TONGA POWER LIMITED

GROSS METERING POLICY

FOR THE

CONNECTION OF SMALL DISTRIBUTED GENERATION (SDG)

This policy replaces any previous published information on this subject. The policy covers requirements for the connecting of embedded generation to TPL's distribution network. This covers factors such as the safety, quality of service, export price paid by TPL and overall control of generation distributed across TPL's grids.

Version History

Date	Version Number	Status	Active?
26 April 2012	**Version 4**	**FINAL for approval**	**Y**
25 May 2012	**Version 5**	**Board approved**	**Y**
June 2012	**Version 6**	**Schedules completed**	**Y**
April 2016	**Version 7**	**Draft Amendments**	**Y**
July 2016	**Version 8**	**Board approved**	Y

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2 BACKGROUND

2.1 TPL AIM:

Tonga Power Limited's objective is to provide safe, reliable, sustainable and affordable electricity supply throughout Tonga.

TPL's Gross Metering policy aims ensure that all TPL's customers have access to the benefits of renewable energy technologies.

Tonga Power Limited's core business is the generation, distribution and sale of electricity within Tonga. It operates under a Concession Contract administered by the Electricity Commission that stipulates the framework for safety, performance and tariff setting that allows the Utility to provide the service of electricity to the Tongan public, both safely and efficiently.

TPL's Gross Metering policy aims to ensure that all TPL's customers have access to the benefits of renewable energy technologies. Electricity is a serious business and TPL's gross metering policy aims to allow TPL customers to generate their own electricity without having a negative impact on other customers who are connected to the TPL grid. The policy aims to support the customer's investment in Renewable Energy (RE) generation, while ensuring sustainable and safe supply of electricity to consumers who may not be fortunate enough to afford the investment in RE. The Policy also aims to ensure that the benefits of renewable energy are available to the owner without creating the situation where privately owned renewable energy generation leads to increased tariffs for the rest of the population.

2.2 LEGAL FRAMEWORK FOR GRID CONNECTION

Potential applicants must be aware of the legal and regulatory framework that governs the generation and distribution of electricity in Tonga.

Tonga's electricity sector operates under a concession based regulation scheme that is enshrined in two primary documents; The *Electricity Act 2007* and the *Electricity Concession Contract*. In 2008 the Government of Tonga established TPL to provide electricity across the four island groups (Tongatapu, Vava'u, Ha'apai and 'Eua[1]). A regulator, the Electricity Commission (EC) oversees the performance of TPL according to the Concession Contract and also authorizes changes to the electricity tariff. TPL as a 100% State Owned Enterprise (SOE) is regulated on its business performance by the Government of Tonga through the Public Enterprises Act 2003.

Under this arrangement TPL is allowed to purchase electricity from third parties. The TPL Gross Metering Policy outlines the process for customers to follow if they are interested in providing electricity to TPL.

[1] This was amended in 2010 to also include the outer islands of Niuatoputapu and Niuafo'ou

3 GROSS METERING OVERVIEW

The TPL Gross Metering policy allows successful applicants to generate their own power from renewable resources. A customer sends electricity back to TPL when they produce AND it is safe to put back into the grid. The customer can also use power from TPL when their renewable systems are unable to generate power, an example would be solar PV systems that are unable to generate power when the sun is not shining. Gross Metering allows the customer to use TPL's grid as a storage battery.

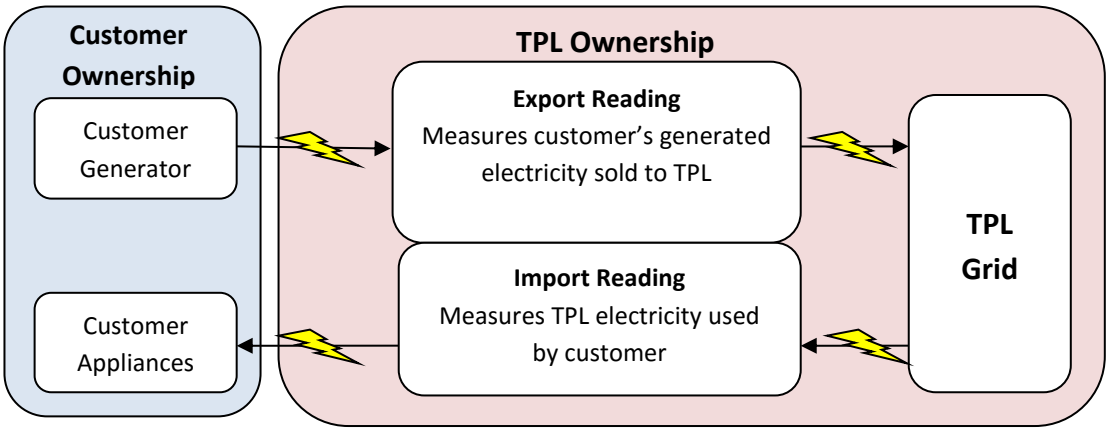


Figure 1 Integration of small distributed generation through the two-meter system.

