Joint Mission for Business Skills, Productive Use of Energy (PUE), Technical Refresher Training in Niuafo'ou

4-9 June 2025

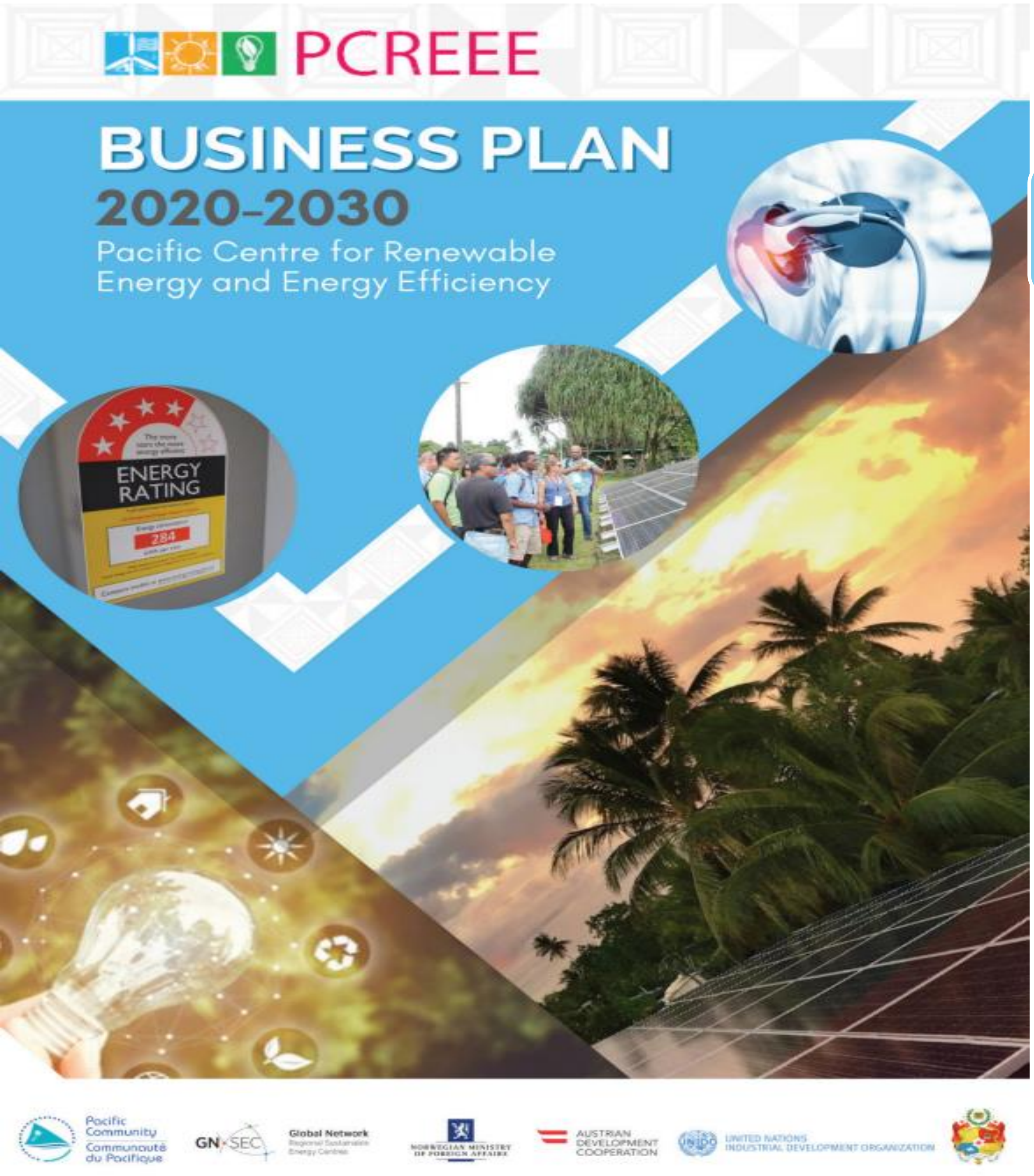
Presentation Outline

Pacific Centre for Renewable Energy and Energy Efficiency

1. PCREEE – roles and experiences
2. Baseline Business info at the islands.
3. TREP and it’s mini-grids systems /components.
4. Potential income generation opportunities.
5. Starting a Businesses.
6. Access funding – startup a business.
7. Basics Financial Management.
8. Electricity Cost and Savings.
9. Energy Efficiency – Minimum Energy Performance Standards & Labelling (MEPSL).

