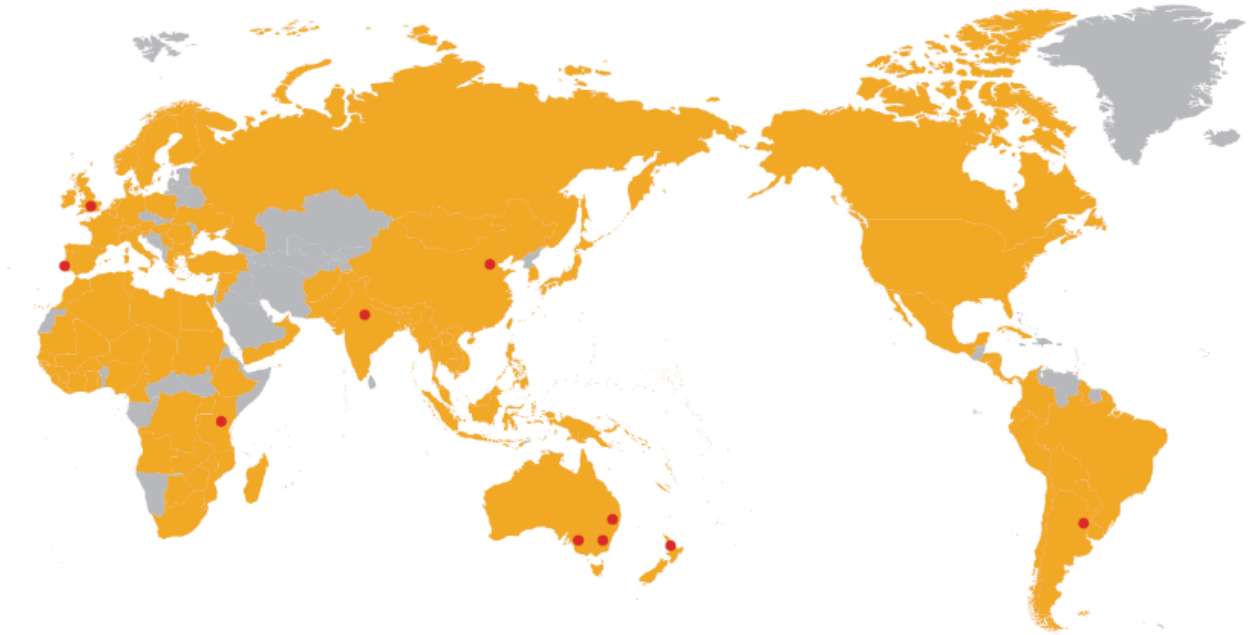
Targets, Planning and Roadmaps for Variable Renewable Energy Upscaling

Challenges & Issues

About ITP

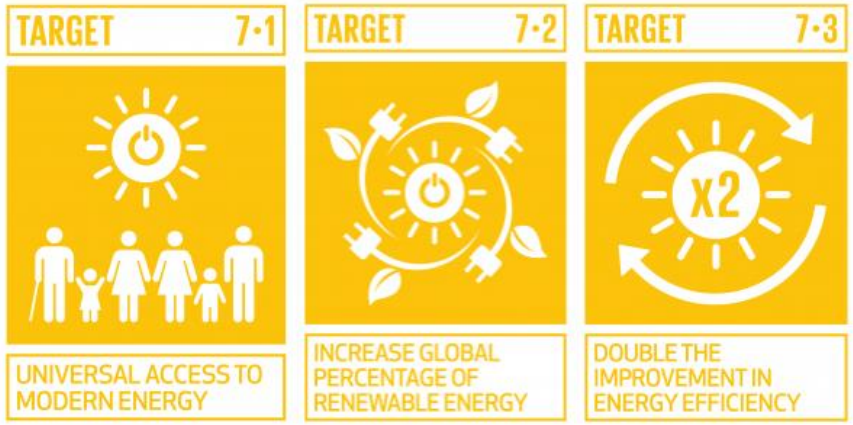
- Specialist renewable energy consulting firm
- Over 35 years international experience and 1,500 projects
- Founded in the UK in 1981
- Major regional offices in UK, India, China and Australia
- Part of the ITPEnergised Group








