

Advancing EOR Collaboration in the Gulf

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The EIA has forecast that 30% additional energy will be required by 2040 - that's around 30 million barrels per day (b/d) or three Aramco's - not a small amount. Yes, there is U.S. shale and there are electric cars that will also reduce demand for fuel, but I don't believe the contribution of these two factors will be sufficient to meet global energy demand.

Most of current supply is coming from conventional reservoirs which are declining, and some of them very fast so we need to do something to sustain and improve recovery. Hence, the importance of Enhanced Oil Recovery (EOR) and Improved Oil Recovery (IOR).

Globally, primary and secondary recovery rates are currently around 30% to 35%. We are lucky here in Abu Dhabi that the number is around 50% thanks to favorable water and flat conditions and rock and fluid interaction. But that leaves 50% of our resources underground as untapped, and we should not leave it as such.

EOR is not a cheap business. However, we have seen examples where what we thought would be very expensive, was in fact realized economically, like with unconventional and fracturing technology. We can achieve what we want from EOR economically and we have no other option actually with current global prices and the competition we have from other renewable energy.

To make EOR economically viable, we need to focus on four areas: talent development, technology, partnership and investment.

ADNOC is developing its talent by collaborating with renowned universities such as Norway's Berk University where Emirati ADNOC PhD students are working hand in hand with leading researchers in various hi-tech technologies. At London's Imperial College, our PhD students are working on rock physics and at Heriot-Watt University, they are developing techniques in carbonated water and low salt water injection. These are just small examples of how we create or we develop our talent. We are very proud in ADNOC that we have a mix of IOC partners from around the world who have helped us bring technology and knowhow and developed our talent.

On technology, we are working to develop formulas where chemicals can have an impact on the very aggressive condition of high temperatures and high solutions that will help to improve efficiencies. I'm also proud to say that we have just finished establishing a subsurface center of excellence in ADNOC HQ that will house the latest technology in field development in EOR and modelling and visualization. This center will be able to house 4 subject matter experts from geophysics and reservoir engineering and all the way to digital oil fields.

Around 10% to 15% of our oil now is actually recovered by EOR, mainly by miscible gas



injection. We have the CO2 Al Riyadhha project - a unique project in ADNOC - and I believe we are just at the start with CO₂ field injection and have many other phases to come.

We are also proud to say that we have one of the latest technologies when it comes to extended reach drilling and MRC wells. In one example offshore, we have four artificial islands and our plan is that these will cover the giant Upper Zakum field with hundreds of MRC wells drilled from these four centers. We have proven the concept of horizontalization and simulation of tight reservoirs, and we now have areas in Upper Zakum where we thought we would never be able to produce and where the rock is producing around 5,000 b/d.

We are also planning to test polymer injection, so all in all, we have an EOR roadmap in ADNOC where we are systematically

implementing all these techniques in our reservoirs from the laboratory, to piloting, and then to the full scale projects.

As far as partnership is concerned, we work with IOCs, service companies, academia such as Khalifa University and Rice and Penn State University. We also have cross country GCC collaboration such as our plans for a joint industry project focusing on EOR.

Last but not least is investment which is crucial to sustain our business and the only way is to have smart investment where we can optimize resources as much as possible.

I would like to thank Gulf Intelligence for arranging this EOR workshop and I hope that the sessions will help us to better interact and share knowledge and come up with some recommendations. ■