

INTRODUCTION

1. The Electricity Commission was created by Statute¹ and requires to operate a system of economic regulation laid down in a document known as a Concession Contract.² Their focus is Tonga Power Limited which has exclusive rights to generate, transmit, distribute and retail electrical power to Tongan consumers. It is therefore a Natural Monopoly and requires to be independently regulated in order to : -
 - Protect consumers from exploitation;
 - To ensure that Tonga Power Limited can provide the electrical infrastructure needed to provide an efficient, safe and reliable service to their customers;
 - To implement appropriate price controls; and
 - To exploit the efficiency improvement potential of the regulated entity (i.e. Tonga Power).
2. The First Concession Contract came into force on 25th July 2008. The Second or the existing Concession Contract which replaces the First Concession Contract came into force on 1st September 2015. This Reset will be the Third Concession Contract.
3. The 2020 Reset provided the Regulator with the opportunity to promote the creation of a more perfect Regulatory Instrument to replace the said 2015 Concession Contract: -
 - which better reflects the realities of the 2020 Energy Market in Tonga;
 - which is markedly different from that which prevailed in 2015;
 - which takes into account of Tonga's recently declared policy to maximise the use of renewable energy sources with implementation targets of 50% and 70% set for dates in the not-too-distant future.

THE RESET PROCESS

4. The Electricity Act 2007³ provides the framework for electricity regulation and the Electricity Concession Contract of 2020⁴ provide the detail for the review and reset of the terms of the 2020 Contract. What the Act and the Contract mandate best can be summarised thus : -
 - The Regulator should use their “best endeavours” to complete the Reset before 30th June 2020 BUT extends to 30th September 2020.

¹ Electricity Act 2007

² Electricity Concession Contract dated 25th July 2008

³ Section 20 and Schedule 1

⁴ Principally Clause 9, and Schedules 10 and 11

- The Conduct of that Review shall be as detailed in Schedule 10 of the Contract.
- The matters which must be reviewed are described in Paragraph 1 of Schedule 10.
- The rules to be followed in resetting the matters described in Paragraph 1 of Schedule 10 are detailed in Schedule 11 of the Contract.

5. Paragraph 1 of Schedule 10 describes the matters to be reviewed during the Reset process. They included :-

- The Fuel and Non-fuel components of the Electricity Tariff
- The Adjustment Formula and indexation factors for periodic review of the Non-Fuel Tariff, presently conducted on an annual basis using CPI data.
- The Adjustment Formula for the Fuel Tariff, presently conducted ordinarily on a quarterly basis. This will require *inter alia* a review of Fuel Type, Generation Mix, and Fuel Efficiency Targets.
- Efficiency Standards generally.
- Bad Debt allowances.
- Service Standards.
- Metering and other reporting standards.
- Penalties.
- Capital Expenditure for the Third Reset period.
- Duration of the Third Reset period and whether this should be coterminous with the Period for which the Reset Tariff applies.

6. The Regulator was required by law⁵ to procure **expert advice** on the matters to be reviewed, in order to provide them with an independent, external and neutral commentary thereon. This they did by engaging Dr. Virendra Ajodhia, PhD (cum laude) in Energy Economics and a MSc in Power Systems Engineering from Delft University of Technology (Netherlands).

- Second Reset: Electricity Commission engaging Morris Pita, MBA (Oxford), LL.M. and B.A. (both Auckland), the Principal of Messrs Shea Pita and Associates Ltd of Devonport, Auckland.

7. Apart altogether from the mandatory (statutory and contractual) requirements of the Reset process, there were some OBVIOUS and COMMON-SENSE questions which the Regulator asked itself during the Reset Process. Simply put there were FOUR questions for consideration : -

⁵ Paragraph 3 (2) (a) of Schedule 1 of the Act

1. What must be done to ensure that Tonga Electricity Consumers receive a continuous, safe and reliable supply of electricity?
2. Are Tonga Power's expenditure proposals, both CAPEX and OPEX, the most efficient and effective way of achieving such a continuous, safe and reliable supply of electricity?
3. Are cost-effective Innovative Technologies with a proven track-record being utilised?
4. PARAMOUNT QUESTION – How can the Electricity Tariff be kept as low as possible?

