

# Fuel-Cell Bike Scoots Into Production

The launch of the world's first fuel cell-powered motor-scooter has moved a step closer after a major engineering group took a stake in the company behind the project.

The UK will be one of the first target markets for the Vectrix fuel cell/electric scooter, which its US developers claimed is the first full-size, high-performance vehicle of its kind.

Parker Hannifin, the global motion control systems group that helped develop the vehicle's underlying technology, has invested in Vectrix to help it bring the scooter, called the VX-FC, into full-scale production.

The two companies claimed the scooter is comparable in performance terms to a 400cc petrol model, while offering low emissions and big savings on run-

ning costs, e4engineering.com reported.

Launch of a purely battery-powered version of the vehicle is imminent, with the first models expected to go on sale in scooter-friendly European markets such as the UK and Italy by 2006. The scooter is expected to sell for between £4,000 and £5,000.

Vectrix and Parker recently unveiled a second-generation version, called the VX-FCe, which has a 500W fuel cell integrated into the battery-powered system. The hybrid scooter has a top speed of 62mph and a range of up to 150 miles, according to its developers, and is expected to go on sale within three years.

The battery pack provides the rapid bursts of power needed by the scooter during acceleration and while traveling uphill. The fuel cell pro-

vides a continuous stream of power to the battery to keep it topped up, automatically shutting down when the scooter is fully charged.

The VX-FC also features regenerative throttle technology, which reverses the polarity of the electric motor to direct back into the battery energy usually dissipated during braking. This extends the scooter's range by up to 12 per cent, according to Vectrix, and also reduces wear and tear on its brakes.

Parker Hannifin, which provided engineering development resources from 12 of its divisions to support the scooter project, said it expected to begin earning returns on its investment within five years.

The fuel cell technology used on the scooter could also have applications in other industries, the company added.

Flying a kite in the park has inspired an innovative concept to generate electricity from powerful winds miles above the earth.

The 'Laddermill' concept, envisaged by a team at Delft Technical University in the Netherlands, is a chain of wings or kites attached to a looped cable stretching up to 10km high. The 'kiteplanes' exert an upwards force on one side of the loop and a downwards force on the other, causing the cable to rotate and power a generator in the base station. The kiteplanes' angle and shape can be altered to generate the opposing forces needed.

Delft University team leader Prof Wubbo Ockels, an ex-astronaut and head of ESA's education office, said the wind energy at 30,000ft is 20 times more powerful than at sea level. 'Above a certain altitude there is a massive amount of wind power,' he said.

'Kites that can tap into that wind can generate a great deal of energy.' One Laddermill could generate 100MW, the researchers claimed, com-

pared to only a few MW for conventional wind turbines.

At the recent European Wind Energy Conference, the Laddermill team announced plans to test a variety of kiteplane designs next year using inflatable and lightweight materials. A working model will be built in the next four years, e4engineering.com reported.

The apparent dangers of a structure extending kilometers above the earth could be overcome, the researchers said.

'If the wind dropped the Laddermill would drift gently to the ground,' said Ockels. 'We want to be safe. Flexible or inflatable kites wouldn't be hazardous; the worst that would happen would be the kite becoming dirty when it landed,' he said. 'We would only operate the system with a good forecast and the wings would be adapted to weather patterns.' The ground station could deploy and retrieve the Laddermill in hours, he added, and they would only be built in uninhabited areas.

The cable connecting the wings would be made

of materials such as Dyneema, said Ockels. Cable breaks would be unlikely, because the cable could be inspected as the system rotated through the base station, and sections removed for maintenance. Each kiteplane would have a GPS sensor to inform air traffic control of its position.

Stability of the wings is important in the unpredictable, turbulent winds near the ground, but the kites higher up the system would support the lower cable, said Ockels.

The most critical aspect is controlling rotation about the cable axis. The team plans to control this by changing the kites' shape, or by fitting small propellers, which could be controlled remotely or by 'smart kites' that reposition themselves.



