

# Pacific Lighthouses

*Renewable energy opportunities and challenges in the Pacific Islands region*

## Solomon Islands



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## Acknowledgements

The work and data for the preparation of this paper was carried out by Herb Wade (Consultant). The kind assistance and support provided by Andrew Daka (Pacific Power Association), John Korinihona (Solomon Islands Energy Office), Nixon Kua (Secretariat of the Pacific Regional Environment Programme) and Apisake Soakai (Consultant) are gratefully acknowledged. This country report could not have been completed without their generous assistance.

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August 2013

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**Note on currency:**

On October 23, 2012, the exchange rate was Solomon Islands Dollars (SBD) 7.348 per United States dollar (USD).

# Preface

In the Abu Dhabi Communiqué on accelerating renewable energy uptake for the Pacific Islands (of 13 January 2012), leaders from the Pacific Island Countries and Territories (PICTs) called on the International Renewable Energy Agency (IRENA) to “...map the Renewable Energy Readiness of the Pacific Islands Countries and Territories to ascertain the status of renewable energy opportunities and identify pathways to close gaps” and to integrate all IRENA activities in the region “...into a coherent roadmap for the Pacific Islands”. In response, IRENA has carried out a wide range of activities of specific relevance and application to the PICTs as well as other Small Island Developing States (SIDS). This work has now been integrated into the IRENA report: ***Pacific Lighthouses: Renewable Energy Roadmapping for Islands***.

The report consists of an overview roadmap framework and 15 island-specific studies on the respective energy

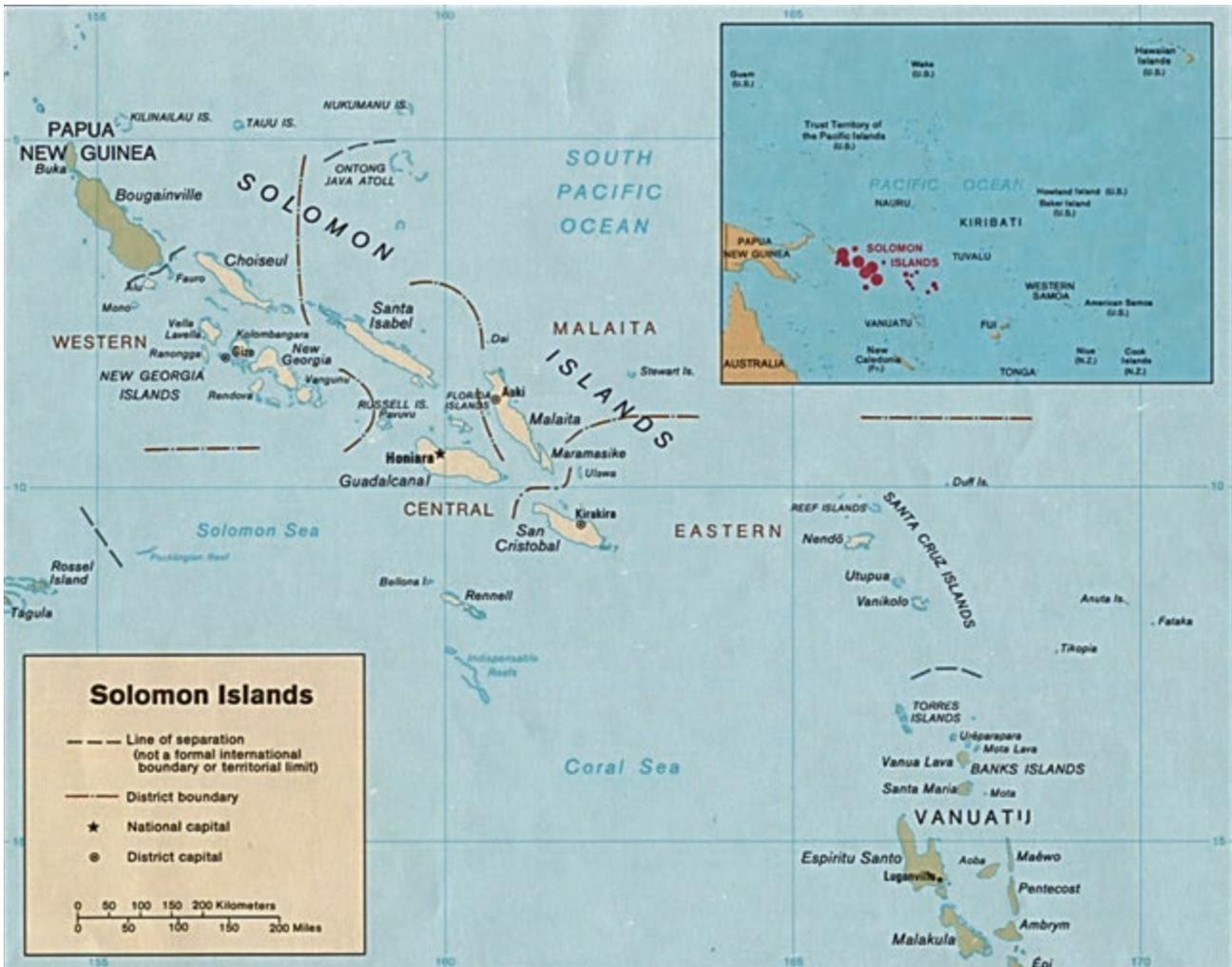
situations, and the challenges and opportunities for renewable energy deployment, around the region. These studies are available for the Cook Islands, the Federated States of Micronesia, the Republic of Fiji, Kiribati, the Republic of the Marshall Islands, the Republic of Nauru, Niue, the Republic of Palau, Papua New Guinea, Samoa, the Solomon Islands, the Kingdom of Tonga, Tokelau, Tuvalu and the Republic of Vanuatu. The IRENA Pacific Lighthouses report draws on those studies, as well as an additional study on a diesel-renewable energy hybrid power system, intended as a transition measure to a renewables-based energy future for the PICTs, which is also part of the series.

