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INVESTOR EDUCATION SERIES

REPORT #2: THE OILPRICE.COM INVESTORS GUIDE TO OIL & GAS RECOVERY PHASES

A SPECIAL REPORT SERIES FROM OILPRICE.COM | VOLUME 2 OF 7

Primary, Secondary & Tertiary. The Oilprice.com Investors Guide to Oil & Gas Recovery Phases

This report contains vital information for new investors in the complex arena of oil and gas. Once you've chosen a company in which to invest, almost nothing will be more important than their plans for getting oil and gas out of the ground—and their plans for making extraction continue beyond the initial smash and grab phase.

Today, extraction is all about what comes next. In this in-depth 20-page report, Oilprice.com answers the key questions that affect your bottom line:

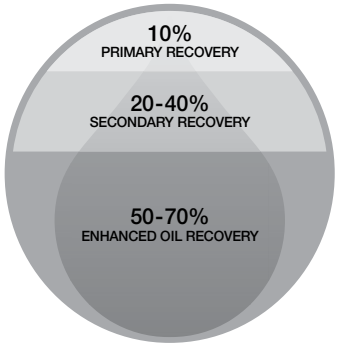
- **What is primary, secondary and tertiary recovery?**
- **How is oil actually extracted?**
- **How much oil can you get out of the ground in each phase?**
- **Where does secondary and tertiary recovery really work?**
- **How do oil recovery phases compare in terms of cost?**
- **When is it cost-effective to pursue tertiary recovery?**
- **How do E&P companies play around with your investment through smash-and-grab primary recovery?**

The Earth's oil and gas resources are limited, even if the shale revolution has put paid to the theory that peak oil will soon descend upon us. Oil and gas resources are not renewable. And while oil and gas will remain the heart of our energy supply for some time to come, conventional production from known deposits is declining as they mature. Major technological advancements such as horizontal drilling and hydraulic fracturing gave us access to massive deposits of oil and gas trapped under shale formations—deposits that no one thought would ever be accessible or commercially viable. But these highly productive unconventional shale plays that have formed the backbone of the recent boom—Bakken, Eagle Ford, Permian, Marcellus, Anadarko-Woodford, Granite Wash, and Niobrara—have a much faster decline rate than the conventional plays of old. This fact is ushering in yet another technological boom—this time focused on secondary and tertiary recovery; in other words, on getting up to 70% of all oil and gas out of a reservoir, whereas before we were extracting only a meager 10% of what was down there.

In this atmosphere, what investors must really focus on when considering their next investment is how much an explorer and producer (E&P company) is actually recovering from the ground, what technology they are using to recover hydrocarbons, and what the economics of using this technology are compared to the amount recovered, as well as the prevailing oil and gas prices of the day.

Looking At The Oil Recovery Margins

It's not enough to just find a hot new resource play and drill, drill, drill. It's what an E&P company does after this to continue recovery and potentially DOUBLE production (and profits).



Investors who are relatively new to this dynamic scene tend to get lured in by the numbers related to primary recovery, the first phase of oil recovery from a well. Never be lured in by these

numbers alone. During the first, primary phase of recovery, they can only get 5%-10% of the oil out of the ground. **At least** 90% of the oil is left in the reservoir after this phase of recovery.

This is not enough on which to base a sound investment. Always evaluate a company's capabilities and plans for secondary oil recovery, a phase during which an additional 25%-30% of the oil in a reservoir can be extracted, greatly increasing the value of your investment. Still, around 70% of the oil is left in the reservoir even after secondary recovery.

You can also evaluate a company's potential for Enhanced Oil Recovery (EOR) or tertiary oil recovery—a third phase that is seeing significant technological advancements towards getting almost all the oil out of a reservoir. EOR can increase a well's performance massively, resulting in up to 75% oil recovery.