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## Steady, Reliable Hand Will Keep N. Sea Renewal On Even Keel

North Sea oil and gas activity has seen a notable and very encouraging turn-around over the past year, but nevertheless does remain vulnerable.

This has been emphasized in the report, 'Succeeding in a Challenging Environment', published last month in response to calls for the imposition of further taxes on the North Sea oil and gas industry.



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**Optimism Proliferates**  
The initial tone of the report is without doubt one of confidence. The facts it conveys include the following:

Exploration and appraisal drilling is on the up, with wells drilled this year apparently increasing in the region of 30% on last year.

Rig rates are on the rise, with semi-submersibles being at their highest rate for over two years. Five drilling rigs have been re-activated, and some rigs that left the UK are returning.

Approvals given by the Department of Trade and Industry (DTI) for new developments is escalating significantly.

Evidently, there were 28 potential new projects in 2003, involving 30 companies, one of which was a smaller player. This year it appears the figure for new projects has risen to in the region of 35, involving 37

players of which 11 are smaller companies, e4energy.com reported.

The growth in the role of smaller companies has been demonstrated by the last two licensing rounds, and they are increasing their share of production.

As stated in 'Succeeding in a Challenging Environment', published by the UK Offshore Operators Association (UKOOA), these developments reflect both growing confidence and the fact that the North Sea is still attractive to many, diverse players in different ways.

While companies recognize that the UK Continental Shelf (UKCS) is a mature region, the report suggests that they are being motivated by the opportunities available, a relatively stable political and fiscal regime, and a positive business environment.

**Warning About Higher Oil Prices**

However, cautions the UKOOA, while higher oil prices do provide opportunities in the short term, it needs to be remembered that investment is not driven by short term oil price, because new developments can take two to five years to be brought on stream, and will be in production for a further 10 to 25 years.

Commenting on the proposal that a 'windfall tax' be introduced the UKOOA, with the above-mentioned factors in mind, states that this proposal, if implemented, could have a seriously corrosive effect on investor confidence, prospects for long-term investment, jobs that that investment supports, and the level of UK self-suffi-

## Russia, Turkey Mull Alternative Transit Routes

Russian Industry Minister Viktor Khristenko has announced that Russia and Turkey are energetically discussing alternative routes of transporting hydrocarbons in circumvention of Bosphorus and Dardanelles.

"As for circumventing routes are concerned, 12 projects have been proposed," he told reporters in Ankara on Monday. "On Sunday the Turkish government presented the Baku-Ceyhan project to us in this connection," he said.

"We are considering this project along with others. The best one can be chosen on the basis of only one principle: the terms and tariffs should be comparable to the conditions in Bosphorus and Dardanelles," Khristenko said. "Otherwise participants may wonder why someone is lucky to use straits and others have to take the more expensive pipeline route," he added.

Khristenko said that for Russia the situation in Bosphorus is helpful because Russia has similar problems with transport corridors to the north and east.

"And we will surely use the experience gained in the talks with Turkey to reduce our

risks to the minimum," he said. "We understand the efforts made by the Turkish authorities to guarantee the safety of travel through the straits," the minister said. In this connection Russia has offered its consultative and expert services resulting on its own experience, seeurope.net reported.

**Gazprom to Consider Gas Deliveries to Turkey**

The chiefs of the Russian company Gazprom and the Turkish oil and gas pipeline corporation Botas, Alexei Miller and Mehmet Bilgic, signed a memorandum on cooperation in the gas sphere in Ankara on Monday.

Gazprom's press service said the company would consider a possibility of exporting gas to Turkey directly or through its daughter companies, up to delivering it to users.

Botas will assist Gazprom in projects of gas supply installation, gas distribution and the construction of gas facilities in Turkey.

A part of profits from Russia's gas deliveries to Turkey are to be invested in these projects.

The press service said a memorandum gave an impor-

tant place to increasing reliability and safety of gas deliveries from Russia, at their peaks.

