



**TONGA POWER LIMITED
CONCESSIONAIRES NON-FUEL PERIOD 3 TARIFF
RESET PROPOSAL**

FINAL

Submitted 27 December 2019

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Terms of Reference, Scope and Context

The Tariff Reset Proposal has been compiled in accordance with *Schedule 12, Reset Rules* as per *The Second Electricity Concession Contract (ii) the Regulatory Addendum* that came into force on 1st September 2015.

Proposed Duration of the Third Regulatory Contractual Period

The Concessionaire nominates a further Regulatory Period duration of 5-years 2020 – 25

General Principle of Tariff Determination

The initial review start point should always be the Reset Model and all documentation is provided as justification to the inputs contained within that model. The Reset Model is designed to follow and implement the Reset Rules of the Concession Contract which sets a regulated price cap for the Non-Fuel Tariff (NFC) for the next Regulatory Contract Period. This Reset application proposes a continuation of prevailing Customer Service Standards.

The net present value of the Concessionaire's expected revenue when applying the Regulated Tariff during the Regulatory Period plus any non-tariff revenue such as connection fees, disconnection fees and reconnection fees is equal to the net present value of the Concessionaire's forecast reasonable costs of meeting its obligations under this Agreement. In summary NPV of Future Revenues = NPV of Future Costs & Operators Return.

TPL's submission approach is to provide as much value adding information in support of this application as practicable. The Proposal is broken down into:

- Main Body of the Proposal.
- Supplementary detailed Appendix worksheets provided electronically on flash drive.
- Pacific Power Association Reports & Average/ Median Benchmarks provided electronically on flash drive.

NB: Most charts and T\$ in the Proposal are at Nominal (inflated) values, unless stated otherwise.

1. Executive Summary

Tonga Power Limited (TPL) presents the Concessionaire Proposal as defined in schedules 10 and 11 of the Electricity Concession Contract (ECC). Both schedules are in support of clause 9 of the ECC.

Our Proposal contains relevant background information, specific detail as per the schedules (to calculate the proposed opening non-fuel tariff) and is for the five year¹ period commencing 1 July 2020. The primary 1 July 2020 objective is to secure a sustainable tariff (under the current ECC framework) which provides for an efficient and safe service for customers and rewards owners for their investment.

1.1. Ten Year Vision – Period 2 Reset: 2016 - 20

TPL's vision is to achieve the Government's strategic energy objectives by:

- Pursuing a number of renewable generation opportunities, and align these projects with our ongoing asset replacement and reinforcement programs. TPL has managed to engage partnership with donors to develop renewable energy projects. In addition, TPL has engaged IPPs through PPAs to provide RE. Overall, this is in pursuit of the 50% generation target that has been prioritised as Tonga's Nationally Determined Commitment (NDC) for 2020.
- Developing micro-grid control technology, which will automate and optimise the output from a mix of renewable and diesel generation sources.
- Upgrade the grids for reliability and resilience (with increased ability to isolate faulted sections) and replace assets at the end of their lives. This work will be underpinned by the NZ Government funded Tongatapu Village Network Upgrade Project, and also the Ha'apai network upgrade (post-cyclone recovery). TPL in partnership with MFAT has successfully completed the TVNUP, covering the rural areas of Tongatapu Island. This partnership has extended into the NNUP, currently upgrading the Nuku'alofa Urban area in complementary to TVNUP. OIREP has upgraded the outer islands main centres' network namely, 'Eua Island, Pangai, (Lifuka Island, Ha'apai Group) and Neiafu Township ('Uta Vava'u, Vava'u Group).
- Enhance the billing system to enable different remote bill payment options, smart and prepayment metering will be introduced. TPL has completed the Smart Metring project.
- Through TPL's customer relationship management continue to provide energy efficiency and safety information to customers, and increase emphasis on meeting customer service expectations. TPL has been, and will continue to endeavour to provide the best services to the people.

1.2. Ten Year Vision – Period 3 Reset: 2021 - 25

TPL continues to progress with its vision to generate and distribute energy for the people and development of Tonga, ensuring safe, reliable, affordable energy and services to the people. In the same instance, reduce Tonga's vulnerability to oil prices shocks, while increasing access to modern energy services in an environmentally friendly manner. In essence, this is supported by six major objectives as follow (TPL Business Plan 2019 – 2024):

- Achieving 50% electricity generations from Renewable Energy generation by 2020 in order to achieve the government TERM target and realistic tariff reduction
- Adopting technologies to manage the complexities arising from a digitised and decentralised renewable future
- Improving the network by replacing ageing assets to improve safety, efficiency and reliability of supply
- Promote a hazard free safety environment to minimise any danger to both the public and staff
- Improving our business processes to enhance customer/employee satisfaction while supporting a healthy and competent team
- Manage all external funding and internal financing sources successfully in order to increase shareholder value

Renewable Energy

It should be noted that the target of 50% generated from RE by 2020 has become Tonga's priority under its *Nationally Determined Commitments*. TPL fully appreciates and continues to progress in pursue of this NDC despite many challenges of RE. Some of these challenges are apparent, and some are only evident during the reset process.

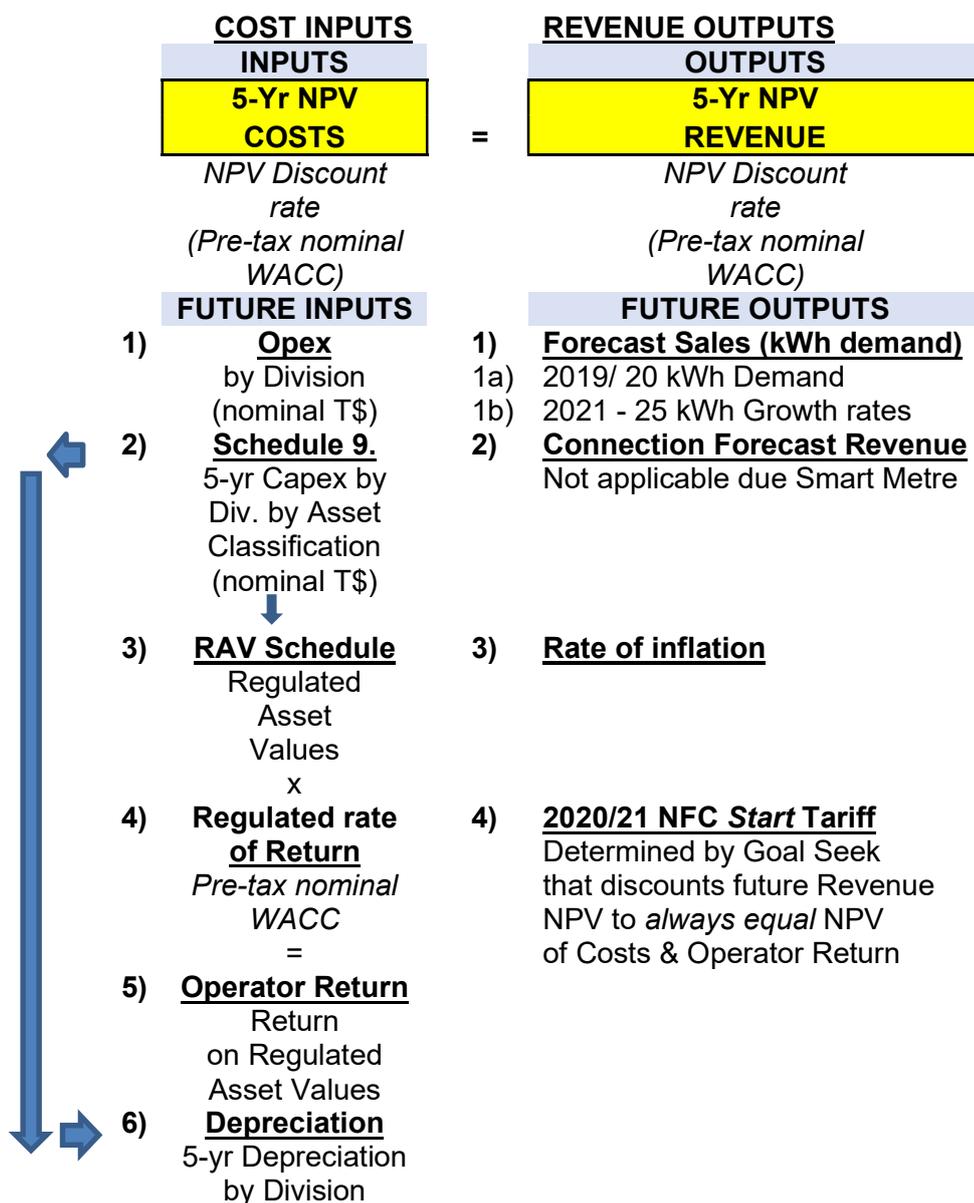
Please refer to Electronic File of Planned RE Roll-Out.

2. Proposed Period 3 Starting Non-Fuel Tariff

After completing the required input steps our proposed starting non-fuel tariff is **43.40** seniti per kWh of electricity sold (inclusive of Electricity Commission Levies). This starting tariff is based on a five-year regulatory window and is formulaically designed to achieve a modelled post-tax real rate of return of 8.5% over the five-year regulatory period. A real return of 8.5% after tax calculated on annual average Regulatory Asset Values will, *all other things being equal*, result in an accounting (IFRS) business equity return of 10%, i.e. the Owners preferred equity return position.

