



information sheet

SUSTAINABLE LAND USES

Hydropower information sheet

Please note: While all care has been taken in the preparation of this information sheet, it is not a substitute for legal advice in individual cases. The content of this information sheet is current as of July 2011.

This information sheet is one of a series on sustainable land uses which have been developed for Local Aboriginal Land Councils (LALCs) by the NSW Aboriginal Land Council (NSWALC). Copies of the information sheet are available from www.alc.org.au or by calling the NSWALC Policy and Research Unit on (02) 9689 4444.

What is hydropower?

Hydropower is energy that comes from the force of moving water. The fall and movement of water is part of a continuous water cycle. Hydropower is considered a renewable energy source because the water on the earth is replenished by precipitation.

As there are limited lands which can support a hydropower system, consideration must be made to whether specific land is suitable. If the proposed land is near a fast flowing water source (i.e. river, creek or dam) and has suitable slopes, then hydropower might be an appropriate renewable energy option.

Australia has a number of large hydropower schemes; the most famous is the Snowy Mountains Hydro-Electric Scheme. Hydropower generates approximately 10 per cent of Australian electricity. ⁽¹⁾

How does hydropower work?

Hydropower works by utilising the power of falling water from dams, rivers and waterfalls. Most commonly, hydropower stations are located near dams because

the storage and release of water can be controlled. The water is used to turn the blades of a turbine. The rotation of the turbine creates electricity in the generator which is passed in to the electricity grid. This electricity produced by hydropower is called “hydroelectricity”.

The amount of electricity generated from a system depends on both its capacity (size of turbine and generator) and the amount of water available and the force of the water flow.

Hydropower systems

Hydropower resources come in many different forms: excess pressure in gravity-flow irrigation systems; small meandering streams from pond overflow; rushing and steep mountain streams and many other combinations of water flowing and dropping.

There are two main types of hydropower systems for private use – a small scale hydropower system and a micro-hydro system. They are both efficient and reliable forms of energy.

A small scale hydropower system can use dams or can be ‘run of river’ systems where part of the river flow is diverted for power generation. A well designed small hydropower system can have minimal environmental impacts and is an ideal method of harnessing renewable energy from small streams.

Micro-hydro systems are generally stand alone systems not connected to the main electricity grid. They operate by diverting part of the river flow through a pipe to a turbine, which drives a generator producing electricity.



Generator

Water turbine

Please note: This image shows the water turbine and generator separately. The water turbine usually sits underneath the generator.

Water flows into the turbine and turns the water blades. The gates on the side of the turbine control the flow of the water. The generator (that is attached to the turbine) turns as the water flows and creates electricity.

Getting started

Advice should be sought from an expert in the field to identify any hydropower potential on proposed sites. Any LALC considering installing a hydropower system should first contact NSWALC or a specialist hydropower engineer for further information. Local Councils should also be contacted to ascertain whether any development consent or other permit is required for the project.

Hydropower systems are designed to be low impact, low maintenance and capable of lasting 20 or more years. If the proposed land has a small flowing stream, it could potentially generate enough energy to power a home all year round with the installation of a 100-500KW hydropower system.⁽²⁾

A specialist hydropower engineer will be able to assess the proposed site and assist in determining what kind of hydropower system could be suitable.

The engineer should provide a feasibility report on the site's suitability, which should include:

Advice on suitable system type and size;

- Preferred locations;
- A preliminary system design;
- Advice on legal, planning and permitting requirements;
- An indicative work program;
- Any obvious environmental sensitivity which will require assessment; and
- An indication of costs, and potential cost savings.

Costs and legal issues

Whilst there can be substantial costs in setting up a hydropower system, once constructed they are relatively inexpensive to operate. Costs can also be shared with other usages such as irrigation and water supply.

The cost per unit of electricity will depend on the site, rather than the size of the dam and the power station, but less initial investment is required for small systems.

Costs include system purchase, engineering, design, environmental assessment, supervision, administration and construction costs.