IRENA, in collaboration with its members and other key development partners, will continue to support the development national roadmaps and strategies aimed at enhanced deployment of renewables in the Pacific and other island states and territories.

# Acronyms

|               |  |
|---------------|--|
| <b>ADB</b>    | Asian Development Bank                                   |
| <b>APACE</b>  | Appropriate Technology for the Community and Environment |
| <b>ASTAE</b>  | Asia Sustainable and Alternative Energy Program          |
| <b>AusAID</b> | Australian Agency for International Development          |
| <b>GDP</b>    | Gross Domestic Product                                   |
| <b>GWh</b>    | Gigawatt hours (thousands of millions of watt hours)     |
| <b>JICA</b>   | Japan International Cooperation Agency                   |
| <b>kW</b>     | Kilowatt (thousands of Watts)                            |
| <b>kWe</b>    | Kilowatts equivalent                                     |
| <b>LED</b>    | Light Emitting Diode                                     |
| <b>LPG</b>    | Liquefied Petroleum Gas                                  |
| <b>MJ</b>     | Megajoules (millions of joules)                          |
| <b>ML</b>     | Megalitres (millions of litres)                          |
| <b>MMERE</b>  | Ministry of Mines, Energy and Rural Electrification      |
| <b>MW</b>     | Megawatt (millions of Watts)                             |
| <b>MWe</b>    | Megawatt equivalent                                      |
| <b>NASA</b>   | National Aeronautical and Space Agency (US)              |
| <b>NGO</b>    | Non-Governmental Organisation                            |
| <b>OTEC</b>   | Ocean Thermal Energy Conversion                          |
| <b>PIREP</b>  | Pacific Island Renewable Energy Project                  |
| <b>PV</b>     | Photovoltaic   |
| <b>RESCO</b>  | Renewable Energy Service Company                         |
| <b>SBD</b>    | Solomon Islands Dollar                                   |
| <b>SIEA</b>   | Solomon Islands Electricity Authority                    |
| <b>SISEP</b>  | Solomon Islands Sustainable Energy Project               |
| <b>SIVEC</b>  | Solomon Islands Village Electrification Council          |
| <b>SPOL</b>   | South Pacific Oil, Ltd.                                  |

# 1. Country context



**Figure 1. Map of the Solomon Islands**

Source <http://www.lib.utexas.edu/maps>

*The boundaries and names shown on this map do not imply official acceptance or endorsement by the International Renewable Energy Agency.*

**Physical description.** The Solomon Islands consists of nearly 1000 islands – 350 of which are populated – with 28 000 km<sup>2</sup> of land spread over 0.8 million km<sup>2</sup> of sea. There are six main islands: Guadalcanal, Malaita, Makira, Santa Isabel, Choiseul and New Georgia. The climate is tropical monsoon, with few extremes of temperature and weather. The islands are mostly rugged and moun-

tainous and the country is relatively rich in mineral, hydro and forest resources.

**Population.** Current population growth is about 2.3% annually with the 2009 census recording 515 870 persons, making the population density about 17 persons per km<sup>2</sup>. Urban growth has been 4.7% since 2003 with 101,798 persons (about 20% of the population) consid-

ered urban dwellers. About 94% of the population are Melanesian, 4% Polynesian, 1% Micronesian and 0.5% European and Chinese. About 80% live in rural villages and 80% of the urban population lives in the capital, Honiara. At the time of the 2009 census, there was an average of 5.5 persons per household. By 2019, the population is expected to reach 716 000 with 105 000 in Honiara, where fuelwood availability is already becoming a problem. Rapid urban growth could affect practical future energy use options.

**Environment.** The Solomon Islands is party to various treaties and conventions related to environmental protection, including the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol and the Montreal Protocol and its subsequent Amendments.

