

Business Skills Training on Income Opportunities from Increased Electricity Supply at Vava'u Outer Islands

Joint PCREEE – CBS Training

27 – 28 January 2025

Presentation Outline

1. PCREEE

- tefito’l fatongia mo e ngaahi tokoni ki he ‘uu Fonua Pasifiki

2. TREP

- Puipuitu’a ‘o e poloseki TREP mo e solar PV mini-grids

3. Fakataukei – fokotu’u ha’o pisinisi

- Ng. pisinisi ‘oku lolotonga fakalele ‘l tukui motu.
- Ng. pisinisi ‘e toe malava ke fakalele
- Fakahoko kimu’a pea fokotu’u ha pisinisi
- Founga ke ma’u ai ha pa’anga – kamata’l e pisinisi taautaha
- Founga angamaheni ki hono pule’l hono fakalele e pisinisi taautaha.

4. Fakamole ki he totongi ‘uhila

5. Ngaue’aki fakapotopoto e ma’u’anga ‘uhila - Minimum Energy Performance Standards & Labelling (MEPSL).

What is PCREEE? – Pacific Centre for Renewable Energy and Energy Efficiency

- Fokotu’u ‘I he 2017
(office based in Tonga)
- Lele’aki eni ta’u ‘e 9
- Tokonia faka-\$ mei he
UNIDO, Austria - ADA,
Norway & NZ



BUSINESS PLAN

2020-2030

Pacific Centre for Renewable Energy and Energy Efficiency



Four (4) Strategic Areas

- **Programme 1. RE&EE Business Start-Up and Entrepreneurship Support**
- **Programme 2. RE&EE for Sustainable Mobility**
- **Programme 3. RE Mini-grids**
- **Programme 4. Energy Efficiency Investment**



Support to PICs

1. Fakahoko ha ngaahi ako pe koha fakataha 'I he Ma'uanga Ivi
2. Fa'u pe kohano fakalelei'I 'o e ngaahi palani fakafonua, tu'utu'uni ngaue 'I he sekitoa ma'u'anga Ivi pea moha tokoni hono fakafonu e foomu kole tokoni \$ ki he ngaahi donors.
3. Fakaivia Fakapa'anga ki ha kulupu pe kominiutii 'ai ke fokotu'u pisinisi
4. Fa'u mo fakahoko ha polokalama Awareness

Programme 1. RE&EE Business Start-Up and Entrepreneurship Support

a) Fa'u mo hono fakalele e polokalama tohi fakamo'oni ako ki he Ma'u'anga Ivi 'I Tonga



- Tohi fakamo'oni Ako 'I he Ma'u'anga Ivi ki he Level 1 mo e 2, na'e malava ke kamata fakalele 'I Fokololo he 2022.

- Malava ke lesisita 'a e tohi fakamo'oni Ako Level 3 'I he 2023.
- Lolotonga fengae'aki vaofi 'a TNU mo e TNQAP ki he fakakakato e ngaahi fiema'u e TNQAP ki hono fakalele 'o e Level 3 'I he TNU
- I ai e palani ke fakahoko e tohi 'o e Level 4 pea mo e hoko atu aipe ki he Tipiloma

b. Tokoni faka Ivia



1. 'Otu motu Solomone

- Kole tokoni Fakaivia fakapa'anga e kominiuitii 'I Solomone ki hano fakatau mai e 'aisi ku ngaue'aki e solar ki hono fakatolonga enau toutai mei 'oseni ki hono fakatau I motu lahi Honiara.
- Malava leva ke 'oange 'e he PCREEE 'a e fakaivia \$ ko e 30% 'o e mahu'inga fakakatoa 'o e 'aisi kae pehee ki he solar.



c. Polokalama Ako fakataukei 'I he 'ofisi 'o e PCREEE



Tiueti Sisilia Fangupo

Ms. Tiueti Fangupo completed her 6 weeks Summer Internship with the PCREEE in February 2019. She was a Structural Engineering student from the University of Technology, Auckland, NZ. Tiueti started her Summer Internship in December 2018 and her internship included working with the Tonga Department of Energy exposing her to some of the small scale and community-based Renewable Energy projects that the department is working on.

Intern



Sione Folau

Mr. Sione Folau was a Master of Science in Climate Change student from the Pacific Centre for Environment and Sustainable Development (PaCE-SD) of the University of the South Pacific. Sione completed 3 weeks with PCREEE in March 2018, doing research for his thesis on the topic – Carbon Footprint Mitigation Strategies for the Kingdom of Tonga. The research is based on Tonga's Energy Sector. Sione worked closely with the PCREEE team together with the Tonga Department of Energy and was grateful for their inputs to his research.

Intern



Annie Marie Malolo

The PCREEE is pleased to welcome Ms Annie Marie Malolo who is on a 6 months internship with the PCREEE that started on 14th November 2024. Ms Malolo is a Graduate of the University of the South Pacific, majoring on Information Systems and Geography. She is a keen Taekwondo enthusiast and loves to do further studies on climate change.

