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# A framework for technology cooperation to accelerate the deployment of renewable energy in Pacific Island Countries

Emanuele Taibi [a,*], Giorgio Gualberti [b], Morgan Bazilian [c], Dolf Gielen [a]

[a] International Renewable Energy Agency (IRENA), Bonn, Germany
[b] African Development Bank, Abidjan, Côte d'Ivoire
[c] International Institute for Applied Systems Analysis, Laxenburg, Austria

## HIGHLIGHTS

- We analyse the energy sector of Pacific Island Countries (PICs).
- We assess current development finance practices for the energy sector of PICs.
- We develop a new framework to orient technical cooperation for energy in PICs.

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## ABSTRACT

When considering renewable energy, Pacific Island Countries (PICs) focus on energy security and affordability as primary benefits. In Melanesia, access to modern energy services represents a major unfinished agenda. To that end, Pacific Energy Ministers have endorsed the Framework for Action on Energy Security in the Pacific (FAESP) in April 2011. The associated implementation plan (IPESP) was developed, however never formally endorsed. PICs have instead taken a pathway towards national energy transition roadmaps. This paper describes the current status of the energy sector in PICs, the main challenges and the barriers to the deployment of renewable energy and the role of international cooperation in accelerating deployment. In the context of this analysis, technology cooperation is treated as the sum of cooperation on "orgware", software and hardware. These three dimensions are explored in the context of the Pacific energy sector, looking at how development finance (DF) is currently distributed among them. Looking at the key barriers identified and the areas where DF has been focused to date, this paper proposes a framework for removal of barriers to the deployment of renewable energy in the Pacific through more focused use of DF and technical cooperation. The framework identifies key goals, actors, activities, resources necessary and indicators to monitor progress.



## 1. Introduction

The Pacific hosts some of the smallest and most remote countries in the world. This peculiar situation poses several challenges to the delivery of modern energy services in a sustainable, affordable and reliable way. Lack of scale, limited local capacity and challenging logistics are some of the main factors that contribute to an energy sector almost entirely dependent on diesel fuel for power generation, with the notable exception of those countries with substantial hydro power resources (i.e. Fiji, Samoa, Vanuatu and Papua New Guinea). The high degree of dependence on imported, price-volatile fossil fuels, puts a considerable pressure on the already fragile trade balance of Pacific Island Countries and raises concerns over their energy security. The countries with a high share of diesel generation are also characterised by high electricity prices, hindering energy access to affordable modern energy services, affecting economic and social development. This is true also in countries where electricity tariffs are kept artificially low by not allowing the power utility to fully recover its costs, thus affecting its ability to perform the necessary maintenance on generation and distribution assets, therefore compromising its ability to operate efficiently and to reliably supply of electricity to its customers.

Pacific countries have abundant and mostly unexploited renewable energy (RE) resources. A greater adoption of RE would likely bring a series of benefits – the extent of which is largely dependent on local conditions – including: reduced energy prices, improved trade balance, increased energy security and strengthened local

* Corresponding author.
*E-mail address:* emanuele.taibi@gmail.com (E. Taibi).

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economy. Exploiting locally-available renewable energy resources is also the most appropriate way to extend access to modern energy services to remote areas, especially in the context of isolated islands where grid extension is not physically or economically viable and fuel transportation is difficult and costly (REN21, 2012; UNEP, 2012; IEA RETD, 2012).

Pacific island leaders are advocating for an acceleration in the uptake of RE. At the regional level, Pacific Energy Ministers have endorsed the Framework for Action on Energy Security in the Pacific (FAESP) in April 2011 (SPC 2011). However the associated implementation plan (IPESP) was never endorsed and put in practice. The FAESP represents the guiding regional framework for energy in the Pacific and, as the name suggests, has a main focus on energy security, pursued through national planning, improvements in energy efficiency, greater adoption of RE and, where appropriate and applicable, regional and sub-regional petroleum procurement approaches. Most PICs developed national roadmaps, charts or energy plans, often with assistance from development partners. This is for example the case for Cook Islands, FSM, Kiribati, Nauru, New Caledonia, Samoa, Tonga, Tuvalu and Vanuatu. Others, like Tokelau, have already transitioned to nearly 100% renewables. As of 2015, almost all PICs had roadmaps in place (IRENA, 2015a, 2015b). The international community, donors and development partners are also supporting the energy sector of PICs with technical assistance and development finance (DF) which, for every single country in the region, reaches much higher per capita levels compared to world average (see Fig. 8).