3. Reset Rule Steps

Tariff Reset Model Drivers



Main Tariff Influencers

The major influencers of the start tariff are:

- 8.5% Weighted Average Cost of Capital (WACC)
- 15.53% Pre-Tax Nominal WACC (adjusted for tax and inflation) calculated on the average of beginning of year and end of year Regulated Asset Values (Net Book Values). NB: The RAV is regularly provided to the EC and subject to independent external audit.
- Calculation of Operators Return and RAV Depreciation rates
- 2.9% Inflation rate over the Reset Period. Based on IMF projections (October 2019 Report)
- CAPEX and OPEX inputs materially sourced from Divisional Managers and approved by Board of Directors.
- 2.8% Sales volume growth rate over the Reset Period (*compound annual growth rate*). Based on a 3.0% growth rate for TBU and 1.5% on other island networks. Assuming 86% Demand from TBU and 14% Demand from Outer-Islands this geographic volume mix equals a total *weighted average* sales volume, growth rate of 2.8%.
- Donated assets are not included in the Regulatory Asset Value (RAV). However, any expenditure expected to be incurred by TPL to facilitate these projects is included in the RAV or as an operational expense

1.0 Step 1: Forecast Annual Growth: 2.78%

Forecasting demand is the most challenging part of the assignment. A review of planned Period 2 demand growth with actual growth illustrates the challenge.

Period 2 Demand Growth Rate Assumption: 2.37% *compound annual growth rate*. Actual *compound annual growth rate* 5.68%.

<u>kWh Billed</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>%</u>
TBU	39,917,682	41,355,634	42,373,257	46,242,952	50,786,766	49,412,001	53,802,793	55,523,381	86%
VAV	4,227,165	4,320,158	4,539,388	4,575,331	5,283,833	5,555,636	5,800,396	5,985,890	9%
HAP	1,284,368	1,142,517	1,216,624	1,351,562	1,471,180	1,586,984	1,697,116	1,751,389	3%
EUA	959,116	999,511	1,035,925	1,172,090	1,279,546	1,352,008	1,491,638	1,539,340	2%
	46,388,331	47,817,820	49,165,194	53,341,935	58,821,325	57,906,629	62,791,943	64,800,000	100%
Real YoY growth %		3.08%	2.82%	8.50%	10.27%	-1.56%	8.44%	3.20%	

NB: 1.56% negative growth in 2018 was due to Cyclone Geta

Period 3 Demand Growth Rate Assumption: 2.78% *compound annual growth rate*.

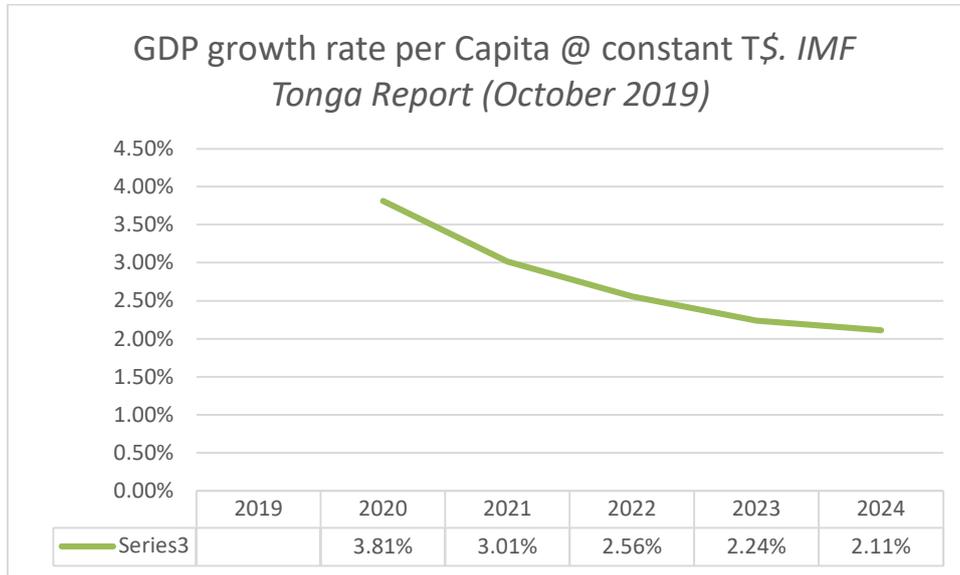
Anticipated Period 3 *compound annual growth rates* for TBU are 3% and 1.5% for Outer Islands. Assuming a Demand volume mix of 86% TBU and 14% Outer Islands therefore the *weighted average growth rate* is 2.78%.

Total Regulated Revenue	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Total Energy kWh Sold to Customers	64,800,000	66,598,200	68,446,300	70,345,685	72,297,778	74,304,041
Annual Demand Growth Rate		2.78%	2.78%	2.78%	2.78%	2.78%

The following table highlights the impact on the proposed start tariff assuming differing levels of kWh growth.

kWh Tariff Sensitivity to Demand Growth		
Period 3: 2021 - 25		
Demand Growth	Start Tariff	% Variation
2.5%	43.65	0.76%
2.8%	43.30	0.00%
4.0%	41.89	-3.30%
5.0%	40.76	-5.91%
6.0%	39.66	-8.45%

Period 3 2020 – 24 GDP per Capita Growth Rate: 2.74%



GDP *compound annual* growth rate per capita at constant prices (National Currency) is projected to be 2.74% between 2019 and 2024. This closely tracks the anticipated Period 3 Demand Growth of 2.78%. This submission does not claim to have compiled an algorithmic correlation model that mathematically estimates demand based on a bundle of economic indicators and rates of electrification but has selected a broad economic indicator that *may* add some weight to underpinning forecast demand growth.

2.0 Step 2: Service Standards, Meter Reporting & Penalties

TPL anticipates a continuation of prevailing standards tabled as per *The Second Electricity Concession Contract II*

3.0 Step 3: Determining the Regulatory Asset Value (Sch.9)

Period 2: Forecast Capex 2016 – 20

<u>DIVISIONAL CAPEX SUMMARY</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>Total</u>	<u>%</u>
Generation Equipment	2,300,250	5,044,240	1,290,000	400,000	3,703,000	12,737,490	29.38%
Distribution Network Equipment	7,648,607	6,067,880	5,080,389	4,521,121	4,452,425	27,770,422	64.05%
Retail	88,000	62,000	12,000	150,000	59,000	371,000	0.86%
Indirect	96,500	256,500	151,500	330,187	146,500	981,187	2.26%
Renewables & other projects	300,000	300,000	300,000	300,000	300,000	1,500,000	3.46%
Company Total	10,433,357	11,730,620	6,833,889	5,701,308	8,660,925	43,360,099	100.00%

Period 3: Forecast Capex 2021 – 25

<u>DIVISIONAL CAPEX SUMMARY</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2025</u>	<u>Total</u>	<u>%</u>
Generation Equipment	1,758,125	1,467,837	1,102,000	2,439,721	72,000	6,839,683	20.54%
Distribution Network Equipment	6,352,129	4,884,987	3,889,466	2,613,388	2,997,523	20,737,493	62.27%
Retail	185,000	5,000	5,000	104,000	60,000	359,000	1.08%
Indirect	110,000	210,000	110,000	110,000	250,000	790,000	2.37%
Renewables & other projects	2,097,423	741,600	841,129	448,761	448,761	4,577,674	13.75%
Company Total	10,502,677	7,309,424	5,947,595	5,715,870	3,828,284	33,303,850	100.00%

TPL has projected a total Capex spend of T\$33.3m Reset 2021 – 25. This is some T\$10.0m (-23%) lower than forecast Capex 2016 – 2020 and is attributable, in main, to a very significant reduction in Generation and Distribution Capex offset by significant increase in Renewable Capex. Distribution Capex represents 60% - 65% of total Capex forecasts in both Reset Period's 1 and 2. The Forecast Capex 2021 – 25 falls below the T\$42,060,000 Capital Maxima as provided in *Schedule 10 of The Second Electricity Concession Contract II*

For Sch.9 Details by Division please refer: Appendix 5.2: "TPL Consolidated Forecast Capex (Sch.9): Reset Period 3".

**4.0 & 5.0 Step 4: Determining Depreciation Expense
Step 5: Determining the Return on Capital**

Depreciation & Operator Return

	<u>2020/21</u>	<u>2021/22</u>	<u>2022/23</u>	<u>2023/24</u>	<u>2024/25</u>	<u>2020 - 25</u>
	<u>Forecast</u>	<u>Forecast</u>	<u>Forecast</u>	<u>Forecast</u>	<u>Forecast</u>	<u>Forecast</u>
Opening RAV Book Value	63,750,240	71,007,846	75,242,214	78,256,238	81,019,767	63,750,240
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
Disposals and Retirements						-
Depreciation on Prior 2008 Period						-
Depreciation on Net Capex end of Period 1	(1,631,893)	(1,631,893)	(1,631,893)	(1,631,893)	(1,631,893)	(8,159,466)
Depreciation on Net Capex end of Period 2	(1,041,611)	(1,041,611)	(1,041,611)	(1,041,611)	(1,041,611)	(5,208,057)
Depreciation (new assets this year & prior yr dep)	(571,567)	(401,552)	(260,066)	(278,836)	(220,389)	(1,732,410)
Closing Estimated RAV @ Net Book Value	71,007,846	75,242,214	78,256,238	81,019,767	81,954,158	81,954,158
Average Net Book Value	67,379,043	73,125,030	76,749,226	79,638,002	81,486,962	
	<u>2020/21</u>	<u>2021/22</u>	<u>2022/23</u>	<u>2023/24</u>	<u>2024/25</u>	<u>2020 - 25</u>
Operator Pre-tax nominal WACC/ return	10,463,067	11,355,342	11,918,131	12,366,720	12,653,839	58,757,099
RAV Register Depreciation	3,245,072	3,075,056	2,933,571	2,952,340	2,893,893	15,099,933

Sch9 Reconciliation	
RAV adds	33,303,850
Sch9 Capex	33,303,850
Zero validation	-

Note the Return on Regulated Assets Value (Net Book Value) provides the owners of the business with a risk adjusted return that provides for:

1. sustainable cash flows to fund Capex,
2. interest expense,
3. loan repayments,
4. cash tax and
5. return on equity to owners.