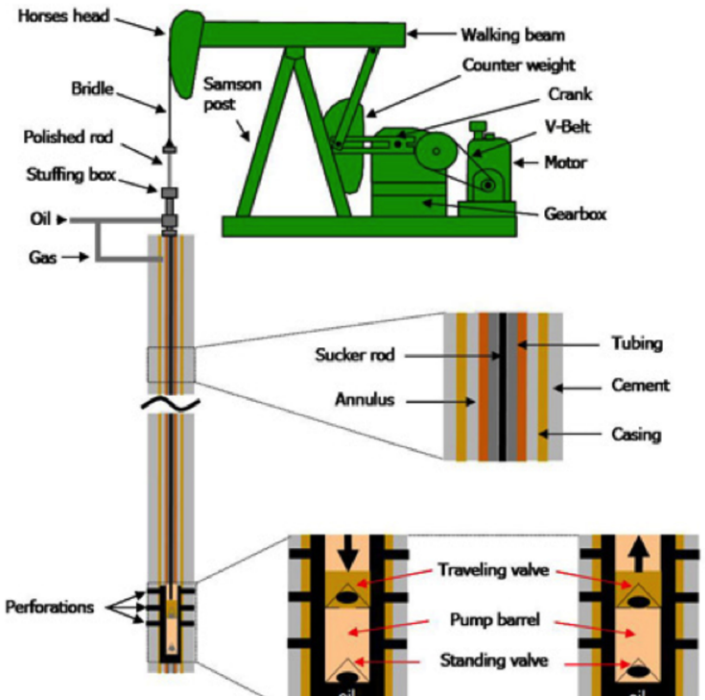
All of these processes are essentially the introduction of **artificial energy** into a reservoir to boost production.

If you haven't heard of EOR, that's because its meteoric rise has coincided with the shale boom and the revolutions in horizontal drilling and hydraulic fracturing. But secondary and tertiary oil recovery methods have been quietly effective; and despite the fact that they haven't gotten as much attention as their revolutionary brethren—they are indeed revolutionary for the bottom line.

In times of an oil price slump, we recommend the individual investor look at least as far as secondary oil recovery, and if market conditions allow, as far as tertiary, or EOR, which can be very expensive even though the potential return is significant.

First Things First: How Oil Is Extracted

To begin to understand how the three phases of recovery work and why they are important, we need to start at the beginning with a primer on how oil is extracted from below the Earth's surface.



Oil and natural gas are trapped within porous rocks deep under the earth's crust and extracted by drilling a well with an oil rig. These wells are either drilled vertically, which is the traditional method of drilling for conventional oil and gas, or they are drilled directionally, at an angle, which is a representation of advanced drilling technology for unconventional oil and gas. Horizontal drilling, which is used in shale oil and gas plays, is a type of directional drilling.

Once the well is drilled and the rig is removed, a pump is installed on the well head. The pump is driven by an electric motor which in turn drives a gear box that controls a lever that pushes and pulls a polishing rod in the well. The rod itself is attached to a sucker rod and further to a pump. As the pump is forced up and down, it creates suction which draws the oil or natural gas up through the well.

There are a variety of factors that will determine how easily the oil flows up through the well, including the porosity of the rock and the viscosity of the deposit. This is where

secondary and tertiary recovery come into play.

Drilling alone requires a very large capital investment that is typically not returned without vigorous secondary and tertiary methods of recovery.

Primary Oil Recovery

Other Recovery Terms You Might Not Know

Estimated Ultimate Recovery (Eur) - The sum of reserves remaining as of a given date and cumulative production as of that date.

Improved Oil Recovery (10r) - Methods employed (such as EOR) to improve the flow of hydrocarbons from the reservoir to the wellbore or to recover more oil or natural gas.

Infill Wells - Wells drilled into the same reservoir as known producing wells so that oil or natural gas does not have to travel as far through the formation. This improves/accelerates recovery.

Pressure Depletion/Reservoir Voidage - The loss of reservoir pressure caused by the primary production of oil and gas.

Recovery Factor - The amount of oil you can recover.

Primary oil recovery uses the natural pressure of the reservoir to push crude oil to the surface, typically extracting only 10% of the oil in the reservoir, but sometimes as much as 25%. Essentially, primary oil recovery is the extraction of only that oil that rises to the surface naturally or through the use of lift devices or pump jacks. There is no other intervention involved in this phase, and at the end of the day, this phase of oil recovery only skims the surface of a reservoir's potential.

How it works

Oil is recovered from an oil field as a result of the expansion of reservoir fluids which undergo a natural pressure within the producing formation. The natural pressure is created by a pressure differential between the higher pressure in the rock formation and the lower pressure in the producing wellbore. Pumps can also be used to reduce pressure in the wellbore in order to increase the pressure differential. But many things can hinder the flow of oil, including pressure, permeability, viscosity, and water saturation.

