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Allocating the economic benefits of renewable energy between stakeholders on Small Island Developing States (SIDS): Arguments for a balanced approach

Danielle Spiegel-Feld [a,*], Bryce Rudyk [b], George Philippidis [c]

[a] Guarini Center on Environmental, Energy and Land Use Law at New York University School of Law, New York, NY, USA
[b] New York University School of Law, New York, NY, USA
[c] Sustainable Energy, Patel College of Global Sustainability, University of South Florida, Tampa, FL, USA

HIGHLIGHTS

- Renewables will create savings in SIDS by lowering electricity production costs.
- Utilities are likely to own the bulk of renewable energy assets in SIDS.
- Policymakers will need to decide how to divide savings among stakeholders.
- There are compelling reasons to allow utilities to retain part of the savings.
- Creditors can play a role in ensuring a prudent distribution of savings.

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ABSTRACT

For many Small Island Developing States (SIDS) the cost of producing electricity from imported fossil fuels is so high and the cost of renewable energy technology has fallen so significantly that transitioning towards renewable energy is likely to produce cost savings. A recent workshop at NYU School of Law, which brought together SIDS utility representatives with a leading renewable energy developer and other stakeholders, provided strong support for this prediction. Utilities are likely to own the majority of renewable energy assets in SIDS and will therefore be the initial custodians of any cost savings renewable energy provides. This raises a key policy question: to what extent should SIDS utilities pass on these savings to consumers by lowering electricity rates? We analyze this overlooked element of energy policy and highlight undesirable consequences that complete disbursement of the savings to consumers could cause.

1. Introduction

For many Small Island Developing States (SIDS) the cost of producing electricity from imported fossil fuels is exceptionally high. In the past few years the cost of renewable energy technology has fallen so significantly that transitioning SIDS towards a renewable energy based electricity system is likely to produce tangible cost savings. A recent workshop at NYU School of Law, which convened utility representatives from four SIDS – the Cook Islands, Palau, the Republic of Marshall Islands, and the Seychelles – provided strong support for this prediction (Spiegel-Feld, 2015). The workshop also featured experts from a leading renewable energy developer, development banks, NGOs, and academia.

In jurisdictions with mature financial and legal systems, such as Germany and Hawaii, renewable energy transitions have largely been implemented through the growth of distributed renewable energy resources, such as rooftop solar installations (Burger and Weinmann, 2014; Geis, 2015; Hawaii State Energy Office, 2013). In these jurisdictions, consumers themselves have been the primary owners of renewable generation assets and consequently the primary beneficiaries of any cost savings they produce.

However, renewable energy transitions are taking a different path in SIDS. In these countries, utilities are driving the transition towards renewable energy and are likely to own the vast majority of the generation assets. As a result, the utilities will be the initial custodians of any savings the resources provide. This raises a key question: to what extent should utilities pass on these savings to

* Corresponding author.
E-mail address: danielle.spiegel-feld@nyu.edu (D. Spiegel-Feld).

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consumers by lowering electricity rates? While SIDS have implemented a range of policies to incentivize renewable energy development, none of the SIDS represented at the workshop have developed policies to address how anticipated savings should be allocated between utilities and the consumers they serve. This article sheds light on this overlooked but important element of energy policy.

We begin by presenting background information on the electricity sectors of the SIDS represented at the workshop and the incentives to transition towards renewable energy. We then explain why utilities are likely to own the majority of renewable energy resources on SIDS and examine arguments for and against passing on the predicted savings to consumers via rate relief. We emphasize that while there may be compelling reasons to try to lower rates, and politicians are likely to pressure utilities to do so, it is essential that utilities keep at least portion of the predicted savings to improve their financial position. If utilities are denied this opportunity to improve liquidity, they may be unable to properly manage and maintain the new technology, thereby jeopardizing the longevity of the nascent transitions. We conclude with suggestions for how creditors can help ensure that SIDS implement a balanced approach to allocating renewable energy-derived savings.

2. Data analysis

2.1. Economic incentives to adopt renewable energy

SIDS endure some of the highest power prices in the world. In 2010, for example, Pacific SIDS reported an average residential and commercial tariff of between $0.39 and $0.44 per kilowatt-hour, with some states reporting tariffs as high as $1.00 per kilowatt-hour (Mofor et al., 2013). By comparison, the average residential tariff in the United States in 2014 was $0.125 per kilowatt-hour (U.S. Energy Information Administration, 2015).

