

TONGA ENERGY ROADMAP OFF-GRID ELECTRIFICATION PROJECTS UPDATE

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Department of Energy
Ministry of MEIDECC

2010 KEY TERM OBJECTIVE AND FOCUS – OFFGRID

– To provide Off-Grid communities⁽¹⁾ with access to electricity options from renewable sources that are sustainable and also provide for their varied power needs.

(1) Communities which are not currently supplied with electricity from Tonga Power Ltd.

– To cultivate quality of life and potential to increase economic activity of the outer islands communities that the Tonga Off-Grid Initiative aims.

Strategic National Targets

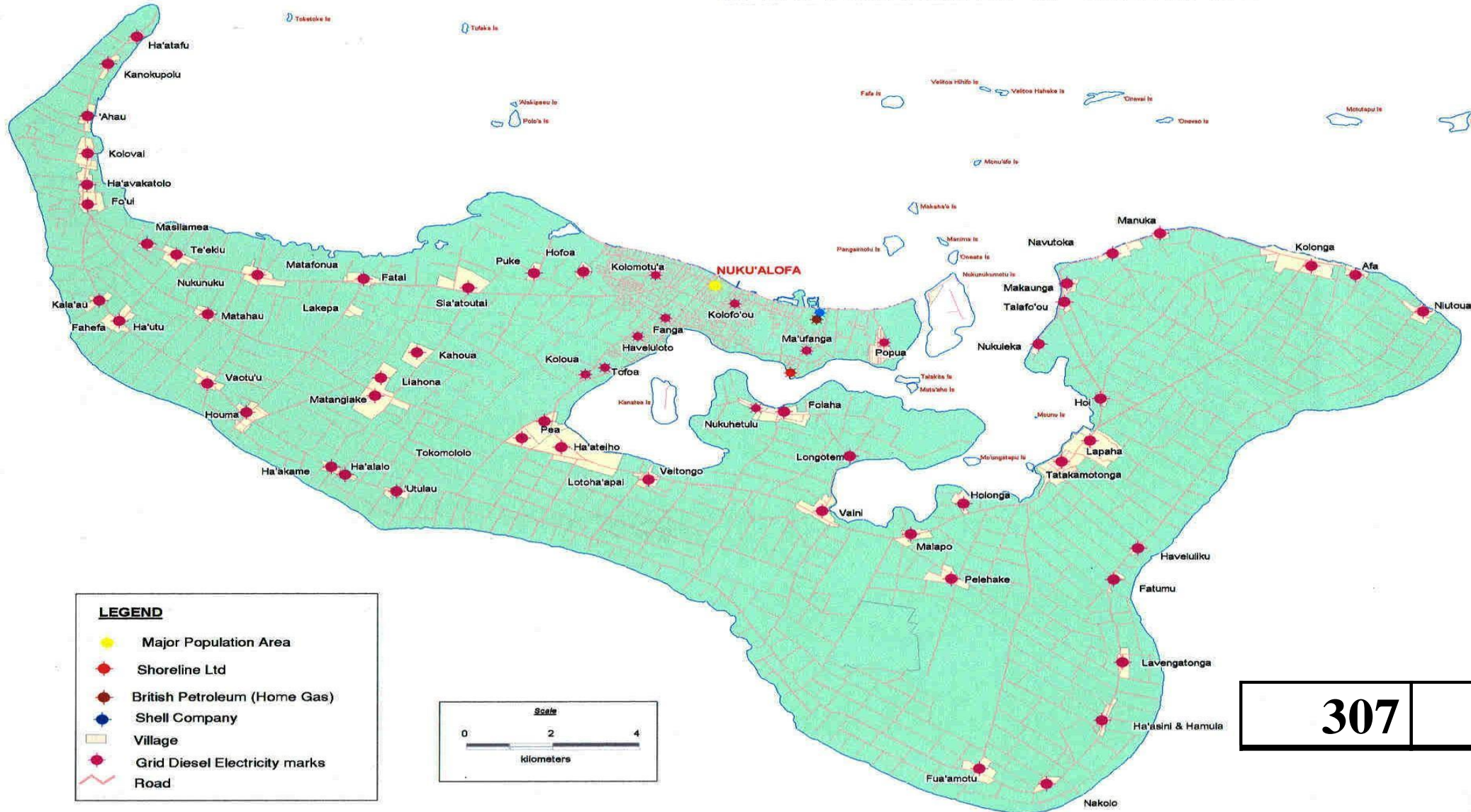
TERM/NDC/JNAP