3.1 GROSS METERING COMMERCIAL TERMS

All electricity purchased from TPL's grid will be charged by TPL at its published rates each billing period (currently monthly). Conversely TPL will purchase electricity from contracted generators at its Export Tariff each billing period through adjustments to the distributed generators electricity bill as shown in Appendix 4. If annually there is an excess or net export by the customer then the value of the net electricity exported will be paid by TPL to an account nominated by the distributed generator. The Export Tariff is based on the components of the published tariff that represents Tonga Power's average fuel cost. These average fuel costs are adjusted by network and generation related support costs, as detailed in Schedule 1 and summarized in Table 1 below. Due to the variable nature of the fuel cost the prices are determined based on a fuel price range, if the price of fuel is within a specific range during price review the lower value of the range is used for electricity exported to the grid. The upper value of the range will be offered for electricity exported during peak electricity demand hours of 6:30pm and 9:30pm every day. These prices will be fixed for a period of 1 year starting from the 01/07/2016 and will be reviewed on an annual basis and may be updated in-line with the published price movements for the fuel component as approved by the Electricity Commission over the period. The methodology will be reviewed as necessary. TPL reserves the right to notify and introduce charges specifically applicable to generators where it can be shown that such connected generators incur costs on the business that should not be subsidized by other, non-generating, customers. TPL will endeavor not to apply such charges retrospectively, however if necessary they will be introduce before the annual review date.

Table 1 TPL Export Tariff

Cost per Litre of Diesel	0.5 ($/ltr)	0.75 ($/ltr)	1.0 ($/ltr)	1.25 ($/ltr)	1.50 ($/ltr)	1.75 ($/ltr)	2.0 ($/ltr)	2.25 ($/ltr)	2.5 ($/ltr)
Fixed Non Fuel Component (s/kWhr)	11.61	11.61	11.61	11.61	11.61	11.61	11.61	11.61	11.61
Fuel Component (s/kWhr)	0.0750	0.1125	0.1500	0.1875	0.2250	0.2625	0.3000	0.3375	0.3750
Generation Support (s/kWhr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity Commission Levy (s/kWhr)	- 0.97	- 0.97	- 0.97	- 0.97	- 0.97	- 0.97	- 0.97	- 0.97	- 0.97
Reactive (kVAr) Support (s/kWhr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Export Tariff (s/kWhr)	$0.1911	$0.2286	$0.2661	$0.3036	$0.3411	$0.3786	$0.4161	$0.4536	$0.4911

3.1.1 ONE-OFF COSTS

It is important for the project developer to consider the one off costs related to distributed generation projects. These vary from shipping and customs fee's to the costs of connecting to the network safely. These costs will vary from project to project however each applicant will need to consider these expenses at the outset of the project and should consult with TPL to better understand the costs of connecting for the specific project.

3.2 GROSS METERING AND CONTROL

TPL's Gross Metering policy is based on a dual-meter system (see Figure 2) to measure generator output as well as the customer's consumption. Successful applicants whose generator produces more electricity than they consume annually will be reimbursed annually. Electricity produced by the generator will be credited to the account on a monthly basis (see Appendix 4: Example of Customer Solar Bill). The successful applicant can still purchase power from TPL at the regulated tariff and will be able to sell electricity to TPL at the published Export Tariff.

