Guidelines for Developing Community Hydro Schemes in Oxfordshire

South Oxfordshire District Council

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TV Energy, Liberty House, The Enterprise Centre, New Greenham Park,
Newbury, Berkshire RG19 6HS

Report produced by:

Alison Wilshaw
TV Energy
Liberty House
The Enterprise Centre
New Greenham Park
Newbury
Berkshire
RG19 6HS

Tel: 01635 817420
alison.wilshaw@tvenergy.org

On behalf of:

Heather Saunders
South Oxfordshire District Council
Benson Lane
Crowmarsh Gifford
Wallingford
OX10 8AX

Report reference TVR 153

Prepared by: Dr. Alison Wilshaw
Renewables Advisor

Approved by: Dr. Keith Richards
Managing Director

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1 INTRODUCTION

1.1 *Purpose of the Guidelines*

These guidelines were developed in response to the growing number of communities in Oxfordshire where there is an interest in developing local hydro schemes. They seek to provide guidance to communities on the process of setting up a local hydro scheme. Many communities are keen to develop this very visible form of renewable energy and it is hoped that this document will assist them in identifying the resources and evaluating the options available for their project.

Developing a hydro project is not an easy task. There are many aspects which have to be taken into consideration including engineering, financial, legal, business and communication tasks. These will all be necessary at different development stages from site selection up to and including operation of the plant.

1.2 *How to use the Guidelines*

The guidelines are divided according to the stages of development of a hydro project, with separate sections describing specific activities required to develop a successful scheme, for example, financing the project, planning, licences, and legal issues.

The guidelines do not focus on the technical details of designing a hydro power project, as there is already a wealth of information available on this subject. For further reference, a list of reading is given in Section 11.

The guidelines may be used in conjunction with the TV Energy report *Goring Weir: a Case Study of the Development of a Community Hydro Scheme* (TVR 154), which provides a real example of a hydro project under development in South Oxfordshire.

2 PROJECT PLANNING

2.1 *Phases in a Hydro Scheme Development*

The main activities of a community hydro scheme development can be divided into five main categories:

1. Technical and engineering;
2. Licensing and permissions;
3. Financial and administration;
4. Legal and management;
5. Communication: project promotion and information to community.

Within these activities, the following tasks can be identified:

Technical and Engineering

- Initial Site Assessment
- Prefeasibility / Full feasibility
- Outline design
- Detailed design
- Civil works
- Construction and installation
- Operation and maintenance

Licensing and Permissions

- Meeting with Environment Agency
- Environmental Assessment
- Flood risk assessment
- Planning permission
- Land drainage consent
- Impoundment / Abstraction License
- Permission to connect to grid

Financial and Administration

- Fundraising, loans, grants
- Local or regional share issue
- Financial Management
- Administration of shares
- Income generation

Legal and Management

- Stakeholder meeting
- Establish limited company and bank account
- Formation of Industrial and Provident Society (or other appropriate structure)
- Power Purchase Agreement
- Business Management

Communication and Community

- Appoint project leader
- Regular meetings with local community
- Set up web-site
- Public Information Display
- Talks and presentations to raise profile of project

2.1 *Project Timeline*

It is not possible to specify the tasks for every hydro project, as each project will have different circumstances and criteria. To date, medium scale hydro projects have required in excess of four years before completion. However, with careful planning, it may be possible to accelerate the project development timeline, by running certain tasks in parallel. The Project Plan below shows how this might typically be scheduled. It shows that the project preparation activities could be completed within the first three years, with the fourth year being the first year of operation.

	Year One				Year Two				Year Three				Year Four			
Technical and Engineering																
Site assessment (Prefeasibility)																
Full feasibility and / or outline design																
Detailed design																
Civil works																
Installation of hydro plant																
Operation and maintenance																
Communication and Community																
Appoint project leader (s)																
Meetings with local community																
Set up 'low carbon' action group																
Set up project / community web-site																
Public information displays																
Presentations to raise project profile																
Licensing and Permissions																
Meet with Environment Agency																
Environmental / Flood Risk Assessment																
Landowner permission																
Planning permission																
Environment Agency permits																
Permission to connect to grid																
Financial and Administration																
Fundraising, loans & grants																
Financial management																
Local or regional share issue																
Share administration																
Income generation																
Legal and Management																
Stakeholder meeting																
Set up appropriate legal structure																
Power Purchase Agreement																
Business management																

3 INVOLVING THE COMMUNITY

A community hydro project requires a strong level of support from the local community to succeed. As a first step towards developing this support, it is important to establish an appropriate community group or club, made up of local community members who are keen to establish and promote the project. This may have various auspices, but the themes of low carbon, sustainability or renewable energy would all provide a suitable focus for the group. It can be helpful if the theme is broader than the hydro project alone, as this provides additional cohesion for the group.