Highlight of Experiences

Programme 2. RE & EE for Sustainable Mobility

- Tokoni ki hono fa’u ha Palani mo e Tu’utu’uni ngaue ki he Pasifiki pea na’e kamata’i ‘I he 2022.
- Tokoni ki hono fa’u ha ngaahi EV standards and guidelines ke ngaue’aki he Fonua e Pasifiki.
- Tokoni’I e ngaahi Fonua ‘oku faka’amu pe palani ke fokotu’u ha’anau ki’I Demo.
- Fakalele ha ngaahi ako pe training ‘I he faahinga kaveinga pe kau ki he EVs



Highlight of Experiences (continue)

Programme 3. RE Mini-Grids

- Fakalele ha ngaahi ako pe training 'I he mini-grids 'o kau ai tafa'aki tekinala pea mo e fakataukei'I e kakai ku faka'amu ke kamata'I ha'anau pisinisi taautaha.
- Tokoni ki hono fa'u ha ngaahi EV standards and guidelines ke ngaue'aki he Fonua e Pasifiki.
- Conducted Feasibility Study and National Mini-Grid awareness, information and promotion campaign.



Highlight of Experiences

Programme 4. Energy Efficiency Investment

- Tokonia e ngaahi 'uu Fonua e Pasifiki ki hono fakalele e polokalama MEPSL pekoe Minimum Energy Performance Standards & Labelling.



***“Ako fakataukei ki hono
fokotu’u mo fakalele ha
pisinisi taautaha”***

2. Business baseline info – ng. pisinisi kei fakahoko 'I motu

Islands	Population		Total
	Female	Male	
Ofu	61	72	133
'Otea	116	100	216
Falevai	100	130	230
Hunga	82	88	170



3. Tonga Renewable Energy Project (TREP)

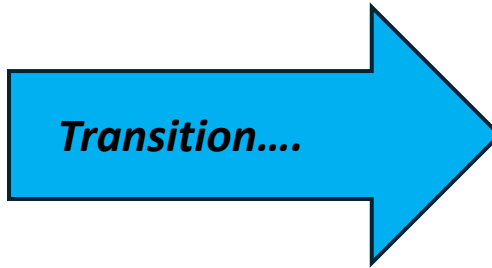
The following subprojects are being implemented under TREP:

1. TREP 01 – Grid Stability BESS at Popua Power Station, Tongatapu (7.2MW /3.8MWh)
2. TREP 02 – Load Shifting BESS at the Villa, Tongatapu (6MW /20.88MWh)
3. TREP 03 – Lot 1
 - 350kW solar PV facility and 464kW/ 1,856 KWh BESS at ‘Eua
 - 300kW solar PV facility and 1003 kW/ 2,007 KWh BESS at Vava’u
4. TREP 03 – Lot 2
 - Solar PV/ BESS microgrid including low voltage distribution system, for the following islands in the Ha’apai group: ‘O’ua, Tungua, Kotu and Mo’ua
 - Solar PV – BESS microgrid, medium /low voltage distribution system for Niuafu’ou.
5. TREP 12 – Solar PV – BESS micro-grid, including low voltage distribution system, for the following islands in the Vava’u Group: Hunga, Ofu, Falevai (note this subproject was added during the TREP implementation phase).



Con't.....

