Proposal for a 9 kW micro-hydro scheme to be built on National Trust land

Motion

It is requested that:

1. The National Trust grant Dr & Mrs Moss a 30 year lease to construct, operate and maintain a micro-hydro system as per the Heads and Terms drafted by Gethin Evans.
2. The National Trust's solicitor provide a letter to the Planning Inspectorate Cardiff in support of work on Common Land CL25 (Tir Comin Plwyf Penmachno) in accordance with Section 23 of the National Trust Act 1971, confirming that the proposed works are desirable with regard to section 23(1).

Background

Hafod y Rhedrwydd is a small 3-bedroom cottage on the southern edge of Snowdonia, 6 miles from Betws-y-Coed and 4 miles from Blaenau Ffestiniog[1]. The National Trust acquired it as part of the Ysbyty Ifan estate in 1951 but subsequently sold it off in 1984; the Trust still owns all the surrounding land. It lies in the Migneint, one of the largest areas of moorland in North Wales.

The cottage is 1150 ft above sea level; being 2 km from the houses in the valley below, it is totally off-grid. The stream behind the cottage falls 500 feet in half a mile (150 m in 840 m) making it ideally suited to a small hydro-power installation.

The owners Roger and Sally Moss purchased the cottage in 1999. After thorough renovation, they now run it as a holiday cottage (600+ families since 2001). They are keen to maintain its traditional appearance: this rules out other forms of renewable energy such as solar panels or wind turbines. Guests start a generator when electricity is required and water is piped from a nearby spring.

Proposal

They propose to build a micro-hydro system capable of generating between 300 W and 9 kW, depending on stream levels. Water will be extracted from the stream at a point 380 m above the cottage and will then run down the hill through a 110 mm diameter pipe (buried, invisible) to a small turbine hut 460 m away. An electrical cable back to the house will be buried alongside the pipe.

The turbine hut will be at the bottom of the steep slope below the house and will be practically invisible from the nearest road (170 m away and 50 m higher up). The hut is to be built of Blaenau Ffestiniog slate with lime mortar and a turf roof. The turf roof will help the hut blend into its environment when seen from above. With an internal height of 5 ft, the hut is designed to allow maintenance while seated on a stool rather than being a full-size building.

Further details are available via a private page on the owners' website[2].

National Resources Wales are evaluating the proposal and will decide what fraction of the stream flow can be extracted with minimal environmental impact (the extraction point is below the Migneint's blanket bogs and will have no impact on them). They are also reviewing the design calculations, pipe route and construction techniques. An ecological report[3] has been obtained and concludes that a scheme this small will have no significant adverse effect.

The scheme will qualify for a Feed-In Tariff for electricity generated (but no export tariff since not grid-connected). To achieve this the FIT application has to be submitted before the FIT scheme closes to applicants on 31st March 2019. FIT approval is essential since without it the owners cannot sensibly budget for the construction costs; the generation tariff (£30-40,000) should provide at least 2/3 of these costs and associated interest charges over the next 20 years.

Benefits

A steady electricity supply would be a great convenience for both guests and owners. It would run the satellite broadband system and VOIP phone (no mobile coverage), lights, a refrigerator and avoid the need to fill petrol cans (perhaps 600 litres/year, at guests' expense).

It would also allow the use of a UV steriliser for the water supply. Bottles of Tesco's cheapest mineral water are currently provided for drinking but increasingly high standards and expectations from the holiday letting companies mean this will not be viable long-term: one company has already announced that they will take no more bookings until all tap water is sterilised.

The existing spring does not provide enough pressure to drive the peat-removal filters that would be needed with a sterilising system. The new pipe from higher up the hill will provide sufficient water pressure for filters in addition to its micro-hydro role.

The cottage uses a Rayburn for heating and hot water, consuming about 2000 litres of oil per annum. In wet weather the micro-hydro system should provide enough power to run some electric radiators and an immersion heater thereby saving at least half the current oil usage.

The reduction in oil and petrol use will reduce CO_2 emissions by about 4300 kg per annum.

There are very few off-grid holiday cottages. The owners hope Hafod y Rhedrwydd will stand as an example of what is possible using renewable energy and encourage others to develop their own renewable systems. Increased bookings will also benefit the local tourist economy.

Risks

The owners recognise that they face a number of risks:

- small micro-hydro is disproportionately expensive to build. Some costs (obtaining all the necessary permissions, labour for burying the pipe) are nearly as high as for a large installation. Costs may exceed expectations.
- construction delays may endanger commissioning within the 24 month FIT build period
- frequent maintenance may be required e.g. cleaning screens
- operational difficulties or guests' inability to accept limited power availability may be a nuisance

To mitigate these, they are minimising the cost by doing as much as possible in person (e.g. all the flow calculations, drawings and proposal documents). Construction delays could be overcome by employing more contractors. They employ a local caretaker and tradesmen to deal with problems.