It is also essential to appoint a project leader, and, if possible, a deputy leader, as these individuals will be responsible for managing the project and driving it forward. These individuals do not necessarily need an engineering background, as long as there is someone technical on the leadership team. Project management and good communication skills are key attributes of this role, whilst a technical understanding of the project aims would be beneficial.

Early on in the project lifetime, there must be a 'kick-off' meeting where the project is proposed and the views of the community are sought. At this meeting there should be an opportunity for people to sign up to become involved in the project. A further function of this meeting is to allay any concerns which may be held by members of the community regarding the development of a hydro project. By sharing the project information with the community as a whole, it is possible to attain people's 'buy-in' to the project.

Another important activity in the early phases of a hydro project is to develop a project web-site. This might be part of a broader community web-site, or possibly even just some additional pages in the Parish Council web-site. This will enable the community to inform wider audiences than just those in the local area, and may be an important route to raising shares in the later project phases. There could also be an area on the web-site where individuals can register for further emails or newsletters about the project, as a way of keeping informed about the development.

Finally, it is useful to raise awareness about the project by making presentations to the community and other interested groups. One possible option is to invite outside speakers to give presentations about relevant environmental issues, or to host speakers from other community groups who have developed hydro projects. In addition, there should be some wider, regional or national publicity about the project as progress is made.

4 FINANCING YOUR PROJECT

4.1 *Project Costs*

The total costs for a hydro development vary depending upon the scale and complexity of the project. However, it is possible to indicate a range of costs for some activities and the typical project costs for the development of a small or medium scale low head hydro scheme are given in the table below:

Project Activity	**Typical cost range**
Initial site assessment / prefeasibility study	£0 – 1,500
Full feasibility / outline design study	£3 - 10,000 (depending on complexity and scale of project)
Environmental assessment	c. £12,000
Flood risk assessment (barrage schemes only)	£2,500
Flood risk modelling (if required)	£10,000
Detailed design and specification	£10 - 15,000
Planning permission	£250
Environment Agency licences	c. £200
Construction and installation	£3,000 to 5,000/kW installed

Depending upon the type and scale of project, some of the above stages may not be necessary for all projects.

4.2 *Funding the Initial Studies*

There is a certain amount of risk associated with the initial studies required for the development of a new scheme. However, many financial investments are inherently risky but can deliver good returns to the long term investor. It may be possible to engage the interest of a local investor, who is willing to provide small amounts of funding to the hydro development. Alternatively there are a number of funds which are possible sources of funding at this stage in the development. Examples of these are:

- Sustainable Development Funds (administered by AONBs);
- Community Sustainable Energy Programme (Big Lottery Fund);
- Other lottery funding;
- Green Funds from Utilities, e.g. EDF;
- the Ashden Trust, or
- your local Parish or Town Council.

4.3 *Raising the Capital for Construction*

Project capital may be financed through:

- Equity in the project, through local share issue;
- Loans, but these need to be long term;
- Finance packages negotiated with financial management companies;
- Part debt, part equity – banks may be more willing to lend where equity can be used to leverage further funds
- Direct investment, e.g. Eon, EDF, to enlarge their renewables portfolio.

5 SETTING UP THE LEGAL STRUCTURES

In order to access grants and loans, or to issue shares, a legal entity must be formed which is appropriate to the funding required. This may be one (or more) of the following:

Community Interest Company CIC: This is an easy to set up community oriented business structure which provides a legal structure to open a bank account and raise grants. A community interest company is controlled by its directors.

Charity: This is a useful structure for raising grants, although it must have a proven charitable purpose. A charity is controlled by the trustees who, in this case, should be prominent community members. There are lengthy requirements to report on financial activity, but taxation is kept to a minimum.

