a relatively larger increase in the rolled forward RAB if actual depreciation is used in the roll-forward compared to if forecast depreciation is used. There is hence an incentive to concentrate capex reductions on the shortest life assets and, conversely, not to increase capex on short life assets.

Nevertheless, the Staff has identified the following benefits of using the actual RAB that would best align UNELCO, Regulatory and Government objectives:

1. Reasonable compensation (cost of investment) will be determined based on the actual investments by UNELCO (subject to the satisfying the prudence and used and useful criteria). It will eliminate the incentive for UNELCO to overinflate their Capex forecasts at the start of the regulatory period. Since UNELCO will obtain a benefit from under spending its forecast Capex, it will be in their interest to exploit its information asymmetry and persuade the Regulator that its Capex requirements for the coming period will be higher than they really are. This would lead to consumers paying more than they need to.
2. The proposed mechanism provides an incentive for UNELCO to reveal its true cost over time and, in principle, reduces the degree of information asymmetry between UNELCO and URA.
3. Will induce UNELCO to select optimal investment path and make prudent investments. The actual RAB will be reviewed and approved by URA on an annual basis and any imprudent or unreasonable investment will not be allowed inclusion to RAB.
4. RAB will include only those assets currently providing and capable of providing regulatory services. Based on an annual review by the Regulator, any asset which is identified to be not used and useful will be excluded from RAB.
5. Will eliminate the need to forecast or estimate RAB as adjusted actual RAB will be used in the tariff formula every year, therefore reducing the scope for windfall gains and losses resulting from subjective valuation decisions.
6. Will provide guaranteed cost of capital recovery to the Utilities based on their actual prudent investments.

7. Will enable a more robust regulatory regime.
8. Consistent with best international practice

The Staff considers the benefits of using the actual RAB to more than off-set the potential distortionary effects discussed in paragraphs 2 and 3 above. However, the Staff does not agree with the methodology prescribed by UNELCO to determine the RAB for annual review and adjustments. UNELCO's proposed calculations forming the basis for determining the RAB for the inclusion into the tariff formula does not provide provisions for regulatory review and a proper assessment by URA to determine the reasonable level of RAB to be included into the annual tariff formula. UNELCO's RAB calculations are based on actual values published in the certified financial statements with no provision in the proposed formula for regulatory adjustment. Therefore, the URA Staff recommends the below formula to determine the value of RAB to be included in the annual tariff formula to calculate the annual reasonable return component of the Revenue Requirement:

URA Proposal – Formula for Establishing RAB for Annual Tariff Adjustment

$$\text{Annual RAB}_t = \text{CNBV}_{\text{PTM}(t-2)} + \text{NInv}_{t-1} - \text{dep}_{t-1} + (\text{WC}_{t-1} - (0.8 \times \text{CSD}_{t-1})) - \text{dp}_{t-1} - \text{CWIP}_{t-1}$$

RAB Components	Description	Regulatory Guidelines/Methodology	Periodicity	Units
$\text{CNBV}_{\text{PTM}(t-2)}$	Closing Net Book Value of of assets for Port Vila, Malekula & Tanna concessions for the year _{t-2} . The $\text{CNBV}_{\text{PTM}(t-2)}$ is set equal to the Opening Net Book Value (NBV) of assets for year _{t-1} .	<ul style="list-style-type: none"> - Net Book Value to be calculated based on historical cost approach (acquisition price of the asset). - The opening net book value for year_{t-1} (i.e. $\text{CNBV}_{\text{PTM}(t-2)}$) will be subject to review, regulatory audit/adjustments and approval by URA. - Will only include tangible assets currently providing or capable of providing regulated services to the consumers. Intangible assets with the exception of goodwill could also be included if they are relevant to the provision of the regulated service. - Will only include assets financed by the concessionaire(both private and concession) - Assets included should satisfy the prudence test and used and useful criteria. - UNELCO's Fixed Asset Register for the relevant year should be reconciled with the balances as per the electricity concession audited financial statements for all three electricity concessions. 	Annually updated on 1 st June based on the review of the annual audited financial statements for all three concessions for the relevant years subjected to regulatory adjustments by URA.	Vatus
NInv_{t-1}	Net New Investments for Port Vila, Malekula & Tanna concessions for year t is set equal to the prudent/reasonable actual net new investments in year _{t-1}	<ul style="list-style-type: none"> - new investments to be recorded at original cost(acquisition price) - Inclusion of New Investments to RAB_t will be subject to ex-ante and ex-post examination and approval by URA which will involve a process of negotiation between UNELCO and URA to determine the reasonable level of new 	Annually updated on 1 st June based on the review of the annual audited financial statements for all three concessions for the relevant years subjected to regulatory	

