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Energy access and security strategies in Small Island Developing States

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HIGHLIGHTS

- Core elements related to energy access/security in SIDS, barriers and strategies.
- Situational analysis of two SIDS: Fiji and Mauritius.
- Outlining the current energy situation in Fiji and Mauritius.
- Comparison of the role of their energy policies in fostering energy security/access.

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ABSTRACT

Small Islands Developing States (SIDS) are isolated and surrounded by ocean. The generation and use of energy resources are two very important aspects for the development of SIDS. Unfortunately, most of SIDS do not use their potential in respect of energy resources, and they as a result have to depend on the import of fossil fuels in order to meet their energy needs. This increases the overall vulnerability of SIDS as they have to depend on the rising or fluctuating fossil fuels prices. Some SIDS, especially in the geographically dispersed Pacific region, do not have proper access to energy whereas other SIDS struggle more with energy security issue. At the same time, SIDS are most vulnerable to the impacts and effects of climate change, as they are among the ones to be most severely affected in case of natural calamities and sea-level rise.

Drawing on experiences from Fiji and Mauritius, this paper explains core elements related to energy access and security in SIDS, contextualizes and discusses barriers and list some of the strategies that may be used to ensure access to and a continuous supply of energy in SIDS. A situational analysis of two SIDS outlines their current energy situation and compares their energy policies to globally accepted criteria for SIDS policies as well as with each other. It is claimed that the diverging energy performances of Fiji and Mauritius cannot be explained by policies differences. The reasons for the varying energy performances may therefore lie in the administrative and institutional mechanisms used by the two countries in implementing their energy policies. Finally, to enable SIDS to reduce their overall vulnerability and become truly sustainable islands, it is recommended to undertake careful assessments of the particular local contexts under which island energy regimes operate.

1. Introduction

Succeeding and expanding the Millennium Development goals (MDG), a set of 17 Sustainable Development Goals (SDG) provides UN member states since September 2015 with a new set of goals, targets and indicators which will frame policy agendas and influence policies over the next decade (UNDESA, 2015). SDG 7 (SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all) relates to the issues of energy access and security, two issues which are highly relevant especially for Small island Developing States (SIDS). SIDS, however, face some island-specific challenges that limit their ability to secure the well-being and to provide sustainable livelihoods to current and future generations (Weisser, 2004; Stuart, 2006; Kelman and West, 2009; UNDP, 2011; Feinstein, 2014; UNEP 2014b; UN-OHRLLS, 2015):

- Inherent characteristics of SIDS, e.g. smallness and remoteness, limited resources and a disproportional dependence on international trade, limit SIDS' ability to achieve economies of scale,

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create relevant internal markets or access capital to finance development action, i.e. influencing economic structure and performance;
- SIDS also rely heavily on fossil fuels to meet local energy demands, the cost of energy is among the highest of the world due to high fuels transportation costs, and, in general, they pay a higher price per unit of electricity than non-island countries.

In future, 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.

Feinstein (2014) points towards a high energy vulnerability of SIDS, indicating that 13 out of 24 Pacific SIDS are classified as being most vulnerable to oil price shock, the cost of fuel imports in SIDS has a share of 12–37% of total imports, and many SIDS have to cope with interrupted supply. The recent GEO SIDS Outlook [4] provides a summary of key energy issues for these island nations, underscoring the importance and inherent island potential of renewable energy sources for SIDS (see Table 1).

Concerning fossil fuel dependence in the Caribbean and the Pacific region, Niles (2013) states that energy consumption for commercial purposes is largely dominated by imported fossil fuels (see also Fig. 1). The seemingly high access to electricity is thus greatly based on fossil fuels, with SIDS spending more than USD 67 million per day on oil (Feinstein, 2014). As energy intensity is high and increasing, SIDS need to take measure to improve energy efficiency, and some having poverty rates above 20%, must provide affordable energy services to allow access for everyone (Feinstein, 2014).