3.2.1 METERING AND CONTROL

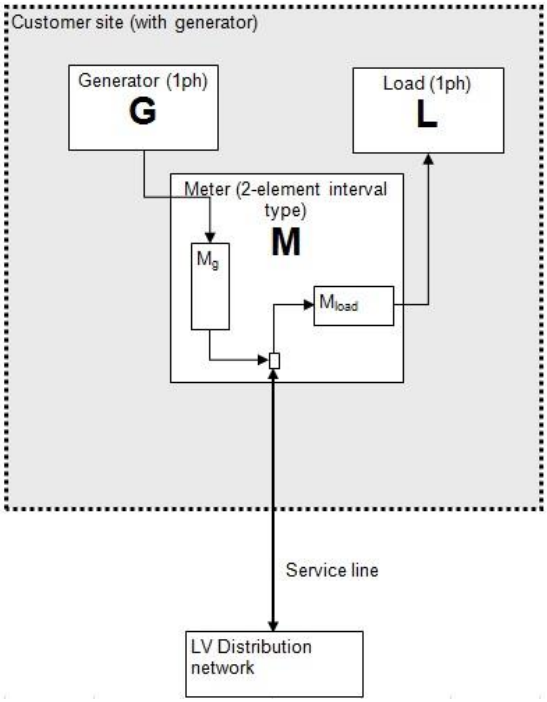


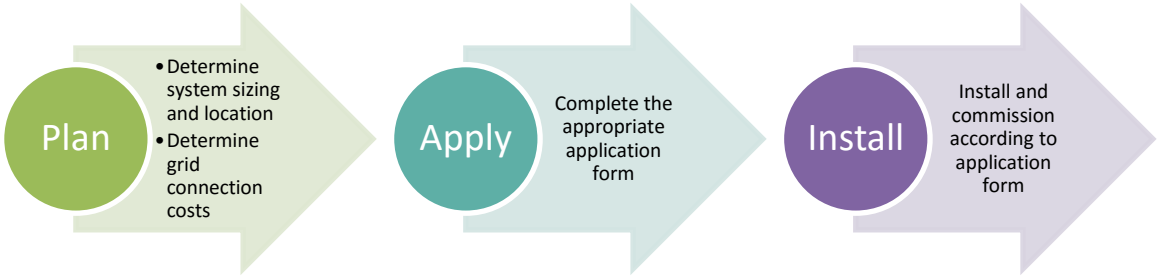
Figure 2: TPL Dual metering configuration for rooftop systems. For 3-phase systems a 3-phase generator and meter will take the place of G and Mg respectively.

Because embedded generation sources are distributed across numerous points on TPL's distribution grid, the matter of controlling the input of these sources such that they do not have an adverse effect on grid stability is important.

Monitoring and control of the dispatch of power into the grid will be overseen by TPL according to Schedule 2: Monitoring and control.

4 THE APPLICATION PROCESS

The application process is designed to be as streamlined as possible.



Once an Application Form (see Appendix 1: APPLICATION FORM A1: 4 kW or less and Appendix 2: APPLICATION FORM B1 for Over 4 kw) is lodged it is considered by TPL according to four primary criteria.

1. Safety – the applicant has considered safety in the design of the system.
2. Technical Completeness – the design and equipment to be used meets all the relevant technical standards.
3. Commercial Impact – the amount of generation and the financial effect this could have on other electricity consumers.

4. Grid Integration – the generation can be adequately absorbed by the grid particularly the distribution network equipment and the generators that are the primary source of electricity.

An applicant that meets the criteria can successfully connect to TPL's grid and begin generating electricity. In other instances, further information or engineering work may be required in-order to gain approval. In certain cases an applicant may be required to re-apply. There are three possible responses that an applicant may receive following the application consideration process: *Approval; Approval Pending; Re-application required.*

4.1 BEFORE YOU APPLY

Please ensure you have read this policy and have consulted an electrician licensed to practice in Tonga regarding the installation of your system.

Planning is essential as there are often extra costs in installation, grid connection and indeed in the purchase and transport of the system to its intended location. The organization of financing and communication with installers, government and TPL is the responsibility of the applicant. Please ensure you give yourself a realistic timeframe for implementation. TPL will work with all applicants to ensure a safe, reliable and appropriate system is finally installed.

4.2 YOUR APPLICATION

Applications can be downloaded from the TPL website or picked up and handed in at the following locations between 9.00am-4.00pm working days:

Tonga Power Limited Main Office, Cnr Taufa'ahau and Mateialona Roads, Nuku'alofa, Tonga.	Network Planning and Design Division, Tonga Power Limited Distribution Depot, Small Industries Centre, Ma'ufanga, Tonga.
Tonga Power Limited Vava'u Office, Kovana Road, Neiafu, Vava'u.	Tonga Power Limited Ha'apai Office, Faifekau Road, Pangai, Ha'apai
Tonga Power Limited 'Eua Office, 'Ohonua, 'Eua	

For further information on the application process please contact Tonga Power Limited's Strategic Development Division or visit our website:

Tonga Power Limited Design and Planning Division
Phone: 24-607 **Email:** solar@tongapower.to **Website:** www.tongapower.to

4.3 CRITERIA CONSIDERED

4.3.1 INSTALLATION SIZE

There are different application forms for systems 4 kWp and under and for systems over 4 kWp

Systems over 4 kWp will need to be three-phase systems to ensure the stability of the network.

