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GOVERNMENT OF THE REPUBLIC OF VANUATU
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Utilities Regulatory Authority of Vanuatu

Utilities Regulatory Authority

Electricity Tariff Review

Position Paper

March 2010

1 Preface

The Utilities Regulatory Authority (the URA) is Vanuatu's economic regulator of electricity and water services throughout Vanuatu. The Government of Vanuatu established the Utilities Regulatory Authority on 11 February 2008 under the *Utilities Regulatory Authority Act No. 11 of 2007* (the Act).

The URA is responsible for the regulation of certain services in the electricity and water sectors. Our role differs in each regulated industry but generally involves regulating prices, service standards, and market conduct and consumer protection. We also investigate and advise the Government on regulatory matters that affect Vanuatu's regulated utilities.

The Act states that our primary objective is to regulate these utilities to ensure the provision of safe, reliable and affordable regulated services and maximise access to regulated services throughout Vanuatu.

The Vanuatu Government has awarded concession contracts for the provision of water and electricity services to a private operator. These contracts delegate the exclusive responsibility for the provision of water and electricity services in Port Vila, and electricity services in Luganville, Tanna Island and Malekula to UNELCO (a subsidiary of the GDF SUEZ Group). The 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.

Furthermore, the power supply concession in Luganville commenced on 23 January 1990 and is due to expire on 31 December, 2010. In accordance with the concession contract the Government has advised UNELCO of its intention to re-tender the concession agreement. The tender process is expected to commence in March 2010.

The Government's concern about the high cost of electricity has led to the URA undertaking a full review of the level and structure of tariffs for all concession areas. Under Section 2 paragraph 27 of the Luganville concession agreement and under Section 7.5 of the Port Vila concession agreement, and at the request of the Government, the electricity tariff will be reviewed as more than five years have lapsed since the previous review.

This tariff review provides guidance to the Government for negotiating the level and structure of consumer tariffs and formulating a different process for tariff-setting for the expiring (end 2010) concession in Luganville.

Johnson Naviti

Chairperson

2 How to respond to this paper

All stakeholders including the Government, UNELCO, existing electricity customers and other members of the public, are invited to comment on the URA's position set out in this paper, including assumptions, key issues and supporting evidence. Responses and information received will be considered in the formulation of the final advice provided to the relevant Ministers

Submissions can be made until **12 April 2010** and can be emailed to tmael@vanuatu.gov.vu or mailed to:

Electricity Tariff Review Position Paper March 2010
Utilities Regulatory Authority
PMB 9093
Port Vila, VANUATU

Submissions may also be made in person at the Office of the Utilities Regulatory Authority located at the ground floor of the VNPF building, Port Vila.

Submissions will be made available on the Authority's website in accordance with the Authority's website policy. Any material that is confidential should be clearly marked as such.

Contents

3 Introduction

3.1 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 monthly 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 awarded concession contracts for the provision of water and electricity services to a private operator. These contracts delegate the exclusive responsibility for the provision of water and electricity services in Port Vila, and electricity services in Luganville, Tanna Island and Malekula to UNELCO (a subsidiary of the GDF SUEZ Group). The 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 the utility company'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 and water supply services, which remain unchanged. Policies regarding electricity and water supply continue to be set by the relevant Government ministries and departments.

More than the required five years has lapsed since the previous review and the Government has expressed concern about the high cost of electricity. This has led to the URA undertaking a full review of the level and structure of tariffs for all electricity concession areas.

Existing electricity concession contracts between the Government and UNELCO provide clear specifications as to when electricity tariff resets can occur. The contracts do not, however, make any provision for the methodology or process to be used for resetting tariffs. This tariff review process conducted by the URA provides guidance for: negotiating the level and structure of consumer tariffs for all current concession contracts; formulating the process for tariff-setting for the expiring (end 2010) concession in Luganville; and establishing the methodology for future utility tariff reviews in Vanuatu.

The URA has commenced a full review of service standards, the cost of, and structure of tariffs for electricity services in Port Vila, Luganville, Tanna Island and Malekula. As part of this review

the URA will also provide the Government of Vanuatu with recommendations relevant to the tendering of the Luganville Concession Contract (Luganville Concession) and the improved administration of the Sarakata Special Reserve Fund.

Therefore, the URA will:

- Develop, in consultation with UNELCO, an approach and methodology for conducting tariff renegotiations now and in the future – to specify the principles, guidelines, process, and financial models needed for reviewing tariffs;
- Develop, in consultation with UNELCO, the information needed for an electricity tariff renegotiation, including accounting and technical definitions;
- Develop a view as to the reasonableness of service standards for electricity currently specified in the concession contracts, and the possible cost implications of any changes to the service standards, to inform its decision on whether to request changes in service standards in conjunction with any tariff renegotiation;
- Review the current costs to develop an estimate of the efficient cost of electricity service in Vanuatu and the associated revenue requirement for the utility;
- Assess the impact of alternative generation technologies such as wind, hydro and copra oil costs, revenue requirements and periodic tariff adjustments (due to corresponding variability of diesel volumes and prices);
- Review the structure of tariffs for all concessions and determine the impact on consumers from alternative tariff schedules, including differentiated pricing between concession areas; and,
- Review the tariff adjustment formulae for all concessions and recommend a method of indexation that ensures the viability of the operator, a fair price for consumers, and considers the impact of the re-tender of the Luganville concession.

3.2 Electricity tariff review regulatory framework

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 25 March 2009 the URA wrote to the Minister for Lands Geology Mines and Water Resources and the Minister for Infrastructure and Public Utilities seeking approval to commence a review of electricity and water tariffs in Vanuatu.

On 17 June 2009, the Minister for Lands Geology Mines and Water Resources requested the URA to undertake a review of electricity tariffs in Vanuatu.

In accordance with sections 5 and 18 of the specification relating to the concession for the generation and supply of electric power in Luganville; sections 5 and 17 of the specification to the concession for the generation and supply of electric power in Port Vila; and article 31 and 32 of the Tanna and Malekula Island concession contract for the generation and public supply of electric power, the 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.

3.3 Electricity tariff review process

In April 2009, the URA published its Electricity Tariff Review Framework Paper inviting interested stakeholders to comment on issues set out in the paper in relation to the process and methodology of the tariff review.

The URA conducted two public consultation workshops to seek further comment on its proposed tariff review approach and methodology. The public consultation workshops were held in Port Vila and Luganville.

In developing its approach and methodology, the URA set out the following process for undertaking the tariff review:

- **Establishing the methodology** for the tariff calculation. The URA establishes the method to be used to calculate the level of the tariff and informs UNELCO;
- **Tariff application** submitted by UNELCO. UNELCO has submitted an application for a level of tariff using the methodology. The application takes the form of a completed financial model and a list of all the assumptions used in the model. The URA has provided a summary of the tariff application in the Electricity Tariff Application Report March 2010.
- **URA's Electricity Tariff Review Position Paper**. The URA responds to the tariff application with its Electricity Tariff Review Position Paper March 2010 (this document), indicating the assumptions that the URA believes are appropriate for the setting of the tariff. Should these assumptions differ from the tariff application, the areas of difference are highlighted and further comments provided by the URA. The Electricity Tariff Review Position Paper March 2010 also sets out the URA's recommended tariff formula.
- **Consultation**. The Electricity Tariff Application Report March 2010 and Electricity Tariff Review Position Paper March 2010 will be made available to the public and all interested stakeholders. The URA invites submissions on the Electricity Tariff Review Position Paper March 2010 from the public, Government, UNELCO and other interested stakeholders.
- **URA's Final Decision & Tariff Recommendation**. Following consultation on the URA's Electricity Tariff Review Position Paper March 2010, the URA will publish its final recommended tariff. In the event that the final tariff is not agreed between the Government and UNELCO, the matter will be referred to arbitration, as specified within the concession agreements. Following agreement on the new tariff level, structure, and formula, the new tariff will take effect upon signing of an addendum to the concession contracts by the Government and UNELCO.

3.4 Purpose of this paper

The purpose of this paper is to seek stakeholder comment on the URA's position on the appropriate tariff level and structure for electricity services across Port Vila, Luganville, Malekula and Tanna Island.

The Paper seeks comment on the following key issues in particular:

- Forecasted electricity demand growth across Vanuatu
- Estimated efficiency improvements and cost reductions that UNELCO can achieve
- Assumed cost of capital for providing electricity services in Vanuatu
- Proposed changes to the tariff structure

Stakeholders are directed to the Electricity Tariff Application Report March 2010 for a detailed explanation of the tariff-setting methodology, and a description of the assumptions used by UNELCO in their tariff application.

Where the assumptions set out by the URA differ from those provided by UNELCO these have been highlighted and supporting evidence provided. The URA has set out its assumptions and the specific issues on which stakeholders are invited to comment. However, stakeholders should make any other comments that they wish that may not be covered by the issues raised in this consultation paper.

3.5 Structure of this paper

- Section 4 gives an analysis of quality of service, and a recommendation regarding service standards.
- Section 5 describes the URA's position on assumptions to be used to set the level of the future electricity tariffs.
- Section 6 describes the URA's position on a new tariff indexation formula.
- Section 7 describes suggested changes to the structure of tariffs across different customer groups.
- Section 8 gives general summary comments from the URA on the tariff application and describes the next steps of the process.
- Appendix A includes a summary description of all the assumptions used by the URA.

4 Reliability of service

In this section we assess the reliability of the service provided by UNELCO. Reliability of supply is a key measure of performance of an electricity operator. In its simplest terms, reliability of supply concerns whether electricity is available when sought by a customer. Reliability measures typically focus on the extent of availability, or non-availability, of electricity to customers.

The purpose of this analysis is to understand if a change in reliability should be factored in to the new tariff level, as a change in reliability could require a change in the cost of providing the service. This section also examines whether any changes to service standards is required as part of this tariff review.

The URA has benchmarked UNELCO's reliability performance against three indicators:

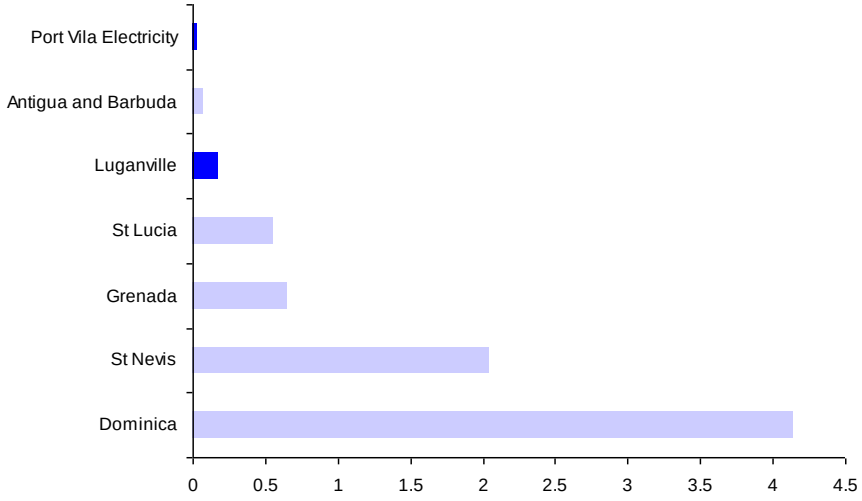
1. System average interruption duration index (SAIDI) benchmarked in Figure 4.1.1
2. Peak load per kVA of transformer benchmarked in Figure 4.2.1 below, and
3. Number of customer complaints per thousand customers benchmarked in Figure 4.3.1.

An assessment of UNELCO's performance across the three benchmarks demonstrates that UNELCO is delivering a reasonably good level of service to its consumers.