Return on Capital: Calculation of WACC for TPL, Real

B _a	Asset Beta	0.65	As used in NZ adjusted for risk environment of Tonga - NZ base .40ish
R _f	Rfr	4.00	Tongan 5 Year Govt bond rate is 4.0 but mid-term average used
	Tax - equity	%	
		25%	
B _e	Equity beta	1.30	
Phi	Market Risk Premium	7.0%	
		12.1	
k _e	Cost of Equity	%	
	Tax - debt	25%	
		1.47	
P _d	Debt Premium, excl debt issuance	%	
		0.50	
	Debt Issuance Costs	%	
		1.97	
	Debt margin	%	Estimated margin above risk free rate
		6.47	Reduction in cost of debt previous Reset Pd2
k _d	Cost of Debt	%	had this at 7%
L	Assumed Leverage Debt / (Debt+Equity)	50%	Increase leverage from 40% as previously applied to Reset Pd2
WA			
CC	Mid (50th percentile) WACC	8.5%	

The above lists *Capital Asset Pricing Model* variables used to calculate WACC. NB: Period 2 WACC variables were updated for a 0.53% reduction in the cost of debt and an increase in leverage debt ratio from 40% to 50%.

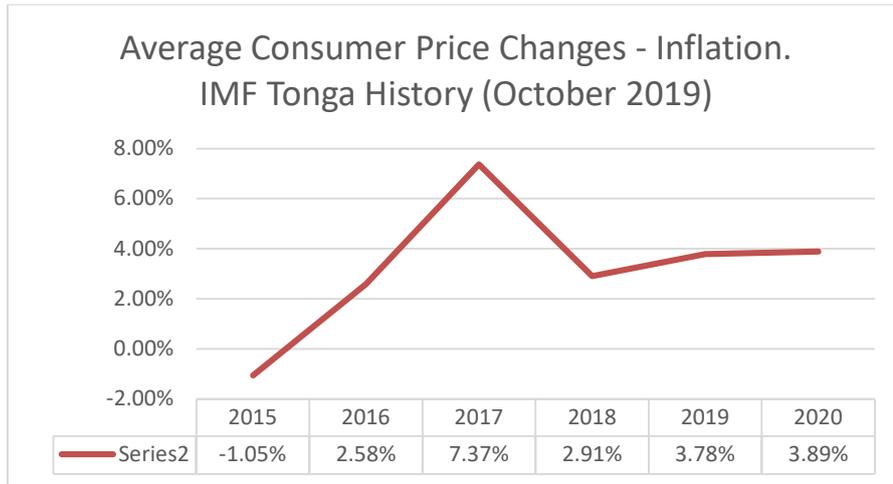
It is noted that comparative WACC for infrastructure enterprise in New Zealand is approximately 4% - 5%. The Reset submission considers, however, an 8.5% WACC (real) to be a *fair and reasonable* weighted average cost of capital and proposes no change to the Operators rate of return.

Period 3 Reset model applies a **15.53% pre-tax nominal rate of return** which is 2% higher than **Period 2 rate of 13.50%** due to a higher 2021 – 25 inflation escalation factors of 2.92% (Period 2 comparative: 1.50%). The post-tax *real* WACC of 8.5% is increased or “grossed-up” to allow for tax and inflation which provides the Operator with a pre-tax *nominal* rate of return. The submission has adopted, annual inflation forecasts from the IMF’s (*October 2019*) Review of Tonga which has enabled calculation of a *compound annual* inflation rate for the 5-year period 2021 – 25.

Return on Capital	2016-20	2021-25
Corporate Tax Rate	25.0%	25.0%
Inflation Escalation Factor	1.015	1.029
Operator Rate of Return (Post-Tax Real)	8.50%	8.50%
Operator Rate of Return (Post-Tax Nominal)	10.13%	11.65%
Operator Rate of Return (Pre-Tax Nominal)	13.50%	15.53%

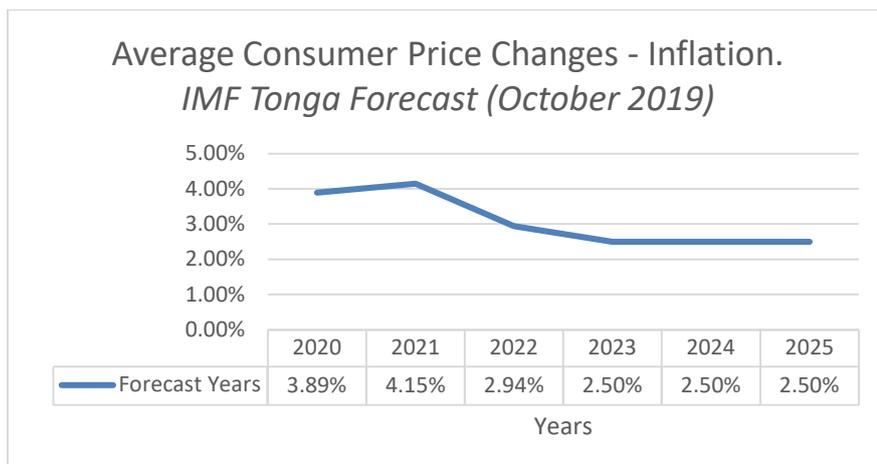
Period 2 Inflation Assumption: 1.5% *compound annual* inflation. Actual 4.10%

A point of interest is that Period 2 Reset Submission referenced two sources for *average* inflation forecast 2014 – 20 being IMF and ARIMA (Autoregressive Integrated Moving Average Model) The IMF projected an average of 5.08% and ARIMA 0.35% - 1.88%. When compared to 4.1% actual compound annual inflation the IMF forecast proved, with hindsight, to be the most reliable predictor and accordingly this submission has selected the IMF as the source of expected inflation rates over Reset Period 3 2021 – 25. 2016 – 20 implied inflation rate(s), was 1.5%.



Period 3 Inflation Assumption: 2.92% *compound annual* inflation

Reset Model has relied on inflation/ average consumer price change data as per the IMF’s Tonga information bulletin, October 2019.



6.0 Step 6: Forecasting non-fuel opex

6.1 Review of Period 2 Opex

Period 2: Forecast Opex 2016 – 20

<u>PERIOD 2: Reset OPEX FORECAST</u>	<u>2015/16</u>	<u>2016/17</u>	<u>2017/18</u>	<u>2018/19</u>	<u>2019/20</u>	<u>Total</u>	<u>%</u>
Generation OPEX	2,577,810	2,570,737	2,583,156	2,605,983	2,790,506	13,128,191	23.1%
Distribution OPEX	2,772,624	2,684,621	2,615,151	2,559,743	2,514,987	13,147,126	23.1%
Retail OPEX	1,183,190	1,195,742	1,208,456	1,221,337	1,234,385	6,043,109	10.6%
Indirect/ Corporate	4,678,418	4,830,731	4,966,573	5,031,993	5,099,105	24,606,820	43.2%
	11,212,041	11,281,830	11,373,336	11,419,055	11,638,983	56,925,246	100.0%

<u>PERIOD 2: OPEX ACTUAL</u>	<u>2015/16</u>	<u>2016/17</u>	<u>2017/18</u>	<u>2018/19</u>	<u>Fcst2019/20</u>	<u>Total</u>	<u>%</u>
Distribution	4,107,558	5,497,887	5,029,782	7,899,013	4,485,706	27,019,947	28.8%
Generation	4,408,512	2,610,023	4,113,801	5,286,063	5,594,085	22,012,484	23.5%
Retail	1,261,873	772,106	1,615,028	1,870,774	3,029,708	8,549,489	9.1%
Indirect/ Corporate	5,413,498	6,687,129	8,738,142	7,325,567	8,050,471	36,214,807	38.6%
	15,191,441	15,567,144	19,496,753	22,381,417	21,159,971	93,796,726	100.0%

<u>PERIOD 2: ACTUAL v FORECAST VARIANCE</u>	<u>2015/16</u>	<u>2016/17</u>	<u>2017/18</u>	<u>2018/19</u>	<u>Fcst2019/20</u>	<u>Total</u>	<u>%</u>
Distribution	(1,529,748)	(2,927,150)	(2,446,626)	(5,293,031)	(1,695,201)	(13,891,756)	37.7%
Generation	(1,635,888)	74,599	(1,498,649)	(2,726,320)	(3,079,099)	(8,865,358)	24.0%
Retail	(78,683)	423,635	(406,571)	(649,437)	(1,795,324)	(2,506,380)	6.8%
Indirect/ Corporate	(735,080)	(1,856,398)	(3,771,569)	(2,293,574)	(2,951,365)	(11,607,987)	31.5%
Actual Overage (T\$)	(3,979,400)	(4,285,314)	(8,123,416)	(10,962,362)	(9,520,988)	(36,871,480)	100.0%

<u>PERIOD 2: ACTUAL v FORECAST %VARIANCE</u>	<u>2015/16</u>	<u>2016/17</u>	<u>2017/18</u>	<u>2018/19</u>	<u>Fcst2019/20</u>	<u>Total</u>
Distribution	-59%	-114%	-95%	-203%	-61%	-106%
Generation	-59%	3%	-57%	-107%	-122%	-67%
Retail	-7%	35%	-34%	-53%	-145%	-41%
Indirect/ Corporate	-16%	-38%	-76%	-46%	-58%	-47%
Actual Overage (%)	-35%	-38%	-71%	-96%	-82%	-65%

