Llywodraeth Cynulliad Cymru
Welsh Assembly Government

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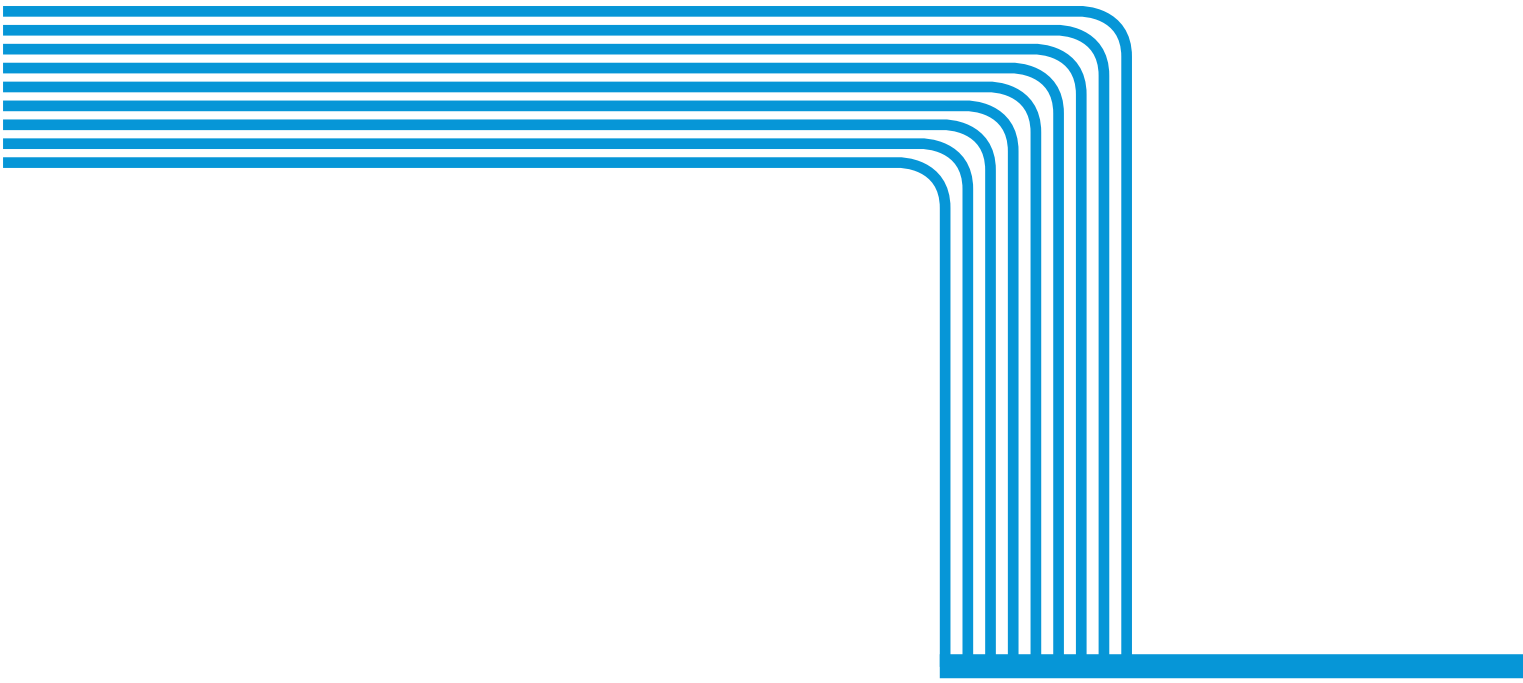
DEPARTMENT OF ENERGY & CLIMATE CHANGE

Environment Agency

Hydropower: A guide for you and your community



We are the Environment Agency. It's our job to look after your environment and make it a better place – for you, and for future generations.

Your environment is the air you breathe, the water you drink and the ground you walk on. Working with business, Government and society as a whole, we are making your environment cleaner and healthier.

The Environment Agency. Out there, making your environment a better place.