**Economic overview.** The economy consists of a mixed subsistence sector on which the majority of the popula-

tion is dependent, and a small monetised sector dominated by large-scale commercial enterprises. Between 1996 and 2002, the GDP declined in real terms by 24%, over 35% per capita. Performance was considerably worse for the monetised sector than the subsistence sector. From 2003 the GDP grew by 3.8%, returning to earlier levels and signalling the return of economic growth. In 2010 the economy grew by 7.1% as a result of higher world prices for gold, palm oil, timber and fish achieving. In 2011 it grew even further by 9.3%. However, the leading export, natural forest timber, is expected to rapidly decline by 2015 lowering long-term economic projections. The Solomon Islands' GDP in 2010 was estimated by the World Bank as SBD 4 988 million (USD 678.8 million).

The government is a signatory to three regional trade and economic trade agreements and the Cotonou Agreement, which provides access to European Union development assistance.

## 2. Energy landscape

### Institutional and regulatory arrangements for energy

**Energy Division.** The Energy Division within the Ministry of Mines, Energy and Rural Electrification (MMERE) is responsible for energy policy, renewable energy development and project implementation. The Energy Division's roles are extensive but staffing levels and financial allocations are reportedly inadequate to carry out these functions, though there has been improvement since 2008.

**National Energy Policy Framework (2007).** Numerous draft energy policies have been developed since the 1980s with considerable donor assistance. A National Energy Policy Framework was endorsed by the Cabinet in 2007. The NEP, currently under review, aims to promote education on dependence on imported fossil fuels, increased use of renewable energy resources and energy efficiency for the sustainable development of the country. Although developing renewable energy and rural electrification policies is a priority for the Energy Division, no such policies are currently in place.

In 2010, in its support of clean energy development for sustainable rural development, the Cabinet of the Solomon Islands approved the exemption of imported solar power equipment from import duty tax and goods tax.

**Solomon Islands Electricity Authority (SIEA).** Electric power is the responsibility of the government-owned SIEA, which supplies Honiara, as well as eight provincial centres: Auki, Kirakira, Lata, Tulagi, Buala, Gizo, Malu'u and Noro in Western Province. SIEA has around 220 employees but has a long history of under-investment, insufficient resources and limited staff capacity.

**Markwarth Oil Ltd (MOL) and South Pacific Oil Limited (SPOL).** These two national oil companies supply the Solomon Islands with petroleum products. Both companies have storage depots in central Honiara. Petroleum and gas (LPG) prices are regulated by a Price Control Unit within the Ministry of Commerce, Industries, Labour and Immigration.

Legislation that impacts on energy includes:

- The Electricity Act of 1969 which created SIEA and gave it exclusive rights for power generation in Honiara and provincial centres. Exclusions

were later added which allowed private generation of less than 50 kW capacity for certain purposes without the need for an SIEA licence. This allowed rural villages to generate their own electricity without a licence as long as their generation capacity remained below 50 kW.

- The River Waters Act of 1981 impacts on hydro development and is intended to prevent upstream water uses to adversely impact on downstream populations.
- The Provincial Government Act of 1981 allows provincial governments to provide electrical services within their jurisdiction.
- The Environmental Act of 1998 includes environmental impact assessment requirements that could affect some future energy sector investments.
- Land Tenure Legislation attempts to sort out some of the many issues surrounding the use of land in the Solomon Islands. About 87% of land rights are based on Customary Land terms, the traditional approach to land transfer and use, and the rest is Alienated Land, which was procured and given freehold title during the colonial era.

Regulation of electricity systems does not go beyond basic licensing of private generation by SIEA and a number of different agencies have some impact on how SIEA and other electricity suppliers operate. The principal energy agency is the 15-person Energy Division within the Ministry of Mines, Energy and Rural Electrification (MMERE). The Department of Commerce regulates electricity tariffs and petroleum prices through its Price Control unit. Important institutions for project development also include the Chiefs Committees and the Customary Lands Appeal Court.

In the 1990s, the Commodities Export Marketing Authority (CEMA) established copra milling facilities in all the provincial centres but none are currently operating. In 2006, a local company, Solomon Tropical Products (STP), developed the concept of electrifying villages using coconut oil for local generation by establishing modular oil mills at villages, assisting in the development of a village electricity grid, and installing engines that could use pure coconut oil as a fuel. However this concept was never realised.

The Solomon Islands has no national energy committee or other mechanism to coordinate energy sector issues.

However, there is a government task force comprising high-level officials from various ministries and representatives from the Guadalcanal Provincial Government that oversees the development of the 15 MW Tina River Hydropower Project. The project office reports to the taskforce which in turn reports to the Minister of Mines, Energy & Rural Electrification.

## Energy supply and demand

**Petroleum.** The Solomon Islands is almost completely dependent on imported petroleum for its commercial energy needs although biomass still accounts for about 40% of gross national energy production, with other renewables representing about 1% and the rest coming from petroleum. Data on import volumes was are not available from the petroleum importers at the time of writing. In 2011, the major energy consumption sectors were residential at 44.1%, transport 42.1% and industry 10.8%.

