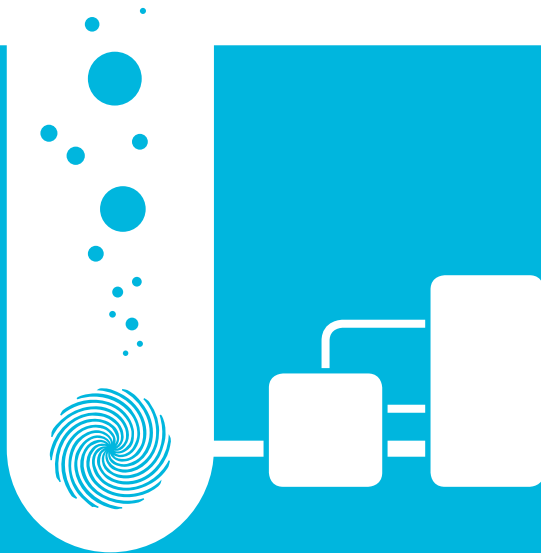


Renewables Factsheet #4

# MICRO HYDROELECTRICITY



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## OVERVIEW

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Hydroelectricity, one of the oldest technologies for generating electricity, is the use of the energy in a flowing stream of water to turn a turbine, which in turn turns an electricity generator. Hydroelectricity can be in very large scale, producing megawatts of electricity, or can be in small scale, producing only a few watts or kilowatts. The bigger systems are constructed across large bodies of water, which are usually dammed. The smaller systems are constructed across small streams.

A range of different hydro-power technologies exist, but the suitability of each type is likely to vary depending on the specific circumstances of a site. A useful guide on micro hydro power has been produced by the British Hydropower Association, which provides further information on site and scheme suitability. This can be viewed at:

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<http://www.british-hydro.org/mini-hydro/download.pdf>

## SUITABILITY

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The two key considerations for a stream to be suitable for hydroelectric power generation are:

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**a. Head Height:**

this is the height difference between the point at which water feeds into the turbine and the point at which water leaves the turbine. The higher the head height is, the better the water flow is for hydroelectricity generation.

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**b. Flow rate:**

the flow rate is the volume of water that passes through a certain point over a certain time. It could be measured in m<sup>3</sup> per second or litres per second. The stream has to have an acceptable annual average flow rate for micro hydroelectric generators to be effective.

Sometimes, the flow rate and head height can compensate for each other, that is, if the head height is low and the flow rate is high, and if the head height is high but the flow rate is low. Different turbine designs are suitable for the two scenarios.

## SCALE AND TYPE OF DEVELOPMENT

The scale of hydroelectric system installed depends on the energy carrying capacity of the available water flow. A turbine is usually designed to optimise water flow. It is usually advised that the full water flow of a stream is not diverted through the turbine in order not to significantly alter the natural ecological state of the water path.

A hydroelectric system can be installed as a stand-alone system providing electricity just to the house or development where it has been installed, or it can be integrated into the distribution grid.

## COSTS AND SAVINGS FROM MICRO HYDROELECTRIC

Costs for installing a micro-hydro system can vary a lot, depending on the location and the amount of electricity it can generate. A typical 5kW scheme suitable for an average home might cost £20,000 - £25,000 including equipment and installation.

Maintenance costs vary but are usually low as hydro systems are very reliable.

Savings depend on the amount of hydroelectricity that is used in place of electricity bought from another source. If the hydro system replaces electricity bought from the National Grid then typical savings could be substantial. Hydro systems are also eligible to receive generation and export payments through the Feed-in Tariff. A 15kW system or smaller could get up to 19.9p/kWh generated.

Micro Hydro qualifies for the Feed-in-Tariff introduced on 1st April 2010. This incentive is comprised of 3 parts.

- The Feed-in Tariff itself, currently paying 19.9 pence for every kWh generated by systems up to 15kW.
- The free use of the electricity generated.
- Payment for each kWh fed into the grid through a contract with a Utility Company.

It should be noted however that equipment will need to be installed by a Microgeneration Certification Scheme (MCS) accredited installer to be eligible for Feed-In-Tariffs. Further information on Feed-In-Tariffs can be found on the Department of Energy and Climate Change's website at:

[www.decc.gov.uk](http://www.decc.gov.uk)

## PLANNING

Installing a micro hydroelectric system will generally require planning permission. It is also likely to require the consent of other agencies such as the Environment Agency and Natural England. A developer is advised to make early contact with these organisations. The local authority should be able to advise applicants on all other agencies that have an input to the development.

Further information on planning considerations can be found later in this factsheet.