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An introduction to hydropower

This guide will help you think through the issues associated with developing a hydropower scheme in England and Wales and explain how the Energy Saving Trust and the Environment Agency can help you to develop sustainable hydropower for your home and your community.

What is hydropower?

Hydropower schemes harness the energy from flowing water to generate electricity, using a turbine or other device. The volume of flowing water and the height it falls determines how much electricity can be generated.

Why develop hydropower?

In the UK we need to generate 15 per cent of our energy from a mix of renewable sources by 2020. Small scale hydropower installations have a useful part to play in meeting this target.

Hydropower systems can provide a reliable source of electricity all year round, though generation is usually higher in winter than summer. This makes hydropower a relatively predictable source of renewable energy.

There are thousands of potential sites for new small-scale hydropower schemes in England and Wales. Together these could generate useful amounts of electricity, with minimal environmental impact, provided that they are carefully located and properly designed, installed and maintained.

A hydropower scheme can reduce your community's greenhouse gas emissions. The electricity generated can help to reduce your energy costs and produce some income from the generation of power and the sale of any surplus electricity.

Micro hydro schemes, typically generating up to 50 kilowatts (kW), can power several homes, farms or business units. Very small schemes, of typically less than 4kW output, can produce more than enough electricity to power an average home. As a guide, an output of just 1kW is enough to power 50 energy-efficient lights.

Hydropower can also be a cost-effective form of renewable energy. Depending on the type of scheme and method of financing, the initial expenditure may be recovered in between 10 and 20 years. The payback period can be reduced by Feed-in Tariffs (FITs). This is essentially a cash-back scheme where energy suppliers make regular payments to householders and communities who generate their own electricity from renewable or low-carbon sources. Payments under FITs apply to schemes generating up to 5 million watts or megawatts (MW) More details about tariffs are given later in this guide.

Once installed, most systems can last for 40 to 50 years, with low running and maintenance costs and could last for longer if well maintained. You may be eligible for support with setup costs through other grants but you may have to choose between grants and claiming FITs. More information on financial considerations is provided later in this guide.

Is hydropower suitable for my home/community?

You can use the Home Energy Generation Selector on the Energy Saving Trust (EST) website to find out whether hydropower is likely to be suitable for your home or community. See **www.energysavingtrust.org.uk**

The EST can advise you on the full range of renewable technologies and advise which energy technology is likely to be best for you. Their helpline number is **0800 512012**. Installing energy-efficiency measures is the most effective way of reducing your energy costs and consumption. You should consider these before installing renewable generation schemes.

In Wales, under the *Ynni'r Fro* scheme, the Energy Saving Trust will also be able to put you in touch with a network of locally-based technical development officers who are there to help groups develop their projects and access funding streams. More information on *Ynni'r Fro* is given later in this guide.

There are some essential requirements for all hydropower schemes.

- **Access to a suitable river or stream**
  It is important to have a river or stream close to where you are going to use the electricity. But not all rivers are suitable for hydropower, so it's best to investigate suitability early on.

  You must also make sure that you have rights of access to the river and any adjoining land required to build, operate and maintain the scheme.

- **Access to the local and national grid**
  To get the best value from your installation you need to be able to export any electricity you cannot use back to the local and national grid. This means you must be connected to the local network. Off grid installations can still receive FITs, but they have to prove that they are using the power they generate in a sensible way, and this can be complex.

  If your maximum output to the local electricity network measures less than 16 Amps (or about 4kW) per phase, you can connect without permission from the local network operator, as long as you notify them within 28 days. Your installer should normally do this for you.

  If your maximum output measures over 16 Amps (or about 4kW) per phase you will be required to contact the local network operator for permission to connect to the network. Their answer will usually be yes, but there may be a fee for enhancing or extending the local network to take the additional power you will be putting into it. This can be an issue in remote rural areas. Again, your installer should do this for you.

  If you are unsure how much energy you will be producing, ask your installer.

- **Permissions**
  You will need to apply for permission from the Environment Agency for a hydropower scheme. In most cases you will also need to obtain planning permission from the Local Planning Authority. More information on planning and permissions is given later in this guide.