The share of oil products in the country's energy consumption has increased from 47.5% to 52.7% mainly at the expense of biomass, the share of which fell from 47.4% to 43.1%, and electricity which fell from 5.1% to 4.2%. Virtually all of the Solomon Islands' electricity is generated from imported diesel. The forecast for 2020 predicts a continuing trend for oil (up to 56.3%) and biomass (down to 39.5%), and the share of electricity to remain unchanged.

**Electricity generation and demand.** There are two small hydropower plants in provincial centres totalling 182 kW of capacity but all the rest of SIEA generation is diesel. Although larger-scale hydropower has been considered for years, to date there is no large hydropower plant on line. Guadalcanal accounts for over 80% of total generation in the Solomon Islands and is therefore the primary target for hydro development. Although projects were begun in the past on the Lungga and Komarindi rivers, the current focus is on hydro development on the Tina River where it is hoped to provide around 60 GWh each year for the Honiara grid, which would cut diesel use by about half. The development is intended to have a minimal environmental effect and cause little disturbance to local communities. An initial feasibility study concentrating on the technical and economic aspects of the project was completed in 2011 and recommended proceeding with the project. However, the project is still in the preparatory stage and social and environmental assessments are still being undertaken. A major hurdle, as experienced by past project proposals, will be land access.

The Tina River project is being developed by MMERE. Preparatory activities for the project are being financed

by the World Bank, (through the Pacific Regional Infrastructure Fund – PRIF); the Australian Agency for International Development (AusAID); the Asia Sustainable and Alternative Energy Program (ASTAE) trust funds; the International Finance Corporation (IFC); as well as with the MMERE.

Under ADB funding, feasibility studies commenced in January 2013 for the development of small-scale hydro power schemes for SIEA's provincial out-stations under the "Outer Islands Renewable Energy Development Project in Solomon Islands".

Japan recently funded SBD 278 million (USD 38 million) in improvements to the Honiara power system including a new genset and upgraded distribution facilities which were commissioned in 2008. In 2007, AusAID began a rural electrification project focussing on provincial power supplies. AusAID also provided funding for the rehabilitation of the Lungga and Honiara power stations and the installation of a 4.2 MW Wartsila engine that had been purchased by SIEA in 2002.

With support from the World Bank, AusAID and other agencies, the Solomon Islands Sustainable Energy Project (SISEP) began operations in 2009. SISEP aims to improve the operational efficiency, system reliability and financial sustainability of SIEA through improved financial and operational management, reduction of losses, and increased revenue collection.

Technical project implementation support to SIEA will also be provided, along with consultancy services, a technical training programme for engineering staff, and the establishment of a technical partnership with the Fiji Electricity Authority. Components of SISEP include:

- Strengthen SIEA management, including engaging two professional utility line managers (a general manager with a technical background and a commercialisation manager) and an overseas director, and provide training for key management staff.
- Strengthen financial operations, including implementation of a commercialisation programme for the finance department, including new financial management and billing systems and preparation and implementation of a new finance accounting manual with a staff training programme.
- Improve technical operations, by implementing a loss reduction programme, a planned maintenance programme for generation facilities in Honiara, and a distribution reinforcement programme to increase the availability of existing generation and improve system reliability.

There are no reliable data on sectoral energy demand for the Solomon Islands. Table 1 shows SIEA's sale of

**Table 1. Electricity sales in kWh**

| Year | Sector                | Sales in MWh |
|------|-----------------------|--------------|
| 2007 | Residential           | 12 932 316   |
|      | Commercial/Industrial | 39 752 528   |
|      | Government            | 8 662 573    |
|      | TOTAL                 | 61 347 417   |
| 2008 | Residential           | 9 789 661    |
|      | Commercial/Industrial | 37 865 914   |
|      | Government            | 13 182 745   |
|      | TOTAL                 | 60 838 320   |
| 2009 | Residential           | 9 856 957    |
|      | Commercial/Industrial | 37 372 213   |
|      | Government            | 12 762 138   |
|      | TOTAL                 | 59 991 308   |
| 2010 | Residential           | 10 661 361   |
|      | Commercial/Industrial | 41 733 984   |
|      | Government            | 10 694 661   |
|      | TOTAL                 | 63 090 006   |
| 2011 | Residential           | 12 877 942   |
|      | Commercial/Industrial | 43 854 698   |
|      | Government            | 10 280 809   |
|      | TOTAL                 | 67 013 449   |

Source: SIEA (2012)

electricity between 2007 and 2011. A Pacific Island Renewable Energy Project (PIREP) mission in 2004 estimated a 2001/2002 demand for petroleum of 78 ML or 68 kilotonnes of oil equivalent (ktoe), with transport accounting for 56%, electricity 28%, commerce and industry 15% and direct household use (mostly cooking and

lighting) 1%. About 89% of all households rely mainly on biomass for cooking. Fuel wood burning probably totals about 110 ktoe, with additional biomass used for copra and cocoa drying.