Secondary Oil Recovery

During the primary recovery phase, oil and gas remaining in the reservoir often become trapped due to a reduction in natural pressure that enables the hydrocarbons to flow to the surface. This can either slow production, or halt it completely.

Did You Know?

- An estimated 80% of the total number of oil wells in the US are now classified as "marginal."
- Oil wells will normally yield only around 10% of their total reserves in the primary stage of recovery.
- Waterflooding, as a method of secondary recovery, can DOUBLE the amount of oil extracted from a well.
- Secondary recovery, particularly waterflooding, is HIGHLY ECONOMICAL and can withstand low oil prices.
- You could be losing money on your investment with a company that ignores secondary recovery.

Secondary oil recovery injects pressurized gas and water into the well to drive residual crude oil and gas that has

remained after the primary recovery phase to the surface. In this phase we're looking at the extraction of an **additional** 25% to 30% of the oil in the reservoir.

How it works

Essentially, secondary recovery maintains reservoir pressure and displaces hydrocarbons toward the wellbore. More simply put, water and gas injections replace pressure lost during the primary recovery phase. This stage reaches its limit at the point when the water or gas injected into the process is produced in volumes large enough to render production uneconomical. Secondary recovery can result in a total recovery of up to 40% of the oil in place in a well, when combined with the primary recovery phase.

Methods of secondary recovery include:

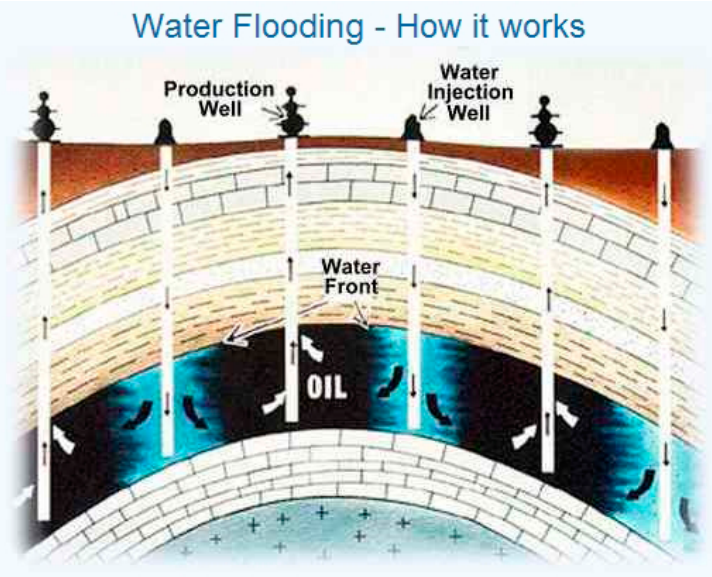
Gas Injection

Gas is injected into the gas cap to sweep oil from the reservoir. These gases may include natural gas produced with the oil, nitrogen or flue gases. Gas may be injected at the start of the production phase (when primary recovery begins) or it may be injected after production has already begun to slow or has halted. The gas expands to force additional quantities of oil to the surface, and the injection requires the use of compressors to raise the pressure of the gas in order for it to enter the formation pores.

In natural gas wells, gas can also be re-injected in a process known as *cycling*. This is a process by which produced natural gas is itself re-injected into a well in order to prevent condensate liquids from separating from natural gas in the reservoir. This is all about maintaining pressure in the reservoir while at the same time preventing separation of condensate and dry gas. Once the gas rises to the surface, the condensates are stripped and the dry gas is re-injected through injection wells.

This process is most effective where there are lighter oils in thinner reservoirs with low permeability, such as the Eagle Ford shale.