What are the choices for a small hydropower installation?

Once you have established that your local water source is suitable for hydropower, there are different types of technology you can install, depending on the type of river and which turbine will be most effective. It is also important to consider the environment when choosing the technology you will use. The Environment Agency will be able to advise you on this through the permitting process.

- **Technology choices**
  There are many turbine and generator options available. It is important to seek expert advice to confirm the most suitable arrangement for your site. Details of approved installer companies and products can be found at **www.microgenerationcertification.org**

  It is important that any hydropower scheme does not damage fish stocks or block their migratory routes. Depending on the type of turbine you choose, you may need to provide screening to protect the fish and a fish pass to help their migration.

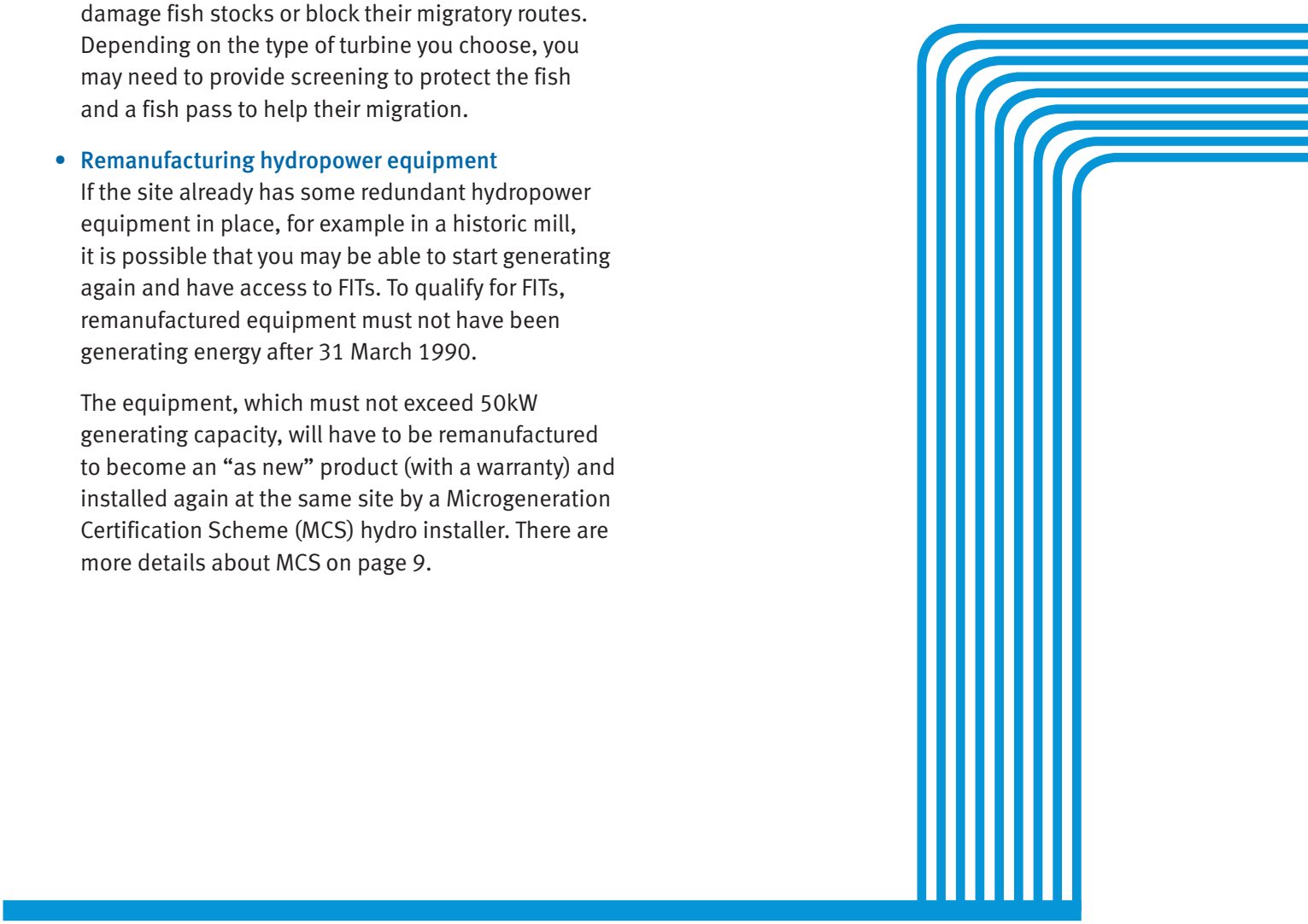
- **Remanufacturing hydropower equipment**
  If the site already has some redundant hydropower equipment in place, for example in a historic mill, it is possible that you may be able to start generating again and have access to FITs. To qualify for FITs, remanufactured equipment must not have been generating energy after 31 March 1990.