In 2011, SIEA sales were 67 GWh of which domestic consumers accounted for 19%, commercial/industrial 65% and government 16%. Honiara accounted for over 80% of the total installed meters (Table 2). For the past 20 years, peak demand in Honiara has usually exceeded load supply so losing two generators causes a blackout. Figure 2 shows Honiara daily load curves. Outages were frequent during the past although with the recent upgrade of the power system that has ceased to be the case.

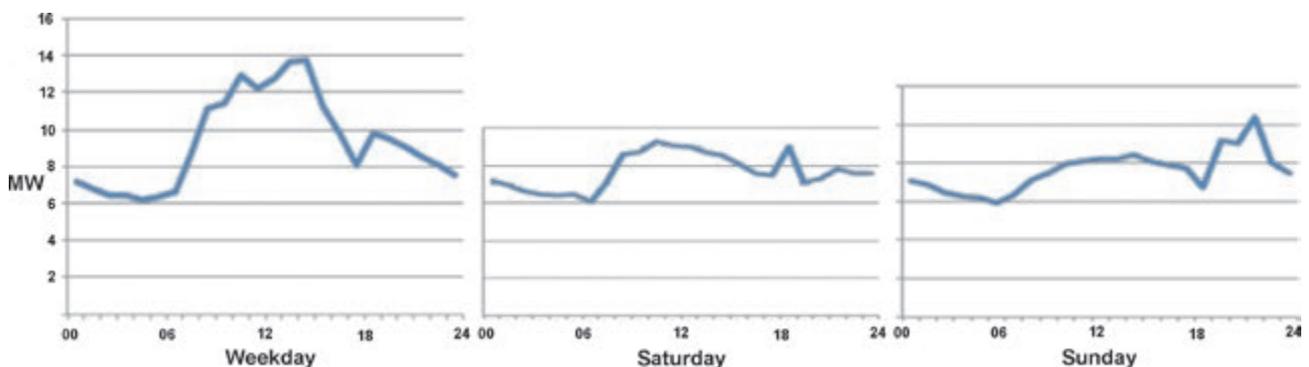
There are 198 streetlights connected to the grid. All are unmetered so SIEA subsidises their use.

**Electricity tariffs.** SIEA has a national tariff with substantial cross-subsidies from Honiara consumers to others. In March 2012, the tariff was SBD 5.9756 per kWh for residential, SBD 6.2526 for commercial and SBD 6.4180 for business.

**Table 2. Installed meters**

| Class of service           | Number of meters |
|----------------------------|------------------|
| Residential standard meter | 2 956            |
| Residential prepaid meter  | 7 801            |
| Commercial standard meter  | 5 283            |
| Commercial prepaid meter   | 1 077            |
| Government standard meter  | 660              |
| Government prepaid meter   | 0                |

Source: SIEA (2012)



**Figure 2. Load curves**

Source: Tokyo Electric Power Company, Inc. (2009).

### 3. Renewable energy opportunities

The technical potential for renewable energy production in the Solomon Islands is considerable but most suitable sites are far from demand centres and cannot be readily exploited. Little of the renewable energy potential has been accurately assessed.

**Geothermal energy.** There are indications of exploitable geothermal resources in at least at four locations: West Guadalcanal, Paraso Bay on Vella Lavella Island, Simbo Island, and Savo Island. In Paraso Bay, studies suggest a 10 Megawatt equivalent (MWe) resource but there is no local demand. In 2012, Kentor Gold Ltd. (KGL) of Brisbane, Australia, was awarded a geothermal-energy prospecting licence and plans to investigate the feasibility of a 20 MW geothermal plant on Savo to power the capital city of Honiara. There are four known thermal areas on West Guadalcanal – Nggurara, Kunjuku, Saikotulu and Koheka – located 40 km from Honiara, about 5 km inland from the coast.

**Hydropower.** Although there are substantial hydro resources on 11 islands there has been only limited evaluation of their potential. The Energy Division, working with the Water Resources Division, plans to install five water-gauging systems and intends to expand this programme to other sites in the future.

Because dams and storage reservoirs would be technically difficult and expensive to construct, most sites are limited to run-of-river schemes. One exception is Komarindi on Guadalcanal, where the Asian Development Bank has financed a design study for a 7 MW system with storage. There is also potential for 20 MW at Lungga on Guadalcanal. More than 20 years ago, a number of hydro systems were considered for development: 360 kW at the Fiu River to serve Auki on Malaita, 25 kW on the Rarinikera River of east Malaita, 200 kW at Puepue on San Cristobal, among others. The government developed a database of over 100 sites for possible small hydro development, of which 62 had an estimated overall capacity of 11 MW. On a larger scale, Japanese experts have identified nearly 330 MW of potential on 11 islands, 73% of which are on Guadalcanal, where the resource has been better investigated since the island accounts for the bulk of national electricity demand. To date the only hydro development has been for village and provincial centre electrification. Two of the installed systems no longer function but six are still operating.