The main cause of SIDS' high electricity prices is the high cost of imported diesel in local markets–the primary fuel for the islands' power systems. Not only must fuel be transported great distances to reach these remote nations, but their archipelagic geographies mean that fuel must be transported significant distances even within SIDS' borders. On the outer islands of SIDS' territories, where fuel transport is most expensive — 42% higher on the outer Cook Islands compared to the main island (Cook Islands, 2011) — the levelized cost of electricity can be staggeringly high. SIDS' nearly exclusive reliance on imported diesel also leaves them highly vulnerable to fluctuations in the global price of oil. When prices spike, utilities can find themselves unable to afford the fuel needed to keep their generators running (Dornan, 2015).

The high cost of producing electricity in SIDS and the volatility of fuel prices have contributed to a situation in which many SIDS utilities find themselves in poor financial health. To understand the roots of these financial difficulties, it is important to first recognize that the vast majority of utilities in Pacific and Indian Ocean SIDS are government owned[1] (Dornan, 2015). Indeed, the utilities of each of the four SIDS represented at the workshop are public.

Government ownership allows utilities to run deficits that would be impossible for private entities to sustain. (Rosenzweig et al., 2004; Dornan 2015). It also makes them more vulnerable to pressures from elected officials, who may seek to lower tariffs to bolster their own political support. While price manipulation occurs in states with publically and privately owned utilities, the mechanisms of manipulation are most direct in states with public utilities, where elected officials often set tariffs and appoint the utility's board of directors and/or managerial staff (Dornan, 2014). In the Marshall Islands, for example, there is not even an independent regulatory agency to monitor rates (Isaka et al., 2013a). And given the extraordinary cost of producing electricity in many SIDS, elected officials have strong political incentives to set tariffs at non-compensatory rates.

In light of this dynamic, it is not surprising that SIDS utility representatives at the workshop described significant difficulties maintaining liquidity. As one unnamed representative explained, his government tends to lower rates in response to decreases in fuel costs, but does not allow the utility to raise rates when fuel prices increase. Public records indicate that the Palau Public Utility Corporation (PPUC) has also experienced such difficulties. Palau legally obligates PPUC to charge “adequate” rates (Palau Consolidated Legislation), which has been interpreted as requiring it to break even on operating and maintenance costs–nevertheless, PPUC's operating expenses routinely exceed its revenues (Deloitte, 2013; Asia Development Bank, 2008). Such deficits harm the quality of service because they prevent the utility from making needed system upgrades and repairs (Conrad et al., 2013; Pacific Islands Report, 2011).

Renewable energy systems offer a chance to lower the cost of producing electricity on SIDS[2] and, if savings are appropriately allocated, improve their utilities' financial health. Renewable energy costs have fallen rapidly in recent years–utility-scale solar installations fell by approximately 70% between 2008 and 2014 and by 80% between 2009 and 2015 (MITEI, 2015; IRENA, 2015). More specifically, the average cost of a solar module fell from roughly $4.00 per peak watt in 2008 to $0.65 per peak watt in the second quarter of 2014 (MITEI, 2015). In terms of competitiveness with fossils, IRENA reports that in 2014 PV projects under construction in several countries were expected to produce electricity at lower cost than fossil-fuels (IRENA, 2015).

In line with these findings, case studies presented at the workshop concluded that solar powered microgrid systems could lower the levelized cost of producing electricity on every single island examined (Spiegel-Feld, 2015). Notably, this cost advantage could widen if renewable systems were procured via grants or very low-cost development loans, which is a distinct possibility.[3] In fact, renewable energy investments in Pacific SIDS have been largely funded by development partners to date (Dornan, 2015). Moreover, over time the cost of renewable energy technologies should continue to decline leading to even larger savings.

2.2. Policy incentives to adopt renewable energy

Appreciating the economic advantages offered by renewable energy, many SIDS have set ambitious renewable energy targets that require rapid expansion of renewable energy resources. The four countries at the workshop exemplify this trend: Palau and the Marshall Islands have each pledged to satisfy 20% of electricity demand with renewable energy by 2020 (Palau, 2009; Marshall Islands, 2009) and the Cook Islands aim to produce an impressive 100% of their electricity from renewable sources by 2020 (Isaka et al., 2013c). The Seychelles have set a somewhat less ambitious

[1] The Dornan citation refers to Pacific SIDS only. However, all Indian Ocean SIDS apart from Mauritius also have government-owned electric utilities.

[2] Whether, and to what extent, renewable energy resources would lower the cost of power generation on an island depends in part on the price of oil. At the time of the workshop, which found that adding renewable resources would confer meaningful savings, crude oil was trading at approximately $45 a barrel.