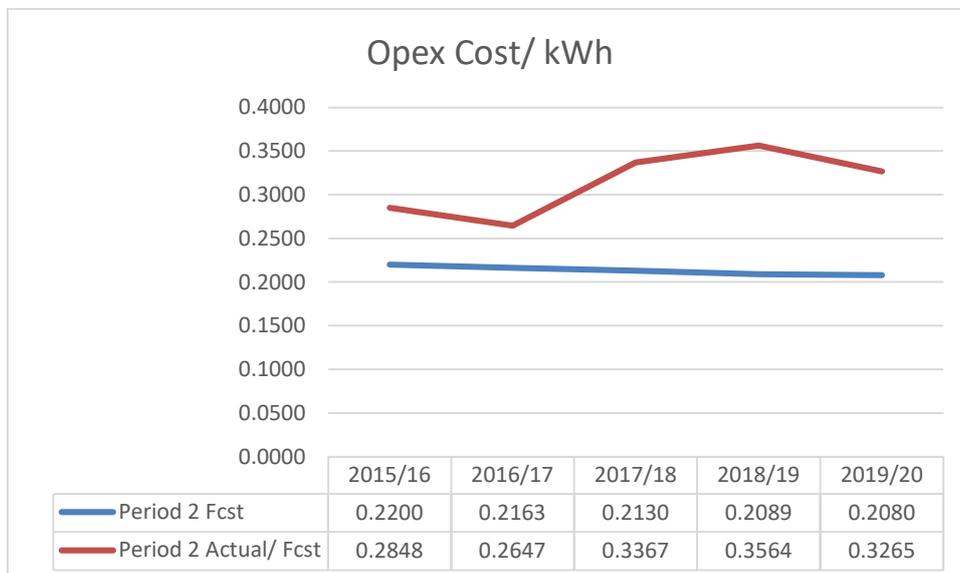
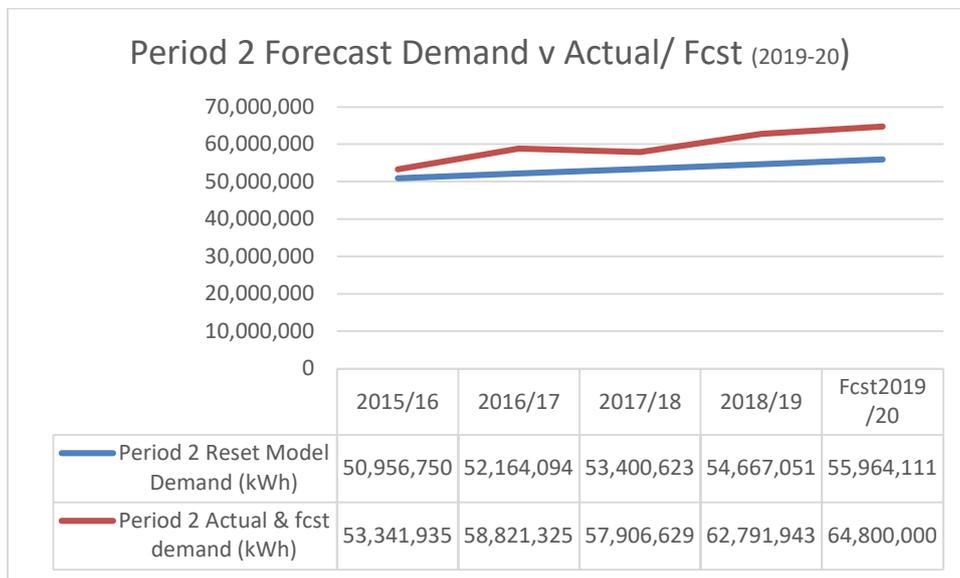
TPL's actual costs during Period 2: 2016 – 20, when compared to planned Period 2 Reset Opex, indicate significant total expenditure overage(s) of T\$36.9m (65%). The highest total overage, by Division, rests with Distribution at T\$13.9m (106%) - the lowest of T\$2.5m (41%) was incurred by Retail. The impact of development projects, during 2016 – 20, had a 1.65x *multiplier effect*, on Reset Period 2 revenue expenditure. The multiplier effect was a consequence of optimising the opportunity to fully utilise Grant funding to upgrade ailing assets and invest heavily for medium to long term gains.

Considering the condition of the Network now, as compared to 2015, TPL is better placed to better control future operational expenses.

For comparative details of Period 2 Forecast Opex versus Period 2 Actual 2016 – 19 & Forecast 2020 please refer: Electronic file “2016 – 20 Pd2 Fcst Opex v Actual”

2016 – 20 Impact of Volume & Cost Variances on kWh

	<u>2015/16</u>	<u>2016/17</u>	<u>2017/18</u>	<u>2018/19</u>	<u>Fcst2019/20</u>
Period 2 Reset Model Demand (kWh)	50,956,750	52,164,094	53,400,623	54,667,051	55,964,111
Period 2 Actual & Fcst demand (kWh)	53,341,935	58,821,325	57,906,629	62,791,943	64,800,000



6.2 Period 3 Opex Forecast

Period 3: Forecast Opex 2021 - 25

<u>OPEX by REGULATED DIVISION</u>	<u>2020/21</u>	<u>2021/22</u>	<u>2022/23</u>	<u>2023/24</u>	<u>2024/25</u>	<u>Total</u>	<u>%</u>
Distribution	3,224,552	3,109,586	3,148,136	3,195,755	3,118,842	15,796,871	18.2%
Generation	4,844,316	4,321,996	4,902,856	4,787,191	4,995,107	23,851,466	27.5%
Retail	1,650,306	1,650,306	1,650,306	1,650,306	1,650,306	8,251,530	9.5%
Indirect/ Corporate	7,521,268	7,569,693	7,721,087	7,875,509	8,133,019	38,820,577	44.8%
	17,240,442	16,651,582	17,422,385	17,508,761	17,897,275	86,720,445	100.0%

TPL has projected a total Opex of T\$86.7m. This projection is some T\$7.1m (-7.6%) lower than actual/ forecast Opex 2016 – 2020 and is attributable, in main, to a very significant reduction in Distribution Opex.

Compound annual growth rate analysis between Period 2 and Period 3 total Opex results in a 1.56% negative growth rate. TPL have effectively factored in cost efficiencies equal to or greater than the rate of inflation, anticipated over Period 3 Reset. This represents a significant operational challenge.

Generation and Indirect/ Corporate have forecast modest positive growth rates of 1.62% and 1.40% respectively whilst Distribution and Retail are reporting negative annual growth rates of -10.18% and 0.71% respectively.

<u>OPEX</u>	<u>5-Yr Total</u>	<u>5-Yr Total</u>	<u>5-Yr Total</u>
<u>Compound Annual Growth Rate (GAGR)</u>	<u>2016-20</u>	<u>2021-25</u>	<u>CAGR</u>
Distribution	27,019,947	15,796,871	-10.18%
Generation	22,012,484	23,851,466	1.62%
Retail	8,549,489	8,251,530	-0.71%
Indirect/ Corporate	36,214,807	38,820,577	1.40%
	93,796,726	86,720,445	-1.56%

Generation and Indirect/ Corporate claim an increasing proportion of total 2021 – 25 operating expenditure when compared to 2016 – 20.

Detailed financial information by Division is provided by electronic file given detailed financial data sets are “deep and wide” and best conveyed in digital format.

For Opex Forecast Details by Company please refer:

Appendix 5.1: “TPL Consolidated Forecast Opex: Reset Period 3.”

For Opex Forecast Details by Division please refer Electronic File “Copy of Master Period 3 Reset Model (Finalv3)”

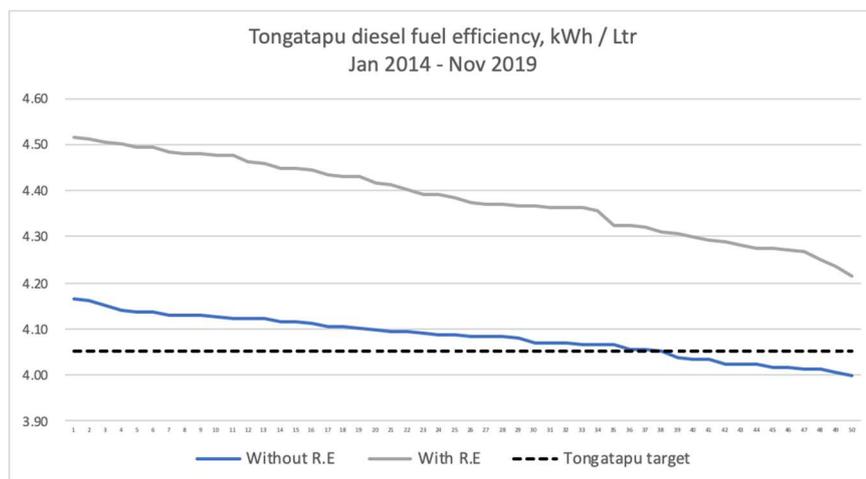
7.0 & 8.0 Step 7: Fuel type and Generation Mix for use in fuel cost adjustment formula.

Step 8: Efficiency Standards

7: Fuel type & Generation Mix

The current target prescribed in the Electricity Concession Contract by the Electricity Commission for Tongatapu is 4.05 kWh per litre of fuel consumed. The actual variation of the fuel efficiency (from High to Low) from January 2014 to November 2019 is shown below (refer to blue line). Apart from a few outliers, diesel fuel efficiency targets have generally been achieved despite ageing generators and higher penetration of intermittent renewable generation stations. The average (diesel only) fuel efficiency has been reported as 4.09 kWh per litre of fuel consumed for this period.

Tongatapu Diesel Fuel Efficiency



The above graph also describes the variation of fuel efficiency caused by both diesel and various intermittent renewable generation stations (refer to grey line). As expected, overall fuel efficiency is significantly improved as renewable energy take on a larger portion of total generated energy. However, it is expected that the fuel efficiency (diesel only) will continue to remain the same.

By end of year 2020, Tonga Power Ltd is expected to generate 50% of its total generated energy from diesel, a sharp drop from the current 89%. Intermittent renewable energy will make up the other half. However, this significant step change, will be supported by two battery energy storage systems (BESS), totalling 10MW/20MWh. One BESS will provide stabilisation of high intermittency

penetration, the other will store excess renewable energy output, to be re-distributed later; load shifting.