This is the intended installed capacity of the installation in kWp. Installation size is important for an applicant to consider for two reasons.

First of all, there is an initial total generation limit of 800 kWp for distributed generation allowed by TPL on Tongatapu[2]. This quota is in place to allow TPL to ensure the technical stability of the network, it is re-evaluated each year and publicized[3]. Applications will be considered on a first-come-first-served basis with respect to the capacity quota and applications are no-longer accepted once the quota is filled for the year.

Furthermore, installation size is important because the policy separates SDG into three groups; proposed installations greater than 160 kWp, proposed installations greater than 4 kWp and up to 160 kWp and installations less-than or equal-to 4 kWp. There are different sets of requirements for each group, such as three-phase connections for installations over 4 kWp (see application form for Systems > 4kWp and Systems <= 4 kWp). Any system larger than 160 kWp will be dealt with through a Power Purchase Agreement process.

Connection to the grid costs different amounts in different areas and varies from customer to customer. Use the map in Schedule 5 to help work out how much grid connection costs in your area

4.3.2 INSTALLATION LOCATION:

In-order to ensure connections to the TPL network are safe for both the Applicant and for their neighbours, TPL will need to be satisfied that the network configuration at the location is suitable and sufficient capacity is available to supply and receive electricity from the new connection.

If there is not sufficient network capacity the network may need to be upgraded to meet the regulatory standards for quality of electricity to the applicant and existing nearby connected customers (see Schedule 3: Tonga standards for Quality of Electricity**).** If network reinforcement is required, the design, cost and schedule for this project work will need to be factored into the applicants installation planning and costing. The diagram in **Error! Reference source not found.** shows an indication of the network locations that are considered SDG ready with reinforcement of the grid not expected.

[2] For Vava'u, 'Eua and Ha'apai each installation will be considered on a case by case basis.

[3] It is envisaged that as technological developments of TPL's grid are implemented more installed capacity can be allowed.

4.3.3 INSTALLATION STANDARD

The facility operator must comply with Tonga's electricity regulations and Tonga Power Limited's technical conditions for connection. These are published under separate cover and amended from time to time. Compliance will be managed by the Electricity Commission, but will include compliance with:

Installation requirement:

- Installation must be undertaken by a licensed electrical contractor
- Inverters must have Low Voltage Ride Through (LVRT) capability and be able to supply power on a grid with voltage as low as 190 V
- Inverters may be required to regulate network voltage
- All systems above a power output level of 4 kW should have a balanced three phase output
- Voltage rise must be measured and must be within 10% of nominal voltage (240 V)
- Reverse power protection relays may be required by Tonga Power Limited
- AS/NZS 3000: Electrical Installations (Wiring Rules)
- AS/NZS 5033: Installation and safety requirements for photovoltaic (PV) arrays
- AS/NZS 1170.2: Structural Design Actions – wind actions
- AS 3011: Secondary batteries installed in buildings
- AS 2676: Installation and maintenance guide secondary batteries in a building

Grid requirement:

- AS 4777: Grid connection of energy systems via inverters
- AS/NZS 1769: Lightning protection
- AS 60038: Standard voltages
- AS/NZS 61000: Electromagnetic compatibility (EMC)
- AS 2067: Substations and high voltage installations exceeding 1 KV AC

PV module requirement:

- IEC 61730: Photovoltaic (PV) module safety qualification
- IEC 61701: Salt mist corrosion testing of photovoltaic (PV) modules

Wind turbines requirement:

- AS IEC 61400.2: Wind turbines – Design requirements for small wind turbines (up to 65 kW rated power)
- IEC 61400-1 Wind turbines – Part 1: Design requirements (greater than 65 kW)

The technical conditions are subject to change, as new technology or concepts are developed internationally. Tonga Power is willing to discuss alternatives if they enhance the robustness and safety of the connection.

4.3.4 CUSTOMER TYPE

TPL's customers are divided into 18 customer categories. Each category uses electricity in a very distinctive fashion. Each customer category has been allotted a portion of the 800 kWp quota (see Table 2 below) to ensure there is equal access, the full table can be found in Schedule 4: Customer Category quotas).

Table 2: Installed Solar PV quota for each TPL customer category 2012

TPL Customer Classification	Customer Category	Installed kWp Quota
7, 8, 9, 10	Education Facility	150
12, 13	Religious institution	350
3, 4, 5, 6, 11, 15, 16	Commercial	250
1, 2, 18	Residential	50
14, 17	Temporary	0

5 APPENDIX 1: APPLICATION FORM A1: 4 KW OR LESS

This Application form is for people who want to connect small distributed generation systems (4 kWp or less) to Tonga Power's electricity network to generate electricity. These systems are usually single-phase, but may be three-phase. They are typically installed at residential or small commercial premises.

