Energy Resilience and the Political Economy of Off-Grid Solar

Part 2 - Workshop Series: Energy Resilience in Pacific Island Countries and Territories

Paul Munro
Faculty Arts, Design and Architecture
University of New South Wales

Merian Institute for Advanced Studies in Africa
University of Ghana
Panel Discussion

Dr Iwona Bisaga
Research Associate, Loughborough University

Sam Grant
Director of Energy Access, CLASP

Shanil Samarakoon
Director / Co-Founder, Zuwa Energy
PhD Candidate, University of New South Wales
Workshop 1: *Planning and investing in more resilient energy systems* (15:30-17:30 AEDT), 1 Dec 2020.
  Chaired by Anna Bruce (UNSW) and Iain Macgill (UNSW)

Workshop 2: *Energy resilience and the political economy of off-grid solar* (15:30-17:30 AEDT), 2 Dec 2020
  Chaired by Paul Munro (UNSW)

  Chaired by Atul Raturi (USP) and Long Seng To (Loughborough)

Synthesis Presentation: *Energy resilience and disasters in the South Pacific: political economy dynamics, community responses and planning* (16:00-16:50 AEST)
  Part of the Urban Resilience Asia Pacific Conference.
Workshop Series: Energy Resilience in Pacific Island Countries and Territories

Workshop 1: Planning and investing in more resilient energy systems (15:30-17:30 AEDT), 1 Dec 2020.
   Chaired by Anna Bruce (UNSW) and Iain Macgill (UNSW)

Workshop 2: Energy resilience and the political economy of off-grid solar (15:30-17:30 AEDT), 2 Dec 2020
   Chaired by Paul Munro (UNSW)

Workshop 3: Community energy resilience strategies in response to disasters (15:30-17:30 AEDT), 3 Dec 2020.
   Chaired by Atul Raturi (USP) and Long Seng To (Loughborough)

Synthesis Presentation: Energy resilience and disasters in the South Pacific: political economy dynamics, community responses and planning (16:00-16:50 AEST)
   Part of the Urban Resilience Asia Pacific Conference.
Overview

• Defining some terms:
  • Energy Resilience
  • Political Economy
  • Off-Grid Solar

• Off-Grid Solar in the Global South

• Energy Resilience and Off-grid Solar in the Pacific
  • Vanuatu
  • Fiji
  • Tokelau

• Panel Discussion
  • Audience Q&A

• Audience activity
Energy Resilience

• “Resilience in an energy system can be defined as its ability to reduce the impact of shocks and stresses, including the capacity to anticipate, absorb, adapt to, and rapidly recover from such events and to transform where necessary.” (ARUP 2019)

• Energy systems as “socio-technical” systems.
Political Economy

• An analytical lens that focuses on how broader political and economic processes, across different scales, shape energy outcomes.

• “Despite the relative paucity of academic attention, or acknowledgement by policy-makers of their importance, issues of power and political economy play a key role in determining technological and social outcomes: the winners and losers from different energy pathways, on whose terms the trade-offs between competing policy objectives are resolved, and how.” (Newell and Phillips)

• “Energy for whom and at what cost?” (Newell and Phillips 2016)

Off-Grid Solar
Small-scale power systems

- Solar PVC (photovoltaic cells) electricity is cheaper than kerosene and benzine lamps for lighting and is suitable for many small battery-powered appliances with village application, including torchlights and radios. The government is encouraged to establish a loan fund for PVC power kits to alleviate the first cost burden of this alternative.

Photovoltaics

3.41 A small solar PV system is in operation at a tourist hotel on Tanna Island; it provides energy to sixteen 12-watt bulbs in place of kerosene lamps. [48] No records exist as to the economic feasibility of this system. Several GOV departments have also installed PV systems in selected areas throughout the country, mainly for communication purposes. However, there is a lack of data on their performance and
Off-Grid Solar Sales (in millions)
Investment in Off-Grid solar (US$ million)
Investment in Off-Grid solar (US$ million)  

Most of this investment in East Africa
Energy Resilience in Pacific Island Countries & Territories

UNSW, USP, University of Papua New Guinea, Loughborough University, ITP, ITP Renewables, GSES, CSIRO
Vanuatu:
Main source of electricity for lighting (2009 versus 2016)
Vanuatu: report highlights

• **Some quick statistics:**
  • 32% of the population is connected to the electricity grid (2016)
  • 65% of the population use off-grid solar as their main electricity source (2016)

• **Aid donor support for household off-grid solar programs**
  • 2010-2013: *Lighting Vanuatu Project* (Aus Government Funded): 55,000 solar lanterns sold (objective was 24,000). Lanterns sold commercial by two NGOs.