The objective of this paper is to suggest key focus areas for technology cooperation to accelerate the adoption of renewable energy in the Pacific, proposing a framework for increasing the effectiveness of international cooperation in the energy sector. Following this introduction, we analyse the status of renewable energy adoption in the Pacific and the main barriers to the acceleration of RE deployment in the region. We then consider technology cooperation in its different dimensions and analyse the status and *modus operandi* of the cooperation activities for the energy sector in the region. Based on this analysis, we propose a framework for more effective technology cooperation to accelerate RE deployment in the Pacific through a sharpened focus on key barriers, followed by concluding remarks.

## 2. The Pacific energy sector

Pacific Island Countries present heterogeneous local conditions and availability of renewable energy resources. Countries with larger land mass, typically tropical elevated rocky islands, are often endowed with abundant hydro power resources and generally already partially exploiting this renewable energy source in their energy mix, presenting substantially lower and less volatile electricity prices compared to neighbouring countries that rely exclusively on fossil fuels – essentially diesel used in internal combustion engines – for power generation, as shown for the countries on the left hand side in Fig. 1.

Looking at the change in the RE share over time, progress is noticeable only in a few countries between 2010 and 2012, while some others have shown a drop in the RE share, explained by the fact that electricity demand growth is being supplied with an increase in diesel generation, reducing the share of RE over time (Fig. 2). For a glossary of the acronyms used in the figures from PPA, defining the name of each Pacific power utility, please check Table 1, which also refers each utility to its country of operation.

In the region, there is an increasing focus on solar photovoltaic (PV) systems as a way to reduce dependency on diesel fuel for power generation. Although there are donor funded PV systems in every Pacific Island Country, the resulting share in the electricity mix was generally below 2% in 2009 with limited progress in 2012 (Fig. 2). In some cases, progress after 2012 has been rapid (e.g. Samoa and Cook islands), however mostly private sector driven (IPP) and not captured yet in the statistics available. In general, the RE share is projected to rise rapidly in many countries in the region due to the momentum created in the last few years, and the rapid decrease in solar PV costs.

It is however important to note that exceptions exist already, like in the case of Tokelau, a New Zealand territory composed of 3 isolated atolls half-way half-way between New Zealand and Hawaii. At the end of October 2012, Tokelau moved from 100% diesel-based electricity to nearly 100% renewable energy, provided by three solar PV systems for a total of 1 MWp, in combination with a comparatively large, advanced lead-acid battery storage system. The transition was fully funded by the New Zealand government and costed ca. 7.5 Million NZ$ (currently ca. 6 Million USD). This translates into an investment of ca. 4500 USD/person, which is offsetting the cost of diesel imports, estimated at 819,500 NZ$, or ca. 650,000 USD per year in 2012 (PowerSmart, 2012).

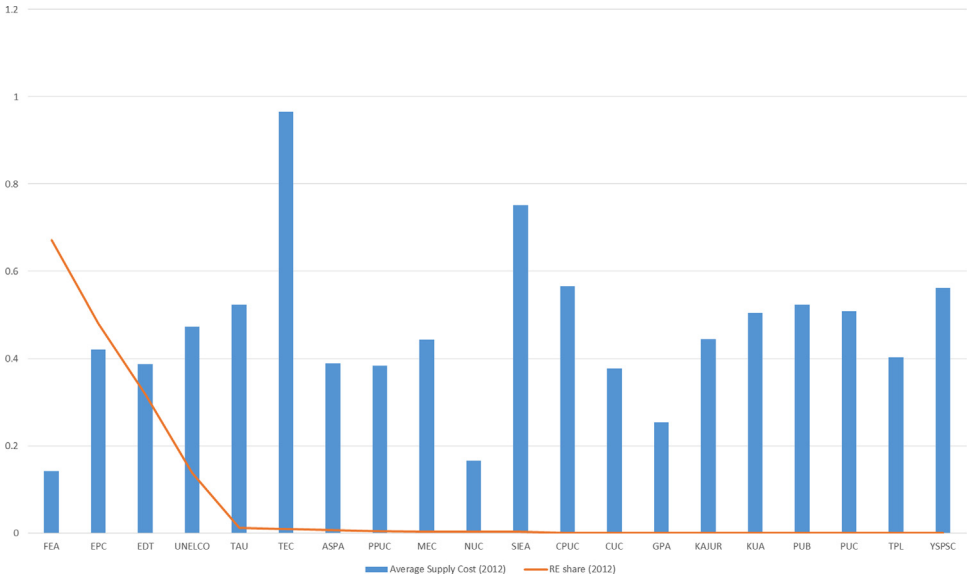


**Fig. 1.** Average electricity supply cost by power utility for the Pacific. *Source*: PPA (2015).

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