Company Limited by Guarantee: A company limited by guarantee can also be used by a community to apply for grants. Again, it is controlled by its directors, with profits usually being reinvested in the company's aims and objectives rather than to directors or shareholders. This structure is only able to raise capital against the personal guarantees of its directors.

Company Limited by Shareholding: A company limited by shareholding is controlled by its directors, with profits go to shareholders. The value of shares determines the voting power. This type of company can raise capital from selling shares, and can then match this with loans.

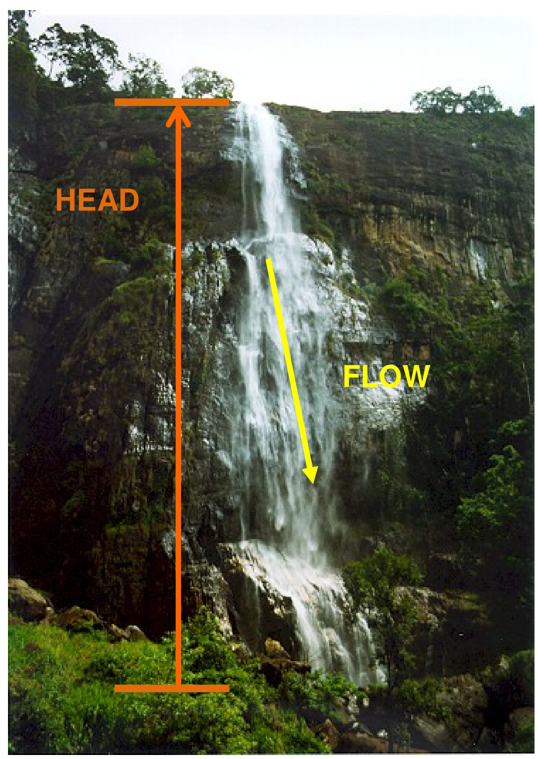
Industrial and Provident Society (IPS): An IPS is controlled by its Directors who are elected by the members. A member can contribute share capital up to a ceiling amount of £ 20K, but only has one vote (rather than voting power proportion to the share value). The rules orient the Society towards serving its community or membership, but it has the ability to raise capital through shares and also loans, as is required by a capital intensive renewable energy project.

Co-operatives: Various co-operative (co-op) structures exist, including Workers Co-ops and Community Co-ops. Co-operatives are obligated to operate under the five ethical principles of co-operative societies. A community co-op can also be an IPS. Torrs Mill Hydro and Westmill Windfarm are both successful examples of a Co-operative IPS (see details in Annex 1). *Co-operatives UK* has a simple procedure for the registration of Co-op IPSs (see web-site details in Section 11).

Further information about the above legal structures and their relative suitability for community group objectives can also be found in the bibliography.

6 TECHNICAL SITE ASSESSMENT

6.1 *Key Site Data*



Hydropower can be generated whenever a body of water flows from a higher to a lower level. Typical examples are when a stream travels downhill, or when a river flows over a weir or waterfall.

The amount of hydro power available depends on two main variables: the head, H, or height of the fall, and the flow rate, Q, or the quantity of water passing a given point per second. Multiplying these two variables together gives a number which is proportional to the power available at the site. The other factors which are necessary for this calculation relate to the generator efficiency, the force of gravity and the density of water. If a generator efficiency of approximately 70% is assumed, then the power equation for a hydro site can be simplified to:

- Generator power, P (kW) = 7 x Head, H (m) x Flow rate, Q (m^3/s)

The head of a site is the height difference, in metres, between the point at which the water would enter the hydro power scheme and the point where the water is returned to the river. The head of a scheme can be estimated or measured with relative ease. For an existing weir, it is approximately equal to the height of the weir. For a mill site with an overshot waterwheel, then the head is equal to the wheel diameter. If the site is undeveloped and has no old watermill or other structures present, then the potential head would be between where the hydro intake screen would be and where the water discharged from the turbine would return to the watercourse.

With hydro it is very important to get as much head as you possibly can, as more head means more power for not very much more cost. Depending on how much flow there is, the minimum head required for a viable hydro system varies. If there is both low head and low flow at a site, then it is very unlikely that the proposed scheme will be cost effective. As a rule, a head greater than 1m is the minimum requirement.