Global Context: SDG7 in 2018



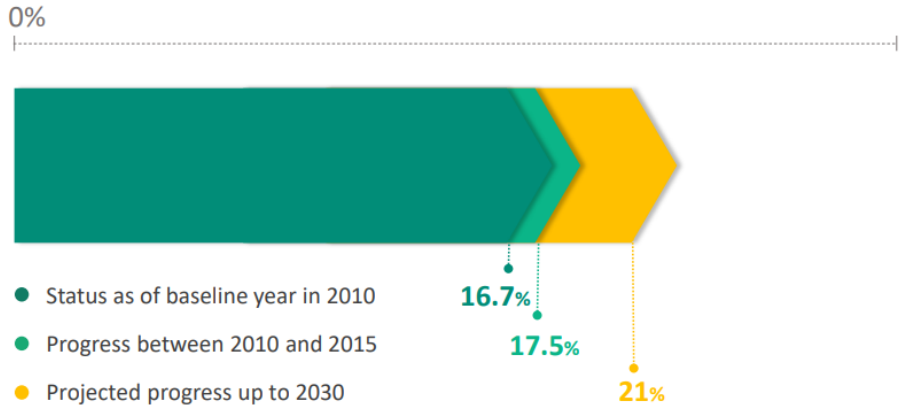
SDG 7.1.1 Electrification

Percentage of population with access to electricity

Source: World Bank

SDG 7.2 Renewable Energy

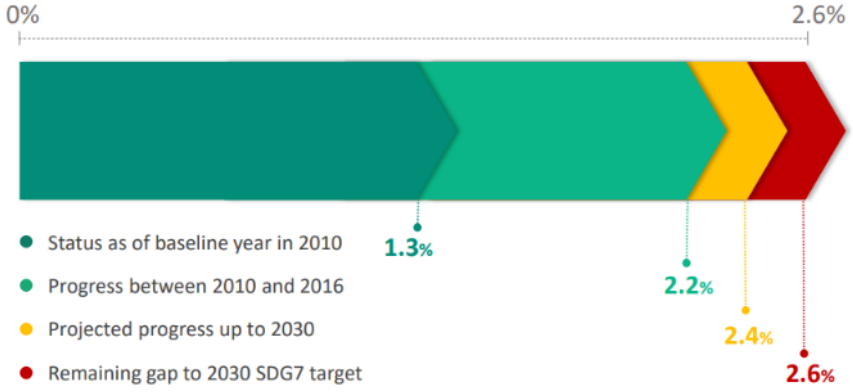
Percentage of renewable energy in total final energy consumption



Source: IEA & UNSD

SDG 7.3 Energy Efficiency

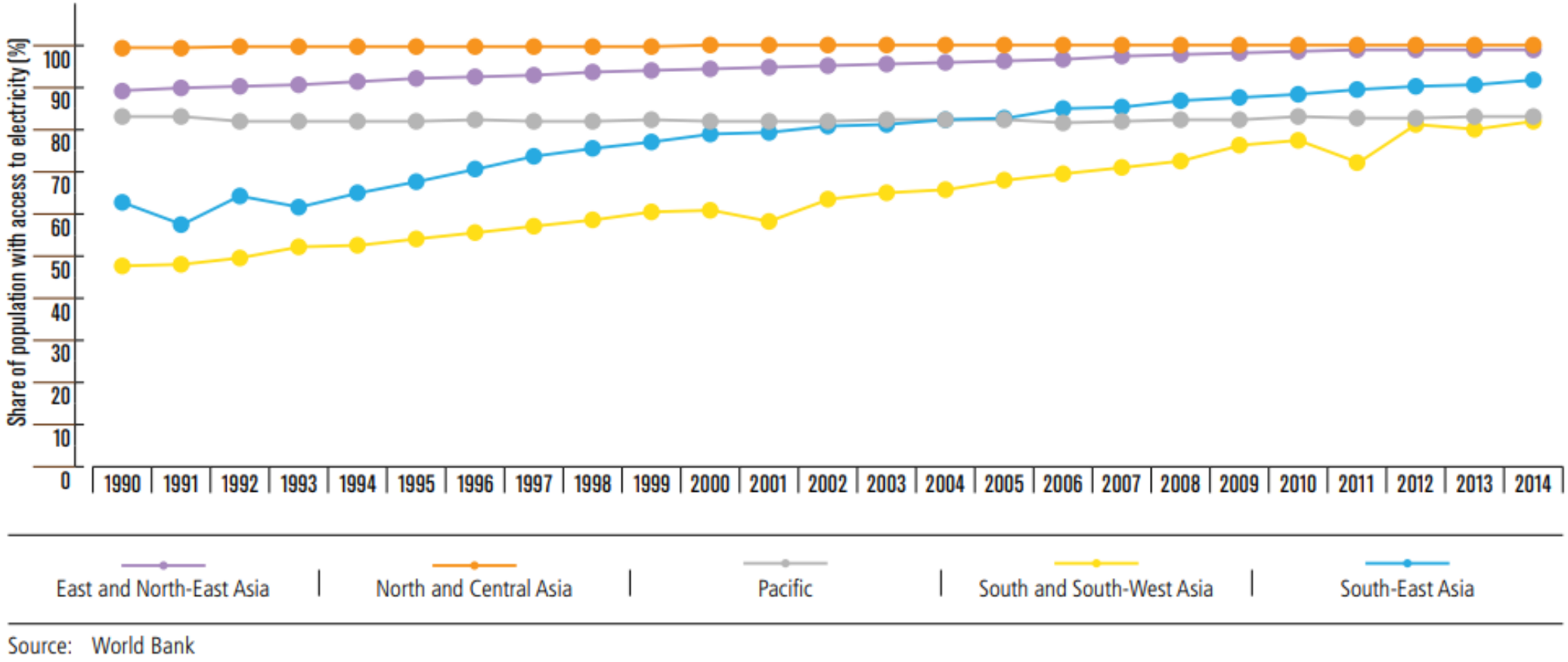
Compound annual growth rate of improvement in energy intensity



Source: IEA & UNSD

Electricity Access – a sticking point

Figure 2.3 Access to electricity grew steeply across much of Asia and the Pacific, but the trend is flat in the Pacific subregion