Waterflooding

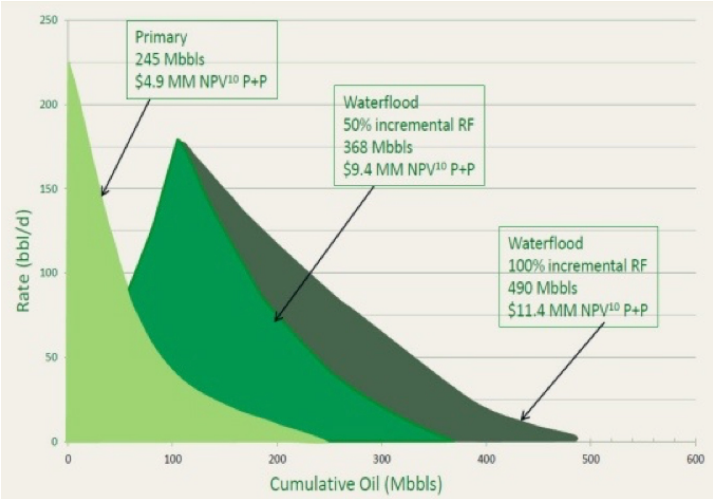


Water is injected into the water zone to sweep oil from the reservoir. Peak oil production from a waterflood happens when 100% of the produced fluids have been replaced by water injection. Waterflooding produces fluids containing both oil and water, and during the waterflooding process this balance changes in favor of oil over time. On the surface, special equipment is used to separate the oil from the water. When too much water is being produced in this process, then it becomes uneconomical to continue the secondary recovery method.

Overall, waterflooding has been the most widely used method of secondary recovery in the world. This is largely because water is very efficient in displacing light-medium gravity oil and it is relatively easy to inject into oil-bearing formations. Where water is readily available, this is often a preferred method that requires less capital investment and

lower operating costs, making secondary recovery more economical.

Keep in mind, however, that waterflooding is not suitable for all reservoirs. This method is effective when the mobility ratio between the oil and the water is appropriate. There are also geological considerations. At reservoir conditions, oil is less dense than injected water. Because of this, the effectiveness of waterflooding depends on the interplay between the gravity/density effects and the reservoir's geological layering. And the internal geology is often not fully known until after the waterflooding process has begun and the wells actually start producing the injected water.



What Investors Need to Ask About Secondary Recovery

- Not all oil fields respond positively to secondary recovery techniques
- Is the company you are considering investing in employing smart secondary recovery techniques? Are they injecting gas, for instance, during the primary recovery phase or are they waiting until production slows or halts?
- Is there a cost analysis available for secondary recovery methods?
- What is the estimated recovery ratio using secondary recovery methods?
- There is a tendency for oil companies to use complex and accurate software for primary recovery production estimates, but this is often not so for secondary recovery estimates. Find out what data sets they are using to calculate the economics of secondary recovery. Poor business planning in this respect can limit valuation, and investors often will not understand and will discount future cash flows from secondary recovery with a very high risk factor.
- Make sure the secondary recovery aspects of the company's business plan are sound and that they integrate different sources of information using a bottom-up approach for accurate calculations. All key economic metrics under varying production scenarios must be considered.

Tertiary Oil Recovery/Enhanced Oil Recovery (EOR)

New technologies and recovery methods continue to increase the percentage of recoverable oil and gas in any given field. During the oil price rout, there wasn't much room for high-cost EOR methods, but the rising prices of today have created an environment for this technology to progress and to be utilized more fully. It's said that oil recovery doesn't stop because a reservoir is out of oil. It stops because it is no longer economically viable to extract additional quantities of oil. But enhanced oil recovery methods breathe new life into aging fields that were once thought past their usable lifespan. And as the rate of new discoveries drops, it is becoming increasingly important to get more and more oil out of existing fields. It can also make a non-mature field produce more from the start.

Which type of tertiary recovery method is used depends on

the well in question for the most part, but it also will depend on whether current commodity prices can support the processes.

True, EOR isn't as en vogue as horizontal drilling or fracking. The high costs of EOR have put some investors off, much as the high costs of horizontal drilling and hydraulic fracturing may scare away investors when oil prices are low. Another point to consider is that there may not always be a ready, steady supply of carbon dioxide to use in advanced EOR processes.

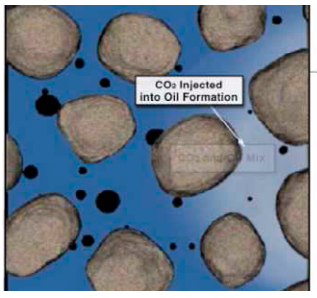
How it Works

Enhanced Oil Recovery, the ever-evolving third stage of recovery, involves the injection of various materials beyond water and miscible gas into a well to improve the flow of oil and gas in order to extract additional volumes of up to **30% more**. This process differs from secondary recovery not only through the materials it injects, but in terms of the end result: It's not only maintaining reservoir pressure, but it ***alters*** the properties of the oil in order to facilitate additional production.