  The equipment, which must not exceed 50kW generating capacity, will have to be remanufactured to become an “as new” product (with a warranty) and installed again at the same site by a Microgeneration Certification Scheme (MCS) hydro installer. There are more details about MCS on page 9.

- **Costs**
  Costs differ according to the type and size of the hydropower scheme. When preparing estimates it is important to allow for the full costs of any engineering works required. These could include designing and constructing suitable structures to manage the flow in the river as well as the costs of housings for the turbines and generating equipment.

  Information on costs is available on the Energy Saving Trust website at **www.energysavingtrust.org.uk/Generate-your-own-energy/Hydroelectricity**

  Hydropower schemes may have to pay business rates, depending on the capacity and the amount of power produced annually. The Valuation Office Agency assesses the rateable value of all non-domestic property, which represents rental value on a set date. For more information on this, please go to **www.voa.gov.uk/valuation**



Torrs Hydro – New Mills, Derbyshire

Torrs Hydro is a community-owned hydropower scheme in New Mills, Derbyshire. The corporate objectives of Torrs Hydro are to help to regenerate the community, improve the environmental sustainability of the New Mills area, and to promote community development.

Members of the local community have formed an Industrial and Provident Society to manage the project and 230 members have invested over £125,000 towards the hydropower scheme's total cost of £330,000. Loans and grant funding made up the difference (note: this scheme was completed before Feed-in Tariffs started). Torrs Hydro was registered in this way so that the community could own the hydro electric scheme and operate it for their benefit. Torrs Hydro encourages local people and visitors to come and see the scheme. A series of open days has been held, in addition to arranging school visits where the scheme offers a very visible demonstration of renewable energy generation. They also have regular private visits (tours and talks) for interested groups, many wanting to build their own hydro scheme.