[3] Participants at the workshop expressed optimism that they would be able to secure development funding to pay for the capital expenditure of new renewable energy systems under consideration.

target – 15% from renewable sources by 2030 – but is well on track to meet that target by 2020 (Amla, 2015). Notably, both the Cook Islands and Palau have enacted net metering policies to encourage private solar installations (Isaka et al., 2013c; Palau, 2009, respectively). However, as indicated below, utilities have developed and will likely continue to develop the majority of renewable energy resources.

2.3. Renewable energy ownership structure

As SIDS begin to implement their transition towards renewable energy, there are reasons to expect utilities to take the lead. The levelized cost of electricity from utility-scale solar installations is typically much lower than that from rooftop solar installations due to economies of scale (IRENA, 2015). In addition, public utilities are eligible for low-cost financing from international development banks and other aid-oriented lenders, which can further reduce the cost of large-scale installations. Individuals cannot access such funds and, as was repeatedly noted at the workshop, individual borrowing costs can be prohibitively high on SIDS. In the Pacific, where communal property rights are pervasive, individuals may not even have adequate collateral to obtain financing on any terms (Dornan, 2014). In several SIDS, including the Seychelles, there is also regulatory ambiguity regarding individuals' rights to feed electricity into the grid and to be compensated for doing so (Seychelles Energy Commission, 2014). Finally, workshop participants noted that grid stability studies indicate a greater potential to integrate high percentages of renewable energy into the grid without compromising reliability, if utility-scale installations are employed. Given SIDS' ambitious targets, governments would therefore prefer to proceed through utility-scale installations.

As a result, SIDS representatives at the workshop described a preponderance of utility owned renewable assets in their states. The Seychelles provides an instructive example. The country has installed a 6-MW wind farm and is considering installing additional 5-MW and 8-MW photovoltaic farms. If these projects go forward, the Seychelles Public Utility Corporation will own 19 MW of renewable energy capacity compared with just 1.6 MW of privately owned capacity.[4] Similarly, in 2013 IRENA reported that approximately 90% of Palau's 600 KW of grid-connected solar was owned by the state utility with another 7% owned by the U.S. government (Isaka et al., 2013b). Despite the country's net metering policy, a paltry 3% of installed solar power was privately owned (Isaka et al., 2013b).

3. Discussion

If utilities own the majority of renewable energy resources in SIDS and these resources lower the cost of producing electricity, their governments will have to decide whether to disburse any or all of the anticipated cost savings to consumers by lowering rates.[5] This question of how to allocate savings will take on greater importance as the proportion of renewable energy in SIDS' power systems grows. The following section examines competing arguments for and against disbursement, highlighting the importance of allowing utilities to maintain a portion of the surplus.

3.1. Arguments in favor of passing on savings to consumers via rate relief

Participants at the workshop raised three main arguments in favor of passing savings to consumers. First, lowering electricity prices could help spur economic growth in SIDS (Brown and Mobarak, 2009). It is widely recognized that limited access to reliable, inexpensive electricity in SIDS has hindered economic development (Weisser, 2004), so decreasing prices may promote growth. Second, one of the key rationales that has been given for transitioning towards renewable energy is that it can help buffer the impact of fuel price volatility, which should ultimately decrease costs (Bunker et al., 2015; Dornan, 2014; Climate Summit, 2014); if consumers do not see electricity prices decline, their support for energy transition may wane. Finally, failure to pass on savings to large commercial consumers may create investment risks. Specifically, if commercial customers (e.g. tourist resorts) are denied rate relief, they may install their own generation assets, thus reducing demand from the grid and threatening the utility's payback assumptions.

For each of these reasons, elected officials have strong incentives to use predicted savings to lower rates. However, while some degree of rate relief may be appropriate, there are also important countervailing considerations. Indeed, as suggested below, if utilities are not permitted to manage a portion of the cost savings, the very success of SIDS renewable energy transition may be jeopardized.

3.2. Arguments in favor of allowing utilities to maintain savings

There are many reasons why utilities should maintain at least a portion of the predicted savings, but perhaps none is more important than to improve the likelihood that they will be able to pay for costs related to the integration, maintenance, and management of the new technologies. These costs, which are described in more depth below, cannot be fully anticipated before the relevant technology is put to use. If utilities lack the funds to cover these expenses and service quality deteriorates, it would undermine a key purpose – and presumably source of public support – for moving forward with the fledgling transition towards renewables.

3.2.1. Grid integration and upgrade requirements

Unlike fossil-fuel based generation, renewable energy resources, such as wind and solar, do not supply consistent amounts of electricity; supply is intermittent and varies with the weather. Electricity grids can generally accommodate low levels of such variable renewable energy (VRE) without significant additional investment (Flavin et al., 2014). However, as VRE reaches high penetration levels for which many SIDS aim, it becomes necessary to invest in grid integration, upgrades, and stability measures (Flavin et al., 2014). The goal of these measures is to maintain power system stability and reliability, which can be achieved by investing in power transmission, demand/supply balance, system flexibility, and VRE capacity expansion. To do so, grid operators, which in most SIDS are the utility companies, need to secure ancillary services to maintain the grid's operation in case of failure or weather-related shut downs in the output. Essential ancillary services include system protection, voltage and frequency control, and operating reserves (Ela et al., 2012).

