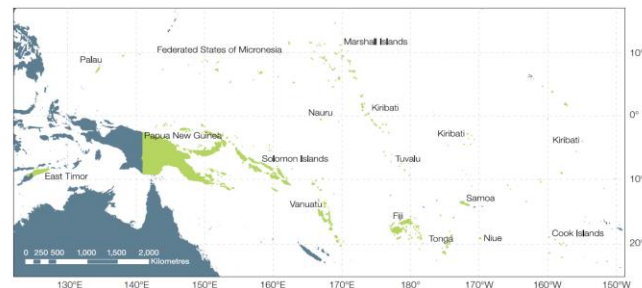


Renewable Energy in the Pacific Islands

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GEOGRAPHY



15 independent Pacific Island Countries (PICs)
Many islands scattered across a very large area of ocean.
e.g. Kiribati: 50 small islands spread across 3000km.
Populations: Papua New Guinea (PNG) ~6m, Fiji ~0.8m;
Tuvalu, Nauru, Cook Islands, Palau, and Marshall Islands all < 50,000
Economic development constrained by small size, remoteness and geographical fragmentation,
Most PICs are heavily dependent on their marine resources, although some have relatively fertile agricultural land and tourist potential.
Overseas aid and remittances for islanders working abroad make major contributions to the GDP of several PICs.

DRIVERS OF RE

Cost of fuel imports



In the PICs, all fossil fuel is imported.
In the smaller island states, fuel imports account for around 30% of GDP, and in the larger PICs around 7-15% of GDP.

Vulnerability to climate change



[photo: NTNK Video (Kiribati)]

Natural disasters (e.g. cyclones) already hit economies and populations hard (CC will worsen this).
Salt-water inundation threatens all atolls and coastal settlements, e.g. much of Kiribati could be uninhabitable within 30 years!

CURRENT USE OF RE IN THE PACIFIC

Cooking



Cooking on firewood
~50% of energy use in region.
• Mainly in villages (~80% of popn), but also some use in periurban areas.
• Mostly open fires. Small use of smoke-free stoves, almost none of charcoal.

Hydroelectricity



[photo: Fiji Electricity Authority]

Good but only on hilly islands.
• (~50% of grid in Fiji + Samoa, ~25% in PNG, revival in FSM)
• Photo shows the 40MW Nadarivatu hydro in the interior of the main island of Fiji (commissioned in 2012).

Solar



[Photo: Solar Electric Light Fund; <http://www.self.org/solomonislands1.shtml>]

Good solar resource on all islands
1000's of small household lighting systems
• System cost ~USD1000
• Panels reliable and cost decreasing; rest of system needs 'marine spec' and maintenance.
• LEDs -> smaller panels -> less cost
• Initial system attractive to donors, but long-term maintenance less so (skills + spares)
• Need regular \$ collection and continued tech back-up from outside village (e.g. RESCO).

Other RE

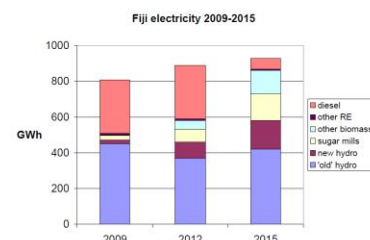
Liquid biofuels: Some use of 'biodiesel' from coconut oil, but wider use limited by supply of nuts from outer islands, though plenty on trees! Ethanol from sugar cane much studied (Fiji, PNG) but economics marginal.

Geothermal: PNG, Solomons, Vanuatu and Tonga all on 'ring of fire' -> some resource, but mostly not near a large energy user. (Only use: 1 gold mine in PNG).
Oceans (wave ,OTEC): resource there but not well mapped. Technology expensive or unproven. **Solar water.** Used in hotels and richer urban households.

Wind: Mostly too little (sea breeze) or too much (cyclone!). 10MW wind farm in Fiji has CF~12%.

PLANNED FUTURE USE OF RE IN THE PACIFIC

Electricity in Fiji



Realistic target of 90% renewable by 2015.
Builds on the 80MW Monasavu hydro (commissioned 1982).
Each slice of these annual outputs represents one or more particular reasonably firm projects identified by Fiji Electricity Authority. (Some of these projects are IPPs).
"Other biomass" is mainly cogen at sawmills.

RE targets announced in some other PICs will be "vapourware", until there is an identified means of approaching them. Funding from ADB, NZ etc announced in 2013 may help.

Grid PV (Tonga)



1 MW utility system installed in 2012. (A\$6m capital cost paid by NZ Aid)
- Largest grid PV system in Pacific Islands.
- Rest of Tonga grid (>90%) is diesel.

Rapid decrease in PV prices may lead to more such systems both in Tonga and in other PICs.

Wind-powered voyaging canoes



Could be a revival of a past glory of the Pacific.
Polynesians voyaged across 1000s km of ocean c.1300AD to settle Hawaii and New Zealand, and earlier to Fiji, Samoa, Tahiti etc.
Voyaging Societies now promoting revival (inc traditional navigation).

[Photos show (clockwise) one of the 'modern' replica *drua*; PV panel for radio eqpt and night lights; TW with Miss South Pacific 2012, who is one of the crew members and a student at USP!]

BARRIERS TO RE

Financial: Donors favour large projects, lack of rural credit, poor knowledge of fossil fuels (especially for outer islands).

Policy/ Institutional: RE projects often ad hoc (-> mistakes repeated), inappropriate power legislation, inertia/mindset in electricity utilities.

Opportunity costs relative to other development projects (especially up-front)

Environment/ social: supply for biofuels (compared to other markets for crops + labour), land issues, cyclones, salt air (-> corrosion)

Limited skills base (and 'training not always for the right people at the right time or in right language')

Change since 1990s

Improving

Improving

Always true

Still sometimes forgotten

Always true for smaller countries; not too bad in Fiji. USP + SPC help

CONCLUSIONS

RE has a clear role in the Pacific Islands

Driven by import cost of fossil fuel and climate change considerations
Need also improved energy efficiency, since many opportunities for EE not yet taken.

RE now

- Traditional biomass
- Solar home systems (stand-alone PV)
- Hydro on larger (higher) islands

RE towards future

- Grid PV (costs coming down rapidly)
- Wave power (+OTEC?+ tidal currents?) as technology matures
- Cleaner biomass (cookstoves? Elec gen?)
- Liquid biofuels (technology OK, but reliable supply? Opportunity costs?)
- Sail power ?

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