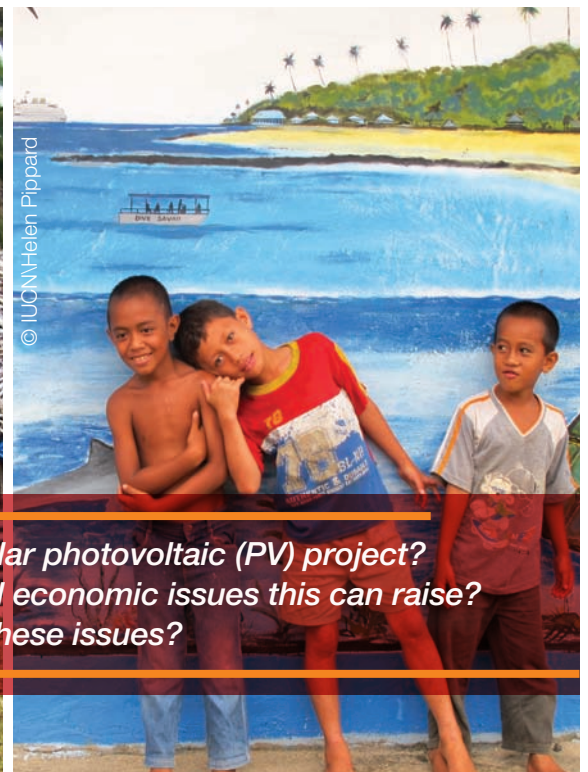


Small scale solar photovoltaic

Pacific energy projects: Impacts on nature and people



*Are you planning to fund, build or manage a solar photovoltaic (PV) project?
Have you considered the environmental, social and economic issues this can raise?
Are you prepared to manage these issues?*

TYPICAL PHOTOVOLTAIC PROJECTS

Photovoltaic projects generate electricity from the sun's rays. Usually a series of solar cells is set in panels, generating DC (Direct Current) electricity. An inverter then converts the electricity to AC (Alternating Current).

- **Stand alone solar PV system** – These are autonomous systems, also known as off-grid systems, i.e. not connected to the grid network. Electricity is supplied directly to the user, supported by a battery. PV systems are commonly used in the Pacific for lighting and electricity, and vary in size and type with installations typically around 20Wp-1kWp.
- **Grid-connected solar PV system** – PV systems that are connected to the electricity network (grid) generate power just as standalone systems do. However to integrate them with other power sources, sophisticated monitoring and load control equipment is used to keep the grid stable. Grid-connected PV may be building-integrated PV, or may be located remotely such as 'solar farms' .

PHOTOVOLTAIC PROJECT DEVELOPMENT

Planning

The best time to build positive outcomes and avoid negative impacts is during development and design. Locating and orienting the solar panels properly is the key to good output – avoid shadows, match the panels' angle to your latitude, minimise cabling and ensure safe maintenance access. Think through the environmental and social implications for all the PV system components: from generation, distribution and storage, to use. This should cover the whole system life: design, construction, operation, maintenance, decommissioning and disposal.

Research

It is important that the project is locally relevant, so you will need to be well informed in your decisions– visit the site, talk to the local people, monitor with equipment, or do research. Good, early communication is important for a sustainable project, so the community and future owners feel responsible and are equipped to manage the project. Making good decisions at the start is cheapest in the long term.

◆ Environmental impacts

Solar PV systems do not emit any greenhouse gases. They are a proven technology, used safely across the Pacific. A 100W solar module is estimated to prevent over two tons of carbon dioxide emissions over its lifetime, generating much more electricity than used in production. Operating PV systems make no noise and do not pollute. Solar power is therefore clean, silent, and freely available.

◆ Social impacts

Solar PV systems have proved the best option for electricity access in remote, rural areas. They provide quality lighting for evening study, household chores and community gatherings, freeing up productive daylight hours. Accessible electricity also enables simple home appliances such as radios, TVs and refrigerators. Developing remote, rural areas can provide an alternative to urban migration. Moreover, a PV system avoids the use of expensive and harmful petroleum fuels. However, PV systems need care and maintenance for a long life, which requires households to save money. If the PV system is not maintained, such as buying replacement batteries, it can fail. And if a system fails, the community can then perceive the technology itself negatively.