Solar Home Systems



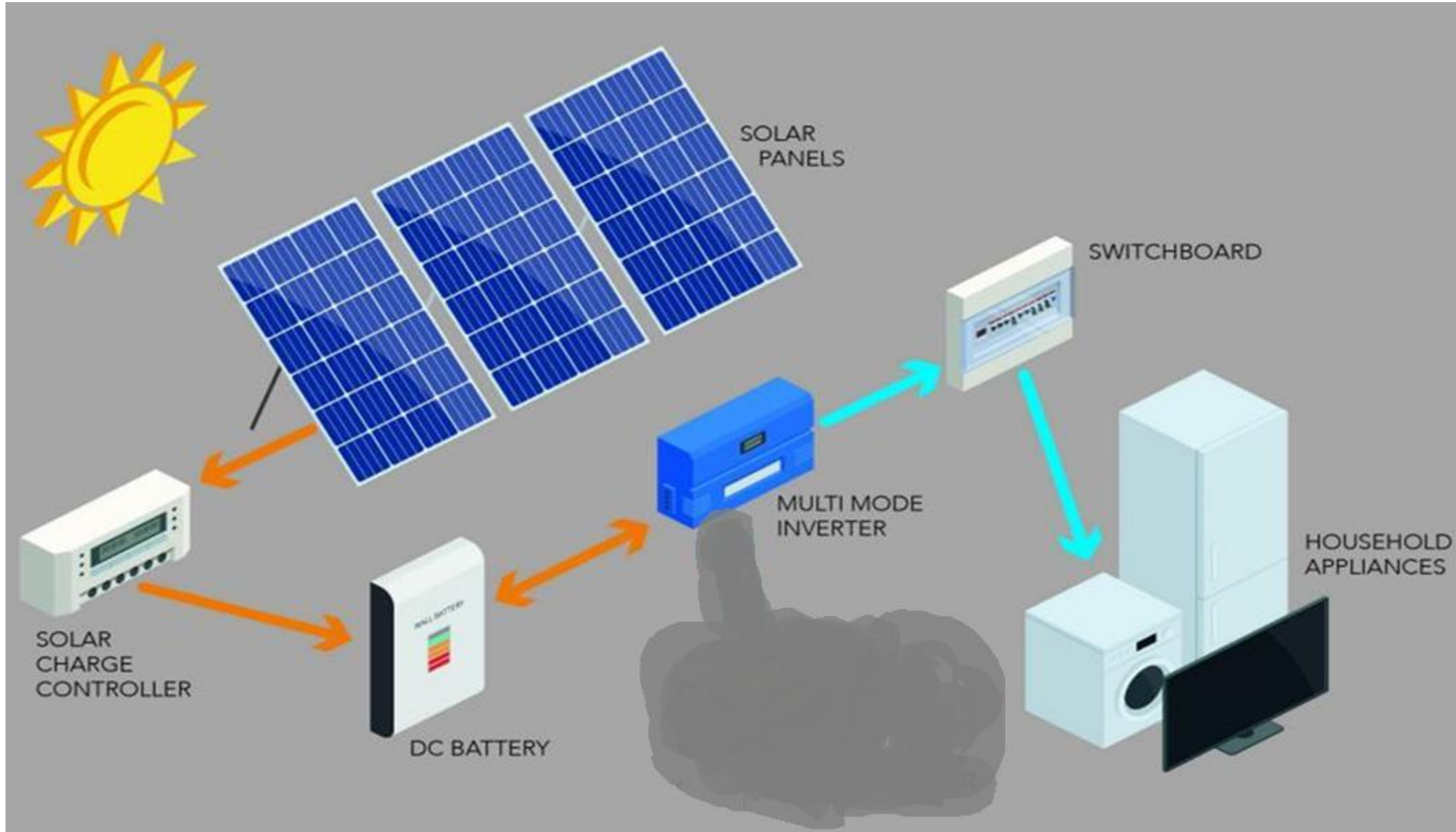
Solar Minigrids Systems



- Solar System iiki, malava ke ne 'oange e ma'uanga ivi 'uhila ki he 'api taautaha (system 'e 1 ki he 'api)
- Angamaheni kene tufaki e ma'uanga ivi uhila 'I he lahi koe 20 – 500Watts.
- Fakataumu'a pe ki he fiema'u ma'uanga ivi si'isi'I hangee ko e fakafonu telefoni, maama 'uhila.

- Solar system 'oku toe ki'I lahi ange, pea na'e fakataumu'a kene tufaki ha ma'u'anga uhila ki ha motu pe koha fanga ki kolo taautaha.
- Malava kene tufaki e ma'uanga ivi uhila 'I he lahi – 1kW ☐ 100+kW
- Lava pe he 'uu api 'o e kolo/motu kenau ngaue'aki e misini foo, 'aisi pe koha naunau 'uhila pe oku fiema'u ha ivi uhila ku lahi.

Simple schematic of a solar mini-grids system



4. Potential Income Opportunities



Barber shop – kosi'ulu totongi



Retail shop - falekoloa



DJ -hire



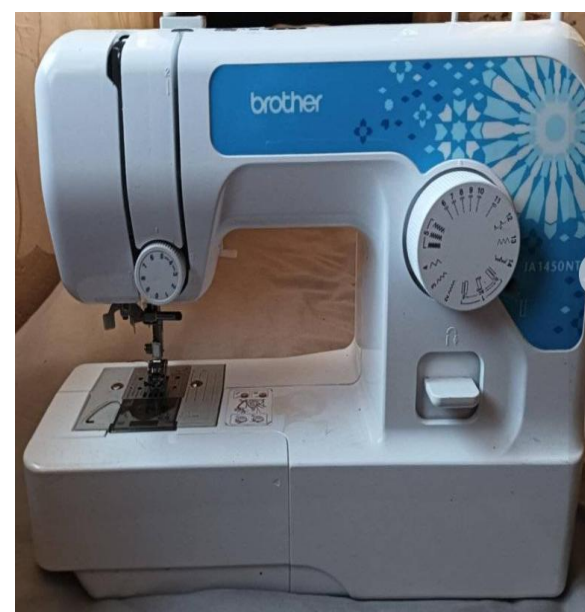
Misini fakapa-tutu



Misini tuki kava



Restaurant - falekai



Tailoring – tuitui totongi



Laundry – foo totongi

5. Kimu'a pea fokotu'u ha'o pisinisi?



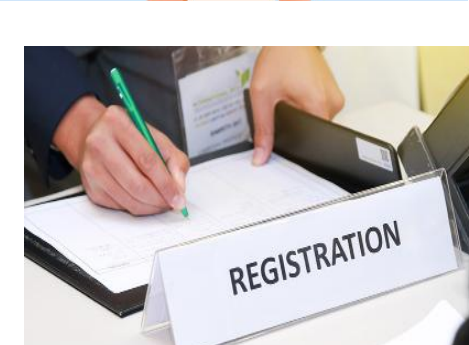
1. Fakakaukau ki ha'o pisinisi

- Pisinisi nai ki ha fefakatau'aki koloa pe koha ngaue ke fakahoko? Kosi 'ulu pe hire Dj etc
- Fakatotolo koeha e koloa pe ngaue (services) 'oku fiema'ua 'e he maketi 'I motu
- Koeha e felave'I 'o e fiema'u ma'u'anga 'uhila ki he pisinisi 'oku ke fakakaukau ki ai.



