E&P business of the future: the challenges of unconventional resources

Lorenz Siggel, Wintershall Holding GmbH, Kassel

Wintershall Holding GmbH is a traditional Exploration and production company in the oil and gas sector. It was founded in 1894 and entered the oil business in 1930. Wintershall became a 100% subsidiary of BASF in 1969. Wintershall is active throughout the world with core regions of Germany, North Sea, Norway, Russia, Northern Africa and Argentina. In the worlds ranking list Wintershall is

Today national oil companies (NOC's), such as Saudi Aramco, Kuwait Oil Company, etc., control 80% of the remaining oil reserves and international oil companies (IOC's), such as Wintershall, Shell, BP, etc., the remaining 20%. This is almost the exact opposite of the situation 40 years ago and makes the competition for reserves more challenging. In order to gain access to the assets of an NOC an E&P company is expected to bring not only money -but more importantly- technology for the optimal recovery of the oil to the negotiation table.

Without the use of advanced technology only 30-40% of the original oil in place can be economically produced, which in an ever more energy hungry world, is not enough. After primary (natural pressure and flow) and secondary (water flooding) recovery methods companies have to employ tertiary or enhanced oil recovery (EOR) methods to maximize recovery. This fact is coupled with the diversity of oil reservoirs: shallow and deep, low and high salinity, low and high temperatures, very fluid to very viscous oil, etc. and the currently available commercial products for chemical EOR target relatively "easy" reservoirs: moderate temperatures and relatively low salinity and low viscosity.

In order to successfully compete for reserves with the majors (Shell, BP, Total, etc.) a small company like Wintershall needs to bring proprietary technology to the table that no one else has, i.e. technology for difficult reservoirs: high temperature, high salinity, high viscosity, etc. In 2006 Wintershall embarked on the road to develop such technologies, together with the parent company BASF. For oils of low to moderate viscosity there are ongoing R&D projects running, but a major challenge remains in the sector of "heavy oil" oil of high viscosity –up to 15,000cP- that is too deep to employ steam. Wintershall is at this time not interested in tar sands, bitumens or shallow heavy oil reservoirs where conventions technology can be used.

The greatest challenges for catalysis in the area of unconventional resources are likely to be concentrated in heavy oil or bitumens and oil sands rather than tight gas or shale gas. Mobilizing and producing gas from challenging reservoirs is more an engineering exercise: drilling, fracturing, etc. An exception is Gas-to-Liquid (GTL) technology where natural gas is first catalytically converted to syngas and then recombined to higher hydrocarbons: synfuels via Fischer-Tropsch chemistry. This technology has only been shown to be economical at a very large scale as seen in S. Africa and some newer projects in the Persian Gulf.

The talk will concentrate on deep, unconventional oil since that is where the greatest challenges are to be found and solutions there are likely to be transferable to shallow reservoirs and, potentially, bitumens and "tar sands". The options can be divided into two major classes: topside upgrading, either in the refinery or compact on-site and downhole upgrading, or in-situ catalysis. We will present a rough overview of the technologies available and some interesting R&D activities.

Wintershall feels that there is still a lot of room for innovation in catalysis for unconventional resources, both from the chemistry and engineering perspectives, and see movement in the R&D landscape.