The government, with Asian Development Bank (ADB) assistance, is pursuing the development of five small-scale hydropower schemes for provincial centres, with the intention of assisting SIEA to avoid the high costs of diesel-fired power generation in the centres and increase access to electricity by extending the distribution grid. Pre-feasibility studies were completed in 2011 and a detailed feasibility study is planned for 2013. The sites being considered are Auki (Fiu River) 1160 kW, Lata (Luembalele River) 107 kW, Kira Kira (Huro River) 110 kW, Noro-Munda (Mase River or Vila River) 1 MW to 4 MW (with the finalised option to be selected after the conclusion of the feasibility studies) and Choiseul Bay (Sorave Falls) 260 kW.

**Ocean energy.** Sea wave energy potential in the Solomon Islands does not seem to have been assessed. Extrapolating from results from Fiji and Vanuatu, the annual average wave power could be around 14 kW per metre of wave front, with a wide range varying according to the site. If the technology for tapping sea wave energy were commercially available and economically viable, the Solomon Islands could produce much of its electricity from a few, relatively small plants. There has also apparently been no measurement of deep sea versus surface ocean temperatures to enable estimates of near-shore ocean thermal energy potential or of tidal energy potential, though this is likely to be minor.

**Wind power.** No accurate data are available on the Solomon Islands' wind energy potential. However, in 2011 the Pacific Islands Greenhouse Gas Abatement, through the Renewable Energy Project (PIGGAREP), agreed to fund the purchase and installation of wind energy monitoring equipment for sites on Kirakira, Buala, Rennell and Taro. The project includes training for the Energy Department staff to operate and maintain the monitoring systems.

**Solar energy.** As the Solomon Islands lie near the equator, there is considerable solar energy potential. Records for 1987–1989 suggest an average annual insolation of 6 600 MJ/m<sup>2</sup> of horizontal surface at Guadalcanal's airport. NASA data indicates an average daily insolation value of 5 kWh/m<sup>2</sup> or more, a good solar resource.

**Bioenergy.** The Solomon Islands is heavily forested. However, considering landowner mistrust of government and logging companies, past political interference, and a history of alienation of land from customary con-

control for long-term crops, the development of large-scale biomass energy (particularly involving replanting) may be difficult even where it is technically and economically viable. It is therefore not easy to assess the available biomass energy resource. Even though palm oil and copra are major agricultural commodities the economic opportunities for biomass power generation appear to be very limited.

A large palm oil plantation, Solomon Islands Plantation Ltd, closed in 1999 due to ethnic tensions but later reopened under new ownership, Guadalcanal Plains Palm Oil Limited (GPPOL) which is a part of West New

Britain Palm Oil Ltd of PNG. Palm oil could be used as a distillate replacement, depending on its relative value as a fuel and as an export commodity. Energy from the biomass waste created by oil production continues is used for steam and electricity generation. Another potential fuel for electricity generation is the methane from the waste effluent pond at the mill.

In the mid-1980s, copra output exceeded 40 000 tonnes, enough to produce about 30 ML of coconut oil, equivalent to 28 ML of distillate, sufficient to displace about half of current diesel fuel imports.

## 4. Experiences with renewable energy technologies

**Geothermal energy.** No geothermal power has been developed in the Solomon Islands.

**Hydropower.** SIEA developed two small hydro schemes in 1986 and 1996, 32 kW on the Malu'u River on Malaita, and 150 W at Buala on Santa Isabel. Five new hydro schemes with a total capacity of around 2 MW are reportedly under consideration. An Australian development organisation, Appropriate Technology for the Community and Environment (APACE), and several local non-governmental organisations (NGOs – particularly SIVREC) were active in the past in developing village-based micro-hydro. Three schemes installed from 1983–1997 on Kolombangara (Iri, Vavanga and Ghatere) had very limited funding, rated capacities of 10–12 kW, and each typically generated only 5 kW or less. Based on the experience gained at Kolombangara, more robust designs were used for four subsequent APACE schemes in Malaita (Manawai, 1997; Raeao, 2002; Nari'aoa, 2004) and Bulelavata (New Georgia, 1999) typically generating 15 kW of electricity (Table 3). A large number of communities that have expressed interest in similar schemes are required to make a significant financial contribution towards construction costs. This includes an application fee of SBD 2500 (USD 340), which goes towards a pre-feasibility study, plus an annual SIVREC membership of SBD 100 (USD 13.61) increasing to SBD 500 (USD 68) when the system becomes operational. These fees are used to cover transport, petrol and food for study teams, as well as chainsaw hire and fuel dur-

ing construction. This is a very different approach from most villages' hydro development in the region as it requires serious community input and involvement.

The government funded a 40 kW micro-hydro scheme at Taka Taka Bay, on East Malaita which was installed in 2010 and used to power a freezer used by local fishermen to preserve their catch while waiting for ship transport to the Honiara market. There are further plans to construct a transmission line to Masupa village for the connection of households within the village.