2. Fa'u ha ki'I palani ki he pisinisi.

- Fakamatala nounou ki he pisinisi 'amanaki ke ke fokotu'u
- Lisi 'o e faahinga (customers) tenau fiema'u e pisinisi – (e.g. ngaahi ako'anga, siasi pe koe kakai fakalukufua e motu)
- Fakafuofua ki he pa'anga huu mai mo e fakamole 'o e pisinisi
- Fa'u ha ki'I taumu'a ki he pisinisi (short/long term)



3. Lesisita ho pisinisi

- Faka'eke'eke ki he Potungau Fefakatau'aki (Ministry of Trade and Economics Development MTED) ki he founa mo e fiema'u ke fakakakato kimu'a pea lesisita ho pisinisi.



4. Fakaava ha'o Akauni Pangike

- Fakaava ha'o 'akauni pangikee ke fakamavahe'I ki ai ho pa'anga ki he pisinisi

6. Founga ki hono kamata'I ho pisinisi - \$\$ mei fee?

1. \$ pe 'a 'O'Ou



2. Noo 'I ha Pangikee



e.g. BSP, ANZ, MBF or
TDB

3. Kautaha noo tautaha



e.g. SPPD, kautaha noo
koloa fakatonga.

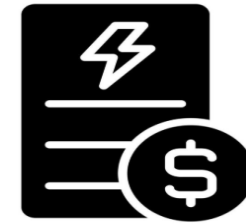
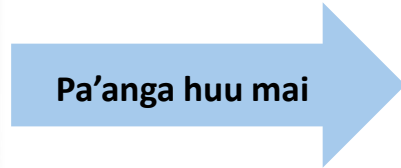
4. Polokalama fakaiviva e pule'anga.



e.g. PCREEE 20-30%
subsidy

7. Founga Angamaheni ki hono mapule'i 'o e \$\$ e pisinisi?

1. Cash Flow – movement of money in and out of business



Electricity/power bill



Wages/salary



Loan

Why Cash Flow is important:

1. Pay expenses on time
2. Avoid running out of money
3. Save for emergencies /growth.

7. cont.....

2. Patiseti– Palani’l ‘a e pa’anga huu mai e pisinisi ki ho ngaahi fakamole

Category	Fakafuofua \$\$ ‘l he mahina
Pa’anga huu mai	
Lahi e \$\$ tanaki mei he kosi’ulu he mahina	4,320
Total Income	+4,320
Fakamole tu’uma’u [fixed cost]	
Vahe ‘o e kau ngaue	1,000
Totongi noo	600
Total Fixed Expenses	-1,600
Variable Expenses	
Ng. naunau kosi’ulu (fetongi ‘oha kilipa maumau, tele, etc)	500
Mo’ua ‘uhila mo e vai	200
Ng. naunau makehe – shampoo, powder etc	220
Total Variable Expenses	-920
Pa’anga talifaki ki he ngaahi me’a fakatupakee (emergency – putu etc)	-500
Remaining Profit	\$ 1,300

Fakataataa’aki eni: : Fakalele ha’o fale kosi ‘ulu

- Ava ‘l he Monite – Tokonaki ‘o e uike kotoa ‘a ia ko e ‘aho fakakatoa ‘e 24 he mahina
- \$15 /tokotaha kosi ‘ulu
- Avalisi ki he kasitomaa ‘e 12 he ‘aho
- $12 \times \$15 \times 24 = 4,320$.

Ng. fakamole tu’uma’u (fixed cost): Ngaahi fakamole eni ‘e malava ke tu’uma’u pe ‘l ha taimi Loloa pea ‘e ‘ikai ke uesia ia he lahi ‘o e kasitomaa fiema’u kosi’ulu.
Examples: totongi noo, vahe e kau ngaue, etc.

Ng. fakamole ‘ikai ke tu’uma’u (variable cost):
Ng. fakamole ‘e malava pe ke feliliuaki fakatatau ki he lahi e kasitomaa
Examples: totongi ‘uhila pe vai, ngaahi naunau fiema’u ki he kosi’ulu, shampoo, etc mo hono fix pe kohono fakafetongi ‘o e kilipa kosi’ulu

7. cont.....

3. Tauhi lekooti e faka'aho 'o e pisinisi– tanaki mo e tauhi e ngaahi fakamatala faka'aho 'a hono fakalele 'o e pisinisi

Key elements of Record-keeping

- i. **Income records:** documentation of money earned through sales, services, or other sources.
- ii. **Expense records:** record of money spent on business operations, including receipts and invoices.
- iii. **Inventory records:** logs of stock levels, purchases, and usage of goods or materials
- iv. **Employee records:** detail of wages, hours worked, payroll information
- v. **Tax records:** documentation needed for filing taxes, such as income statement and deductible expenses.

