MICRO GRIDS – A SOLUTION FOR ELECTRICITY ACCESS IN THE PACIFIC ISLAND COUNTRIES

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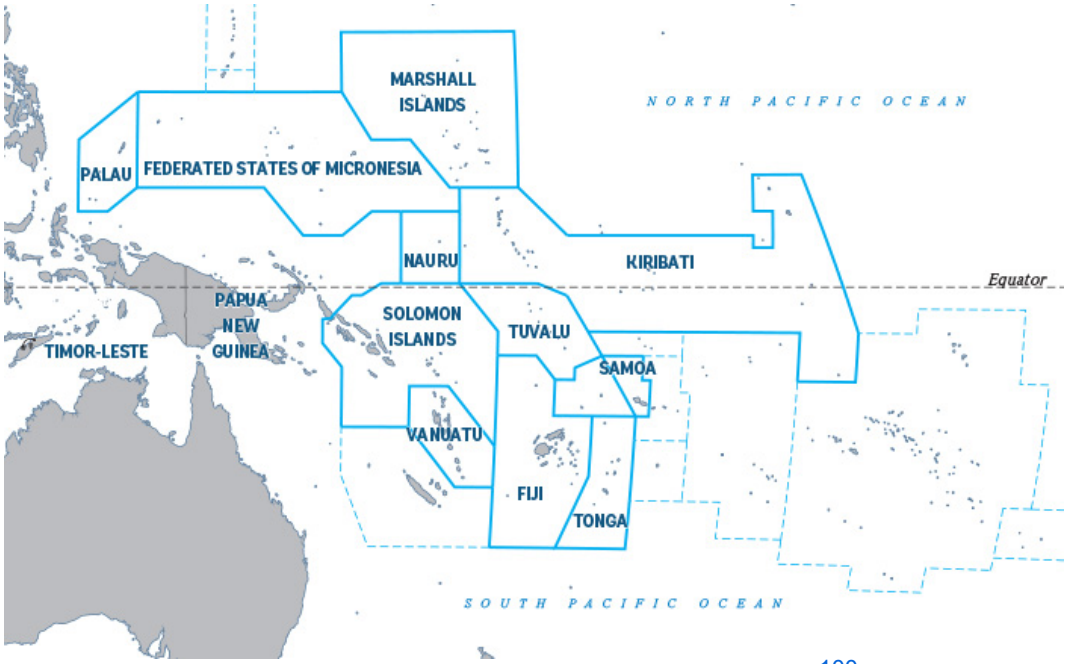
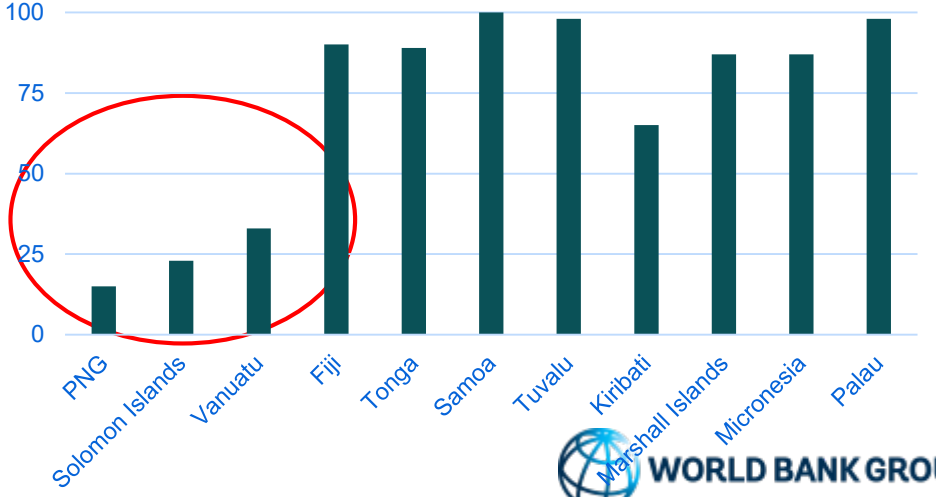
World Bank Group - Pacific energy operations