This information does not apply to generation systems which are not connected to the TPL network.

You must obtain our written agreement before you can connect distributed generation to our network.

1. Details of Applicant

Customer Name:			
Person responsible for application:			
TPL Account Number:			
Contact phone:		Facsimile:	
Mobile:			
Email address:			
Postal address:			

2. Proposed location of embedded generation

Address:	(road, village, constituency, district, island)

Is the property owned by the applicant?	YES ☐ NO ☐ (If YES continue to 3)		
Name of owner:			
Contact phone:		Facsimile:	
Mobile:			
Email address:			

3. Proposed installation size

Type :	☐ Solar PV	☐ Wind turbine	☐ Other (Please specify----------)

Please provide details of the make and model of the system and inverter in the space provided below:			
Max. Output current (Amps):		Installed Generation Capacity (kW)	
Max. Output Voltage (Volts):		Installed Generation Capacity (kVA)	
Manufacturer's specifications and/or nameplate ratings of installation attached:			YES ☐ NO ☐
Number of phases:	One ☐ Three ☐		

4. Installation standards

Please provide a line diagram of the proposed installation if it differs from the standardised line diagram provided as **Schedule 5** of the *'Gross Metering Policy for Connection of Embedded Generation.'*
Expected kWh/year: _____ kWh/year
What is the installed system cost?_____ (TOP $)
How is this system paid for? Did you pay for it yourself or did you obtain finance or some sort of loan or subsidy?

Electrical Contractors License Number:	

If you do not complete all sections of this form your application may be delayed

I apply to connect a distributed generator to Tonga Power's electricity network and confirm that the above information is correct.

Name: _____

Signature: _____ Date: _____

6 APPENDIX 2: APPLICATION FORM B1 FOR OVER 4 KW UP TO 160 KW

The following applies to generation greater than 4 kWp but not larger than 160 kWp.

You must provide Tonga Power with enough information to enable your distributed generation to successfully connect to our network without affecting other connected customers. Please note that an application fee may be payable if we need to carry out significant research and analysis to assess the potential impact of your proposed distributed generation on our network.

You must obtain our written agreement before you can connect distributed generation to our network

5. Details of Applicant

Customer Name:			
TPL Account Number:			
Party responsible for application:			
Contact phone:		Facsimile:	
Mobile:			
Email address:			
Postal address:			

6. Proposed location of embedded generation

Address:	(road, village, constituency, district, island)
Is the property owned by the applicant?	YES ☐ NO ☐ (If YES continue to 3)

Name of owner:			
Contact phone:		Facsimile:	

Mobile:	
Email address:	

7. Proposed installation size

Type :	☐ Solar PV ☐ Wind turbine	☐ Gas turbine ☐ Gas Engine	☐ Other (Please specify----------)

Technical Specifications required	**Attached**
Project feasibility report detailing expected output and maintenance costs	YES ☐ NO ☐ N/A ☐
Type of Generation unit – synchronous, asynchronous, inverter-based	YES ☐ NO ☐ N/A ☐
Make/model of prime mover, wind turbine or PV module	YES ☐ NO ☐ N/A ☐
Rated terminal voltage (kV)	YES ☐ NO ☐ N/A ☐
Rated generation capacity (kVA)	YES ☐ NO ☐ N/A ☐
Rated minimum power factors	YES ☐ NO ☐ N/A ☐
Maximum continuous active power generated (kW)	YES ☐ NO ☐ N/A ☐
Maximum short term active power generated (kW)	YES ☐ NO ☐ N/A ☐
For asynchronous generators, reactive power requirements (kVAr)	YES ☐ NO ☐ N/A ☐
Anticipated operating regime e.g. continuous, intermittent etc)	YES ☐ NO ☐ N/A ☐
Method of voltage control	YES ☐ NO ☐ N/A ☐
Generation transformer details if applicable	YES ☐ NO ☐ N/A ☐
The means of connection and disconnection	YES ☐ NO ☐ N/A ☐
The means of synchronising between the generation and the network	YES ☐ NO ☐ N/A ☐
Single line diagram for installation	YES ☐ NO ☐ N/A ☐
Three-phase inverter set-up (if applicable)	YES ☐ NO ☐ N/A ☐

The parties may agree to modify or customise the above table to better suit a particular project.	
Protection Requirements	**Attached**
Generation Circuit Breaker	YES ☐ NO ☐ N/A ☐
Disconnect/Isolate Switch	YES ☐ NO ☐ N/A ☐
Over and under voltage protection	YES ☐ NO ☐ N/A ☐
Over and under frequency protection	YES ☐ NO ☐ N/A ☐
Synchronisation	YES ☐ NO ☐ N/A ☐
Loss of network supply (see islanding notes)	YES ☐ NO ☐ N/A ☐
Fault current that can be delivered by the generation device	YES ☐ NO ☐ N/A ☐

8. Installation standards

Copy of electrical drawing of proposed installation attached:	YES ☐ NO ☐
Electrical Contractors License Number:	

If you do not complete all sections of this form your application may be delayed

I apply to connect a distributed generator to Tonga Power's electricity network and confirm that the above information is correct.