4.1 System average interruption duration index (SAIDI)

The system average interruption duration index (SAIDI) is the total minutes, on average, that a customer could expect to be without electricity in a year due to supply interruptions. UNELCO's performance on this benchmark when compared to international data is very good. As shown in Figure 4.1.1, UNELCO manages to provide a service with very little interruptions in Port Vila and Luganville.[1]

Figure 4.1.1: System Average Interruption Duration Index (SAIDI) (Hours per customer per year)

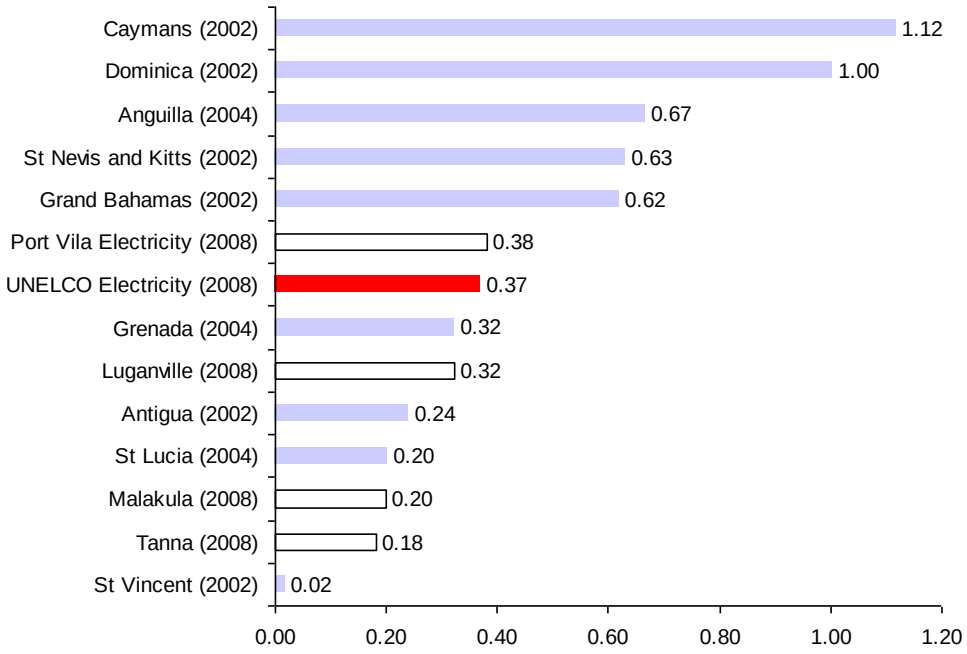


[1] UNELCO has not provided data for Tanna and Malekula

4.2 Peak load per kVA of transformer

The capacity of transformers on a utility's network relative to the load on its network affects the performance of the network and provides an indication of the amount of investment in the network that has been undertaken. An indicator that describes this, peak load per kilovolt-ampere (kVA) of transformer capacity is shown in Figure 4.2.1. A high ratio indicates that there is less capacity relative to load, which will result in poorer network performance. A low ratio can indicate over investment in the network. UNELCO's average performance across the four concession areas sits in the middle of the range when compared to other similar utilities which suggests that it has avoided over or under investment in the network.

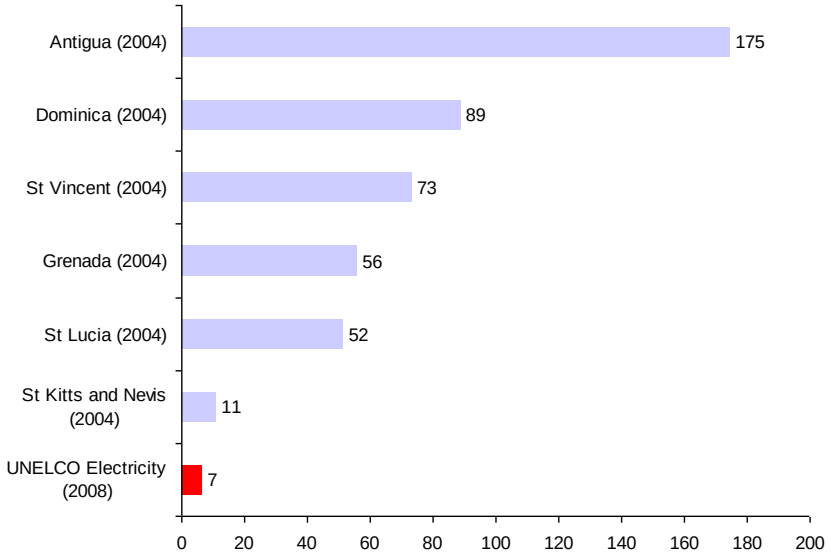
Figure 4.2.1: Peak load per kVA of Transformer (MW/kVa)



4.3 Number of complaints per thousand customers

Based on the data that was made available, UNELCO has demonstrated very low levels of complaints per thousand customers when compared to other utilities in island countries. It is not clear if the very low level of reported complaints is due to an exceptionally low number of complaints or difficulties with UNELCO's complaints recording and reporting system.

Figure 4.3.1: Number of Complaints per Thousand Customers



Source: UNELCO and audited financial reports (2004) of other utilities

4.4 Service Standards

It would appear that UNELCO are providing a reasonably good level of service when compared to comparable industry benchmarks. For the purposes of reviewing the tariff, it is assumed that UNELCO will be able to provide at least the same level of service as is currently being achieved.

The service standards should be kept under review and should the quality of service begin to fall, the URA will act to adjust or introduce standards as necessary.

Stakeholders are invited to comment on the extent to which performance standards are adequate. If not, then what sort of standards should be adopted, and how should they be enforced?

5 URA Position on the Tariff level

5.1 Overview

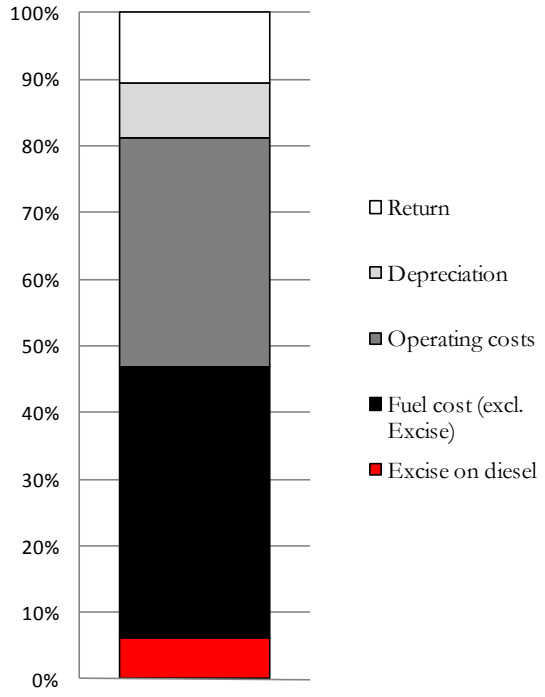
A description of the methodology used to calculate the appropriate tariff level is given in section 3 of the Electricity Tariff Application Report March 2010.

On 24 February 2010 UNELCO submitted its tariff application to the URA. The application included a base scenario and efficiency assumptions. The base scenario sets out UNELCO's proposed forecasts of demand, generation, costs, and asset levels from 2010 to 2014. The efficiency assumptions consist of a net saving from operating and technical efficiency improvements for the five-year period. The base scenario and efficiency assumptions combined provide a forecast of the base price (P_0).

UNELCO's tariff application is described in detail in the Electricity Tariff Application Report, March 2010.

The following sections describe the URA's position on each of the areas that affect the tariff level. Where the URA's position differs from UNELCO's application, extra supporting evidence is provided.

Figure 5.1.1 – Breakdown of revenue from tariff



The revenue generated by the tariff must cover the reasonable costs of providing electricity services, and a return that covers the reasonable cost of capital.

Figure 5.1.1 illustrates the relative proportions of the major areas of cost (fuel costs, operating costs, and depreciation) including the Utility's return.

5.2 Demand Forecast

Forecasts of growth in customer numbers, energy consumption and peak demand are central to setting the tariff level as they determine the amount of energy required, and translate the utility's revenue requirements into the average price changes implied. They are also used in establishing estimates of load-related capital expenditure. UNELCO's assumptions used in their demand forecast are described in section 4.2 of the Electricity Tariff Application Report. In this section, the URA sets out its position with regards to demand forecast.

5.2.1 Overall electricity demand

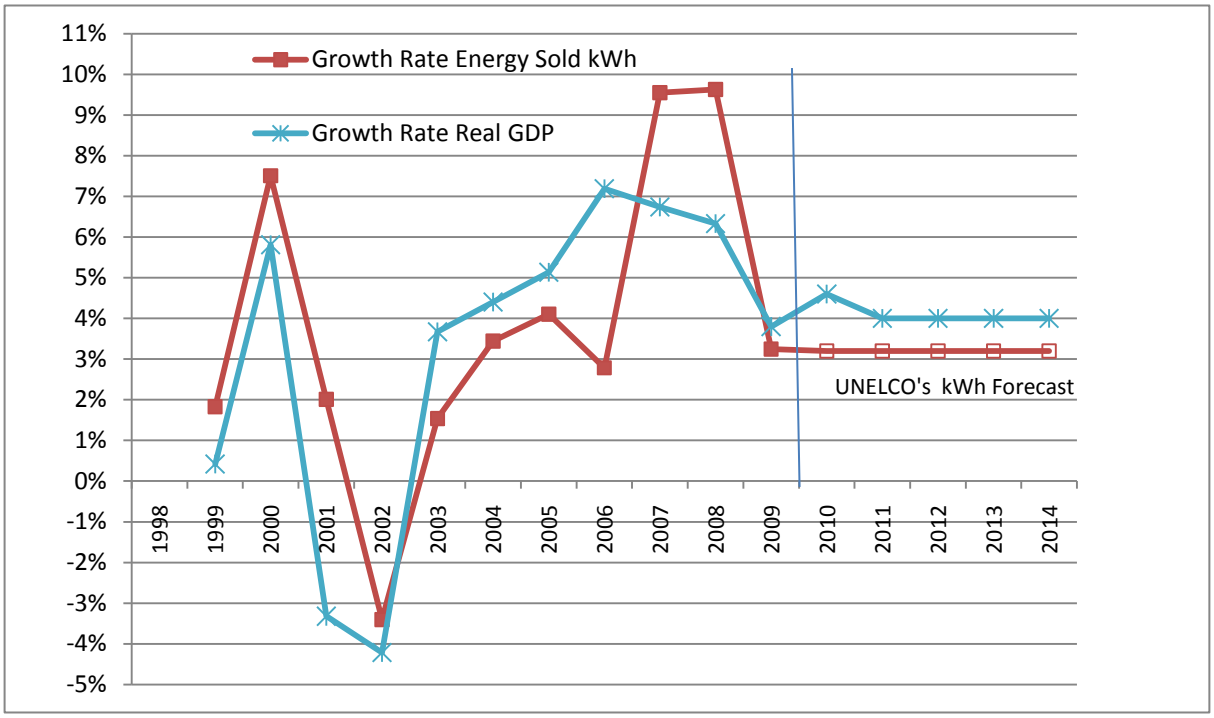
The URA has taken a top-down approach to estimating future electricity demand. This means that demand is estimated at an overall level, rather than for individual groups of customers. Electricity demand in Vanuatu is affected by several factors, such as:

- Overall GDP growth
- Industry and service sector performance
- Tourism arrivals
- Urban population growth

Each of these factors is investigated below:

GDP Growth - Historic growth in real GDP shows a high correlation with growth in electricity demand as shown in Figure 5.2.1.1 below. The correlation between real GDP and kWh sold from 1995 to 2009 is 0.98. From 1995 to 2009, real GDP grew 66.9% while kWh sold grew 65.8%.