		<p>investments to be added to the RAB for year t.</p> <ul style="list-style-type: none"> - For consumer protection and to avoid Averch-Johnson effect, the new investment will be capped at the level which should not exceed the average actual investment for the past 5 years (year_{t-1} to year_{t-5}); however the cap may be adjusted via regulatory approval based on justification, validity and financial impact on tariffs. - New Investments should pass the prudence test with the following conditions: <ul style="list-style-type: none"> ▪ The amount of investment does not exceed the amount that would be invested by a prudent electricity service provider acting efficiently in accordance with good industry practice and to achieve the lowest sustainable cost of delivering services. ▪ The anticipated incremental benefits/gains generated by the capital expenditure exceed the investment cost. ▪ The Utility should satisfy the regulator that the new investment has system wide benefits that in the regulator's opinion justify its inclusion in the RAB; or is able to justify and convince the regulator that the new investment is necessary to maintain safety and integrity of the system. 	adjustments by URA.	Vatus
dep_{t-1}	Regulatory Depreciation expense for Port Vila, Tanna and Malekula concessions.	<ul style="list-style-type: none"> - The electricity concession contracts for UNELCO are specific as to how depreciation expenses should be calculated for tariff review purposes for all three concessions (Port Vila, Malekula, Tanna). - To be based on historical cost. 	Annually updated on 1 st June based on the review of the annual audited financial statements for all three concessions for the relevant years subjected to regulatory adjustments by URA.	Vatus
WC_{t-1}	Working Capital Requirement	<ul style="list-style-type: none"> - To be calculated based on 45-day formula approach. - Operating expenses component of the above formula should not include non-cash expenses (e.g. provisions and depreciation etc) 	Annually updated on 1 st June based on the review of the annual audited financial statements for all three concessions for the relevant years subjected to regulatory adjustments by URA.	Vatus
CSD_{t-1}	Customer Security	<ul style="list-style-type: none"> - The value for the CSD in year t is 	Annually updated on	Vatus

	Deposits/Advance	set equal to the amount of the accumulated balance of CSD for the regulated business as published in the electricity concession audited financial statement for the year t-1 for all three concessions (Port Vila, Tanna & Malekula)	1 st June based on the review of the annual audited financial statements for year t-1 for all three concessions subjected to regulatory adjustments by URA.	
dp_{t-1}	Asset Disposed/Not in Use	- Net Book Value at Historical cost of assets disposed or not in use or useful in period t-1	Annually updated on 1 st June based on the review of the annual audited financial statements and the Fixed Asset Register for year t-1 for all three concessions subjected to regulatory adjustments by URA.	Vatus
$CWIP_{t-1}$	Construction Work In Progress	- The value of CWIP as per the audited financial statements for all three electricity concessions for the year t-1	Annually updated on 1 st June based on the review of the annual audited financial statements and the Fixed Asset Register for year t-1 for all three concessions subjected to regulatory adjustments by URA.	Vatus

The parameters in the above table provides regulatory framework for the determination of annual RAB in the tariff formula. The opening value of the RAB (initial Capital base for year t) once determined, is adjusted over time to reflect changes in the value of productive capability of the existing asset base and new investment in the business. The approach and treatment of the components of the RAB are set out clearly in the methodology/guidelines provided by URA and which allows the Utility to understand and apply the concepts.

8.5 Use Actual Risk Free Evolution in Tariff Formula every Year

UNELCO has proposed an annual adjustment to the cost of capital by using the actual risk free rate evolution in the tariff formula every year. UNELCO's justification for this proposal is to avoid the uncertainty over the evolution of capital cost.

The Staff is not convinced that the proposed adjustment to the tariff formula will resolve the issue of uncertainty over the capital cost as the risk free rate is not the only element driving the cost of capital. The proposed principle is driven to transfer the financial risk component of the Shareholder risk to the Customers. The following reasons justify URA's rejection of the proposed principle:

1. The other input parameters forming the basis of calculating the capital cost (equity beta, MRP, CRP and the Capital Structure) are based on forecast and estimates and it will be inconsistent to use the actual current risk free rate while the other components are based on future estimates. The CAPM is a forward looking technique and as such the values chosen for the variables in the CAPM should generally be prospective even if they are estimated using retrospective data. Uncertainty over the evolution of the capital cost can only be eliminated if we were able to quantify the actual risk

premium. In this sense, the risk utility functions of all capital owners would have been known, which to all intent and purposes is impossible.