◆ Cumulative impacts

As more and more solar PV systems are installed, new issues and opportunities can arise. PV systems are often mounted on rooftops, but larger or multiple systems require more space, away from trees, which can raise land ownership and access issues. Increasing use of PV systems can produce a competitive market for parts, equipment, and maintenance skills, which helps everyone. Unfortunately, PV systems – and the electrical appliances they enable – create waste that is not biodegradable. If these wastes are released to the environment they can harm plants, animals, fish and people, polluting the environment for many years. Projects and organisations that promote PV systems, especially in rural and remote areas, must plan safe waste disposal.

KEY ISSUES !

Waste management – Electrical equipment, some solar panels, and most batteries, contaminate the environment by releasing chemicals that enter and stay in the food chain. In particular, batteries and inverters will need replacing, so used lead-acid batteries, similar to car batteries, will need disposal. From the start, the project should recommend appropriate disposal strategies so users know what to do, such as a battery exchange program. For example, batteries must not be opened or drained, and the lead must be prevented from entering the environment. Inter-country transport of hazardous wastes – including batteries – is regulated under the Waigani Convention. Refer to SPREP for more information.

Maintenance – it is important to plan to look after the solar PV system for its whole life, instead of becoming like the many examples that no longer work. The humidity and salt air of the Pacific can be harsh, so choose the right equipment, check meters, clean and maintain regularly, and be prepared for repairs. Some batteries may need 'topping up' with pure water. For each task, agree who will be responsible at the start of the project.

Safety – solar panel installation and maintenance involves risks such as working at heights and electrical work. Poor electrical work, such as 'adjustments' can have consequences long afterwards. Use competent people who know and follow latest wiring rules.

Financial management – having a solar PV system can save time and money, like the cost of kerosene and diesel, and the time to buy or gather fuel. On the other hand, it costs money to engage skilled people, and buy parts. People need to be disciplined with their savings so money is available, as PV systems can be costly to fix. For community PV systems, good management and cooperation is essential. Overall, seeing the savings can encourage people to take care of the equipment.

Disasters and emergencies – whilst not avoidable, these can be prepared for. Are the structures safe in the event of a cyclone? If the building catches fire, what happens to the panel and electric currents? In case of a blackout or tripped circuit, do users know how to restore power?

FOR FURTHER INFORMATION

- 1 **Guidelines for lead-acid battery management**, SPREP
<http://www.sprep.org/Waste-Management-and-Pollution-Control/Hazardous-Waste-Management/>
- 2 **Environmental due diligence of Renewable Energy Projects: Guidelines for solar photovoltaic energy systems**, UNEP and Base. http://www.energy-base.org/fileadmin/media/base/downloads/tools_EDD/edd_solar_pv.pdf
- 3 The Sustainable Energy Industry Association (SEIAP) coordinates a network, and is preparing standards and a certification system: www.seiapi.org. The (Australian) Clean Energy Council's Solar Accreditation Scheme, references may be useful in the Southern Pacific: <http://www.solaraccreditation.com.au/acccec/installerresources/standards.html>
- 4 Refer to the relevant EIA and other environmental legislation in your country, such as an Environment Management Act. See <http://www.paclii.org> or your country's website.

Please note, this factsheet provides general guidance only and is not legal advice. Please see the references and seek assistance for technical or legal advice for your specific needs.

Development of this factsheet has been assisted by funding from:



U.S. Department of State Regional
Environmental Office for the Pacific, Fiji.

Austrian
Development Cooperation

CONTACT US:

International Union for Conservation of Nature
Oceania Regional Office
Private Mail Bag, 5 Ma'afu St, Suva,
Fiji Islands

P: (+679) 3319 084
F: (+679) 3100 128
E: oceania@iucn.org
www.iucn.org/oceania