Example: Record-keeping of Fish Market

Date	Fish Type	Quantity Sold (kg)	Price per kg (TOP)	Income (TOP)	Expense Item	Expense (TOP)	Remaining Stock (kg)	Notes
Tuesday, 21 January 2025	Ngatala	10	15	150	Ice Purchase	10	50 kg	Fresh stock received today.
Tuesday, 21 January 2025	Snapper	5	12	60	Fuel for Boat	20	20 kg	Sold to regular customer.
Tuesday, 21 January 2025	ponetuhi	8	10	80	Packaging Materials	5	12 kg	Used 16 plastic bags.
Tuesday, 21 January 2025	Valu	6	18	108	Market Stall Rent	15	14 kg	Paid stall rent for the day.
Totals	4 Types	29 kg	-	398	4 Expenses	50	Remaining Stock: 96 kg	Net Income: 348 TOP

8. Electricity Cost and Savings


Fakafehoanaki 'a e ngaahi mo'ua 'uhila

Ko ha tepile fo'ou 'oku ne fakafehoanaki 'a e mo'ua 'uhila lolotonga moe ngaahi mo'ua ki mu'a:

- 'Avalisi e ma'olunga moe ma'ulalo e mafana 'o e 'ea- Fakamatala 'ea fakatatau ki he feitu'u 'oku ke 'iai.
- Ngaahi 'aho tohi mo'ua- Koe lahi e ngaahi 'aho 'oku lau ai ho'o mo'ua 'uhila.
- 'Avalisi e ngaue'aki faka 'aho (kWh) - Ko e 'avalisi ho'o ngaue'aki faka'aho ho'o 'uhila 'i he kilowatt-houa.
- kWh fakakatoa 'oku ngaue'aki - Fakakatoa 'o e 'uhila 'oku ke ngaue'aki 'i he kilowatt-houa.
- Iuniti totongi 'uhila & Tokoni 'a e Pule'anga -Koe totongi 'uhila 'i he kilowatt fakatatau ki he totongi kuo faka'ata meihe Komisoni 'Uhiila. 'Oku 'asi foki heni moe tokoni 'a e Pule'anga

Ngaahi founnga totongi & ngaahi founnga fetu'utaki

- Ngaahi founnga totongi ke fili mei ai- 'Oku fakafaingofua'i hono totongi ho'o 'uhila 'aki hono 'oatu ha ngaahi founnga totongi 'uhila keke fili mei ai hange koe totongi ngaue'aki 'a e initaneti, ngaue'aki 'a e Pangike fakafou 'i he initaneti pe koe ngaahi feitu'u ke totongi 'i he kanita. (Totongi 'i he initaneti 'oku ngaue'aki pe ki he kau kasitoma 'a Tongatapu te'eki a'u ki motu.)
- Founnga Fetu'utaki - Fetu'utaki mo kimautilu fakafou he'emau uepisaiti, telefoni pe imeili. Fetu'utaki ki he'emau fika ki he fiema'u fakavavevave, 'aia ku ta'e totongi, pea 'oku faka'ilonga'i makehe atu.



YOUR ELECTRICITY BILL

Customer No: 123456
Account No: 654321

INVOICE TO:
Tonga Power Limited

PAYMENT AND ADJUSTMENT
26/09/24 Opening Balance: \$173.83
Past Due Power Charges: \$173.83

ACCOUNT SUMMARY

Invoice No: 8158302
Electricity Supplied from: 04/06/2024 to 26/09/2024
Past Due Power Charges: \$173.83
Power charges (please see below for details): \$15.36
Lifetime Tariff Discount Scheme: -\$1.79

Total Amount Due by 09 September 2024: \$187.40

(If any part of the Past Due Power Charges amount remains unpaid after 2 Sep 2024 your electricity supply will be disconnected without further notice)
The current Power Bill Amount is due for payment within 30 days of bill date
Government Lifetime Tariff Discount Scheme provides a 17.91 senti per kWh rebate for all power customers who use 150 kWh or less per month

CURRENT CHARGES: \$15.36
(Please see Current Month power charges table below for more detail)

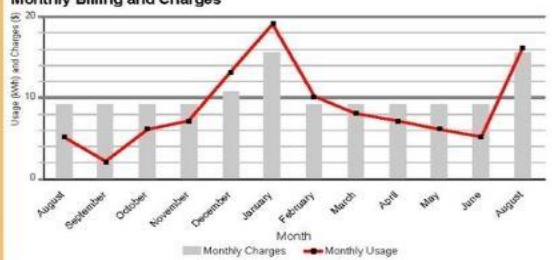
PAYMENT OPTIONS

Online Payment (Credit \ Debit Cards):
Send an email to oss@tongapower.to to register and manage your bill account online
Link: <https://www.oss.tongapower.to>

Internet Banking:
BSP account number: 2000624664
ANZ account number: 1681919
TDB account number: 153116 S1

Over the Counter:
Any Tonga Power Limited Office
Any Western Union Office
Any Tonga Gas Office
Tonga Development Bank

Monthly Billing and Charges



CONTACT INFORMATION
(Also available on our website: www.tongapower.to)

- Billing enquiries: 21400, 28311
- Re-connections: 7720141 / 7720019
- Meter enquiries: 27744
- Fault: +676944 / 28344
- Email: powerbillstbu@tongapower.to