Development Initiatives	Baseline 2009	TARGET as of Year 2010	BY Year	Current Achievements
1) RE Power Generation	0.2%	50%	2020	Updated
	50%	70%	2030	Updated
	70%	100%	2035	Updated
2) Line Loss Reduction	18%	9%	2020	Updated
3) Electricity Access¹	83%	100%	2020	91%
<i>4) Sector Emissions Anticipated [Power]</i>	<i>0.12%</i>	<i>11%</i>	<i>2020</i>	<i>2.53%</i>
[Transport/Waste/Agr-Forestry]	Not Set	Not Set	Not Set	Not Set
1.				

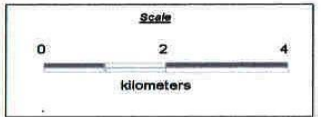
SHS OFF-GRID EVOLUTION

- ▶ 1988 – First SHS (Mango and Taunga Is.)
- ▶ 1993 – LOME Convention (Vava’u Outer Islands)
- ▶ 1995 – NZAid/GoT (Niuafu’ou/’Atataa and Tafahi Islands)
- ▶ 2000 – PREFACE/SPC/France/AusAID (Ha’apai Islands)
- ▶ 2005 – IUCN/Austria/Italy (Ha’apai Islands)
- ▶ 2010 – TERM Initiative



