CASE STUDY 4

Green Fuel on Inland Waterways
Norfolk Broads

Background

Increasing awareness of global warming, fuel shortages and stringent water quality standards have encouraged the development of renewable and cleaner sources of fuel for boats with biodiesel and electric engines playing a major role. The Norfolk Broads and hire companies operating in the Broads have been leading the way in trialling and introducing these methods to the huge fleets of hire boats using their waters each year. In fact, from 2006 eight Broads hire boat companies participated in a two year biodiesel trial:

- Alexander Cruisers, Brundall
- Barnes Brinkcraft, Hoveton
- City Boats, Thorpe
- Connoisseur Cruisers
- Faircroft Loynes, Wroxham
- Sabena Marine, Hoveton
- Silverline Marine, Brundall
- Woods Dyke Boatyard, Horning

Objectives

Encouraging wider use of cleaner sources of fuel, particularly biodiesel and electric boats, in the Norfolk Broads.

Actions

Biodiesel

Biodiesels are produced from either waste vegetable oil and fats or specifically grown crops. Refining waste oils for use in engines reduces the amount of oil to be disposed of and the amount of carbon, sulphur, aromatic hydrocarbons, metals or crude oil residues emitted. It is worth noting that although accidental discharges of small amounts of biodiesel have less impact on the environment and aquatic life compared to petroleum diesel, they can still cause harm and steps should remain in place to reduce any spillages.

Biodiesel and the Broads

A number of yards in the Broads trialled biodiesel with the Broads Authority providing financial support through its Sustainable Development Fund for two years. The yards chose to be involved in the trial due because they considered biodiesel a potentially cheap and environmentally-friendly option. The trial ended in 2008, with the following results:

Boat Performance:

No difference in boat performance between biodiesel and red diesel could be seen during the summer. Mick Derbyshire, Chief Engineer of Faircroft Loynes, chose to run boats from
new on biodiesel to get a clear idea of the effect of the fuel on the engine. He, and engineers at the other yards, saw no difference in performance between boats run on biodiesel and red diesel.

**Fuel storage:**
Cold weather can cause problems with biodiesel as the wax in the biodiesel freezes, clogging up the filters. One of the companies, Sabena Marine, found this problematic although the others also operating during the winter did not experience this. Faircroft Loynes ensured that this was not an issue by storing the biodiesel in a double bunded fuel tank facing south to ensure that it was exposed to the light every day. Double bunded tanks provided extra insulation and protection against spillages, thus making them even more environmentally friendly.

**Availability of fuel:**
A number of the companies had been interested in using biodiesel for a number of years but lack of available fuel sources stopped it being a viable option. This changed with the establishment of Norfolk-based Global Commodities UK, which is the UK’s only purpose-built factory dedicated to the manufacture of biodiesel.

**Cost:**
During the trial the cost of the red diesel was subsidised, making it the same as red diesel. While this made it more financially viable, it was administratively difficult to claim this subsidy. The companies felt that for future trials this would need to be improved.

**Future use:**
In principle, the companies felt that biodiesel is good option for boats but at the moment that it is expensive compared to red diesel. Biodiesel is now used in a more ad hoc fashion, depending on which fuel tank the boats are nearest to. This is possible because no engine conversion is needed to use biodiesel in the boat engines.

**Electric Boats**
Electric powered boats are particularly favoured for inland waterways as no exhaust emissions and no noise allows peaceful movement causing fewer disturbances to wildlife. The boats tend to cause less wake and less bank erosion as they run most efficiently at lower speeds. The Annual Broads Electric Boat Show, organised by the Electric Boat Association being labelled the ‘eco-friendly boat show’, promotes these messages. There is of course the downside of electric power in that batteries containing heavy metal components are used.

Electric conversion can also be used for both sail and power boats. White Moth, a traditional 26 ton Norfolk wherry dating from 1915 (pictured above), underwent a conversion replacing the old diesel engine with an 8.5W electric motor and a sound encapsulated Panda AGT DC generator. Trials proved to be successful lasting for 5 hours at full speed (5 knots) without having to use a generator increasing to 8 hours at half speed. Her performance and manoeuvrability were also good.

To encourage the use and development of electric boats the Broads Society jointly funded by the Sustainable Development Fund and LEADER+ offer grants to private owners to convert diesel and petrol engines to electric and the Broads Authority have doubled the number of electric charging points in northern and southern rivers enabling the boats to travel further. This and the White Moth project are two of more than 20 electric boat projects that have benefited from SDF support. Electric charging pillars are operated by a £1 payment card and pillars can be found at: River Bure, River Yare, River Thurn, River Ant, Coltishall, Bramerton, Hickling, Ludham Bridge, Hoveton, Rockland Broad, Potter Heigham, Stalham, Horning, Reedham Quay, Ranworth, Great Yarmouth, River Waveney, River Chet, River Wensum, Burgh Castle, Loddon, Norwich, St Olaves.
For a map of charging points and instructions for use see: www.broads-authority.gov.uk/boating/facilities-and-access/electric-charging-points.html

The Broads Authority’s Sustainable Development Fund has funded another Broads company, Creative Marine, to test the effectiveness and suitability of fitting nine sets of 12 volt panels on the roof of a 21 foot electric launch. Experts believe that light levels here on a sunny day can equal those of the Mediterranean and so is hoped the panels will be able to provide enough power to fill the batteries when the boat is not in use. Creative Marine is monitoring light levels, tides, boat speed and power output.

Results

The environmental impact of biodiesel and electric boats on watercourses is significantly less than fossil fuels. Currently biodiesel mixes are two to four pence a litre cheaper than regular diesel but still significantly higher than red diesel. The trials of biodiesel and developments in electric boats have been helped considerably by grants and funding contributing towards fuel costs.

Trials of biodiesel and electric boats show that there is potential for these methods of propulsion to have wider use in inland waterways, especially if the lessons learned from the trials are acted upon. For nationwide use there may be a problem with the supply and distribution of biodiesel from recycled oil, so dedicated crops would have to be grown. The Environment Agency stresses this change in agriculture would however have to be managed carefully to protect the countryside, wildlife and natural resources.

The Broads has demonstrated that the use of electric powered boats on inland waterways can work and there is potential for future growth. By developing solar power generation to recharge the batteries it alleviates the environmental consequences of electricity generation.

Sources of Further Information

Creative Marine: www.creativemarine.co.uk
Electric Boat Association: www.electricboatassociation.org.uk
Global Commodities fuel supplies www.globeco.co.uk or call 01362 821582
Norfolk and Suffolk Boat Builders Association: www.nsatboatbuilders.org.uk
DEFRA’s fact sheet on biodiesel from www.defra.gov.uk
LEADER+ grants : www.levelsleaderplus.org.uk/grants.php
Alexander Cruisers, Brundall: 01603 715 048
Barnes Brinkcraft: www.barnesbrinkcraft.co.uk
City Boats, Thorpe: www.cityboats.co.uk
Connoisseur Cruisers is now part of Le Boat: www.leboat.co.uk/bases/england/horning
Faircraft Loynes, Wroxham: www.broads.co.uk
Sabena Marine, Hoveton: www.sabenamarine.co.uk
Silverline Marine, Brundall: www.silverlinemarine.co.uk
Woods Dyke Boatyard, Horning is no longer trading but for information on their previous work see www.woodsdyke-boatyard.co.uk
Broads Authority’s Sustainable Development Fund: www.broads-authority.gov.uk

The Green Blue call 02380 604 100, email info@thegreenblue.org.uk or visit www.thegreenblue.org.uk. Updated December 2009