The effect of introducing BESS will provide much needed relief for the diesel generators from a loading standpoint. It is expected that with the introduction of this new technology to the grid, deterioration to the diesel generator’s load factor, because of excessive renewable energy will be restrained. It is expected to remain the same as the current review period. With that expectation, diesel fuel efficiency will also remain the same for as long as the BESS are in good operational order.

8: Efficiency Standards

With diesel generation operation somewhat unchanged but supported by BESS, it is recommended that diesel fuel efficiency targets be agreed as:

Figure 11 – Diesel Fuel Efficiencies

	2021	2022	2023	2024	2025	
Tongatapu	4.05	4.05	4.05	4.05	4.05	4.05
Vava’u	3.75	3.75	3.75	3.75	3.75	3.75
Ha’apai	3.55	3.55	3.55	3.55	3.55	3.55
‘Eua	3.55	3.55	3.55	3.55	3.55	3.55

The adjustment formula for the fuel component of the Regulated Tariff, to be used in Schedule 5, including the fuel type and mix of generation to be used in the adjustment formula for fuel price and for setting the Fuel Efficiency Rate targets in the Efficiency Standards; The EC has enabled Fuel Component (FC) adjustments #3: Donor RE generation and #4: IPP RE generation.

Fuel cost adjustment formula – Increased Systems Loss due to BESS

The current regulated 10% system loss is approximately the sum of 3% parasitic loss and 7% transmission loss. The Operator considers a 10% system loss to be efficient in the context of regional PPA benchmark rates.

During Reset Period 3, 2020-21 – 2024-25 RE will generate 50% + demand with blended delivery from three fuel types, each with its own system loss characteristics as follows:

1. Diesel : 3% parasitic loss + 7% transmission loss = 10%
2. RE – generation fed direct to grid. 3% parasitic loss + 7% transmission loss = 10%
3. RE – battery stored generation. 7-11% parasitic loss* + 7% transmission loss = 14% - 18% (range)

* due to DC/ AC round-trip conversion

Accordingly, an *increasing* proportion of RE battery stored generation will increase systems loss above current regulated 10% systems loss.

For example, if battery stored generation represented 30% of total generation and battery conversion increased systems loss to say 16% then the weighted average system loss, all other things being equal, would increase systems loss from 10% to 11.8% $[(30\% \times 16\%) + 70\% \times 10\%]$.

The Operator will monitor the impact of Battery Energy Stored Systems (BESS Nos 1 – 3) impact on increased parasitic loss arising from DC/ AC round-trip conversion losses and recommend that the **value of diesel displacement savings is adjusted to allow for increased parasitic losses arising from battery storage.**

9.0 & 10.0 Step 9: NPV of forecast reasonable non-fuel cost of service.

Step 10: Preliminary non-fuel component of the Regulated Tariff.

Regulatory Review of the Tonga Electricity Tariff		AWM	23-12-19				
Total Regulated Revenue		2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Source							
Total Energy Sold to Customers (kWh)	64,800,000	66,598,200	68,446,300	70,345,685	72,297,778	74,304,041	
Annual Demand Growth Rate		2.78%	2.78%	2.78%	2.78%	2.78%	2.78%
Inflation escalation factor (cum)		1.0000	1.0292	1.0593	1.0902	1.1220	1.1220
NFC Tariff **		0.4340198	0.4466932	0.4597366	0.4731609	0.4869772	0.4869772
Sales (Energy sold to customers x Tariff)		28,904,936	30,574,494	32,340,486	34,208,482	36,184,374	
Alternative		0.9303688	0.8053142	0.6970687	0.6033729	0.5222712	
Method		26,892,249	24,622,074	22,543,541	20,640,472	18,898,056	
NPV of Revenue Collections		113,596,393	122,098,245				
<i>**Escalated with inflation based on six monthly adjustments</i>							
Discount rate for alternative NPV method			2021-22	2022-23	2023-24	2024-25	
			15.53%	15.53%	15.53%	15.53%	
Total Regulated Costs		2020-21	2021-22	2022-23	2023-24	2024-25	
Operating Expenses		17,240,442	16,651,582	17,422,385	17,508,761	17,897,275	
Depreciation		3,245,072	3,075,056	2,933,571	2,952,340	2,893,893	
Operator Return		10,463,067	11,355,342	11,918,131	12,366,720	12,653,839	
Total Costs		30,948,581	31,081,980	32,274,088	32,827,821	33,445,007	
Alternative		0.9303688	0.8053142	0.6970687	0.6033729	0.5222712	
Method		28,793,593	25,030,760	22,497,257	19,807,419	17,467,364	
NPV of Costs		113,596,393	122,098,245				
Zero Validation		(0)	(0)				
		v\	v\				
Return on Capital		2016-20	2021-25				
Corporate Tax Rate		25.0%	25.0%				
Inflation Escalation Factor		1.015	1.029				
Operator Rate of Return (Post-Tax Real)		8.50%	8.50%				
Operator Rate of Return (Post-Tax Nominal)		10.13%	11.65%				
Operator Rate of Return (Pre-Tax Nominal)		13.50%	15.53%				

For Reset Model Inputs please refer Electronic File "Copy of Master Period 3 Reset Model (Finalv3)"

4. Development Plans

1.0 Distribution Division Development Plan

Strategy:

- Comply with the Concession Contract Service Standards incorporating Best Practice to the Distribution Network to enable the sustainable development of a clean energy economy covering the 3-Dimensional pillars:
 - Decarbonization
 - Decentralization
 - Digitalization
- Reduce the cost of generation and the dependence on diesel generation by upgrading the networks to connect large scale distributed generation.
- Continue with the advancement of Smart Grid Technologies to enhance customer demand side management opportunities, and design the network to enable remote switching and restoration of supply through a centralised control centre.
- Improve the Design and Construction of high voltage, low voltage network together with service lines and meter connections.
- Improve network safety through replacement of sub-standard low voltage village networks as part of the Nuku'alofa Network Upgrade Project (NNNUP).
- Ensure security of supply and safety by replacing assets that are a hazard to the public (e.g. crumbling concrete power poles, stick poles, end of life cables).
- Planned routine Patrol and Condition Assessments of line joints by heat sensor camera and visual line inspections.
- Continued vegetation control and management by way of tree trimming and cutting operations, coupled with ground line weed spaying at pole and other equipment locations.
- Maintenance and replacement program for the vehicle fleet to ensure a reliable field service response.

Development Plan

Following on from the last 5 years of Network Upgrade Projects, the transformation of the Radial Feeder Network to a Ring Topology Network will be integral in preparing the Network to meet the Nationally Determined Contribution of becoming 50% Renewable by 2020 and 70% Renewable by 2030. A planned asset replacement program will increasingly be based on asset condition monitoring. Asset surveys will develop better condition assessments, enabling a replacement program to be optimised over time on the basis of age and condition. Safety projects will lead to short term increases in distribution maintenance and operations spend. In addition to asset condition surveys, the distribution division will focus on safety inspections such as road clearances, transformer earth bank testing, infra-red (thermal imaging) of switches and connections, pro-active

cable joint testing and replacement and upgrading of the main feeder trunk lines. Key assets that are under capacity and pose hazardous situations will be programmed for replacement as budgets allow. These include:

- The upgrading of the Eastern and Western District Feeder cables on Tongatapu to further allow Wind and Solar Farms
- Air Brake Switch replacement (Synchronize the operation and isolation of feeder sections rather than using solid links.)
- Continued replacement of high loss service line connections.
- Increasing ground and road clearances.

Other projects planned include:

- Support and grant funding to continue the five-year network upgrade programme.
- Upgrade the high voltage network on the three outer islands, including voltage increase to 11 kV in Vava'u, and replacement of transformers and network connections (subject to some donor funding).
- Upgrade of the Nuku'alofa urban network (preferably donor funded to complete full project). Some budget provision from 2020 to 2024.
- Complete Install of smart system initiatives onto the Tongatapu Network to assist distributed renewable generation.
- Install an express feeder from the Niutoua and/or Lapaha area back to Vaini to support distributed Wind Generators.
- HV feeder lines or cables into the Nuku'alofa main town area assist in meeting expected growth (fourth feeder).
- Development of smart grid technology, including two-way communications to all customers.
- Installation of new reclosers and sectionalisers (to improve restoration of supply)
- Improvement and extension of streetlight circuits and high efficiency light fittings
- Replacing poles that had been removed from spans some 10 years ago, resulting in long spans that are subject to clashing and can affect road clearances
- Programmed replacement of high loss stick poles in the outer island grids to improve reliability.
- Gradually replace poor quality porcelain insulators in between villages not covered under Network Upgrade Project Scope.

Impact on Network Performance

The listed projects will reduce outages and sectionalising the feeders means that customer can still be supplied during times of constrained generation. Also, during storm or other (e.g. vehicle related) outages it will become possible to reconnect groups of customers through alternate feeds and mid-feeder isolation. Tonga Power will continue to improve network losses and the ultimate target is 8%. Upgrading of the Eastern feeder cable crossing the Fanga'uta Lagoon and the upgrade of supply into the CBD will strengthen the supply backbone and help make the network in Tongatapu more resilient. Both of these projects are included in the proposed RAV.

The Smart Grid

The transformation by way of Decentralization and Digitalization of the Network will identify options for automated control and information flows through the networks. Remote switches will be placed at strategic locations, and will be fitted out to support remote control from a future control centre. The deployment of advanced metering will enable real time communications with all customers (for outage management, power quality monitoring, etc)

Points to Note:

- Period Two allowance of \$5m for the Tongatapu Village Upgrade, \$3m for the Smart grid program, \$1.5m for Eastern Feeder Upgrading & Developments (Fanga'uta Bridge Project) and \$1.2m for the fourth feeder on Tongatapu (includes capitalised labour & transport)
- Period three proposed allowance of \$10m Village Upgrade (Nuku'alofa and Outer islands), \$1m for Network resilience and Fourth Feeder demand growth in the central business district, \$2.2m for upgrading of HV network in between villages, \$1.4m for network extensions for decentralised renewable energy plants and \$1.5m for the Eastern Feeder Upgrading & Developments to reduce the risk of the current power station location identified to be inside the high risk area for Tsunami disaster.

