Alternative energy finance: Sectioned

Following a visit to his old University, Imperial College – BRAVE partner, Chris Cloke-Browne has a different view of carbon capture and storage (CCS). Moreover, he has some ideas as to how it relates to another pet topic at the firm – Section 29 collateral for North Sea decommissioning.

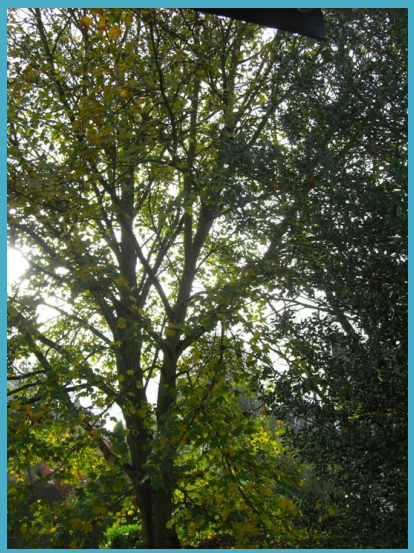
NOVEMBER 12, 2011

Returning to academia

This commentary really concentrates on the technical feasibility of CCS, which one of the BRAVE Partners has always been sceptical about. For now, the issue of the economics of CCS is left aside – except to note that the commentary concludes with some speculative thoughts on an appropriate source of investment for CCS. The failure to agree subsidy levels for the Longannet CCS project has cast some doubt on the economics – although it might also be noted that it is perhaps bold to try the first project on the third largest power station in Europe.

However, as new build plants have to allow space in their plans for CCS equipment, the concept looks as if it is here to stay.

An existing, proven CCS technology: Chris Cloke-Browne had his doubts as to why anything else was needed:



Section 29

Section 29 is the shorthand for the equivalent section of the Petroleum Act 1998. It enables the Secretary of State to serve notices requiring the recipient to submit a costed Decommissioning Programme for his approval at such future time as he may direct. Moreover a Section 29 plan requires collateral. In addition, any vendor of an asset does not relinquish their Section 29 liabilities. Vendors themselves therefore often require collateral from the purchaser of an asset on a more stringent basis than that required by the regulations.

Carbon capture and storage (CCS)

The cynical view put out by Christopher Cloke-Browne was that CCS technology has existed for around 400 million years – trees. In fact arguably the current use of fossil fuels is just mankind making use of carbon that was captured and stored millions of years ago.

With only one third of the heads of the Lernean Hydra, which Hercules had to defeat as one of his twelve tasks, CCS is still quite a monster. The three heads, or headings, of the problem are:

- Capture
- Transport
- Storage

Carbon capture

Chris Cloke-Browne never had any scepticism that the carbon could be captured. Currently it is envisaged that the CO_2 will be captured captured through one of three commercially ready chemical processes. We are using the more academic terms in this commentary – these technologies are often referred to as postcombustion; oxyfuel and precombustion

Amine solvents (postcombustion)

Amines are particular organic compounds that contain a nitrogen atom that can bond to hydrogen compounds. Solutions of these amines have been used to remove a variety of undesirable gases from the output of chemical processes – often referred to as a scrubber or scrubbing. Carbon dioxide is one such gas that can be removed by amines. The technology is attractive for existing installations as it can often be retro-fitted by passing the waste gas through the amine before sending it up the flue.

Oxyfuel combustion (oxyfuel)

This process seeks to create an almost pure CO_2 exhaust gas by combusting the fuel in a mixture that is 95%, or more, oxygen and some carbon dioxide, recycled from the output. The exhaust gas is a mixture of carbon dioxide and water vapour. The water vapour can be condensed out leaving just about pure CO_2.

Calcium looping (precombustion)

Calcium looping is perhaps the most promising technology right now, but it needs to be embedded into the process so it is more appropriate for new build installations than retro-fitting. In this process calcium oxide and carbon dioxide are reversibly reacted to create calcium carbonate (limestone). The process is then reversed to produce pure CO_2 and the calcium oxide is recycled. The process also integrates well with cement manufacture, allowing for the production of low carbon cement. As cement manufacture currently accounts for around 5% of global carbon dioxide emissions this is significant.

The liability risk once the carbon dioxide is in the ground remains an issue. BRAVE Partners always recalls the fact that Chevron, ExxonMobil and Royal Dutch Shell refused to develop the Gorgon liquefied natural gas project in Western Australia until the Government took on the long term liability risk associated with the storage of the CO_2 that is injected back into the ground.

Carbon transport

Here's where the scepticism began to creep in. However, CO_2 can be readily transported in the same way as natural gas – as a liquid through a pipeline, on a ship or by road in small quantities. Naturally, there is some expense in the compression of the gas, but there is no magic or rocket science required for the process. The USA has 2,500

km of CO_2 pipelines that transport 50 million metric tonnes of carbon dioxide per year.

