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Access to electricity in Small Island Developing States of the Pacific: Issues and challenges



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ABSTRACT

Energy poverty is widespread in Small Island Developing States (SIDS) of the Pacific. It is estimated that 70 percent of Pacific Islander households do not have access to electricity, which is equivalent to access rates in sub-Saharan Africa and slightly below the average for low income countries. Pacific SIDS face unique challenges in expanding access to electricity, given that their populations are spread across tens of thousands of islands. Governments and development partners in Pacific SIDS continue to prioritise development of electricity grids, as is evident in ongoing subsidisation of grid-based power consumption and the establishment of ambitious (grid-based) renewable energy targets.

This paper argues that traditional approaches to rural electrification which prioritise grid extension are not suited to the Pacific islands region. Increased funding should be directed by both governments and development partners towards rural electrification, especially in off-grid areas where isolated systems are more appropriate. Institutional reform is also important. Regulatory reform is needed for power utilities to extend electricity grids into rural areas. Institutional arrangements that facilitate the sustainable operation and maintenance of off-grid systems also need to be established. Past donor and government-funded off-grid rural electrification projects have rarely been sustainable. Alternative approaches involving payment of output-based subsidies to energy service companies are worth exploring, although will only succeed where sound regulatory arrangements are in place.

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Contents

1. Introduction	726
2. Context	727
2.1. The challenge	727
2.2. Impact	727
2.3. Renewable energy	728
3. Expanding access to electricity	730
3.1. Extension of electricity grids	730
3.2. Off-grid electrification	731
4. Addressing the challenge	732
4.1. Output-based approaches to rural electrification	732
4.2. Reform in Pacific SIDS	733
5. Conclusion	734
References	735

1. Introduction

Energy poverty, or the lack of access to modern energy services, is a significant global development challenge. Electricity facilitates economic activity and the delivery of key public services, including health, education and infrastructure services. Clean cooking

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technologies reduce the incidence of respiratory disease and enable women and children to spend less time searching for fuel wood. The Sustainable Energy for All Initiative, launched by UN Secretary General Ban Ki-Moon, highlights the need to increase access to modern energy services for the Millennium Development Goals to be achieved.

Energy poverty is widespread in Small Islands Developing States (SIDS) of the Pacific. It is estimated that 70 percent of households across the Pacific do not have access to electricity and 85 percent do not have access to clean cooking energy technology [1]. The vast majority of those households reside in rural areas. The figures are alarming. Energy poverty in the Pacific islands region is greater than in other parts of the Asia-Pacific, and is equivalent to that in sub-Saharan Africa, despite higher income levels.

The focus of this paper is on expanding access to electricity in Pacific SIDS. Pacific SIDS face unique challenges given the geography of the region. The population of 14 independent Pacific island states is spread across tens of thousands of islands, many of which are home to less than 100 people. Access to infrastructure, including electricity, is limited outside of urban centers. Traditional approaches to expanding access to electricity, which are focused on grid extension, are often not feasible in these areas. The reliance in rural areas on subsistence agriculture presents an additional barrier to rural electrification, given that it restricts the ability of households to pay for an electricity connection.

There is limited literature on access to electricity in SIDS of the Pacific. The region does not generally feature in international surveys, given its small population (see for example [2,3]). Reports on energy poverty and energy security from development partners are often general, with limited analysis of rural electrification policies [1,4]. Project documents, such as monitoring and evaluation reports, provide useful lessons at the project level, but given their narrow focus, provide less insight into broader policy questions associated with the allocation of scarce public resources. There is more literature available on renewable technologies in the region, however, it generally focuses on supply of electricity to the grid rather than off-grid areas [4–8]. Academic literature on rural electrification in Pacific SIDS is particularly sparse, being almost entirely focused on off-grid electrification projects using renewable technologies [9–12].

What is missing in the literature is a high level perspective on the challenges faced by Pacific SIDS in widening access to electricity. In particular, there has been no critical analysis of rural electrification policies across the Pacific islands region drawing on experience in the Pacific and other regions. The issue is of considerable importance given that progress in expanding access to electricity has been slow in the region. This paper addresses this gap in the literature.

2. Context

2.1. The challenge

The rate of access to electricity in SIDS of the Pacific is low by international standards, being equivalent to access rates in sub-Saharan Africa and slightly below the average for low income countries. There is nonetheless considerable variation in the electrification rates of different Pacific SIDS. Access to electricity is widespread in countries with relatively higher income levels such as Palau, Cook Islands, and Fiji.¹ In a number of micro-states all households have access to electricity, such as in Nauru, a single

island state with a population of 10,000 (see Table 1). Energy poverty in the region is concentrated in three countries: Papua New Guinea (PNG); Solomon Islands and Vanuatu. These countries account for 84 percent of the population of all 14 independent SIDS in the Pacific, and have very low levels of access to electricity. The electrification rate in all three countries is lower than that of other countries with similar levels of GDP per capita (see Fig. 1).

The challenge faced by policy makers in widening access to electricity in Pacific SIDS is significant. The vast majority of un-electrified households in SIDS of the Pacific reside in rural areas, justifying a focus on rural electrification (households in informal urban settlements comprise only a small proportion of households without access to electricity). Households in rural areas are commonly distant from electricity grids. Connecting these households to an electricity grid is not financially feasible, given low levels of demand, low population density, and geographical constraints (such as archipelagos of islands) (see Fig. 2). Off-grid electrification is more feasible, but involves significant upfront costs for households. These upfront costs are often beyond the capacity of rural households to fund, given lack of cash income and available credit.²

The case of the Solomon Islands illustrates the challenges faced in the region. The Solomon Islands has an estimated population of 552,000 spread across more than 900 islands. Electricity grids are in place in only several urban centers, with little access to electricity outside of these townships. Approximately 12 percent of Solomon Islanders have a power supply, with access to electricity in rural areas estimated at 4 percent [14,15]. The average cash income in Solomon Islands is US\$1515, but incomes in rural areas are considerably lower, with rural households generally reliant on subsistence agriculture for livelihoods. Non-cash livelihoods limit the ability of rural Solomon Islanders to purchase off-grid systems or fund grid extensions. The ability of the government to invest in infrastructure is also restricted, given fiscal constraints. Government spending on rural electrification in 2012 totalled just US\$1.34 million (this represented an increase on previous years) [16].

2.2. Impact

The lack of access to electricity in Pacific SIDS produces adverse economic and social impacts. It is widely acknowledged that access to electricity is welfare enhancing, although evaluation can be difficult due to attribution problems [17]. Electricity facilitates economic activity and the provision of a range of basic services. It enables cold storage of food and vaccinations, and is essential for use of appliances such as computers, televisions, radios, and mobile phones. Electronic appliances are often important sources of information for rural households, and in many SIDS are leading to greater access to formal financial services in rural areas. The use of electricity for lighting extends working hours, makes public spaces safer, and permits children to do homework at night [8,18]. It has also been demonstrated around the world that the provision of electricity helps attract teachers and health-care workers to rural areas [3]. A recent survey of health and education facilities in rural areas of Papua New Guinea supports these findings [19,20].

Access to electricity has financial advantages. Electricity replaces expensive traditional fuels such as kerosene for lighting

(footnote continued)

electricity being below what would be expected for a given level of per capita GDP. This also appears to hold true for Pacific SIDS.

² Land is the only significant financial asset owned by most rural Pacific Islanders, but ownership is vested in communal structures which prohibit its use as collateral.

¹ There is a statistically significant relationship between log GDP per capita and access to electricity. A comparison of electrification rates in Africa, Latin America and Asia in [13] demonstrates that low population densities result in access to

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