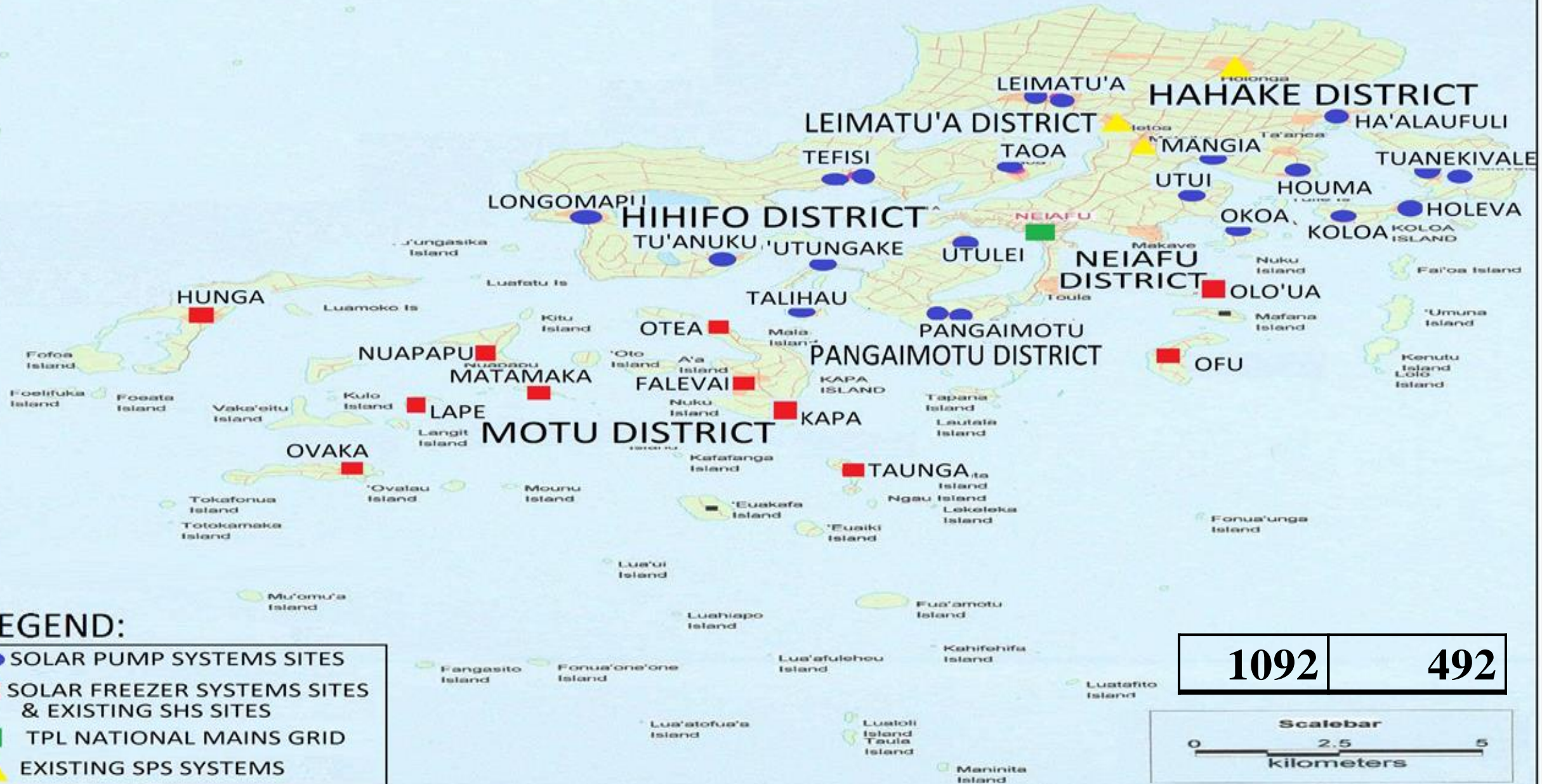
LEGEND

- ★ Major Population Area
- ◆ Shoreline Ltd
- ◆ British Petroleum (Home Gas)
- ◆ Shell Company
- Village
- ◆ Grid Diesel Electricity marks
- Road

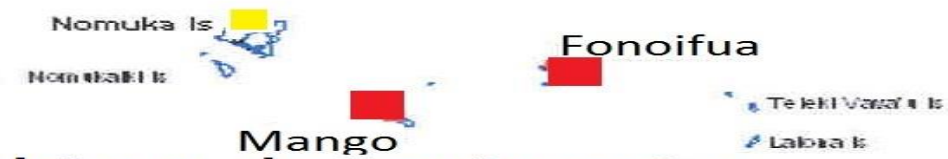
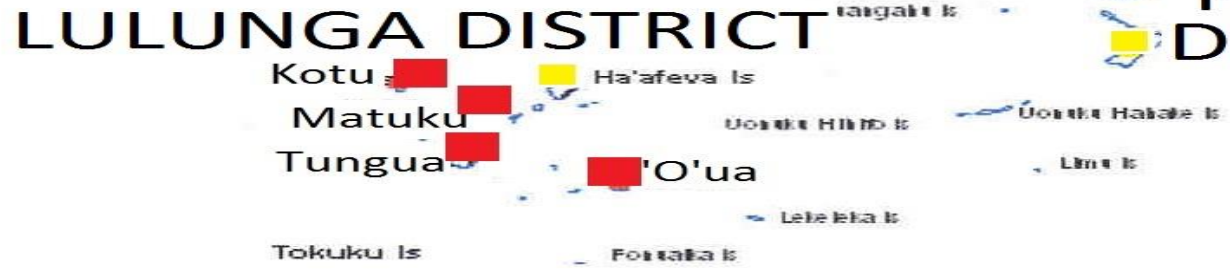