- 13 countries, 10M people, 8 with populations less than 200K
- Low access in PNG 15%, SI, 20%, Vanuatu 35%
- Small systems 3MW Tuvalu to 370MW PNG
- Mainly diesel, most lack indigenous fuel sources
- Demand for productive use
- RE integration issues
- Natural disasters

Energy access rates %



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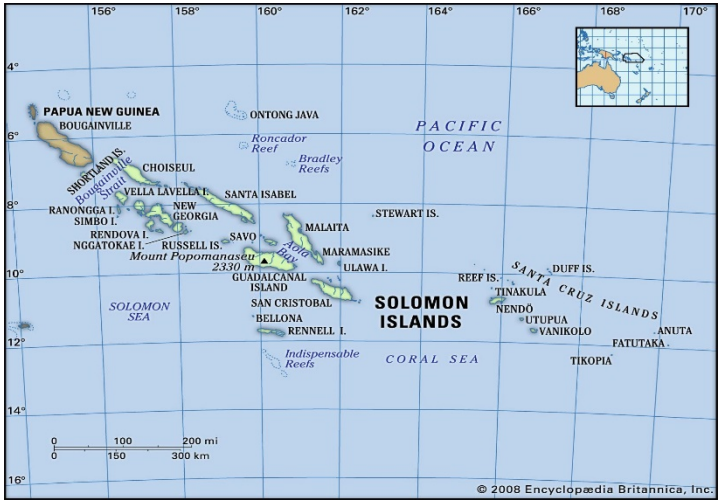
Energy sector challenges – scale/expertise/finance

- Demand – small islands, low demand, mostly not “grid” suitable
- Dispersed communities, low income, limited technical expertise, remote from main centers, markets thin (size/number), limited scale
- Weak supply chains, small private sector, limited financial sector reach
- Lack of finance for borrowers (loans) and investors/suppliers (working capital/loans/equity)
- Weak policy, planning and legal and regulatory frameworks (governance).
- Weak institutions and capacity
- Community land ownership
- Telecommunications available



Maps: Maps.com, Encyclopedia Britannica

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Energy access options – grid and off grid

- Grids: main islands, high density
- Mini/micro grids:
  - utility models for larger population centers
  - purchase options for smaller single user applications
- Solar Home Systems (SHS) for dispersed communities
- “Plug and Play” systems for the very remote isolated homes and businesses

Source: IRENA

Photos: Courtesy DoE, Vanuatu and Fiji

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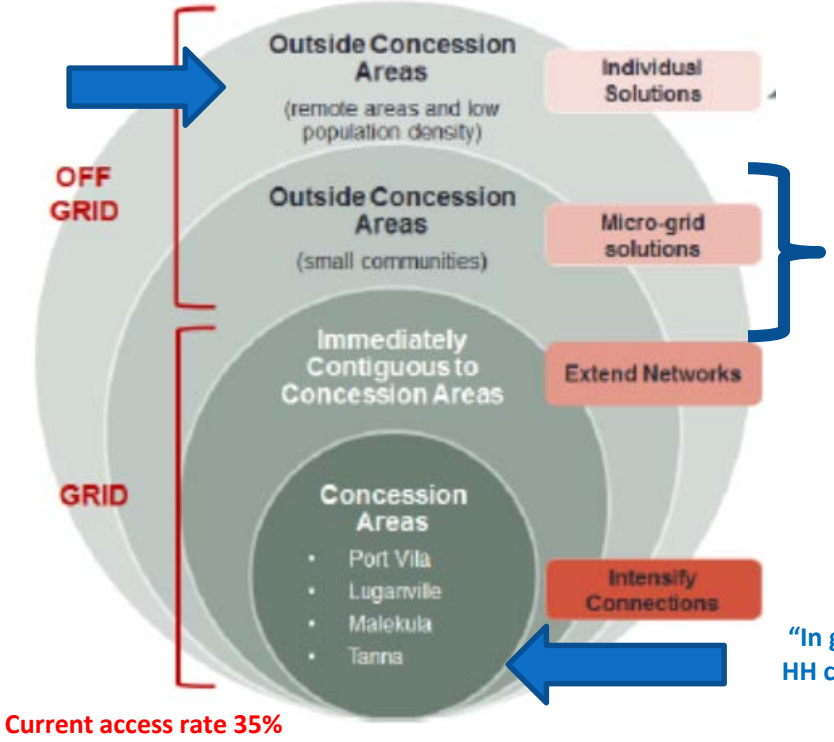
Energy Access Framework for Vanuatu

