THE EV EFFECT

A GUIDEBOOK FOR INVESTING IN TODAY'S CLEAN ENERGY TRANSITION

SOPHY M. LAUGHING, PH.D., MBA
THE COBEAL GROUP

TABLE OF CONTENTS

12 KEY INVESTMENT FACTORS

THE EV EFFECT

A JOURNEY OF RISK & REWARD

The Electric Vehicle Paradox: More EV's, More Power, More Natural Gas

As the world shifts toward greener energy solutions, electric vehicles (EVs) are leading the charge in transforming transportation. EVs are widely promoted as the cleaner alternative to traditional gasoline-powered cars, helping reduce carbon emissions and slow climate change. However, there is a critical aspect of this transportation that needs more attention: the power required to charge these vehicles. As the number of EVs increases, so does the demand for electricity, and in many countries, much of that electricity still comes from natural gas.

The Growing Demand for Power

The rise in EV adoption directly correlates with an increased need for electricity. While EVs themselves may be zero-emission vehicles, the electricity that powers them is often generated using non-renewable resources like natural gas. Currently, renewable energy sources such as solar and wind are expanding but are not yet capable of meeting the rapidly growing energy demands. This leaves natural gas as a significant player in the power generation mix.

For example, in the United States, natural gas is the largest source of electricity, accounting for about 38% of total electricity generation. As more EVs hit the road, the demand for electricity will only continue to rise, and without sufficient renewable infrastructure in place, natural gas power plants will be working overtime to meet the increased energy needs.

The Role of Natural Gas in Power Generation

Natural gas is often touted as a "bridge fuel" between coal and fully renewable energy sources. It burns cleaner than coal, producing roughly half of the carbon dioxide emissions per unit of energy. However, it is still a fossil fuel, and its increased use to power EVs highlights the paradox of electrification. While EV's reduce emissions at the tailpipe, their reliance on natural gas-generated electricity shifts the burden of emissions to power plants.

This raises the question: **Are we simply trading one environmental issue for another?**

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The Infrastructure Challenge

One of the significant challenges in the mass adoption of EVs is the need for robust infrastructure to support charging stations and ensure a stable power supply. Current power grids, many of which are reliant on natural gas, were not designed to handle the energy demands of millions of EVs charging simultaneously.

As power demand increases, especially during peak times when many drivers plug in their cars, utilities may be forced to ramp up natural gas production to prevent grid failures. This increased reliance on natural gas could hinder the progress toward net-zero emissions unless renewable energy sources are scaled up at an even faster rate.

A Path Forward: Balancing EV Growth with Clean Energy

To fully realize the environmental benefits of electric vehicles, the energy sector needs to accelerate its transition toward cleaner energy sources. This includes massive investments in renewable energy infrastructure such as solar, wind, and battery storage to ensure that the power grid can handle the increased demand from EVs without increasing our reliance on natural gas.

Additionally, smart grid technology and energy-efficient charging stations can play a role in balancing the load during peak times, minimizing the strain on natural plants.

While electric vehicles are a crucial component in the fight against climate change, their true environmental benefit will only be realized when they are powered by clean, renewable energy. Until then, the growing demand for electricity will continue to drive the need for natural gas, presenting a paradox that needs to be addressed as we move toward a more sustainable future.

The Looming Mineral Supply Crisis

Beyond the power required for EVs, there is another critical issue: the mineral supply chain. EV batteries rely heavily on minerals like lithium, cobalt, nickel, and graphite. According to the EIA, by 2030, existing mines and projects under construction will only be able to produce about half of what's needed to satisfy global demand for these critical minerals.

Benchmark Research:

- 59 new lithium mines (45,000 t/y)
- 38 new cobalt mines (5,000 t/y)
- 72 new nickel mines (42,500 t/y)
- 87 new natural flake graphite mines (56,000 t/y)
- 54 new synthetic graphic plants (57,000 t/y)

