5th Project DIREKT Meeting

Project DIREKT Seminar
Renewable Energy in Small Island States

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The University of the West Indies, Cave Hill Campus
Barbados

Renewable Energy Developments in the Pacific – present status and future prospects

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RE in the PICs – Outline

• Energy Policy and Strategy in the region
• RE activities – regional
• RE activities – Fiji
  – National grid
  – Rural electrification
• Standards and certification
• The Future
The Pacific Island Countries and Territories (PICTs)
1. Energy Policy and strategy

• Energy challenges of the region
  – No indigenous sources of fossil fuel
  – Remoteness
  – Lack of human capacity and institutional mechanisms
  – Need policies at national level and strategies at regional level
• In 2004 the regional Pac Island Energy Policy (PIEP) – ineffectual (defunct)
• 2009/2010 replaced by the more imaginative Framework for Action on Energy Security in the Pacific (FAESP)
The FAESP

- FAESP is based on 11 guiding principles and 7 themes
  - Principles include primacy of national energy policies, whole-of-sector-approach to energy solution, many partners, one team philosophy
  - The 7 themes are
    1. Leadership, governance, coordination and partnership
    2. Capacity development, planning, policy and regulatory frameworks
    3. Energy production and supply
      - Petroleum and alternative liquid fuels
      - Renewable energy
    4. Energy conversion
      - Electric power
FAESP (7 themes cont)

5. End-use energy consumption
   • Transport energy use
   • Energy efficiency and conservation

6. Energy data and information

7. Financing, monitoring and evaluation
IPESP

- FAESP lays down the policies and the philosophies – need a concrete plan to realise these ideas
- Sets up indicators to monitor activities of the 7 themes at regional level.
- Each indicator comprises of components that are specific indicators at the national level.
- Additional indicators, called macro indicators, monitor the 4 key elements of FAESP- access to energy, affordability, efficiency and productivity, environmental quality.
IPESP cont.

- Thematic indicators use a scoring system that can be applied to the national level and aggregated across the region for comparative analysis of performance indicators across the Pacific Island Countries and Territories (PICTs).

- The year 2009 was chosen as the baseline year (as 2008 had an oil price spike in it).
IPESP cont.

- E.g. of a macro indicator

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to energy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Electrification rate</td>
<td>%</td>
<td>Share of households connected to the grid</td>
</tr>
<tr>
<td>2. Access to small-scale power</td>
<td>%</td>
<td>Share of households with access to basic electrification (SHS + grid)</td>
</tr>
<tr>
<td>3. Access to modern energy rural</td>
<td>%</td>
<td>Share of rural households with access to modern cooking and lighting energy</td>
</tr>
<tr>
<td>4. Access to modern energy urban</td>
<td>%</td>
<td>Share of urban households with access to modern cooking and lighting energy</td>
</tr>
</tbody>
</table>
IPESP cont.

Matrix of regional activities

This matrix shows all the regional activities and their indicators with their priorities and shows the timelines and required funding.

E.g. entry for Theme 2 – capacity development, energy planning, policy and regulatory frameworks.
## Example of matrix entry – theme 2

<table>
<thead>
<tr>
<th>Priorities</th>
<th>Regional Activities</th>
<th>Indicator /Measurement</th>
<th>Timeframe</th>
<th>Indicative Activity Costs (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policies and implementation plans /roadmaps, and M&amp;E frameworks</strong></td>
<td>Support and improve capacity to collate, analyse and disseminate energy data including the assessment of the energy sector</td>
<td>20 PICTs energy country profiles</td>
<td>2011</td>
<td>350,000</td>
</tr>
<tr>
<td></td>
<td>Assist in the development and costing of their energy policies and implementation plans</td>
<td>6 PICTs costed IPs adopted</td>
<td>2014</td>
<td>180,000</td>
</tr>
<tr>
<td></td>
<td>Assist in the formulation of administrative and legal tools</td>
<td>Assisted 6 PICTs</td>
<td>2015</td>
<td>250,000</td>
</tr>
<tr>
<td><strong>Regulations, legislation and other administrative and legal tools</strong></td>
<td>Support for training in energy planning, policy and regulatory frameworks</td>
<td>6 training activities conducted</td>
<td>2014</td>
<td>200,000</td>
</tr>
<tr>
<td></td>
<td>Conduct periodical training needs assessments</td>
<td>2 TNAs conducted</td>
<td>2015</td>
<td>100,000</td>
</tr>
<tr>
<td><strong>Human and institutional capacity development</strong></td>
<td>Develop and implement energy training programmes</td>
<td>2 regional training programmes implemented</td>
<td>2015</td>
<td>250,000</td>
</tr>
<tr>
<td></td>
<td>Promote the exchange of expertise between PICTs</td>
<td>3 exchange schemes realised</td>
<td>2015</td>
<td>150,000</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td></td>
<td></td>
<td></td>
<td>US$1,480,000</td>
</tr>
</tbody>
</table>

**Theme 2:** Capacity Development, Energy Planning, Policy and Regulatory Frameworks
2. RE Activities - regional

• At regional and national levels
• Regional Activities
  – Secretariat of the Pacific Community (SPC) – North REP
  – International Union for the Conservation of Nature (IUCN) – various energy programmes
  – South Pacific Regional Environmental Program (SPREP)- Pacific Island Greenhouse Gas Abatement using Renewable Energy Programme (PIGGAREP)
## Regional activities cont.

