

Renewable & Green Technologies

Low levels of energy supply and natural conditions in the Pacific provide substantial opportunities in the renewable technologies sector. UK companies and organisations with green technology expertise would be welcome in the region.

Renewable Energy

The Pacific Islands have significant potential for renewable energy and are well suited to this form of energy generation. Isolated population concentrations require innovative small scale energy solutions. Difficult topography and numerous islands means many are geographically unsuited to connection to a larger power network.

High fuel costs mean that renewable energies also make sense for economic reasons. Fuel costs in the Pacific Islands are amongst the highest in the world and have risen considerably over the past decade. For example from 2004 to 2009 Fiji's imports of oil tripled to US\$1.2 billion.¹

Hydro

Hydro is the major form of renewable energy supply in the Pacific and the choice for mid to large scale projects. Papua New Guinea and Solomon Islands have excellent water resources for hydro projects with ample rivers and suitable terrain.

Most of PNG's hydro power capacity is over 30 years old and is not properly maintained. For future expansion there are nine large hydrological drainage divisions which have significant hydro power potential. Almost all communities are located near rivers and medium and mini hydro generation has excellent potential to meet future demand.

In PNG there is a proposal in the Southern Highlands region to build a K300 million hydro power plant with an Israeli company.²

In Port Moresby energy demands are growing about 10% per year which the government intends to supply with hydropower generation.³

In Solomon Islands, for the larger islands hydro is considered the best solution with abundant waterways. The government is following a Japanese developed plan which identifies 300 kilowatt - three megawatt hydro stations for the larger islands.⁴

In Fiji, the Electrical Authority report the potential for development of small scale hydro in the one to ten megawatt range.

Solar

Solar energy is the preferred option for individual homes in rural areas to access power. Solar has distinct advantages for household use as it is; inexpensive, easily transportable, requires little maintenance and is simple to use.

In PNG the average for much of the country is 4.5 to 8 hours of sunshine a day and Port Moresby benefits from about 2,478 sunshine hours per annum

In Solomon Islands, Willis is a local solar solutions company which was set up with British support. Willis has a 20 watt product aimed at households and a 120 watt product for small enterprises. The Solomon Islands government "yumi solar" initiative is rolling out solar solutions at about 350 houses a year and also have solar projects to power high schools and health offices in villages.⁵

A success story in renewable energy is **CBS power solutions** (Australia). It sells mainly solar but also wind solutions around the Pacific. The success of CBS is due to their active approach and by setting up a presence in Fiji they have been able to create opportunities. There is scope for like minded companies.

Geothermal

The western Pacific is an active volcanic region and as such geothermal resources are excellent.

The international Geothermal Energy Association estimates PNG's geothermal potential at 21.92 terawatt hours. Most of PNG's significant thermal energy potential is on its islands of New Britain where thermal water flow is rapid and surface temperatures are in the 90 to 100 C range.⁶

In PNG, Reykjavik Geothermal a company from Iceland has expressed interested in developing a 100 megawatt geothermal power station on Karkar island in Madang province in the northern region of PNG.⁷

The Lihir Gold Mine in PNG generates 45% of its power use with geothermal energy. The mine has a total of 56 megawatts of geothermal power production with the potential to expand. Gold mining and thermal energy work well together as harnessing of the thermal waters lowers levels which makes the mining easier. The geothermal power station might also enable Lihir to receive carbon credits as the geothermal power station is certified to generate carbon credits.⁸

Solomon Islands has potential including for the Guadalcanal islands, but no production at this time.⁹

Fiji has geothermal potential on both major islands with seven locations with potential in the range of 2 to 19 megawatts and a total potential of 70 megawatts.¹⁰

Biofuels

Biofuels is another area with good development potential. Although significant government support is needed for the industry to develop.¹¹ Coconut oil is the biofuel of choice for the Pacific and there is ample supply across the region.

In PNG there are various initiatives to use coconut oil as a fuel including use in rural electrification and motors.

Changhae Bio-ethanol Project is a US\$20 million Korean investment to produce bio-ethanol from cassava. The project currently has a 20,000 hectare plantation which will be expanded to 30,000 hectares and a bio-ethanol factory which will be completed in 2012. Production is due to begin in 2013 with an output of 100 million litres per annum.¹²

Cosmo Oil is a US\$50 million Japanese investment in bio fuel in PNG.¹³

In Solomon Islands a pilot programme funded by the Asian Development Bank is providing for a 300 kilowatt generator fuelled by coconut oil on Malaita Island. A company **Solomon Tropical Products** sell blends of coconut oil, kerosene and coconut oil, diesel in Honiara.

In Fiji the government is supporting the introduction of blended oils and is currently in talks with the major oil companies.

Carbon Trading and REDD+

At present no carbon trading mechanism exists in the Pacific. Papua New Guinea has one of the worlds most untouched natural environments with approximately 24 million hectares of virgin forest.¹⁴ PNG has high potential for carbon sequestration (primarily forests), and along with Solomon Islands would have potential for projects holding high value in a carbon trading platform. In PNG, carbon trading is on hold pending guidelines established by the PNG OCCD (Office of Climate Change and Development).