Name: _____

Signature: _____Date: _____

7 APPENDIX 4: EXAMPLE OF CUSTOMER SOLAR BILL

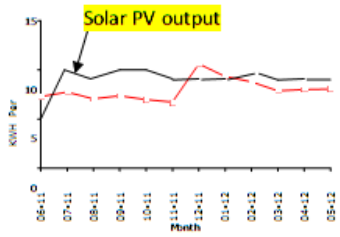
TONGA POWER LIMITED

PO Box 429, Nuku'alofa, TONGA

Customer No. 911007

SIONE CUSTOMER

Account Number: 111001700000



Historical Usage Information

Previous 13 months Usage 3162 kWhs
kWhs `e 3162 na'ake ngaue `aki `I he mahina e 13 kuo hili.
Avge Daily Usage 8 kWhs

Faka'avalisi ki he kWh 8 `oku ke ngau e 'aki faka'aho.
Avge Monthly Bill $241.12
Oku Faka'avalisi kihe $241.12 ho'o mo'ua `uhila kihe mahina.

Statement/Invoice number/Fika` Inivoisi:	**6307867**
Invoice Date	06/06/2012
For electricity supplied/received from \ Ki he 'uhila na'e tufaki mei he	04/05/2012 to\ki he 06/06/2012
Account Enquiries / Faka'eke'eke mo'ua:	21400, 28311
Fax:	+676 23047
Faults/Maumau/Fakatu'utamaki:	944 or +676944 / 28344
New Meter Installation/Fokotu'u mita fo'ou	27744
Disconnection/Reconnections/Tu'usi/Fakahoko:	7720141 / 7720019
Email:	powerbillstbu@tongapower.to
Web:	
TIN:	268147

(1) 17 May 2012	Opening Balance	$224.59
17 May 2012	Payment Received - Cash	-$224.60
Balance Before Current Charges / Palanisi kimu'a he Mo'ua lolotonga		**$ -0.01**
(2) Current month Power charges (please see **(A)** below for details) / Mo'ua 'uhila ki he mahina ni (vakai ki hono fakaikiiki 'i he **(A)** 'i lalo)		230.20
Total Amount Fed-in/Fakakatoa totongi fakafoki		**-$128.61**
Total Amount Due/Fakakatoa Mo'ua ke totongi		**$ 101.58**

(1) If any part of the Past Due amount remains unpaid after: 13 June 2012 your electricity supply will be Disconnected without further notice.
Kapau `oku `i ai ha toenga mo'ua `oku te'eki totongi mai `i he `aho 13 June 2012 `e tu'usi atu leva ho'o ma'u'anga `uhila `ikai toe fanongonongo.

(2) The Current Power Bill Amount is due for payment within 30 days of bill date
Koe mo'ua lolotonga ke totongi `i loto he `aho `e 30 mei he `aho `o e mo'ua ni

(A) Current Month Power Charges Usage Details/ Koe fakaikiiki eni 'o e mo'ua 'uhila ki he mahina

Route: 1110/4

Item / Fakaikiiki	Meter	Last Actual Read/Lau Faka'osi		Last Bill / Mo'ua ki Mu'a	This Bill / Mo'ua ko eni	Units Read / Lahi `oe unit na'e	Multiplier / Liunga Fiha	Units Used / Uniti na'e ngaue 'aki	$ Rate / Totongi	$ Total / Fakakatoa
Energy Usage/ 'Uhila na'e ngaue'aki	10051467	06 Jun 12	5122	4875	5122	247	1	247	$0.9320	$230.20
Energy Output/ 'Uhila na'e tuku'atu	10293444	06 Jun 12	6111			300	1	-	$0.4287	-$128.61

Total for site this month / Mo'ua 'Uhila Ki he Mahina ni **$ 101.58**

Fuel component $124.81 (247 units x $0.5053),Non-fuel component $105.37 (247 units x $0.4266)/ ***Totongi 'uhila 'oku 'ave ke totongi 'aki 'o e lolo $124.81 ('iuniti 'e 247 x $0.5053), fakalele 'aki 'a e Pisinisi koe $105.37('iuniti 'e 247 x $0.4266).***

