

Fracking

Major Bahrain find of shale oil and gas could create big demand for fracking minerals

- Shallow shale resource found
- Frac sand likely to be imported
- New technologies must be developed

Paul Cochrane, in Bahrain

The island state of Bahrain in the Persian Gulf is investigating its first major oil find in 86 years, and the minerals sector will be keeping close watch on its exploration because this is an offshore shale oil and gas resource that will need fracking inputs to extract its hydrocarbons.

"It is definitely unique, a one-of-a-kind oil find in shallow waters close to shore," Edgar van der Meer, senior research analyst at NRG Expert in London, said.

The find was announced in April 2018 by Bahrain's National Oil & Gas Authority. It is in the Khaleej Al Bahrain Basin, offshore to the west and south of the country, in territorial waters bordering Saudi Arabia, and is estimated to hold 81.5 billion barrels of oil and 390 billion cubic metres of associated gas.

The viability of the find will be determined by two test oil rigs now being drilled by Halliburton and Schlumberger, with the results to be announced later in the first quarter of 2019.

"There are uncertainties around how to develop such a huge resource," according to Abdulaziz Al Doseri, a research analyst in economics & energy studies at the Bahrain Centre for Strategic, International & Energy Studies (DERASAT), in the capital city of Manama.

"The two test oil rigs will determine the quality of the crude because we don't know yet whether it's light, the density of the crude, and the sulfur content, because that will



Bahrain is investigating a shallow offshore shale oil and gas resource

dictate the price of a barrel of oil," he added.

The resource is classified as a 'P50' find, from which 50% or more of the oil could be recovered. This compares with US fracking resources, where estimates for recovery range from 5% to 6% and possibly up to 10%.

With the find being on the borderline between conventional and unconventional, Al Doseri said, and being not under rock but under a mud-like geology, it is not yet clear how difficult it will be to extract the shale oil.

There is also the additional challenge that the resource is offshore, "and techniques must be developed to ensure that the oil can be extracted, which differs from established practise," van der Meer said.

Compared to shale finds in North America, such as Canada's oil sands, which primarily use surface extraction, the Bahrain find will require more complicated fracking techniques.

"Finding [market participants] willing to make investments and to agree to [Bahrain's] terms will also mean taking risks on techniques, because they are as yet unproven," van der Meer added.

It typically requires the test results from 20 wells to understand such a find in the United States, so with the cost of offshore drilling at \$10-20 million per well, according to Qamar

Energy in Dubai, much will depend on the project's affordability.

"The find is really going to be determined by oil prices, because it's technically challenging," van der Meer said. "Technologies exist for drilling into bedrock and going so deep, but they need to be developed and adapted for a new environment, and employed in a way that makes economic sense."

What the frack

Bahrain does not have expertise in offshore drilling or with shale oil extraction, Al Doseri said, so much will also depend on the results of the test wells when determining what technology, and what fracking minerals, will be needed.

Silica 'frac' sand is mixed with hydraulic fracturing fluids to help extract oil from shale rock. In the US fracking sector, frac sand is produced according to shale firms' specific requirements, and Bahrain would have to develop similar specifications.

"Ironically, with all the sand in the Gulf deserts, not a single grain matches the specifications of frac sand," Al Doseri said. "And even if Bahrain sets up a plant to produce frac sand, it will still need to supply the plant with proper sandstones that are made into frac sand. I would assume that Bahrain plans either to import sandstone and make frac sand locally, or to import frac sand."

Raw frac sand could be sourced from the wider Middle East region or be imported from the US, or both. Some frac sand is already imported into the region from the US, with about 70,000 tonnes used in 2018.

If ceramic proppants are required for the fracking, these will also have to be imported. China and the US are the major exporters, and 85,000 tonnes per year is currently exported to the Middle East.

Environmental issues

Although importing proppants is feasible, water is a scarce resource in the Gulf region.

"Obviously, sweet water is not abundant in Bahrain," Al Doseri said, "so this might pose a technical challenge for oil companies, while using seawater might cause unintended chemical reactions or at least affect the efficiency of the hydraulic fracturing process."

It is not clear what environmental regulations, if any, Bahrain will follow regarding fracking, but the government is keen to develop the resource within the next four years.

The Gulf kingdom does not have a particularly active civil society or activist movement, because of restrictions imposed on such protests following a 2011 uprising. But most of the country's oil infrastructure is in the south of the country, with good access to the location of the shale oil find, and well away from the population centers around Manama.

The gas portion of the new resource is expected to be easier to develop than the shale oil, and Bahrain may be able to benefit from the development of unconventional gas projects elsewhere in the Middle East, such as in Saudi Arabia and Oman, which with Bahrain are fellow members of the Gulf Co-operation Council.