

Enhanced oil recovery & carbon capture and storage: a perfect fit?

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Maersk Oil, like the rest of the industry, has been confronted with a great conundrum, the solution of which could change not just the way oil companies operate but how we all consume energy.

The IEA says demand for energy will increase 40 per cent by 2030 and the overwhelming majority of that increase will come from developing nations, where 1.5 billion people still live with no electricity. Demand for oil will increase 24 per cent over the next two decades just as the industry is facing depleting reserves and increasingly difficult exploration conditions.

At the same time, the IEA in its 2009 *World Energy Outlook* says that “without a change in policy, the world is on a path for a rise in global temperature of up to 6°C, with catastrophic consequences for our climate”. CO₂ emissions are set to rise just under 40 per cent in the energy sector and 33 per cent as a whole, if no climate policies are implemented, the IEA says. This means the oil industry is placed in a particularly difficult situation – on the one hand we must find the investment and technology to extract more oil than we currently do if we are to keep markets supplied. At the same time, we must learn how to do this in a far cleaner and environmentally responsible way by reducing our CO₂ footprint.

To rise to the challenge of increased oil demand against a backdrop of fewer bountiful and accessible discoveries, some companies have been developing novel recovery processes including injection of water, gas or chemicals into fields to sweep more oil out, under one technique referred to as Enhanced Oil Recovery (EOR). At the same time, to address the issue of climate change, some players in the industry have also begun tentative Carbon Capture and Storage (CCS) projects, whereby CO₂ is captured, transported and locked safely away inside a geological formation, such as a depleted oil field.

We believe that the two processes could go hand in hand – that it could be possible to capture unwanted CO₂ and pump the gas into maturing fields to recover more oil. Such a proposition could provide a win-win solution, helping to both boost oil production out of existing assets and to mitigate CO₂ emissions. We are serious enough about the viability of such a project to have sought out commercial partners and are now surveying our fields for suitable sites for CO₂ injection.

We know that we can squeeze more oil than first expected out of maturing fields through the injection of water or gas into rock formations. In North America producers have been using naturally-occurring CO₂ to do just that for decades. We ourselves are experts at water flooding of our Danish North Sea fields which are characterised by high porosity but low permeability chalk reservoirs. With such experience, we believe we can be capable of EOR operations using CO₂ gathered from power plants or other large emitters of CO₂ that needs to be disposed of safely.

In contrast, there are only a handful of sizeable CCS projects around the world, most notably in Norway, Canada, the United States and Algeria. Yet, the potential of CCS projects is immense – the IEA estimates CCS should provide around 20 per cent of the CO₂ cuts needed from the energy sector to mitigate climate change. The World Bank thinks that figure could be higher at 33 per cent and others still say 50 per cent. But the distance between CCS’s infancy stage and the fulfilment of its potential as a key tool in fighting climate change is huge. One of the key obstacles is cost – it is still significantly more expensive to capture, transport and store CO₂ safely than to pay for the right to emit. Moreover, there is no money to be made purely from CCS.

The regulatory landscape surrounding the environment and energy is now changing fast. Governments across the globe have stepped up their support for a range of projects that are aimed at mitigating climate change. The EU’s executive arm, the European Commission, for example is offering billions of funding for CCS demonstration projects. EU member states and the companies functioning in them are already part of the Carbon Emissions trading scheme, and some governments have imposed or are considering imposing a tax on CO₂ emissions. While such measures may be hard for industries to swallow if they do not change the way they operate, we think the inevitable changes could provide business opportunities.

Measures that make emitting CO₂ into the atmosphere expensive will force industries, particularly the power sector, to take action on CCS. Moreover, combining CCS with EOR, also introduces income into the process, through the sale of the extra oil that can be recovered as a result. Thus, development of CCS-EOR could be a significant activity for the oil industry at a time when it deals increasingly with maturing and challenging fields. As large, accessible discoveries become fewer and far between, many oil companies have begun to focus on getting more out of the fields that they do have.

Around the world oil companies manage to gather just 35 per cent of the oil in their fields on average, according to industry estimates, before recovery becomes commercially unviable and reservoirs are abandoned. Yet, if applied today, industry experience and estimates show that EOR could boost production from existing fields by 5-15 per cent, depending on the specification of each field, where a 5 per cent increase would provide another 10-20 years of oil supplies at today’s rate.

That is why we believe the combined CCS-EOR technology appears to be a win-win solution. It can take damaging CO₂ out of the atmosphere. It can create entire new business opportunities within the industry and it can help oil companies increase supplies from their existing fields to meet global demand and fuel economic growth. □