Emergency (free): 944

Billing Period Comparison

	August 2023	June 2024	July 2024
Billing Days	30	32	31
Avg Daily Usage (kWh)	0.17	0.16	0.52
Total Usage (kWh)	5	5	16
Avg High Temp	23°	24°	23°
Avg Low Temp	17°	19°	17°
Tariff Unit Cost	\$0.8120	\$0.8120	\$0.9603
GPO Rate	\$0.1791	\$0.1791	\$0.1120

CURRENT MONTH POWER CHARGES USAGE DETAILS

Item / Fakakiiki	Meter	Invoice Period / Taimi 'Invoisi	Previous Bill Read / Lau Mo'ua ki Mu'a	Current Bill Read / Lau Mo'ua ko eni	Units Used / Uniti na'e ngaue'aki	\$ Rate / Totongi	\$ Total / Fakakatoa
Energy Usage / 'Uhila na'e ngaue'aki	10112938	05/06/24 - 05/07/24	3901 kWh	3917 kWh	16 kWh	\$0.9603	\$15.36
Total for site this month:							\$15.36

Fuel component: \$7.84 (16 units x \$0.4903). **Non-fuel component:** \$7.52 (16 units x \$0.4700) / Totongi 'uhila 'oku 'ave ke totongi 'aki 'o e tofo \$7.84 ('uniti 'o 16 x \$0.4903), fakalele 'aki 'a e Pisisia koe \$7.52 ('uniti 'o 16 x \$0.4700).

The Electricity Commission Administration Fee of \$0.18 (16 units @ \$0.0112) / Totongi 'uhila Komisoni 'Uhiila (Electricity Commission) \$0.18 ('uniti 'o 16 @ \$0.0112).

Tonga Power Ltd welcomes any **feedback/complaint**. If you have an issue please contact us at: feedback@tongapower.to. If you wish to take a complaint/feedback further then you can contact the Electricity Commission, P.O. Box 47, Nuku'alofa or [email to chairman_regulator@gmail.com](mailto:email_to_chairman_regulator@gmail.com) / Oku mau tili lele ho'o mau tanaki'anga 'oku fa'ia ma: Fetu'utaki mai kibe 21400 pe email mai kibe feedback@tongapower.to. 'E toe malava pe ke toe fakano'ho 'o laungatanaki kibe Komisoni 'Uhiila 1 he P.O. Box 47, Nuku'alofa pe email kibe chairman_regulator@gmail.com.

Fakamatala 'o e 'Akauni

'Oku 'i heni kotoa 'a e fakakiiki ki he ngaahi fakamatala mahu'inga fekau'aki mo ho'o mo'ua 'uhila.

Mo'ua fakakatoa ke totongi

'Oku tohi lanu hinehina ho'o mo'ua fakakatoa ke totongi 'i he pa lanu kulokula, ke ha makehe mo 'ilonga lelei ange. 'I lalo ai, 'oku ha ai 'a e 'aho faka'osi ke totongi ho'o toenga mo'ua 'uhila, ki mu'a pea tu'usi atu.