The Electricity Commission Administration Fee of $2.77 (247 units @ $0.0112)/ **Totongi 'uhila Komisoni 'Uhila(Electricity Commission) $2.77 ('iuniti 'e 247 @ $0.0112).**

Tonga Power Ltd welcomes any feedback/complaint, if you have an issue please contact us atfeedback@tongapower.to . If you wish to take a complaint/feedback further then you can contact the Electricity Commission, P.O. Box 47, N
chairman.regulator@gmail.com / *Oku mau tali lelei ho'o mou tanaki/launga 'oku fie fai mai. Fetu'utaki mai ki*
feedback@tongapower.to. 'E toe malava pe ke toe fakahoko ha'o launga/tanaki kihe Komisoni 'Uhila 'I he P.
chairman.regulator@gmail.com

Notice / Fanongonongo

8 SCHEDULE 1: PRICING METHODOLOGY

This Schedule sets out the methodology to be applied for charging for supply and receipt of electricity.

8.1 PRICING PRINCIPLES

Tonga Power Limited's approach to pricing is that it should:

a. Be economically efficient, prices should;

- Not encourage over investment
- Encourage investment by third parties to defer or avoid expenditure
- Avoid inefficient stranding of assets

b. Represent the underlying cost structures and service levels;

- Reflect services received
- Allocate capital charges to reflect asset utilisation
- Allocate operating costs to where they are incurred

c. Adequately reflect the business risks associated with investments;

- The risks associated with system investments differ depending upon the circumstances, such as location, consumer groups served, rate of growth.

d. Be Simple

- Prices should be easily understood, provide clear signals to customers that encourage efficient use of the grid, and not be unduly complex to administer.

e. Reflect the Asset Management Plan

- Pricing signals will be set to reflect the projected capital requirement to accommodate growth in demand and changes of generation mix over the time horizon of the Company's Asset Management Plan.

f. Meet legal and regulatory requirements

- Electricity Act 2007
- The Company's Concession Contract
- The Customer's obligations under the Electricity Commission
- Tonga Power Limited's technical conditions of connection to the network

8.2 COST OF CONNECTION

The Distributed Generator will pay all costs associated with upgrade of the connection to the network facility, including any upgrade or modification required to Tonga Power Limited's distribution network, protection and communication systems, and/or control systems.

Any design and site inspections will be charged at Tonga Power Limited's standard charge-out rates.

8.2.1 ELECTRICITY PURCHASED FROM THE TONGA POWER GRID:

All electricity will be charged by Tonga Power at its published rates.

8.2.2 ELECTRICITY INJECTED INTO THE TONGA POWER GRID:

The price of electricity to be purchased by Tonga Power for a specific site (connection) will be based on the total kWh injected into the network in a billing period (currently monthly). It will comprise the following components:

8.2.2.1 PAYABLE BY TONGA POWER LIMITED

1. Avoided fuel costs:
    - The Fuel Component is an extrapolation between the actual diesel prices going back to July 2008 (when TPL started) using the average Fuel Tariff to average Diesel Prices. This works out to an average of 30% of the price of fuel in $/ltr. Further this is halved to allow for the spinning reserve that TPL must provide as a result of the introduction of high levels of intermittent Renewable Energy.
2. Fixed Non Fuel Component:
    - Opex and Capex for generation for the next 5 years allowable in the current tariff. The charge is 11.61 seniti/kWh.

8.2.3 PAYABLE BY THE DISTRIBUTED GENERATOR

1. Generation support charges
    - Covering any cost incurred to Tonga Power Limited's centralized generation plant as a result of the introduction of the plant.
2. Electricity Commission levy
    - Recovering the cost to Tonga Power Limited for funding the Electricity Commission. The charge is 0.97 seniti/kWh
3. Reactive support
    - To compensate for the cost of maintaining adequate power factor, and managing network losses. The charge is currently 0.0 seniti/kWh

8.2.4 RENEWABLE CAPACITY OFFSET

Tonga Power Limited recognises the value of renewable generation, in avoiding the use of fossil fuel oils for generation. As the amount of connected renewable generation increases, the component of consumers' tariff representing fuel will decrease.

If the fuel component of tariff as calculated in accordance with regulation includes the offset of renewable generation, then no further adjustments are necessary.

