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Energy policy, aid, and the development of renewable energy resources in Small Island Developing States

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HIGHLIGHTS

- SIDS have established the world's most ambitious renewable energy targets.
- These are motivated by fossil fuel dependence and climate change vulnerability.
- Aid dependence has influenced the ambition of renewable energy targets.
- Energy efficiency and energy access have received insufficient attention.
- Domestic policy reforms necessary for the achievement of targets has been limited.

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ABSTRACT

Small Island Developing States (SIDS) have established ambitious renewable energy targets. The promotion of renewable energy has been motivated by several factors: a desire to lessen dependence on fossil fuels, to attract development assistance in the energy sector, and to strengthen the position of SIDS in climate change negotiations. Here we explore the interplay between the role of aid and energy policy in the development of renewable energy resources in SIDS. We find that the importance of development assistance has implications for the sustainability of renewable energy development, given that funding is not always accompanied by necessary energy policy reforms. We also identify energy efficiency and access to modern energy services as having received insufficient attention in the establishment and structure of renewable energy targets in SIDS, and argue that this is problematic due to the strong economic case for such investments.

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1. Introduction

Small Island Developing States (SIDS) have established some of the most ambitious renewable energy targets in the world. Their promotion of renewable energy has been motivated by several objectives. Foremost is the desire to lessen dependence on fossil fuels, given high levels of reliance on imported fossil fuel products which make SIDS vulnerable to oil price rises. To meet such targets, SIDS must attract, and even compete for, foreign aid (or development assistance) to the energy sector, given barriers to financing renewable energy investment in other ways. The ten countries in the world that are most dependent on aid (defined as ODA as a proportion of GNI) are SIDS (OECD, various years).

Foreign aid is especially important in the development of infrastructure in these countries, with much capital expenditure in the energy sector being funded by development partners. Apart from the energy insecurity challenge, SIDS now find themselves at the forefront to climate change impacts including more extreme weather events, sea level rise and coastal inundation (Rhiney, 2015; Shah et al., 2014). For this reason, SIDS have a prominent international platform in climate change negotiations and while their greenhouse gas emissions share is negligible, by setting ambitious renewable energy targets, they champion the urgency for action. This is acknowledged in their special treatment by successive IPCC reports and the establishment of special funding streams dedicated to SIDS such as that of the Green Climate Fund.

This paper explores the role of aid and energy policy in the development of renewable energy resources in SIDS from a public policy perspective. Although these subjects are related, the academic literature has mostly developed each in isolation. We

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contribute to the literature by bringing these strands together to show how energy policy and the provision of aid in the energy sector are important determinants of renewable energy development in SIDS. We also contribute through coverage of all SIDS groupings: the Caribbean; the Pacific; and the Atlantic, Indian Ocean, Mediterranean, and South China Sea (AIMS), since the majority of the literature on renewable energy development in SIDS is concerned with countries in one of these groups (especially in the case of the Caribbean and the Pacific) (Betzold, 2016; Dornan, 2015b; Niles and Lloyd, 2013; Yu et al., 1996), or with SIDS country case studies (Dornan, 2011; Mala et al., 2008; Urmee and Harries, 2012). Very few papers have explored renewable energy development across SIDS (Niles and Lloyd (2013) explore developments in the Caribbean and Pacific SIDS; Stuart (2006), Weisser (2004a, 2004b) are other exceptions).

2. Background

2.1. The energy sector in SIDS

By definition a common attribute of SIDS is that they are geographically small. This has economic and policy implications for renewable energy development. Small consumer markets constrain the ability of energy suppliers to benefit from economies of scale in power generation, and limit the extent to which it is possible to have multiple competing generation and retail companies supplying electricity (Weisser, 2004b). This has implications for the structure and regulation of the power sector. Smallness limits the ability to establish independent regulatory agencies in extremely small SIDS, given the fixed costs associated with those agencies (Dornan, 2014a). National markets spread over island archipelagos also make electrification efforts more difficult in the case of several SIDS (Dornan, 2014a, 2015a). Logistically many SIDS, particularly those of the Pacific, must also rely on oil-fired generators, as can be seen in Table 1. Technologies that can

Table 1.
Thermal-based electricity production in SIDS (percentage of total electricity production). Source: Developed using data from United Nations (various years) and Weisser (2004a, 2004b).