2. In general it is preferred that shareholders bear the risk of investment rather than the customers because shareholders are in a better position to diversify their risk by creating diversified investment portfolios. Uncertainty over the evolution of Capital cost is compensated to the Shareholders under the component of Market Risk Premium of the CAPM model.
3. The goal of UNELCO should be to match financing tenure to its average asset life span towards the end of the concessions contract. Given the types of assets that UNELCO invests in, this would lead to the decision to use mostly longer-term debt instruments to finance these investments. In light of this, the 10-year U.S. Treasury bond is an appropriate measure of a long-term risk-free rate of return whereby the interest rate on long term investments/debts is less volatile than the short term debt instruments.
4. Some regulatory cycles will result in over-compensation over the life of the assets while others will result in under-compensation, thus balancing the risk return portfolio of UNELCO's shareholders.
5. The CAPM is a single period model that determines an expected rate of return over a future period. Specifically, the CAPM assumes that investors share a common investment horizon that corresponds to the period between successive reassessments of their portfolios. Consequently, the relevant risk free rate implied by this feature of the CAPM is that rate with a term that matches the length of that investment horizon. UNELCO's length of investment horizon has been averaged between the remaining life of the concession contract (15 years) and the 5 year regulatory cycle. Therefore, the URA Staff has used 10 year treasury bond to determine the risk free rate for UNELCO's cost of capital which will be re-assessed in the next 5 year regulatory cycle (instead of 10 years which provides an added advantage to UNELCO's shareholders). Strictly speaking, interest rate changes are not consistent with the standard one period CAPM.
6. Shareholders base their expectations on what they typically can earn elsewhere on investments of equal risk. Therefore, in terms of specifically determining the return on risk free investment where US treasury bonds provides a close proxy, UNELCO's investors will not have the option to get an annual revision on their interest rate for a 10 year treasury bond. The interest rate and the return are fixed for the term of the investment.
7. If it was a company specific risk than it would be justified to make an adjustment, however changes to the risk free rate are a result of changes in the overall economy and changes in the world wide investment climate that are likely to affect the returns of all stocks in the market. Therefore, the interest rate risk on long term treasury bonds should not be subject to annual adjustments and the risk transferred to the UNELCO customers since this is the fundamental risk which not only affects UNELCO's investors but all investments worldwide.
8. Annual adjustment of the risk free rate to UNELCO's cost of capital would lead to over and under capitalization by the Utility. UNELCO will have an incentive to over invest in facilities when the estimated cost of capital (as a result of increase in risk free rate in the particular year) is greater than UNELCO's actual cost of capital at the margin and vice versa.

Finally, the current interest rate on US 10 year Treasury bond as at 10th August, 2017 as per the latest update from the US department of the Treasury³⁶ is 2.20% (decreasing trend) and the URA Staff determination of the risk free rate is 2.55% which has been calculated based on an overall average of the 10 year US bond rates by allocating a higher percentage composite weighting to the current and forecasted bond rates (90% weightings) and lower percentage composite weighting of 10% to the average historical bond rates which fairly compensates UNELCO for its risk to the interest rate changes.

³⁶ <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2017>

Based on the above justifications, the URA Staff is not convinced that uncoupling rates from the fluctuations of annual risk free interest rates is a feasible option. Therefore, the URA Staff recommends not to consider this proposal.

8.6 Use local Inflation as a basis for the evolution of costs

UNELCO has proposed to use local inflation as a basis for the evolution of operational cost. UNELCO states that the inflation proxies used so far inadequately reflected the actual cost evolutions and now since VNSO is reliably publishing inflation index, Vanuatu local inflation can be used as a proxy for cost evolutions.

VNSO has been publishing general CPI index since 1998(data available as per website) which has been used by organizations such as RBV, World Bank organizations etc to conduct their research and analysis. There is no reason or supporting evidence provided by UNELCO to prove the point that CPI index published so far by VNSO has been unreliable and just because VNSO is now publishing reliable CPI index, it can be used as a major reason to index operational cost evolutions. UNELCO has not provided proper justification for proposing this adaptation principle.

