

PACIFIC RENEWABLE ENERGY (RE), INCLUDING MARINE ENERGY KEY POINTS



- Terrestrial renewable energy is valuable to Pacific island countries to increase their energy and economic independence.
- Pacific island countries have made substantial recent progress in the use of renewable energy sources. All PICs have renewable energy targets in their national energy roadmaps or their Nationally Determined Contributions under the Paris Agreement.¹
- There is limited knowledge in the region regarding renewable energy technologies that use the marine environment as its resource base. [Pacific marine environment information](#) is limited, challenging adequate feasibility studies and [environmental impact assessment](#) (EIA) for energy infrastructure developments.
- Marine energy is “energy derived from technologies that utilize seawater [movement] as their motive power or harness the water’s chemical or heat potential” (IPCC 2011).¹ Not all forms are suitable for tropical island systems. Marine energy includes²:
 1. Tidal Range: energy extracted from the vertical rise and fall of the tides through entrapment;
 2. Tidal Stream: energy extracted from currents generated by tides;
 3. Wave: energy extracted from the motion of the waves;
 4. Ocean currents [conceptual to date]: energy extracted from wind-driven or thermal ocean currents;
 5. Ocean thermal energy conversion [conceptual, but prototypes have been tested in the region and in Japan]: energy derived from temperature differences between warmer upper ocean layers and colder deeper parts;
 6. Salinity gradients (osmotic power) [conceptual to date]: derived from salinity gradients occurring between areas of salt water and fresh water.
- Marine animals and plants can also be used as marine bio-energy sources. Still conceptual, the suggested biofuels can be produced via conversion from biomass, e.g. of farmed algae, or hydrogen production from microbes.

HOW ISSUE LINKS TO/IMPACTS SDGs BEYOND **SDG14 LIFE BELOW WATER**

- SDG1, 10, 11: effective management of energy needs and resources is vital to increase economic independence and the sustainability of Pacific cities and communities.
- SDG7, 13: affordable, clean energy is a key component of climate change action.
- SDG8, 9: Pacific economic growth, infrastructure/industry, and local labour opportunities can be boosted by local energy production, if projects are managed so as to build local capacity.
- SDG12: [responsible consumption and production](#) is increasingly based on renewable energy.

BACKGROUND

1. **Energy independence is tied to economic independence.** Pacific island countries are among those with the highest vulnerability to the impact of oil price fluctuations. Several of these countries—Kiribati, Solomon Islands, and Tonga—rely almost entirely on imported oil for their commercial energy requirements, and all others (except oil- and gas-producing Papua New Guinea) are heavily reliant on fuel imports. Fuel imports in the region are worth on average close to 10% of GDP.³
2. **Switching to renewable energy sources reduces the significant environmental hazards from the transport of diesel and other fuels to the islands.** Increased, self-sustaining local energy supply and/or decreased demand will reduce the risk of spills, [pollution](#), and other [shipping](#) impacts including marine noise, spread of [invasive species](#), and vessel strikes on [threatened species](#). Increases in [storm severity](#) with [climate change](#) also threaten imported fuel supply and storage.

¹ Offshore wind and [hydropower](#) (using freshwater in the coastal zone) may be included in the discussion of marine and water energy, but will not be the focus of this factsheet.



3. **Pacific nations are already committing to energy independence.** All 3 atolls of Tokelau were 100% RE (photovoltaic) for electrical supply in 2014. The Cook Islands has set a target of 100% electricity from renewable energy by 2020, while Samoa has set the same goal for 2017. As of 2016, the Northern Cook Islands and the island Ta'u in American Samoa have become fully self-sufficient in electricity through solar energy supply.
4. **There are integrated programmes of support to achieve these targets by regional donors, and many RE installations under construction.** There are growing consequential issues of maintenance, on-island capacity to manage and maintain, needs for better battery technologies, disposal of existing batteries and longer-term replacement of what is high tech infrastructure. However, examples of best practices can be found in the region; for example, Marshalls Energy Company is collecting and exporting end-of-use lead batteries for a profit.
5. **There are several active renewable energy projects in the Pacific islands region.**⁴ For example, the Asian Development Bank has projects in 10 Pacific countries, focusing on energy efficiency as well as on renewable energy supply, primarily solar. There are also examples of private sector-led initiatives in biomass and gasification to produce electricity in Samoa.
6. **Advances in marine renewable energy technologies are increasing the possibilities for Pacific sites.** New designs, increased efficiency and reduced costs of generating and storage technology increase the range of suitable sites and reduce the investment outlay required to establish renewable energy systems. However, knowledge of these systems and technologies is limited in the region.
7. **Development and installation of new renewable energy technologies requires environmental impact assessments, just as any development.** Despite the benefits of renewable energy technologies, they also come with risks for marine life and ecosystems. For example, tidal generators carry risks of marine noise, impact of animals with the turbine blades causing injury or death, and the broad range of impacts from construction of enclosures, tidal lagoons or barrages.⁵ Suitability of RE infrastructure depends on energy capacity and ecosystem risk, as well as the level of available energy sources.
8. **Pacific countries can be leaders in renewable energy implementation.** Although prices are decreasing, the cost of renewable energy technology and the potential impacts of installation remain a barrier for many nations. The Pacific has a chance to demonstrate large-scale implementation of renewable energy while developing and influencing best practices in environmental management. This approach is in keeping with Pacific valuation of marine environments and Pacific leadership in the demand for climate-friendly development.

1 Guardian 2016. [South Pacific island ditches fossil fuels to run entirely on solar power.](#)

2 Jensen C. 2016. [Marine energy.](#) Institution of Civil Engineers, UK

3 IRENA (International Renewable Energy Agency) 2012. [IRENA Policy Brief: Policy Challenges for Renewable Energy Deployment in Pacific Island Countries and Territories.](#) IRENA, United Arab Emirates (and references therein)

4 ADB 2015. [Pacific energy update 2015.](#) 24 p

5 IRENA 2014. [Tidal energy technology brief.](#) 35 p