Finally, modern energy services require increased energy production. Appropriate policies to accelerate the spreading and implementation of low emission technologies especially if they utilize renewable sources, to facilitate access and a secure, reliable supply of energy and promote energy efficiency, become more and more important (UN, 2010). Taking into account local endowments and the distinctive constraints of island energy production, e.g. difficulties to achieve economies of scale, capacity issues, continued use of fossil fuels etc., are critical elements when designing energy policies for SIDS (Stuart, 2006). This paper analyses the energy policy environments in Mauritius and Fiji, and show how these two SIDS approach the quest towards becoming sustainable energy islands.

1.1. Energy access

The lack of access to modern energy services, sometimes also referred to as energy poverty, resembles a significant global development challenge (Dornan, 2014). If the three major SIDS regions – i.e. African, Caribbean and Pacific SIDS – are compared, large differences in energy access can be noticed. Being extremely wide geographically dispersed, especially many islands in the Pacific SIDS region still lack adequate access to energy. Apart from some exceptions like Tokelau which is heavily solar powered and Fiji and Papua New Guinea which can utilize heavily hydro power resources, the Pacific region SIDS show rather low levels of electrification (see Fig. 1).

Access to energy can contribute to a set of SDGs such as improved healthcare provision, better education, gender equality and poverty reduction (UN, 2010). However, defining energy access is difficult as there is no common definition in the literature. Common features found in all definitions relate to the provision of energy services that are key to socio-economic development and may be classified underneath three broad headings:

- access to a *minimum level of electricity*, e.g. for lighting and communication;
- safer and more sustainable *cooking and heating fuels and technologies*; and
- access to *modern energy services* for productive uses, e.g. industry, and public services such as schools or street lighting.

Related to the provision of these energy services are certain quality aspects such as technical availability, adequacy, reliability, convenience, safety and affordability (IEA, 2015). In line with the understanding of affordability by the UN (2010), affordable energy would be compatible with local income levels, i.e. with a price level not higher than traditional fuels. Most SIDS are, however, unable to connect to a larger, possibly intercontinental grid like, for example, a global power grid proposed by Chatzivasileiadis et al. (2014), which may result in those affordable energy prices due to seizing economies of scale and cost spreading on a much larger customer base than just the population of one small island, so SIDS need to find other solutions, taking into account their internal constraints as well (Stuart, 2006). Pointing towards sustaining economic growth, Weisser (2004:129) underscores that "*the availability of adequate energy resources at a reasonable cost remains a vital precondition for continued economic growth*." Weisser (2004) adds that the infusion of renewable technology may result in a lower cost of production, valid for both on- and off-grid applications.

SIDS are also distinctively marked by their high cost of energy in general as prices of petroleum products are much higher in SIDS than in other regions of the world, for example, in Pacific SIDS sometimes as much as 200–300% (UNEP et al., 2012:17). As a result, households in the Pacific might have to spend up to 20% of their disposable income on energy. World market prices of crude oil fluctuate largely, and imported energy resources would need to be paid in foreign currencies whose exchange rates vary as well, placing additional burden on SIDS national accounts (UNEP et al., 2012; UNEP 2014b; 2014a).

1.2. Energy security

Definitions of energy security span from a narrow view, focusing on disruptions of physical energy supply, to wider perspectives considering economic, environmental and political impacts and changes that influence energy markets (Dreyer and Stang, 2013). Guiding policy design, the simplest, mainstream definition is by the International Energy Agency (IEA):"*the uninterrupted availability of energy sources at an affordable price*" (IEA, 2015). Another, well-known framework in the study of energy security are the four As (availability, affordability, accessibility, acceptability). However, due to a lack of scientific credibility,

Table 1
Power and energy generation mix for the FEA national grids in 2013. Source: FEA (2013).

Energy source	Installed capacity (MW)	Energy generated (MWh per annum)	Fraction of total grid energy (%)
Hydro	130	527,397	61.5
Wind	10	5348	0.6%
Diesel and Heavy Fuel Oil (HFO)	75	324, 755	37.9
Total		857,500	100

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