**Ocean energy.** There has been no development of sea wave, tidal, OTEC or other ocean-based energy.

**Wind power.** There have been no significant installations of wind energy systems.

**Solar energy.** Until recently the use of solar PV has been minimal, especially for rural electrification, even though there has been a long-standing government policy to increase rural electrification through renewable energy. By the end of the ethnic troubles, fewer than 100 homes in rural areas were known to have solar electricity. In 2011, almost 8000 homes are said to have received solar installations (Table 4).

Historically, solar PV has been used at church missions since the 1970s for lighting. A few PV refrigerators were installed in 1992 for vaccine cooling in health centres,

**Table 3. Community-managed micro-hydro installations**

| Location        | Capacity | Year | Funding      | Comments                              |
|-----------------|----------|------|--------------|---------------------------------------|
| Iri             | 10 kW    | 1983 | UNIDO/APACE  | Long out of service                   |
| Vavanga         | 12 kW    | 1994 | AusAID APACE | Refurbished in 2006 with 8 kW turbine |
| Ghatere         | 12 kW    | 1997 | AusAID APACE | Long out of service                   |
| Manawai Harbour | 50 kW    | 1997 | China        | Operating                             |
| Nari'ao'a       | 25 kW    | 2004 | China        | Operating                             |
| Raeao           | 25 kW    | 2002 | China        | Operating                             |
| Bulelavata      | 29 kW    | 1999 | AusAID       | Operating                             |

Source: Provided through communication by various sources.

**Table 4. Solar installations in Solomon Islands households**

| Location               | Population | Households | Kerosene | Solar |
|------------------------|------------|------------|----------|-------|
| <b>Malaita</b>         | 137 596    | 24 421     | 19 211   | 2 969 |
| <b>Makira</b>          | 40 419     | 7 173      | 5 735    | 424   |
| <b>Central</b>         | 26 051     | 4 905      | 4 476    | 188   |
| <b>Western</b>         | 76 649     | 13 762     | 10 425   | 1 149 |
| <b>Isabel</b>          | 26 158     | 5 143      | 3 825    | 870   |
| <b>Choisel</b>         | 26 372     | 4 712      | 3 869    | 478   |
| <b>Renbel</b>          | 3 041      | 688        | 145      | 515   |
| <b>Temotu</b>          | 21 362     | 4 303      | 3 431    | 532   |
| <b>Guadalcanal</b>     | 93 613     | 17 163     | 14 198   | 597   |
| <b>Honiara</b>         | 64 609     | 8 981      | 2 835    | 202   |
| <b>Solomon Islands</b> | 515 870    | 91 251     | 68 150   | 7 924 |

Source: Mr. David Iro, *Willies Electric and Solar Power, Honiara, Presentation at IRENA Sydney Workshop 2011.*

but soon failed due to poor maintenance. Solomon Telekom has PV radiotelephone installations in most provinces, the largest unit being a repeater station on Ngella with 1.6 kW peak from twenty 80 Wp panels. The American Solar Electric Light Fund, working with local NGOs, provided around 110 solar home systems in Sukiki and Makaruka (Guadalcanal) in 1997–1998 but the majority were damaged or stolen during the civil unrest. ANZ Bank uses solar PV to power rural automated teller machines (ATMs), and the rural Internet network also operates on PV power.

Donors including Australia and New Zealand have recently joined with the government of the Solomon Islands to provide funding of over SBD 5.788 million (USD 800 000) to provide rural solar for village electrification. Unfortunately, there does not appear to be a consistent approach to their maintenance plans and it is feared that many of the resulting installations will not be able to sustain operations.

In 2012, Japan provided SBD 29.4 million (USD 4 million) through its PEC Fund for about 2 000 solar home systems to be installed under a “solar utility” or renewable energy service company (RESCO) concept, whereby users pay a periodic fee for the services provided, and the utility provides all maintenance and repairs. The Department of Energy will oversee the project, which is being implemented by a Japanese company, the Inter Action Corporation. The approach here is to use established credit schemes and associations as financial institutions from which members can obtain loans to buy solar home systems from the project. Due to public interest,

the project has been opened up to members of the public who are not members of any credit schemes/associations on condition that they pay 100% of costs up-front before installation and servicing takes place. The managing company (RESCO or utility) will be selected by tender with installations starting around March 2013.

The government plans to scale up this approach using the network of active NGOs in the country that presently works within remote communities in the country.

Although a number of companies sell solar PV equipment, only one (Willies Electric Power and Solar) specialises in the technology. Willies has pioneered the concept of accepting local products in payment for solar installations, thereby avoiding the common problem in rural areas of poor access to cash. It also provides training in solar installation and maintenance. In 2008, Willies, with funding from the Renewable Energy and Energy Efficiency Partnership (REEEP), implemented the Pacific Micro Energy Services Company (PMESCO) initiative which, as a pilot project, provided funding for 70 solar PV units powering small LED lights for purchase by villagers through a micro-credit arrangement. The cost of the systems was typically SBD 1860 (USD 253) with 25% down payment and the rest to be paid over 24 months. However payments were accepted as crops or product provided they had a cash value. The systems were provided by the non-profit Light Up The World Foundation (LUTW) and included 5 W of PV panels and two LED lights with associated batteries and a control unit. However, the Energy Division received a number of complaints from some participants who said that the

price of solar was too high, despite the 100% exemption on import duty taxes provided by the government.