• Left unchecked, market mechanisms can enable the relatively rich to secure their own resilience while leaving the poor stranded.
  • ‘With solar, it’s always the pesky humans that mess things up. Stress-test by asking the question ‘what can break it?’ Then, work with the community to come up with solutions.’
Vanuatu: report highlights

• Some quick statistics:
  • 32% of the population is connected to the electricity grid (2016)
  • 65% of the population use off-grid solar as their main electricity source (2016)

• Aid donor support for household off-grid solar programs
  • 2010-2013: Lighting Vanuatu Project (Aus Government Funded): 55,000 solar lanterns sold (objective was 24,000). Lanterns sold commercial by two NGOs.

• Left unchecked, market mechanisms can enable the relatively rich to secure their own resilience while leaving the poor stranded.
  • ‘With solar, it’s always the pesky humans that mess things up. Stress-test by asking the question ‘what can break it’? Then, work with the community to come up with solutions.’

<table>
<thead>
<tr>
<th>Household</th>
<th>Urban</th>
<th>Rural</th>
<th>Torba</th>
<th>Sanma</th>
<th>Penama</th>
<th>Malampa</th>
<th>Shefa</th>
<th>Tafea</th>
</tr>
</thead>
<tbody>
<tr>
<td>using solar as main source of lighting (%)</td>
<td>65.4</td>
<td>11.4</td>
<td>83.7</td>
<td>93.6</td>
<td>66.6</td>
<td>95.6</td>
<td>90.9</td>
<td>32.9</td>
</tr>
</tbody>
</table>

Solar Product Breakdown

- Solar lamp
- Pico Solar Home System (< 50 Watt)
- Standard Domestic Solar Home System (50 - 150 Watt)
- Commercial Solar Home System (> 150 Watt)
Fiji: report highlights

• Some quick statistics:
  - 78.9% of the population is connected to the electricity grid.
  - 12.5% of the population use off-grid solar as their main electricity source.

• Government has various programs and funds to implement off-grid solar systems in remote communities:
  - Since 2016, around 5000 households have had solar homes systems installed, reaching a total of about 13,500 systems. Under the new Rural Electrification Fund, there is a target to electrify over 300 communities by 2036, with an estimated 17,000 households being electrified.

• One stakeholder: long-term success of rural electrification programs were not with technical design, but rather the social structure of the community and how this shapes the ability to maintain and pay for energy systems.

• Communities claiming government owned energy systems. (refusal of payment):
  - No one would have to pay for electricity – local electoral promises.
  - Not enough money available to maintain the system.

• Questions:
  - Who should own and take responsibility for their off-grid solar energy systems?
  - How have these systems performed during and after severe cyclones?
Tokelau: report highlights

• Some quick statistics:
  • Population 1,500 people.
  • Low-lying atolls.
  • 100% renewable energy (achieved 2012) – funding from the NZ Government.

• Three solar power stations:
  • PV panel, inverters, batteries
  • Tropical environment, necessitating long-term planning for the longevity and resilience of the systems.
  • Frequency and severity of storm surges creates logistical challenges around the placement, structural integrity and corrosion protection of energy infrastructure.

• At night, Tokelau relies on batteries to supply the energy demand and reduce fuel consumption.
  • “I cannot tell you how many thousands of batteries are lying around the Pacific, not being recycled, simply because no one bothered with them. They use them as weights on the roof to keep the tin flying off.”
Dr Iwona Bisaga
Research Associate, Loughborough University

Sam Grant
Director of Energy Access, CLASP

Shanil Samarakoon
Director / Co-Founder, Zuwa Energy
PhD Candidate, University of New South Wales
Questions:

1. What ways can the spread of off-grid solar products enhance energy resilience in the South Pacific?

2. What are some of the limitations of off-grid solar products in promoting energy resilience in the South Pacific?

3. What are the benefits and limitations of market models for spreading off-grid solar and promoting energy resilience?

4. What research questions need to be answered to support this?

Post any responses/idea that you have in relation to these questions here:

https://padlet.com/ehunsw/EnergyResilience2