Landowners should seek advice to determine how production of hydropower will interact with the *Aboriginal Land Rights Act 1983* (NSW) (**ALRA**) and prevailing land rights. In particular, it is important to determine:

- Whether the production of hydropower will constitute a land dealing requiring NSWALC approval under Part 2 Division 4 of the ALRA.

- Whether changing land use (i.e. to land being used for a residential or commercial purpose) will result in a change in any rates, levies or charges payable in relation to the land as described in Part 2 Division 5 of the ALRA and Regulation 7 of the Aboriginal Land Rights Regulation 2002.

Please contact NSWALC for further information and assistance with answering these questions.

Incentives

The Small-scale Renewable Energy Scheme (SRES) provides a financial benefit for owners wishing to purchase hydropower systems. Installation of these systems permits the creation of "Small-scale Technology Certificates" (STCs). As of June 2011 each STC created has a value up to \$40.

These certificates can be sold and transferred to a STC agent (usually electricity retailers) or sold in the STC market or through the STC Clearing House. A STC agent will offer you a financial benefit such as an up-front discount or delayed cash payment when you assign your STCs to them. A majority of owners take this option.

By generating your own power you can avoid the costs of buying electricity from the grid.

To learn more, visit the Australian Government's Office of Renewable Energy Regulator website: www.orer.gov.au/.

Benefits of hydropower

There are many advantages of using water to generate electricity. Some of these include:

- By generating electricity on your property, you can avoid costs of purchasing from the grid, and can sell STCs for financial gain;
- If managed carefully and used sustainably water is a renewable resource that does not emit carbon, unlike some other sources of electricity;
- Water can be stored, therefore the amount of electricity generated can be managed to meet demand;
- Hydroelectric power stations, once constructed, are relatively inexpensive to operate;
- Costs of small schemes can be shared with other usage such as irrigation and water supply; and
- Small scale schemes can often be designed in a way which is consistent with current land use, and as a result may not interfere with other cultural uses of the land.

Disadvantages and risks

There are disadvantages and risks for using water to generate electricity. Some of these include:

- Large hydro-electric schemes usually rely on the construction of dams which may have significant environmental effects on river flows, water quality, flora and fauna and Aboriginal culture and heritage;
- Large hydro-electric schemes are expensive to construct;
- Finding new suitable sites can be difficult; and
- In times of drought (or where water resources are over-exploited), water supplies can be reduced thereby reducing the amount of electricity that can be generated.

⁽¹⁾ www.aie.org.au

⁽²⁾ www.aie.org.au

Available Grants

Grant	Purpose	Contacts and Information
Small-scale Renewable Energy Scheme (SRES)	Designed to assist households, small business and community groups with the upfront cost of installing small scale renewable energy systems through certificates which may be created for eligible installations.	This program is administered by the Office of Renewable Energy. Web: www.orer.gov.au/index.html Phone: (02) 6159 7700 Email orer@orer.gov.au
Small Grants for Small Rural Communities Program	Open to not-for-profit organisations for projects that offer public benefit for small rural and remote locations in Australia, contributing to their development in social and community welfare and environment or cultural areas.	The program is administered by the Foundation for Rural & Regional Renewal (FRRR). Web: www.frrr.org.au/programsDetail.asp?ProgramID=4 Phone: (free call) 1800 170 020 Email: info@frrr.org.au
Grants under the Climate Change Fund	Established to help business, households, schools, communities and government save water, energy and greenhouse gas emissions.	Environmental Funding Programs section at the Office of Environment and Heritage. Web: www.environment.nsw.gov.au/grants/ccfund.htm Phone: (02) 8837 6093
Remote Indigenous Energy Program	The Remote Indigenous Energy Program was set up by the Australian Government under the Clean Energy Future Package. The Program is managed by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs and includes \$40 million funding over four years to provide financial support to install renewable energy generations systems in remote Indigenous communities.	Web: www.cleanenergyfuture.gov.au/clean-energy-future/securing-a-clean-energy-future/chapter-8-creating-opportunities-for-farmers-and-landholders/ Phone: 1800 057 590