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

- Established in 2017 (office based in Tonga)
- Going years 9 years now
- UNIDO, Austria, Norway & NZ funding support



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. Capacity Buildings Program
2. Energy Policy Development – (incl. guidelines /standards)
3. Small subsidy – starting a new businesses related to energy
4. Energy Forum, Awareness
5. Development/review of Concept Note and Project Proposal.

Highlight of Experiences

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

a) Supported the Development AND Delivery of National Qualifications in Sustainable Energy

- NSCE Level 1 & 2 successfully started on the 12 September 2022 with 20 students (71% female, 29% male) registered under Level 1 and 30 students for Level 2 (21% female, 79% male).

- Certificate Level 3 successfully registered in Tonga 2023.
- Next step is for TIST to seek accreditation from TNQAP to deliver these registered Level 3 courses
- Development of SE National Certificates Level 4 is underway.
- Hopes to extend the qualifications to Diploma level in the future.

b. Support the Productive Use of Energy [20 – 30%]

At the Solomon Islands:

- One rural community reached out to PCREEE for funding assistance to purchase solar freezer systems that could be used to store their catches /fish for sale at the markets in Honiara.
- PCREEE provided subsidy ~ 30% of the total cost.

c. Internship Opportunities

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 14 th 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

- Supported the development of Regional E-mobility Policy – started rolling out in 2021.
- Supported the development of EV standards and guidelines in [ADB-funded project and managed by PRIF)
- Supported the demonstration of EV technologies and business services.
- Hosted national/regional workshop to share experiences on EVs

Highlight of Experiences (continue)

Programme 3. RE Mini-Grids

- Supported with capacity programs and trainings on mini-grids maintenance and operation.
- Supported the development of standards and guideline for Minigrids
- Conducted Feasibility Study and National Mini-Grid awareness, information and promotion campaign.

Highlight of Experiences

Programme 4. Energy Efficiency Investment

- Supported the Pacific Island Countries with operationalizing the Energy Efficiency Legislations – such as the Minimum Energy Performance Standards and Labelling regulation.
- Supported the national energy forum /events

Pacific Centre for Renewable Energy and Energy Efficiency

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

PCREEE
Pacific Centre for Renewable Energy and Energy Efficiency

Islands	Population		
	Female	Male	**Total**
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 /3.8MW
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’u
   - Solar PV – BESS microgrid, medium /low voltage distribution system Niuafo’ou.
5. TREP 12 – Solar PV – BESS micro-grid, including low voltage distrib 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

Transition….