The flow rate, which is measured in cubic meters, is more difficult to estimate. An indication of typical flow rates for a range of streams and rivers is given in the table below. This can be used as an initial guide to estimate the flow available at a site, but would need to be analysed in greater detail by a professional during the initial site assessment.

Type of river	Approximate flow rate	Minimum head required
Very small stream, e.g. in a garden	0.01 – 0.05 m^3/s	10 – 50 m
Small stream	0.05 – 0.25 m^3/s	2.5 – 10 m
Stream	0.25 – 1.00 m^3/s	2 – 2.5 m
Small river	1 – 2 m^3/s	1.5 – 2 m
River	Greater than 2 m^3/s	1 – 1.5 m

For a more detailed estimate, flow rate data can be obtained from the Centre for Ecology and Hydrology in Wallingford, where data from 1300 UK gauging stations is available. Data for 200 of these sites can be accessed over the internet. These records can be used to calculate the flow rate at a given site. For a precise measurement of head and flow, it is advisable to consult an expert in the field and this can be done as part of the initial feasibility study (see the British Hydropower Association for relevant company details www.british-hydro.org). An enthusiastic amateur with a technical background can also find information about the process in the reference section of this document (Section 10).

As a general rule, if a site has around 8 kW or more available power, then it is a viable site for hydro power development. The presence of a previous mill on the site can be used as an indication of a potential hydro site.

The other key requirements for a potential hydro site are:

- Suitable location for turbine, e.g. weir or mill stream;
- Proximity to load (houses, local businesses) or electricity sub-station for grid connection to DNO (Distribution Network Operator). The sub-station must have enough capacity for the grid-connection to be made and this will need to be confirmed with the DNO.
- Landowner permission;
- Sufficient access for construction traffic.

There are a number of possible configurations for a hydro plant to be sited on a river and these can essentially be divided into two main types:

- run-of-river schemes, where the hydro turbine is situated in the main flow of the stream or river, and
- diversion schemes, where a small canal or 'leat' is created to channel some of the water flow away from the main river, where it passes through the hydro turbine before being returned to the river.

It should be noted here that run-of-river or 'barrage' schemes are likely to require more rigorous studies and a larger number of permissions and licences than a mill stream development, where the turbine does not constitute an obstruction to the flow of the main body of the river.

Hydro sites can also be divided into three categories related to the head of the site: high head, medium head and low head, where sites with less than 10 m are low head and over 50 m they are classed as high head. It can therefore be assumed that all sites on the River Thames are low head sites. The technology options available for a low head site are:

- Kaplan or 'propeller' type turbine
- Open flume Francis turbine
- Archimedean Screw turbine, also known as an Archimedean Spiral
- Cross flow turbine

All of these technologies can be used in either a barrage or leat configuration.

6.2 *Feasibility and Design Studies*

There are a number of consultancies and installation companies which are able to provide low-cost feasibility or pre-feasibility studies to assist with the site selection process. Some of these represent particular manufacturers, whilst others are technology neutral. Contact details for some of these companies can be found in Annex 2.

A feasibility study is required to assess the site to ascertain whether or not it is technically and economically feasible to install hydro power generation equipment. A feasibility study may be classed as 'pre-feasibility' or 'full feasibility'. A pre-feasibility will consider only the basic site requirements and assess whether there is a technically and financially viable solution. A full feasibility will consider the site in more detail and select the best available technology for that site, as well as providing a cost analysis of that option.

Following the feasibility study phase, it may be necessary to further define the technical detail of the scheme by commissioning an outline design study. This will depend upon the depth and scope of the feasibility study, but in any case, it is essential at this stage to define the outline technical details of the project, in particular the type of hydro turbine to be installed and the basic site configuration. This information is necessary to inform the subsequent environmental studies and permission process. In addition, an assessment of the costs involved (capital cost and running costs), as well as potential income generation is also vital to enable the project leader to raise the required investment.

If there is thought to be sufficient power available for a financially viable hydro scheme, and if there is a suitable load or grid-connection point (e.g. an electricity network substation) nearby, then the next step is to identify the various assessments and permissions that will be required to move forward with the development.

The relevant people to be consulted for permission to install a hydro scheme are: the Environment Agency, the Local Planning Authority, the electricity Distribution Network Operator (DNO) and the local landowners.