Inflation adjustment tend to be offered within the context of a limited range of costs/expenses and cannot be used a proxy for evolutions of other costs that may be recovered through separate recovery mechanisms and determinations. The important question to be discussed is whether a consumer focused index (Vanuatu general CPI) is relevant for the electricity sector, as the majority of the costs of this sector relates to personnel cost, equipment & materials and purchased power/fuel cost. The bundle of domestic products and services used in determining the overall inflation adjustment may not bear a strong resemblance to the input price of the electricity industry. In any case, an industry specific index has the potential to more accurately reflect the particular costs of the Utility.

UNELCO's proposal poses a huge risk in that using the general Vanuatu CPI and indexing to overall Non-fuel Revenue requirement(excluding the reasonable return) can easily equate to the pass through of inflated cost(above actual cost) without sufficient regard to proper nexus, efficiency and productivity considerations. It is important to note that UNELCO's proposal for inflation adjustment will adjust tariff rates based upon changes in quarterly inflation as published by VNSO. It may be true that certain category of expenses may show an increase or decrease in prices throughout the economy. However, such changes in prices do not necessarily flow directly, dollar to dollar, to a utility's cost. It does not allow for cost savings that may result from increased efficiencies on the part of the Utility or cost that may not change due to existing contracts. Furthermore, such an arbitrary proposed adjustment will not encourage innovation and efficiency on the part of UNELCO. There is simply an insufficient nexus between changes in inflation and the actual cost incurred by UNELCO.

UNELCO's contemporary adjustment formula provides indexation to personnel cost (composite weighting of 10.7%) based on the average of the daily wage for a single male not receiving board or lodging in Port Vila at Ifira Wharf and Equipment and Materials cost (composite weighting of 8.6%) based on the average of the indices Material (equipment) published by the Official Gazette. 62.08% of the Non-fuel cost component remains constant and non-indexed (fixed for the regulatory lag which includes depreciation expense, renewal expense, provisions and reasonable compensation).

The proposed adjustment formula by UNELCO provides inflation indexation to all the Non-fuel Revenue Requirement cost components (excluding the depreciation expense, renewal provisions and reasonable compensation which are disjointedly indexed using other mediums) with only 9.1% of the cost remaining constant/non-indexed (which includes provision for force majeure and regulatory recovery expenses and both of which are not included in the tariffs). UNELCO's view that the inflation adjustment mechanism would adequately reflect the actual cost evolutions may not be correct as it is often difficult to obtain specific

deflators. It is important to note that indexation is not the only way in which the regulatory model takes into account the changes in input prices for the Non Fuel Revenue Requirement component of the base tariff. The following paragraphs will discuss the major Non-fuel Revenue requirement cost components of UNELCO (Excluding ROR, Dep & Renewal provisions) and how the cost evolution is factored into the regulatory model and aligned with the requirements of the concession contract. Table 78 below provides the summary of the cost structure of the Non-Fuel Revenue Requirement with respective price drivers proposed by UNELCO.

Table 78 : UNELCO Proposal – Evolution of Non Fuel OPEX Cost (Excluding ROR, Depreciation & Renewal Provisions)

Million Vatus	UNELCO Calculation - 2015 OPEX ₀	Percentage of OPEX ₀	Price Driver
Equipment and materials	71.50	7.43%	Exclusively Vanuatu CPI
Personnel expenses	377.10	39.20%	Exclusively Vanuatu CPI
Subcontracting and services	459.50	47.76%	Exclusively Vanuatu CPI
Tax and related expenses	20.40	2.12%	Exclusively Vanuatu CPI
Provision for doubtful debt and write off	11.80	1.23%	Exclusively Vanuatu CPI
Provision for inventory obsolescence	20.70	2.15%	Exclusively Vanuatu CPI
Fixed Cost	87.20	9.06%	None
Non Concession Cost	-86.10	-8.95%	None
Non Fuel OPEX Cost(Excluding ROR)	962.10	100%	

Data Source: UNELCO Tariff Application V2 (2016-2021) page 144 – Table 161

Data Analysis: URA Staff

Note: The provision for Retirement benefits has also being indexed by UNELCO (which is incorporated under Personnel Expenses) to Vanuatu CPI

Personnel Cost

As presented in Table 78 above, UNELCO's personnel expenses represent 39.20% of the overall Non Fuel OPEX Cost(excluding ROR, Depreciation & Renewal Provisions) and UNELCO have proposed to index the evolution of the entire personnel cost to the Vanuatu CPI.

First of all, VNSO does not publish industry specific index or Employment cost index to more accurately reflect the evolution of UNELCO's personnel cost. If the stated indexes were published by VNSO, the index could easily equate to the pass through of personnel cost evolution.

