AkzoNobel invests $20 million to increase surfactants capacity (Oct 10, 2011)
AkzoNobel has announced its plan to invest $20 million to increase capacity at its Surface Chemistry plants in Itupeva, S.P., Brazil, and Morris, Illi...

GTSC opens new training centre in North Iraq (Oct 10, 2011)
Gulf Technical & Safety Training Centre (GTSC) has opened a new facility in Erbil, North Iraq

Technip awarded umbilical contracts in the US (Oct 10, 2011)
Technip was awarded two contracts, by Shell Offshore Inc, for the Cardamom and West Boreas field developments

Playground of the western world

9/9/2011

Mindful of Offshore Europe in Aberdeen this month, Andrew McBarnet explains why seismic companies keep coming back to the mainly mature offshore hydrocarbon province of northwest Europe.

It's not the most elegant of sayings but 'there's life in the old dog yet' does sum up pretty well the current view of oil and gas prospects offshore northwest Europe, and hence the enduring enthusiasm of the marine seismic industry which seems as active as ever in the region. A feature of this phenomenon is that the seismic companies continue to defy that other old saw that 'you can't teach an old dog new tricks'. In fact the introduction of new technologies in acquisition and processing over the last few years is encouraging oil companies to take a look at existing acreage, perceived as mature, with new eyes. None of this would come as a great surprise to Peter Odell, emeritus professor of International Energy Studies at Erasmus University, Rotterdam whose autobiography was published this year. He was the man whose name in the early days of UK North Sea oil used to cause apoplexy among the oil company community. He was seen by the industry as the villain of the piece because he advised UK prime minister Harold Wilson's government of the time to stick to their guns on the imposition of a Petroleum Revenue Tax and to disregard threats by the oil industry to quit if the tax was brought in. Needless to say there was no sign of an exodus.

Odell penned a number of influential publications the gist of which was that just about every known oil province in the world has exceeded the reserve prognostications of the oil industry. Odell used to talk about the dilemma for oil companies. On the one hand they wanted to boost their stocks with optimistic estimates of their reserves, but on the other hand were equally minded to keep those estimates on low beam for fear of attracting a more punitive tax regime.

Now in his eighties, Odell is as combative as ever, dismissive of 'peak oil' theory and the flight from hydrocarbons as a source of energy. Recently he pooh-poohed the idea that 'first, there is an inherent scarcity in the world's endowment of carbon energy resources; second, that CO2 emissions from the use of carbon fuels are causing a rapid onset of global warming, and third, that a set of geopolitical constraints will inevitably inhibit the production of, and trade in, energy'.

No need to go into the details here. The point is that like Odell we should not be surprised that northwest Europe can still look forward to a prolonged active life; just like the Gulf of Mexico, it keeps on giving and giving.

Ironically, it is the geopolitical circumstances of the UK, Norway, the Netherlands, Denmark, Ireland, etc that make the European offshore region a natural playground for the oil industry. Taxes may sometimes be considered on the high side, but the region offers a very stable environment for oil companies to operate in and that is very important when the investment stakes are high. We are also inclined to forget that northwest Europe is one of the few remaining locations in the world where the international oil industry is welcome to do its business, and encouraged to participate in competitive but fair licensing rounds. You could of course argue that the Norwegians have over time pushed the envelope in favouring Statoil and other indigenous companies but, hey, the UK tried to run a British National Oil Corporation and failed miserably.

These days incremental additions to existing reserves are expected to be the mainstay of oil company operations, especially in the mature UK sector. Specifically re the UK, the point may have been reached where oil companies are no longer crying wolf when they complain about recent changes in the fiscal regime, themselves dictated by a government desperate to generate extra revenue. Mike Tholen, economics director of the industry representative body UK Oil & Gas, said recently: 'The drop in UK exploration and appraisal activity compared to other sectors of the North Sea since the Budget is a worrying reflection of the negative impact of the surprise tax increase on investor confidence in the UK Continental Shelf (UKCS). Oil & Gas UK's latest business confidence survey – which showed a 20% drop in confidence across the exploration, production and supply chain sectors – is now backed up by the hard news of a drop in exploration. It is imperative that the economics of less attractive projects are quickly aided by changes to the tax regime which lessen the impact of the tax hike and that exploration for new reserves is encouraged.'