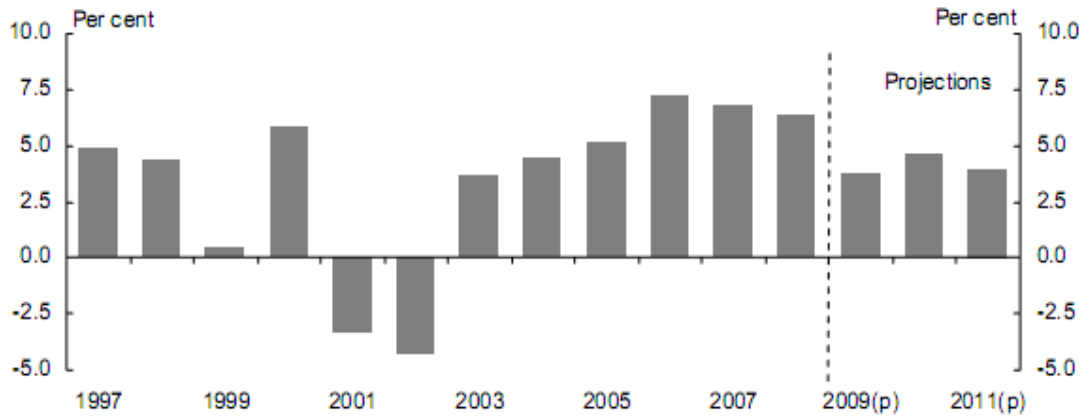
Figure 5.2.1.1 – GDP growth and electricity demand growth



Source: National Statistics Office and UNELCO

The 2010 Budget Papers forecast GDP growth of 4.6% for 2010 and 4.0% for 2011 shown below. The ANZ forecasts 4.5% and 4.5% respectively. The Asian Development Bank in the February 2010 'Pacific Economic Monitor' expects "Vanuatu to remain the best-performing Pacific Island economy"

Figure 5.2.1.2 – GDP growth, historic and forecast



Source: National Statistics Office and Ministry of Finance. 2010

Industry and service sector performance. Although overall GDP growth is slowing, this is not uniform across all sectors. Agriculture is slowing dramatically while the more electricity-intensive sectors of Industry and Services are expected to remain robust, according to official forecasts, as shown in Table 5.2.1.3 below.

Table 5.2.1.3 – Growth forecasts by industry sector

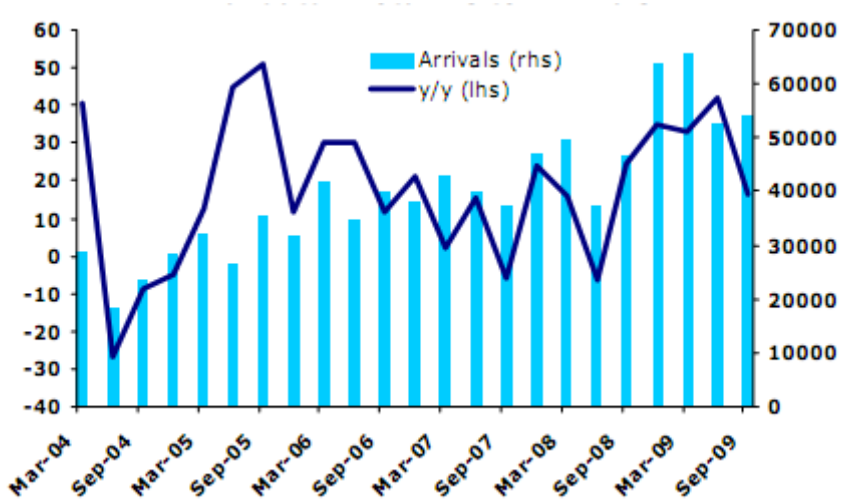
	Actual	Estimate	Projections		
	2007	2008	2009	2010	2011
Agriculture, fishing & forestry	2.0	5.0	1.7	2.2	2.1
Industry	7.7	13.1	6.9	9.2	4.9
Services	5.2	4.3	3.8	4.4	4.2
Real GDP	**6.8**	**6.3**	**3.8**	**4.6**	**4.0**
Nominal GDP	12.1	12.3	9.1	7.9	6.9
Consumer price index (b)	4.1	5.8	4.5	3.0	3.0
Current account balance (c)	-4.4	-6.9	-3.7	-4.1	-4.3

(a) Annual percentage change.
(b) Year-ended percentage change, 2008 figure is an actual outcome.
(c) Expressed as a per cent of nominal GDP.

Source: Budget Papers 2010

Tourism Arrivals - An import driver of electricity demand is Tourism Arrivals with an annual correlation with kWh demand being 0.97. The RBV Quarterly report stated that the quarter September to December 2009 saw "a rise of 39 percent increase arrivals on the quarter and 12 percent over the year to 31,030 visitors. Historically, this is a record-high quarter for air visitor arrivals". Holiday visitors, which accounted for 87 percent of air visitors, rose 54 percent on the quarter and 23 percent over the year 2009.

Figure 5.2.1.4 – Tourism arrivals



Source: ANZ –Pacific Quarterly Feb 2010

Urban population growth - Preliminary population counts from the Census of 16 Nov 2009 give the populations numbers shown below:

Table 5.2.1.5 – Urban population growth

Location	Population 2009	Households 2009	Av Annual Pop Growth, 1999-2009
Port Vila	45,694	8637	4.70%
Luganville	13,484	2505	2.40%

Source: National Statistics Office, 2010

Port Vila's population has been growing at 4.7% annually since the last census of 1999. The Household Income and Expenditure Survey of 2006 estimated Port Vila population at 33,150 – that is a 12.6% annual population growth rate between 2006 and 2009.

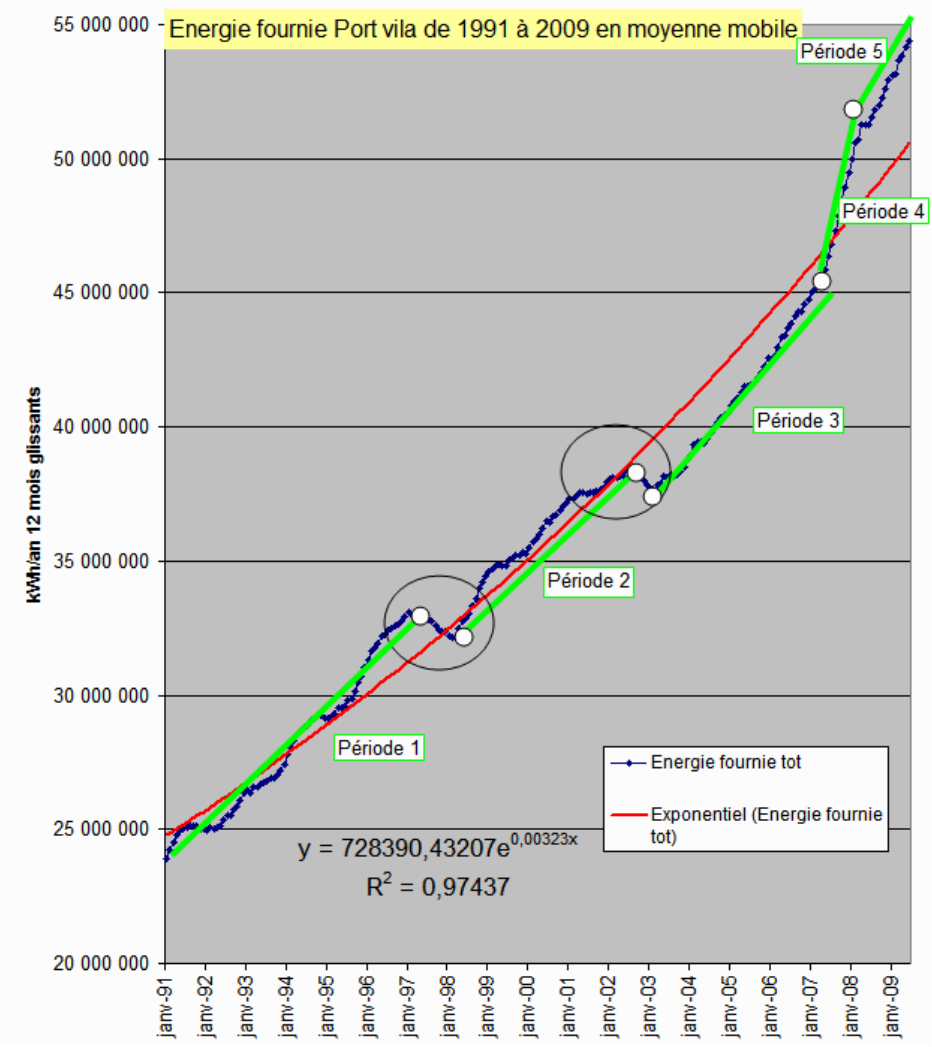
Demand Forecast - Conclusion. Based on the evidence stated above, the URA estimates overall electricity demand growth to be in line with overall real GDP growth forecasts for Vanuatu, as shown in Table 5.2.1.6 below.

Table 5.2.1.6 – URA forecast of electricity demand annual growth

2010	2011	2012	2013	2014
4.6%	4.0%	4.0%	4.0%	4.0%

These forecasts are consistent with long- and medium-term trends in electricity demand growth, and illustrated in Figure 5.2.1.7 below. The long term growth rate in kWh demand for the 18 years to June 2009 has been 3.9% per annum. The medium term growth from June 2003 to June 2009 has been 6.0% per annum. A significant increase was recorded over the period 2007/2008, where demand grew by 12% in one year. This was despite base tariffs increasing by 18.8% over the same period. This suggests that growth in electricity is not dampened by price increases.

Figure 5.2.1.7 – Historic trends in electricity demand



Source: UNELCO Electricity Generation Master Plan, 2009

5.2.2 Kilowatt-hour (kWh) Demand

The URA forecast electricity demand across Vanuatu to be in line with forecast overall demand for electricity as described above.

The URA use the same growth rate across all concessions and customer groups.

5.2.3 Kilovolt-amp (kVA) Demand

Every electricity connection has a rating in kVA. For customers in the Industrial, Commercial, and Low Voltage (Other) categories, the monthly fixed charge is proportional to the rating of their connection in kVA. Demand growth in kVA is forecast the same way as for kWh.

The URA assumes that kVA demand will be in line with forecast overall demand for electricity as described above.

5.2.4 Power Factor (Cos Phi) Charges

Cos Phi charges are penalties for industrial customers who achieve a power factor of less than 80%.

The incentive for UNELCO to work with customers to improve their power factors should remain. UNELCO have assumed that the revenue from these fines will remain constant for the next five years. The URA accepts this assumption from UNELCO as reasonable.

5.2.5 Prime de transfo

Prime de transfo is revenue paid by high voltage customers to rent a transformer from UNELCO, rather than have their own transformer.

UNELCO assume the growth in Prime de transfo to be in line with the 10 year average growth, which is 0.36% for Port Vila, and 2.07% in Luganville. There is no Prime de transfo revenue in Malekula or Tanna. The URA accepts this assumption from UNELCO as reasonable.

Stakeholders are invited to comment on these demand assumptions used by the URA, and the extent to which the URA's position on future electricity demand appears to be reasonable for the next five years. If not, then what sort of assumptions should be used?

5.3 Generation Forecast

The Generation Forecast predicts how power will be generated to meet the estimated demand. Please refer to section 4.3 of the Electricity Tariff Application Report March 2010 for the assumptions UNELCO have used in their generation forecast.

5.3.1 Port Vila

Generation capacity in Port Vila comprises diesel/copra plant at Tagabe, diesel plant in Port Vila, and the wind farm at Devil's Point. UNELCO have estimated the amount of power generated by the wind farm, and have estimated the amount of copra oil that will be used in the Tagabe generator. UNELCO have assumed that power generated by diesel will make up the difference between total gross power required (total demand plus forecast losses) and power generated by wind and copra oil.

The amount of power generated by the wind farm is assumed to be 4,600,000 kWh per annum from 2010 to 2012, and 6,600,000 kWh from 2012 to 2014. The URA accepts UNELCO's assumptions as described in Appendix B of the Electricity Tariff Application Report March 2010.

For the purposes of the forecast, the cost of diesel is assumed to be constant at 85 vatu per litre from 2010 to 2014. The impact on costs of variations of fuel prices will be dealt with in more detail in the design of the Indexation Formula in section 7.

