

The Sunday Times: 15.03.09

Hydrogen to fuel green jets: Matthew Bingham

We have had the hydrogen-powered car, now meet the hydrogen aircraft.

A British company has developed an air-breathing hydrogen engine that could radically cut the environmental footprint of air and space travel.

Reaction Engines, based in Oxfordshire, has just secured a €1m (£926,000) grant from the European Space Agency (ESA) to advance its Sabre propulsion system.

Like a rocket engine, Sabre burns liquid hydrogen. But unlike a rocket, Sabre does not also require a supply of liquid oxygen to operate inside the Earth's atmosphere; instead it grabs, cools and compresses its own supply from the air itself.

Although developed for the Skylon pilotless-spaceplane project, Sabre could be central to a new generation of hydrogen-fuelled aircraft.

Fossil-fuel-powered air travel is responsible for up to 3% of global carbon-dioxide emissions and is Britain's fastest-growing source of greenhouse-gas emissions. But liquid-hydrogen fuel can be created from water, using electricity, and the Sabre's only exhaust gas is steam.

The British-designed Skylon requires only a small supply of liquid oxygen (for operation at heights above 25km) and is light enough to take off from a standing start on an ordinary runway.

The entire vehicle is re-usable, and does not require expensive, exotic materials for its construction.

"We could conduct a test flight in 2018 and be in operation by 2020," said Mark Hempzell, the future programmes director at Reaction Engines.

But first the engine has to be perfected. The ESA cash brings Sabre's total seed money to about £6m — peanuts compared with the estimated £4.3 billion spent by America's Nasa on similar hydrogen-engine projects.

The Americans have little to show for their investment, however. Reaction Engines has working prototypes of two of Sabre's key components: the pre-cooler that handles the rush of incoming air, and the turbo-compressor that condenses it before feeding it to the engine.

Hempzell said: "Hydrogen is the fuel of the future for aeroplanes. It's green and it's efficient — although you can't force hydrogen engines onto existing planes. The trick is to start designing on a blank slate, as we have done with Skylon."