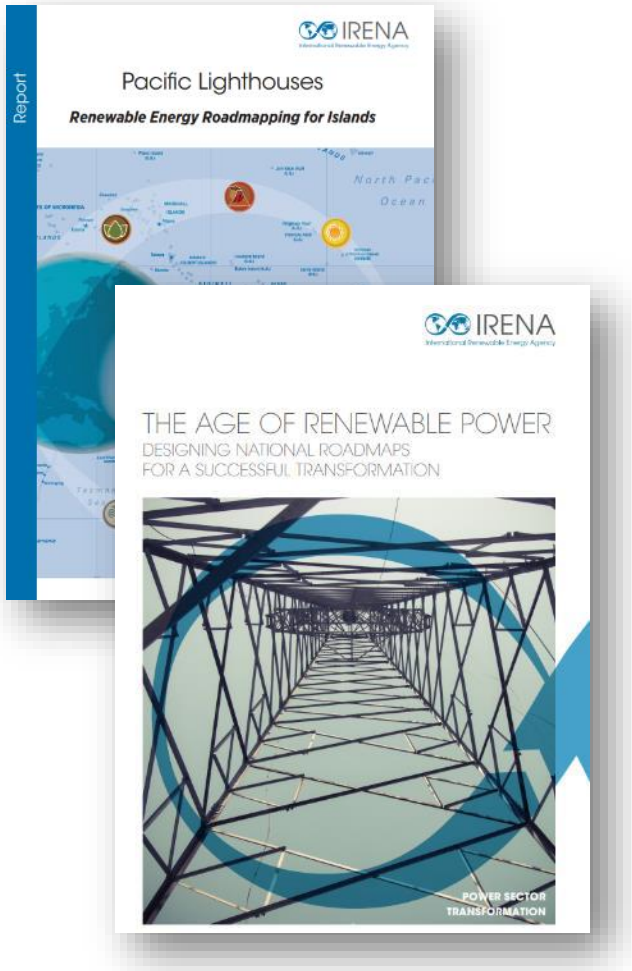


Source: World Bank

Pacific Targets

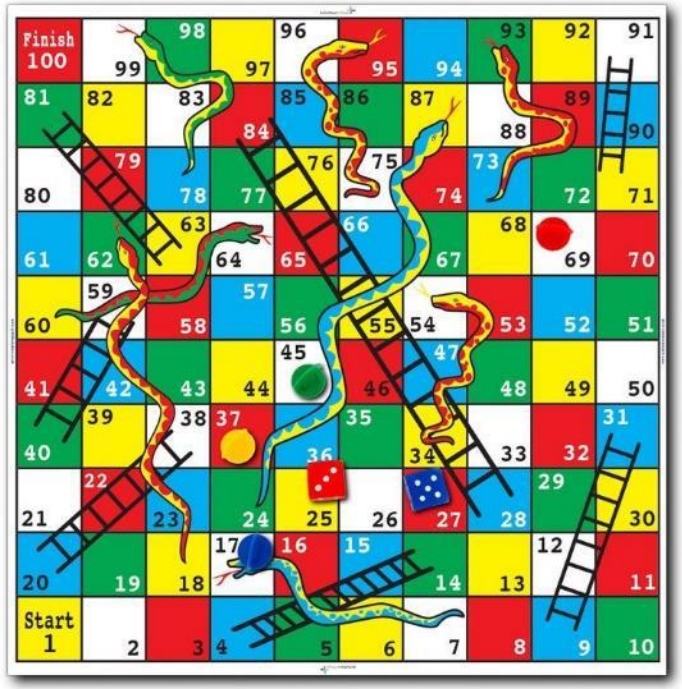
	Geography	Population	Electricity Access	Generation GWh pa	RE Target	RE Target by Year
Cook Islands	14 islands	15,200	99%	31.8	100%	2020
Fiji	320 islands, 106 inhabited	888,400	87%	900	100%	2030
FSM	607 islands	105,300	65%	72	> 30%	2020
Kiribati	32 widely scattered atolls	120,100	>65%	23	23 - 40%	2025
Marshall Islands	34 islands, mostly atolls	55,500	87%	101	20%	2020
Nauru	single island	11,000	100%	31.7	50%	2020
Niue	single island	1,520	99%	3.3	80%	2025
Palau	596 islands, 12 inhabited	17,900	98%	89.3	45%	2025
PNG	Over 600 islands	8,558,800	12%	217.3	100%	2030
Samoa	10 islands	196,700	100%	140	100%	2025
Solomon Islands	~1000 islands, 350 inhabited	682,500	23%	78	79%	2030
Tokelau	3 atolls	1,400	100%	1.2	100%	long-term
Tonga	176 islands, 36 inhabited	100,300	89%	55.4	50%	2020
Tuvalu	9 atolls	10,200	98%	5.2	100%	2020
Vanuatu	>80 islands, 65 inhabited	304,500	33%	66.3	100%	2030