The system is designed to be easily serviced, highly reliable and automated to need no interaction from guests.

The risks to the National Trust's land are minimal. The materials used and construction techniques will be approved by Natural Resources Wales, Conwy Council's ERF department and the Snowdonia National Park planning authority. The pipe trench will be carefully back-filled and recovered with the original turf to prevent erosion. The turbine hut uses traditional materials that will not detract from the heritage of the local area.

The owners currently have £2M of liability insurance in case of injury to guests. This will be increased to £5M to cover any kind of unforeseen events related to the micro-hydro scheme, whether injury or environmental. £5M is enough (for instance) to build 250 yards of motorway and should be sufficient to ameliorate any unforeseen need for restoration work.

Timescale

- February/March 2019
    - Sign lease granting access, construction, use and maintenance rights
    - Obtain all necessary permissions (abstraction & impoundment licences; Ordinary Watercourse Consent; Common Land Permission; Planning Permission)
- Friday 29th March 2019
    - Register for the Feed-In Tariff (requires all above permissions)
- March 2019 – March 2021
    - Construction and commissioning.

Comment

The National Trust has built a considerable number of grid-connected micro-hydro systems as part of its pledge to reduce fossil fuel use by 50% by 2020. The proposed scheme is smaller than any National Trust installation but is in keeping with the Trust's environmental policies.

Unlike a grid-connected scheme, the system is modestly sized to only provide power for one house rather than the maximum available from the stream. This minimises any environmental impact, as do the small-scale construction techniques (mini-digger and power barrow rather than heavy earthmovers, no new tracks).

Dr Moss is a university research fellow in sustainable energy[4] and is suitably qualified to build this system. In case of any queries please contact him directly: roger@hafodyr.co.uk, 07854 675742, roger.moss.77 on Skype.

References

1. http://www.hafodyr.co.uk/files/Location%20and%20site%20plans.pdf
2. http://www.hafodyr.co.uk/?page_id=111
3. www.hafodyr.co.uk/files/Ecological%20surveys%20Hafod%20y%20Rhedrwydd.pdf
4. https://warwick.ac.uk/fac/sci/eng/staff/rm/

Figures.

Figure 1. Hafod y Rhedrwydd

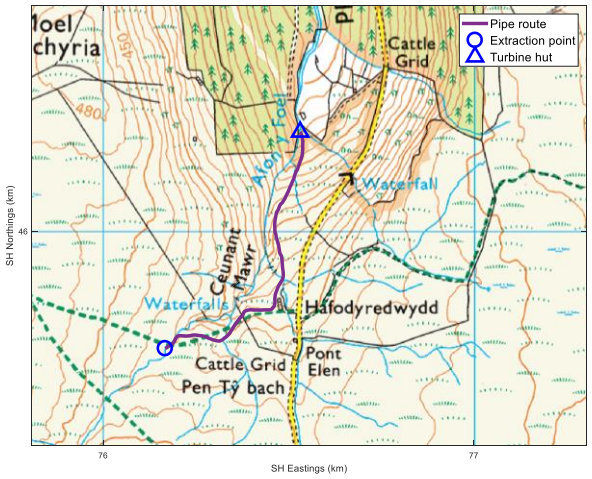

Figure 2. Pipe route past the cottage.

Figure 3. Small waterfall at the extraction point. Stick with tape at 1 m intervals to show scale.

Figure 4. Site for turbine hut.

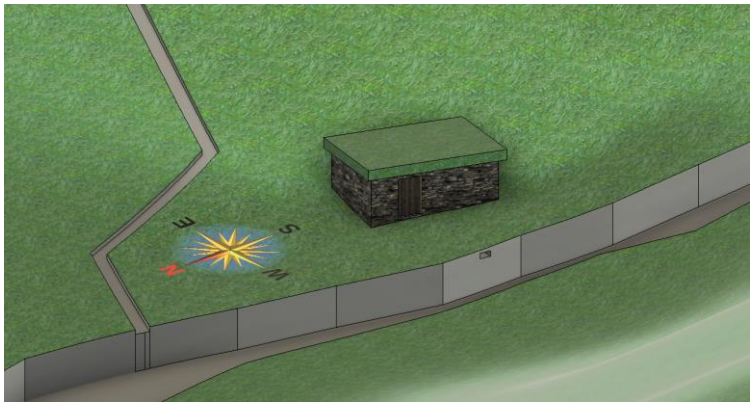

Figure 5. Turbine hut appearance.