EOR is most frequently used in fields that have heavy oil, poor permeability, and irregular fault lines. EOR can be employed after both primary and secondary recovery phases, or once production has been exhausted.

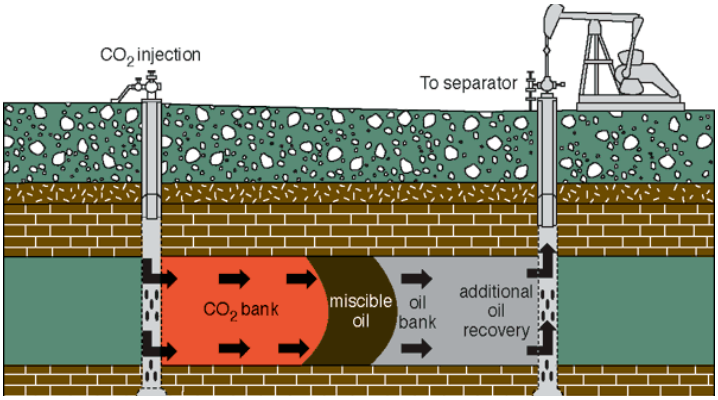
The three most popular EOR methods include:

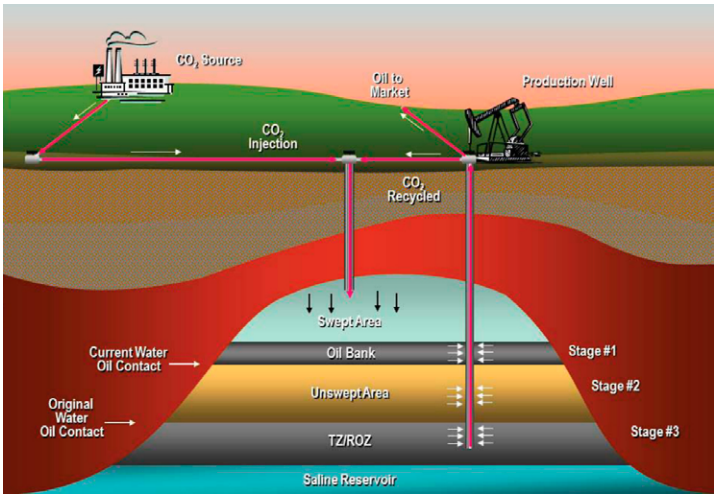
CO2 Injection



This advanced form of gas injection is becoming the most popular method of EOR, and has been particularly successful in Texas and New Mexico. Across the US, CO2 injection—often referred to as C02 EOR—represents more than 50% of all EOR methods employed. Initially, this process used naturally occurring CO2 deposits, but in recent years, new technologies have been developed to inject CO2 created as byproducts from industrial activities.

EOR technologies stand to boost US domestic oil production by 4 million barrels per day for 50 years, according to an estimate published by the U.S. Department of Energy, and CO2 will lead the way. Injecting CO2 (and in some cases nitrogen) into depleted oil fields could result in the US recovering billions more barrels of oil, while at the same time improving the environment by trapping more manmade greenhouse gases.





Investors must keep in mind that EOR is more expensive than conventional oil production, so oil prices must be able to support it. Interest in EOR has closely followed the price

cycle, with interests running high in 2014, waning during the price slump, and then picking up steam again as prices rose. Despite price slumps, however, EOR will definitively be a game-changer on the scale of the shale boom.

The statistics speak for themselves: by 2010 alone, EOR projects were producing an extra 281,000 barrels of oil a day in the US and accounted for 6% of total US production, according to the National Enhanced Oil Recovery Initiative, which lobbies on behalf of the industry.

Thermal EOR

Thermal recovery introduces heat to the reservoir, reducing the viscosity of the oil. Over many applications the oil becomes thinner, thus enhancing its ability to flow to the surface. Approximately 50% of all EOR projects in the US employ thermal recovery methods, often referred to as steamflooding. Thermal recovery is especially suitable for shallow heavier crudes (at less than 900 meters) whose levels of viscosity are a deterrent for commercial oil production rates.

Chemical Flooding

In this process, chemicals are injected into a well to help free trapped oil within the reservoir. The process involves the injection of polymers into the reservoir. These polymers can increase the efficiency of secondary recovery waterflooding as well. Chemical injections, however, are employed in less than 1% of US EOR programs. Chemical flooding experienced a meteoric rise in the 1980s, but its popularity fell just as meteorically in that same decade.