Roadmaps & Plans

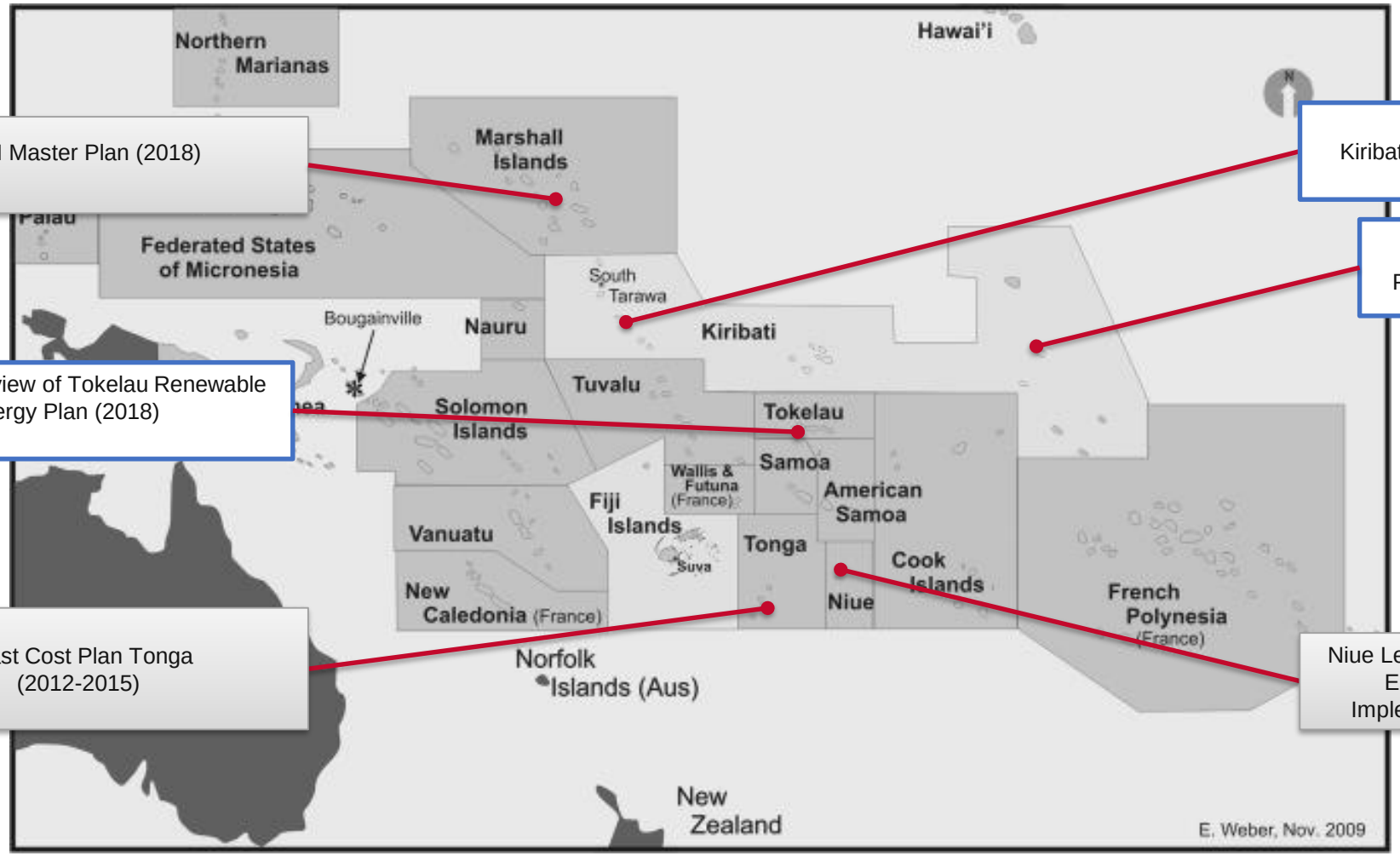


Complexities of Planning VRE Integration:

- Demand growth
- Resource availability
- Land Availability
- RE, Access, EE & Reliability targets
- Range of technologies available
- Sizing
- CAPEX changes
- OPEX changes
- Network constraints
- Generation constraints
- Urban vs Rural (OuterIsland)
- Stakeholder coordination (e.g. Institutions, Donors)



Pacific Planning Experience



FSM Master Plan (2018)

Kiribati Least Cost Plan (2018)

Kiritimati Island Energy Sector Programme KIESP (2015-2019)

Technical Review of Tokelau Renewable Energy Plan (2018)

Least Cost Plan Tonga (2012-2015)

Niue Least Cost Plan Renewable Energy Programme & Implementation (2017-2018)

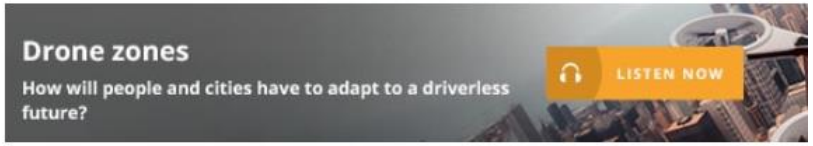
Tokelau

BBC Sign in | News | Sport | Weather | Shop | Reel | Travel

NEWS

Home | Video | World | Asia | UK | Business | Tech | Science | Stories | Entertainment

Asia | China | India



Tokelau islands shift to solar energy

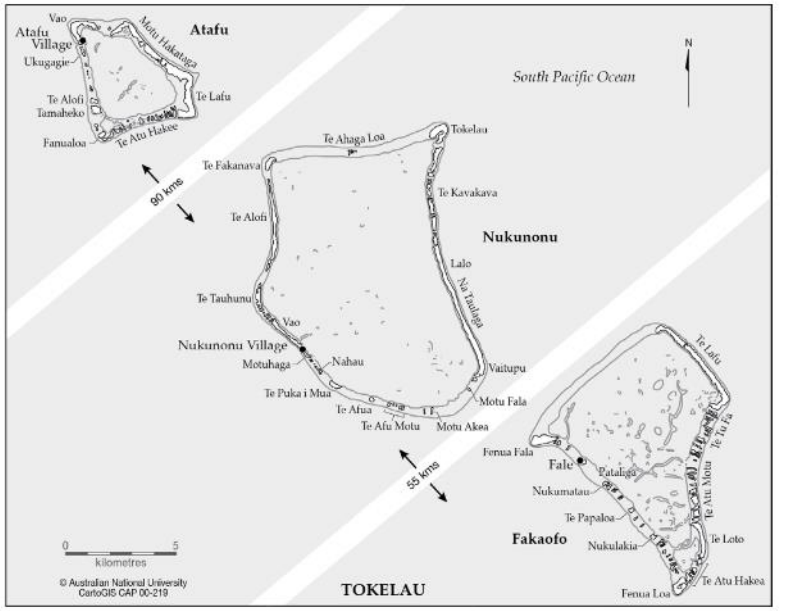
7 November 2012 Share

Tokelau has become the first territory able to meet all its electricity needs with solar power, officials say.