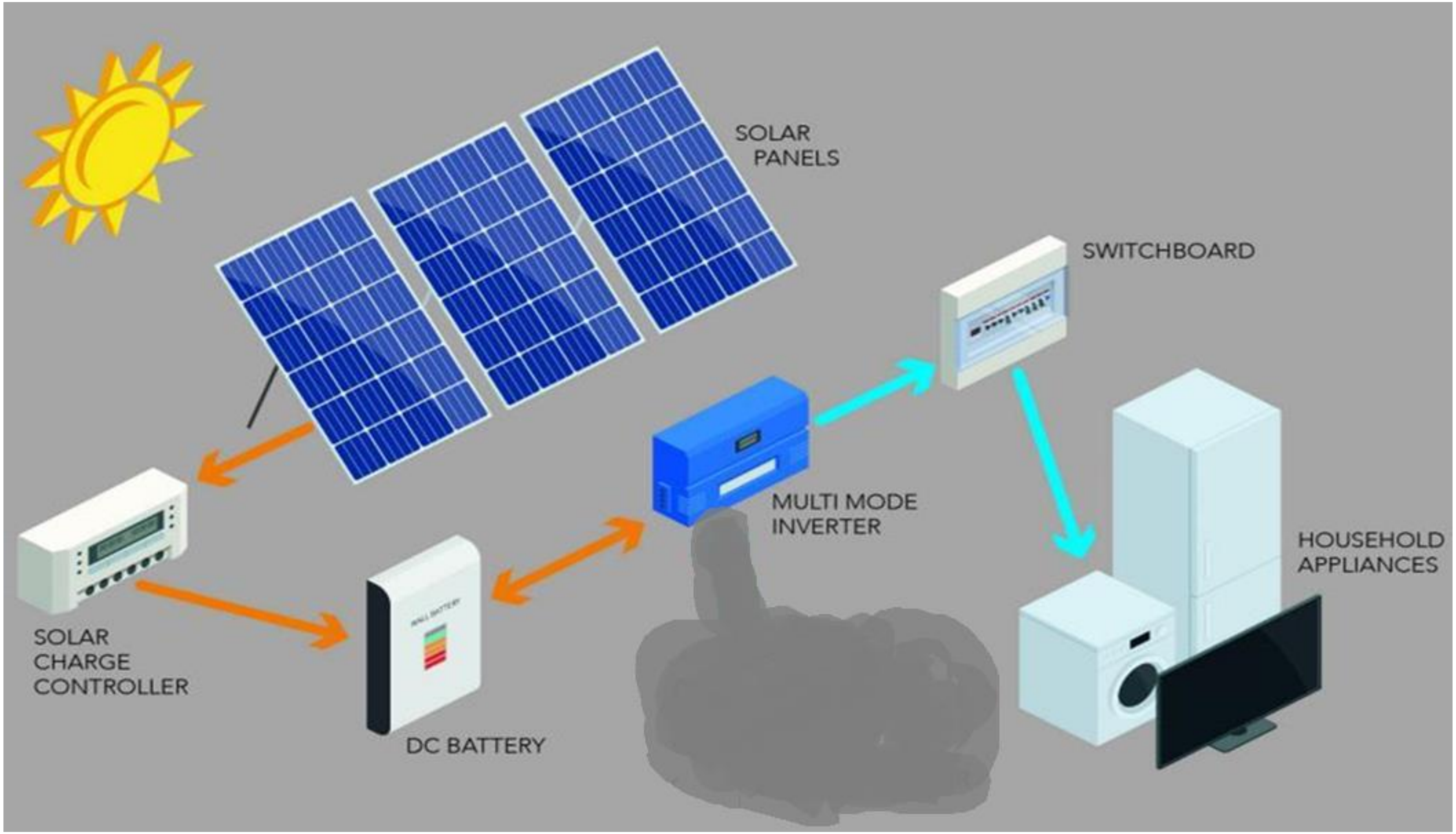
Solar Minigrids Systems

- Small-scale, standalone systems designed to power individual households.
- Typically range from 20 – 500Watts of capacity.
- Designed for basic energy needs, such as lighting, phone charging and low-power appliances

- Medium-large scale systems designed to supply electricity or even small islands/communities.
- Capacity range from a few kW to 100+ kW
- Can support higher energy demands – washing machine, refrigerators, freezers and heating appliances etc.

Simple schematic of a solar mini-grids system

PCREEE
Pacific Centre for Renewable Energy and Energy Efficiency



https://soltaro.com/faqs-frequently-asked-questions/dc-coupled-battery-system

4. Potential Income Opportunities

Barber shot – kosi'ulu totongi

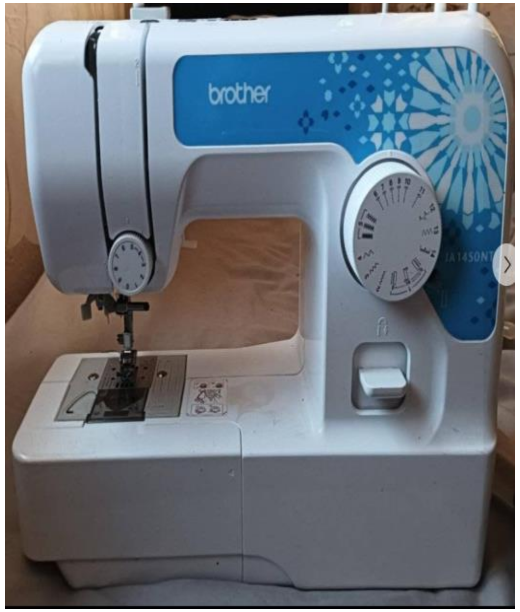
Retail shop - falekoloa

DJ -hire

Misini fakapa-tutu

Misini tuki kava

Restaurant - falekai



Tailoring – tuitui totongi

Laundry – foo totongi

Productive Use of Energy refers to the use of energy—typically electricity—to support income-generating activities and improve productivity in various sectors, such as agriculture, small-scale industry, and services

The **ultimate goal** is to enhance economic development, improve livelihoods, and reduce poverty by leveraging energy access.