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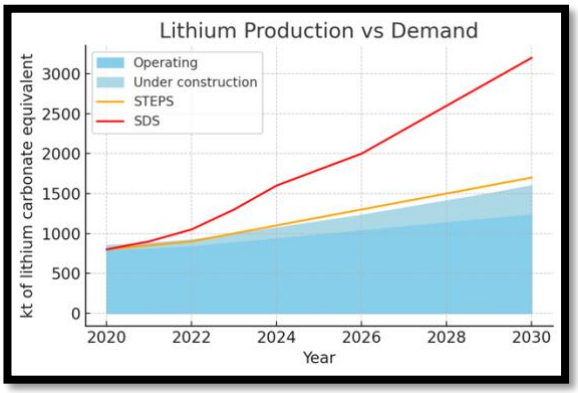
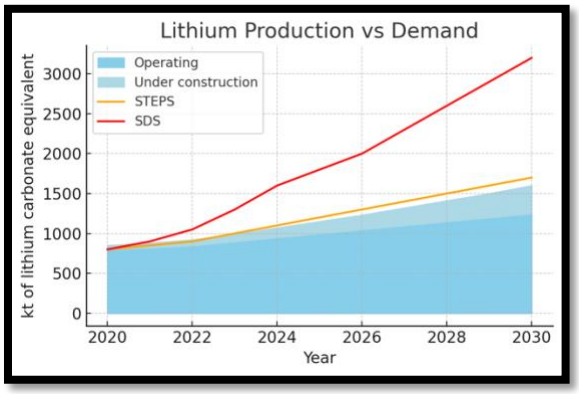
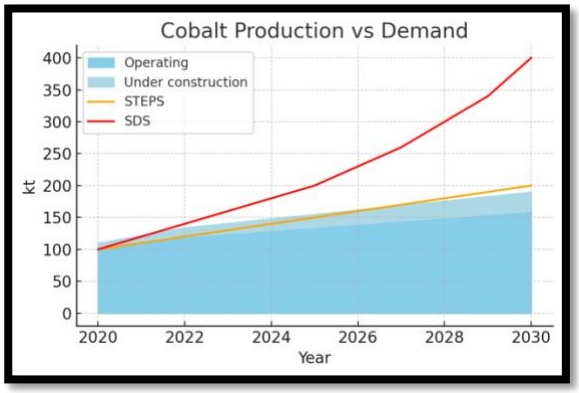
Committed mine production and primary demand for selected minerals







This mineral supply shortfall poses a significant bottleneck for EV production. To make matters more complex, lithium mines that started operations between 2010 and 2019 took an average of 16.5 years to develop. This lengthy timeline suggests that even with increased investment, the supply of these materials will struggle to keep pace with demand for EVs and renewable energy storage solutions.

The charts illustrate the gap between committed mine production and primary demand for critical materials like copper, lithium, and cobalt, indicating that demand is significantly outpacing current production and projects under construction.

These facts indicate that there is a growing supply-demand imbalance for key minerals, especially as electric vehicle production increases, highlighting the reliance on natural gas for power generation until renewables can scale to meet the broader energy and material demands.

Although advances in technology and growing interest in lithium mining could help reduce this time frame, the process is still heavily reliant on fossil fuels. From high-powered excavators and diesel trucks to transporting materials to refineries, much of this mining infrastructure operates on diesel.

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In other words, while lithium is essential for EV batteries, the process of extracting and refining this critical mineral is far from green. It requires a massive amount of fossil fuels to mine and process, contributing significantly to carbon emissions. The very industry that supplies the materials to build a greener future is itself deeply entrenched in traditional fossil fuel consumption.

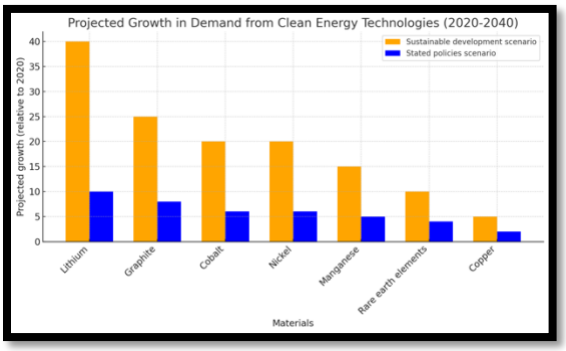
This paradox reveals another layer of complexity in the transition to electric vehicles. Even as the demand for lithium increases to meet the needs of EV batteries, the infrastructure required to mine and refine it remains powered by non-renewable energy sources. Unless a shift is made toward cleaner mining technologies, the growth of lithium production could inadvertently contribute to the very emissions that green energy is trying to reduce.

This is a key factor to consider as we expand EV production and mining efforts, reminding us that sustainability isn't just about the end product - it's about the entire lifecycle, from the extraction of raw materials to the energy that powers our vehicles.