In light of the above limitation, the Staff has estimated UNELCO's personnel cost differently, which incorporates the inflation risk into the calculation model. The Staff has applied Multiple Regression Analysis (Method 1) and Activity Based Analysis (Method 2) which are advanced statistical tool used to derive the value of a criterion from several other independent, or predictor, variables and cost drivers. It uses simultaneous combination of multiple factors (cost drivers) to assess how and to what extent they affect a certain outcome (personnel expenses).

Therefore, the direct price of labour is only a component of this model and not the key factor driving the personnel cost. The Staff has modelled the multiple regression analysis to project the nominal wages and nominal compensation per employee which incorporates the effect of inflation and also factors in the magnitude and evolution of the Vanuatu CPI index into the projection model. Both the methods are based on the future estimate of UNELCO's personnel cost for the next 5 year period and includes adjustments for productivity and efficiency factors. Therefore, the impact of inflation is already incorporated in the forecast model. Increases in personnel cost arising from input price inflation will be recovered by the Utilities as they are initially accounted for in the proposed base tariff. On the other hand, when inflation declines to a lower rate, UNELCO will benefit through lower cost. Re-indexing the evolution of personnel cost to Vanuatu CPI would be considered to be “double dipping” by UNELCO in this sense.

In addition, most of UNELCO's employees may be on fixed term employment contracts and in standard business practice employees do not receive contract variations in times of changes in inflation. This is well reflected in the ex-post assessment of UNELCO's personnel expenses. In 2014, the inflation rate increased by 0.9% and in comparison UNELCO's personnel expenses decreased by 13%. In 2015, the inflation continued to increase by 2.5%; however UNELCO's personnel expenses further reduced to 4%.

Furthermore, section 5(22) of the specifications to the Port Vila Concession Contract states that if a scale of wages or a collective agreement is concluded in Vanuatu, or if a cost of living index should be published on a regular basis, the Concessionaire and the Grantor shall confer to modify the definition of M. The section further states that the application of the new index shall be such as to cause neither gain nor loss to the Concessionaire. Therefore, in these terms, UNELCO's proposal to index the personnel cost (M) to Vanuatu CPI is inconsistent with the provisions of the Concession Contract. URA is required by the Court of Appeal Decision to regulate UNELCO within the boundaries of the Concession Contract, therefore UNELCO's proposal to the changes to the definition of M will only be considered by URA if the scale of wages, collective agreement or cost of living index is published and concluded in Vanuatu which are the requirements of the Concession Contract. To be fair to UNELCO, the Staff has made reasonable provisions for the labor cost increases in the proposed tariff review as it is understood that the current indexation to M (labor cost) is not that effective.

Equipments and Materials (Including Subcontracting & Other Services)

Vanuatu local Inflation is not the best reflective proxy that can be used to index UNELCO's equipments and materials purchases, subcontracting and other services, as the major proportion of the E&M purchases by UNELCO are carried out in overseas market which is not affected by local Vanuatu Inflation. Local CPI can only be used to index local E&M purchases but then there is no specific index or deflators for commodities important and specific to the electric industry such as copper wires, cables, switches, power and transmission transformers, electric poles etc. Furthermore, UNELCO's proposed principle does not take into account the effect of exchange rate fluctuations on the importations of the equipments and materials.

Therefore, the contemporary indexation average of the indices "Materiel" (equipment) published by the "Journal Officiel" (New Caledonia Gazette) may still be more appropriate (as it is adjusted for both changes in price and exchange rate fluctuations) and is mandated by the Concession Contract. However, the Staff does realize that the composite weighting for IM needs to be revised in order to adjust the cost components that may not change due to existing contracts and should include an X factor to recognise productivity and efficiency improvement, however no such changes can be proposed by Staff due to the limitations by the Concession Contract.

Allowance and Provisions

UNELCO has also proposed the indexation of the following provisions and allowances to Vanuatu CPI:

- Provision for Inventory Obsolescence
- Provision for Bad Debt/Doubtful Debts
- Provision for Retirement Services, annual service leave etc.

First point to note is that provisions created for personnel cost such as provisions for retirement benefits, long service leave, gratuity etc are recorded in the financial statements at Net Present Value amounts whereby the discount factor used to calculate the NPV is inherent of inflation rate. Therefore, indexing the salary

related provisions to Vanuatu CPI would be double counting and also Vanuatu CPI as discussed above is not a viable representation of the personnel cost evolution.