Plug and play systems



Mini/micro grids

"In grid"/contiguous HH connections

Current access rate 35%

Private sector delivery models

Maps: Maps.com
Diagram: Vanuatu National Energy Road Map

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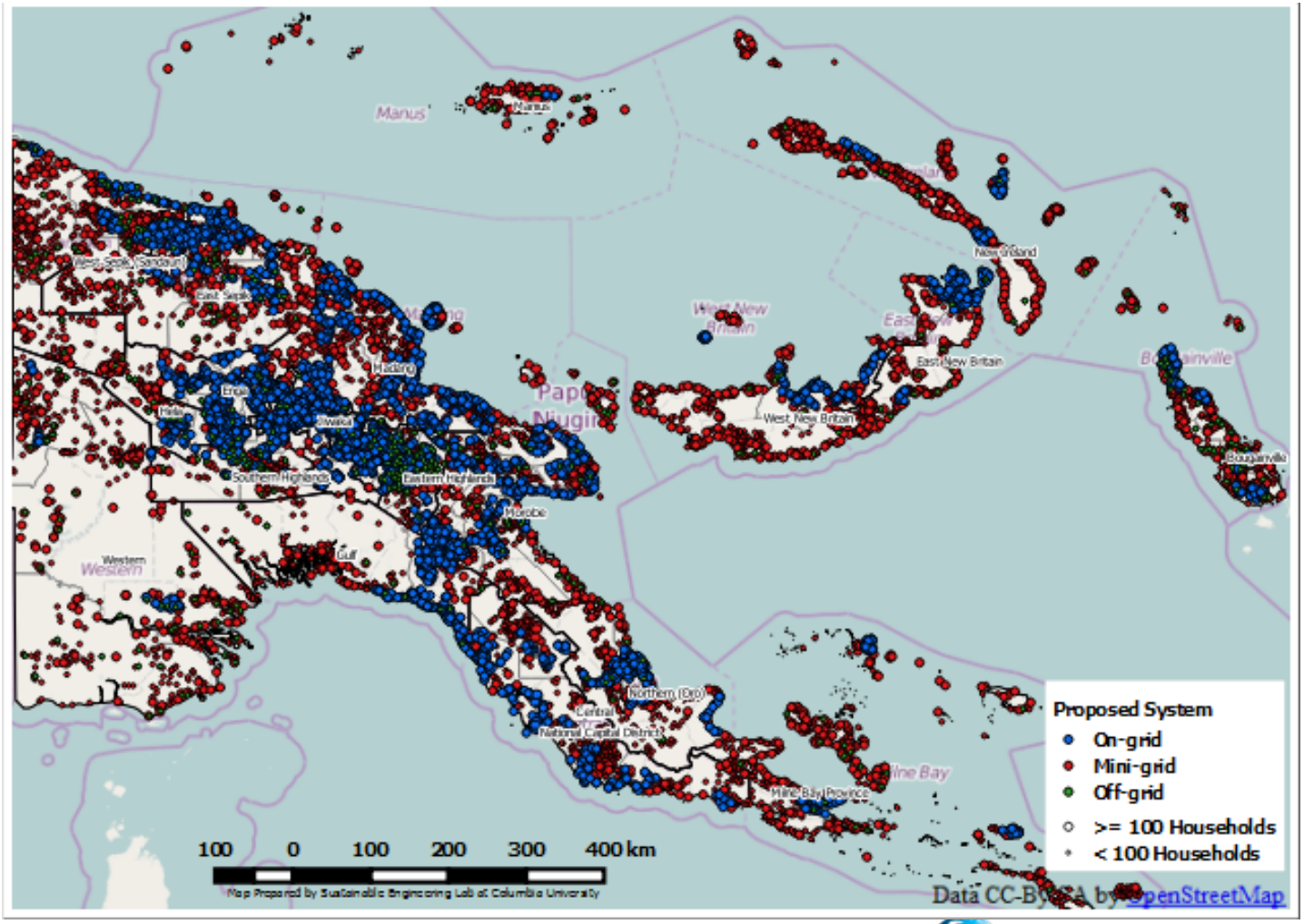
Mini grid potential in PNG – NEROP