8. In addition a Regulator will also set Service Standards and other measures designed to incentivise the operator (Tonga Power) to improve its efficiency. In Tonga this is done by including in the Fuel Price Model targets for System Losses and Diesel Generation Efficiency: if these targets are not met the fuel element of the tariff is less than otherwise it would have been, which benefits consumers and penalises the operator!

The EC has come with the Reset Rules written in details accordingly in each document attached from both parties, the Electricity Commission and the Tonga Power Limited as Concessionaire.

TPL Doc TPL Concessionaires Non-Fuel Period 3 Tariff Reset Proposal;
(27 Dec 19)

EC Doc Report #3 - Final Independent Expert Report of TPL Proposal
(14 Jun 20)

The Concessionaire **AGREED** with the Electricity Commission on the following points mention below, unless stated otherwise.

GENERAL PRINCIPLE

- The existing Reset Period to be set to a period of five (5) years; and
- All forecasts will be in nominal terms.

2. NON-FUEL TARIFF

2.1 Time period

DECISION : To set the duration of Reset Period 3 to five years. The Third Reset Period shall commence on 1st October 2020 and shall terminate on 30th June 2025.

(Refer to Final Independent Expert Report #3, page 7)

2.2 Demand forecast

DECISION : The Demand Forecast growth for the Third Reset Period shall be 2.78%

(Refer to Final Independent Expert Report #3, page 7)

2.3 Non-Fuel Opex

DECISION : The Non-Fuel Opex outcomes have been reached in two model in Benchmarking which will both be used in the analysis of the non-fuel tariff as shown in Table 11 (below).

(Refer to Final Independent Expert Report #3, page 20)

Table 11: Final OPEX Projections for Non-Fuel Tariff analysis

Opex	2020-21	2021-22	2022-23	2023-24	2024-25
TPL Proposal	17,240,442	16,651,582	17,422,385	17,508,761	17,897,275
Benchmarking model 1	17,240,442	16,651,582	16,149,521	15,694,011	15,282,532
Benchmarking model 2	17,240,442	16,391,974	16,614,295	16,100,304	15,607,243

2.4 Capex Projections

DECISION : To adopt TPL's proposed CAPEX as shown in Table 12 (below).

(Refer to Final Independent Expert Report #3, page 21)

Table 12: Final CAPEX

	2020/21	2021/22	2022/23	2023/24	2024/25	2020 - 25
Generation Capital Expenditure	1,758,125	1,467,837	1,102,000	2,439,721	72,000	6,839,683
Distribution Capital Expenditure	5,105,290	3,983,813	3,606,922	2,457,949	2,684,631	17,838,605
Smart Grid						-
Office Computers & Equipment	121,054	124,203	123,814	133,889	119,096	622,056
Furniture & Fixtures	3,378	5,490	17,084	5,903	2,970	34,824
Tools & Equipment	37,406	61,481	36,646	44,647	120,827	301,008
Vehicles	1,090,000	705,000	170,000	185,000	380,000	2,530,000
Other Auxiliary Equipment						-
Land & Building	290,000	220,000	50,000	-	-	560,000
Renewables	2,097,423	741,600	841,129	448,761	448,761	4,577,674
TOTAL	10,502,677	7,309,424	5,947,595	5,715,870	3,828,284	33,303,850

2.5 Depreciation

Combining this with the depreciation for existing investment, the final depreciation figures for Period 3 are shown in the following Table.