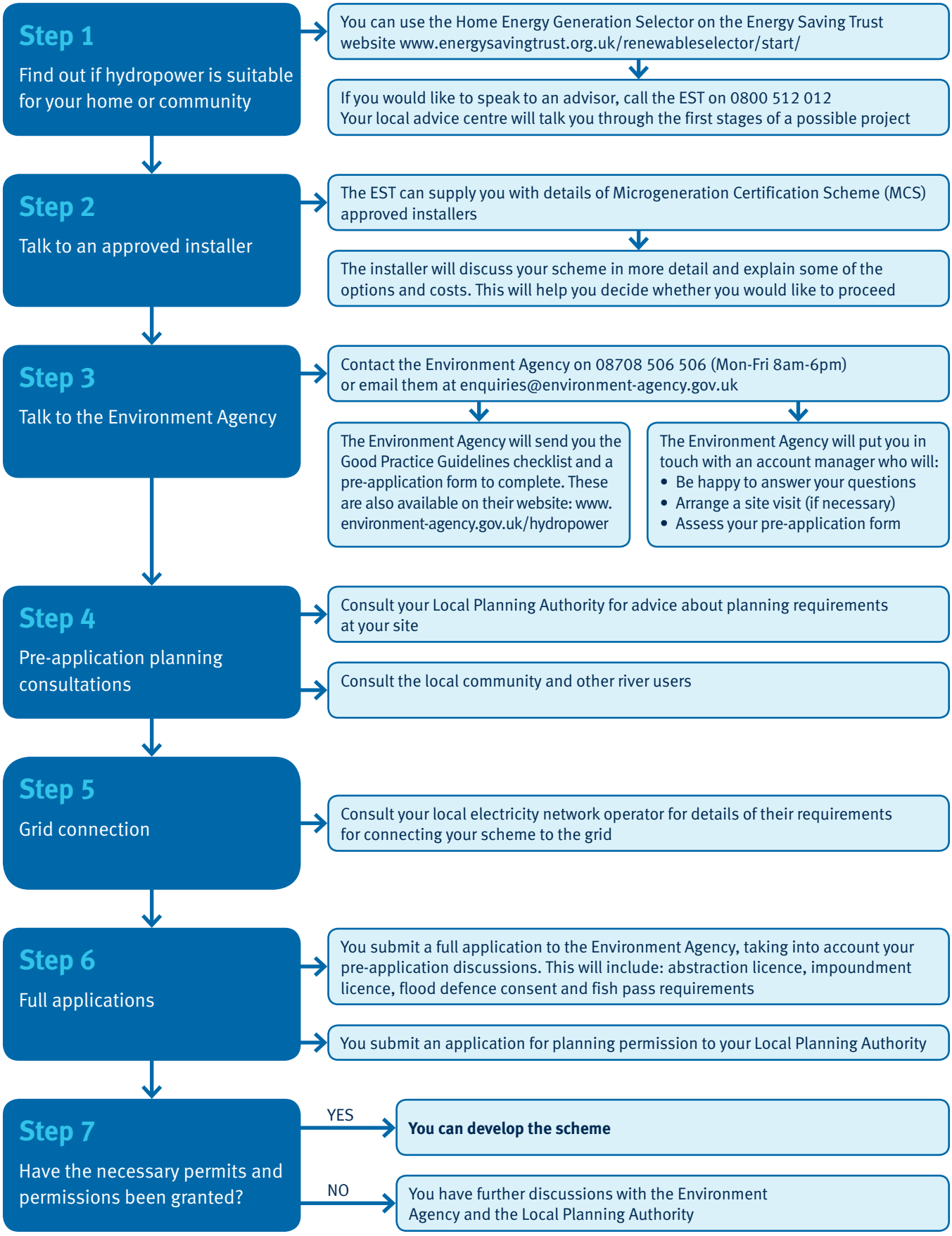
The scheme is located on an existing weir on the site of Torr Mill, a textile mill built in 1790 which was destroyed in a fire in 1912. The turbine actually sits in the same location as the original mill pit, where the water wheel would have been. Some of the original stones from the mill pit now line the surroundings of the turbine. A 63kW Archimedes screw turbine aims to generate over 240,000 kWh each year. Torrs Hydro worked closely with the developer and the Environment Agency to ensure that the scheme was environmentally sustainable. This included installing a fish pass to allow the safe movement and migration of fish up and down the river.

To find out more please visit www.torrshydro.org Additional information is available from Water Power Enterprises at www.h2ope.org.uk

Photograph courtesy of Peak Digital Limited

Where do I start?

Do you think you might have an opportunity for generating hydroelectricity on your land or in your community? If so, follow these steps:



Hydropower and the environment

Hydropower schemes can be complex and need to be designed and managed carefully to avoid unacceptable impacts on communities and the river environment. For example, changes to a river can increase the risk of flooding and have significant impacts on wildlife, especially fish.

The Environment Agency regulates the installation and operation of hydropower schemes in England and Wales and is keen to help you. Their Good Practice Guidelines will help you to make sure that your scheme does not harm the environment.

These Guidelines, together with more information about hydropower and the environment can be found on their website at **www.environment-agency.gov.uk/hydropower**

Once you have an idea of the type of hydropower scheme you would like to set up, contact the Environment Agency by email at **enquiries@environment-agency.gov.uk** or telephone **08708 506 506**. They will allocate an account manager to help with your application and guide you through the permissions process.

