

25 June 2015

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Report Two: Feedback on Tonga Power Limited's reply of 30 April 2015

The Electricity Commission (Commission) has sought feedback from Shea Pita based on TPL's reply of 30 April 2015 to our paper of 22 March 2015, on the following matters:

1. Smart metering
2. New Distribution projects
3. ERP proposal
4. Fourth feeder
5. Submarine cable
6. Generation at Eu'a
7. Benchmarking
8. OPEX
9. TPL's proposed revisions to Fuel tariff formula
10. CAPEX and OPEX reforecasting

1. Smart metering

In our paper to the Commission we made the following statement:¹

"[T]he project appears to convey little in the way of tangible benefits to the electricity consumers of Tonga. Smart metering is often justified in the first instance by operating cost savings. Further dynamic benefits are usually expected but can be difficult to quantify. TPL's smart metering project is expected to improve:

- The integration of distributed renewables, and demand side management generally
- Diesel fuel consumption; and
- Revenue management and unaccounted for energy

Yet, in TPL's proposal distributed renewable generation is having no effect on demand (assumed to be net of distributed generation) – and further diesel generation is proposed in the capital plan

¹ Page 37.

to meet greater than forecasted increases in demand. Likewise, we cannot see any significant fall in the forecast demand for diesel fuel consumption related to smart metering (i.e. over and above that expected from renewable projects). Additionally, contrary to what one might expect, TPL have asked for their system loss targets to be relaxed relative to those proposed by the Commission when presumably these should be easier to achieve if smart metering were having a material impact in this respect. Finally, although operating costs are budgeted to decline from 2015, they are at a much higher level and increase more quickly than they were prior to the step change in operating costs in 2012.

We agree that advanced metering infrastructure will benefit electricity consumers in Tonga in the long-run but over the next reset period, the smart metering project is a very large capital cost that could be deferred and reduce costs to customers by approximately 1.0 seniti/kWh.”

TPL has not replied to any of the points we have raised. It has however proposed a revised and somewhat reduced expenditure programme, taking its original recommended capital investment down from \$7 million to \$3 million (acknowledging that it expects aid funding to cover a further \$1 million in cost), otherwise this cost will rise from \$3m to \$4m.

TPL have not explained how consumers are to benefit from their revised programme. Previously the benefits of smart metering have been generally described (we appreciate for instance that less meter readers may be needed thus potentially helping reduce operating costs) but no long run efficiencies seem to be accruing to consumers in TPL’s plans. Moreover, TPL is now talking about still spending the rest of the \$7m of capex “Once the base systems are deployed, the meters can be deployed as capital is available.” Since TPL now propose to spend the ‘saved’ \$3m on other projects, their capex proposal is, effectively, \$3m higher than their original proposal.

We note that the total cost of this project (including MFAT grant) is approaching 1% of Tonga’s GDP. This is a project of such size that it should have to pass a very high test of public scrutiny before costs are passed onto consumers. This has not occurred.

The cost to consumers of what is proposed is in the order of 2 seniti/kWh (assuming \$7m CAPEX). The reduced programme TPL refers to still leaves customers facing a CAPEX bill of \$3m or about 0.75 seniti/kWh in the absence of a compelling business case.

2. New Distribution projects

TPL proposes to spend \$3 million in “savings” from the original \$7 million smart metering plan, on additional distribution CAPEX. These include:

- **OIEEP and HCIRP - Outer Island Energy Efficiency Project and Ha’apai Cyclone Ian Recovery Project**
- **Pacific games**
- **Waterboard project**
- **Sub division – Patangata**
- **Resort development - Fuamota**

First, we note that none of these projects were set out in the TPL Reset Proposal submitted in December 2014; nor were they mentioned during our meetings and extensive correspondence with TPL during February and March 2015. Given they were not considered strategic priorities or even issues worth raising at that time, we find it difficult to accept that within a month of our reports release priorities have transformed so dramatically. It is also notable that the costs of these new projects

matches the exact difference in cost TPL is proposing it achieves through reducing its smart metering project.