The South Pacific territory - comprising the three atolls of Atafu, Nukunonu and Fakaofo - had been dependent on diesel to generate electricity.

Solar energy is to replace diesel to power Tokelau's electricity

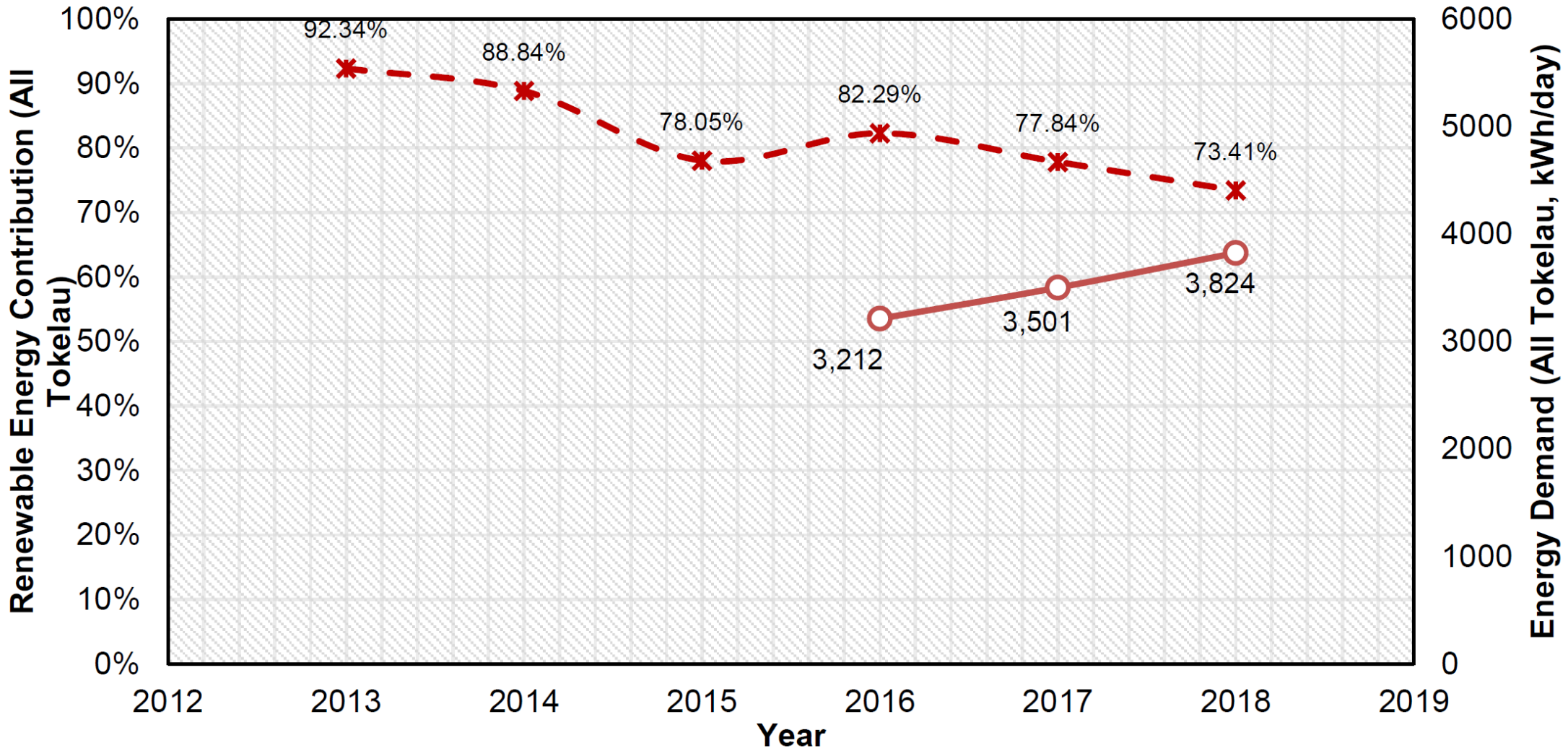
New Zealand, which administers Tokelau, funded a $7m (£4.3m) solar project.