5. Starting a Business

1. Develop a Business Idea

- Identify what you want to sell or the services you want to provide.
- Research the market to ensure there is demand for your product/service.
- Consider how electricity (e.g. AC power from minigrids) can help your business

2. Create Simple Business Plan

- Describe your business – what will you do or sell
- Identify your target customers
- Estimate Cost and Revenue – what will it cost to run a business, and how much money will you make
- Set Goals – what you want to achieve (short /long term)

3. Register your Business

- Describe your business – what will you do or sell
- Identify your target customers
- Estimate Cost and Revenue – what will it cost to run a business, and how much money will you make
- Set Goals – what you want to achieve (short /long term)

4. Open your Bank Account

- Open a Business Bank Account to keep your personal and business money separately.
- This will help you manage your cash flow and building credibility.

6. Access Funding – to start-up a business

Pacific Centre for Renewable Energy and Energy Efficiency

1. Personal Saving

2. Bank Loan

e.g. BSP, ANZ, MBF or TDB

3. Micro-finance Loan

e.g. SPPD

4. Gov Grants/Subsidy Program

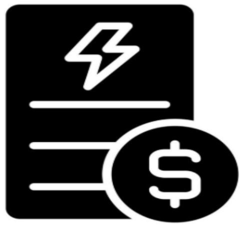
e.g. PCREEE 20-30% subsidy

7. Basics Financial Management

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

Cash in-flow

Cash out-flow



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…………

PCREEE
Pacific Centre for Renewable Energy and Energy Efficiency

2. Budgeting– Planning how much money you expect to earn(income) and how much you will spend (expenses)

Category	Estimated Monthly Amount
Income	
Barber services (haricuts,shaves etc)	4,320
Total Income	**+4,320**
Fixed Expenses	
Wages for employees	1,000
Loan	600
Total Fixed Expenses	**-1,600**
Variable Expenses	
Barber tools & equipment (razors, clippers etc)	500
Utilities (electricity & water)	200
Supplies (shampoo, hair gels etc.)	220
Total Variable Expenses	**-920**
Savings – Emergency	**-500**
Remaining Profit	**$ 1,300**

For example: Running a barber shop [fale kosi ‘ulu)

Assumption:

- Operating Monday – Sat every week or 6 days/week, 24 days per month
- $15 /customer hair cut
- Avg of 2 customers/day

What is Fix expenses/cost: are costs that remain constant or predictable over time. These expenses are not affected by the number of Customers or sales in the business.
Examples: rent, loan payments, salaries/wages etc.

What is Variable expenses/cost: are expenses that change in direct proportion to the level of business activity or production. These costs fluctuate depending on factors such as # of customers, sales volumes or production output.
Examples: utilities (electricity and water), maintenance and repairs, supplies and materials etc.

7. cont………….

PCREEE
Pacific Centre for Renewable Energy and Energy Efficiency

3. Record Keeping– involves collecting, organizing, storing and maintaining information related to a business's financial and operational activities