Of the projects raised in Appendix 3 of TPL's response:

1. Major Distribution Areas – in our view the Commission cannot be asked to approve funds based on evidence that hasn't been presented.
2. Outer Islands projects – prima facie these projects seem to be important. However, very little information and justification has been provided. In our view, given Tonga's stage in the development of electricity reticulation, these projects should be given priority over smart metering.
3. Sub-divisions and other developments – based on the descriptions given these projects seem to be of no direct benefit to electricity consumers and are social projects. Subject to other constitutional and legislative constraints the Government, as owner of TPL, has a right to commit funds to discretionary projects. However, in our view these projects should be funded from TPL equity and not from electricity consumers.

3. ERP proposal

TPL has raised a new request for capital spending in its reply. This was not a part of its forecast or discussions with Shea Pita as at March 2015. The request relates to the implementation of an 'Enterprise Resource Planning (ERP) system, to improve quality and efficiency of business processes'. We have no difficulty with this conceptually and note that it may well have some operational and efficiency advantages for the performance of TPL on behalf of its customers.

However, given its late inclusion (and lack of strategic significance only a few months prior) it is important that a proper business case is presented to the Commission so it is able to make an informed judgement as to whether this is a justifiable new spend over and above what had been sought by TPL in its original budget forecast. In other words, the primary purpose of any upgrade to infrastructure must be to improve efficiency, either through improving output, reducing input or a combination of both. Any request for funding needs to explicitly identify the efficiency gains and how benefits accrue to consumers.

We recognise that this may be an issue the new Chief Executive wishes to initiate as part of a wider organisational enhancement programme, and suggest that further discussion and information sharing with the Commission occurs to determine the best way forwards.

4. Fourth feeder

The concern we expressed in our report with what TPL had proposed regarding the fourth feeder was they had not included any rationale for it in their report or even their asset management plan. We asked TPL as a part of our interview process in February 2015 if they had any reports on technical losses and were told there were none. This was clearly not the case and TPL has now presented analysis on losses from SKM dated 2010. It would have been helpful had TPL shared the data requested by Shea Pita on behalf the EC and Tonga consumers in February.

This is the first time that the issue of the unbalanced loading has been raised. This helps explain why our assessment of TPL losses could be significantly lower than the actual losses. We have no reason to question the SKM report and the assessment is credible. It also raises the question of why the loads are so unbalanced (possibly TPL is saddled with the decisions of previous management).

Our recommendation is that the Commission accepts what TPL has proposed but sends a strong message that it needs to be more transparent and organised in future when making any case for capital spend to avoid wasted time and resource.

5. Submarine cable

In our report we stated:²

“The replacement of the second cable, however, is much harder to justify and would cost (based on half of the budgeted \$1.2m) about \$0.6 million (real).³ This amounts to expensive n-1 capacity in our view and an unnecessary degree of security given as a properly sized, designed and installed submarine cable should provide very high levels of reliability.

The potential for greater future demand on the Vaini side of the lagoon and (subject to donor funding) new wind generation, is also put forwards by TPL as a rationale for the second “standby” cable. However, we regard these as considerations more for the sizing of the lagoon cable’s capacity as opposed to justification for n-1 redundancy.⁴ It is also our view that much cheaper options are potentially available for providing back up capacity for a single submarine cable, especially as there are plans to upgrade the ring feed capacity around the lagoon.”

In short, we can agree that it is important to install a new submarine cable, but building a second new cable is an over investment and inefficient use of scarce resources and more significantly, a cost TPL wants to pass on to the ordinary consumer; the very person the Commission is there to protect from the cost of inefficient capital spending decisions.

Part of TPL’s revised justification is that the project represents a small increase in the electricity tariff. A counterview is that the submarine project represents a cost of approximately 0.1% of Tonga’s GDP. To put this in the New Zealand context this is equivalent to an electricity project of NZD\$300m. Such a project in New Zealand would be subject to a Grid Investment Test, a comprehensive Cost Benefit Analysis (including the assessment of alternatives) and public consultation. Obviously such a process is cost prohibitive in Tonga; nevertheless, the justification provided by TPL for a project of this relative scale is inadequate.

We reiterate that we acknowledge that the existing submarine link needs to be replaced with a suitably designed and installed cable. It is the full n-1 redundancy provided by a second cable of the same capacity we are questioning.

Based on TPL’s feedback and using a rough estimate of average Value Of Lost Load (VOLL) for Tonga we make a rough first order estimate that a single cable would need a failure at least once in twenty years for a duration of 45 days for a second cable to be economic.