What Investors Need to Ask About EOR

- Are EOR programs and subsequent capital expenditures contingent upon commercial viability? In other words, does employing EOR make economic sense?
- How was commercial viability for the program established?
- Were their pilot tests and how successful were these pilot tests?

Weighing the Costs

Secondary Recovery

Cost. Cost. Cost. This is the number one reason why we recommend that investors focus on secondary recovery in today's market. Primary is not enough and leaves too much oil in the ground. By far the best and cheapest way to increase profits is through the secondary recovery method of waterflooding. The fact that waterflooding works with tight oil formations makes for some brilliant production math. As such, waterflooding is a major share price catalyst for junior producers. So when you are looking to invest in a junior company, this is the first thing you should determine: What are they doing in terms of secondary recovery to increase production and profits? Most waterflooding operations in North America cost around $5-$10 per barrel—a price that can be supported even when commodities are slumping. This is half the price of primary recovery—so this is where the money is to be made. You can double reserves recovered from a well—thus doubling the value of your investment.

How long will it take to see a return on investment? Well, waterflooding tends to take anywhere from 2 months to one year on average to see a significant effect in recovery production, but they can also pay out for two decades in some cases.

Enhanced Oil Recovery

CO2 is expensive and is the biggest cost related to this EOR process. There is a lot of capital expenditure necessary here

in the form of drilling or reworking wells so they can produce and serve as injector wells simultaneously. There must also be a CO2 recycling plant, and due to the highly corrosive nature of CO2, field production infrastructure must be built that is resistant to corrosion. And you have to get the CO2 to the field in the first place, which involves transportation pipelines. Buying the CO2 itself is also costly. We're looking at a total cost of about 25-50% of the cost per barrel of oil produced. A reasonable-sized CO2 flood can cost in the neighborhood of $200 million. At the same time, more than 20 billion barrels of oil are estimated to be recoverable from CO2 flooding in the US alone. Regardless, the math has to make sense before you consider an investment.

Investors should understand that this is a longer-term investment that will have a much longer payback period than primary or secondary recovery. It requires patience to get the much larger reward. There will be a lot of expenditure up front and it may be a year before additional oil is recovered. But it could take five years for production to peak and another five years before it starts to slowly decline. So we're looking at a gradual, long-term payout for the patient, sophisticated investor.

Overall, Frost & Sullivan predicts that the use of CO2 EOR will be more widespread than chemical or thermal EOR as federal governments focus on carbon capture and sequestration. Chemical EOR has not shown significant growth due to long pay-out times and an even longer breakeven point. Still, CO2 EOR is experiencing slower growth than it might otherwise see due to a lack of infrastructure in place for the process.

Secondary & Tertiary Recovery by Play

Secondary methods such as waterflooding and dry gas injection are generally more effective in conventional oil and gas plays, while EOR is being ambitiously explored and deployed in North America's key shale, or tight oil and gas plays. Below, we examine a handful of conventional and nonconventional plays and the secondary and tertiary recovery methods used.

Bakken Shale

The Bakken shale formation covers about 200,000 square miles of the subsurface of the prolific Williston Basin and lies under parts of Montana and North Dakota in the US and Saskatchewan and Manitoba in Canada.

At the primary recovery phase, the Bakken only produces about 7.5% of the reservoir's oil, leaving more in the ground than anywhere else. But the clincher is this: That 7.5% is highly prized high-quality sweet oil that is often worth the lower recovery rate and the fast decline rate (typically an 80% decrease in production rates in the first year).

This is incredibly tight oil that has certain shale rock characteristics that render secondary recovery methods such as waterflooding generally ineffective. The oil is 'wet', so flooding a reservoir with water would most likely not sweep the oil out of the well. In fact, waterflooding could end up having the reverse effect of pushing the oil deeper into fractures and pores and making it even harder to get out of the ground. There may be some exceptions here, but the general sentiment is that waterflooding is not for the Bakken. Some areas will be different than others, and EOG Resources, for one, is testing waterflooding in some of its wells.

Because the Bakken is so geologically complicated, and waterflooding doesn't appear particularly promising, researchers are hoping to employ EOR techniques, particularly CO2 injection, but the jury is still out on whether this will improve production at the Bakken. Ultimately, the goal at the Bakken is to use EOR not to improve the volume

recovered, or the recovery rate itself, but to extend the production life of the reservoir.