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

PCREEE
Pacific Centre for Renewable Energy and Energy Efficiency

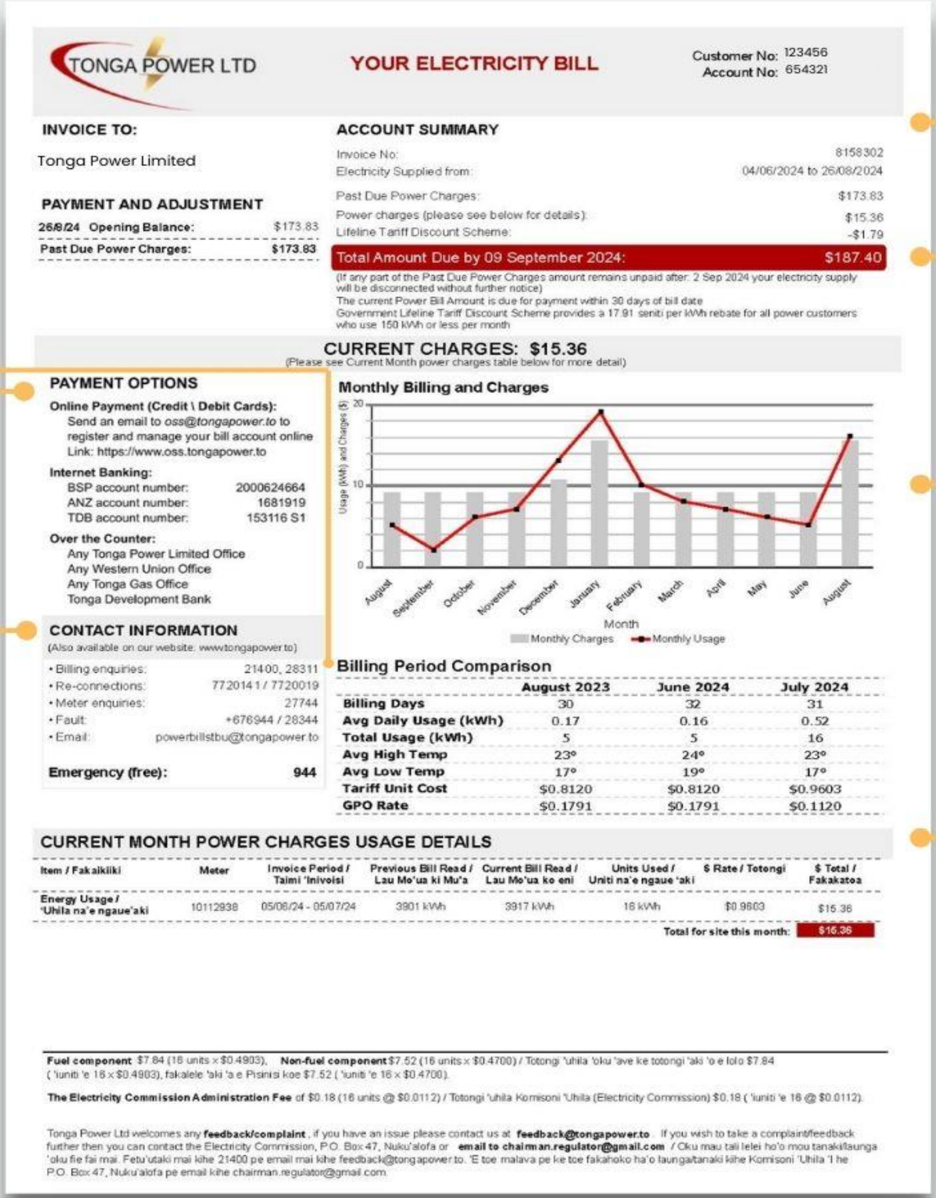
Fakafehoanaki ʻa e ngaahi moʻua ʻuhila

Ko ha tepile foʻou ʻoku ne fakafehoanaki ʻa e moʻua ʻuhila lolotonga moe ngaahi moʻua ki muʻa:

- ʻAvalisi e maʻolunga moe maʻulalo e mafana ʻo e ʻea- Fakamatala ʻea fakatatau ki he feituʻu ʻokuke ʻiai.
- Ngaahi ʻaho tohi moʻua- Koe lahi e ngaahi ʻaho ʻoku lau ai hoʻo moʻua ʻuhila.
- ʻAvalisi e ngaueʻaki faka ʻaho (kWh) - Ko e ʻavalisi hoʻo ngaueʻaki fakaʻaho hoʻo ʻuhila ʻi he kilowatt-houa.
- kWh fakakatoa ʻoku ngaueʻaki - Fakakatoa ʻo e ʻuhila ʻoku ke ngaueʻaki ʻi he kilowatt-houa.
- Iuniti totongi ʻuhila & Tokoni ʻa e Puleʻanga -Koe totongi ʻuhila ʻi he kilowatt fakatatau ki he totongi kuo fakaʻata meihe Komisoni ʻUhiila. ʻOku ʻasi foki heni moe tokoni ʻa e Puleʻanga

Ngaahi founga totongi & ngaahi founga fetu'utaki

- Ngaahi founga totogi ke fili mei ai- ʻOku fakafaingofuaʻi hono totongi hoʻo ʻuhila ʻaki hono ʻoatu ha ngaahi founga totongi ʻuhila keke fili mei ai hange koe totongi ngaueʻaki ʻa e initaneti, ngaueʻaki ʻa e Pangike fakafou ʻi he initaneti pe koe ngaahi feituʻu ke totongi ʻi he kanita. (Totongi ʻi he initaneti ʻoku ngaueʻaki pe ki he kau kasitoma ʻa Tongatapu teʻeki aʻu ki motu.)
- Founga Fetuʻutaki - Fetuʻutaki mo kimautolu fakafou heʻemau uepisaiti, telefoni pe imeili.Fetuʻutaki ki heʻemau fika ki he fiemaʻu fakavavevave, ʻaia ku taʻe totongi, pea ʻoku fakaʻilongaʻi makehe atu.