REDD+ (Reducing Emissions from Deforestation and Degradation programme

Once the review is complete, this has potential to offer opportunities in the following areas; afforestation and reforestation programs, secondary forest management, reduced impact logging, carbon economy expertise, renewable energy, rural electrification via rehabilitation of existing hydro schemes and new micro hydro projects and energy efficiency expertise.

There is the potential for development assistance funding. For example a US\$58 million Sustainable Energy Financing Project by the World Bank aims to increase significantly the use of renewable energy technologies in Pacific Island nations by encouraging local financial institutions to finance sustainable energy projects. The project runs for ten years until 2017.¹⁵

Papua New Guinea

PNG is amongst one of the island nations in the world facing enormous threats from the impact of global warming and the effects of changing climatic patterns. However, climate change can be seen as both a threat and an opportunity for PNG. In an effort to address the adverse impact of both rising global temperatures and climate change, PNG has embarked on a long term national policy to address both Environment and Climate Change by 2050. It is not only the environmental sector that has to deal with this issue. From a broader perspective, other sectors most affected are: Forestry, agriculture, energy, waste management, electricity, water, tourism, urbanisation, natural disaster and fisheries.

As a result, development that factors in climate change will need to be achieved through strong collaboration and an holistic government approach. This will need to include initiatives from both the private sector and NGOs.

PNG Energy

Although PNG is a net energy exporter only about 12% of the population has access to electricity. Generation equipment and the national grid need considerable modernisation. Electricity is currently generated by: Hydro 39.5%, Diesel 37.3%, Natural gas 14.1% and Geothermal 9.1% with a total installed capacity of 582 megawatts.¹⁶ PNG Power is a state owned electricity provision company and delivers power through three larger and fifteen smaller grids. The growth of electricity provision for rural areas is best suited to small scale renewable solutions and for urban areas, mid to large scale hydro solutions.

PNG Sustainable Development Project (PNG SDP) is an organisation that is keen to work with private enterprise to achieve development goals. They are a potential partner for UK green technology and renewable energy companies. PNG SDP backed projects include;

- **PNG Energy Development** is a 2009 joint venture (JV) with Origin Energy. The JV is carrying out feasibility studies for sustainable energy projects for power provision to towns, cities and major projects. They are also working with PNG power and the Independent Public Business Corporation (IPBC) on large scale hydro projects such as the refurbishment and expansion of the Yonki Dam Hydro scheme to supply power to PNG's second largest city, Lae. The JV is also carrying out a major feasibility study into the Purari Dam a large scale hydro scheme of about 2500 megawatts. 700 megawatts is expected to power an aluminium smelter in PNG and the rest will travel by undersea line to supply power to the Australian grid.
- **Western Power** is the only non-statutory organisation in PNG to hold licenses for generation, transmission, distribution and retail of electricity.¹⁷ Western power is developing electrification projects for small urban and rural communities and alternative renewable energy projects for remote communities in Western Province.

Solomon Islands

Solomon Islands environmental laws are essentially reactive, responding to environmental damages rather than establishing parameters for development. Access to electricity in the Solomon Islands is low. Estimates range from 15% to 20% of the population and supply is poor with frequent black outs. The Solomon Islands Electricity Authority (SIEA) is responsible for power supply and controls an installed capacity of about 22 megawatts.¹⁸ Importing diesel to power generators means that electricity prices in Solomon Islands are amongst the highest in the world. As a result the government recognises the need for renewable energy suitable for the country, as well as to reduce its current reliance on diesel.¹⁹

Development organisations financed the study for the **Tina River Project**, currently in planning stage the hydro scheme would be in the range of 20 megawatts and supply power to the main island of Guadalcanal.

Fiji

The Fiji government has better environmental regulation than most other countries in the region and Fiji's Sustainable Development Bill of 1999 provides a detailed framework for government institutions and community to work with.

About 70% of the population have access to electricity, with a total installed capacity of 104 megawatts. Some 62% of electricity is hydro generated and 34% diesel, 3% solar and 1% wind. The public utility responsible for provision of electricity is the Fiji Electricity Authority (FEA) which has a goal to generate 90% of electricity by renewables by 2014.²⁰ To this end, Fiji is relying on the Chinese financing and construction for various projects including the FJ\$300 million Nadarivatu hydro project. Construction of the 40 megawatt hydro station is underway and expected to be completed in 2012.

Most of Fiji's areas that are not currently electrified are in rural areas and opportunities exist for renewable energy companies to work with the FEA's Rural Electrification Program (REP). Fiji's Department of Energy is another good resource for energy providers and lists various renewable energy schemes on its website.

Opportunities for UK Business

With technological expertise in this sector UK companies should take note of unique conditions in the Pacific that favour green technologies. For example renewable energy companies enjoy natural advantage as local geography and demography combine to give preference for renewables for energy provision. There are opportunities to work with Mining, Oil and Gas companies that are motivated to back community and environmental initiatives as part of their contract of engagement. For carbon trading and forest protection initiatives, PNG is one of the worlds most important countries.



Photo courtesy Nautilus Minerals