Eagle Ford Shale

The Eagle Ford formation is a massive shale play that underlies much of South Texas. Here, the recovery factor for wells is around 6%, with 94% of oil left in the ground without secondary or tertiary recovery.

Overall, an Eagle Ford shale well could see a life expectancy of 30 years, with 40% of its production coming in the first five years and the next 25 years seeing a gradual decline. After about 10 years, an Eagle Ford well can become what is referred to as a stripper well, producing less than 10 barrels per day without secondary or tertiary recovery.

At Eagle Ford, secondary recovery through dry gas injection is being considered. As we noted previously, this process is most effective where there are lighter oils in thinner reservoirs with low permeability. This prevents gravity segregation of the oil and gas. Eagle Ford meets these requirements.

Core samples taken from Eagle Ford indicate that waterflooding will not work and that it may have even less of a chance of success than at the Bakken.

According to EOG Chairman Mark Papa:

> *"In the Eagle Ford, laboratory tests on the rocks tell us that water injection probably isn't going to work, so in the Eagle Ford we're looking at something that has also been used for fifty years, but at a much lower frequency of use, (than water flooding) and that's simply dry gas injection. You put dry gas in the reservoir and then you push it through the reservoir and it picks up "heavy ends." One way to look at it is that when it's injected it costs $2.50 an MCF, because it's dry gas, and by the time it passes through the reservoir it picks up a whole lot of heavy ends. You pull it out of the reservoir and it's worth about $15 an MCF, by the time you get all of the liquid out of it. So it'll be interesting to see if that technology works."*

EOG has increased the number of recoverable barrels of oil in its Eagle Ford acreage from 900 million to 3.2 billion barrels, and ambitious secondary and tertiary recovery plans could see this jump significantly. Beyond this, each 1% increase in recovery will increase EOG's reserves by 280 million barrels. This is certainly a framework for changing the way an investor thinks about what's in the ground and how the recovery margins can paint an entirely different profit picture.

Permian Basin

This sleeping Texan giant had seen its production peak in the 1970s. Of the estimated 100 billion barrels of oil in place in existing fields here, only about one-third, or 33 billion barrels, has been produced. So far, horizontal drilling, hydraulic fracturing, secondary recovery waterflooding, and EOR CO2 injections have helped revive this massive basin and push production up to 3.5 million barrels per day, according to the Energy Information Administration.

Pilot projects to determine whether CO2 flooding is economical have so far been very positive, and the recently recovered oil prices have made it even more economical. The big hurdle here is securing enough supplies of CO2.

Alaska's Prudhoe Bay Oil and Gas Field

The secondary recovery methods of gas re-injection (cycling) and waterflooding has proven immensely successful in Prudhoe Bay, a conventional play that has seen oil companies produce more than 12 billion barrels since it launched in 1977. This is the top conventional oil field in terms

of daily production—and has been for 37 years. In terms of secondary recovery, Prudhoe is the clear overachiever, and the overachieving operators are ConocoPhillips, Exxon Mobil and BP.

Western Canada Sedimentary Basin

The Western Canada Sedimentary Basin contains 1.7 billion barrels of tight oil and 4,995 trillion cubic feet of shale gas yet to be recovered. This is a massive opportunity for revenue with the use of secondary recovery methods. In this basin, horizontal waterflooding has proven to significantly improve tight oil reservoir recovery, typically doubling primary recovery rates. It has even proved more effective than CO2-EOR.

Saskatchewan

In Saskatchewan, Cenovus Energy spent $1.1 billion on the province's first commercial scale CO2-EOR project, which led to a 50% increase in oil production before selling its stake. This province is home to—among others—the Alberta Bakken, where tight oil waterfloods are the rule of the day and have produced amazing results.