Environmental consent

You will need permission from the Environment Agency to operate your scheme.

Before applying for formal permission, you should complete the pre-application form, available by contacting the Environment Agency on **08708 506 506** (Mon-Fri 8am-6pm) or from their website at **www.environment-agency.gov.uk/hydropower** This will help the Environment Agency to understand what you are proposing and support you in preparing your full application. Their guidance will let you know which permits you may need. The Environment Agency will consider:

- **Abstraction**
  You need the Environment Agency's agreement for the amount of water your scheme can take from the river to flow through a hydropower turbine.
- **Impoundment**
  Any new or raised weir will change the water levels and flows in the river by impounding more water above it. The Environment Agency will need to agree these changes with you.
- **Flood risk**
  You need the Environment Agency's agreement for any works in or near rivers that have the potential to increase flood risk. This will include both the construction works and the finished scheme.
- **Fish passage**
  For many schemes, the Environment Agency will require a fish pass to allow fish to pass safely up and down the river.

The planning process

In almost all cases you will also need planning permission from your local planning authority to develop a hydropower scheme.

It is important to contact your local planning authority to discuss your plans at an early stage. They will consider issues such as flood risk, physical appearance of any buildings, ecology, landscape, amenity and archaeology.

You will have to provide a Design and Access Statement and other information with your application. In England it is likely to need a Flood Risk Assessment, or a Flood Consequences Assessment in Wales.

If the potential impact on the environment is considered significant enough, you may have to prepare an Environmental Statement to go with your planning application. This should be done by a technically competent person and should also include the information the Environment Agency needs to decide which permits to issue. The local planning authority will consult with other people who may be affected by the scheme and the application may be decided by a Planning Committee of elected Councillors.

Consulting the local community and other river users

Harnessing the power of rivers through hydropower schemes is just one of many river uses. Schemes can have an impact on other users including water abstractors, anglers, canoeists or those who enjoy the natural beauty of an area. Impacts can be seen as beneficial or negative so it is important to involve other river users in your plans. The best schemes are those that offer multiple benefits to many river users and these can involve angling, recreational or even educational enhancements.

Each river and each site is different so there isn't a standard list of people to contact but it would be a good idea to involve the following:

- Adjacent landowners and riparian (river or river bank) owners
- Local angling clubs and associations
- Local Rivers Trust (or Association of Rivers Trusts)
- Local Wildlife Trust
- Recreation interests (e.g local boating, canoeing and rowing clubs)

Depending on the type of structure and local habitats, you should also contact the following organisations, as there may be extra requirements in certain cases:

- Natural England or the Countryside Council for Wales
- English Heritage or Cadw (the Welsh Assembly Government's historic environment service)

The planning and permitting systems will ensure that those affected by a scheme have an opportunity to comment, but contacting them early will reduce the risk of subsequent delays during the planning process.

Summary of your route to approval

- Carry out preliminary work to assess the feasibility of a hydropower scheme. Seek advice from the Energy Saving Trust: visit **www.energysavingtrust.org.uk/** or telephone **0800 512012**.
- Discuss your scheme with a Microgeneration Certification Scheme (MCS) installer to make sure your scheme is eligible for Feed-in Tariffs (see next section).
- Contact the Environment Agency on **08708 506506** (Mon-Fri 8am – 6pm) or email **enquiries@environment-agency.gov.uk** to indicate your interest in developing a hydropower scheme. You will be given a copy of the Environment Agency's Good Practice Guidelines and a pre-application form. These are also available on their website at **www.environment-agency.gov.uk/hydropower**
- Complete a pre-application form and Good Practice Guidelines checklists and submit them to the Environment Agency. You will be allocated an Environment Agency account manager. A site visit can be organised (if necessary) and your pre-application form assessed. You will be given advice.
- Consult your Local Planning Authority for advice about planning requirements at your site and consult the local community and other river users.
- Consult your local electricity network operator for details of their requirements for connecting your scheme to the grid.
- Submit a full application to the Environment Agency, including information to help you get an abstraction licence, impoundment licence, flood defence consent and fish pass decision as necessary.
- At the same time, you should also submit an application for planning permission to the Local Planning Authority.
- Your applications will be considered and you will be told the outcome.