**RE monitoring and resource assessment in the PICs - 2011**

<table>
<thead>
<tr>
<th></th>
<th>Country</th>
<th>Site (exact location)</th>
<th>Type of monitoring/assessment</th>
<th>Date of installation/conduct</th>
<th>Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Samoa</td>
<td>Upolu</td>
<td>2 wind and solar monitoring stations</td>
<td>Jun-07</td>
<td>UNDP supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Savaii</td>
<td>1 wind station without tower</td>
<td>2010</td>
<td>UNDP supported</td>
</tr>
<tr>
<td>2</td>
<td>Cook Islands</td>
<td>Rarotonga</td>
<td>1 wind and solar monitoring station</td>
<td>May-07</td>
<td>UNDP supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Atiu Island</td>
<td>1 wind and solar monitoring station</td>
<td>May-10</td>
<td>UNDP supported</td>
</tr>
<tr>
<td>3</td>
<td>Tuvalu</td>
<td>First Funafuti, now Niulakita Is</td>
<td>1 wind and solar monitoring station</td>
<td>May-07</td>
<td>UNDP supported</td>
</tr>
<tr>
<td>4</td>
<td>Nauru</td>
<td></td>
<td>1 wind and solar monitoring station, excluding tower</td>
<td>Jul-09</td>
<td>UNDP supported</td>
</tr>
<tr>
<td>5</td>
<td>Fiji</td>
<td>Rotuma</td>
<td>1 wind and solar monitoring station</td>
<td>Jun-07</td>
<td>UNDP supported</td>
</tr>
<tr>
<td>6</td>
<td>Solomon Islands</td>
<td>Tender for Kirakira, Buala, Rennel, Taro</td>
<td>1 wind, solar, temp, pressure station</td>
<td></td>
<td>PIGGAREP (UNDP supported)</td>
</tr>
<tr>
<td>7</td>
<td>Vanuatu</td>
<td>Tendered, 1 for each of 6 provinces</td>
<td>1 wind, solar, temp, pressure station</td>
<td>Tender to be signed this week (25 Feb11)</td>
<td>Vanuatu govt/PIGGAREP/IUCN</td>
</tr>
</tbody>
</table>
3. Fiji Activities

- National grid development
- Rural electrification
  - Hydro
  - small home PV systems
  - Outer island biofuel projects for alternative diesel fuels
National grid – the Nadarivatu hydro project

• Grid power available in
  – Viti Levu (coastal region electrified)
  – Vanua Levu (Labasa and Savusavu)
  – Ovalau

• Main sources on Viti Levu are
  – Monasavu hydro (80 MW)
  – Other small hydro (~12 MW)
  – Diesel power stations at Kinoya (Suva), Vuda (Nadi) and others
  – Wind farm at Butoni (Sigatoka) (10 MW)

• Nadarivatu will add another 40 MW
Site of Nadarivatu project
Nadarivatu hydro project cont.

- Located at the upper Sigatoka river and junction of the Qaliwana and Nukunuku rivers
- Power station at Ba river
- Design flow $Q = 15\ m^3/s$, gross head $H = 335.7\ m$
- Capacity $41.7\ MW$ (check $P(kW) = 10\ QH = 5035\ kW = 50.35\ MW$)
- Concrete weir, 2 km upper tunnel, 1.4 km penstock, 2x22 MW Pelton wheel turbines
View from Qaliwana river
Weir construction
Penstock construction
Switchyard construction
Rural electrification

Small Hydro – Buca Village Vanua Levu
30 kW – funded by Turkish and Fiji governments
Buca hydro cont

Power house
Outer island biofuels programme

- Plan to provide electrification for outer island through use of coconut oil (CNO)/deisel blends
- Currently 20% CNO/80% deisel proposed, but later 100% CNO for diesel generators modified using duel fuel kits.
- Each mill with a capacity of 463,000 L per annum
- Koro, Rotuma and Cicia completed
- Feasibility study being carried out (Oct 2011) in the Lau group
Fiji’s outer islands
Biofuel for outer islands cont.
4. Standards and certification

• Biofuel blends being produced by a number of private companies as well – need to define standards and certify new biofuels for consumption
• Biofuel standards approved by cabinet this year
• Negotiations with USP for establishment of an accredited biofuels testing laboratory
5. The future

- Fiji’s powergen target – 90% renewable by 2015 – big boost with Nadarivatu coming online
- Rural electrification via small PV home systems ongoing
- Biofuel feedstock production in Vanua Levu (jatropha, pongamia, castor) by Biofuel International
- Other nations with similar ambitions – see Tonga’s TERM, Samoa’s biogasification scheme
Thank you for your attention!