Grid for more densely populated coastal & highland areas

Mini-grid for sparsely yet sufficiently populated areas & islands

Off grid recommended for sparsely yet densely populated areas & islands



Source: The Earth Institute Columbia University, Sustainable Energy Lab, ECA

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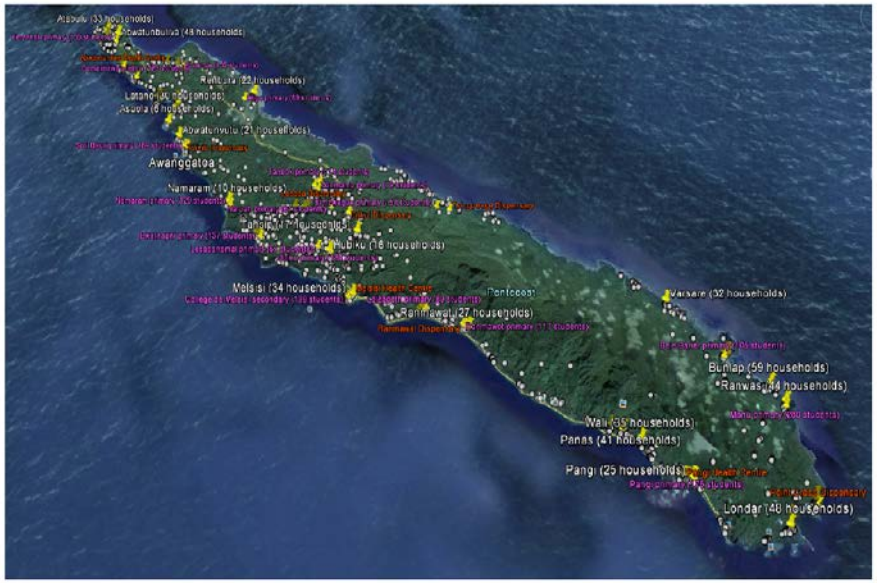
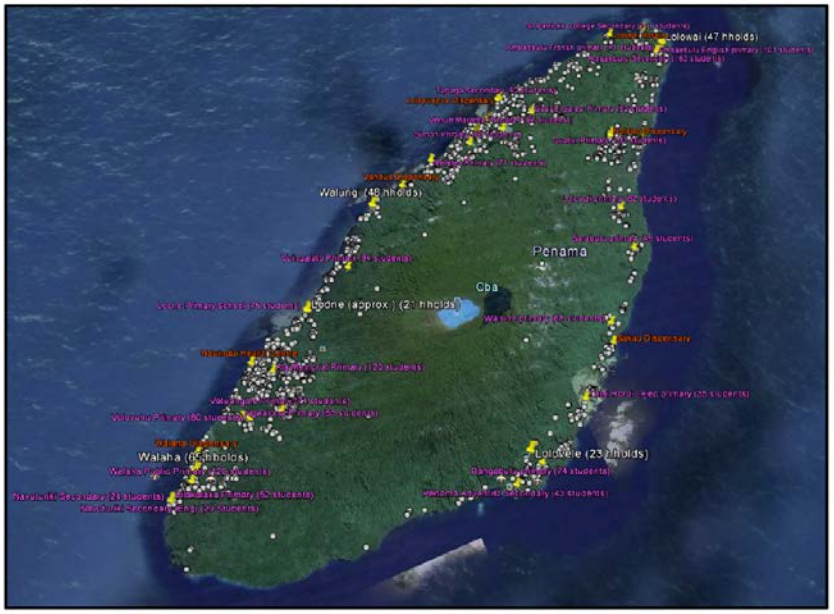
Summary mini/micro grid solutions - framework