Experience with existing schemes has shown that early contact with the Environment Agency is important to ensure that all the requisite permissions and studies are identified as soon as possible within the project time frame. In August 2009, the Environment Agency published their Good Practice Guidelines for the Environmental Assessment of Low Head Hydro Power Developments. This document provides a checklist that can be used to assess the environmental sensitivity of a given site as well as giving guidance on the licenses that will be required for a hydro site. In addition, to this, the Environment Agency is currently streamlining the process for permitting hydro developments so that, in the future, the number of licenses required will be reduced.

7 LICENSING AND PERMISSIONS

7.1 *Planning*

Planning aspects of hydro developments are the responsibility of local planning authorities. Planning permission is likely to be required for most hydro developments, except for the refurbishment of an existing scheme, which is often exempt as it is considered that there is no 'change of use'.

The planning department will advise on whether planning permission is required and also whether Building Regulations Approval or the submission of an Environmental Statement (see below), are necessary.

Many planning authorities will give pre-application advice (sometimes for a fee) and this will include a list of organisations which should be consulted, as well as measures that can be taken to make the scheme more acceptable.

It is often advisable to apply for outline planning permission early on in the project, so that the main elements of the scheme are agreed prior to the completion of the final design. This allows feedback from planners to be accommodated into the final design and reduces the risk of the full planning application being rejected.

The main issues of concern tend to include the following:

- Visual appearance of the hydro scheme;
- Noise impact on residents;
- Disturbance to local residents during construction;
- Disruption of traffic during construction;
- Preservation of structures of historical importance.

On environmental issues, the planners will normally take advice from bodies such as the Environment Agency and Natural England. They will also provide advice on whether the scheme requires a public information display to present the project to local people.

7.2 *Environmental Assessment*

As mentioned above, an Environmental Statement is required at the planning application stage for any development that is likely to have a significant impact on the environment (Town and Country Planning Regulations 1988). This provides an assessment of the project's likely environmental effects, together with any design and construction measures that are to be taken to minimise them. It includes consideration of impacts on flora, fauna, noise levels, traffic, land use, archaeology, recreation, landscape, and air and water quality.

If the local planning authority requests an Environmental Statement, this may meet the requirements of the Environment Agency. If the planning authority does not ask for an Environmental Statement, then it is likely that the Environment Agency will require its own Environmental Assessment. This will cover issues such as water quality, fisheries, river ecology, flood defence, nature conservation and public recreation issues.

In addition to the above, hydro-schemes on rivers with migrating species of fish (e.g. salmon or trout) are subject to special requirements (fish passes) as defined in the Salmon and Freshwater Fisheries Act. The Environment Agency should be consulted at an early stage and will provide guidance on what is required.

7.3 *Licenses*

The removal or impoundment of water from rivers and streams in England and Wales requires Environment Agency permission in the form of a licence. The main obligation of the Environment Agency is to protect water courses and they are likely to object to a scheme if insufficient assessment has been undertaken prior to the application for a license. However, they will remove the objection if their concerns are addressed. There are four licences that can apply to a hydropower scheme:

- Abstraction licence: this applies if the water is being diverted 'away from the main line of flow of the river'. The only scheme which can avoid an abstraction licence is therefore a barrage-type project where turbines are installed on an existing weir. Abstraction licences are currently valid for a period of 12 years, after which they must be renewed.
- Impoundment licence: this applies if changes are being made to structures which impound water, such as weirs and sluices, or if new structures are built.
- Flood defence consent: a flood risk assessment is required by the local

planning authority to show that the construction will not impede land drainage or increase flood risk. The Environment Agency will be consulted on this assessment and they will subsequently use this information for the flood defence consent application.

- Fish pass approval: this is issued separately by the EA Fish Pass Panel for rivers with migratory salmonids and eels, otherwise it is covered in the abstraction or impoundment licence.

The impoundment or abstraction licenses currently take three to four months for approval, whilst the flood defence consent can be granted in two months. As described above, the Environment Agency is currently reviewing the procedure for permitting hydro developments and, in March 2010, they published a consultation for a new simplified process of licensing hydro schemes. This should enable a new streamlined system to be initiated in autumn 2010.

7.4 *Land ownership*

It is important to consult with local land-owners at an early stage to establish objections to the proposed scheme and to negotiate access. Rivers and streams often run along property boundaries, and this sometimes results in queries regarding the legal ownership of the river banks. If this issue is not dealt with at an early stage there may be delays and additional charges later in the project.

