



Renewable energy programmes in the South Pacific – Are these a solution to dependency?



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ABSTRACT

Like many small island states, a number of Pacific Island countries (PICs) have ambitious renewable energy programmes in place. In some cases, the programmes include the objective of electricity generated from “100% renewable energy” by 2020 or 2025. The motivations for these ambitious programmes are commendable: to reduce dependency on imported oil fuels and to be seen to contribute towards reduction in greenhouse gas (GHG) emissions.

The paper reviews renewable electricity generation policy and programmes in four PICs – Cook Islands, Niue, Tonga and Tuvalu – and implementation of the programmes to date. To illustrate the broader relevance of the issue, these programmes are compared with those of Maldives and Seychelles. Concerns identified include the ambitious goals and almost total reliance on solar photo-voltaic (PV) technology to supply electricity in small and remote islands. Our central argument is that dependency on oil imports will be replaced with dependency on technical support given the complex nature of PV technology compared with diesel particularly where high PV fractions are proposed. The lack of interest in biofuel, particularly coconut oil, is seen as a missed opportunity to use an endogenous energy resource that could form a useful part of the renewable energy mix.

1. Introduction

The recent (September 2015) international agreement on the Sustainable Development Goals (SDGs) has provided a focus and urgency to future development efforts, requiring the combination of technological, attitudinal and policy efforts by countries and communities to achieve the far-reaching goals. Within this context, the status of energy has become more significant, with Sustainable Development Goal (SDG) 7 seeking to “Ensure access to affordable, reliable, sustainable, and modern energy for all” (United Nations, 2015). Given the current emphasis on climate change (both within the SDGs and under the CoP21 Paris Agreement) and a switch away from fossil fuels, it is understandable that renewable energy is given a high profile among the specific targets under SDG 7 as a means towards achievement of this goal: Target 7.1 seeks to, ‘by 2030, increase substantially the share of renewable energy in the global energy mix’ (United Nations, 2015).

The Pacific islands, like many other small island communities and states, present a number of specific difficulties for energy policy and supply (Wolf et al., 2016). Very small, dispersed populations and extreme isolation marks the context for many of the countries. A high

degree of dependence on oil fuels currently characterises the energy profile of most of the small island Pacific states, a situation that they share with small island states in other regions. As Wolf et al. (2016) note in regard to SIDS¹ generally:

SIDS nations may have to face a set of island-specific emerging socio-economic challenges, among them the need for appropriately skilled capacities as well as a transition to renewable energy systems to support sustainable island livelihoods. Moreover, as societal development both relies on and leads to increased electricity consumption and transportation and manufacturing fuel needs (for an extensive review see, for example, (Bayar and Özel, 2014)), a lack of access to and an insecure supply of energy can therefore substantially impede sustainable development in SIDS.

A number of Pacific Island countries (PICs) now have ambitious renewable energy programmes in place with some programmes including the objective of electricity generated from “100% renewable energy” by 2020 (Dornan, 2012, 2015). The motivations for these ambitious programmes are commendable: to reduce dependency on imported oil fuels, the primary source of energy for electricity

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¹ Small island developing states – SIDS.

generation, and (ironically given their very limited contribution to global emissions and conversely extreme exposure to the effects of climate change) to be seen to contribute towards reduction in greenhouse gas (GHG) emissions. International aid donor agencies working in the Pacific – the major source of capital for these programmes given the limited internal funding available – have a particular fixation on assistance in this area: New Zealand for example has ‘renewable energy’ as one of its two priority investment and assistance areas (MFAT, 2015).

Despite the importance of these issues and the rising prominence of this debate in the context of the SDGs, with the exception of Dornan (2012, 2015), there has been very little detailed examination of the energy prospects of individual small island Pacific states. This is particular the case in terms of a critical discussion of the limits to which renewable energy policies and pathways are practical and will actually meet the intended aims. This paper aims to redress this absence and outline some of the potential tensions that are created in pursuing widespread renewable energy programmes across the Pacific. The paper reviews electricity generation policy and programmes in four PICs – Cook Islands, Niue, Tonga and Tuvalu – and implementation of the programmes to date. All four countries have limited renewable energy resources, notably a lack of hydro-power potential, in contrast to their larger neighbours, Fiji and Samoa, and in the cases of Cook Islands and Tuvalu in particular, include extremely remote island communities with very limited shipping services and in some cases, no air services (Dornan, 2015). To provide points of comparison, and illustrate the broader applicability of the Pacific findings, two “non-Pacific” SIDS, Maldives and Seychelles, are also discussed in terms of energy consumption and energy policies. Located in the Indian Ocean, both Maldives and Seychelles are archipelagos with population concentrated on a small number of main islands. Both countries share the lack of significant hydro-power potential with the four PICs. The primary focus of this paper, however, is the Pacific.