In our view a suitably designed and properly installed and maintained (including holding critical spares) submarine cable should:

- Be expected to have a substantial failure less than once in twenty years,

² Page 38.

³ We assume a value here for the second cable of \$0.6m based on TPL’s Proposal which states \$1.2 million has been budgeted for the second reset period to cover the cost of both new cables (pp 46-47, 90).

⁴ In other words, how much capacity should the new cable have?

- Be expected to fail for less than 45 days.

We also note that renewable generation in the area would potentially augment back up supply, and that there may be other ways of achieving a sufficient level of security without full redundancy.

TPL suggests there are customers in the area that would value security more highly and that the airport in particular cannot be supplied by alternative supplies. These customers must be on a lower level of security now. While we recognise that there is already a significant level of cross-subsidy in the Tonga electricity tariffs, in the case of the second cable where the costs and the benefits are so easy to identify and where the number of customers that would value the extra security highly is low, the most economic solution might be to offer the customers that would value the extra security a special arrangement whereby they can choose whether to fund the second cable.

6. Generation at Eua

In our report we made the following statement:

We note that if this CAPEX is scheduled and approved and the biomass plant goes ahead with donor funding, that TPL would have surplus cash under this forecast. Although this only affects the price by ~ 0.05 seniti/kWh, the principle of efficient pricing still applies from a customer's standpoint; therefore, the Commission may wish to provide for this possibility as part of the new Concession Contract (possibly via an Extraordinary Review which also provides for a downwards adjustment in non-fuel tariff prices).

TPL have responded as follows:

"As the ICR correctly points out this is not material to the start price (.05 of 1 seniti) and TPL proposes that the funds remain in 2019. If funding needs to be brought forward this will be discussed as part of the annual planning discussions with the EC and if the spend is not required the impact to consumers is virtually nil. This spend is dependent on the outcome of the bio mass project and a possible donor funded solar facility."

We are satisfied that new generation is going to be required at Eua in the event the new biomass plant does not go ahead. We also recommend the Commission discusses this point further with TPL and makes provision for extraordinary adjustment clauses to work both ways, including where appropriate in favour of the customer, and not only TPL. Materiality levels should be determined to provide a clear guide as to when such a clause could be invoked on behalf of customers in cases where TPL's costs are lower than originally forecast.

7. Benchmarking

Benchmarks are a useful tool in business and can provide valuable insights and performance metrics for organisations looking to compare their standards and outcomes with those of the rest of the market or who compete in similar markets.

As TPL have pointed out, PWC remarked how well TPL was performing relative to its benchmarked Pacific peers. Technically, this assertion is accurate.⁵ However, when looking at benchmarks, it is critical that we take our thinking a step further and consider the wider market context. In other words,

⁵ Concessionaire's Response to the Independent Consultants Review, Page 15.

who are the other parties being benchmarked and how well are they running their businesses on average?

Out-performing the majority of your benchmarked peers does not mean you are performing in an optimal or efficient manner if the average company being examined is a poorly run monopoly over charging its customers and making poor investment decisions.

In the Pacific we understand there are significant performance challenges among numerous power companies based on statements by the Pacific Power Association in its 2012 "Pacific Power Utilities Benchmarking Report (the same source document referred to by PWC in its Performance Review of TPL dated March 2014):⁶

"Broad areas of concern for Pacific power utilities are summarised below. In general, trends since 2010 in the majority of the indicators that informed these concerns are **unfavourable**....

- Levels of overall **labour productivity appear to have dropped further** for the benchmark group in 2011. Improved capture of information on Full Time Equivalent (FTE) employment may have contributed to this outcome. The previously recommended utility specific reporting into factors underpinning poor productivity should be progressed for use by the PPA and other agencies.
- While **loss data has not been improved** significantly as a result of this benchmarking update, regional loss-reduction programmes based on cost-effective improvements should continue, including discussions with PRIF partners on grant and loan assistance for implementation.
- There is a **general lack of appreciation for the asset management discipline from asset design to end of life management**. This exhibits itself most clearly in lack of systematic maintenance. It is recommended that specific utility support is supplemented with case studies covering key aspects of utility asset management.
- The level of **reporting of safety incidents and other non-conformances appears either low or non-existent amongst many utilities**. It is recommended that Pacific utilities or PPA subscribe to the safety specific newsletters of other industry associations and further develop safety improvement strategy and associated programmes.
- **Varying financial standards and accounting regimes, coupled with a lack of transparency in financial data, limit the value of financial benchmarking**. It is recommended that utilities consider revealing all financial data to improve comparative and other forms of analysis. It is also recommended that PRIF partners provide direct specialist financial support for future benchmarking updates, reviewing the design and scope of all financial measures and information.