Whatever the merits of the UK Oil & Gas protestations, more basic pre-conditions for oil company exploration activity would be the prospectivity of the target area, available finance, the price of oil, and access to appropriate technology. For a short period two or three years ago there was a UK North Sea mini-revival of sorts inspired in part by improvements in geophysical imaging of the subsurface emanating from the marine seismic business. In a nutshell the major oil companies began to lose interest in finding and developing minnows offshore UK when there were bigger prizes to be won off West Africa, Brazil and even the Gulf of Mexico. With the world economy in a much better place than it is today, a niche market briefly emerged in which smaller oil companies were able to raise investor cash to pick up and rework acreage relinquished by the Big Boys.

Availability of improved 3D seismic technology from the geophysical industry played a significant role in this

process, and there have been some significant successes. The trailblazer was Apache (OE December 2010). BP must be kicking itself today for giving up on the Forties field back in 2003. When Apache acquired Forties – for the tidy sum of $800 million and change – there were 45 producing wells. Today, there are 77 producing wells with an inventory of future locations. By the end of 1Q 2010, Apache had produced and sold, net to its interest, oil volumes in excess of the proved reserves booked when the company acquired the field. Shooting new seismic data had something to do with this.

Most recently during the summer of 2010, a 3D time-lapse seismic survey (4D) was acquired in Forties. Comparison of this data with previous 3D seismic highlighted many areas of bypassed oil in the reservoir and provided better definition of existing targets. In 2010, 20 wells were drilled into the Forties reservoir, of which 12 were productive. The company projects that this 60% drilling ratio will improve because recent drilling results have validated the 4D evaluation and geological interpretation.

In both the UK and Norwegian sectors the value of 4D seismic technology for reservoir monitoring is appreciated. There's plenty of evidence to demonstrate how time-lapse 3D surveys can document changes in the reservoir which allow petroleum engineers to optimise production through more targeted drilling, injection programmes. Every year now there are between 10 and 20 seismic surveys offshore UK and Norway which are identifiably 4D seismic in nature.

Arguably this figure should be considerably higher with more operators realising the benefits of this technique.

The reality is that 4D seismic to all but the largest companies is a risky luxury investment which may or may not pay off. The pre-planning, acquisition and the processing is more complicated than your average 3D and for best results the project invariably requires the services of one of the major seismic contractors with highend streamer capacity. Not surprisingly it's companies like BP, Shell and Statoil who are making most use of 4D, but there seems little doubt that more producing fields could benefit from this type of reservoir monitoring if it was somehow more obviously attractive and affordable. The trouble is that not all reservoir locations are geologically favourable and, as with any other technique involving the subsurface, a positive result cannot be guaranteed.

Up to now the preferred option for 4D seismic acquisition has been towed streamers, mainly on grounds of cost, convenience and speed of the operation. Repeatability and high resolution of the data, the key to time-lapse surveys, can be compromised by infrastructure and other obstacles in the survey target area which prevent full coverage of streamer operations. One way around this is to adopt the ocean bottom node solution of which there are versions from SeaBird Exploration and Fairfield Nodal, both of which picked up some work this year offshore Europe.

Once again, however, the clients have been limited to Big Oil. Most recently ExxonMobil as operator of PL596 in the Norwegian Sea booked SeaBird's Hugin Explorer and Munin Explorer to carry out a $3.6m pilot 4C node survey to characterize sub-basalt structures which are difficult to image with other seismic technologies. The work follows on from a large OBN survey for Chevron on the Rosebank field northwest of Shetland aimed at acquiring multi-component data for improved reservoir imaging and characterization.

The ultimate solution is of course permanent reservoir monitoring (PRM) which so far in the North Sea has been confined to BP's UK Clair field and the ConocoPhillips Ekofisk field in the Norwegian sector. Interestingly the decision to opt for PRM on Ekofisk followed some good 4D imaging results using towed streamers obtained for the company by WesternGeco. PRM, however, is a much rarer species than 4D seismic, and only the odd major oil operator is likely to take on the risk, not to mention the loaded upfront costs involved in installing PRM systems.

Difficult climate

In the northwest European region traditional contract seismic work has been down on previous years, partly because of the abhorrent weather that affected the early part of the North Sea summer season. The appetite for exploration among the junior players has also been tainted by the squeeze on credit and that has had a depressing impact. Petroleum Geo-Service (PGS), CGGVeritas and WesternGeco would also like to believe that demand for seismic projects is increasingly being influenced by the better quality acquisition technologies available. This may cause companies to be more selective about projects given the additional cost. After all, the mature areas of the UK and Norway have been picked over for decades; if new reserves are to be found it makes sense to go for the best that the market can offer. If this is the case, then there is a strong case for taking advantage of the advent of broadband.