Copra oil is used in the Tagabe generator. The forecast use of copra oil in Port Vila is shown in Table 5.3.1.1 below:

Table 5.3.1.1 Forecast copra oil consumption in Port Vila

Year	Copra consumption, litres
2010	750,000
2011	1,400,000
2012 to 2014	2,500,000

The efficiency of copra in the Tagabe generator is assumed to be 0.294 litres per kWh.

For the purposes of the forecast, the cost of copra oil is assumed to be constant at 100 vatu per litre from 2010 to 2014. The impact on costs of variations of fuel prices will be dealt with in more detail in the design of the Indexation Formula, which will be included in the Electricity Tariff Review Position Paper March 2010.

Losses are calculated as the difference between the electricity generated (gross energy) and the amount of electricity invoiced to customers. UNELCO have included un-invoiced energy in their losses amount. Losses are forecast to be at the same level as 2009.

The URA agrees with all of these assumptions from UNELCO.

5.3.2 Luganville

Generation capacity in Luganville comprises the diesel generator at Luganville, and the Sarakata hydroelectric plant. UNELCO have estimated the power generated by the Sarakata hydro plant. UNELCO have assumed that power generated by fuel will make up the difference between total gross power required (total demand plus forecast losses) and power generated by the Sarakata hydro plant.

The amount of power generated by the Sarakata hydro plant is assumed to be 5,614,000 kWh per annum from 2010 to 2014. For a full explanation of this assumption, see Appendix C: Estimated Annual Energy Yield – Hydro.

As set out in the Addendum to the Contract of Concession for the Generation of Public Supply of Electric Power in Luganville relating the handing over of the Sarakata Hydroelectric Power Station, UNELCO must set aside the fuel savings from running the hydro plant. The method of calculating these savings is set out in the Addendum to the Luganville Concession Agreement. For the purposes of calculating the Sarakata savings, the price of diesel is assumed to be 85 vatu per litre, and the price of lubricant oil is assumed to be 256.40 vatu per litre.

For the purposes of the forecast, the cost of diesel is assumed to be constant at 85 vatu per litre from 2010 to 2014. The impact on costs of variations of fuel prices will be dealt with in more detail in the design of the Indexation Formula in Section 7.

Losses are calculated as the difference between the electricity generated (gross energy) and the amount of electricity invoiced to customers. UNELCO have included un-invoiced energy in their losses amount. Losses are forecast to be at the same level as 2009.

The URA agrees with all of these assumptions from UNELCO.

5.3.3 Malekula

Generation capacity in Malekula comprises the diesel/copra generator. UNELCO have converted the generator to be able to run on 100% copra oil. The forecast of power generated is calculated as total demand plus losses.

For the purposes of the forecast, the cost of copra oil is assumed to be constant at 100 vatu per litre from 2010 to 2014. The impact on costs of variations of fuel prices will be dealt with in more detail in the design of the Indexation Formula in Section 7.

Losses are calculated as the difference between the electricity generated (gross energy) and the amount of electricity invoiced to customers. UNELCO have included un-invoiced energy in their losses amount. Losses are forecast to be at the same level as 2009.

The URA agrees with all of these assumptions from UNELCO.

5.3.4 Tanna

Generation capacity in Tanna comprises the diesel generator. The forecast of power generated is calculated as total demand plus losses.

For the purposes of the forecast, the cost of diesel is assumed to the constant at 85 vatu per litre plus a freight charge of 20.5 vatu per litre from 2010 to 2014. The impact on costs of variations of fuel prices will be dealt with in more detail in the design of the Indexation Formula in Section 7.

Losses are calculated as the difference between the electricity generated (gross energy) and the amount of electricity invoiced to customers. UNELCO have included un-invoiced energy in their losses amount. Losses are forecast to be at the same level as 2009.

The URA agrees with all of these assumptions from UNELCO.

5.3.5 Generation Efficiency

The URA estimates diesel generator fuel efficiency (litres per kWh) based on adjusting the average fuel efficiency from 2006 to 2009. Performance varied widely over the period, so the two highest and the two lowest numbers have been removed to give a more representative average, as shown below.

Table 5.3.5.1 – Estimated diesel fuel efficiency by Concession

2006-2009	Highest Value	Second Highest	Lowest Value	Second Lowest	Unadj Average	Adj Average	UNELCO Forecast
Port Vila	0.2831	0.2714	0.2419	0.2432	0.2541	0.2536	0.2590
Luganville	0.3132	0.3129	0.2426	0.2557	0.2857	0.2861	0.2860
Malekula	0.5392	0.5332	0.1732	0.2079	0.3574	0.3568	0.3570
Tanna	0.4902	0.4902	0.1524	0.2513	0.3642	0.3659	0.3640

UNELCO's estimate is only significantly different for Port Vila. UNELCO's estimate of 0.259 litres/kWh is considered high as there were only 8 months from 2006 to 2009 that this value equalled or exceeded 0.259. Additionally, given that investment is planned over the next five years to upgrade generation plant, the URA is of the view that fuel efficiency will improve.

The URA accepts UNELCO's proposed forecasts for copra oil efficiency, as the use of copra oil in the generators is a relatively new practice, and there is a lack of external evidence to support an alternative. As such, the efficiency of copra in the Tagabe generator is assumed to be 0.294 litres per kWh, and the copra oil fuel efficiency for the Malekula generator is assumed to be 0.414 litres per kWh.

Stakeholders are invited to comment on these fuel efficiency assumptions used by the URA, and the extent to which they appear reasonable. If not, then what sort of assumptions should be used?

5.4 Cost Forecast

The Cost Forecast consists of several categories of costs: Fuel Costs, Staff Costs, Other Costs, and Depreciation. UNELCO have provided forecasts for each of these. The URA's position on each area of costs is stated below.

5.4.1 Fuel Costs

The cost of fuel in the model is determined by the Generation Forecast and a forecast of the prices of diesel and copra oil. The fuel cost is calculated from the Generation Forecast described in Section 5.3 above and assumptions of fuel prices. As the price of diesel is unpredictable and potentially volatile, the tariff indexation formula is designed to pass the impact on costs through to electricity customers. The URA accepts UNELCO's forecasts of fuel prices, as shown in Table 5.4.1.1.

Table 5.4.1.1 – Fuel price assumptions used in the Base Scenario

Fuel type / Concession	Assumed fuel price per litre, vatu
Diesel / Port Vila & Luganville	85
Diesel / Malekula	85 plus 14.5 transport and fees
Diesel / Tanna	85 plus 20.5 transport and fees
Copra / All	100

Statements submitted by UNELCO reflect the fact that the business has entered into contracts with Socometra (a related entity) to provide a significant proportion of their copra oil supply.

As the weighted average price for diesel and copra fuel is passed through to electricity customers through the indexation formula, the supply of fuel by a related entity has the potential to create a situation where unfair gains are being retained within the total corporate group.

In establishing whether to take into account the price charged or the underlying costs, the URA must consider three fundamental questions:

- Is there a competitive market for the service?
- Is there an incentive for UNELCO to enter into the arrangements "at arm's length"?
- Was a competitive tender process conducted to establish the price for the services?

It is not the URA's intention to prevent or prohibit arrangements between UNELCO and third parties for the supply of services but rather to ensure that they do not result in customers paying more because of them.

Indeed, the URA recognizes that, in the normal course of providing regulated services, UNELCO may find it beneficial to enter into arrangements with third parties for the supply of certain services. However, the URA expects that such arrangements would only be entered into where the services could be provided more efficiently than if UNELCO provided those services itself. It also expects that, in entering into any such arrangements, UNELCO would seek to secure the best possible price from the market.

Stakeholders are invited to comment on the URA's position regarding third party contracts with related entities, especially where such a contract may have an impact on prices paid by customers.

5.4.2 Staff Costs

Staff costs are the wage and salary costs of staff, and the labour related on-costs directly incurred in the provision of electricity. UNELCO have provided forecasts of staff costs from 2010 to 2014 for each electricity concession. The average annual change from 2009 levels to 2014 in forecast staff costs is shown in Table 5.4.2.1.

Table 5.4.2.1 – Average forecast annual change in staff costs 2009-2014

Concession	Average annual staff cost change 2009-2014, %
Port Vila	+2.4%
Luganville	+3.6%
Malekula	-1.7%
Tanna	+3.1%
Total	+2.6%

The URA accepts these forecasts for the base scenario, but use benchmarks of staff costs to estimate reasonable efficiencies, as described in Section 5.7.1 below.

5.4.3 Goods and other Costs

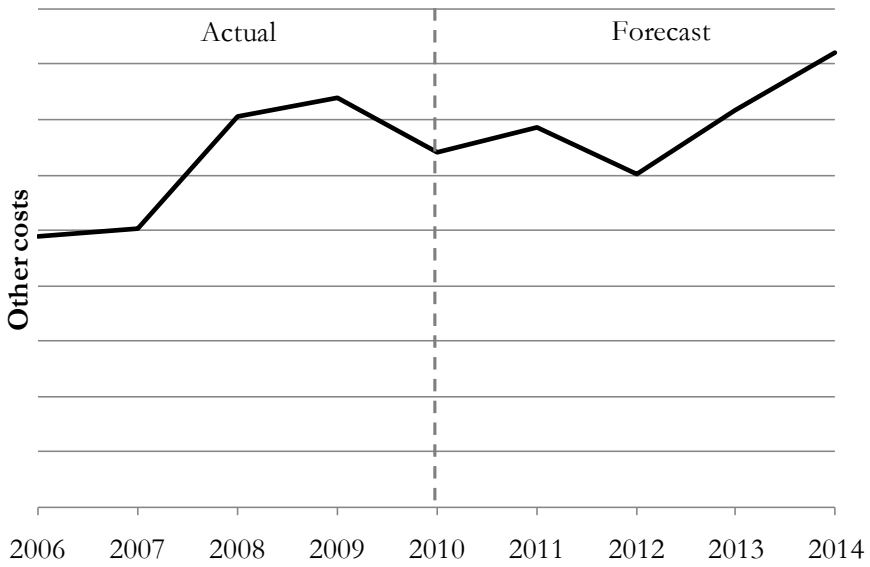
Other costs included in UNELCO's Tariff Application are:

- Goods & materials purchased
- Purchases non-stocked (e.g. sub-contracting)
- Taxes

A detailed description of these costs is given in Section 3.4 of the Electricity Tariff Application Report March 2010.

The forecast level of these costs is shown in Figure 5.4.3.1 below.

Figure 5.4.3.1 – Forecast trend in other costs



Source: UNELCO

The URA accepts these forecasts for the base scenario, but use benchmarks of staff costs to estimate reasonable efficiencies, as described in Section 5.7.2 below.

5.4.4 Depreciation

The method for calculating depreciation for concession assets is set out in the concession contracts. UNELCO have applied this method, and as such the URA accepts UNELCO's assumptions of depreciation.

5.5 Regulated Asset Base

The Regulated Asset Base (RAB) is an estimate of the reasonable level of assets required to provide a reasonable level of service to electricity customers. UNELCO have provided forecasts of the value of the Regulated Asset Base, consisting of the current Regulated Asset Base values and a plan for investment from 2010 to 2014

On the basis of the information provided to the URA by UNELCO, the URA accepts the current valuation of the Regulated Asset Base. The URA is concerned as to the lack of detail provide by UNELCO in describing their Regulated Asset Base and the URA anticipates that any future tariff review will more closely evaluate the reasonableness of existing assets and the method of their valuation.

5.5.1 Capital expenditure

A reasonable level of capital expenditure is required for the purposes of:

- augmenting the capacity of the network to meet demand growth;
- replacing aged or obsolete assets;
- improving the quality and reliability of supply;
- meeting other legislative requirements; and
- purchasing non-network assets (for example, buildings and vehicles) for normal business purposes.

The URA notes that the current network capacity is much higher than peak demand, and the plan includes further investment to increase capacity. There are also separate plans under discussion around the addition of solar and geothermal capacity into the network. There is therefore a risk of an inefficient level of assets in Port Vila.