(Refer to Final Independent Expert Report #3, page 23)

Table 16: Final Annual Depreciation charge

		2020-21	2021-22	2022-23	2023-24	2024-25
Depreciation - Period 1	T\$	1,631,893	1,631,893	1,631,893	1,631,893	1,631,893
Depreciation - Period 2	T\$	1,177,385	1,177,385	1,177,385	1,177,385	1,177,385
Depreciation - Period 3	T\$	571,567	973,119	1,233,185	1,512,021	1,732,410
Total Depreciation	T\$	3,380,845	3,782,397	4,042,464	4,321,300	4,541,688

2.6 WACC

DECISION : For regulatory purposes the allowed Rate of Return for the Third Reset Period shall be 8.50% Post-Tax Real (WACC).

(Refer to Final Independent Expert Report #3, page 23)

WACC Range	Lower	TPL	Upper
WACC (Post-Tax Real)	7.6%	8.5%	10.0%
Corporate Tax Rate	25.0%	25.0%	25.0%
Inflation Escalation Factor	102.9%	102.9%	102.9%
WACC (Post-Tax Nominal)	10.7%	11.6%	13.2%
Rate of Return	14.3%	15.5%	17.6%

2.7 Inflation Forecast

DECISION : For Reset purposes an annual rate of inflation during the Third Reset Period is forecast to be 2.92% as shown in Table 19 below.

(Refer to Independent Expert Report #3, page 23)

Table 29: Proposed inflation forecast based on IMF projections.

Year	2020	2021	2022	2023	2024	2025	Compound
Inflation forecast (IMF)	3.89%	4.15%	2.94%	2.50%	2.50%	2.50%	2.92%

2.8 Regulated Asset Value

The Regulated Asset Value (RAV) is driven by two factors namely the Investment (CAPEX) and the Depreciation.

- The initial RAV is taken from TPL’s proposals and is set at T\$ 67,591,956.
- For the CAPEX, the projections by TPL have been used. As mentioned before, the CAPEX allowances are still subject to detailed analysis and can change as a result of this.
- For the depreciation amounts refer to **Error! Reference source not found.**Table 16.

(Refer to Independent Expert Report #3, page 24)

The resulting RAV per annum is shown in the following Table.

Table 3: RAV computation to use in the Non-Fuel Tariff computation

REGULATED ASSET VALUE		2020-21	2021-22	2022-23	2023-24	2024-25
Starting RAV	T\$	67,591,956	74,713,788	78,240,815	80,145,946	81,540,516
Investment	T\$	10,502,677	7,309,424	5,947,595	5,715,870	3,828,284
Depreciation - Period 1	T\$	(1,631,893)	(1,631,893)	(1,631,893)	(1,631,893)	(1,631,893)
Depreciation - Period 2	T\$	(1,177,385)	(1,177,385)	(1,177,385)	(1,177,385)	(1,177,385)
Depreciation - Period 3	T\$	(571,567)	(973,119)	(1,233,185)	(1,512,021)	(1,732,410)
Ending RAV	T\$	74,713,788	78,240,815	80,145,946	81,540,516	80,827,112

2.9 Non-Fuel Tariff Computation

DECISION : Given that TPL’s proposed number is within the range of the scenario outcomes and also below the average, it is recommended that the non-fuel tariff for Period 3 is set at 43.40 seniti per kWh.

(Refer to Independent Expert Report #3, page 26)

3. FUEL TARIFF

3.1 Fuel type and generation mix

DECISION : [1] Adopt the projected change in TPL’s renewable energy generation share in line with the INDC i.e. 50% by 2020 and further towards 70% by 2030.

[2] Adopt the introduction of batteries in the system.

(Refer to Independent Expert Report #3, page 27)

3.2 Split of Fuel Tariff Formula into Fuel and RE Components

The following is therefore recommended:

1. Rename the “Fuel Tariff” to “Fuel/RE Tariff”
2. This Fuel/RE Tariff will then allow the concessionaire to recoup the cost of diesel generation as well as RE generation;
3. The new RE tariff can be based on the same principles as the current fuel tariff i.e. forecasts of sales and prices, and adjustments afterwards.

(Refer to Independent Expert Report #3, page 28)

3.3 Diesel efficiency targets

DECISION: For the Reset Period 3 the Diesel Efficiency Target to be used in the calculation of the Diesel Fuel of the Regulated Electricity Tariff shall be weighted average for the whole of the Kingdom of Tonga of 4 kWh per Litre of diesel fuel used in the generation of electricity.