Green Energy Revolution

To meet the Paris Agreement goals, the International Energy Agency (IEA) projects that the demand for lithium will need to increase by 40 times between now and

Green Reality Check



2040. This enormous demand spike reflects the urgent need for raw materials to support electric vehicle (EV) production and battery storage solutions as global energy systems transition to renewable sources. The same study shows a 20-fold increase in demand for nickel and cobalt, minerals also essential for battery manufacturing.

This demand growth is necessary to achieve the targets for electric energy infrastructure outlined in climate agreements. However, it highlights the sheer scale of investment and development required in natural resource extraction. A green revolution will not only need massive investment in mining and resource development, but it will also demand long-term security in resource supply, including a focus on U.S.-based mineral development to reduce reliance on unstable foreign sources. Moreover, the long timelines associated with mine development present a challenge, as lithium mines

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often take more than a decade to come online.

This indicates a critical need to balance environmental goals with the reality of mineral supply chains, which are heavily reliant on fossil fuels for extraction and refining. Achieving sustainability targets will require innovation not just in renewable energy, but also in how we source and process the raw materials that power this green energy revolution.

Green Energy: A Long Way from Replacing Carbon

Despite rapid developments in green energy, we are still a long way from replacing carbon-based fuels. As of 2020, carbon fuels - oil, natural gas, and coal - made up 83% of global energy use. Non-carbon energy sources, such as hydro, wind, solar, and nuclear, only accounted for 17%. This stark contrast highlights how deeply reliant the global economy remains on fossil fuels.

One of the primary reasons for this dependence is the physics of moving massive objects like ships, airplanes, and trains. When it comes to moving goods across continents and oceans, only liquid petroleum products, like diesel and jet fuel, have the energy density required to do so efficiently. These fuels can store and deliver more energy by weight than most alternatives available today, making them essential for transportation logistics in a global economy.

Our economy relies on the fast, efficient movement of goods around the world. The global supply chain depends on transportation systems that can deliver products freely and reliably across long distances. Currently, the only way to power these systems at scale is through liquified petroleum. Until we develop alternatives that match or exceed the energy density and transport efficiency of petroleum products, the global economy will continue to rely on them for large-scale transportation.

To put things into perspective, only a small portion of the world's total energy use is generated from alternative sources, highlighting how far we are from a complete transition to green energy.

Breaking down that 17% further:

- Hydro accounts for 41% of the non-carbon energy,
- Nuclear contributes 32%,
- Wind makes up 17%.

While solar energy is often seen as the future of renewable energy, it currently represents only 9% of the non-carbon energy mix. These numbers reveal the challenge ahead in the global push for renewable energy and the significant investments needed to further develop

THE EV EFFECT

and scale non-carbon energy technologies.

A Carbon-Based Economy

We are still a carbon-based economy, despite the growing optimism about the future of energy innovations like fusion power. While fusion holds immense potential, it remains far from being a viable energy source, and even new nuclear fission technologies, which are clean and safe, are still a long way from widespread implementation.

In the aftermath of the 2008 financial crisis, during the end of the Obama recession, energy demand began to plateau. This gave rise to a narrative suggesting that we were entering a post-fossil fuel era. At the time, it seemed to make sense - energy demand wasn't risking significantly, and global initiatives focused on environmental, social, and governance (ESG) factors gained prominence, emphasizing the need to reduce fossil fuel consumption.

But then the COVID-19 pandemic hit, and after the world began to recover, energy demand surged again. Suddenly, the narrative that we had reached "peak fossil fuel demand" was exposed as premature. However, a dangerous idea had already taken root in the minds of investors: "Why would you want to invest in an obsolete fossil fuel when it has no future?"

As a result, long-term investments in fossil fuel production declined by 55% since 2014, leading to severe constraints on global energy supply.

In today's environment, stating that you are investing in or drilling for oil can be highly unpopular, with companies facing backlash on social media. It's so contentious that many energy companies feel the need to downplay their fossil fuel activities to avoid being targeted by critics. Ironically, what is often overlooked is that the petroleum industry invests more in renewable energy technology and innovations than any other sector. For example, companies like BP, Shell, and Chevron have poured billions into renewable energy products, from wind farms to hydrogen and biofuels.

This highlights the complexity of transitioning away from fossil fuels. While the world aims for a green future, the reality is that our current energy infrastructure is built around carbon-based sources. Until renewable technologies are fully scaled and capable of meeting the global energy demand, fossil fuels will continue to play a critical role in our economy. The narrative needs to shift from demonizing fossil fuels to embracing **a balanced energy transition**, one that doesn't leave the world without power while we transition to a sustainable future.