It is also necessary to assess how construction companies will access the different components of the hydro scheme, and to confirm that these routes will be available at the times required.

Leasing agreements also need to be drawn up which establish the right to use the necessary land areas and also to define the responsibilities of the tenant in maintaining it.

8 DESIGN AND CONSTRUCTION

8.1 *Detailed Design Phase*

When the Environmental Assessments are complete and all the necessary permissions described above have been granted, then the detailed design and drawings can be undertaken. This phase of development should normally be undertaken by a company experienced in hydro plant design work.

The detailed design of the scheme will consider the optimum sizing of the turbine. The rated capacity of the turbine will determine the 'capacity factor' or 'load factor' at which it works. For example, a large, expensive turbine will accommodate a high flow rate, but will operate at a low capacity factor for much of the year. In contrast, a smaller turbine will have a more limited flow intake, and therefore a lower rated power, but it will be working for more of the time with a higher capacity factor. To get the optimum sizing, most mini-hydro schemes tend to have a capacity factor of 50% to 70%, as this gives the best return on the investment.

8.2 *Construction and Civil Works*

For large schemes, it is important for the project to be managed by a professional hydro-engineering firm, and installed by an experienced contractor. Such projects tend to be managed as a 'turn-key' operation, where a main contractor is responsible for the construction of the scheme. The contractor (usually a civil engineering company or the turbine supplier), brings together a team of sub-contractors and suppliers under a single contract, thereby simplifying the project management from the client's viewpoint.

8.3 *Grid Connection*

The electricity generated by a hydro scheme may be used at the point of generation, instead of the electricity being supplied by the local utility. Alternatively it may be exported to the public electricity network (the 'grid') by agreement with the Distribution Network Operator (DNO). The DNO is the electricity company which has responsibility for the maintenance and servicing of the local distribution (electricity) network.

The value of electricity consumed on site rather than importing from the electricity supply company is usually higher than the price that will be paid for exporting the same electricity. It is therefore financially better to consume as much electricity on site as possible.

For a grid connected system, there should be early discussions with the DNO who will specify the system protection and metering equipment, and will also provide an estimate of connection costs and the best location for grid connection.

9 SELLING THE ELECTRICITY

The Energy Act 2008 introduced enabling powers for the introduction of feed-in tariffs (FITs) for small-scale low-carbon electricity generation, up to a maximum limit of 5 MW capacity. It is intended to encourage the uptake of renewable microgeneration installations by individuals and communities, while the

Renewables Obligation (RO) continues to be the main support mechanism for large scale renewables deployment.

Following a period of consultation in 2009, the Feed-in Tariff became available in Great Britain from 1st April 2010. Under this scheme, energy suppliers must make payments to householders and communities who generate their own electricity from renewable or low carbon sources such as hydro or solar power. The tariff guarantees a price for the electricity generated for a period of 20 or 25 years (depending on the technology). This removes uncertainty for investors, reduces the payback period and increases the return on investment. It is intended to encourage individual households, communities, businesses, schools, hospitals, universities and many other organisations to consider installing small-scale low carbon electricity generation technologies.

The FIT operates in the following manner:

- A fixed payment will be made by the electricity supplier for every kilowatt hour (kWh) generated (this is called the "generation tariff").
- An additional payment for every kWh exported to the electricity grid (the "export tariff").
- In addition, any renewable electricity which is consumed on-site will offset some or all of the electricity which would have been imported / purchased otherwise (the "avoided cost").

Table 1 shows the generation tariffs which are offered for small hydro schemes. These tariff levels are fixed for projects which are installed during the next three years. In addition to the above, a guaranteed export price of 3p/kWh is paid for every unit of electricity which is exported to the local distribution network. It is possible that the tariff levels may be revised in the future, to reflect future reductions in installation costs.

Table 1: Feed-in Tariff bands for small hydro developments (under 5 MW)

Scale	Generation Tariff	Lifetime
< 15 kW	19.9 p/kWh	20 yr
15 – 100 kW	17.8 p/kWh	20 yr
100kW – 2 MW	11 p/kWh	20 yr
2 MW – 5 MW	4.5 p/kWh	20 yr

It is possible to 'opt-out' or 'opt-in' to the export tariff on an annual basis. This provides the option of a guaranteed minimum export price as well as the freedom to sell on the open market if energy prices become higher in the future. For larger schemes, a PPA (Power Purchase Agreement) is required to get the best export price for electricity.

