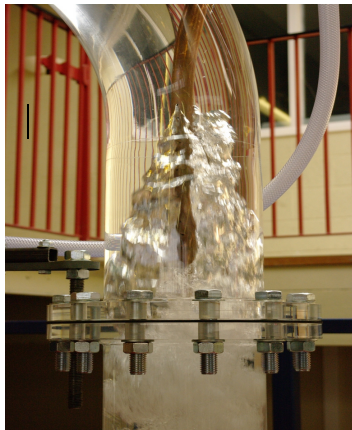


**Project Title:** 'Optimisation and build of a siphonic hydro system for small scale local electricity production.'  
**Principle Investigator:** Dr Widden (University of Lancaster)  
**Project duration:** 01/10/07 – 30/09/10  
**Grant Value:** £134054.00

Hydro power is a mature and proven technology that helped shape the landscape of the North-West of England and is responsible for producing some 5.5% of the world's primary energy consumption. However, since the end of the 19th century its use in the region has declined but the resource that supported the Industrial Revolution is still contained within the landscape and can still be harnessed to our advantage. In order for the UK to meet its ambitious targets for energy production from renewable sources (10% of electricity by 2010, 15% by 2020) it needs to expand its capacity to generate all forms of renewable energy and hydro power can make a significant contribution to this. The North West is particularly well suited to hydro schemes



because of its consistent rainfall and suitable drainage systems meaning there is great scope for new schemes in the region. Despite this currently only about 1.6 MW, or about 1.4%, of the region's renewable capacity is generated by hydro. One of the crucial characteristics of any potential hydro site is the vertical distance between where the water is taken in (intake) and where it is pumped out (outlet), which is commonly known as head. Hydro schemes can be divided into two main categories; low head and high head, this project focuses on low head projects which typically have a head of between 2 - 4m and are located on large lowland rivers.

Many of the suitable sites for high head/large hydro have already been explored. However there is still a large potential resource at existing weirs (a dam built across a stream or river to raise the level of water) with low heads but the civil engineering costs associated with constructing a traditional hydro plant at these sites makes them uneconomic to develop. Exploiting this potential resource requires the creation of a low-cost system for low head sites, the purpose of this project is to develop and test such a technology.

In a weir, river water flows over a barrier to a lower water level. An alternative method of transporting the water across the height difference is through a sealed pipe. The water can be guided though any route between the two water levels, including one which goes upwards before discharging the water at the lower level. In this case the pipe is called a siphon. In the siphonic hydro system proposed here, air is deliberately drawn into the system through a turbine. The resulting rotary motion can be used to generate electricity. Air turbines used for this method are cheaper and spin faster than water turbines, pipe work is also cheaper than traditionally used concrete dams. Thus this technology may represent a cheaper method of extracting energy from low weirs, making a large resource of untapped energy potentially available. This project involves the fabrication of a demonstration project on site then monitoring its performance and impact on the host river over the course of a year. It also involves carrying out experimental work in a lab to optimize the performance of the siphonic hydro process.