CGGVeritas argues that its new BroadSeis technique accommodates the importance of recording the full range of frequencies (low as well as high) for high resolution imaging. High fidelity, low frequency data provides deeper penetration for the clear imaging of deep targets, as well as providing greater stability in inversion. Broader bandwidths produce sharper wavelets therefore both low and high frequencies are required for high resolution imaging of important shallow features such as thin beds and small sedimentary traps. PGS claims much the same for its 'ghostfree' GeoStreamer GS dual source system, and WesternGeco has an 'over and under' wavefield separation solution, which is widely seen as a stop-gap to tide the company

over until it introduces the much anticipated update of Q-Marine.

If broadband continues to gain traction in the mature provinces where subtle nuances are only revealed by higher resolution seismic, then companies such as Fugro, Polarcus and Dolphin Geophysical with no broadband solution to offer may find themselves at a disadvantage in bidding for future contract work in the region.

This may not prove such a handicap while exploration interest focuses on frontier areas of Norway and the UK. Here multi-client is the survey model. Right now there is a free-forall in the largely unexplored Barents Sea, encouraged by the Norwegian government's desire to get a handle on what's out there, the recent resolution of the border question with Russia, and doubtless the major gas find last month by Total with its wildcat well 7225/3-1, about 250km north of Melkøya. WesternGeco, Polarcus, Fugro and Dolphin have had 3D vessels on multi-client projects in the Barents Sea, and a number of 2D multi-client projects are also being undertaken.

Meantime the Norwegian Petroleum Directorate (NPD) has money from the government to pursue its own mapping of the country's northern areas in anticipation of future licensing initiatives. For example, PGS on behalf of the NPD, has been conducting 2D seismic with a single GeoStreamer cable on board the Harriet Explorer (leased from SeaBird Exploration) to investigate Norway's new maritime zone in the Barents Sea and before that the untouched Jan Mayen area.

Norwegian acreage in this early exploration stage is clearly going to provide steady work for the seismic business. Meantime Statoil's finding of the hidden giant Aldous Major South field in a well explored area of the North Sea offshore Norway will surely have every company in the North Sea reviewing their seismic data to see whether they have missed something.

The UK does not have quite the same buzz as Norway for the time being. It has a new (the 27th) licensing round scheduled for next year which should stimulate fresh seismic activity. One frontier area multi-client project of note is being carried out jointly by PGS and TGS in the Faroe-Shetland Basin. The survey covers 2500km2 west of the British Isles over quads 6004, 204 and 205 and is being acquired by the PGS Ramform Viking towing 12 x 6000m with 75m separation utilizing PGS' GeoStreamer technology. Data acquisition will continue through Q3 2011 and the vessel will return in 2012 to complete the survey. It is TGS' first investment in a 3D multi-client seismic programme west of the British Isles in an area with a number of discoveries and further undiscovered hydrocarbon potential, according to Kjell Trommestad, TGS senior vice president, Europe & Russia.

All these projects are confirmation enough that northwest Europe continues to be staple business for seismic companies. But, on the periphery, there has been a flurry of seismic offshore Ireland in the Celtic Sea and Porcupine Basin spearheaded by Providence Oil & Gas, which has used Polarcus vessels for two surveys recently. In addition, the Irish government is excited about the 15 companies which have expressed interest in its latest Atlantic Margin licensing round offering acreage off the west coast of Ireland in the Porcupine, Rockall, Erris, and Donegal basins.

And how about a fresh look at Denmark in the light of the latest gas find by PA Resources? As operator of offshore licence 12/06, the company has made a gas discovery at the Broder Tuck prospect 10km south of Gorm field in the Danish sector of the North Sea. The well encountered approximately 17m of net pay in high quality sandstones in the primary Middle Jurassic target.

Marine seismic companies with increasingly sophisticated imaging technology have managed to remain indispensable enablers for oil companies, whether it is to revisit old haunts in search of new treasures or to venture into unchartered territory. The northwest Europe offshore oil and gas experience 40 years on is a case in point, and it may be that the role of seismic, perhaps in combination with electromagnetic surveys, will become increasingly significant in the search for those elusive oil and gas reserves concealed in a mature province. ***OE***

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