The Feed-in Tariff and other support available

Feed-in Tariffs

Feed-in Tariffs (FITs) became available in the UK from 1 April 2010. Under this scheme, energy suppliers make regular payments to householders and communities who generate their own electricity from renewable or low carbon sources such as micro hydropower schemes.

The scheme guarantees:

- a fixed payment per kilowatt hour for all electricity generated by the system, whether you use it for yourself or sell it to an electricity supplier.
- a separate payment for any electricity exported to the National Grid.
- In addition to these payments, you will also save money by reducing your electricity bills.

Once you have installed a micro hydropower scheme you will see a reduction in your electricity bills and receive income from your FITs (clean energy cashback) provider. FITs are designed so that the income from your installation over its lifetime will be sufficient to cover the cost of the system and provide a reasonable return. Use the **cashback calculator** on the EST website to see the impact that the purchase price and loan will have on your payback times.

What conditions do I need to meet?

To be eligible for FITs, you need to ensure that you use approved installer companies and products which are listed on **www.microgenerationcertification.org** Approved installer companies are members of a consumer code of practice which meets Office of Fair Trading requirements.

Some parts of a micro hydro installation, such as civil engineering works, can be undertaken by developers, communities or other companies. But to be eligible for FITs, the turbines, controls and electrical parts must be installed by an approved company. The turbine must also be listed as approved.

For a list of products and installation companies eligible for FITs, see **www.microgenerationcertification.org**

Conditions for schemes over 50kW

Hydropower schemes above 50kW and below 5MW can be eligible for FITs or Renewable Obligation Certificates (ROCs) without requiring MCS accreditation. Eligibility for accreditation is determined by applying to Ofgem through their Renewable and CHP Register **www.ofgem.gov.uk/Sustainability/Environment/RCHPreg**

What is the Microgeneration Certification Scheme (MCS)?

MCS is an independent scheme that approves products and installation companies against consistent standards to protect consumers. The MCS micro hydro standards are published on the MCS website where approved installer companies and products are listed.

More information is available through **www.microgenerationcertification.org** Where possible all hydro installations up to 50kW must meet MCS hydro standards (installers and products) to be eligible for FITs. Turbines and electrical controls should be installed by approved installers.

How can I find an MCS installation company?

See **www.microgenerationcertification.org** or contact EST who can point you towards an approved installer.

How do I register for the Feed-in Tariff scheme?

To be eligible for FITs, your approved installer will register your installation details and commissioning date on the MCS database. This provides the verification required by Ofgem and your chosen energy supplier. As this is a new UK policy, this arrangement may be changed as a result of lessons learned in the early stages of operation. We recommend that you check the current payment process before signing contracts with any particular energy supplier.

Am I eligible for a grant?

In England, there are currently no national energy related grants for micro hydropower schemes. Financial support is now provided solely by FITs. However, local grant assistance may be available for related work such as that on feasibility studies, water course improvement, fish passes or biodiversity.

In Wales, the *Ynni'r Fro* programme is contributing small grants to fund preliminary costs such as feasibility studies. There is more information on this scheme below.

You will need to observe UK aid policy and European state aid regulations. Your installation may not be eligible for FITs if you receive certain grant funding, or you may be asked to pay back grant assistance in order to benefit from tariffs. You should establish the eligibility of the funding sources for your scheme before proceeding. Further information on FITs and grants can be found at **www.decc.gov.uk/fits**

What sort of funding is available in Wales?

The Welsh Assembly Government's *Ynni'r Fro* programme uses European Structural Funds to provide support and funding to encourage the development of community scale renewable energy schemes across Wales.

A network of locally-based technical development officers is in place across Wales to help groups develop their projects and access funding.