The tariffs, both generation and export, are indexed against RPI. This means that developers can use the Feed-In-Tariff scheme to secure finance without worrying about the effects of future inflation.

In order to qualify for the tariff, the installation must be installed by a company which complies with the Microgeneration Certification Scheme (MCS). The MCS is an independent scheme that certificates microgeneration installers and products under 50 kW in accordance with consistent standards. Any larger scale systems (over 50 kW) should apply directly through the Renewables Obligation Order Feed-in Tariff (ROO-FIT) process as they are not covered by the MCS.

10 OPERATION AND MAINTENANCE

10.1 *Maintenance Requirements*

Small-scale hydro schemes tend to have long lifetimes and low maintenance costs. They are often automated, and the only maintenance requirements are clearing the intake trash-rack and greasing parts of the equipment. In some cases, remote monitoring is used so that any technical faults can be identified in good time.

For a modern hydro installation, it is usually necessary to have an annual service, which might be expected to take one to two days. The cost of routine inspections and an annual service is usually around 2% of the capital cost of the scheme. As the lifetime of the turbine progresses, there will be the additional costs of replacement bearings, a new generator, etc., but these should not occur for at least 10 years.

10.2 *Management of a Community Hydro Scheme*

There are a number of administrative and management activities required for the smooth running of a community hydro scheme after the plant has been installed. These include the following:

- Annual or biannual meetings with the members of the share scheme;
- Administration of members' shares;
- Negotiations with Distribution Network Operator, including payment of FIT

for generation and export

- Communication to the community and wider audiences;
- Web-site updates and public information;
- Payment of rent to landowner: the rent payable should be based on a proportion of the revenue generated by the scheme. This will ensure that the landlord has a vested interest in the project and will assist with its smooth running.
- Insurances: insurance is recommended against damage to the equipment and public liability insurance will also be required.

11 FURTHER READING

11.1 *Bibliography*

A number of useful reference sources are available on the subject of generating power from a community hydro site.

- *Going with the Flow: Small Scale Water Power*, B. Langley & D. Curtis, CAT Publications, 2008;
- *Good Practice Guidelines for the Environmental Assessment of Low Head Hydro Power Developments*, The Environment Agency, 2009;
- *Community Investment – Using Industrial and Provident Society Legislation,* Co-operatives UK, October 2008;
- *Factsheet 6: Legal Structures,* Community Shares, 2009, www.communityshares.org.uk;
- *Guide to UK Mini-hydro Developments*, The British Hydro Association, 2006;
- *Micro-Hydro Power: a guide for development workers*, P. Fraenkel, O. Paish et al, IT Publications Ltd, 1991 (reprinted 2001);
- *Micro-Hydro Design Manual*, A. Harvey et al., IT Publications Ltd, 1993.

11.2 *Useful internet sites*

The British Hydropower Association: www.british-hydro.org/

The Centre for Alternative Technology: www.cat.org.uk

Co-operatives UK: www.uk.coop

The Environment Agency: www.environment-agency.gov.uk

The European Small Hydropower Association: www.esha.be/

The National River Flow Archive: www.nwl.ac.uk/ih/nrfa/

ANNEX 1 - Examples of Community Energy Schemes

Baywind Energy Co-operative, Cumbria

Baywind Energy Cooperative was the first community owned wind farm in the UK and it pioneered the idea of community owned energy schemes by forming its own Industrial and Provident Society (IPS) co-operative in 1996 to enable a community in Cumbria to invest in local wind turbines. The first share offer of 1996/97 raised £1.2 million to buy two turbines at Harlock Hill wind farm. This was followed in 1998/99 with a second share offer to purchase a turbine at the Haverigg II wind farm. For information about the Baywind Energy Co-op, go to http://www.baywind.co.uk

Following the success of the Baywind project, the co-operative received numerous enquiries from other community groups, which were interested in developing their own community energy schemes. As a result of these requests, a separate agency called *Energy4All* was developed in 2002 to assist other groups to set up similar projects. The agency uses IPS legislation to provide the framework for its community investment schemes. At the time of writing, Energy4All has successfully assisted the development of seven co-operatives: Westmill Windfarm, Isle of Skye, Fenland and Boyndie. It is owned by the co-operatives that it assists and currently has more under development. For further information about Energy4All, please go to www.energy4all.co.uk.