Whilst the village upgrade program assists materially with the network integrity, there are still numerous projects required to achieve the improving SAIDI service standards. The Period Three Proposal have been driven primarily by the asset management plan. This plan will continue to be further refine

Points to Note:

- Maintenance trending materially more than anticipated when compared to Period Two allowed. Aggressive target.
- Reflects focus on recent Capital works and positive impact on OPEX.
- Period Three additionally reflects improving network (NNUP & OIREP).
- However, the outer island of Vava'u still needs a sustainable level of maintenance – 2019 expected is not a sustainable level.

Please Refer To:

- Appendix Schedule 9 for a high-level summary of CAPEX and Excel File *Budgets for Reviewer*, which also contains an electronic version of Schedule 9

1.1 Projects for the Distribution System (Tongatapu)

The following two sections provide additional background to the Distribution CAPEX spend.

Figure 32 – Selected Distribution Project Outline, Nominal and excluding Smart Grid.

Summary of Major Distribution Projects (Excluding Smart Meter):	Period 3 Reset Forecast 2021 - 25					
	Forecast	Forecast	Forecast	Forecast	Forecast	Forecast
	2020/21	2021/22	2022/23	2023/24	2024/25	Total
Total Distribution CAPEX:	T\$6,352,129	T\$4,884,987	T\$3,889,466	T\$2,613,388	T\$2,997,523	T\$20,737,493
Selected Material Projects						
Village Upgrade Program, Tongatapu (NNUP) & Vavaú (OIREP)	T\$2,695,067	T\$2,583,990	T\$2,208,575	T\$1,714,108	T\$1,753,956	T\$10,955,696
Construct a Fourth Feeder line, Tongatapu	T\$300,000	T\$0	T\$0	T\$0	T\$0	T\$300,000
Network Resilience (Replace Overhead HV to Underground HV)	T\$171,035	T\$381,552	T\$50,000	T\$0	T\$0	T\$602,587
Replacing Aging and Missing HV Wood Poles (In Between Village)	T\$630,189	T\$559,270	T\$459,347	T\$309,841	T\$316,675	T\$2,275,322
Network Extension for Decentralised Renewable Energy Plants	T\$1,120,000	T\$270,000	T\$50,000	T\$0	T\$0	T\$1,440,000
Eastern Feeder Uprating & Developments (Fangaúta Bridge Project)			T\$700,000	T\$300,000	T\$500,000	T\$1,500,000
	\$4,916,290	\$3,794,813	\$3,467,922	\$2,323,949	\$2,570,631	\$17,073,605

The Nuku’alofa Network Upgrade Project (NNUP)

On Tongatapu, the NNUP project has so far ensured the replacement of village high voltage and low voltage networks for 2 of the 5 areas under the NNUP Scope. Additional funding has been provided to further continue onto Area 3 (funded by NZ MFAT, ADB, UAE, EU) with the goal to complete 56 villages on NNUP on Tongatapu spread across the 5 Areas. To date (December 2019) year one of this new five-year plan is almost completed. As a part of this program of works, TPL has had (and is required under the funding agreement signed by the GoT) to contribute a significant amount of its own resource by way of labour, transport costs and materials in support of the total project costs.

Each year a significant proportion of the overall TPL distribution capital funding will be spent on this project. The project provides an upgraded high voltage and low voltage reticulation network and the service line connections to each premise in the village. TPL’s responsibility is to provide the high voltage network and transformers which in most cases are relocated to meet the location of the loads. New transformers are installed or upgraded where power quality demands such works. TPL has to contribute funding with Capital contributions as shown in Figure 32.

Incorporated into the project figures is budgetary allowance to replace the capital items in some outer villages that have not been included in Stages 1, 2, or 3 of the TVNUP projects. TPL has called this Network Extensions of the overall project and intends to allocate any leftover materials from the NNUP to assist in this by way of service main assets, leaving the larger items to TPL budget Capex.

Fourth Feeder & Network Growth & Strengthening

The fourth feeder and network resilience are anticipated following the latest feasibility study of loading on the existing feeders and their capacity to each carry the entire combined load in case of planned or un-planned events. The existing feeder capacity has been proven in recent studies to be insufficient without high system losses, high temperatures and an un-acceptable drop in voltage in many areas of the network.

In addition, TPL is actively seeking to install distributed renewable energy plants and expects the installation of third party owned distributed generation in areas that access the ends of Feeder One and Three. The Transformation of Feeder One and Feeder Three into a Ring Topology is planned to carry the energy load from the Eastern solar and wind plant back into the city area (around the lagoon). All of these issues will impact on the existing lines, specifically Feeder One and its capacity to carry the electrical load. TPL considers that Feeder Four construction will enable demand to be met and evenly distributed.

The fourth feeder will enable load sharing in the event of one or another feeder lines being out of service. The design would incorporate some switchgear, changing of shorter or understrength poles and the running of a suitable conductor for network resilience. The budget amount is split over three financial years, with construction from the power station to the centre of Nuku'alofa. A secondary link would be made to Tafa'ahau Rd along the By Pass Rd. Interconnecting switchgear will likely be installed at each of the three ends and network upgrade in between villages will be programmed accordingly.

The timing for this project is planned around July 2020 to June 2023. The intent is to construct a second circuit underground along the existing line of Feeder One, merging into Feeder Two line in the city area. A further connection would be into the Feeder One and Two lines near the two intersections of Tafa'ahau and Salote Rds. The need becomes critical when considering the load growth in the Nuku'alofa area including the Sports Complex at Tonga High School. In addition, TPL anticipates the growth in demand from the North and Western areas of the feeder line from the newly upgraded villages in the TVNUP project Stages 2 and 3

City, Main Urban Centres

The project involves replacement of light bare conductor with aerial bundled conductor (ABC). This project is planned to start after the completion of the TVNUP Stages 2 and 3. The budget years start in 2019/20 and is planned to be completed over a 5-year period. The project is scheduled to commence until the last year of Regulatory Period Three, on the assumption that donor funding is not available. The project timing and commencement will change if funding becomes available. TPL would then likely face a contribution similar to that for Stages 2 and 3 of the village upgrades projects.

This project is about safety of the public and creating an environment for sustainable economic growth. Most of the network in the Nuku'alofa city area is under designed, and consists of old structures and poles carrying small insufficient capacity conductors. This project covers the rebuild of the Nuku'alofa urban area from the Water Board land to Sopu and to Popua and all areas in between, including Hofoa and Sia'atoutai.

The plan includes HV and LV and road crossing pole replacements, HV and LV ABC run including underbuilt on the existing HV lines where possible and practicable to leave as is, along with the installation of LV ABC along the stretches where only LV poles exist. From the LV system, service line cables will be installed to run underground for resilience. Replacement of meter boxes, earth pins, leads and protection devices similar to the TVNUP project will also be in the scope.

Replacing Aging, Short or Missing HV Wood Poles

This work is for replacement of poles in between village area and some outlying areas, which are outside of either the TVNUP or the Nuku'alofa projects. There are instances where historically poles have been removed and not replaced, and the resultant span between remaining poles is deemed too long for suitable conductor ground clearance but also for upgrading to enable decentralised power supply.

Upgrading of the Feeder Cables crossing the Fanga'uta Lagoon

The cable upgrading across the lagoon are scheduled for replacement later in the regulatory period to coincide with the Fanga'uta Bridge Crossing Project. Two cables cross the lagoon from Popua, one cable has failed the other is at the end of its life. The expenditure profile is as follows:

Eastern Feeder Developments

Not only is the possible relocation of the Power station vital for security of supply, but also the increased developments of renewable projects of both wind and solar together with agricultural commercial opportunities of the Eastern District once the Bridge is complete.

1.2 CAPEX Donor Funded - Impacts

Schedule Four of the EC's correspondence dated 27 November requests TPL to highlight the impact donor funded projects could have on the starting tariff. All projects listed in the Proposal are either TPL's contractual contribution or projects that the company wishes to carry out in its own right from planned cash flows or borrowings. All generation CAPEX is assumed to be funded from these cash flows and there is no provision (or likelihood of receiving) donor funding for generation CAPEX. However, if the submarine cable project, the fourth feeder and commencement of the Nukualofa upgrade figures were removed (in effect donor funded) the starting tariff would be 43.62 seniti per kWh, a reduction 0.5 seniti. If TPL is able to secure funds for the Nukualofa upgrade then TPL's contribution may be brought forward.

1.3 Outer Island Grid Based Distribution Projects

General

Whilst primary grid development focus is on the more densely populated Tongatapu distribution and reticulation systems, the remaining outer island network of Vava'u is currently being upgraded under

the Outer Island Renewable Energy Project (OIREP) but Only 70%. Fortunately, the island grids of Ha'apai and 'Eua have been reconstructed and upgraded to 11 kV. This means transformers and other line equipment are now readily interchangeable with Tongatapu, while Vava'u is the only remaining network at 6.6kV and in need of Rehabilitation of the remaining 30% of the network over the first two years of Period 3. Vava'u will also be updated to 11kV upon completion of the Network Rehabilitation Project.

In addition, and as a result of periodic storms crossing the islands, high voltage poles are in poor condition, in a number of areas poles have been removed from mid-span, in order to prop up other network areas. This leaves the high voltage in a weakened state and more susceptible to prolonged outages. The low voltage networks feed through a number of stick poles (branches – used for service lines) and in some cases insulators are fitted to trees. The impact on reliability, public safety, and losses is self-evident. Upgrade projects are in progress. One project is underway, the other is under negotiation for donor funding.