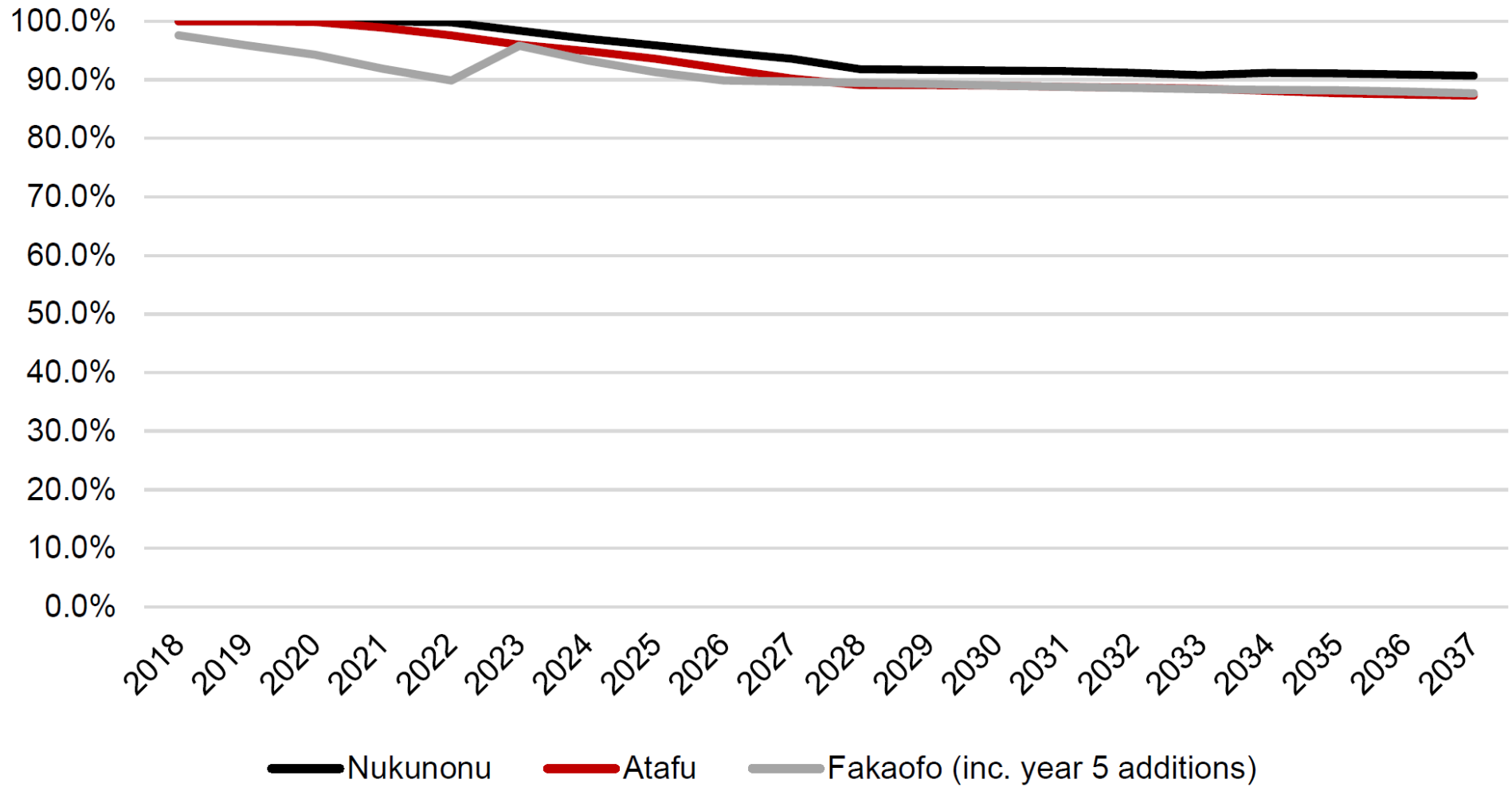
Tokelau

	Nukunonu	Atafu	Fakaofo
2012 original			
PV capacity (kWp)	265	300	365
Battery capacity to 50% DoD (kWh) / power (kW)	1152 / 110	1296 / 120	1584 / 150
Generator capacity (kW)	80 x 3	100 x 3	80 x 3
After 2016 Expansion			
PV capacity (kWp)	295	330	395
Battery capacity to 50% DoD (kWh) / power (kW)	1308 / 133.8	1442 / 149.8	1730 / 178.8
Generator capacity (kW)	200	200	200