In assessing the reasonable level of capital expenditure, the URA must have regard to its objective under the *Utilities Regulatory Authority Act No. 11 of 2007*, particularly its primary objective to ensure the provision of safe, reliable and affordable regulated services and maximise access to regulated services throughout Vanuatu. It must also have regard to facilitating efficiency in the electricity utility and the incentive for efficient long term investment, and to facilitate the financial viability of the utility. On the basis of the information provided to the URA by UNELCO, the URA accepts the suggested investment plan included in the tariff application, and the resulting forecast level of the RAB.

The URA anticipates that any future tariff review will evaluate the actual investment level completed in comparison to the plan, and adjust the future tariff to account for any excess benefits from investment planned but not completed. In order to facilitate this, the URA will seek to perform a detailed analysis on the level and value of UNELCO's assets to ensure the infrastructure is used and useful, and also to put in place a detailed reporting system for investment, the regulated asset register and asset values.

Stakeholders are invited to comment on the URA's position regarding the Regulated Asset Base, in particular the plans for further future analysis and reporting requirements.

5.6 Reasonable Return

In Section 4.6 of the Electricity Tariff Application Report March 2010, UNELCO described the assumptions they have applied to calculate a proposed Weighted Average Cost of Capital (WACC). This figure is then used to calculate the reasonable return for UNELCO.

To provide an incentive for investors to invest, the rate of return should reflect the opportunity cost of their capital – that is, the return should be commensurate with the returns that an investor could expect to earn from other investment opportunities in the market, after adjusting for the different levels of risk. The appropriate cost of capital cannot be directly observed so must be estimated from available data.

The generally accepted method of estimating the WACC is the Capital Asset Pricing Model (CAPM). A description of the different elements of the CAPM is given in Section 3.6 of the Electricity Tariff Application Report March 2010.

Identifying the reasonable value for each of the inputs into the CAPM model poses a challenge in the Vanuatu context; as there is limited data on business risks and thinly or non-traded financial markets. Consequently, the URA has emphasized the need to have primary regard to objective market evidence when estimating the cost of capital, as well as the consistent application of models drawn from finance theory and established regulatory practice.

The **Nominal Risk Free Rate** (RFR) is the average real yield over February 2010 of 5 year United States Treasuries[2] of 0.42%. This is grossed up using the Vanuatu inflation estimate described below to give a Vanuatu Nominal Risk Free rate of 5.14%. This is above UNELCO's rate of 4.0%

The **Market Risk Premium** (MRP) is estimated at 5.00% which is consistent with the long term MRP and the same as UNELCO's estimate.

The **Country Risk Premium** (CRP) is calculated as the difference between the real yield of 5 year United States Treasuries (1.02% at April 2009) and Vanuatu Government bonds (2.07%)[3] at the time of the last Vanuatu Government bond tender (April 2009). The CRP is thus calculated at 1.05%. This is low compared to similar countries risk premium so an upward adjustment is made to a more conservative 2.0% in line with similar countries. This is below UNELCO's rate of 6.0%.

The **Gearing ratio** of 60 percent comes from the latest decision of the Australian Energy Regulator on WACC parameters as being the efficient capital structure for a regulated Australian electricity or gas distribution or transmission businesses. UNELCO's suggested gearing of 40% is too low to be efficient given the low risk of a government-guaranteed electricity monopoly with the ability to pass through most external cost changes. Table 5.6.1 below shows reported gearing levels for Australian utilities.

[2] Real US Treasury Rates source

[3] Tender rate was 6.75% less average inflation for last 8 quarters of 4.68%

Table 5.6.1 – Reported average gearing levels

Year	Bloomberg (market)	Bloomberg (adjusted)	Standard & Poor's	Average
2002	66.3	67.4	61.6	**65.1**
2003	63.9	63.7	66.7	**64.8**
2004	62.2	58.2	64.7	**61.7**
2005	62.8	63.3	67.8	**64.6**
2006	60.3	62.1	66.4	**63.0**
2007	58.7	57.8	65.1	**60.5**
Average	**62.4**	**62.1**	**65.4**	**63.3**

Source: Australian Energy Regulator (2009), Electricity Transmission and Distribution Network Service Providers – Statement of the Revised WACC Parameters (Transmission), Statement of Regulatory Intent on the Revised WACC Parameters (Distribution), May, p.113.

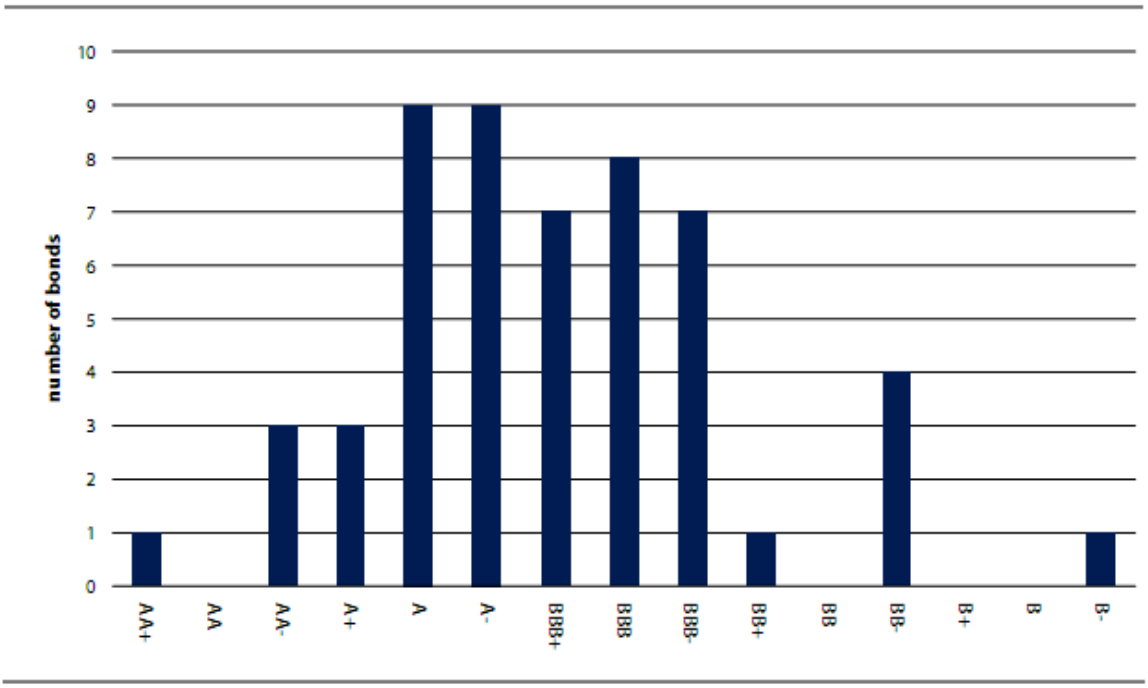
The **Inflation Rate** is the forecast annual increase in the Consumer Price Index. The Vanuatu National Statistics Office CPI release showed annual inflation to the December quarter 2009 as 2.3 % compared to 5.8% in December 2008. Inflation has been volatile in Vanuatu with large variations quarter-on-quarter. In calculating the rate of inflation the URA has annualised the last 8 quarters of reported data, up to December 2009. This provides a forecast rate of inflation equal to that provided by UNELCO, which is 4.7%

The **Corporate Tax Rate** is zero in Vanuatu as there is no corporate tax, and other taxes such as business license fees are accounted for in operating expenses. This is consistent with the assumption provided by UNELCO.

The **Equity Beta** is estimated to be 1. Regulated electricity companies are generally considered to be less risky than the market as a whole. UNELCO's long history as a profitable government-protected monopoly with the ability to pass through a large proportion of input cost changes suggest it is less risky than the Vanuatu market, suggesting that an equity beta of less than 1 would be appropriate. However the URA has determined that, on the balance of evidence and considering the market as a whole, an equity beta of one is reasonable. This is consistent with the assumption provided by UNELCO.

The **Debt Risk Premium** is the margin the regulated business must pay to borrow over the nominal risk free rate. Given UNELCO's long history as a profitable government-protected monopoly with the ability to pass through a large proportion of input cost changes and strong balance sheet it is estimated to have an A- credit rating. The rating also falls well with the distribution of credit ratings for utilities across Asia Pacific shown in Table 5.6.2. Given UNELCO's current balance sheet, an A rating is supported by Moody's ratio analysis shown in Table 5.6.3.

Table 5.6.2 – Distribution of credit ratings for Utilities – Asia Pacific region



Source: Standard &Poor's

Table 5.6.3 – Expected financial ratio for a utility company

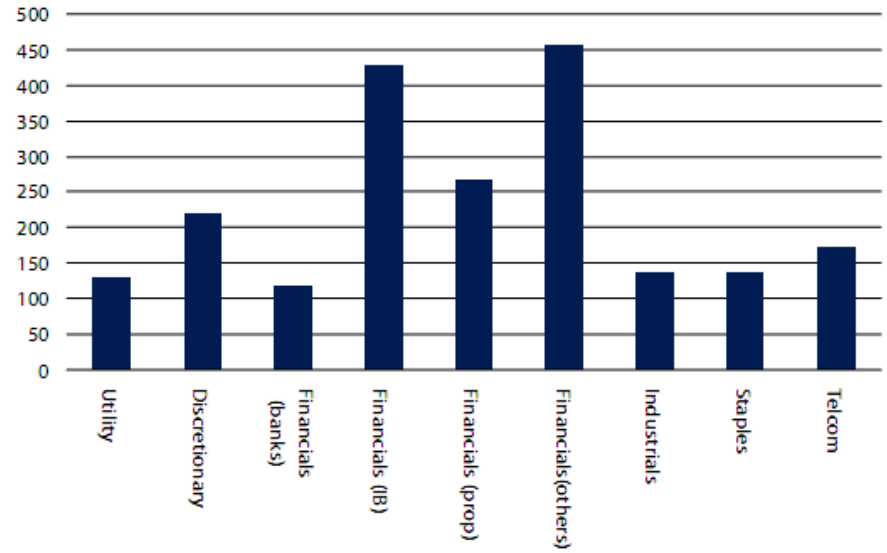
Moody's rating	**Aa2**	**Aa1**	**A2**	**A1**
Business risk	**Medium**	**Low**	**Medium**	**Low**
S&P equivalent	**AA**	**AA+**	**A**	**A+**
FFO interest cover (x)	>6	>5	3.5-6.0	3.0-5.7
FFO/Debt (%)	>30	>22	22-30	12-22
RCF/Debt (%)	>25	>20	13-25	9-20
Debt/Capital	<40	<50	40-60	50-75

Source: www.moodys.com

From Australian Reserve Bank Data[4] A-rated corporate debt as at February 2010 is trading at a margin of 2.34% over Australian Government bonds. A-rated debt spreads in the US and for utilities are trading at less than this margin over US Treasuries. After including the country risk premium of 2.0% the URA thus estimates the total debt risk premium at 4.0%. This is supported by the average debt margins for utilities shown in Table 5.6.4. This is below UNELCO's estimate of 6.0%.

[4] http://www.rba.gov.au/publications/smp/2010/feb/pdf/0210.pdf

Table 5.6.4 – Debt margins by industry group March 2009



Source: Bloomberg and 'Estimating the debt margin for the weighted average cost of capital', Independent Pricing and Regulatory Tribunal, NSW, May 2009

Table 5.6.5 below summarises the URA's WACC calculation and compares it to UNELCO's position.