## SOURCES OF FURTHER INFORMATION AND ADVICE

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The following websites provide further information and advice on micro hydro-electric power:

**a. Energy Saving Trust:**

<http://www.energysavingtrust.org.uk/Generate-your-own-energy/Hydroelectricity>

**b. Direct.gov.uk:**

[http://www.direct.gov.uk/en/Environmentandgreenerliving/Energyandwatersaving/Renewableandlowcarbonenergy/DG\\_072632](http://www.direct.gov.uk/en/Environmentandgreenerliving/Energyandwatersaving/Renewableandlowcarbonenergy/DG_072632)

**c. Department for Energy and Climate Change:**

[http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/uk\\_supply/energy\\_mix/renewable/explained/microgen/micro\\_hydro/micro\\_hydro.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/explained/microgen/micro_hydro/micro_hydro.aspx)

**d. British Hydropower Association:**

<http://www.british-hydro.org/index.html>

**e. The Microgeneration certification Scheme:**

<http://www.microgenerationcertification.org/>

**f. Local Government Improvement and Development:**

<http://www.idea.gov.uk/idk/core/page.do?pagelid=23051802>

# PLANNING CONSIDERATIONS

## Permitted Development Considerations

Planning permission will normally be needed for all scales of hydro schemes, including domestic and non-domestic installations either attached to or within the grounds of the premises in question. The only potential exception is for the refurbishment of an existing scheme (i.e. where no new civil works would be required).

The government is currently investigating the possibility of extending permitted development rights for small scale hydro installations for both domestic and non-domestic situations, but as of yet no decision has been taken on this matter. For further information on permitted development rights, please refer to the Planning Portal and the Department for Communities and Local Government website:

<http://www.planningportal.gov.uk/permission/commonprojects/windturbines>

<http://www.communities.gov.uk/documents/planningandbuilding/pdf/smallscalefinal.pdf>

Advice should always be sought from your Local Planning Authority if you are unsure whether your development falls under permitted development rights. Your local planning authority can advise you on the need to obtain planning permission.

If you want certainty that your renewable energy proposal is considered permissible (in that you do not need to make a planning application) you should apply for a Lawful Development Certificate (LDC).



## Development Management and Planning Policy Considerations

Small scale hydro schemes are usually defined as those with a capacity of less than 1MW. Hydropower is well developed in England, most sites with a potential of 1MW or more having already been developed. However there are a large number of sites with the potential to economically develop small scale schemes of less than 1MW.

The Key features of a small hydro scheme include:

- a hydraulic 'head' – vertical distance from water source to the turbine
- a water intake above a weir or behind a dam
- a pipe or channel to take water to the turbine
- a turbine, generator and electrical connection
- an outflow, where the water returns to the watercourse

These elements raise a number of important planning issues.

When determining an application for a small scale hydro scheme the main issues likely to be taken in to account will include:

- Siting and landscape impacts
- Design Considerations
- Hydrological considerations
- Ecological considerations,
- Fisheries interests
- Noise
- Construction disturbance
- Operational disturbance
- Impacts on Listed Buildings and Conservation Areas (in some instances)
- Recreation and public access

This list is not exhaustive however and the factors that need to be taken into account are likely to vary depending on the location of the property or site in question.

Your local planning authority will be able to assist you in identifying the issues and planning policies that will need to be taken into account for a particular proposal and will usually be able to agree with a developer before an application is submitted what information is required in order for an application to be registered. Advice should always be sought from your Local Planning Authority before submitting an application.

Some form of environmental assessment is essential when it comes to applying for planning permission and environmental licenses.

Under the Town and Country Planning (Assessment of Environmental Effects) Regulations 1988, a planning application for any development that the planning authority considers likely to have a significant impact on the environment must be accompanied by an Environmental Statement. This document provides an assessment of the project's likely environmental effects, together with any design, construction, operational and decommissioning measures that are to be taken to minimise them. It would typically cover such issues as flora, fauna, noise levels, traffic, land use, archaeology, recreation, landscape, and air and water quality.

Also, The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (SI No. 293) include "installations for hydroelectric energy production" within Schedule 2(3)(h). Those with a generating capacity of over 500kW (0.5MW) must be screened for the need for EIA by the planning authority. Projects that lie within sensitive areas as defined in regulation 2(1) must all be screened as the thresholds do not apply. Where a screening opinion is required, Schedule 3 to the EIA Regulations provides selection criteria for screening Schedule 2 development (see regulation 4(5)).

An EIA is often required by the Environment Agency as part of the application for an Abstraction Licence. Consultation between the Environment Agency and local planning authority at the scoping stage will minimise duplication of effort as in many cases, one Environmental Statement will be sufficient for both purposes.

## OTHER AUTHORISATIONS/CONSENTS

### Abstraction Licence

Any small hydro scheme in England requires an abstraction licence and possibly an impoundment licence from the Environment Agency, and the applicant may have to produce calculations, or other evidence to justify assumptions in respect of the available flow and the amount of water abstracted. Abstraction of the entire flow is not permitted and the design must guarantee a minimum flow to maintain the riverine environment in the deprived reach. Further details about water abstraction can be found on the Environment Agency website:

<http://www.environment-agency.gov.uk/business/topics/water/32020.aspx>

### Consent to Work in a Watercourse

In addition to an Abstraction Licence, if you wish to construct anything which may affect the flow in a watercourse, you must obtain written consent from the Environment Agency. Evidence of Planning Permission is usually required in order to secure a consent.