Since 2008, the government of the Solomon Islands through the Ministry of Mines, Energy & Rural Electrification has been implementing solar electrification projects at rural schools and clinics as well as providing infrastructure for rural communities such as solar battery-charging stations and solar water-pumping from bore-holes. This is a major challenge as the total number of schools in the Solomon Islands in 2009 included 520 early childhood education (ECE) schools, 507 primary schools, 167 community high schools, 16 provincial secondary schools, nine national secondary schools, and 26 rural training centres. Most of these are rural-based and are ideal targets for electrification by solar PV.

Funding from Turkey and Italy also recently helped provide solar electricity for rural health centres.

**Bioenergy.** In the late 1980s, 28 wood-fuelled water boilers were installed at ten boarding schools for cooking root crops. Their current status is unknown but similar units constructed at the same time in Fiji are still in use. Although nearly all rural Solomon Islanders cook with wood, most use open fires rather than wood stoves. As the availability of wood in Honiara declines and the price goes up, the use of kerosene and LPG is increasing but the quantities used are not known.

Biomass has already been used on a small scale to produce electric power in the Solomon Islands and proposals to expand the use of sawmill and agro-industrial waste for generation – including building a power sta-

tion near Honiara – have been considered since the early 1980s. Palm oil producers generally produce steam and electricity by burning mill waste and provide power to local workers living near the mill but none are connected to a SIEA grid.

In the 1970s, small biogas digesters were built at several piggeries. In 1985, the government planned a larger biogas system at Tambea for processing the waste from 800 pigs (to be expanded to 2000 pigs) but the cost was high and plans were abandoned. Around 1990, a biomass gasifier for power generation was tested at the Batuna sawmill, Vangunu. It produced 15 kWe from charcoal but only functioned for a year or so.

The Solomon Islands could potentially use coconut oil to displace 25 million litres of distillate per year. In 2002, SIEA tested coconut oil as a fuel in a small power generator at Lata in Temotu, but there were major problems with the quality of the oil used resulting in clogged fuel filters and the generator overheating. Although testing was stopped SIEA remains interested in the concept and used ADB funding to procure a dual-fuel generator for Auki on Malaita in 2011. This 350 kW generator is currently running on a blend of 80% coconut oil and 20% diesel, with the coconut oil supplied under contract from a private coconut oil miller. This is a pilot project to systematically explore the option of using highly purified coconut oil as a substitute fuel in all of SIEA's provincial power stations. Results so far have been positive and work is currently on-going to connect 200 additional households from a nearby rural village to the grid via an extension constructed under the ADB-funded project.

## 5. Challenges for renewable energy deployment

Renewable energy deployment faces significant challenges that call for careful planning and thorough capacity building:

- Paucity of staffing and financial resources in the Energy Division.
- Lack of adequate data, including hydrological data for hydropower, and data for geothermal, ocean energy, wind and biomass potential.
- Lack of data on fuel imports and consumption due to non-cooperation from responsible government departments and oil companies.
- Missing a national energy balance database.
- General geographical characteristics of the Solomon Islands – rough terrain, and archipelagos spread out over a wide expanse of sea. This isolates large load demand centres from potential renewable energy sources, particularly hydropower and geothermal sources.
- Very low cash incomes in rural communities.
- Land tenure issues.
- Inability of banks to use customary land as security or equity for loans.
- Lack of formal energy development plans, and few standards or regulations regarding energy use and development, despite the government goal of converting generation from fossil fuels to renewables.

- Inadequate legislation for consumer protection, price control, fuel storage and handling, water rights and permits for hydro-power systems and power sector regulation.
- Lack of legislation for Renewable Energy Service Companies (RESCOs).
- Lack of capacity in government to properly absorb donor assistance for energy projects.
- Insufficient capacity to develop bankable renewable energy technology project proposals that are acceptable to donors or financiers.

Additional challenges include the following:

- Although donors often support renewable energy development they are far too slow to act and frequently change their priorities.
- There is a serious lack of technical skills and virtually no industry other than on Honiara and Noro.
- Little or no renewable energy training is available locally to help with maintaining any technical capacity developed by projects.

IRENA can suggest pathways to overcome these challenges through its Global Renewable Energy Islands Network (GREIN) and believes that regional and national roadmaps should reflect these pathways. IRENA will continue to work with existing regional and national stakeholders to achieve the transition to renewable energy for a secure and sustainable energy supply.

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In the preparation of this report, primary sources were used as much as possible. Some information was obtained through written questionnaires, some through interviews and some through email correspondence. Where primary sources were not available, the following secondary and tertiary sources were used.

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