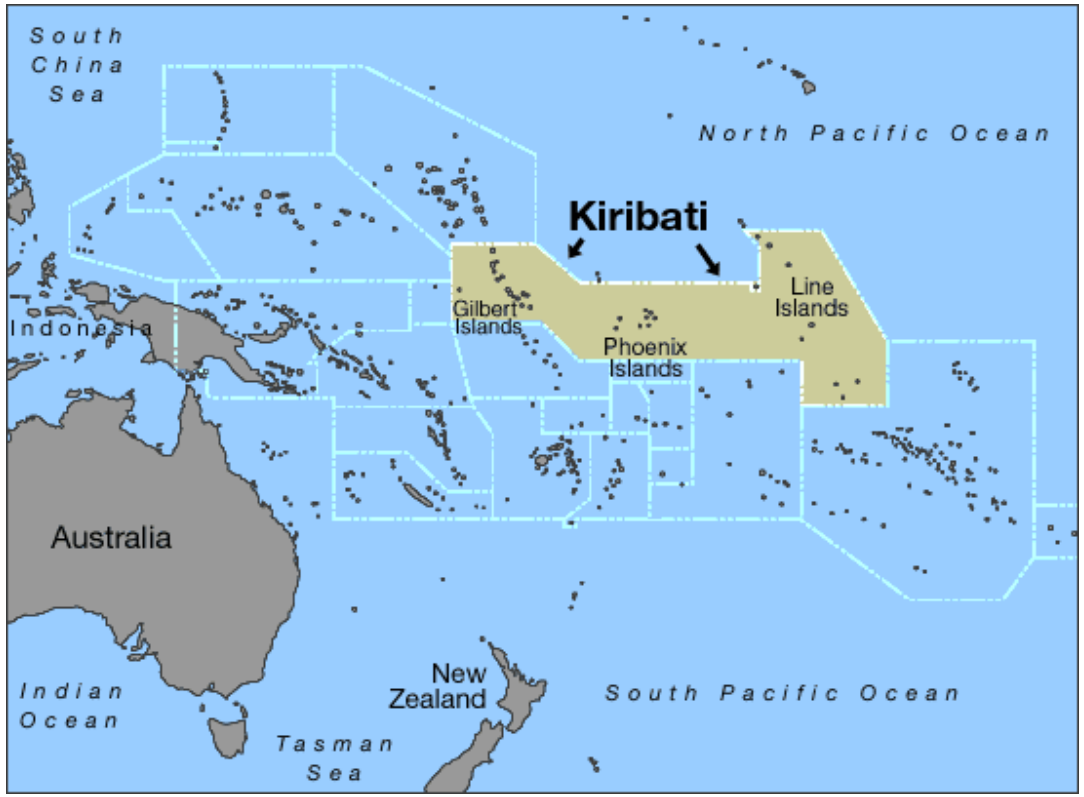
Tokelau Challenges



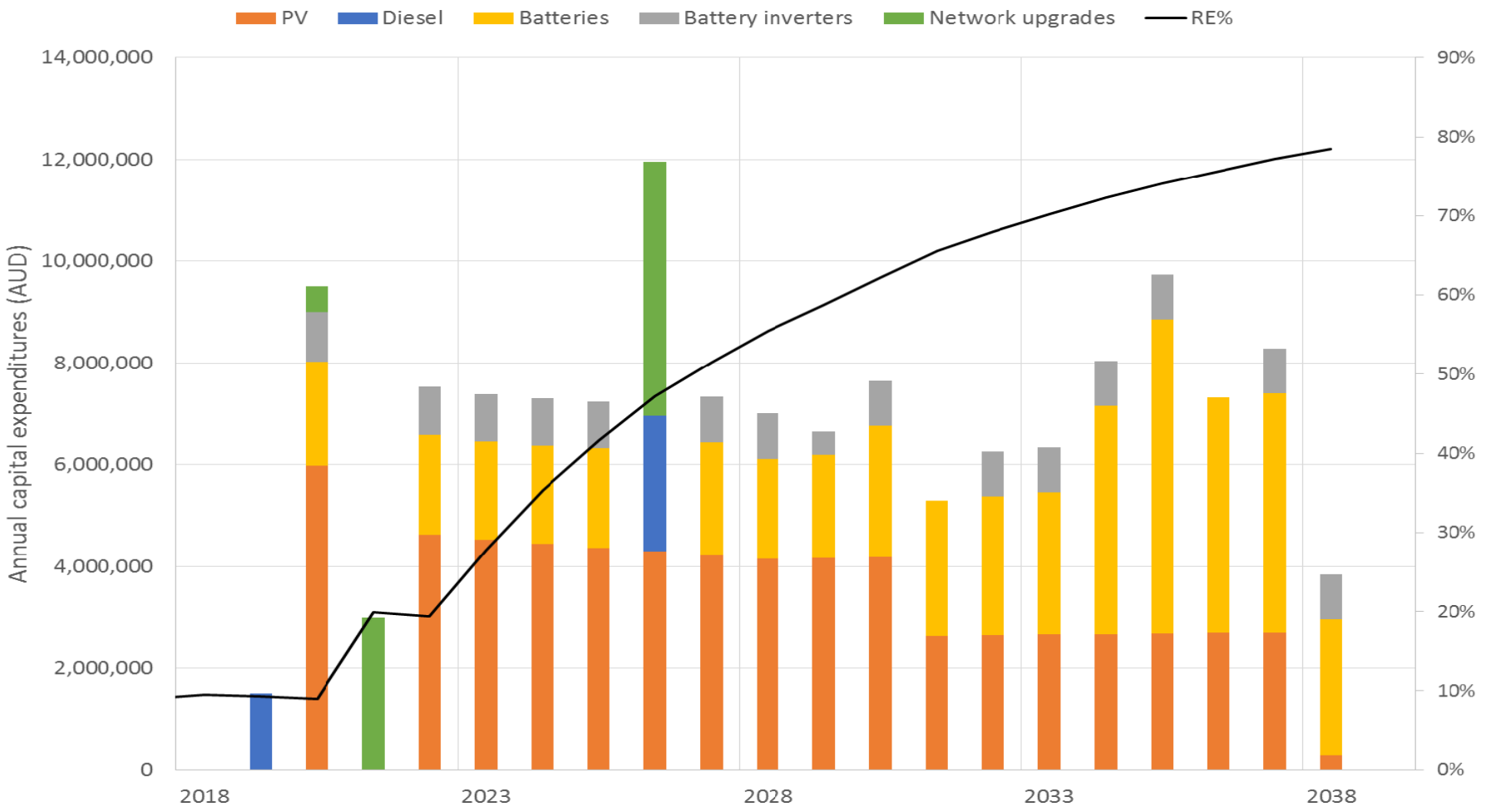
Tokelau


100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
Nukunonu
Atafu
Fakaofo (inc. year 5 additions)

