

### Micro-Hydro

Small-scale hydro power systems make use of the kinetic energy of water dropped from a height to turn a turbine that generates electricity.

#### Summary

- Improvements in the technology of small-scale systems have made micro hydro schemes an efficient and reliable means of producing electricity. The term 'micro-hydro' is used to describe schemes up to 100kW. In most cases, private schemes generate between a few hundred watts and 25kW. Above this level, schemes are usually commercial.
- Hydro systems at the 25 to 100 kW scale can be connected to the main electricity grid or alternatively can be used in an off-grid system where electricity is either used directly by appliances or is stored through the use of batteries. Single households might be able to go completely 'off-grid' where there is a suitable hydro source nearby. In cases where excess power is generated this can also be sold back into the grid.
- Supply of power from a hydro scheme is liable to be seasonal. Unlike most other systems, for renewable generation, demand usually fluctuates in a similar way to supply. However, some kind of back-up power system is usually required.

#### Site requirements

The obvious site requirement is to have a water source which is suitable for a hydro scheme. The most important suitability criteria for the watercourse are:

- 'head', the difference in height between the water inlet and the turbines;
- 'flowrate', the volume of water passing per second.

The typical components of a system are:

- **An intake** to divert the flow of water from the water course
- **A penstock pipe** to convey water from the source to the turbines
- **A generating set** to convert the head and flowrate into power
- **An outflow** through which water is returned to the watercourse
- **Cables**, either overhead or underground, to convey power to the point of use.

## **Planning and other regulatory requirements**

Planning permission will almost certainly be required for any small scale hydro system. Contact your local planning authority for more information. Engineering works will also require authorisation under the Controlled Activities Regulations. Contact with SEPA will be required to establish whether that licence is possible in advance of the formal application process.

## **Capital & Installation costs**

For low head systems (assuming that there is an existing pond or weir) costs may be around £4,000 per kW up to around 10kW. Where there is no pond or weir then civil engineering works will be required on top of this.

For medium heads there will be a fixed cost of around £10,000 plus around an additional £2,500 per kW up to about 10kW.

## **Operation and maintenance Costs**

There may be costs associated with leasing land, and hydro schemes are also subject to business rates unless seen as being part of a domestic property. In the latter case, Council Tax liability will increase unless the increase in assessed value is within the existing band.

Larger schemes require metering, which must be monitored by an independent meter-reading company. There is an annual charge of this, between £350 - £1000 per year.

Modern equipment requires little maintenance. The cost of inspections and servicing should cost no more than 1-2% of the capital costs of the scheme.

## **Savings**

Savings can be made for electricity which is generated rather than being supplied by a power company. These can be in the region of 12p per kWh for peak rate use.

In some cases it may be possible to supply energy to the grid, and to be paid for it. This would be in the region of 2 – 2.5 pence/kWh. Additionally, such sales will attract the benefit of Renewable Obligation Certificates (ROCs).

## **Sources of funding support**

### **Scottish Communities and Householder's Renewable Initiative:**

The Energy Savings Trust (EST) and Highlands & Islands Community Energy Company run the Scottish Communities and Householder's Renewable Initiative (SCHRI). Householders can receive up to 30 per cent of the total cost of their project up to a limit of £4,000. Community schemes can receive a maximum grant of £10,000 for a feasibility study and a maximum grant of £100,000 for a capital project. Contact: [www.est.org.uk/schri/](http://www.est.org.uk/schri/) or call 0800 138 8858.

### **Loan Action Scotland:**

Loan Action Scotland is funded by the Scottish Executive through the Scottish Energy Efficiency Office in support of Action Energy. Loans may be advanced against a range of energy saving measures to enable companies to take action to reduce their energy bills. It is primarily an energy efficiency scheme, but it may be worth discussing whether biomass heating equipment would be eligible.

The scheme provides interest free loans of £5,000 to £50,000. Loans can have a repayment period of up to five years. The loans are available to companies based in Scotland, with up to 250 employees. Companies must be able to demonstrate that the actions proposed will deliver the energy efficiency benefits claimed. See: [www.energy-efficiency.org/howto/help/loan/index.html](http://www.energy-efficiency.org/howto/help/loan/index.html)

## Advice

Energy Savings Trust (EST) business advisers can help small to medium sized businesses make best use of the many energy and resource efficiency schemes provided by the Trust and other government funded organisations. They can also help access interest free loans to help finance improvements.

EST advisers can help you access:

- Free and impartial information and advice.
- Free on-site energy, waste and water audits.
- Practical guides and best practice literature.
- Low carbon, clean fuel and renewable technologies.
- Relevant training and seminars.

Contact: **0845 458 5040**