⁶ Page xii.

- **Reliability performance data continues to be highly questionable** with few utilities making significant efforts to analyse customer perceptions and views.”
[Emphasis added]

Therefore, contrary to what TPL suggest in the opening remarks of their reply,⁷ relying on Pacific nation benchmarking to determine whether your power prices are at an appropriate level is a high risk strategy if you are a Tonga power consumer, but arguably a good approach if you are the monopoly power company and only being compared to other monopoly providers who have in many cases it would seem less than optimal performance track records.

Moreover, benchmarking is no substitute for the approach taken during our review of TPL’s Reset proposal, where we looked in detail at the business and technical arguments and analysis put up by TPL in support of its decision making on forecast capital and operational spending (which in turn directly impacts on future power prices to households throughout Tonga).

Our inquiries were not focussed on how much do other island nation monopolies spend on, for instance, “generation CAPEX per annum per capita”. Rather, we sought to identify (a) how much TPL intends to invest on generation CAPEX (b) on what specific projects, and (c) what was its commercial and/or technical rationale for such an investment/s (i.e. is this spending and the consequential price increase for customers, justifiable or not?).

Where we believed the evidence furnished by TPL was sufficient, we explicitly supported such decisions (e.g. TVNUP stages 2 and 3; Outer island CAPEX, Capital replacement, Generation Vava’u).

Similarly, where we thought the evidence was lacking, and no clear business case had been made, we made that clear also (e.g. TPL’s case for a \$7 million Smart Metering spend) as it is crucial that in the absence of competitive market for electricity supply, Tonga consumers do not pay any more than is necessary for a safe and reliable electricity supply.

8. OPEX

TPL claims that its forecast of operating cost is fair provided you only look as far back as 2012. We remain unconvinced and stand by the arguments and data we put forward in our report. For example, in the case of Corporate OPEX, when we contrast proposed spend with historic spend to 2014, we note several material increases ranging from 188 to 544% on an annual basis:

Corporate OPEX category	2010/11	2011/12	2012/13	2013/14	2015/16 -20 (real)	Historical Average (2010-14)	Difference	Percentage difference
Auto Expenses - Diesel and Fuel	\$ 12,019.86	\$ 13,561.99	\$ 27,548.21	\$ 32,383.69	\$ 61,592.60	\$ 21,378.44	\$ 40,214.16	188%
Auto Expenses - Repair and Maintenance	\$ 4,060.24	\$ 5,621.15	\$ 7,731.49	\$ 8,941.82	\$ 40,944.00	\$ 6,588.68	\$ 34,355.33	521%
Repair and Maintenance - Ground	\$ 924.80	\$ 3,168.14	\$ 2,045.19	\$ 6,825.10	\$ 20,886.00	\$ 3,240.81	\$ 17,645.19	544%
Repair and Maintenance - Equipment	\$ 3,402.80	\$ 1,620.57	\$ 2,544.35	\$ 9,406.80	\$ 12,215.00	\$ 4,243.63	\$ 7,971.37	188%

TPL has not provided sufficient compelling data or arguments from our perspective to deal with the issues we raised regarding what appears to be OPEX overspending. A more detailed independent

⁷ Concessionaire’s Response to the Independent Consultants Review, Page 4, paragraph 2.

audit of these and all OPEX costs going back to 2010/11 would be of value to both the Commission and TPL as it should confirm that TPL has an historical and forecast OPEX profile which makes the most efficient use of non-fuel tariff revenues on behalf of customers. We would be happy to assist in preparing the terms of reference for such an audit if the Commission deemed it appropriate.

We have no issue with the revised position on bad debt.