How Companies Play You on the Frack

Oil and gas companies can take advantage of an investor's lack of industry savvy in many ways, but one of the biggest mistakes an investor makes is getting in with a company that goes into a play hard and fast and ruins the wells—for good. These will be the companies who, on paper, have the most to offer a new investor. The initial production rates may look fantastic, and the return on investment may look fast and furious. But these high initial production rates aren't always what they seem. In fact, pumping everything you can out of a well as fast as possible can destroy a well and make it impossible to do any recovery beyond the primary. It means some great returns right off the bat—and then nothing. The bottom line is that if you go into a shale well—a tight oil or gas well—and pump it hard, it will die out faster. This is done by using a large choke at the well head, causing the sand or other proppants used in the hydraulic fracturing process to flow to the surface along with the oil and gas. When that proppant is spewed back onto the surface, it means it's no longer in the shale, holding the fractures open so the oil and gas can flow. Without the proppant, the well can collapse. Life expectancy is thus severely reduced, along with your investment.

The Big Names in Recovery

While the International Energy Agency created a technology collaboration project (TCPs) to bring down the costs of Enhanced Oil Recovery, but EOR is still cost-prohibitive for smaller players. Look to the larger companies for EOR:

- Occidental has met with impressive EOR-based production results in West Texas and New Mexico, with about 40 CO2-EOR projects under its belt.
- Hess has had fantastic EOR results in West Texas and New Mexico, and is undertaking a test project to see if EOR could be a fit for the complexities of the Bakken.
- Kinder Morgan is another big EOR name in West Texas and New Mexico and nearly 100 percent of its Texas production is associated EOR, producing about 55,000 barrels of oil daily using EOR, along with 21,000 barrels of natural gas liquids daily.
- Chevron is a major EOR producer in Colorado and has used EOR in the partitioned zone in Saudi Arabia and Kuwait.
- Denbury Resources dominates the EOR production scene in Mississippi and Louisiana. Denbury already

has a massive CO2 infrastructure in place, placing emphasis on this segment of its business. It has agreements with industrial facilities to provide CO2 to its pipelines. This will have a significant impact on the costs of its EOR operations. It most recently sanctioned an EOR development project at Cedar Creek Anticline, with a total recoverable oil potential estimated to be more than 400 million barrels, per Denbury's Q2 2018 report.

- EOG Resources (NYSE:EOG): EOG is a clear leader in secondary and tertiary recovery and is trying gas-injection in Eagle Ford, waterflooding in Bakken and has plans for CO2-EOR in both. On Eagle Ford, EOG Chairman Mark Papa has been known to reflect that if the recovery factor at Eagle Ford cannot be improved, "we should probably be shot as a company".

- Petronas Carigali Sdn Bhd announced in 2017 investments into EOR projects to the tune of US$2.3 billion.

The Smaller Players With Big Value-Adding Recovery Plans

As much as EOR is the playground of the larger companies, the juniors have latched on to cheaper yet highly effective secondary recovery through waterflooding to exponentially increase value for investors. This list is a long one—and growing, but is a sample of who is out there and what they're doing in terms of secondary recovery:

- Crescent Point Energy (CPG-TSX): Probably the leading junior in secondary recovery from waterflooding, and the developers of a number of new waterflooding improvements and techniques;

- Canadian junior Raging River Exploration (RRX-TSX), employing waterflooding in a tight oil formation in Saskatchewan for $5-$10 per barrel;

- Canadian junior Legacy Oil + Gas (TSE:LEG), focused on light oil development with the majority of spending on drilling, completions, equipping and waterfloods, with successful expansion of pilot waterfloods for secondary recovery;

- Mid-Con Energy Partners' (NASDAQ:MCEP), focusing on the US mid-continent, has a long-term strategy of managing its balance sheet and production profile through waterflood assets for increased security in times of slumping commodities prices. The company's primary focus is on enhancing the development of producing oil properties through waterflooding;

- Cardinal Energy Group Inc. (OTCQB: CEGX), operating in central Texas, is pursuing a business strategy focusing heavily on secondary recovery methods on existing acreage, pursuing continued profitability that can withstand low oil prices.

- Predator Oil & Gas Holdings PLC (LON:PRD) recently announced its C02-EOR plans for Trinidad, whereby it intends to increase production from its wells there six fold.

Remember this very important point as you consider your next oil and gas investment:

The declining production curve at all these shale and tight oil and gas wells is a sharp one. Maximum production is achieved quickly. In fact, in as little as 18 months from the beginning of operations you can be looking at the end of extraction. It's fast and hard money, but not long-lasting. The real consideration is what a company is adding to the game in terms of secondary recovery to reduce the rate of decline. This is something the market understands when it engages in futures pricing … and it's something every investor absolutely must follow.

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