Vava'u Network Upgrade Proposal

The ADB and Australian Government have jointly funded an outer island renewable energy project, which aims to introduce solar power to individual outer island homes, plus one or more sizable grid connected solar power generation schemes to TPL's grids. Through the implementation of this project it has become clear that renewable energy requires upgraded networks, to ensure a reliable and stable connection and associated delivery to homes.

A second linked project is under discussion, the Outer Island Energy Efficiency project. This project aims to provide micro grids to the isolated islands, but also to upgrade the remaining TPL Vava'u network. The total cost of an upgrade of island grids, including the replacement of service lines with underground construction is TOP 6 million for Vava'u that of which TPL is striving to contribute around \$1.5m towards the total upgrade of the Vava'u network.

The shortfall in funding will lead to a greater level of contribution by TPL. It is expected that TPL's contribution to the proposed outer island upgrade will be at least similar, and could lead to a future request to the Commission under the Concession Contract to invest an additional TOP 4.5 million or so over a three-year period. This amount has not been included in the budgets or Reset model, due to a positive response in terms of grant funding channelled through DFAT or subsequently through the ADB.

2.0 Generation Division Development Plan

Strategy:

- Invest efficiently in new generators to meet consumer demand and improved fuel efficiencies.
- Maintain preventative maintenance programs and essential maintenance on all generators.
- Replace diesel generators at end of economic life, and extend existing life as much as possible. Carry out remaining life survey on generators with more than 10 years of operation. Plan for retirement or refurbishment of six caterpillar generators at Popua over the next 5 years.
- Optimise alternative renewable fuel sources for generation including bio-fuel and biogas generation.
- Future-proof diesel generation and controls, to facilitate the ongoing renewable energy plans for the future.
- Consolidate controls of all energy sources, diesel, renewable energy and BESS by upgrading the SCADA to provide a better generation management system for the power station and grid operators.

Development Plan

One of the major projects TPL plans to complete during the next five years is the full refurbishment of the remaining 4 x 1.4MW CAT generators in Tongatapu as these come to the end of their useful lives. Two have been done during the 2015-2020 review period. The major objective of the asset refurbishment program is to provide uninterrupted supply to the consumers whilst maintaining N+1 security of supply.

There is no plan to phase out any old diesel generators but rather a plan to procure additional generating capacity. And this will be done in several stages, while being cognoscente of renewable energy projects. In year 2020, an LPG generator is expected to be online, and will be provided by Tonga Gas Ltd, under a power purchase agreement.

On Tongatapu, two CAT generators have already been fully refurbished in 2018 and 2019 respectively. The remaining four CAT generator are expected to be refurbished starting in year 2021.

Demand growth is not expected to be significant in the outer island grids, however, engine refurbishment, like Tongatapu will follow on to these islands.

Generation Management System

The impact and share of intermittent renewable energy on the grid are significant because of the nationally determined commitment for 50% renewable energy by 2020. These renewable energy sites are spread over the island group.

For Tongatapu, renewable energy sites, are present from west to east, giving much concern for how each output, including diesel generation is despatched. This is a complex situation which requires all signals from each energy source to be consolidated. Naturally, this will all come together at Popua power station. The existing SCADA at Popua will be upgraded to meet this daunting task. Reliability and availability of the grid is of utmost concern for power generation.

5. Appendixes

1.0 TPL Consolidated Forecast OPEX: Reset Period 3

	<u>2020/21</u>	<u>2021/22</u>	<u>2022/23</u>	<u>2023/24</u>	<u>2024/25</u>	<u>Total</u>	<u>%</u>
OTHER COST OF SALES EXPENSES							
ENGINE / GENERATOR MAJOR MAINTENANCE	1,245,000	460,000	925,000	690,000	775,000	4,095,000	4.7%
ENGINE / GENERATOR OTHER MAINTENANCE	860,000	885,800	912,374	939,745	967,938	4,565,857	5.3%
PREVENTATIVE MAINTENANCE	62,710	62,710	63,004	23,298	23,592	235,314	0.3%
SAFETY AND REMEDIAL FAULTS	188,113	188,113	190,893	193,673	196,453	957,247	1.1%
VEGETATION CONTROL COSTS	98,523	98,523	99,979	101,435	102,891	501,349	0.6%
THIRD PARTY CONTRACTS	539,542	541,699	419,439	423,946	378,452	2,303,079	2.7%
DIRECT LABOUR	3,425,639	3,609,855	3,624,483	3,685,674	3,744,733	18,090,385	20.9%
CALLOUT	527,913	540,042	536,620	542,055	547,619	2,694,249	3.1%
CAPITALISED LABOUR	-528,146	-528,146	-432,822	-387,736	-396,753	-2,273,602	-2.6%
EMPLOYER CONTRIBUTION (SUPERANNUATION)	180,534	182,094	185,002	187,957	190,963	926,550	1.1%
WAGES	205,278	199,432	202,734	206,100	209,532	1,023,076	1.2%
EMPLOYEE BENEFITS	202,044	203,964	207,506	211,107	214,769	1,039,391	1.2%
MEALS AND ENTERTAINMENT	55,993	56,773	57,837	58,924	60,037	289,564	0.3%
SUPPLIES AND CONSUMABLES	144,831	146,181	148,750	151,360	154,013	745,136	0.9%
UNIFORMS & SAFETY GEARS	267,499	280,649	295,113	299,674	294,335	1,437,270	1.7%
STAFF TRAINING	357,433	256,041	255,320	230,470	213,317	1,312,582	1.5%
AUTO EXPENSES - DIESEL FUEL	588,278	571,998	558,050	543,237	523,805	2,785,368	3.2%
AUTO EXPENSES - REPAIR AND MAINTENANCE	236,588	237,068	239,429	241,806	244,198	1,199,089	1.4%
CAPITALISED TRANSPORT	-487,937	-487,937	-399,871	-358,217	-366,548	-2,100,511	-2.4%
FREIGHT EXPENSES	127,741	129,361	132,071	134,830	137,641	661,644	0.8%
DUTIES AND FEES	33,775	34,465	35,251	36,058	36,887	176,435	0.2%
LICENSES AND FEES	25,455	25,542	25,887	26,234	26,584	129,701	0.1%
REPAIRS AND MAINTENANCE - GROUND	192,690	196,050	199,901	203,855	207,917	1,000,413	1.2%
REPAIRS AND MAINTENANCE - BUILDING	98,323	100,603	103,207	105,882	108,629	516,644	0.6%
REPAIRS AND MAINTENANCE - EQUIPMENT	116,315	118,565	121,198	123,900	126,673	606,650	0.7%
OFFICE EXPENSES-STATIONARY	44,069	44,279	44,696	45,118	45,548	223,711	0.3%
OFFICE SUNDRIES	37,258	37,888	38,681	39,494	40,327	193,648	0.2%
MEDIA ANNOUNCEMENTS	50,073	50,073	50,813	51,553	52,293	254,807	0.3%
RENT AND LEASE FEES	155,927	159,647	163,527	167,522	171,635	818,257	0.9%
UTILITIES	183,430	183,733	184,975	186,227	187,488	925,852	1.1%
TRAVEL EXPENSES	319,552	324,862	332,083	339,469	347,023	1,662,989	1.9%
TELEPHONE AND COMMUNICATIONS	180,603	181,323	182,535	183,769	185,026	913,256	1.1%
SITE SECURITY	260,656	266,656	272,992	279,513	286,226	1,366,043	1.6%
COMPUTER AND EQUIPMENT CONSUMABLES	423,471	423,981	424,642	425,319	426,012	2,123,425	2.4%
RENEWABLE EXPENSES	0	0	0	0	0	0	0.0%
OTHER NETWORK WRITE-OFFS	-700,000	-700,000	-700,000	-700,000	-700,000	-3,500,000	-4.0%
TOTAL OTHER COST OF SALES EXPENSES	9,719,174	9,081,888	9,701,298	9,633,252	9,764,255	47,899,868	55.2%