9. TPL's proposed revisions to the fuel tariff formula

There were two suggested amendments to our proposed changes to the fuel tariff adjustment:

- a. That Fuel Savings accruing as a result of renewable energy plants **not** owned or governed by TPL be excluded from the Fuel Adjustment formula
- b. TPL proposed an alternative formula for the monthly forecasting of demand

With regard to (a) we agree with TPL that recognising savings in fuel from non-TPL DG through the reduced Permitted Gross Generation should be equivalent to recognising it through the Fuel Adjustment process

In respect of point (b), we note that, while TPL did not agree with our proposed formula, their new suggestion is different again from that in the original proposal. And we are of the view that this latest formula is again fundamentally incorrect.

In the proposal, TPL explained the intention behind their proposed formula: "The Model calculates forecast kWh billed for the current month using the moving average of last six months' actual kWh billed and increasing this value by monthly growth."

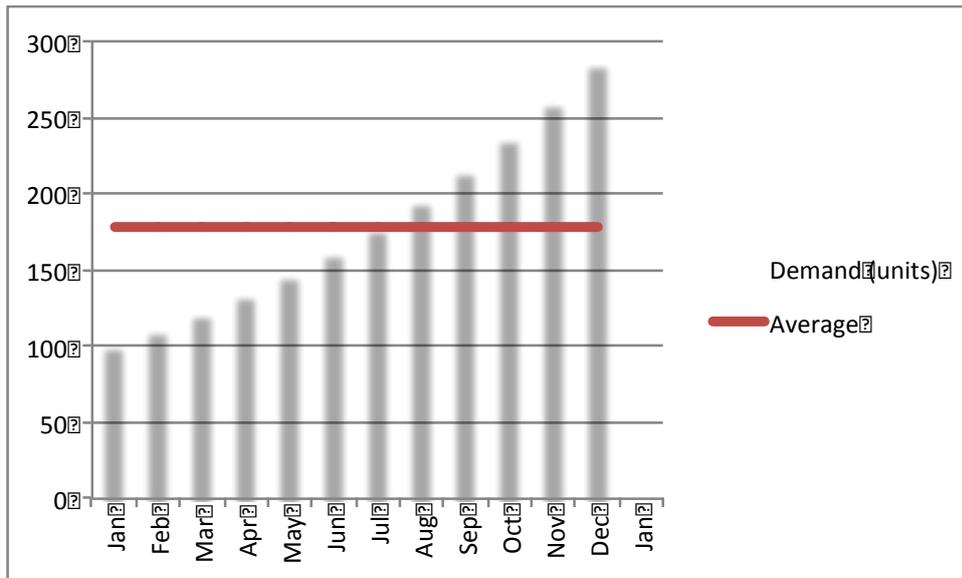
Any moving average forecast (including TPL's) is a combination of a structural component and a growth component. Arguably, the structural component could be any representation of historical behavior, as long as the growth component is accordingly set to produce a sensible forecast. If the structural component is biased downwards, the growth factor has to be increased. Our original difficulty with this approach was that TPL appeared to want to systematically derive the monthly growth from the assumed annual growth. This being the case, the structural component (the right-hand term in TPL's formula) has to be a reasonable predictor of the forecast month's demand, **had no growth occurred**.

In the case of TPL's proposed formula, there are consequently two issues:

- i. If there was no seasonality but underlying demand growth was present, by inflating the average of the last 6 months (or, even worse, 12 months as now proposed by TPL), would systematically bias the structural component of the forecast demand down if only a monthly growth factor was applied
- ii. If there was seasonality as well as underlying growth, the forecast could either systematically underestimate or overestimate, depending on which part of the year was being forecast.