307	58
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VAVA'U GROUP



HA'APAI GROUP



LEGEND

- MICRO-GRID ELECTRIFICATION
- SHS SITES & PROPOSED SFS UNDER PEC
- TPL MAINS ELECTRICITY GRID

3156	649
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Huiga Ha'apai Is
Huiga Toiga Is

Niua Group

NIUAFO'OU DISTRICT



LEGEND

Proposed Migrogrid
GCF/OIREP

SHS Sites

646

128

NIUATOPUTAPU DISTRICT

Tafahi

Falehau
Vaipua
Hihifo

878

254

2009 OFF-GRID KEY IDENTIFIED CHALLENGES

2010	2019
Vast Geographical Locations	Will never be removed – Cost of inter-island transport continues to increase
High Capital Cost of RE Equipment	Slightly decreasing
Dependence on Donor – longer lead time	Improved
Donor strict rules	Removed
Government Duty and Levies	Totally removed
Lacking in technical skills	Improved dramatically – Utility/Private/GoT
Tropical harsh salty conditions	Will never be removed – Technology improved
Lack of public awareness	Improved – Schools, Communities, NGOs, Private Sector
Data Gaps	

Developments Partners' Interventions under TERM



Solar Home Systems – Offgrid	
Donors	Japan, Italy/Austria, Canada
Funds	USD5.42M
Total Capacity	0.31 kWp
Approaches	Bilateral and Regional
GHG Emission Reduction	0.1 Gg CO2 Equivalent
Benefits	Rural Communities socio-economic/livelihood improved, Lower Operation/Maintenance costs & tariff, BUT limited electricity service.
Management	District based Management established under Incorporated Society Act

Developments Partners' Interventions under TERM



Solar Streetlight Systems – Offgrid

Donors	China/Private
Funds	USD3.42M worth of equipment
Total Capacity	230kWp
Approaches	Bilateral
GHG Emission Reduction	0.7Gg CO2 Equivalent
Benefits	Safety at all times; GoT provides maintenance; helps in times of major power blackouts during TCs particularly on main islands.
Management	District based Management established under Incorporated Society Act