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Balancing Immediate Needs with Long-Term Climate Goals

John Kerry, a leading figure in global climate diplomacy, played a significant role in shaping international policies aimed at transitioning away from fossil fuels. As part of these efforts, he worked to limit access to capital for fossil fuel production, encouraging banks and financial institutions to move away from funding oil, gas, and coal projects. This had the effect of making it difficult for fossil fuel companies to secure bank loans or lines of credit, ultimately undermining long-term investment in the sector. The rationale behind this push was rooted in the popular idea that fossil fuels have no future in a carbon-neutral world, and that investments should instead focus on renewable energy and sustainable alternatives.

However, this approach created a significant problem for the energy sector. Global energy production is inherently tied to fossil fuel resources, which are constantly depleting. For every barrel of oil extracted, the rate of production decreases over time. This means that to maintain current levels of energy supply, the world needs to find and produce an additional 5 million barrels of oil per day (Mbpd) each year, just to keep pace with demand.

With investments in new fossil fuel projects drying up and fewer resources available to explore, develop, and extract new oil and gas supplies, the global energy market faces a serious supply gap. Without the necessary capital to replace depleting resources, production will continue to decline, exacerbating the ongoing energy crisis. This creates a dangerous feedback loop, where decreasing supply pushing energy prices higher, affecting global economies and energy security.

The focus on limiting fossil fuel investment also overlooks a key reality: while renewable energy sources are growing, they are not yet capable of filling the gap left by declining oil and gas production. It is one thing to advocate for a greener future, but another to ensure the global energy system remains stable in the process. The transition to a carbon-neutral economy requires a balance between ramping up renewables and maintaining enough fossil fuel production to meet current demand until new technologies and infrastructure are ready to take over.

In this context, it becomes clear that securing a sustainable energy future will require more than simply cutting off access to fossil fuel funding. It will involve **strategic investments in energy production** that balance immediate needs with long-term climate goals.

THE EV EFFECT

Seven Years of Underinvestment

Seven years of underinvestment in fossil fuel production has created a critical gap in global energy supply. Reversing this trend will not be quick or easy. To recover from this, it will take at least seven years or more of overinvestment just to bring production back to levels that meet current demand. This isn't a situation that can be fixed overnight—developing new oil fields and ramping up production capacity takes time, often years, as exploration, drilling, infrastructure development, and regulatory approvals are all long processes.

One of the major issues facing the industry is that there's simply not a lot of marginal production left. Most of the easily accessible oil reserves have already been tapped, meaning that new projects are often more technically complex, riskier, and expensive. The lack of investment over the past several years has resulted in fewer new fields being developed and older fields continuing to deplete. Production naturally declines every year, and with less exploration and fewer new wells coming online, the gap between supply and demand continues to widen.

Moreover, geopolitical tensions, regulatory hurdles, and environmental pressures make it more difficult for companies to quickly ramp up production. Even if the capital suddenly became available to flood into fossil fuel investments, the global oil and gas sector has lost capacity, talent, and infrastructure in the interim, making it harder to restart or expand operations.

In practical terms, the world needs around **5 million barrels per day** (Mbpd) of new production just each year to maintain current output levels due to depletion. But after years of limited capital, projects that could meet this demand haven't been developed or brought online. To not only maintain but increase production, the industry would require sustained and significant overinvestment—something that currently faces major financial, political, and social barriers.

This underinvestment is already showing its effects in the form of supply constraints, higher energy prices, and energy insecurity in several parts of the world. Moving forward, a balanced approach is critical: while **investing in renewable energy is essential for the future**, the world also needs continued investment in fossil fuels to meet its immediate energy needs and prevent further supply shocks. Without significant reinvestment in the sector, global energy shortages will only worsen, and the transition to greener alternatives will be even harder to manage. We all want to protect the climate, but we also want a warm cup of coffee to start the day. Balance is key. Imbalance has unintended consequences.