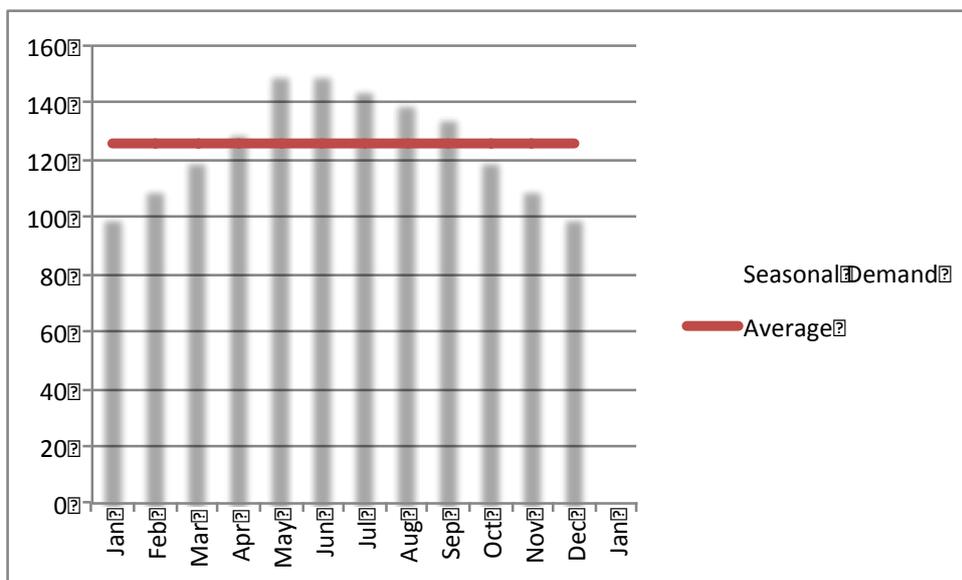
In order to clear up the confusion over our proposed formula, we illustrate here with an example.

Suppose that our initial (January) demand is 100 units. There is no seasonality present but there is underlying growth of 10% per month (we have exaggerated monthly growth here to illustrate the point). Over a 12 month period the resulting demand sequence is illustrated in Figure 1, along with the average of the 12 month period (the second term in TPL's new formula).



Clearly, the structural component of TPL’s proposed formula significantly understates likely demand in the next month (January of the new year) should no growth occur.

We illustrate the case of seasonality in Figure 2. It should be equally clear that the 12 month average is nonsensical as a basis for the next month’s forecast in a no-growth scenario (it would have to be deflated in this case).



We have not been engaged to analyse the presence of seasonality in Tonga’s electricity consumption, hence we cannot comment on which of the two cases presented above apply.

However, we acknowledge that with relatively low, stable annual demand growth and no seasonality, the numeric value of a “reasonable estimate of the monthly growth in demand” (however that is estimated) could be numerically reverse-engineered to achieve a sensible forecast. That is, current practice might use a figure for ‘monthly growth’ that produces a sensible forecast. We stress that this situation can plausibly arise not because it is fundamentally correct, but because parameters can be estimated which make it ‘work’.

The risk with this scenario arises when changes in consumption behavior arise, causing growth to vary or seasonality to arise. If the monthly growth factor is truly derived from the forecast annual growth, one only needs to consider the very simple illustration above, in a scenario where the annual forecast for the coming year is set to 0%.

Our proposed formula attempted to correct for this by inflating the historical average (in our case, we used 6 months to align with TPL’s proposal) by 3.5 months so that the structural component was “brought forward” to be comparable to the most recent month. This is a superior approach to simply using the most recent month’s observed value, since the averaging over many time periods removes noise. Then a sensible single-month growth factor could be applied.

However, we admit that this is a potentially confusing approach. Simpler alternatives include:

- a. periodically estimate a moving-average equation (using simple statistical techniques), and not attempt to derive the growth factor from the forecast annual growth. This has the downside of losing the connection to the annual forecasts derived elsewhere in the ECC.
- b. Revert to the previous approach of applying an annual growth factor to the observed value in the same month last year, i.e.,

$$kWhbilled_m = kWhbilled_{m-12} \times (1 + \text{annual growth})$$

10. OPEX and CAPEX reforecasting

It would also be helpful to the Commission in our view if TPL provided a new summary of its proposed OPEX and CAPEX budgets for the second reset period. A suggested template follows:

OPEX for Reset Period 2015-2020						
Category	Total	2015-16	2016-17	2017-18	2018-19	2019-20
Generation						
Renewable generation						
Distribution						
Retail						
Corporate						
Total						

CAPEX for Reset Period 2015-2020						
Category	Total	2015-16	2016-17	2017-18	2018-19	2019-20
Generation						
Renewable generation						
Distribution						
Retail						
Corporate						
Total						

Conclusion

Should the Commission have any questions in regard to what we have described in this supplementary report, please do not hesitate to forward these to us for further consideration.

Me te mihi nui

A handwritten signature in blue ink, appearing to be 'MP', is centered below the text 'Me te mihi nui'.

Morris Pita

Shea Pita & Associates