Westmill Windfarm Co-operative, Oxfordshire

Westmill Wind Farm was established in 2004 as a co-operative society under the guidance of Energy4All. The wind farm is located on a former airstrip owned by an organic farmer, and was the first 100% community owned wind farm in the UK. There are five 1.3 MW wind turbines, generating enough electricity to power the equivalent of 2,500 homes.

Over half of the funding required for construction (£7.6 million) was raised through an IPS public share issue. These funds were then used as leverage to secure a loan from the Co-operative Bank for the remaining capital. The public share offer was managed by Energy4All and launched in November 2005 with a share offer prospectus produced by Westmill and vetted by the Financial Services Authority (FSA). The total cost of the £3.5 million share offer amounted to

£150,000, and comprised:

- £58,500 for the services of Energy4All to manage the project;
- £20,000 for professional fees (accountants and solicitors);
- £31,800 for printing, publicity and promotion;
- £34,000 for processing share applications;
- £5,700 for the FSA vetting fee.

The share offer was extremely successful and, after three months, was oversubscribed. In early 2007, due to unforeseen increases in the proposed construction costs, a further share offer was launched, raising an additional £1.25 million. This enabled project construction to begin in August 2007, with electricity first being generated by the wind farm in February 2008.

Torrs Hydro, New Mills, Derbyshire

Torrs Hydro New Mills Limited was founded in 2007 and is incorporated as an IPS which owns and operates a hydro scheme in Derbyshire. New Mills is a small town on the edge of the Peak District and the Torrs is a gorge where the River Sett joins the River Goyt. It was also the site of a weir which was used to feed water to an old mill, now no longer existing.

A specialist company, Water Power Enterprises (also known as H_2OPE), assisted the community with the development of a 70 kW Archimedean Screw installation on the weir. In 2007 full planning permission was in place, as well as an extraction license from the Environment Agency and landowner permission from the local Town Council. The whole scheme was estimated to cost £226,000 with annual revenue of approximately £20,000. Pre-tax profits were forecast to be £11,000 to £15,000 on issue of the share launch. Profits from the scheme are being used to create a community grants programme.

Grants and loans were secured to pay for £100,000 and the remaining funds were raised through a public share offer by the Torrs Hydro IPS community benefit society. Torrs Hydro company rules are based on a model set of rules provided by Wessex Reinvestment Trust which made it relatively easy to set up the company and launch a community share issue. For further information about this scheme, please go to www.torrshydro.org and www.wessexrt.co.uk (Wessex Reinvestment Trust).

South Somerset Hydropower Group

The South Somerset Hydropower Group (SSHG) was formed in 2001 as the result of an initiative by South Somerset District Council. At that time, a group of ten owners of former watermills joined forces and engaged consultants to conduct feasibility studies and to negotiate the required licences from the Environment Agency as well as permission from the DNO. The first hydro turbine, at Gants Mill (Bruton), was commissioned in 2003 and began generating electricity in 2004. It now produces up to 12kW of electricity from a 300mm crossflow turbine made by Valley Hydro in Cornwall. Other sites in the project include Carey's Mill (Martock) and Cutterne Mill (Evercreech).

A number of grants were obtained to support the groups. These came from South Somerset District Council, the Energy Savings Trust and SWEB Energy (a subsidiary of EDF Energy). By 2010, the membership of SSHG has increased to sixteen, with turbines and generators being installed at nine of the planned sites.

The nine SSHG sites operating in 2010 have a total generating capacity of 55kW and produce approximately 200,000 kWh of electricity each year. This is sufficient to power 50 average homes. The group operates mainly by encouraging information exchange and mutual support between its members, and by holding regular meetings at the various sites. The group does not directly advise or undertake feasibility studies at potential hydro sites. However, members are very pleased to share their experiences with others, and regular day tours are organised to the various sites now operating. Since SSHG was formed, adjacent groups have followed suit. There are similar groups in Mendip, North Dorset, Dartmoor and Exmoor.

For further information about the group of mills, please go to www.southsomerset.gov.uk/environment/climate-change or, for specific project information, see www.gantsmill.co.uk/hydropower.