Secondly, provision for Bad Debt/Doubtful Debts and Inventory Obsolescence is also proposed to be indexed to Vanuatu inflation which will violate the standard accounting principles. The objective of IAS 37 is to ensure that appropriate recognition criteria and measurement bases are applied to provisions, contingent liabilities and contingent assets and that sufficient information is disclosed in the notes to the financial statements to enable users to understand their nature, timing and amount. The key principle established by the Standard is that a provision should be recognised only when there is a liability i.e. a present obligation resulting from past events. The Standard thus aims to ensure that only genuine obligations are dealt with in the financial statements – planned future expenditure, even where authorised by the board of directors or equivalent governing body, is excluded from recognition. Therefore, the provisions for the above stated items are not based on the exposure to Vanuatu CPI but on past events. In other words, a business cannot recognise these provisions until such time as there is an obligation to pay another party.

Allowance for Bad Debt has no relevance to inflation adjustment as the Accounts Receivable balances of UNELCO's customers does not change with the changes in inflation rate and neither does the corresponding doubtful debts. Correspondingly, Allowance for Inventory Obsolescence has no relevance to inflation adjustment either. The provision is based on the actual cost of sales write-down. Cost of goods sold represents an expense account while allowance for obsolete inventory is a contra-asset account.

9.0 Reference Price (P) – Monthly Adjustment Parameters

The purpose of the indexation formula is to allow fluctuations in certain input prices (fuel, wages and materials) to be passed through to electricity customers. This allows UNELCO to collect sufficient revenue to supply electricity services should input prices increase, and allow customers to benefit when input prices fall.

The indexation formula only takes into account external factors that are outside the control of the utility and has a material impact on the utility's ability to recover the allowed revenue determined during the tariff review, such as fuel price fluctuations that are dependent on market supply and demand and forms a major portion of the utility's costs.

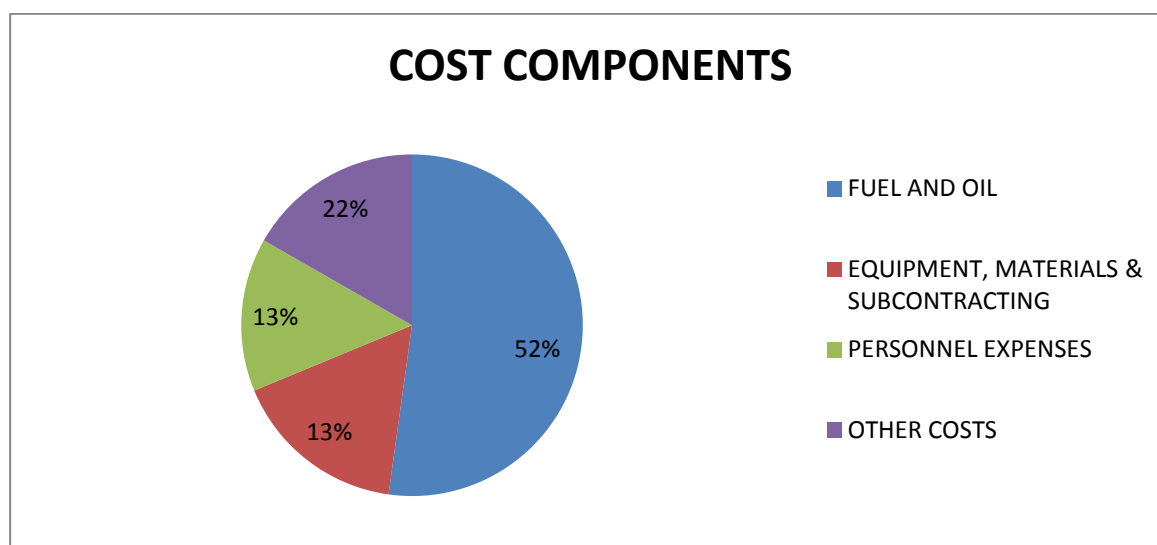
UNELCO Proposed Formula

UNELCO has submitted formula to calculate Reference Price. The formula is an integral part of the overall UNELCO's proposal based on "guiding principles" which drives both tariff calculations and the formula for the upcoming tariff period. The URA Staff determined that the "principle based framework" proposed by UNELCO is outside the scope and boundaries of the contemporary Concession Contract. In addition, new mechanism to calculate reference price P differs significantly from current contract approach (Base Price P_0 plus price adjustment formula). In particular, the concept of the Base Price P_0 is eliminated which is inconsistent with the Concession Contract.