Grid integration measures should generally be planned far ahead of any decision to invest in utility-scale renewable energy projects through careful collaboration among utility officials, grid operators, regulators, and policy makers, and should be factored into the cost of the system. Yet, in some instances, the full extent of

[4] Data is as reported by the Seychelles representative at the workshop.

[5] Notably on islands where the government subsidizes electricity rates, predicted cost savings could be used to reduce the ssubsidy instead of lowering rates (Bunker et al., 2015). Outside creditors may encourage SIDS governments to take this approach (Di Bella et al., 2015). From the utilities' perspective, subsidy reduction is functionally the same as rate reduction. In either case the utility is denied the opportunity to increase its liquidity, which, as we note in Section 3.2, may be needed to pay for unanticipated costs related to renewables or otherwise invest in service quality improvements.

upgrades required is only realized after new VRE resources come online. Moreover, in countries where distributed generation grows in tandem with utility-led deployment, additional upgrades may become necessary as the total amount of VRE on the grid increases. SIDS utilities will need funds to respond to these needs as they arise.

Grid operators (utility companies) typically bear the entire cost of such services, which is often neglected by governments when they adopt policy measures, such as renewable portfolio standards (Cifor et al., 2015). Election-focused politicians have relatively little incentive to appropriate funds towards improving quality of service through measures like grid upgrades, which go largely unnoticed by the public, and are likely to focus their efforts on the more visible issues of lowering rates and expanding access instead (Min, 2015). Utilities could protect themselves against this sort of government neglect, if they are allowed to maintain a portion of the operating cost savings renewable energy is expected to provide.

3.2.2. Maintenance

Some of the renewable energy systems SIDS are considering adopting, such as the latest battery and microgrid systems, are at the cutting edge of technological progress. This creates a great opportunity to take advantage of the most cost-effective means of production, but it also entails a degree of risk that unexpected maintenance costs will arise, particularly given that weather events on SIDS, such as hurricanes and typhoons, can test the limits of a system's resilience. As with grid integration issues, utilities will need to have sufficient liquidity to tackle potential challenges, when they emerge.

3.2.3. Battery replacement

To the extent that batteries are used for renewable energy storage, the utilities will need to set aside funds to replace them as their useful life fades, which generally does not correspond with the useful life of the renewable asset (Hittinger et al., 2015). Batteries can be quite expensive, and it is far from certain that the utilities will have the cash to purchase replacements, when needed. In fact, the Marshall Island's electric utility has already encountered difficulties raising funds to replace aging batteries used in early photovoltaic systems (Isaka et al., 2013a). If SIDS' utilities cannot raise the funds required to replace aging batteries, their reliance on renewable energy will be short-lived.

3.3. Incentivizing utilities to pursue cost-effective and robust action

A final reason for allowing utilities to retain a portion of the savings is to incentivize them to pursue more renewable energy projects. One of the themes raised at the workshop was that utilities, who are chiefly responsible for maintaining the safety and reliability of the grid, tend to be somewhat averse to taking on the risks of new technology. Allowing utilities to share in the financial benefits renewable energy resources provide could help offset any potential reticence to adopt them. It would also incentivize them to seek out the most cost-effective means to maintain and operate such systems.

4. Conclusion and policy suggestions

Expanding renewable energy on SIDS should produce significant benefits, including lowering the cost of electricity production. There are compelling reasons for policymakers to want to allocate a share of such cost reductions to electricity consumers via rate relief. However, particularly in the near-term, rate relief also entails a degree of risk as the cost of grid integration and maintenance is not yet fully known. SIDS can protect against such risks – and can help ensure that their renewable energy transitions are successful – by adopting a policy that allows their utilities to manage a portion of the anticipated cost savings. Consistent with nationally determined objectives for renewables, development banks and other lenders may be able to help promote the sustainability of these energy transitions as well. Specifically, by structuring renewable energy aid packages to provide funds in stages or by designating specific funding for grid integration, maintenance, and replacement costs, economic development organizations could help shield SIDS' utilities from local political pressure to lower rates. Whatever the mechanism ultimately adopted is, it is clear that to prudently expand renewable energy in SIDS near-term rate relief for consumers must be carefully balanced with the utilities' expanded responsibilities and risks associated with heavier reliance on renewable power.

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