- **Private sector** operating models for sustainability (financial and operational)
- Need for **scale**/equity for viability
- **Scalable** to meet increase in demand, initially 1.2kWh/day, 30 – 40 kWh /month per household



Pentecost Island
Total Villages = 278 (18809 population / 4035 households)
Largest Village = 69 households (297 population)



Ambae Island
Total Villages: 105 (11061 population / 2376 households)
Largest Village = 65 households (275 population)

- Low costs to match **capacity to pay** – around US$20-30/month
- **Community engagement** to address land issues
- Social and environmental approaches to minimise impact

Source: Google maps, World Bank and DoE, Vanuatu

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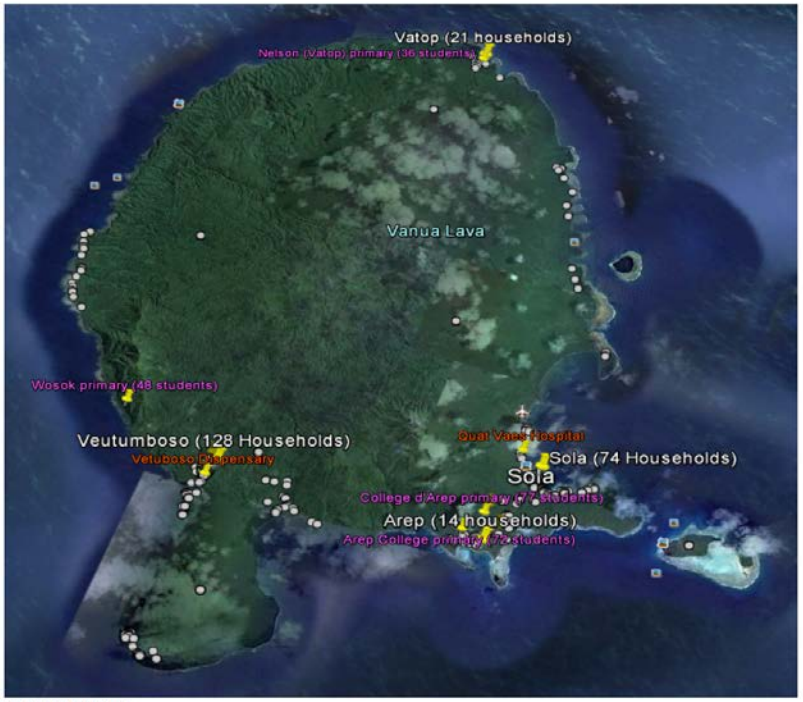
Summary mini/micro grid solutions - technology

- Least cost, proven technology, resilient
- Energy management and SCADA for grid integration (Kiribati)
- Service levels and operating duty targeted to affordability

Photo: Courtesy PUB, Kiribati

- Periodic maintenance with basic on-site support
- Remotely operated and managed with metering & IT platforms for off grid
- Pre-payment/Pay As You Go (PAYG) systems



Vanua Lava Island
Total villages = 30 villages (3110 population / 587 households)
Largest village = 128 households (591 population)

Source: Google maps, World Bank and DoE, Vanuatu

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