Developments Partners' Interventions under TERM



Solar Water Pump Systems – Offgrid

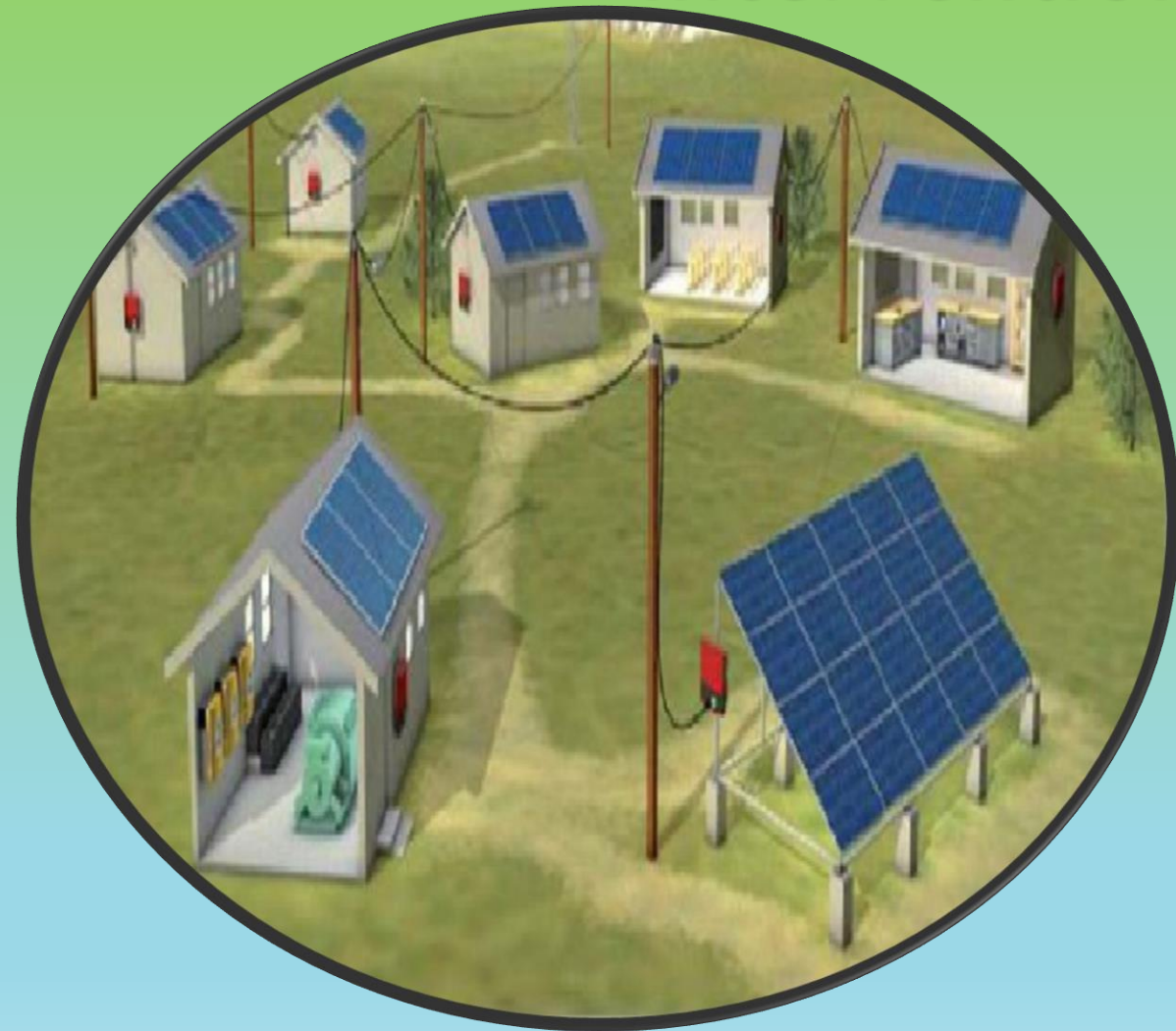
Donors	Japan, Italy/Austria, Canada
Funds	USD3.42M
Total Capacity	1 80kWp
Approaches	Bilateral and Regional
GHG Emission Reduction	1.1Gg CO2 Equivalent
Benefits	Rural Communities Hygienic, Lower Operation/Maintenance costs & tariff, Diesel Based Pumping put off, Water quality improved.
Management	District based Management established under Incorporated Society Act

Developments Partners' Interventions under TERM



Solar Freezer Systems–Offgrid	
Donors	Japan
Funds	USD3.2M
Total Capacity	308kWp
Approaches	Regional
GHG Emission Reduction	2.2Gg CO2 Equivalent
Benefits	Rural Communities Hygienic, Create Business Opportunity for women/youth – Empowerment, Additional income for households.
Management	District based Management established under Incorporated Society Act

Developments Partners' Interventions under TERM



Solar Micro-Grid Systems – Offgrid

Donors	GCF, AusAid, ADB
Funds	USD22.4M
Total Capacity	180kWp
Approaches	Bilateral and Regional
GHG Emission Reduction	1.1Gg CO2 Equivalent
Benefits	Rural Communities Hygienic, Lower Operation/Maintenance costs & tariff, Diesel Based Pumping put off, Water quality improved.
Management	Community based Management Established under Cooperative Society Act

MONTHLY TARRIF PER SYSTEM SET BY MANAGEMENT - TOP

	TOISES Inc	HOISES Inc	VOISES Inc	NIUA Inc
SHS	15	13	13	15
SSS	GoT	GoT	GoT	GoT
SPS	30%	30%	30%	30%
SFS	100	100	100	100
SMS	-	60/2-3/kWh	-	-