Gazprom and Botas "will evaluate a possibility of the joint development of underground gas storage facilities in Turkey".

The sides have agreed to study joint projects of organizing gas transportation through Turkey's territory to third countries, to which Russia does not export gas at present, primarily in southern direc-



Russia exported in 1987-2003 about 106 billion cubic meters of natural gas through the Trans-Balkan and Blue Stream gas pipelines.

tions. Miller and Bilgic expressed the shared opinion that liberalization of the gas market that is going on in Turkey provided additional conditions for developing new forms of cooperation during the deliveries of Russian gas to the country.

Russia exported in 1987-2003 about 106 billion cubic meters of natural gas through the Trans-Balkan and Blue Stream gas pipelines.

The Blue Stream has added to an already operating transportation corridor from Russia to Turkey through the territories of Ukraine, Moldova, Romania and Bulgaria.

Deliveries by the Blue Stream route substantially increase reliability of exports and provide additional prerequisites for development of Turkey's gas market and infrastructure.

The volume of Russia's exports through the Blue Stream was 1.3 billion cubic meters in 2003, and the figure is expected to increase almost 2 billion cubic meters in 2004.

The amounts of gas exports has increases in 2003 almost 6 percent, to 12.9 billion cubic meters.

## Pump Action

An innovative pump designed by UK engineers could lead to major improvements in the energy-efficiency of the oil systems used in diesel engines.

Developed by Birmingham's Concentric, the new variable flow oil pump (VFP) is said to use significantly less power than conventional fixed flow pumps.

Indeed, the pump has demonstrated savings for heavy-duty engines of between 3 and 4hp at rated speed and more than 1hp at cruise speed. Concentric's design office manager Kevin Johanson explained that the problem with the kind of positive displacement

pumps typically used is that they are completely linear.

"The faster you run them the more you get out of them," he said. With the amount of oil coming out of the pump limited either by a safety release valve or pressure regulator, and the rest of the oil either recirculated within the pump or dumped straight into a sump, there's clearly room for improvement.

By contrast, VFPs closely match oil supply to demand and are therefore able to take advantage of the differing oil requirements for each point in an engine's operating cycle, thus enabling fuel savings to take place.

Johanson said that Concentric was working on variable flow pumps for the past 30 years, but early models weren't very robust and didn't enable very large fuel savings. Then, around 12 years ago, following some 'serious interest' from a Japanese automotive group, the company developed an alternative design, e4engineering.com reported.

But while this pump allowed greater fuel savings, it was still somewhat impractical from a commercial perspective. 'It was very expensive and in order to get it to work we had to make it very robust--

it had all sorts of great big bearings on the outside to make it durable--it was just way too expensive,' he said. Fast-forward a few years, and following something of a hiatus where reducing emissions became the main thrust of automotive R&D, the fuel-efficient pump has now become more desirable than ever.

Johanson explained that driven by this renewed interest, his design team set about developing a product that would still contribute to fuel reduction, but at the same time be easy to manufacture and relatively

cheap. The company managed to do this by designing a product that could be built from 'known technology'; in other words the kind of standard components found in conventional pumps. Johanson said that the new design is around 75 per cent cheaper than previous incarnations.

The fuel savings made possible by the pump are largely dependent on how the technology is adopted, claimed Johanson. 'If you just stick it on you're not going to get all the benefits--you need to adopt a complete system approach.'

Taking this into account he said that fuel savings of around one per cent are very much

achievable. While this may not sound like a hugely dramatic figure, it is thought that it could lead to massive savings in the pump's most likely application; within the engines of heavy-duty trucks. Across a whole fleet of such vehicles, a one per cent saving equates to a lot of money.

Despite this, Johanson said that owing to the truck industry's traditional reticence when it comes to new technology, the first application is likely to be on a car rather than a truck. He declined to reveal the identity of potential customers, but said that the pump is likely to enter series production around 2007.