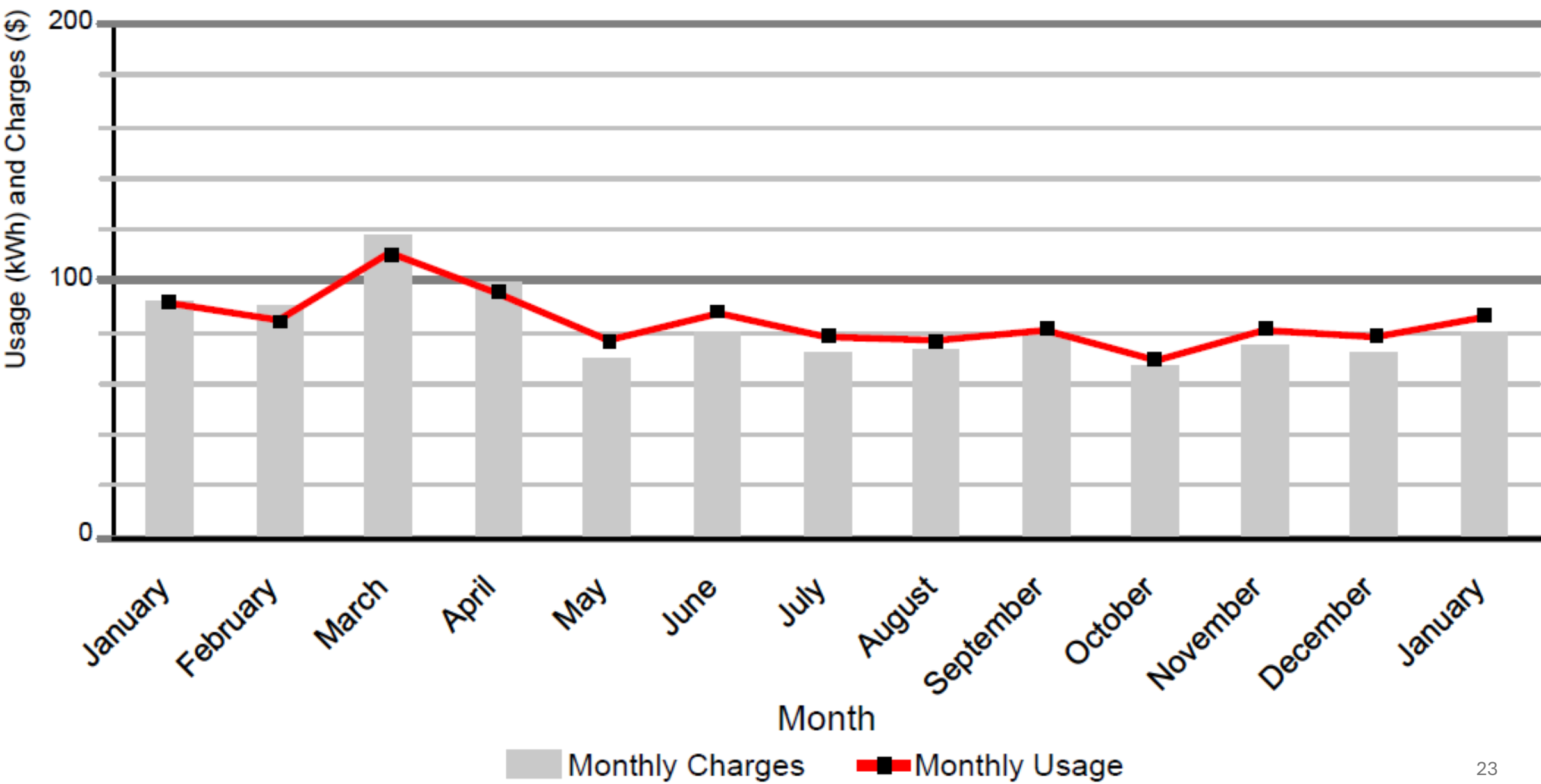
Kalafi- Hisitolia

'Oku faka'asi 'i he kalafi 'o a'u ki he mahina 'e 12 'a e hisitolia ho'o ngaue'aki fakamahina ho'o 'uhila fakataha mo hono ngaahi totongi.

Ko ho'o mo'ua 'uhila lolotonga/Fakakiiki ho'o ngaue'aki

'Oku fakakiiki heni 'a e mita ho'o 'uhila, vaha'a taimi 'oku totongi, mo'ua ki mu'a, mo'ua lolotonga, 'iuniti ngaue'aki, totongi ki he 'iuniti 'o e 'uhila 'oku ke ngaue'aki, pea mo ho'o mo'ua fakakatoa ki he mahina.

Monthly Billing and Charges



CURRENT MONTH POWER CHARGES USAGE DETAILS

Route: 1310/42

Item / Fakaikiiki	Meter	Invoice Period / Taimi 'Inivoisi	Previous Bill Read / Lau Mo'ua ki Mu'a	Current Bill Read / Lau Mo'ua ko eni	Units Used / Uniti na'e ngaue 'aki	\$ Rate / Totongi	\$ Total / Fakakatoa
Energy Usage / 'Uhila na'e ngaue'aki	316187743	05/12/24 - 31/12/24	12329 kWh	12408 kWh	79.14 kWh	\$0.9169	\$72.56
Energy Usage / 'Uhila na'e ngaue'aki	316187743	01/01/25 - 02/01/25	12408 kWh	12414 kWh	5.86 kWh	\$0.8947	\$5.24

Total for site this month: **\$77.80**

Difference: $79.41\text{kWh} \times \$0.9169 = \72.56

**image of smart meter to be put here.

1. Cooling Appliances

- Refrigerator -200 Watt



- Freezer 400 W



- AC unit 1kW (1000W)



