

20 May 2009

## **Geothermal energy: Instant Steam gets into hot water**

Geothermal energy -- thermal energy stored in the Earth's crust -- currently supplies less than 1% of the world's energy. But with the advent of new technologies, such as engineered geothermal systems (EGS) -- which can extract enough heat from lower grade geothermal resources to generate electricity -- geothermal energy could potentially be used to produce enough electricity to meet a large portion of the world's energy demands.

A memorandum of understanding (MOU) signed between Oxford Catalysts and Potter Drilling to explore the application of Oxford Catalysts' Instant Steam technology to Potter Drilling's hydrothermal spallation drilling technology could bring the dream of widespread geothermal electricity generation much closer.

Geothermal wells can be slow and expensive to drill using conventional rotary drilling methods. This is because the wells are often sunk deep into hard crystalline rocks which are difficult and slow to penetrate and which quickly wear down the drill bits. The slow penetration rates combined with the need for frequent trips out of the hole to change bits adds greatly to the cost of the wells. Potter Drilling's spallation technology overcomes these problems by using superheated fluid to drill through the rocks, rather than relying on the abrasive cutting power of a rotating drill bit.

Under the terms of the MOU the two companies will be carrying out trials to explore the application of Oxford Catalysts' Instant Steam technology to generate the necessary heat for use in Potter Drilling's spallation drilling tool. In these tests the Instant Steam catalyst will be contained in the drill head, which is attached to a flexible coiled pipe that can be pulled out of the well quickly when required.

### **Dave Wardle, Business Development Director Instant Steam at Oxford Catalysts says:**

Instant Steam is ideal for this application because it is capable of generating superheated steam deep underground. We are looking forward to working with Potter Drilling to explore the use of Instant Steam for spallation drilling, and to helping to make possible the greater use of geothermal heat for clean, environmentally friendly electricity generation.

### **Tom Wideman, Chief Technology Officer at Potter Drilling says:**

Oxford Catalysts' Instant Steam technology is ideally suited to produce the heat for Potter Drilling's hydrothermal spallation drilling technology. Potter Drilling is looking forward to demonstrating the use of Instant Steam to produce well bores in hard rock during our field trials next year.

### **For further information and pictures, please contact:**

Dave Wardle, Business Development  
Director, Oxford Catalysts

01235 841 700/0777 444 8399;  
[dave.wardle@oxfordcatalysts.com](mailto:dave.wardle@oxfordcatalysts.com)

Notes to editors:

## Geothermal energy

Geothermal energy is energy generated by heat stored beneath the Earth's surface. Power generation from geothermal energy was first commercialised in Italy in 1904, reached the United States in 1960, and grew steadily into the 1990s. There is currently a worldwide installed electricity generating capacity of just 10,000 MW.

But as technologies such as engineered geothermal systems (EGS) advance, geothermal energy has the potential to become an important clean, renewable source of energy for electricity generation. Recent estimates from the US Department of Energy suggest that geothermal energy could provide up to 100GW – 10% of the current power capacity in the US – by 2050. [source: [http://web.mit.edu/erc/spotlights/underground\\_heat.html](http://web.mit.edu/erc/spotlights/underground_heat.html)]. And a recent report from MIT estimates that just 2% of the heat held between 3-10 km below the continental United States could produce more than 2,500 times the US total annual energy use. [source: [http://geothermal.inel.gov/publications/future\\_of\\_geothermal\\_energy.pdf](http://geothermal.inel.gov/publications/future_of_geothermal_energy.pdf)]

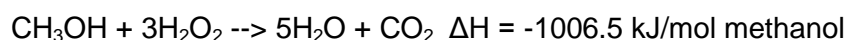
## Engineered geothermal systems (EGS)

Engineered geothermal systems (EGS), originally known as Hot Dry Rock (HDR), were pioneered and patented in the early 1970s at Los Alamos National Laboratory (LANL) by Potter Drilling co-founder Bob Potter and his co-workers.

EGS extracts heat from hot rocks in geothermal wells to heat water to drive steam turbines that generate electricity. In contrast to other forms of geothermal power, EGS power plants can be developed anywhere that hot impermeable rock exists below ground. The EGS technology is one of the few sources of renewable energy capable of producing electricity at a price that is competitive with coal fired power plants. It offers a promising option for meeting the increasing global demand for energy without increasing CO<sub>2</sub> emissions, which are associated with global warming.

## Instant Steam

Oxford Catalysts' Instant Steam technology makes it possible to generate superheated steam instantly and safely using compact, simple and portable equipment. The technology involves passing a liquid fuel – consisting of mixture of methanol and hydrogen peroxide – over a precious metal catalyst. This triggers the spontaneous and highly exothermic reaction



and releases high temperature steam, along with small amounts of effluent gases.

While the chemistry behind this development isn't new – the basic reaction was known to the 19<sup>th</sup> century scientist Michael Faraday – the use of the catalyst is. It is the catalyst that provides the key to the technology's success.

## **The Oxford Catalysts Group**

Oxford Catalysts Group PLC is a listed public company (LSE: OCG) comprised of two operating subsidiaries – Oxford Catalysts Ltd and Velocys, Inc. The Group has over 90 employees and operates from facilities near Abingdon, Oxfordshire, UK and Columbus Ohio, USA. The company was founded in October 2004 and was admitted to trading on the AIM market of the London Stock Exchange on 26th April 2006, having raised £15m before expenses from a solid base of institutional investors.

### **Oxford Catalysts Ltd**

Oxford Catalysts Ltd, designs, develops and licences specialty catalysts for the generation of clean fuels from both conventional fossil fuels and certain renewable sources such as biomass. The company focuses on two key platform technologies.

The first is based on a novel class of catalysts made from metal carbides. Aside from their lower cost, these catalysts offer a number of advantages. For example, in some reactions metal loadings can be reduced. In others, the need for precious metal promoters can be eliminated, while still retaining or even exceeding the benefits of traditional catalysts. Applications of these metal-carbide catalysts include hydro-processing and the conversion of natural gas, biogas or coal into sulphur-free diesel

The second platform is based on a novel a catalyst and fuel combination that produces instant chemical steam. at temperatures between 100°C and 800°C+ starting from room temperature. Such Instant Steam could have important applications in a broad range of markets, from cleaning and disinfecting, to green energy in the form of motive power or electricity.

[www.oxfordcatalysts.com](http://www.oxfordcatalysts.com)

### **Velocys Inc.**

Velocys Inc. is a Columbus, Ohio, US based company acquired by Oxford Catalysts in 2008. It specialises in the design and development of microchannel reactors.

### **Potter Drilling, Inc.**

Founded in 2004, by father-and-son team Bob and Jared Potter, Potter Drilling's mission is to commercialize innovative drilling technology designed to lower the cost of developing Engineered Geothermal Systems (EGS). The company is based in Redwood City, California.

Potter Drilling recently received a \$4 million investment from Google.org, the philanthropic arm of Google Inc, as part of Google's Renewable Energy Cheaper than Coal initiative. More information about Potter Drilling's technology and EGS is available from:

[www.potterdrilling.com](http://www.potterdrilling.com)