Pacific		Caribbean		AIMS	
Cook Islands	100	Anguilla	100	Cape Verde	98.07
Fiji	55	Antigua and Barbuda	100	Comoros	90.74
Kiribati	100	Bahamas	100	Guinea-Bissau	100
Marshall Islands	100	Barbados	100	Mauritius	91.63
FSM	72	Belize	17.91	Sao Tome and Principe	64.34
Nauru	100	Cuba	99.18	Seychelles	100
Niue	100	Dominica	76.46		
Palau	87.67	Dominican Republic	85.46		
Papua New Guinea	50–60	Grenada	100		
Samoa	53.04	Guyana	100		
Solomon Islands	100	Haiti	62.76		
Timor Leste	100	Jamaica	93		
Tonga	96	Montserrat	100		
Tuvalu	95	Saint Kitts and Nevis	100		
Vanuatu	85	Saint Lucia	100		
		Saint Vincent and the Grenadines	75.54		
		Suriname	100		
		Trinidad and Tobago	100		

provide electricity at scale and at low financial cost (although high environmental costs), such as coal-fired generation, are generally inappropriate in SIDS given limited demand for power.

Presently, renewable energy is a major source of electricity supply in few SIDS, despite ongoing efforts to ramp up development and production. The reliance on fossil fuels to meet energy needs makes SIDS vulnerable to movements in the international price of oil. The oil price spike that occurred prior to the global financial crisis caused price inflation and led to major declines in the terms of trade of SIDS (ADB, 2008, 2009; Dornan, 2009; IMF, 2011; Levantis, 2008; Levantis et al., 2006; Sugden, 2009; UNDP, 2007b). Risk mitigation and economic objectives form a major objective of efforts to promote renewable energy development in SIDS as a result (Dornan and Jotzo, 2015). In this context, aid for energy development is important for SIDS, especially in the financing of large-scale energy infrastructure projects (Bertram and Watters, 1985; Betzold, 2016; Easterly and Kraay, 2000; Pacific Region Infrastructure Facility, 2013). The energy sector has historically been a beneficiary of such assistance, attracting limited government funding (and attention) (Niles and Lloyd, 2013; Stuart, 2006). Private sector investment in energy infrastructure has similarly been limited in most SIDS, given the small scale of markets, as well as various regulatory challenges (outlined below).

Despite common features, there are important differences in the energy sectors of SIDS. One is access to modern energy services. Many SIDS enjoy high levels of access to modern energy services, but this is not universal. The Melanesian states of Papua New Guinea, Solomon Islands, and Vanuatu in the Western Pacific have very low rates of electricity access, comparable to those in Sub-Saharan African countries. The availability of renewable energy resources also varies considerably in SIDS. Atoll states must rely on solar power, and small-scale biofuel or waste-to-power schemes for their renewable energy supplies. Larger countries such as Jamaica, Papua New Guinea, and Fiji have ample supplies of renewable energy resources that can be used for large-scale electricity production: hydro-power, geothermal, wind-power, are some examples. A third difference among SIDS are the institutional arrangements in the energy sector. As in most of the world, the power sector of most SIDS developed as vertically integrated state-owned monopolies. However, in some SIDS, power sector reforms have led to the privatisation of utilities or their separation into generation, distribution/transmission and retail components in a bid to facilitate competition.

Such differences have a bearing on renewable energy development in SIDS. The availability of renewable energy resources, for instance, is an important determinant of the economics of renewable energy investment. Countries with ample renewable energy resources that are suitable for low-cost energy supply are better placed to utilise these resources. The same can be said of development assistance, the significance of which does vary between nations. Access to modern energy services also influences priorities. In cases where access to modern energy services is limited, renewable energy development may compete for aid funding with rural electrification projects. Institutional arrangements in the energy sector are also important. Regulatory structures determine the incentives of, and financial resources available to, power utilities, and the private sector in investing in renewable energy. These linkages between energy policy, aid, and renewable energy development are further discussed below.

2.2. Method and literature review

This paper surveys grey and academic literature relevant to energy policy, aid, and the development of renewable energy resources in SIDS in order to explore both the rationale for ambitious renewable energy targets, and the interplay between aid and energy policy in renewable energy development. Its contribution is in bringing together various strands of literature that have

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