2. Heating Appliances



Microwave 800W



Kettle 1,500W



Toaster 1000W



iron 1000W

Washing Machine 450W



Sewing Machine 80W



Laptop-Computer 60W



Phone Charger 7W



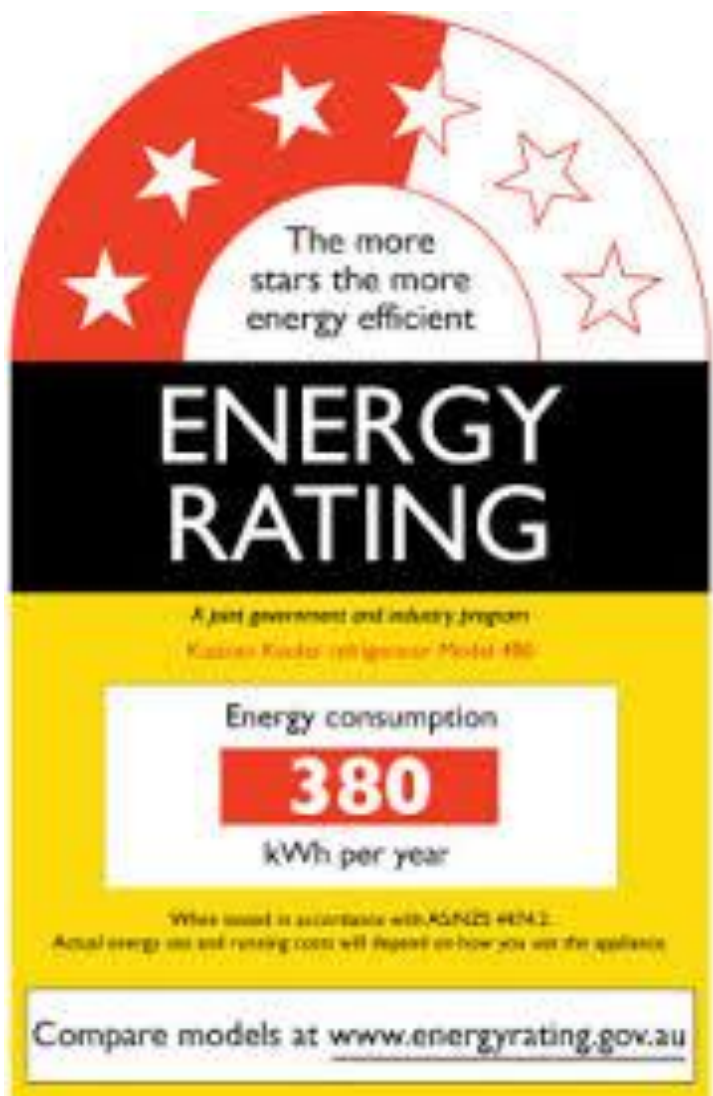
Hair Clippers-100W



Floodlights-100W



Minimum Energy Performance Standards & Labelling [MEPSL] program



The more stars the more energy efficient

ENERGY RATING

A joint government and industry program
Kaitiaki Takekiriwhiriwhiri Mōhiohihi

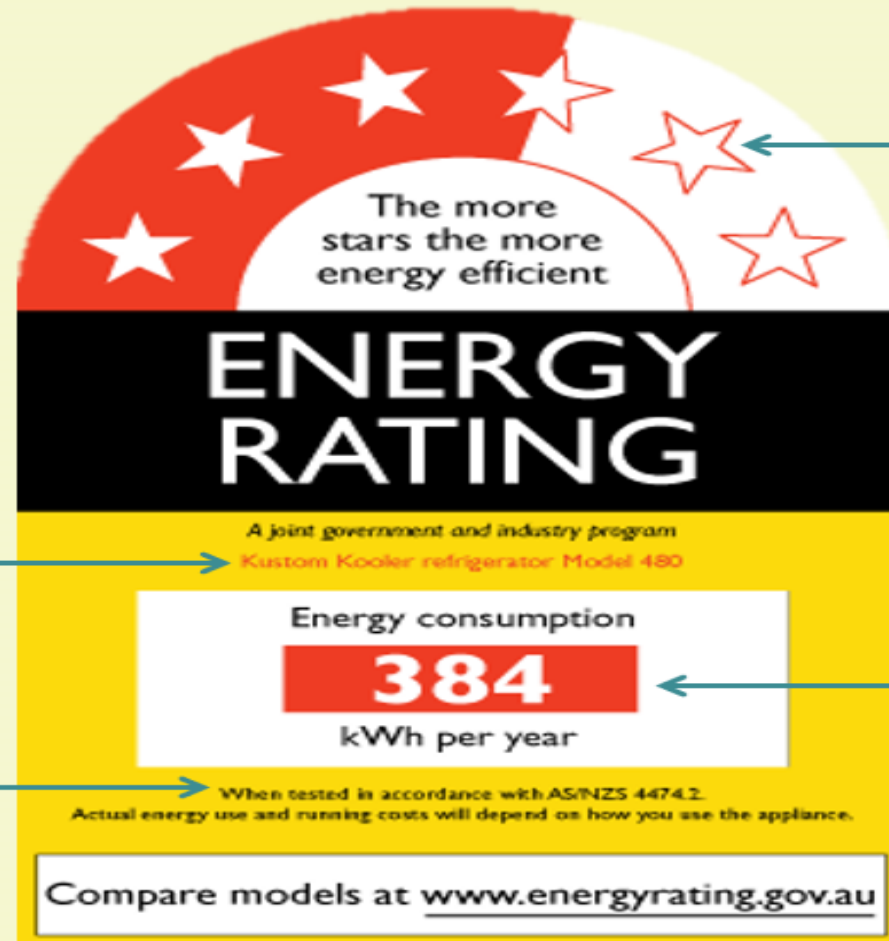
Energy consumption
380
kWh per year

When used in accordance with AS/NZS 4572.
Actual energy use and running costs will depend on how you use the appliance.

Compare models at www.energyrating.gov.au



Identifying Energy Rating Labels



Stars shows the efficiency of the appliance

Brand and the specific Model Number

Must state the AS/NZS 4474.2 Test Standards

States the energy consumption rate in kWh per year

THE ENERGY RATING LABEL

Calculating Cost to Run [Compare the labels on two similar sized fridges]:

- Annual Cost to Run = Energy Consumption (kWh) x Electricity Tariff (TOP/kWh)
- **Example** – Kapau fie fakatau ha’o ‘aisi fo’ou ‘I Tonga, pea ko e totongi ‘o e ‘uhila ki he ‘iuniti (kWh) ko e TOP\$1.10

	'Aisi 1	'Aisi 2
Lahi e fetu'u he Leipolo	Fetu'u e 3 	Fetu'u e 6 
Lahi 'o e fakamole ki he 'aisi takitaha	542 kWh x \$1.10 = \$596 .20 ki he ta'u	318 kWh X \$1.10 = \$349. 80 ki he ta'u

Malo 'aupito.....