TONGA POWER LTD — YOUR ELECTRICITY BILL

Customer No: 123456
Account No: 654321

INVOICE TO:

Tonga Power Limited

PAYMENT AND ADJUSTMENT

26/8/24 Opening Balance:	$173.83
Past Due Power Charges:	$173.83

ACCOUNT SUMMARY

Invoice No:	8158302
Electricity Supplied from:	04/06/2024 to 26/08/2024
Past Due Power Charges:	$173.83
Power charges (please see below for details):	$15.36
Lifeline 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 Lifeline Tariff Discount Scheme provides a 17.91 seniti 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

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

Monthly Billing and Charges

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 / 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	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 lolo $7.84 ('iuniti 'e 16 x $0.4903), fakalele 'aki 'a e Pisinisi koe $7.52 ('iuniti 'e 16 x $0.4700).

The Electricity Commission Administration Fee of $0.18 (16 units @ $0.0112) / Totongi 'uhila Komisoni 'Uhila (Electricity Commission) $0.18 ('iuniti 'e 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** / Oku mau tali lelei ho'o mou tanaki/launga 'oku fie fai mai. Fetu'utaki mai kihe 21400 pe email mai kihe feedback@tongapower.to. 'E toe malava pe ke toe fakahoko ha'o launga/tanaki kihe Komisoni 'Uhila 'I he P.O. Box 47, Nuku'alofa pe email kihe chairman.regulator@gmail.com

TONGAN VERSION

Fakamatala ʻo e ʼAkauni

ʼOku ʻi heni kotoa ʻa e fakaikiiki ki he ngaahi fakamatala mahuʻinga fekauʻaki mo hoʻo moʻua ʻuhila.

Moʻua fakakatoa ke totongi

ʼOku tohi lanu hinehina hoʻo moʻua fakakatoa ke totongi ʻi he pa lanu kulokula, ke ha makehe mo ʻilonga lelei ange. ʼI lalo ai, ʼoku ha ai ʻa e ʻaho fakaʻosi ke totongi hoʻo toenga moʻua ʻuhila, ki muʻa pea tuʻusi atu.