The paper proceeds with a description of the energy profiles of the six case study countries, then proceeds to provide a detailed discussion of the renewable energy programmes and technologies deployed to date. Alternatives technologies are then discussed, before the economic viability of the various options are outlined. In this context, discussion focusses on the ambitious nature of some of the goals of the four PICs and it is questioned as to whether plans when implemented can achieve the objective of reduced dependency and justify the large expenditure involved. We conclude that when implemented, the programmes will reduce dependency on imported diesel fuel, but this will be replaced with a new dependency in the form of an increased need for technical assistance to maintain and operate the complex renewable energy generation plant, an issue that will be faced by other SIDS. In this context, the lack of firm commitment to exploiting biomass as an energy source for electricity is identified as a missed opportunity.

All monetary values are expressed in United States dollars (USD).²

2. Country energy profiles

The populations of the six countries are shown in Table 1. With the exception of Niue, which is a single island, the countries are archipelagos made up of widely scattered islands, ranging from over 1100 islands in Maldives – of which only 192 are populated – to Tuvalu with just nine islands (ADB, 2014a; MFAT, 2017c). In all five archipelagos, the populations are concentrated on one or two main islands. Tourism is the major “industry” in the Cook Islands, Maldives and Seychelles and to a lesser degree in Niue and Tonga (Kundur, 2012; MFAT, 2017a, 2017b,

² Where the origin was expressed in another currency, conversion rates have been applied as follows:
 NZD = USD0.70.
 EUR = USD1.18.
 AUD = USD0.78.
 TOP (Tongan Pa’anga) = USD0.47.

Table 1

Population by country.
 Sources: Cook Islands Statistics Office (2012); Government of Niue (2010); Government of Tonga (2014); Statistics Maldives (2017); NBS Seychelles (2017); Tuvalu Central Statistics Department (2013)

| COUNTRY | Population |
|--------------|------------|
| Cook Islands | 15,500 |
| Niue | 1460 |
| Tonga | 103,000 |
| Tuvalu | 10,600 |
| Maldives | 407,000 |
| Seychelles | 94,200 |

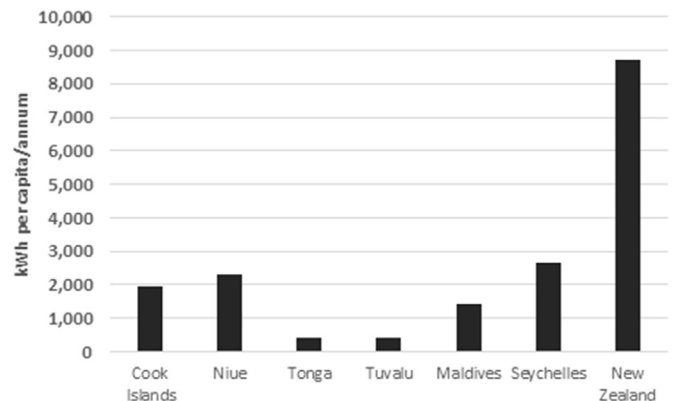


Fig. 1. Comparative annual electricity consumption. All data is indicative only and in some cases for different years depending on availability of data. Sources: Cook Islands Statistics Office (2012); Government of Niue (2010); Government of Tonga (2014); MBIE (2016); REEP (2017a, b); Tuvalu Central Statistics Department (2013).

2017d; NBS Seychelles, 2017). All six countries have significant negative trade balances (Cook Islands Statistics Office, 2017; Government of Niue, 2012; WTO, 2017)

As shown in Fig. 1, when compared with New Zealand, a neighbouring developed Pacific country, electricity consumption in the four PICs, Maldives and Seychelles is modest. Over the six countries there is significant variation between countries in terms of consumption per capita. Lack of a 24 h electricity supply in some outer islands could contribute towards the relatively low level of consumption in Tonga and Tuvalu. For example, in Tuvalu up until 2015, electricity was only available in the outer islands – that is islands other than Funafuti, the capital atoll – for a maximum of 18 h a day and often less (Cole, 2015). In all six countries, the tariffs include a level of subsidy although in the Cook Islands and Tonga this applies mainly to islands other than Rarotonga and Tongatapu (ADB, 2014a; Isaka et al., 2013a, 2013b, 2013c, 2013d; Meister Consultants, 2015).

A clear relationship between gross domestic product (GDP) per capita and energy consumption is evident across the countries (Fig. 2). To some extent, the relatively higher GDP and electricity consumption in the Cook Islands, Maldives and Seychelles can be attributed to the significant tourist industries in all three countries. In the case of Niue, while there is some tourism, there is a very high level of international aid funding, mainly from New Zealand, which contributes to GDP.

In terms of the impact on the national import bill (Fig. 3), fuel imports are significant, typically accounting for about 15% of the total value of imports except for Niue and Tuvalu where the percentage is higher. The higher figure for those two countries is possibly due to the most recent available data for these countries dating back to 2011 since when there has been a significant fall in diesel oil prices (MBIE, 2017). Even with the drop in oil prices since 2011/12, the cost of energy imports are significant and contribute to the large negative trade balances in the six countries. It is not surprising, therefore, that there is a major

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