Grant funding is available towards feasibility studies and other preparatory costs. Up to £30,000 is available to fund early stage activities without which the projects would not be able to go ahead, such as environmental surveys, planning applications and community consultation.

Financial support is also available towards capital costs of a renewable energy project.

Who can apply for *Ynni'r Fro* funding?

Grants are available to any legally-constituted community based social enterprise located in Wales. A social enterprise can be, but is not limited to:

- Community interest company
- Industrial and provident society
- Company limited by guarantee or shares
- Limited liability partnership
- Registered charity

In all cases, a social enterprise must fall within the following definition used by the Energy Saving Trust for the purposes of the *Ynni'r Fro* scheme:

- 'an organisation that, in the reasonable opinion of the Energy Saving Trust, is engaged in the carrying on of a business with primarily social purposes (other than the provision of schooling or social housing), meaning that it is involved in some form of trading, but that it trades primarily to support a social purpose (other than schooling or social housing) and seeks to reinvest any surpluses principally in the business or in the community to enable it to deliver on its social objectives.'
- Projects must be based in Wales and generate energy from a renewable source.
- Projects should be able to employ at least one part time employee within the first two years of completion.
- Hydro schemes should expect to generate at least 240,000kWh per year, raising a minimum gross income of £30,000.
- Schools and registered social landlords are not eligible to receive *Ynni'r Fro* funding.

How to apply for *Ynni'r Fro*

You must complete an **expression of interest form** to enter the programme. If you wish to discuss your project then please contact your local development officer or the **Energy Saving Trust project team**. More information is available at **www.energysavingtrust.org.uk/ynnirfro**

Dyffryn Crawnon – Llangynidr, Powys

Dyffryn Crawnon is a community of just over two dozen homes in a quiet valley in the Brecon Beacons National Park. The community-owned micro-hydropower scheme is due to be completed early in 2011 and is expected to cost less than £50,000 to build.

The community has formed Dyffryn Crawnon Green Energy – a community interest company – to manage its interest in the 15kW scheme.

The Dyffryn Crawnon scheme is a typical high head (over 20 metre) system. As little as 17 litres per second will be diverted from the Nant y Wenynen stream. The water will then be piped down the hill to drive the turgo wheel in the turbine house 130m below, before being returned to the stream. Once it is up and running, the scheme will be able to generate more than 65,000 kWh each year.

The scheme is being developed in partnership with The Green Valleys – itself a community interest company dedicated to developing and financing small scale hydropower schemes in Wales. The Green Valleys has been helping with the Environment Agency licensing procedure and working with the local authority planning department to ensure that the scheme meets the highest environmental standards.

A fish pass will allow migratory fish to move safely around the equipment and the turbine house will be partially buried, made from local stone, and topped with a turf roof.

The scheme has been funded by grants, loans and capital provided by The Green Valleys. Income from the scheme will be used to support activities in the valley to save energy and generate the energy that is used from renewable sources. The community's aim is to make Dyffryn Crawnon a carbon negative valley.

To find out more please visit www.thegreenvalleys.org

Photograph courtesy of The Green Valleys cic

Useful Contacts

Environment Agency
Tel: 08708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

Energy Saving Trust
Advice line: 0800 512 012
www.energysavingtrust.org.uk

Department of Energy and Climate Change
See the Community Online Portal
(to be launched late 2010) at www.decc.gov.uk

Welsh Assembly Government
www.cymru.gov.uk

Cadw
www.cadw.wales.gov.uk

Countryside Council for Wales
www.ccw.gov.uk

English Heritage
www.english-heritage.org.uk

Natural England
www.naturalengland.org.uk

National Parks
www.nationalparks.gov.uk

Ofgem
www.ofgem.gov.uk

Planning Portal - Local Planning Information Online
www.planningportal.gov.uk

Angling Trust
www.anglingtrust.net

Association of Rivers Trusts
www.associationofriverstrusts.org.uk

British Hydropower Association
www.british-hydro.org

Micro Hydro Association
www.microhydroassociation.co.uk

The Wildlife Trusts
www.wildlifetrusts.org