hydro power: a watery solution

by David Bone and Nick Mackay of Wright, Johnston & Mackenzie LLP

In the midst of the current debate about the UK's future energy supplies much has been said about wind farms, both onshore and offshore. However it is often forgotten that hydroelectric schemes in Britain already produce some 45% of our existing renewable energy , dwarfing current contribution of wind power many times over. In global terms ropower produces one fifth of the world's electricity and in developing ntries that increases to one third of all electricity produced. In this cle David Bone and Nick Mackay take a look at the history of hydro ver in the UK and the prospects for future development and investment.

centuries man has realised that ing water has held the potential to er a variety of tasks, such as milling heat. It was not however until 1881 hydropower was used to produce tricity in Britain, when a water wheel he river Wey was used to produce tricity that lit up the streets of alming. Soon the Highlands of land were to benefit. The monks of St edict's Abbey in Fort Augustus were off the mark, constructing an 18-watt power station using the flow of a by stream. This provided power not to the Abbey but also to the 800 ple of the town. By 1914 many similar small private supply schemes had been built and many of them were still working up until after the Second World War.

In the late 1920s and 1930s hydroelectric projects started to be developed on a much larger scale. Instead of simply relying upon existing streams or rivers, these larger scale projects employed dams to allow water to be stored and then subsequently released when power was required. Early projects such as Dolgarrog in North Wales (built in 1924 with an electrical capacity of 24 mega (million) watts and Tummel in Scotland (1933/34 megawatts) still operate to this day, testament to the potential longevity of hydro electric schemes.

The largest hydroelectric scheme in the UK today is Dinorwig in Wales, commissioned in 1983 and with a massive installed capacity of 1,728 megawatts. However since then there have been few large hydro schemes constructed. This is in part due to the fact that many of the best large sites have already been developed. Additionally there is potential for significant environmental damage if major schemes are not very carefully designed and constructed. One major hydro scheme is however under construction at present, a scheme of around 100 megawatts that is being developed by Scottish and Southern Energy at Glendoe, Loch Ness.

It is however the much smaller 'run of river' schemes that continues to offer potential for development and investment opportunities. These schemes do not require a dam to be constructed; instead, water is typically drawn from a stream or river via an intake weir and then passes through an underground pipe before entering a turbine to generate electricity. The theoretical power that can be produced is dependent upon: -

the mass of the water x the height or 'head' that the water can fall.

Whilst in practice some energy is lost due to friction and heat loss a modern hydro turbine generator can convert over 90% of the energy in the available water into electricity. Add to that the longevity of hydro plant (which can have an operational life of more than 100 years) and it is not hard to see why in environmental debates that emphasise sustainability and efficiency, there continues to be interest in hydroelectric development.

There are without doubt plenty of sites that are still available for development, particularly in Scotland and Wales. For instance it is commonly asserted within Renewable Energy circles that, in Scotland alone, there is potential to develop at least a further 500 megawatts of small to medium sized schemes. These smaller schemes do not have the same effect upon the environment as large-scale hydro.

All hydro development tends to be capital intensive yet remains viable because of its long operational life. The viability of each individual site depends upon water flow and head, the market price for the power that is generated and the cost (and availability) of a connection to the National Grid. This last factor must be evaluated carefully since if the existing grid infrastructure requires to be extended (as is often the case) then the capital cost can be considerable.

Other factors of which potential developers and investors should be aware include: -

- The length of time and cost involved in securing planning consent: an Environmental Statement will require to be submitted to the planning authority and specialist consultants may require to be engaged. Additionally there may be vociferous objectors to hydro schemes. For instance in certain cases fishermen and canoeists have seen proposed hydro schemes as threatening the enjoyment of their sport.
- The EU 'Water Framework Directive' has now been implemented in the UK, requiring all potential hydro schemes to obtain a licence from the Environment Agency (England and Wales) or the Scottish Environment Protection Authority for abstraction or impoundment of water and certain engineering works. Early indications are that, whilst the aims of the licensing regime (protecting water quality) are laudable, a further significant time and cost barrier must now be overcome before development may proceed.
- Potentially high levels of business rates: since April 2005 the method of assessing hydro schemes for rates has changed and most schemes are now facing considerably increased charges.
- Legal considerations must be addressed from an early point in order to protect a developer's investment. It is normal for a developer to seek to sign an Option Agreement with a landowner giving the developer exclusive rights to investigate the site and apply for planning during a given period, typically 2 to 4 years. Ideally an agreed form of lease will also be attached to the Option, in draft form. This means that if the developer subsequently obtains planning and the other permissions that it requires, it can serve notice upon the landowner that it wishes to enter into a lease upon commercial terms that were previously agreed and in the agreed legal form. In this way the developer can avoid further time-consuming negotiations (and the risk of being held to ransom) at a time when it is ready to proceed with building the project.

Whilst hydroelectric development is a complex and specialist field it continues to offer significant benefits of longevity, efficiency and of course virtually carbon free electricity generation (with corresponding economic benefits). Hydropower therefore continues to merit serious consideration as an attractive investment opportunity.

Further Information from:-

The British Hydropower Association – www.british-hydro.org

The Scottish Renewables Forum – www.scottishrenewables.com

About the authors

The authors are both partners specialising in Renewable Energy Development, at Wright Johnston & Mackenzie Solicitors, Glasgow and have worked on a number of completed hydro schemes including Stanley Mills, Braevallich and Inverbain together with others that are currently being developed

David Bone (djbone@wjm.co.uk) received the 'Partner of the Year' award at the 2006 Scottish Legal Awards in recognition of his achievements within and contribution to, the Renewable Energy industry. He acts as Secretary and legal adviser to the Scottish Renewables Forum (SRF) as well as many other leading industry players.

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