Table 5.6.5 – URA's position on WACC estimate

WACC Components	UNELCO	URA
Nominal risk free rate	**4.00%**	**5.14%**
Market risk premium	**5.00%**	**5.00%**
Country risk premium	**6.00%**	**2.00%**
Market rate of return	**15.00%**	**12.14%**
Corporate tax rate	**0.00%**	**0.00%**
Gearing	**40%**	**60.00%**
Equity proportion	**60%**	**40.00%**
Rate of imputation credit utilisation	**50.00%**	**n/a**
Inflation rate	**4.70%**	**4.70%**
Return on equity calculations		
Nominal risk free rate	**4.00%**	**5.14%**
Market risk premium	**5.00%**	**5.00%**
Country risk premium	**6.00%**	**2.00%**
Market rate of return	**15.00%**	**12.14%**
Equity beta	**1**	**1**
Return on equity	***15.00%***	**12.14%**
Return on debt calculations		
Risk premium (indds country risk)	**6.00%**	**4.00%**
Return on debt	***10.00%***	**9.14%**
Real WACC	***7.93%***	**5.39%**

The URA's calculation for the real WACC is 5.39%. UNELCO's electricity assets are re-valued for inflation each year, meaning that a real WACC should be used in the Required Return calculation.

Although the Vanuatu financial system has a low level of integration with global financial markets, it is noted that UNELCO have access to international capital markets through their global A-rated parent company, and also to subsidised loans through international development agencies. Both of these factors reduce the realised cost of capital for UNELCO.

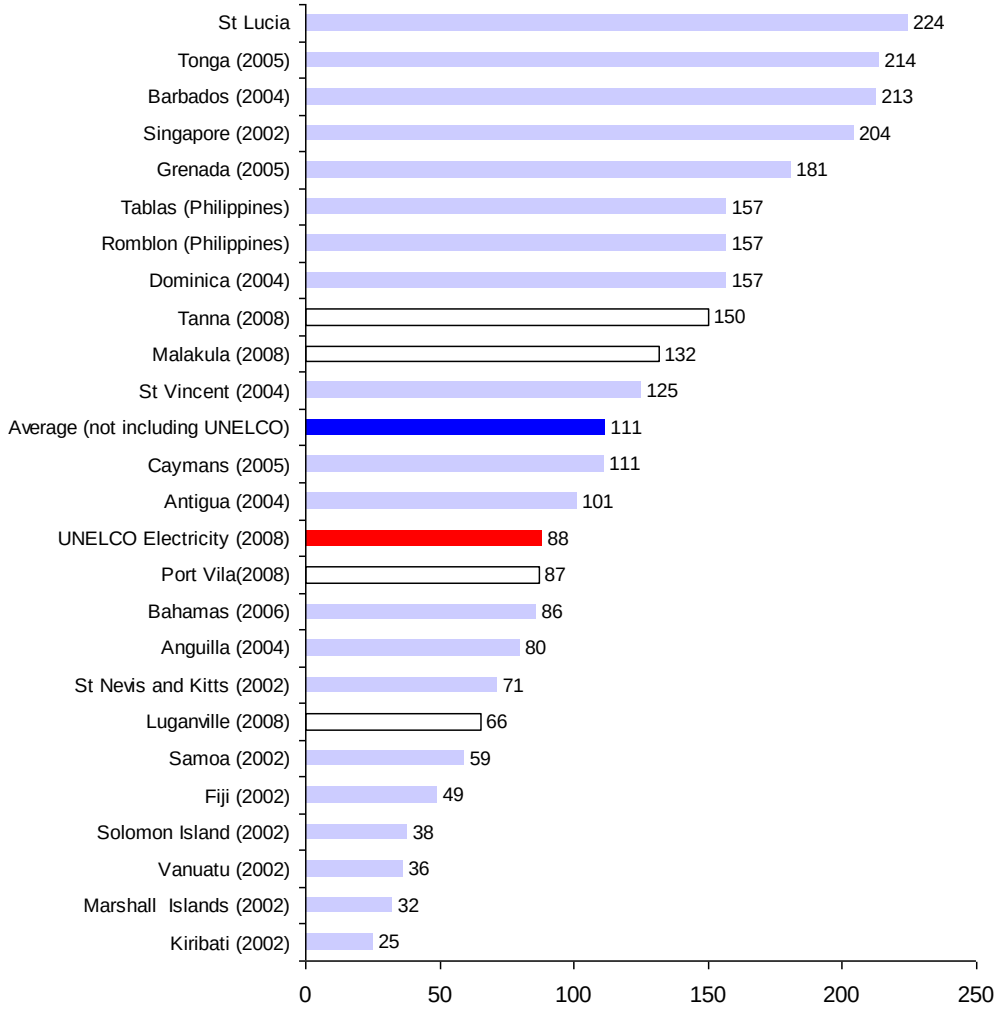
5.7 Efficiency assumptions

As part of their tariff application, UNELCO provide assumptions of efficiencies. Sections 5.7.1 to 5.7.3 set out the URA's position in relation to assumptions of UNELCO's efficiency. The areas analysed by the URA for potential cost efficiencies are staff costs and other operating costs.

5.7.1 Staff cost benchmarking

UNELCO's labour productivity has been benchmarked using the industry-standard indicator of connections per staff member. Figure 5.7.1.1 shows that UNELCO's performance is below average compared to a set of comparable Caribbean and Pacific small island countries.

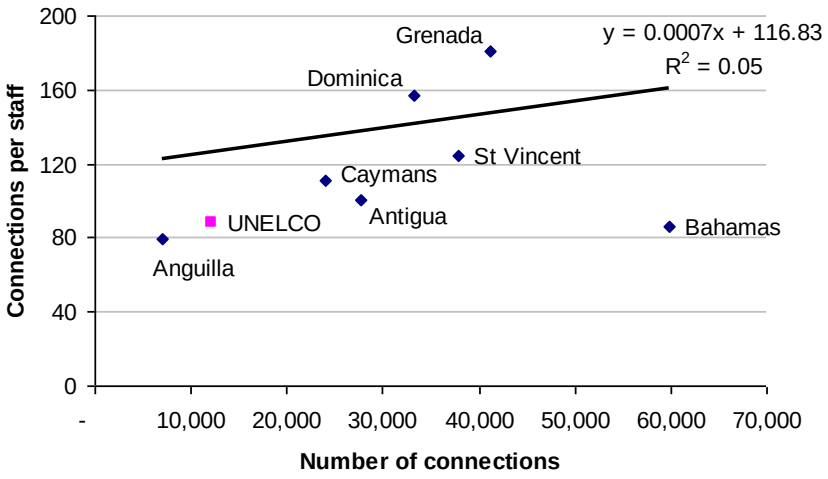
Figure 5.7.1.1: Connection per Staff Benchmarking



Source: Data from UNELCO and audited financial reports for other utilities

To test whether the low labour productivity is an inevitable result of the small size of the system the number of connection per staff was compared to the size of the system (number of connections). There does not appear to be a strong relation, as shown below in Figure 5.7.1.2.

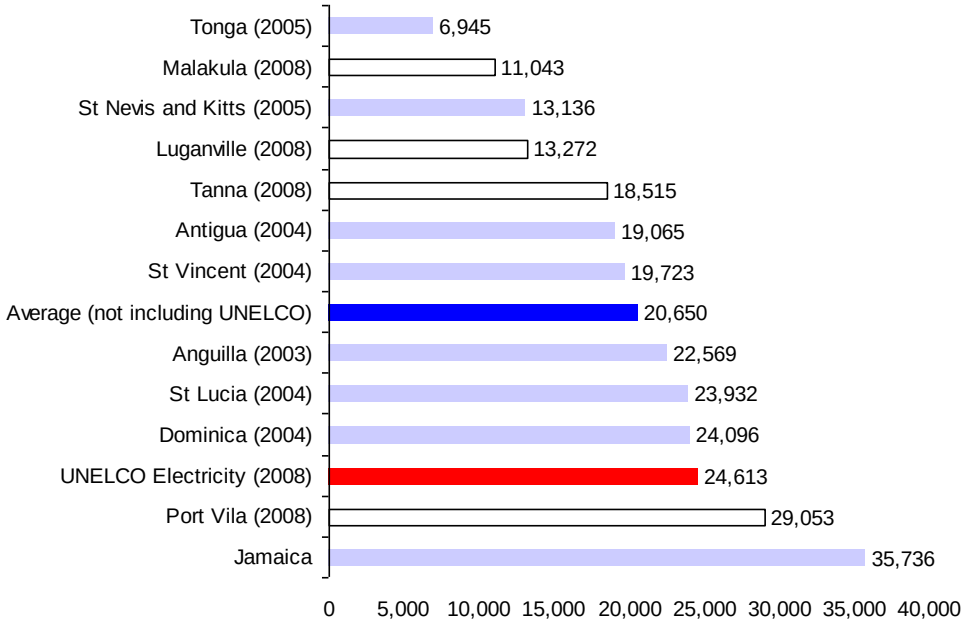
Figure 5.7.1.2 Connections per staff vs. Number of Connections



Source: Data from UNELCO and audited financial reports for other utilities

Figure 5.7.1.3 presents the benchmarking of average annual staff cost per staff. UNELCO has costs higher than the average. The URA further notes that average wage rates generally in Vanuatu are lower than wages in the Caribbean benchmark countries.

Figure 5.7.1.3: Average Cost per Staff Benchmarking



Source: Data from UNELCO and audited financial reports for other utilities

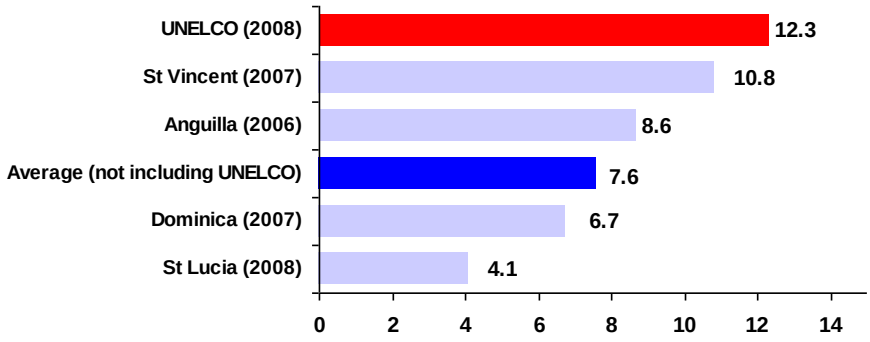
The URA's estimate of reasonable efficiency gains is based on a scenario where connections per staff move to the average position of the comparator group (111 connections per staff) over the next three years, and the average cost per staff moves to the average position of the comparator group (a 16.10% reduction) over the next three years.

5.7.2 Other Operating Cost benchmarking

Other Operating Costs includes all other current costs other that fuel and staff costs, incurred in the provision of electricity.

These costs have been benchmarked against electricity operators in similar situations. Figure 5.7.2.1 shows that UNELCO has higher costs than the average.

Figure 5.7.2.1: Other Operating Expenses Benchmarking (US cents/kWh)



Source: Data from UNELCO and audited financial reports for other utilities

The URA's estimate of reasonable efficiency gains is based on a scenario where Other Operating Costs can move to the average position of the comparator group (a 38.4% reduction on 2009 cost levels) over the next three years.

5.7.3 Total efficiency assumptions

The scenarios described above indicate that operational efficiencies are possible for UNELCO. The assumption of reasonable efficiency gains are based on the two scenarios described above. The total implied efficiency gains compared to the base scenario are shown in Table 5.7.3.1.

Table 5.7.3.1: URA and UNELCO estimates of operating efficiencies per annum

	2010	2011	2012	2013	2014	Total
URA	51,580,651	171,376,476	214,572,008	289,547,270	356,274,081	1,083,350,486
UNELCO	98,495,643	142,460,919	164,349,618	185,560,998	193,254,746	784,121,924

5.8 Impact of Wind Farm savings

The Addendum to the Port Vila Concession Contract 1998 specifies that one of the acceptable reasons for reviewing the tariff level is:

- *If some new event should cause a major variation in the costs to the Concessionaire such that a review of tariffs appears necessary to 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 construction of the Wind Farm at Devil's Point constitutes such a variation to the conditions of power generation. Therefore, in this tariff review, the URA has set out what it considers to be an appropriate method of passing on this variation into the tariff.