Following the Staff's analysis and determination regarding UNELCO's "guiding principles" the URA has not accepted the Reference price formula proposed by UNELCO. URA invites UNELCO to discuss proposals that are consistent with the provisions of the Concession Contract. It should be noted that with good faith URA Staff agreed to consider and negotiate the guiding principles from UNELCO's proposal that would best serve the interest of the major stakeholders. The review of principles proposed by UNELCO and the URA's proposal can be found in section 8 of the Preliminary Decision.

URA Proposed Indexation Formula

The exact proportions of cost components determined by the URA are displayed below in the pie-chart.



Base Price (P_0) will still remain fixed throughout the following tariff period and will be adjusted accordingly due to changes in the relevant indexes incorporated in the tariff indexation formula.

The proposed new formula to calculate the monthly base price (Po) is:

$$P = P_0 \times \left[\left(0.523 \times \frac{G}{G_0} \times \frac{N}{N_0} \right) + \left(0.133 \times \frac{M}{M_0} \right) + \left(0.129 \times \frac{IM}{IM_0} \right) \times \left(0.60 + \left(0.40 \times \frac{C}{C_0} \right) \right) + 0.215 \right]$$

Adjustment Formula Components

$P_0 = 38.56$, this is the Base Price determined at the start of the tariff review period which will remain constant until next tariff review.

G - Represents the weighted average cost per litre of fuel used to generate the electricity to meet demand in any given month; this is inclusive of third party Power Purchasing Agreements (PPAs) and coconut fuel for all three concessions. Below is a breakdown of the G cost component:

$$G = \left[\frac{(G_{DV}L_{DV} + G_{DM}L_{DM} + G_{DT}L_{DT}) + (G_{CV}L_{CV} + G_{CM}L_{CM} + G_{CT}L_{CT}) + (PPA_{TPV} + PPA_{TPM} + PPA_{TPT})}{(L_{DV} + L_{DM} + L_{DT}) + (L_{CV} \times Kpci_V + L_{CM} \times Kpci_M + L_{CT} \times Kpci_T) + (E_{TPV} \times HR_V + E_{TPM} \times HR_M + E_{TPT} \times HR_T)} \right]$$

G_{DV}, G_{DM}, G_{DT}	This is the average price of diesel fuel for Port Vila (G_{DV}), Malekula (G_{DM}) and Tanna (G_{DT}) power stations net of any deductions, rebates or discount whatsoever, calculated by dividing the total amount of diesel fuel invoices received by the Concessionaire by the corresponding amount of diesel delivered during the month preceding the date of adjustment of tariffs.
L_{DV}, L_{DM}, L_{DT}	Litres of diesel fuel for Port Vila (L_{DV}), Malekula (L_{DM}) and Tanna (L_{DT}) consumed by the Port Vila, Malekula and Tanna power stations during the month preceding the date of adjustment of tariffs.
G_{CV}, G_{CM}, G_{CT}	This is the average price of coconut fuel for Port Vila (G_{CV}), Malekula (G_{CM}) and Tanna (G_{CT}) power stations net of any deductions, rebates or discount whatsoever, calculated by dividing the total amount of coconut fuel invoices received by the Concessionaire by the corresponding amount of coconut fuel delivered during the month preceding the date of adjustment of tariffs. In the absence of prior agreement between the Concessionaire and the Grantor/the URA coconut oil price will be capped by diesel price for the same period adjusted by relevant ratio of calorific value between diesel and coconut oil ($Kpci_V$ or $Kpci_M$ or $Kpci_T$)
L_{CV}, L_{CM}, L_{CT}	Litres of coconut fuel for Port Vila (L_{CV}), Malekula (L_{CM}) and Tanna (L_{CT}) consumed by the Port Vila, Malekula and Tanna power stations during the month preceding the date of adjustment of tariffs.
$Kpci_V, Kpci_M, Kpci_T$	The ratio of calorific value between diesel and coconut fuel at the Port Vila ($Kpci_V$), Malekula ($Kpci_M$) and Tanna ($Kpci_T$) power stations used to convert the number of litres of coconut oil to equivalent litres of diesel oil. The ratio defined at the start of the tariff period for the duration of the tariff period. $Kpci_V = 0.836$, $Kpci_M = 0.828$, $Kpci_T = 0.828$ set at the start of the tariff review period and will remain constant until next tariff review.
$PPA_{TPV}, PPA_{TPM}, PPA_{TPT}$	The cost of third party electricity as per third party power purchase agreements for Port Vila (PPA_{TPV}), Malekula (PPA_{TPM}) and Tanna (PPA_{TPT}) during the month preceding the date of adjustment of tariffs. For any new PPA the Concessionaire should submit Tariff Adjustment Application to be approved by the URA³⁷. It will be at the URA discretion to include new