(Refer to Independent Expert Report #3, page 31)

3.4 System Loss Target

DECISION : In the determination of the System Loss Target, each individual type of losses area to be assessing separately.

(Refer to Independent Expert Report #3, page 31)

3.4.1.1 Line losses

DECISION : The Line Loss Target for the Reset Period 3 shall be set, as shown in Table 22 below.

(Refer to Independent Expert Report #3, page 32)

Table 42: Target for Line Losses. Based on TPL system loss modeling

	2021	2022	2023	2024	2025
Line losses	7.5%	6.5%	6.5%	5.5%	5.5%

3.4.2 Parasitic losses - Fuel

DECISION : The Parasitic Loss Target for the Reset Period 3 shall be set as shown in Table 23 below.

It should be noted though that the **target of 2.5%** is defined as the percentage of losses occurring in the **diesel power station only**. Thus, the target does not apply to the total generation, but only to the diesel component of gross generation.

Table 5: Recommended Loss Targets for Fuel in Period 3

	Line Loss Target	Parasitic - Fuel	Total Loss Target - Fuel
2021	7.5%	2.5%	10.0%
2022	6.5%	2.5%	9.0%
2023	6.5%	2.5%	9.0%
2024	5.5%	2.5%	8.0%
2025	5.5%	2.5%	8.0%

(Refer to Independent Expert Report #3, page 34)

3.4.3 Parasitic Losses - RE

It seems appropriate not to impose a target for the additional losses in the coming Period 3. Instead it is recommended that the additional losses are set on the basis of actually incurred losses. For practical purposes, the actual losses from the previous year can be used for this.

Table 6: Recommended Loss Targets for RE-TPL in Period 3

	Line Losses Target	Parasitic Target - RE_{TPL}	RE Loss Target
2021	7.5%	2.5%	10% + actual Spill/Battery losses in 2020
2022	6.5%	2.5%	9% + actual Spill/Battery losses in 2021
2023	6.5%	2.5%	9% + actual Spill/Battery losses in 2022
2024	5.5%	2.5%	8% + actual Spill/Battery losses in 2023
2025	5.5%	2.5%	8% + actual Spill/Battery losses in 2024

(Refer to Independent Expert Report #3, pages 35)

Table 7: Recommended Loss Targets for RE-PPA in Period 3

	Line Losses Target	Parasitic Target – RE_{PPA}	RE Loss Target
2021	7.5%	0%	7.5% + actual Spill/Battery losses in 2020
2022	6.5%	0%	6.5% + actual Spill/Battery losses in 2021
2023	6.5%	0%	6.5% + actual Spill/Battery losses in 2022
2024	5.5%	0%	5.5% + actual Spill/Battery losses in 2023
2025	5.5%	0%	5.5% + actual Spill/Battery losses in 2024

(Refer to Independent Expert Report #3, page 36)

3.5 PPA Guidelines

DECISION : A draft Protocol has been included in Annex 3 of this report for further discussion between TEC and TPL.

(Refer to Independent Expert Report #3, page 36)

4. RELIABILITY INDICATORS

4.1 Possible inclusion of reliability indicators

DECISION : To include SAIDI/SAIFI/CAIDI in the regulatory framework in the Reset Period 3 .

(Refer to Independent Expert Report #3, page 37)

4.2 Analysis of TPL reported data

DECISION : For the Targets :
 $14 \times 870 = 12,180 \neq 1,080$

Actual Performance
 $10.69 \times 1178 = 12,529 \neq 877$

(Refer to Independent Expert Report #3, page 37)

4.3 Inconsistency with IEEE formula

DECISION : That an audit is carried out of TPL's reliability reporting systems and that reporting practices are aligned with international standards as per IEEE guidelines. After that, these indicators can be included in the ECC Reset Period 4.

(Refer to Independent Expert Report #3, page 39)