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	<u>2020/21</u>	<u>2021/22</u>	<u>2022/23</u>	<u>2023/24</u>	<u>2024/25</u>	<u>Total</u>	<u>%</u>
OTHER EXPENSES							
IMPAIRMENT LOSS	0	0	0	0	0	0	0.0%
INDIRECT LABOUR	1,883,199	1,920,863	1,959,281	1,998,466	2,038,436	9,800,246	11.3%
EMPLOYER CONTRIBUTION (SUPERANNUATION)	107,814	109,970	112,170	114,413	116,701	561,068	0.6%
EMPLOYEE BENEFITS	102,000	104,040	106,121	108,243	110,408	530,812	0.6%
WAGES	26,520	27,050	27,591	28,143	28,706	138,011	0.2%
SUPPLIES AND CONSUMABLES	153,000	156,060	159,181	162,365	165,612	796,218	0.9%
STAFF TRAINING	306,255	312,380	318,628	325,000	331,500	1,593,763	1.8%
AUTO EXPENSES - DIESEL and PETROL FUEL	79,560	81,151	82,774	84,430	86,118	414,033	0.5%
AUTO EXPENSES - REPAIR AND MAINTENANCE	45,900	46,818	47,754	48,709	49,684	238,865	0.3%
FREIGHT EXPENSES	28,213	28,777	29,353	29,940	30,539	146,823	0.2%
DUTIES AND FEES	9,241	9,426	9,615	9,807	10,003	48,092	0.1%
LICENSES AND FEES	12,648	12,901	13,159	13,422	13,691	65,821	0.1%
REPAIRS AND MAINTENANCE - GROUND	22,440	22,889	23,347	23,814	24,290	116,779	0.1%
REPAIRS AND MAINTENANCE - BUILDING	51,000	52,020	53,060	54,122	55,204	265,406	0.3%
REPAIRS AND MAINTENANCE - EQUIPMENT	6,630	6,763	6,898	7,036	7,177	34,503	0.0%
MEALS AND ENTERTAINMENT	104,244	106,329	108,455	110,625	112,837	542,490	0.6%
OFFICE EXPENSES/STATIONERY	42,840	43,697	44,571	45,462	46,371	222,941	0.3%
OFFICE SUNDRIES	35,700	36,414	37,142	37,885	38,643	185,784	0.2%
MEDIA ANNOUNCEMENT	115,260	117,565	119,917	122,315	124,761	599,818	0.7%
RENT AND LEASE FEES	0	0	0	0	0	0	0.0%
UTILITIES	51,000	52,020	53,060	54,122	55,204	265,406	0.3%
TRAVEL EXPENSES	494,700	504,594	514,686	524,980	535,479	2,574,439	3.0%
TELEPHONE AND COMMUNICATIONS	137,088	139,830	142,626	145,479	148,388	713,411	0.8%
SITE SECURITY	0	0	0	0	0	0	0.0%
BAD DEBTS	117,309	119,655	122,048	124,489	126,979	610,482	0.7%
GIFTS EXPENSE	51,000	52,020	53,060	54,122	55,204	265,406	0.3%
LEGAL AND PROFESSIONAL EXPENSE	600,474	612,483	624,733	637,228	649,972	3,124,891	3.6%
DUES AND SUBSCRIPTIONS	122,400	124,848	127,345	129,892	132,490	636,975	0.7%
BANK CHARGES	153,000	156,060	159,181	162,365	165,612	796,218	0.9%
ELECTRICITY COMMISSION	612,000	624,240	636,725	649,459	662,448	3,184,873	3.7%
SPONSORSHIP	102,000	104,040	106,121	108,243	110,408	530,812	0.6%
DIRECTOR'S FEES	71,400	72,828	74,285	75,770	77,286	371,568	0.4%
Board Travel & Other Expenses	102,000	104,040	106,121	108,243	110,408	530,812	0.6%
COMPUTER AND EQUIPMENT CONSUMABLES	51,000	52,020	53,060	54,122	55,204	265,406	0.3%
INSURANCE	1,530,000	1,560,600	1,591,812	1,623,648	1,656,121	7,962,181	9.2%
RECRUITMENT COSTS	51,000	52,020	53,060	54,122	55,204	265,406	0.3%
HSE ADMINISTRATION - NEW	42,432	43,281	44,146	45,029	45,930	220,818	0.3%
RISK & COMPLIANCE - NEW	100,000	0	0	0	100,000	200,000	0.2%
FOREIGN EXCHANGE LOSSES/(GAINS)	0	0	0	0	0	0	0.0%
TOTAL OTHER EXPENSES	7,521,268	7,569,693	7,721,087	7,875,509	8,133,019	38,820,577	44.8%
	17,240,442	16,651,582	17,422,385	17,508,761	17,897,275	86,720,445	100.0%

2.0 TPL Consolidated Forecast CAPEX (Sch.9): Reset Period 3

GENERATION:	<u>2020/21</u>	<u>2021/22</u>	<u>2022/23</u>	<u>2023/24</u>	<u>2024/25</u>	<u>Total</u>
Tongatapu:						
Growth - ancillary. SCADA & System Upgrade	800,000					800,000
Replacement - ancillary MAK/CAT Load sharing system upgrade	400,000					400,000
Growth - ancillary. New office space central	50,000					50,000
Growth - Generator - (High Speed)	-	-	-	1,500,000	-	1,500,000
Replace - Engine #2	-	-	-	450,000	-	450,000
Replace - Engine #4	-	-	450,000	-	-	450,000
Replace - Engine #5	-	450,000	-	-	-	450,000
Replace - Engine #6	-	-	450,000	-	-	450,000
Replace - Sea-water pump	-	150,000	-	-	-	150,000
Replace - Heat Exchangers G1-G6	75,000	75,000	-	-	-	150,000
Replacement - ancillary	88,125					88,125
Replace - Exhaust Silencers G1-G6	-	378,837	-	-	-	378,837
Replace - Fuel offloading meters	-	-	-	-	-	-
Replace - Air conditioner units	-	4,000	-	4,000	-	8,000
Replace - CAT Protection Switchboard	-	-	-	83,721	-	83,721
Ancillary - Town Water Tank upgrade	-	10,000	-	-	-	10,000
Ancillary - Bulk tank bund wall rework	-	-	-	100,000	-	100,000
Ancillary - Building improvements Noise reduction	-	200,000	-	-	-	200,000
	1,413,125	1,267,837	900,000	2,137,721	-	5,718,683
Vava'u						
Growth - High Speed Generator 600kW	200,000					200,000
Replacement - Engine reset to zero running hours (Cummins)	-	100,000	-	-	-	100,000
Replace - Cummins System Controller	-	100,000	-	-	-	100,000
Growth - ancillary SCADA & system upgrade Engine controllers	75,000					75,000
Replace - Vehicle Ute (5-yr replacement due)	70,000	-	-	-	70,000	140,000
Replace - Air conditioner units	-	-	2,000	-	-	2,000
	345,000	200,000	2,000	-	70,000	617,000
Eua						
Growth - 200 kWGenerator - (High Speed)	-	-	100,000	-	-	100,000
Replacement - Engine reset to zero running hours (Cummins)	-	-	-	150,000	-	150,000
Replace - Cummins System Controller	-	-	-	150,000	-	150,000

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Replace - Air conditioner units	-	-	-	-	2,000	2,000
	-	-	100,000	300,000	2,000	402,000
Ha'apai						
Growth - 200 kWGenerator - (High Speed)	-	-	100,000	-	-	100,000
Replace - Cummins System Controller	-	-	-	-	-	-
Replace - Air conditioner units	-	-	-	2,000	-	2,000
	-	-	100,000	2,000	-	102,000
Total Generation	1,758,125	1,467,837	1,102,000	2,439,721	72,000	6,839,683
DISTRIBUTION:	<u>2020/21</u>	<u>2021/22</u>	<u>2022/23</u>	<u>2023/24</u>	<u>2024/25</u>	Total
Tongatapu						
Growth	908,459	608,319	623,267	379,231	388,384	2,907,660
Submarine Cable	-	-	-	-	-	-
Fourth Feeder	-	-	-	-	-	-
Safety	426,629	429,710	443,347	293,841	300,675	1,894,202
Improvements	1,838,747	1,212,810	722,707	506,333	518,108	4,798,704
Meters/Smart Grid	60,000	60,000	60,000	60,000	60,000	300,000
	3,233,834	2,310,839	1,849,321	1,239,405	1,267,167	9,900,566
Vava'u						
Growth	150,000	150,000	64,909	67,590	69,162	501,662
Safety	113,560	113,560	-	-	-	227,120
Improvements	172,813	183,330	-	-	-	356,143
Meters/Smart Grid	35,000	35,000	25,000	20,000	20,000	135,000
	471,373	481,891	89,909	87,590	89,162	1,219,926
Eua						
Growth	50,000	15,000	15,000	15,000	15,000	110,000
Safety	20,000	6,000	6,000	6,000	6,000	44,000
Improvements	160,000	-	-	-	-	160,000
Meters/Smart Grid	20,000	20,000	10,000	10,000	10,000	70,000
	250,000	41,000	31,000	31,000	31,000	384,000
Ha'apai						
Growth	-	-	-	-	-	-
Safety	10,000	10,000	10,000	10,000	10,000	50,000
Improvements	50,000	50,000	50,000	-	-	150,000
Meters/Smart Grid	20,000	20,000	10,000	10,000	10,000	70,000

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	80,000	80,000	70,000	20,000	20,000	270,000
Sub Total Direct CAPEX	4,035,207	2,913,730	2,040,230	1,377,995	1,407,329	11,774,491
Capitalised Labour and Transport	1,016,083	1,016,083	832,692	745,954	763,301	4,374,113
Total Direct CAPEX	5,051,290	3,929,813	2,872,922	2,123,949	2,170,631	16,148,605
Other Non-Direct CAPEX (Vehicles, safety gear, buildings etc)	1,300,839	955,174	316,544	189,439	326,893	3,088,889
Total Distribution	6,352,129	4,884,987	3,189,466	2,313,388	2,497,523	19,237,493
RETAIL	<u>2020/21</u>	<u>2021/22</u>	<u>2022/23</u>	<u>2023/24</u>	<u>2024/25</u>	Total
Office Furniture	1,000	1,000	1,000	3,000	-	6,000
Office and Computer Equipment	3,000	3,000	3,000	15,000	-	24,000
Tools and Equipment	1,000	1,000	1,000	1,000	-	4,000
Vehicles	60,000	-	-	85,000	60,000	205,000
Buildings	120,000	-	-	-	-	120,000
Total Retail	185,000	5,000	5,000	104,000	60,000	359,000
CORPORATE/ INDIRECT	<u>2020/21</u>	<u>2021/22</u>	<u>2022/23</u>	<u>2023/24</u>	<u>2024/25</u>	Total
Office Furniture	-	-	-	-	-	-
Office and Computer Equipment	60,000	60,000	60,000	60,000	60,000	300,000
Tools and Equipment	-	-	-	-	-	-
Vehicles	-	100,000	-	-	140,000	240,000
Buildings	-	-	-	-	-	-
Network security/ reliability	50,000	50,000	50,000	50,000	50,000	250,000
Total Corporate/ Indirect	110,000	210,000	110,000	110,000	250,000	790,000
Renewables & other projects						
Detailed	2,097,423	741,600	841,129	448,761	448,761	4,577,674
COMPANY TOTAL	10,502,677	7,309,424	5,247,595	5,415,870	3,328,284	31,803,850