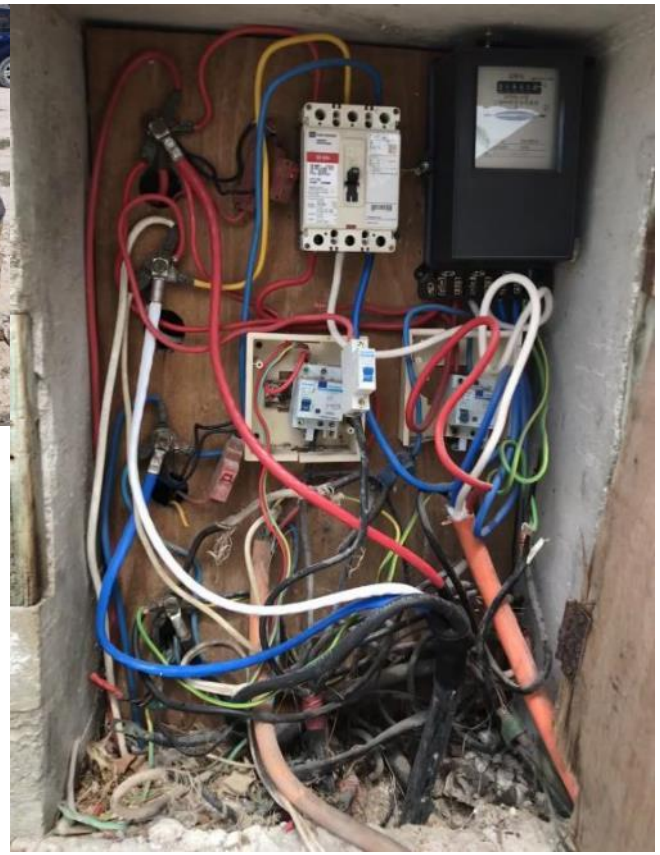
Kiribati Least Cost Plan

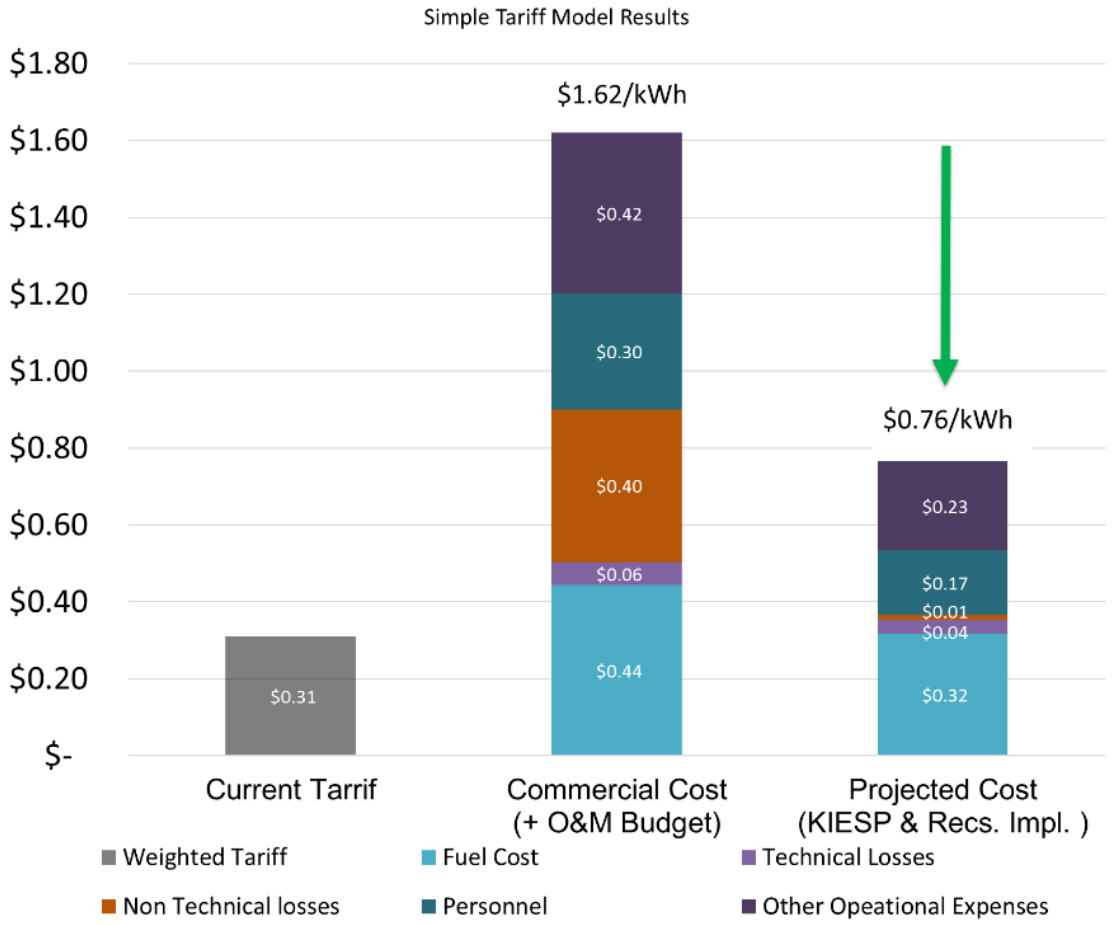


Kiribati Least Cost Plan



Kiritimati Island





Challenges & Issues

- How are these targets being developed and for what purposes?
- Urban vs Rural - Balancing needs between: Outer Islands (SE4All) vs >RE in Central Island grids
- Beyond the installed MW, important:
  - Develop the institutional support
  - Asset Management Plans and practise
  (i.e. could NDC's also incl. commitment to adopting an effective asset management plan?)
  - Subsidy & tariff reforms necessary for sustainability
  - Network upgrades
- Plans are live documents - models needs to be provided to utilities with training on using and updating.
- Achieving private sector involvement
- "High Penetration" means less diversity when comparing to larger grids -> storage is more critical
  - impending need for circular economy capacity development

Conclusion

- Globally SDG 7 is currently “not on track” - there are many success stories around the world, including in the Pacific where the ambitions are high.

- Plans & Roadmaps can lead to a “destination”, but important to proactively plan to build or maintain progress from this point.

- Complexities and uncertainties will always be involved, local capacity to update these is crucial.

ENGINEERING | STRATEGY | ANALYTICS | CONSTRUCTION

ITP RENEWABLES
SUITE 1, LEVEL 1
19 MOORE ST TURNER ACT

EMAIL: INFO@ITPAU.COM.AU
PHONE: +61 (0) 2 6257 3511
FAX: +61 (0) 2 6257 3611

FOLLOW US:

© 2018 ITP (Australia) Pty Ltd, part of the ITP Energised Group