### Reservoirs Act

If the development entails the construction of a new reservoir (or restoration of an existing reservoir) exceeding 200,000 cubic metres capacity, the Reservoirs Act will apply. Under the Act, such reservoirs require certification and regular inspection by an engineer registered under the Act to do so.





## CONSERVATION AREA OR LISTED BUILDING CONSIDERATIONS

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Additional planning considerations will apply when determining proposals for hydro schemes that could affect a listed building, which are protected for their special architectural or historic interest. Generally, they may not be extended or altered, internally or externally, in any way which may affect their interest. A proposal would be assessed against the extent to which it would interfere with the appearance, structure, design or character of a listed building. When this would have a negative effect on a listed building's special interest, a proposal would not be allowed.

Proposals for free standing buildings in the vicinity of a listed building may also be assessed against their impact on the setting of the building in question, any potential visual or physical damage they may cause to it, or any other adverse effect they may have on it.

It is more than likely that listed building consent will also be required when proposing development which could affect a listed building. This is in addition and separate to the granting of planning permission, but similarly seeks to ensure that any alterations to a listed building, whether internal or external, do not alter the special interest of the building.

**You should always consult your local planning authority before submitting an application if you think it could affect a listed building.**

Conservation areas are areas of special historical or architectural interest which have a character or townscape that it is desirable to preserve or enhance.

As a general rule development must preserve or enhance the character and appearance, setting and views into and out of a conservation area. Accordingly, buildings and structures are unlikely to be appropriate within a conservation area where they would be visually intrusive or prominent features. Proposals for development on sites or buildings which lie outside of a conservation area, but which would affect its setting or the views in or out of a conservation area, would also be required to preserve or enhance the character or appearance of the area in question.

**You should always consult your local planning authority before submitting an application if you think it could affect a conservation area.**

In addition to listed buildings and conservation areas, the development of hydro electric schemes could affect scheduled monuments, historic parks and gardens, historic battlefields and World Heritage Sites. There will be other considerations to take into account when proposing development within or in the vicinity of these sites and areas. Local designations may also apply to specific sites and buildings.

**Advice should always be sought from your Local Planning Authority before submitting an application.**

# PLANNING APPLICATION REQUIREMENTS

The following information will normally be required in support of a planning application for a small scale hydro scheme. As indicated previously Listed Building consent may also be required in addition planning permission in some circumstances. Guidance on how to make a planning application can be obtained from the Planning Portal website at:

<http://www.planningportal.gov.uk/planning/applications/howtoapply>

National requirements for all planning applications will apply to any proposal. These can be found at:

<http://www.communities.gov.uk/documents/planningandbuilding/pdf/1505220.pdf>

Alternatively, this information can usually be obtained from your local planning authority, along with details of the application fee that will apply.

**It is recommended that you contact your local planning authority for further advice before submitting an application.**

Local planning authorities can set out local requirements for the information that will be required in support of a planning application, and will usually be able to agree with a developer before an application is submitted the information which is required in order for an application to be registered.

In most cases it is likely that the following information would be needed to support an application involving the installation of a small scale hydro scheme:

- Design and Access Statement
- Grid Connection Details (including transformer and any transmission lines or cabling routes)
- Site management measures during the construction phase
- Provision of fish passes
- Noise impact assessment
- Biodiversity Surveys and Reports
- Conservation Statement and Heritage Impact Assessment
- Landscape and Visual Assessment

Please note that this is not an exhaustive list and additional information may be required to assess to an application depending on the characteristics of a site. It is likely that additional information would be required to support a larger scale scheme. Also, as mention above, a local planning authority will also be required to screen applications for the need for an Environmental Impact Assessment if they have a generating capacity of over 500kW (0.5MW) or lie within sensitive areas as defined in regulation 2(1) regardless of their generating capacity.

**It is recommended that you contact your local planning authority for further advice before submitting an application.**

## BUILDING CONTROL REQUIREMENTS

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If you wish to install a small scale hydro facility, building regulations will normally apply to aspects of the work such as electrical installation. The electrical connection and installation of small hydro schemes will normally need to be approved under Part P (Electrical Safety) of the Building Regulations.

It is recommended that you contact your local authority Building Control section or an installer for further advice when considering a particular proposal.



FURTHER INFORMATION ON PLANNING  
REQUIREMENTS WILL BE AVAILABLE FROM  
YOUR LOCAL COUNCIL.

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## CHESHIRE EAST COUNCIL

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Development Management

**T:** 0300 123 5014

**E:** [planning@cheshireeast.gov.uk](mailto:planning@cheshireeast.gov.uk)

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## CHESHIRE WEST AND CHESTER COUNCIL

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Development Management

**T:** 0300 123 7027

**E:** [planning@cheshirewestandchester.gov.uk](mailto:planning@cheshirewestandchester.gov.uk)

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## WARRINGTON BOROUGH COUNCIL

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Development Management

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