If the fuel component of tariff as calculated under regulations does not include the offset from renewable generation, then the amount payable by Tonga Power to the Distributed Generator for energy injected into the Grid will be scaled by the ratio of non-renewable generation on Tongatapu to the total volume generation connected to the Tongatapu Grid. This will be calculated once per year, based on the previous twelve months generation statistics.

8.3 ESCALATION PROVISIONS

Published charges will be changed on an annual basisby Tonga Power Limited, and will consider the allowable movements under regulation and as approved by the Electricity Commission. Changes to price will be published.

The generation support, reactive support and Electricity Commission levy will be reviewed on a yearly basis, and notified.

8.4 TAXES

All taxes and levies set by Government (with the exception of the Electricity Commission levy) will be applied in addition to the rates specified.

8.5 LOCATIONAL INCENTIVES

In certain areas Tonga Power Limited faces investment in the network due to constraints and implications of localized growth. Tonga Power proposes to identify and make public these localities, and will offer additional pricing incentives to encourage more efficient location of grid connected generation or demand management capabilities. Such incentives will be determined on a case-by-case basis as they are likely to be short to medium term incentives associated with savings through deferring (rather than eliminating) capital expenditure in the network.

8.6 APPLICATION OF CHARGES AS AT 1JUNE 2016

Following is a summary of the price structure (excluding taxes and prior to any renewable offset), applicable to electricity injected into the Tonga Power Limited Network, based on published rates applicable as at June 2016.

Cost per Litre of Diesel	**0.75 ($/ltr)**	**1.0 ($/ltr)**
Fixed Non Fuel Component (s/kWhr)	11.61	11.61
Fuel Component (s/kWhr)	11.25	15

Generation Support (s/kWhr)	0.0	0.0
Electricity Commission Levy (s/kWhr)	- 0.97	- 0.97
Reactive (KVAr) Support (s/kWhr)	0.0	0.0
Export Tariff (s/kWhr)	**22.86**	**26.61**

9 SCHEDULE 2: MONITORING AND CONTROL

9.1 MONITORING

TPL reserves the right to remotely monitor the output of the customers meter to ensure it can measure the performance of the system and other systems on that particular part of the grid.

It is strongly recommend applicants also undertake their own records of output and performance.

9.2 CONTROL

TPL Generation Management reserve the right to remotely disconnect the generator from TPL's grid in the following circumstances:

- Scheduled shut-downs
- Emergency shut-downs
- To ensure voltage and frequency stability within regulated limits

For further details please refer to the '*Small Distributed Generation Connection Agreement.'*

10 SCHEDULE 4: CUSTOMER CATEGORY QUOTAS

10.1 CUSTOMER QUOTA METHODOLOGY

The aim of the TPL Customer Quota system is to ensure stability across the grid and to allow equal access to renewable energy options for all of TPL's customers. Applications will be processed on a first-come-first-served basis with respect to the Customer Category that each application falls under.

The status of these quotas will be updated quarterly on the TPL website as well as other information for project developers.

10.2 POTENTIAL FOR SYSTEMS OVER THE QUOTA

It is important for TPL to understand the impact on the network once the quota for each customer category is reached and it is determined whether the quota can be extended. Therefore no further applications will be approved once a quota is reached. The only caveat being if the applicant is willing to install battery storage that will assist with grid stability.

10.3 SELECTION OF APPLICATIONS ACCORDING TO THE QUOTA

As outlined in 12.1 the processing of applicants is undertaken on a first-come-first-served basis within each customer category. The quotas for each customer category are reassessed annually and published.

TPL Customer Classification	Customer Category description (English/Tongan)	Customer Category Group	Installed kWp Quota
7	Kindergarten/Ako Kiniti	Education Facility	250
8	Primary/Ako lautohi		
9	Secondary/Ako Kolisi		
10	Tertiary/Ako Makehe		
12	Church/Fale Lotu	Religious institution	500
13	Hall/Holo fakakolo, kavatonga		
3	Shop large/Fale koloa lahi	Commercial	375
4	Shop other/Fale koloa iiki		
5	Business Large/Pisinisi lalahi		
6	Business other/Pisinisi iiki		
11	Government/Potungaue Pule'anga		
15	Shop/container/Falekoloa moe koniteina		
16	Quarry/Tata'anga maka		
1	Residence/Fale loki 1 ki he 3	Residential	125
2	Residence large/ Falenofo'anga lahilaka hake loki 3		
18	Public Streetlight/Maama hala		
14	Container site/Tu'u'anga koniteina	Temporary	0
17	Temporary Meter Box/Puha Temipili		

11 SCHEDULE 5: STANDARDISED LINE DIAGRAM FOR GENERATORS 5 KW OR LESS