AINA CASE STUDY
CLIMATE CHANGE

Developing a zero-emission boat

A hydrogen-powered canal boat has been successfully trialled in Birmingham

A hydrogen-powered canal boat has been successfully trialled in Birmingham

A boat developed by the University of Birmingham demonstrates how a combination of contemporary magnetic and fuel cell technologies can be used to power craft on the inland waterways. The boat was been created from the conversion of a standard maintenance boat donated to the University by British Waterways, and the work involved the replacement of a diesel engine with a zero-emission propulsion system.

This comprises a high efficiency electric motor, a battery pack for short-term energy supply and a fuel cell with hydrogen storage system to charge the batteries. The hydrogen is stored in a large scale metal hydride system which was developed in Switzerland and can safely hold the hydrogen at normal ambient temperatures. In addition Ross Barlow has been fitted with a solar panel capable of supplying up to 320W of electric power.

During a 100km four-day summer test journey - which negotiated 58 locks - a total of 106 kWh of electric energy was consumed on board, including lighting and recharging the crew's mobile phones and computers. The batteries successfully supplied 71 per cent of the energy required, the hydrogen fuel cell 25 per cent and the solar panel 4 per cent.

There has been praise for the silent movement of the boat, and crew have noted that when waiting in a lock the boat is not engulfed in its own diesel fumes. An accompanying conventionally powered boat of approximately the same size used around 50 litres of diesel, resulting in a CO^2 emission of approximately 133kg. By comparison, Ross Barlow produced no emissions, assuming that any hydrogen used was derived from renewable sources.

The reliability and operational lifetime of the hydride storage system was tested in the laboratory during its development. Results showed that if the boat was assumed to travel 650 kilometres per year it would need hydrogen refuelling just once a month. The boat would have an operational lifetime of at least one hundred years, and would therefore comfortably outlive the useful lifetime of the barge itself.

Longer term aims of the project include the development of an infrastructure to support hydrogen refuelling across the inland waterways and the generation of green hydrogen on suitable sites throughout the network, which could ultimately link into a number of waterways managed by AINA members.