



Shale oil in Russia – commercial catalyst required

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Decline of conventional oil

As Russia enters a period when oil production from its traditional heartland in West Siberia has plateaued and could go into decline, the search has begun for new sources of output that can help to maintain the country's output above 10 million barrels per day (mmbpd). It is vital that this level is maintained, in order to allow crude oil and oil product exports (which contribute around 45 per cent of Russia's budget revenues) to remain as a vital bulwark of the country's economy. To this end, the Russian authorities have been encouraging the country's major oil companies to explore new greenfield regions – such as East Siberia, the Black and Barents Seas, and the Arctic offshore – in the

hope that major new production areas can be developed. These prospects are relatively long term, however, with major increases in oil production unlikely for a decade or more, meaning that a medium-term solution still needs to be found. Unconventional oil would appear to be just such a solution especially as, in a recent assessment, the United States Geological Survey (USGS) estimated that Russia has the largest potential shale oil resources in the world, with its 75 billion barrel estimate being almost equivalent to the country's current proved conventional oil reserves. The Russian authorities have also been expressing growing confidence in the potential from tight and shale reservoirs located in West Siberia and European Russia, with production expectations set as high as

1.5mmbpd by the Ministry of Natural Resources. The key question, of course, is whether this potential can be realized. It is becoming increasingly clear that the answer to this will be less to do with geology and technology than with the commercial environment in Russia and the corporate mind set of the companies that currently control the majority of the relevant licences.

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Moves to exploit shale oil

The need for both an alternative corporate outlook and an increased

level of experience in the development of unconventional resources has been exemplified over the last two years by the number of partnerships that have been formed between Russian and international companies to begin initial exploration. In 2012 Rosneft, the leading Russian player in terms of licensed acreage, started the process by forming a joint venture with ExxonMobil to conduct a pilot project in West Siberia to develop the Bazhenov reservoirs beneath existing fields owned by its subsidiary Yuganskneftegaz. The Bazhenov shale oil resource is the most documented and researched of the Russian unconventional plays, covering an area of 1 million square kilometres across West Siberia; the Rosneft–Exxon JV plans to conduct a pilot project that will see 30 wells drilled at a cost of \$300 million over the next three years. The project will be entirely funded by Exxon, and will test the reservoir using the horizontal drilling and multi-stage fracturing techniques that are common practice in the US shale industry.

Rosneft has also formed an additional unconventional oil JV with Statoil to investigate tight oil and shale prospects in the Stavropol region of European Russia, and is also exploring 'difficult-to-recover' reserves in the Yamal Nenets region. Gazprom Neft, another state-owned company, is also making significant efforts to develop new reserves: in partnership with Shell at its Salym JV, and with oil services company Schlumberger at a number of prospects in the Khanty-Mansiisk region. Its efforts with Shell are of particular importance because a significant pilot project, comprising six wells, is being undertaken; Gazprom Neft CEO Alexander Dyukov suggests that if successful, the reservoirs at Salym could produce up to 100,000 barrels per day of shale oil by 2020.

Most recently, the French company Total has entered the race to exploit Russia's shale reserves. Total acquired three

licences in an auction in West Siberia, and then formed a joint venture with the private company Lukoil to develop both these licences and additional assets brought by Ritek, Lukoil's unconventional oil subsidiary. Again, the venture is at a very early stage of development, with both companies remaining cautiously optimistic about the prospects for production but refusing to commit to any detailed forecasts of future output.

Geological issues

The key reason for this reluctance to say anything significant about future output is that it remains very unclear whether it will be commercial to develop shale oil in Russia. There are a number of underlying factors behind this uncertainty, the first of which is geological. Although the Bazhenov reservoir and other tight oil and unconventional plays have been known about in Russia for many years, the key problem with their development to date has been the heterogeneity of the rocks; it is possible for one well to produce in abundance, while there is almost no flow from a well only a kilometre away. Indeed Surgutneftegaz, the most active driller into the Bazhenov to date, estimates that only one in three wells can be counted as successful. Furthermore, the significant presence of kerogens as well as light oil in the reservoirs means that production costs can also be very high, if heating is required to ensure that liquid hydrocarbons will flow.

Taxation

The lack of certainty over well performance, both initial flows and decline rates, and well cost means that estimating the overall economic outcome is a precarious process, but this problem could be reduced if the tax regime allowed costs to be offset pre-tax, with profits being shared

with the government. Unfortunately Russia's current tax system is primarily revenue-based, with both the Mineral Extraction Tax (MET – essentially a royalty on production) and the export tax being taken from overall sales, before allowance for any costs. This leaves the majority of the risk with the developers, meaning that their incentive to spend the billions of dollars that will be needed to increase output to any figure which is close to government forecasts is severely limited. The Russian authorities have appreciated this fact to some extent – reducing the MET royalty on output from specific reservoirs (including the Bazhenov) to zero and effectively reducing the tax bill by approximately \$20 per barrel – but nevertheless the economics of shale oil production remain very sensitive to changes in operational performance. For example, at an average well cost of \$9 million, a change in initial well output from 75 tonnes per day (c.500bpd) to 50 tonnes per day (c.375bpd) could change the IRR of a well from a healthy 24 per cent to an unacceptable 7 per cent (assuming a \$100 per barrel oil price).

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This combination of geological and economic uncertainty effectively means that the pilot projects currently underway in the Rosneft, Gazprom Neft, and Lukoil joint ventures will be exploring not only the productivity of the shale oil reservoirs but will also be establishing the commercial parameters that will be needed to make them work as investments. It is now anticipated that once the preliminary exploration work has been done, all the companies and their international partners will come back to the Russian authorities in order to negotiate a set of tax terms that will encourage capital



expenditure to be committed and new business technology to be brought to bear. A similar negotiation took place concerning the Arctic, with Rosneft and ExxonMobil essentially insisting on the return-based sliding scale royalty system that has now been adopted to allow exploration to commence; it is likely that tax concessions will also be required if Russia's shale oil resources are to be exploited in a timely fashion.

Technical issues

The issue of business technology is also an important one, as it implies the application of business practices which have not been prevalent in Russia and which are arguably not suited to the current corporate landscape. Russia has been using the operational technology needed to develop unconventional oil (such as horizontal drilling and multi-stage fracturing) for

many years, thanks to the involvement of multinational service companies such as Halliburton and Schlumberger since the 1990s. However, entrepreneurial risk-taking and adaptive planning – key features of the US unconventional oil industry – are much less prevalent in Russia, due to the history of traditional development of conventional fields in its oil industry. Two key elements of this US environment have been the proliferation of small companies and the abundance of financial institutions willing to provide capital to back them; neither of these is present in Russia. The stark contrast is clearly seen when comparing the 89 small companies operating in the Bakken region of the USA alone, with the three or four major Russian companies that dominate the Russian unconventional industry.

As a result, although the potential unconventional resource base in Russia is enormous – suggesting that

a production target of 1.5 mmbpd is not unreasonable – a number of factors combine to make it unlikely that such an outcome will be realized in the short term. Importantly, the geology is difficult, but this is true of many oil basins in the world. More crucially, the tax system has yet to be fully adapted to provide adequate incentives for the huge capital expenditure that will be needed to develop the industrial process essential to profitable shale development. Finally, there is as yet no proof that Russia's model of large NOC joint ventures with IOCs can be as successful as the multi-company model used in the USA. It is likely to take many years before the experiment can be completed and a significant change in Russian corporate culture may be required; this means that shale oil in Russia may be no more of a short-term fix to the country's production issues than the development of the Arctic offshore.