Carbon storage

Here's where Chris thought the real problem lay, but in reality, the researchers at Imperial College and other institutions, are pretty confident that CO_2 can be safely and reliably stored underground for long periods of time. The first revelation was that to store CO_2 it is pumped as a liquid into brine that exists in an aquifer. Over reasonably short periods of time – or at least short periods of geological time – the following happens:

First the CO_2 begins to be absorbed into the porous rock. This is much like shale gas in reverse. All the little gaps in the rock trap bubbles of the carbon dioxide. Next, the brine begins to absorb the CO_2. This is the same process as used to create fizzy drinks – one of the major uses of CO_2. Finally, the dissolved CO_2 begins to solidify into minerals, so after 1,000 years models predict that about half of the carbon dioxide will be in a solid form.

An excellent Bakerian Lecture by Herbert Huppert, Professor of Fluid Dynamics demonstrates some of the science behind storage. It is available at: http://royalsociety.tv/rsPlayer.aspx?presentationid=524

Where to store the CO_2

So CCS all works – we just need a number of salt water filled holes in the ground to put it in. Fortunately the UK has been creating large numbers of holes in the ground under the North Sea for decades. These are the oil and gas fields, many of which are heading towards the end of their lifespan and therefore requiring Section 29 plans and collateral.

The Section 29 headache

The Section 29 collateral requirements are a headache for the independent oil and gas businesses that tend to buy late stage wells from the majors and extract the last hydrocarbons. These businesses wish to borrow as heavily as they can to acquire assets, lease equipment and all the other capital needs that go with exploration business. The Section 29 collateral is an unproductive call on cash for these businesses.

Migrating from the removal business to the storage business

Exploration companies are in the removal business. They drill a well, develop it, extract the hydrocarbons and move on. The Section 29 requirements are there to ensure that these companies don't leave the knackered old lorry parked outside – so to speak. However, what is currently a liability can quickly become an asset when it is viewed as a carbon dioxide storage site, rather than a hydrocarbons well at the

There is a ban on moving CO2 across national borders for the purpose of dumping – all other uses are allowed.
This would have an impact on the use of the North Sea wells as this makes most sense as a European storage facility.

It is best to work to get the legislation changed, but during our visit to Imperial College we did joke that the company could always claim that they were using the CO_2 for enhanced extraction from a well and the fact that nothing was coming out was simply because their geologists were no good …

end of its life. The owner of such a facility would want all its newest, shiniest lorries turning up bringing product to be stored.

My new CO_2 storage facility

As recently presented by Dr. Stephen Brown, Director of Development at CO_2 Sense, at an event organised by the Energy Institute, depleted and end of life wells in the North Sea have the appropriate geology to store carbon dioxide. If they are not already full of salt water, then there is no problem getting it there and pumping it in. Moreover, these platforms are already connected to the mainland through pipelines that were built to bring the oil and gas ashore. As a well ends its life, all that infrastructure needs to be removed which is the reason for a Section 29 plan and collateral. But if an end of life well becomes a start of life carbon dioxide storage facility – then the infrastructure just needs to be maintained, not removed and the cash tied up in Section 29 collateral could be used to build CCS technology and deliver CO_2 to these sites.

Picking up the tab

Just to put it into context, a May 2011 Herbert Smith e-bulletin estimates that in this decade, £9 billion will be spent on decommissioning approximately 280 installations and 940 wells across 144 individual North Sea oil and gas fields. That should cover the £1.5bn that is being argued over for the Longannet project.

Pie in the sky

Such an idea is not pie in the sky – more CO_2 out of the sky. Following the collapse of the Longannet project, Shell and Scottish and Southern Energy (SSE) have reached an agreement to capture carbon emissions from SSE's Peterhead combined cycle gas turbine unit and to store it in Shell's Goldeneye gas field in the North Sea. The project aims to use as much of the existing infrastructure as possible.

- *BRAVE Partners is a boutique investment bank with specific expertise in the alternative energy sector.*
- *The firm believes that Carbon capture and storage (CCS) is a viable technology to fill the gap before sufficient low carbon energy can be bought on stream.*
- *BRAVE Partners sees a number of synergies between the need for carbon dioxide storage sites and the roll off of oil and gas production in the North Sea, together with the associated decommissioning costs and liabilities.*

- *BRAVE Partners can:*
  - *See alternative collateral for Section 29 decommissioning liabilities.*
  - *Advise on CCS technology and the associated risks across the three phases: capture; transport and storage.*

enquiries@bravepartners.com

www.bravepartners.com

OFFICE: +44 844 997 0271

BRAVE Partners services

BRAVE Partners is a boutique investment bank that specialises in the alternative energy and (re)insurance sectors. The firm is seeking to focus on Section 29 issues and Carbon Capture and Storage for independent exploration businesses.

BRAVE Partners is currently engaged on a project to provide an independent exploration business with alternative collateral to satisfy the vendors of its assets on their Section 29 liabilities.

BRAVE Partners can further advise firms on a range of issues particularly:

- Working with firms to source alternative collateral for their Section 29 liabilities.
- Working with firms to release collateral their Section 29 collateral against the future potential of a site to store CO_2
- Developing business plans and the economics around carbon storage, especially in old wells that are subject to decommissioning costs.

Interaction

If you enjoyed this commentary and would like to receive a weekly update by E-Mail, then please contact BRAVE Partners on commentary@bravepartners.com

If you would like to comment on the content of this piece, then please send an E-Mail to discussions@bravepartners.com