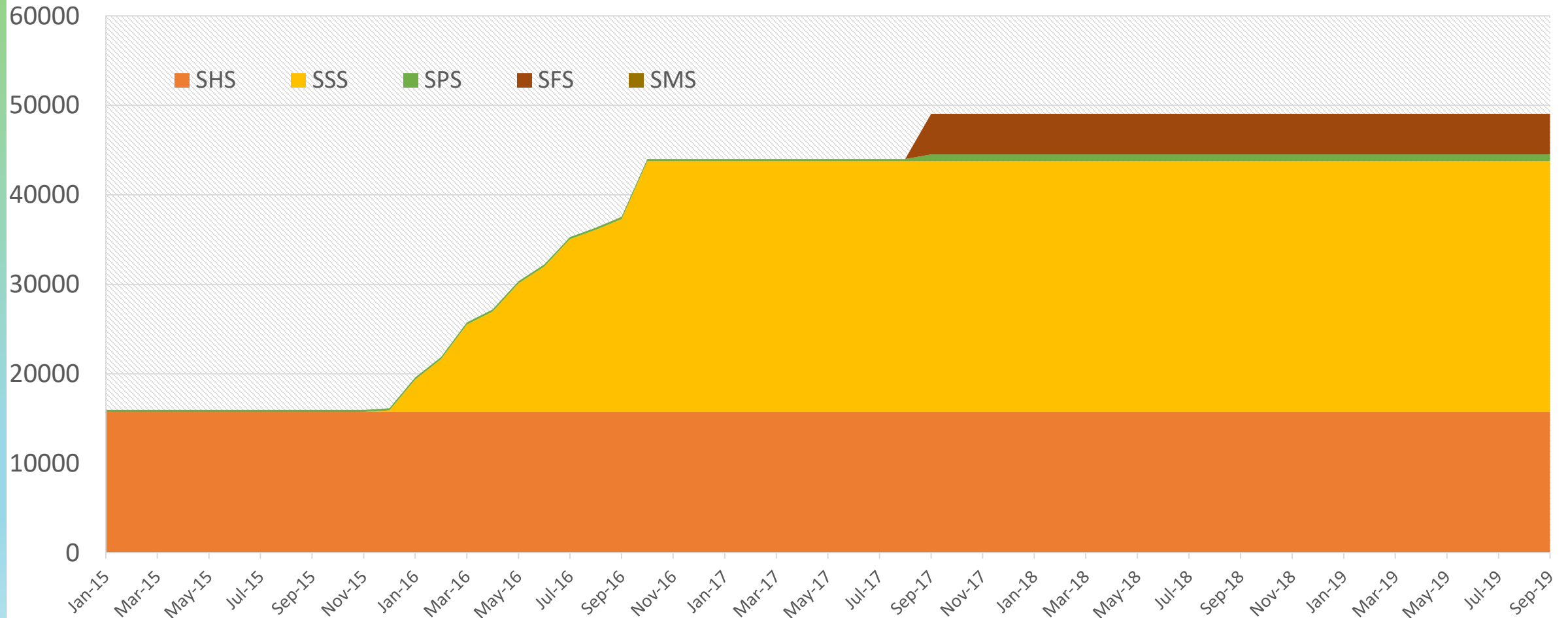
BENEFIT\$



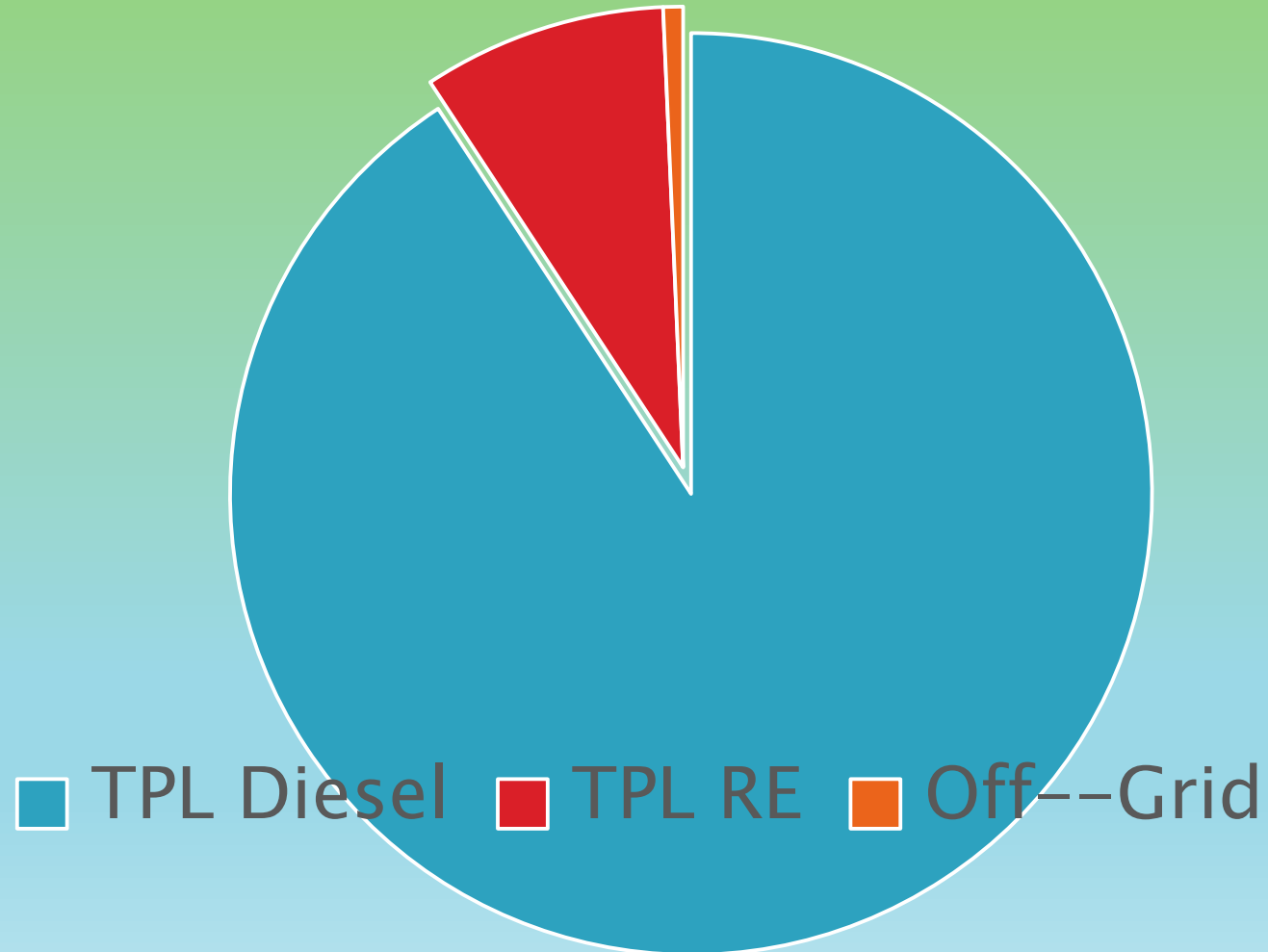
BENEFIT\$



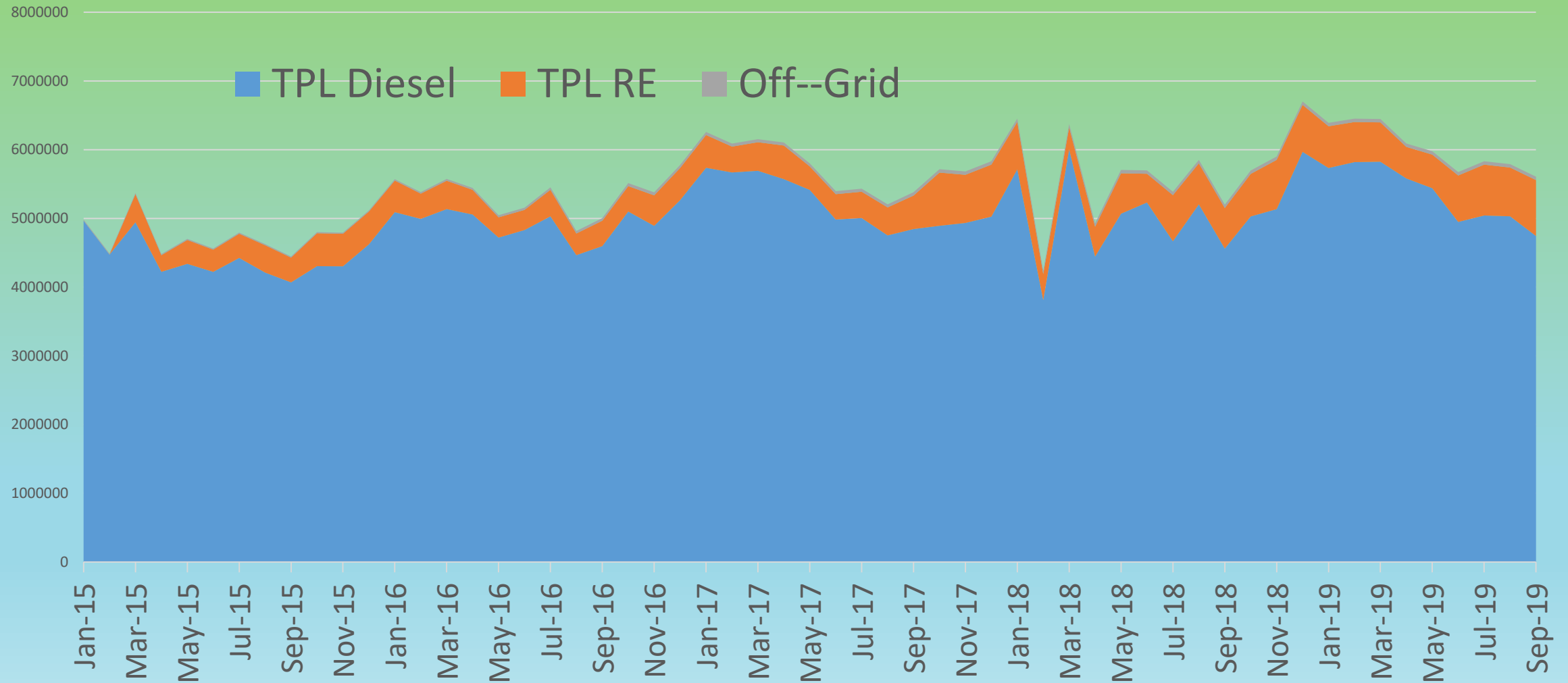
OFF-GRID INITIATIVES ELECTRICITY USED - calculated kWh



AVERAGE MONTHLY GENERATION 2015–2019



MONTHLY GENERATION kWh



FOUR KEY LESSONS LEARNT

- ▶ That service quality is priority: reliable hardware, a responsible organization, sound finance for operation, maintenance and spares, and appropriate knowledge.
- ▶ That the design must fit needs: One size does not fit all.
- ▶ That the solution must be attractive: Users, energy has to open better life opportunities and allow for possible economic activity.
- ▶ That the institutional framework must function: The current institutional framework governing energy in Tonga must be upgraded to cope with development in the sector.

Environmental Precaution Measures



RECOMMENDATIONS

- ▶ THAT AWARENESS AND REFRESHER TRAINING FOR USERS AND OPERATORS ARE NEEDED DUE TO CHANGES IN TECHNOLOGY
- ▶ GoT/DONORS TO CONTINUE PROVIDING ADVISORY ROLES TO COMMUNITY MANAGEMENT SETUPS
- ▶ COMMUNITY MANAGEMENT SETUPS MUST ALSO ASSIST GoT ON BEARING COSTS OF OPERATION AND MAINTENANCE



THANK YOU