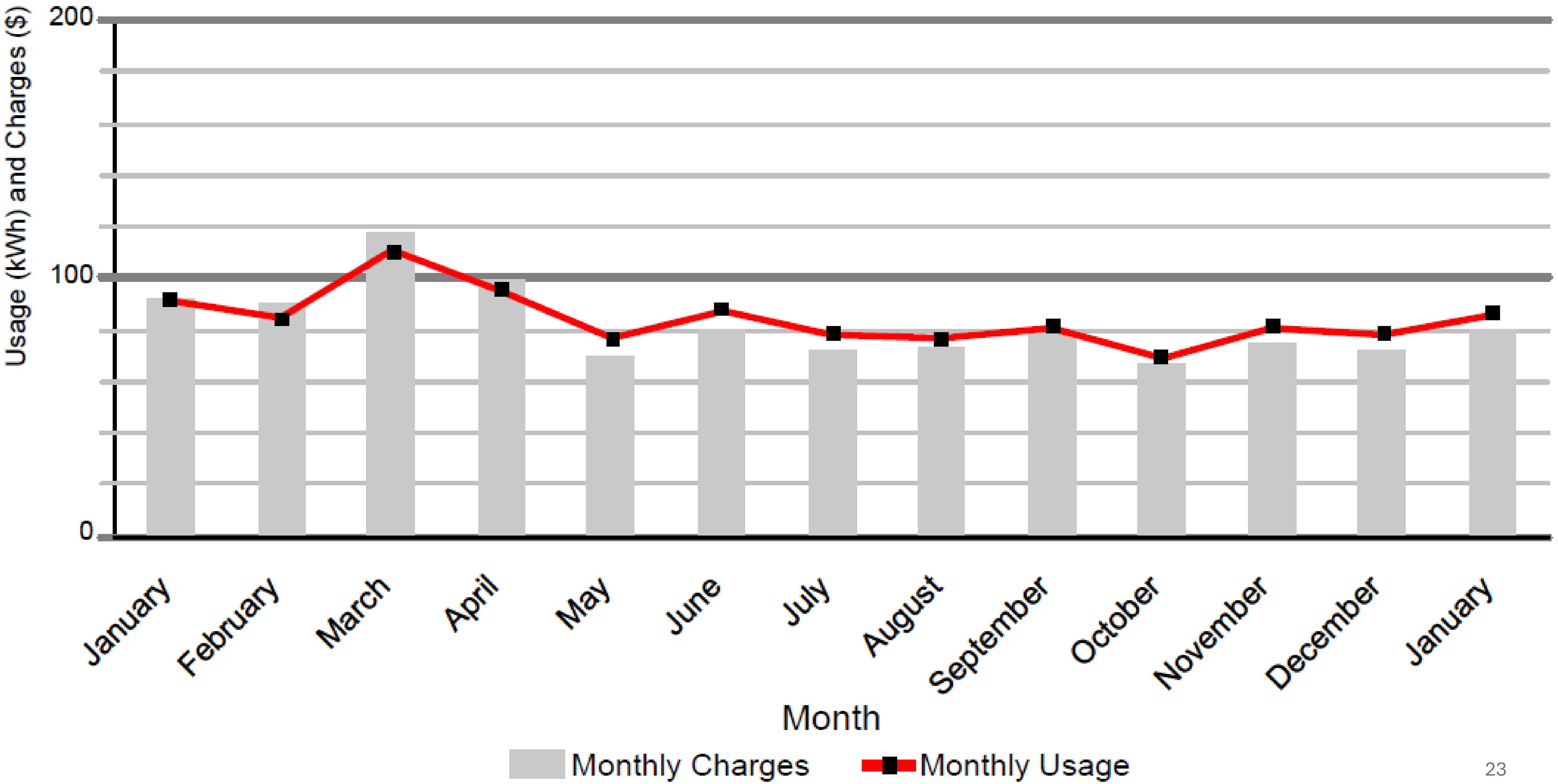
Kalafi- Hisitolia

ʼOku fakaʻasi ʻi he kalafi ʻo aʻu ki he mahina ʻe 12 ʻa e hisitolia hoʻo ngaueʻaki fakamahina hoʻo ʻuhila fakataha mo hono ngaahi totongi.

Ko hoʼo moʻua ʻuhila lolotonga/Fakaikiiki hoʻo ngaueʻaki

ʼOku fakaikiiki heni ʻa e mita hoʻo ʻuhila, vahaʻa taimi ʻoku totongi, moʻua ki muʻa, moʻua lolotonga, ʻiuniti ngaueʻaki, totongi ki he ʻiuniti ʻo e ʻuhila ʻoku ke ngaueʻaki, pea mo hoʻo moʻua fakakatoa ki he mahina.

Monthly Billing and Charges



PCREEE
Pacific Centre for Renewable Energy and Energy Efficiency

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: 79.41kWh X $0.9169 = $72.56