The variation in costs arises due to the fuel saving on electricity generated using the wind farm, minus the additional costs of operating the wind farm since May 2007. The existing formula was developed before the construction of the wind farm, and so does not include either the fuel savings or the operating costs. The fuel savings can be estimated by multiplying the fuel component of the current indexation formula by the proportion of power that was supplied by wind in that month. The costs are unknown, but a precedent has been set in the form of the allowances UNELCO receive for running the Sarakata Hydro plant. These total 30m vatu per year.

The Cost Forecast for 2010 to 2014 is adjusted by the full amount of the estimated retrospective benefit, spread over the five years of the price control period. The amount of the adjustment is given in Table 5.8.1.

Table 5.8.1 – Adjustment for Wind Farm savings

2007 fuel saving	18,609,490
2008 fuel saving	50,425,155
2009 fuel saving	207,273,746
2010 (to date) fuel saving	41,917,905
Total fuel saving	318,226,296
Total estimated operating costs of wind farm	90,000,000
Total net benefit	228,226,296
Annual reduction to Cost Forecast 2010-2014	45,645,259

Stakeholders are invited to comment on the extent to which these assumptions appear reasonable, and if not, to suggest appropriate alternatives.

6 Tariff structure

The Tariff Structure defines the prices charged to different customer groups, based on the monthly price P. Table 6.1 shows the current tariff structure.

Table 6.1 – Current Tariff Structure

Customer group	Price per kWh	Monthly fixed charge	Security deposit
Small Domestic Customers	Up to 60 kWh = 0.62 x P 61 to 120 kWh = 0.93 x P Over 120 kWh = 1.70 x P	None	70 x P
Other Domestic Customers	0.96 x P	19 x P per subscribed kVA	150 x P per subscribed kVA
Business Licence Holders – Low Voltage	0.87 x P	20 x P per subscribed kVA	150 x P per subscribed kVA
Sports Fields	1.00 x P	None	None
Public Lighting	0.54 x P	None	None
High Voltage Users	0.70 x P	25 x P per subscribed kVA	150 x P per subscribed kVA

This tariff structure is set out in Section 5 of the Specifications (1986) and Section 7 of the 1997 Addendum of the Port Vila concession agreement.

As part of its tariff application, UNELCO has put forward an adjustment to the Small Domestic Customer tariff structure shown in Table 6.2 below.

The proposed structure contains a lower tariff for consumption of 0-60 kWh each month, and a higher tariff for consumption of 60-120 kWh each month.

Table 6.2: UNELCO's proposed changes to the Small Domestic Customer tariff

Consumption	Old Tariff	New Tariff
<60 kWh	0.62 x P	0.34 x P
60 to 120 kWh	0.93 x P	1.21 x P
>120 kWh	1.7 x P	1.7 x P

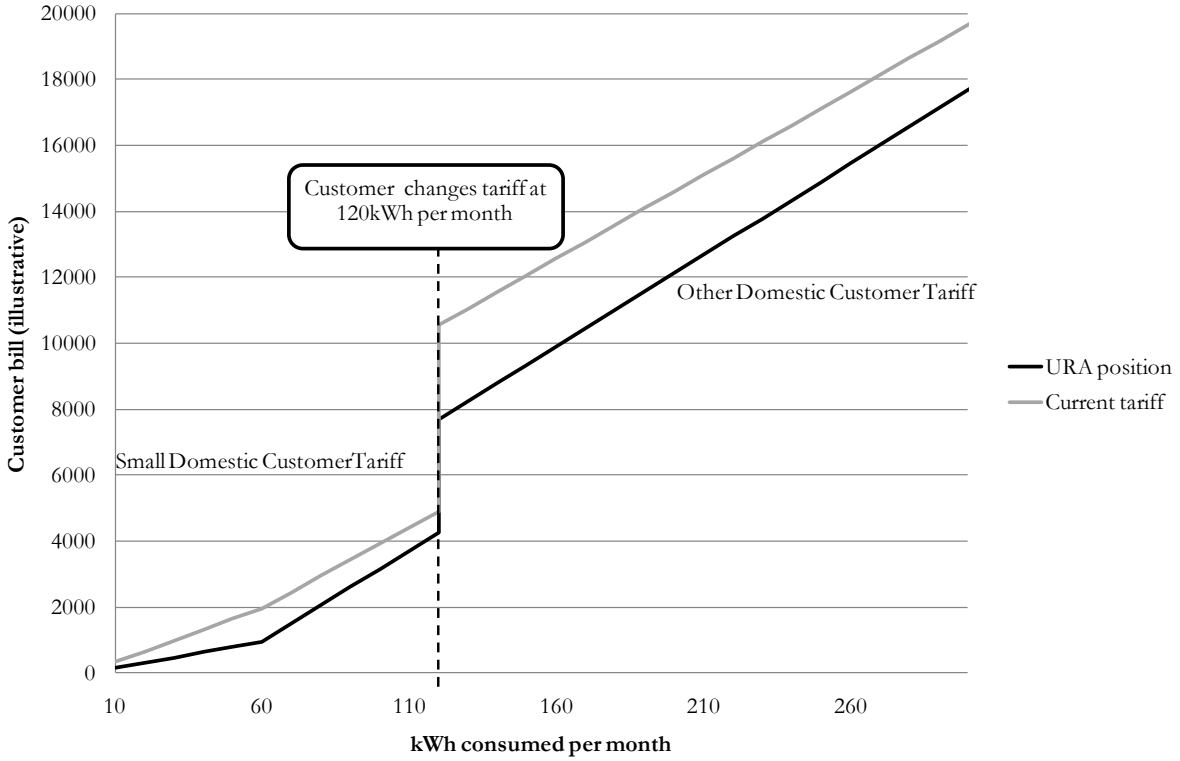
The URA agrees with UNELCO's suggestions regarding the changes to the rates paid by Small Domestic Users.

However, the URA is concerned with the sharp difference between the Small Domestic Customer tariff and the Other Domestic user tariff. If a customer increases their electricity usage above 120kWh per month, they automatically switch to the Other Domestic User tariff. This is specified in Section 18 of the concession agreement.

With the current tariff structure, at the point when users switch tariff, their bills approximately double (depending on exact usage and the kVA rating of their connection). The URA is concerned that this creates a barrier to customers expanding their domestic electricity consumption beyond 120kWh per month. The URA suggests adjusting the tariff structure to smooth this transition. This is achieved by reducing the monthly fixed charge for Other Domestic Customers, but increasing the charge per kWh.

Figure 6.3 below shows the evolution of bills as domestic customers increase consumption from the Small Domestic Customer tariff and the Other Domestic Customer tariff.

Figure 6.3: Comparison of bill evolution for existing tariff structure and URA position



The proposed new tariff structure is summarised in Table 6.4 below.

Table 6.4 – URA suggested new Tariff Structure

Customer group	Price per kWh	Monthly fixed charge	Security deposit
Small Domestic Customers	Up to 60 kWh = 0.34 x P 61 to 120 kWh = 1.21 x P Over 120 kWh = 1.70 x P	None	70 x P
Other Low Voltage Customers	1.21 x P	5 x P per subscribed kVA	150 x P per subscribed kVA
Business Licence Holders – Low Voltage	0.87 x P	20 x P per subscribed kVA	150 x P per subscribed kVA
Sports Fields	1.00 x P	None	None
Public Lighting	0.54 x P	None	None
High Voltage Users	0.70 x P	25 x P per subscribed kVA	150 x P per subscribed kVA

Stakeholders are invited to comment on the suggested changes to the tariff structure, and make any further suggestions they feel are appropriate.

7 Indexation formula

The purpose of the indexation formula is to allow fluctuations in certain input prices beyond UNELCO's control (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.

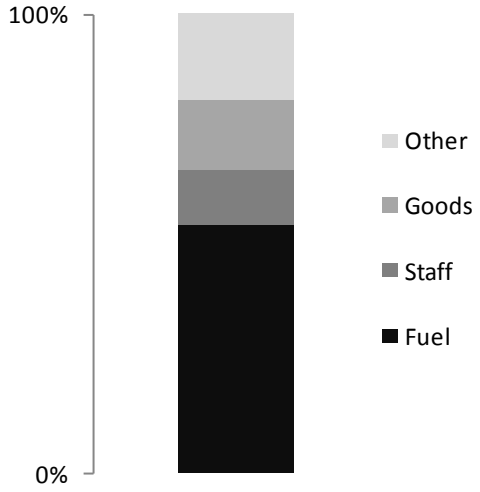
Section 3 of the Electricity Review Tariff Application Report March 2010 provides a detailed description of the current tariff formula.

The assumptions described in section 5 above set the level of the base price P_0. The base price P_0 is then used with an indexation formula to calculate the monthly electricity price P.

7.1 Formula structure

The tariff is made up of several components, which represent the reasonable costs of providing electricity in Vanuatu, and a reasonable return for the operator. The methodology for setting the tariff level is described in detail in section 3 of the Electricity Tariff Application Report March 2010.

Figure 7.1.1 – Illustration of components of formula



Cost components strongly influenced by external price variations include:

- Fuel costs are influenced by the fuel price;
- Staff costs are influenced by general wage inflation in Vanuatu, and the minimum wage;
- Materials costs are influenced by the price of goods, and currency rates if the goods are purchased overseas.

UNELCO does not have control over the price charged to customers; rather it is specified in the concession agreement. If external input costs increase and the price is not adjusted, UNELCO are at risk of not generating sufficient revenue to continue supplying electricity. If input prices decrease and the price is not adjusted, then electricity customers are missing out on potentially lower prices.

The aim, therefore, is to link each component to an index that will reasonably accurately reflect the impact of input price changes on costs.

The proportion of the tariff that each component represents is referred to as the coefficient of that component. For example, if fuel costs make up 50% of the tariff revenue, then the coefficient of fuel costs (X_{FUEL}) will be 0.50. The coefficients are set based on the forecasts of the different areas of costs, with assumed constant input prices. The assumed constant input price forms the starting value for each index.

7.1.1 Fuel component

The first variable that has a major impact on the fuel costs faced by UNELCO is the fuel price. UNELCO do not control the price they pay for imported diesel, so it is reasonable for the impact on costs of fuel price fluctuations to be passed through to electricity customers. This does, however, remove the direct financial incentive for UNELCO to negotiate down the fuel price as much as possible. For the purpose of this tariff review, it is assumed that UNELCO will act in good faith and strive to get the best price for customers when negotiating fuel prices.

The current mechanism for passing through fuel prices, allows UNELCO to calculate the weighted average fuel price per litre paid for diesel and copra across all concessions (G), compare this value to the base fuel price (G_0) and adjust the fuel component accordingly.

The second major external variable that impacts the fuel cost is the amount of power that is generated by non-fuel based power (e.g. hydro, wind, solar PV, geothermal). Currently, the hydro savings are added in to the tariff through the Sarakata savings method, and so for the purposes of the formula, power generated by the Sarakata hydro plant is treated as if it was generated by diesel fuel. Power generated by the wind farm in Port Vila, however, is fuel free, as would any further investment in new non-fuel generation. The total cost of fuel for UNELCO is reduced as more is produced by wind, and vice versa. The fuel component of the formula should be adjusted by the proportion of power generated by fuel (N), where

$$N = \ Average\ for\ previous\ twelve\ months\ of\ \left(1 - \frac{Energy\ produced\ by\ wind}{Total\ energy\ produced}\right)$$

N_0 should be set according to the five-year average forecast level of N.