³⁷ Commission Order Case U-0003-14 "In the matter of developing regulatory guidelines for Power Purchase Agreements for generation and supply of electricity", June 2015

	PPA in the indexation formula if the Tariff Adjustment Application hasn't been approved by the URA.
$E_{TPV}, E_{TPM}, E_{TPT}$	Total kWh of third party electricity for Port Vila (E_{TPV}), Malekula (E_{TPM}) and Tanna (E_{TPT}) purchased during the month preceding the date of adjustment of tariffs.
HR_V, HR_M, HR_{VT}	Average diesel heat rate for the next tariff period for Port Vila (HR_V), Malekula (HR_M) and Tanna (HR_M). The heat rate defined at the start of the tariff period for the duration of the tariff period. $HR_V = 0.245$, $HR_M = 0.344$, $HR_T = 0.291$ set at the start of the tariff review period and will remain constant until next tariff review.

$G_0 = 83.66$ set at the start of the tariff review period and will remain constant until next tariff review.

N is the average proportion of power generated by diesel, coconut fuel and third party electricity and is calculated as follows:

$$N = \left(\frac{E_D + E_C + E_{TP}}{E_{Total}} \right)$$

E_D	Total kWh produced from diesel fuel for Port Vila, Malekula and Tanna for the previous twelve months.
E_C	Total kWh produced from coconut fuel for Port Vila, Malekula and Tanna for the previous twelve months.
E_{TP}	Total kWh of third party electricity for Port Vila, Malekula and Tanna for the previous twelve months.
E_{total}	Total kWh produced from all fuel including third party electricity for Port Vila, Malekula and Tanna for the previous twelve months.

$N_0 = 0.881$ set at the start of the tariff review period and will remain constant until next tariff review.

M is an index that closely correlates to fluctuations in labour cost with in Vanuatu therefore allowing these changes to automatically adjust the labour component in the monthly adjustment formula. The URA is currently finalising its position regarding appropriate index. It will be proposed soon following this preliminary decision and will be represented by M_0 .

IM is the average of the indices "Matériel" (equipment) published by the "Journal Officiel" (Official Gazette) for the first of two months preceding the tariff adjustment. IM_0 is the latest index before the start of the tariff review period.

C is the average daily currency exchange rates for the month preceding the date of adjustment of tariffs, as published by the Banque d'Havaii in the column "selling rate" for the Pacific Franc (XPF or CPF) to Vatu (expressed in Vatu/XPF). C_0 is the average daily currency exchange rates for the month preceding the tariff review period.

If UNELCO considers that other currency or corresponding currency coefficients are more appropriate for the purpose of the indexation formula for the next tariff review period the URA is happy to discuss it provided that sufficient data is supplied by the utility.

Note that base indices M_o , IM_o , C_o will be updated once the URA issues its Final Decision Commission Order on the Electricity Tariff Review for Port Vila, Malekula and Tanna.

10.0 Tariff Structure

“Cost of Service” study is an essential tool of ratemaking to rely on for designing rates that equitably assign cost responsibility to each customer class. Therefore it is important for a utility to prepare a Cost of Service study in order to determine what it costs for the utility to serve a class of customers and to design the final tariff structure. UNELCO's submission has covered total Revenue Requirement. Cost of Service study that allocates costs between different customer categories has not been submitted by UNELCO, however they have stated in their submission that:

"They believe that tariff structure should remain a political decision, one that the Government influences based on its vision and priorities for economic development, environmental stewardship and social equity."

The URA agrees with UNELCO that Government's targets and priorities have been and will remain to be a major influence for the future tariff structure. Nevertheless it is important to start the process with proper Cost of Service study using it as a foundation.

The cost of service study will also assist in reaching NERM objectives such as Green Growth. By having proper cost of service to serve individual customer categories, the appropriate costs can be assigned to any new customer categories such as those involved in any particular program introduced to increase the amount of renewable fuels used. It will also be easier to determine the level of subsidy to support and sustain the program if required by the Government.

The URA sees that having a tariff structure with no proper foundation to support it at this stage would be inappropriate and seeks further assistance from the Government and the utility in ensuring that the cost to serve each customer category is established first with Government policy objectives forming the second layer. Therefore URA requests UNELCO to provide comprehensive Cost of Service study.