**image of smart meter to be put here.

PCREEE
Pacific Centre for Renewable Energy and Energy Efficiency

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

PCREEE
Pacific Centre for Renewable Energy and Energy Efficiency

Washing Machine 450W

Sewing Machine 80W

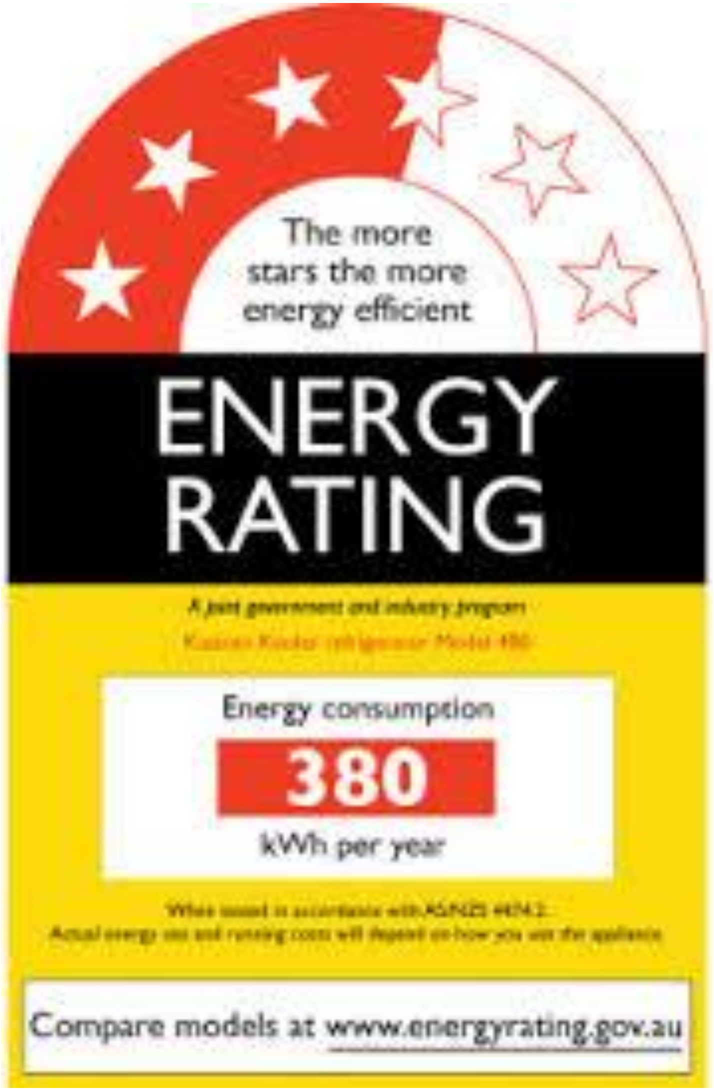
Laptop-Computer 60W

Phone Charger 7W

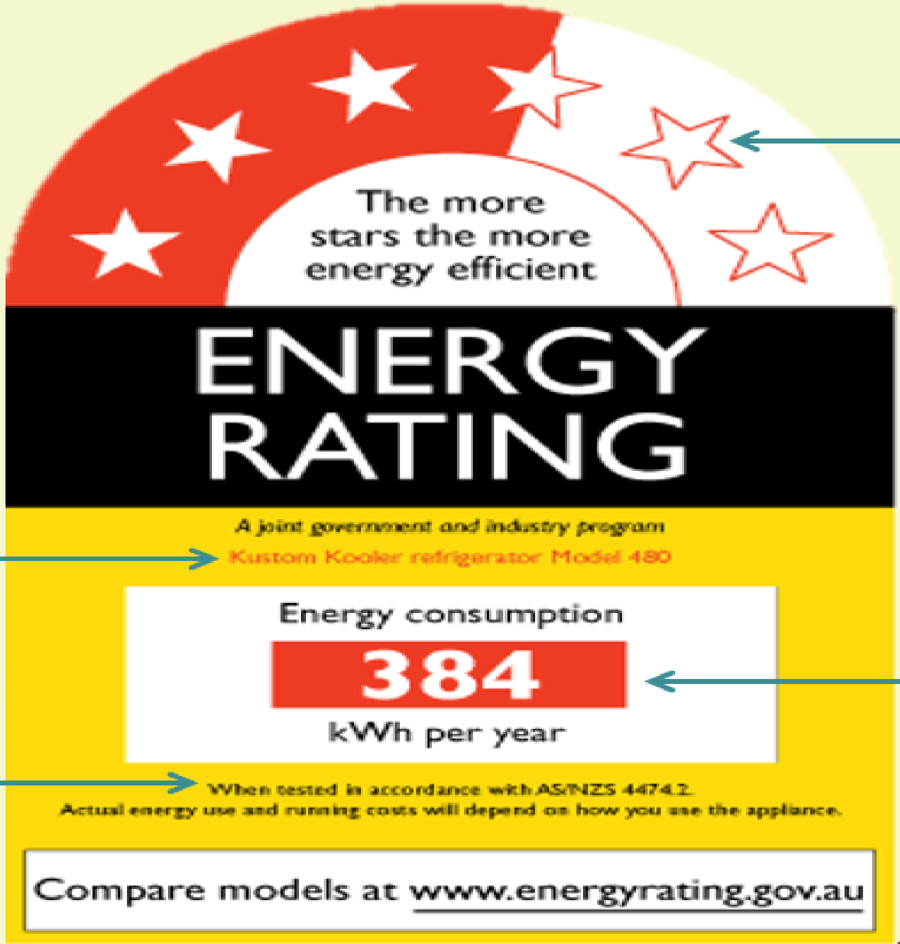
Hair Clippers-100W

Floodlights-100W

Minimum Energy Performance Standards & Labelling [MEPSL] program



Identifying Energy Rating Labels



Stars shows the efficiency of the appliance

Brand and the specific Model Number

States the energy consumption rate in kWh per year

Must state the AS/NZS 4474.2 Test Standards

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**

Pacific Centre for Renewable Energy and Energy Efficiency

Malo ‘aupito……………………