The suggested formula for calculating the fuel component of the price is suggested as:

$$X_{FUEL} \times \frac{G}{G_0} \times \frac{N}{N_0}$$

7.1.2 Wages component

UNELCO operates in a reasonably competitive labour market. Therefore, staff costs are influenced by the market rate for wages in Vanuatu. The method of calculating the wages component is:

$$X_{STAFF} \times \frac{M}{M_0}$$

Where M is an index of average wage costs in Vanuatu. Currently, this index is based on an average of the daily wage for a single male not receiving board or lodging in Port Vila at Ifira Wharf and Stevedoring classified as an "inexperienced labourer"; and the classification "GRT" of the Public Service of the Vanuatu Government. It has been noted that there has been very little change in either of these indicators for more than twelve months, suggesting that they may not be an accurate measure of average wages in Vanuatu. A suitable alternative index has not yet

been created. Should a suitable alternative be found, then it is suggested that it should be used to calculate M.

7.1.3 Materials component

UNELCO must purchase materials in order to operate, maintain and upgrade equipment for electricity supply. The price of these materials is determined by the market for such materials in Vanuatu and abroad. The Materials component currently used in the formula is:

$$X_{MATERIALS} \times \frac{IM}{IM_0} \times \left[0.60 + \left(0.40 \times \frac{C}{C_0}\right)\right]$$

Where IM is an index of materials prices, and C is an index of the relative strength of the Vatu. IM is based on the index of "Matériel" published in the "Journal Officiel" (New Caledonia Gazette) and C is the exchange rate between the Vatu and the Pacific Franc.

In an ideal model, the Materials component should take into account price and currency fluctuations for the mix of currencies in which materials are purchased. Given the practical impossibilities of creating such an ideal model, the URA suggests that the existing mechanism is retained.

7.1.4 Other component

The remaining component comprises of tariff revenue that will not be adjusted according to an external index. This comprises depreciation, returns, and "other" operating costs.

The indexation formula does not make any adjustments for economies of scale. This means that UNELCO has an incentive to drive demand through a high quality of service and increasing connections.

The Other component is represented in the indexation formula by a constant X_{OTHER}.

7.1.5 Complete formula

The overall tariff indexation formula calculates the price P based on a base price P_0, adjusted for each of the components listed above. The overall tariff indexation formula is:

$$P = P_0 \times \left[X_{FUEL} \times \frac{G}{G_0} \times \frac{N}{N_0}\right] + \left[X_{STAFF} \times \frac{M}{M_0}\right] + \left[X_{MATERIALS} \times \frac{IM}{IM_0} \times \left[0.60 + \left(0.40 \times \frac{C}{C_0}\right)\right]\right] + X_{OTHER}$$

Stakeholders are invited to comment on the suggested tariff indexation method, and make any further suggestions they feel are appropriate.

8 Impact of Luganville re-tender

The concession agreement for Luganville is due to expire at the end of 2010. The new concession is subject to an international tender process, which raises the possibility of multiple electricity operators in Vanuatu. Each concession has a different cost base. It is the position of the URA that uniform tariffs should be maintained across all four current concession areas. In order to maintain the possibility of uniform electricity tariffs across all of Vanuatu, an explicit mechanism is required to balance the revenue across the operators.

In addition, it is the position of the URA that there should be a mechanism in the tariff for creating a fund that can be used for expanding access to electricity services and/or for further reduction in customer tariffs.

8.1 Principles

The following principles have guided the design of this mechanism:

- It must allow for the possibility of multiple operators.
- It must allow for uniform tariffs across all of Vanuatu.
- It must allow all electricity operators to cover their reasonable costs and earn a reasonable return on their investment in the electricity concession.
- It must maintain incentives to increase electricity connections, operate efficiently, and use renewable energy.
- One operator must not be able to influence the results of another operator.

8.2 Balancing mechanism

The proposed mechanism is based on having two separate price formulas for each operator, one for Luganville, and the other for Port Vila, Malekula, and Tanna combined. Both formulas will use the structure defined in Section 7.1.5. above, but use different coefficients.

P_{PV} represents the price for Port Vila, Tanna and Malekula, and P_L represents the price for Luganville. Each formula is calculated monthly, and the higher of the two prices is charged to customers across all concessions.

Each month, the concession with the lower P must make a payment (B) to a balancing fund of:

$$B = (P_{HIGH} - P_{LOW}) \times D$$

Where:

- B = the amount payable to the balancing fund
- D = the electricity sold by the operator with the lower P in that month, in kWh.
- P_{HIGH} = the higher of the two price formulas calculated that month
- P_{LOW} = the lower of the two price formulas calculated that month

8.3 Operation of the balancing fund

So as to not adversely impact the cash flow or working capital position of the operator that must pay into the balancing fund, the payment should be required after such a reasonable time as the operator can be expected to have collected the revenue from customers for that month. As such, it is recommended that payment into the balancing fund be required within 60 days of the start of the month for which P is set. For example:

- Day 1: Start of the month. P_{PV} and P_L calculated based on previous month's data.
- Day 10-15: Customer bills sent out
- Day 30: Customer payments due
- Day 60: Payment to balancing fund due.

Stakeholders are invited to comment on this new mechanism and suggest alternatives as they see necessary.

9 Use of Sarakata funds

The existing Luganville concession contract specifies that the fuel savings from running the Sarakata Hydro plant, minus some specified costs of running the plant, must be set aside in the Sarakata Special Reserve Fund. In their tariff application, UNELCO suggest using the full amount of the Sarakata savings for lowering the tariff.

The use of the fund is decided by Government. The URA recommends that the existing Sarakata funds should be used for lowering tariffs across all concessions.

As discussed in Section 8 above, the current mechanism of creating the Sarakata Special Reserve Fund expires with the Luganville concession at the end of 2010. Section 8 describes a new mechanism for creating a fund for electrification and tariff reduction purposes. The URA's position is that this new fund should be used for tariff reduction, unless specific electrification projects have been approved.

Stakeholders are invited to comment on the proposed use of the Sarakata fund.

10 Next Steps

This document sets out the current position of the URA on the tariff review, and invites comment from all stakeholders.

The next steps in the process are:

- **Consultation**. The Electricity Tariff Application Report March 2010 and Electricity Tariff Review Position Paper March 2010 will be made available to the public and all interested stakeholders. The URA will invite submissions on the position paper from the public, Government departments, UNELCO and all other stakeholders.
- **URA's Final Decision & Tariff Recommendation**. Following consultation on the URA's Electricity Tariff Review Position Paper March 2010, the URA will publish its final recommended tariff. In the event that the final tariff is not agreed between the Government and UNELCO the matter will be referred to arbitration, as specified within the concession agreements. Following agreement on the new tariff level, structure, and formula, the new tariff will take effect upon signing of an addendum to the concession contracts by the Government and UNELCO.

Appendix A: Summary of assumptions in URA's position

Type	Concession	Metric	Assumption	Comments
Demand Forecast				
Demand Forecast	All	kWh demand growth annual growth rate	2010 = 4.6% 2011-2014 = 4.0%	Disagree with Tariff Application
Demand Forecast	All	kVA demand annual growth rate 2010 to 2014	Same as kWh growth rate	Agree with Tariff Application
Demand Forecast	All	Revenue growth from COS PHI 2010 to 2014	0%	Agree with Tariff Application
Demand Forecast	All	Revenue from Prime de Transfo annual growth rate 2010 to 2014	Port Vila = 0.36% Luganville = 2.07%	Agree with Tariff Application
Generation Forecast				
Generation Forecast	Port Vila	Wind generation 2010-2011	4,600,000 kWh	Agree with Tariff Application
Generation Forecast	Port Vila	Wind generation 2012-2014	6,600,000 kWh	Agree with Tariff Application
Generation Forecast	Port Vila	Diesel plant fuel efficiency	0.259 litres per kWh.	Disagree with Tariff Application
Generation Forecast	Port Vila	Diesel price 2010 - 2014	85 VUV per litre	Agree with Tariff Application
Generation Forecast	Port Vila	Port Vila Annual Coprah consumption 2010 to 2014	2010 : 750 000 litres 2011 : 1 400 000 litres 2012 : 2,500,000 litres	Agree with Tariff Application
Generation Forecast	Port Vila	Copra fuel efficiency	0.294 litres per kWh.	Agree with Tariff Application
Generation Forecast	Port Vila	Copra price 2010 - 2014	100 VUV per litre	Agree with Tariff Application
Generation Forecast	Port Vila	Monthly system losses (kWh sold / kWh produced)	Same as 2009	Agree with Tariff Application
Generation Forecast	Luganville	Annual hydro generation 2010 to 2014	5,614,000 kWh per annum	Agree with Tariff Application

Generation Forecast	Luganville	Price of lubricant oil (used in Sarakata fund savings calculation)	256.40 VUV per litre	Agree with Tariff Application
Generation Forecast	Luganville	Diesel plant fuel efficiency	0.286 litres per kWh	Disagree with Tariff Application
Generation Forecast	Luganville	Diesel price 2010 - 2014	85 VUV per litre	Agree with Tariff Application
Generation Forecast	Luganville	Monthly system losses (kWh sold / kWh produced)	Same as 2009	Agree with Tariff Application
Generation Forecast	Malekula	Copra plant fuel efficiency	the Malekula generator is assumed to be 0.414 litres per kWh for coprah.	Agree with Tariff Application
Generation Forecast	Malekula	Copra consumption	2010: 215,000 litres 2011: 224,000 litres 2012: 235,002 litres 2013: 238,500 litres 2014: 246,500 litres	Agree with Tariff Application
Generation Forecast	Malekula	Copra price 2010 - 2014	100 VUV per litre	Agree with Tariff Application
Generation Forecast	Malekula	Monthly system losses (kWh sold / kWh produced)	Same as 2009	Agree with Tariff Application
Generation Forecast - Tanna	Tanna	Diesel plant fuel efficiency	0.364 litres per kWh.	Disagree with Tariff Application
Generation Forecast - Tanna	Tanna	Diesel price	Port Vila price plus 20.5 VUV per litre	Agree with Tariff Application
Generation Forecast - Tanna	Tanna	Monthly system losses (kWh sold / kWh produced)	Same as 2009	Agree with Tariff Application
Cost Forecast				
Cost Forecasts	Port Vila	Staff Cost 2010- 2014	Move to 111 connections per staff and 16.10% reduction in cost per staff over 3 years	Included in efficiency savings
Cost Forecasts	Luganville	Staff Cost 2010- 2014	Move to 111 connections per staff and 16.10% reduction in cost per staff over 3 years	Included in efficiency savings
Cost Forecasts	Luganville	Sarakata savings calculation	Theoretical diesel & lubricant cost based on Sarakata savings formula added to fuel cost for Luganville. 10m removed from staff cost for	Agree with Tariff Application

			Luganville. 6m + 4m removed from Goods & Other costs for Luganville	
Cost Forecasts	Malekula	Staff Cost 2010- 2014	Move to 111 connections per staff and 16.10% reduction in cost per staff over 3 years	Included in efficiency savings
Cost Forecasts	Tanna	Staff Cost 2010- 2014	Move to 111 connections per staff and 16.10% reduction in cost per staff over 3 years	Included in efficiency savings
Cost Forecasts	All	Other Costs 2010- 2014	Decrease costs 38.40% from 2009 level over 3 years	Included in efficiency savings
Global Efficiencies	All	Cost savings per year	2010 51,580,651 2011 171,376,476 2012 214,572,008 2013 289,547,270 2014 356,274,081 Total 1,083,350,486	Disagree with Tariff Application
Adjustment for Wind Farm savings	All	Annual adjustment for Wind Farm savings, to be applied 2010-2014	45,645,259	Not included in Tariff Application
Reasonable Return				
Reasonable Return	All	Nominal risk free rate	5.14%	Disagree with Tariff Application
Reasonable Return	All	Market risk premium	5.00%	Agree with Tariff Application
Reasonable Return	All	Country Risk Premium	2.00%	Disagree with Tariff Application
Reasonable Return	All	Gearing	60%	Disagree with Tariff Application
Reasonable Return	All	Equity proportion	40%	Disagree with Tariff Application
Reasonable Return	All	Inflation rate	4.70%	Agree with Tariff Application
Reasonable Return	All	Equity beta	1	Agree with Tariff Application
Reasonable Return	All	Debt risk premium	4.0%	Disagree with Tariff Application

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