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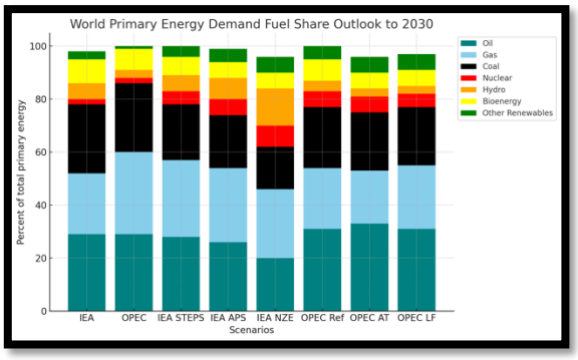
Higher Energy Costs on the Horizon

As soon as global demand for oil and gas rises again, we can expect to see significant increases in energy prices. Right now, factors like China's slower-than-expected economic recovery and other geopolitical dynamics are holding demand below its peak, but that lull is temporary. The reality is that global oil and gas demand is predicted to increase through 2030, as highlighted in the chart.



According to projections, oil and gas will still account for between 46% to 54% of total energy sources by 2030, despite all the efforts to accelerate renewable energy adoption. The demand for fossil fuels is likely to remain fairly consistent through 2045, as the transition to renewables will be slower than originally expected. This illuminates the importance of managing both sides of the energy equation—investing in new fossil fuel projects to meet short- to medium-term demand while continuing to develop renewable energy sources for the long-term.

Once we see demand fully rebound—driven by factors like economic recoveries in major global markets and increased energy needs from industry and transportation—the energy market will tighten, likely resulting in higher prices. This is a pattern we've seen before, where supply constraints, coupled with rising demand, lead to sharp price increases. The current underinvestment in fossil fuels is setting the stage for this eventual price surge, as there simply won't be enough production to meet the rising needs.

For now, while demand hasn't peaked yet, it's important to prepare for the inevitable. Once global demand catches up, energy markets will feel the strain, and consumers and businesses alike will see the impact in the form of higher energy costs.

When you have a **decreasing supply curve** and an **at least consistent increase in demand**, basic economic principles tell us that this combination typically leads to **one thing: higher prices.**

In the energy market, this is exactly what we're facing. Supply is constrained due to years of underinvestment in fossil fuel production, while demand for oil and gas is expected to increase or, at the very least, remain stable for the foreseeable future. This imbalance between supply and demand is a classic recipe for price hikes.

THE EV EFFECT

As production continues to decline due to natural depletion and a lack of new projects coming online, any uptick in demand will put significant pressure on the market. With fewer options to meet the growing energy needs, prices are likely to rise sharply. We've seen this pattern in the past, and without significant reinvestment in both fossil fuels and infrastructure, the situation could worsen.

In essence, this supply-demand imbalance creates a volatile market that could see **energy prices skyrocket**, especially as global economies rebound or as geopolitical events further strain supply chains. While renewable energy offers a long-term solution, it's not yet ready to fill the gap, meaning fossil fuels will continue to play a critical role—and their prices will reflect the growing tension between dwindling supply and rising demand.

The Investment Calculus for Oil and Gas Changed

On April 11, 2020, the world witnessed an unprecedented event when oil prices went negative for a day—something that had never happened before. This event sent shockwaves through the oil and gas (O&G) industry and wiped out many companies that were **overleveraged**, unable to withstand the sudden collapse in prices. It fundamentally changed the game for how companies and investors approached the oil and gas sector.

Before this seismic shift, the investment strategy for oil and gas entrepreneurs in the 1990s and early 2000s was largely based on a value play. The O&G business was inherently capital intensive, with typical reservoir decline rates of 7-10% per year, meaning that assets were constantly depleting. To stay in business, companies needed to continually invest in new drilling projects to replace their depleting assets, requiring significant capital investment.

The strategy at the time was relatively straightforward:

1. Add capital to develop new fields or wells.
2. Increase production and improve the value of the asset.
3. Eventually sell the developed assets to a larger oil and gas company or an investment firm at a premium, earning a disproportionate return on investment (ROI) or rate of return (ROR).

It was a cycle of leveraging capital to maximize the value of a depleting asset and cashing out when the time was right, all while managing the high operational and financial risks involved. This was a viable model in a world where demand was steadily rising, and prices, although volatile, typically trended upward over time.

However, the crash in 2020 exposed the

THE EV EFFECT

vulnerability of this model. When prices went negative, many companies that had taken on too much debt to finance

new drilling projects were suddenly faced with an unsustainable financial situation. Overleveraged companies with high operational costs and shrinking revenues couldn't survive this downturn, and many were forced into bankruptcy or were acquired at a fraction of their previous value.

The fallout from this event changed the investment calculus for oil and gas:

- Risk management became a top priority, with investors now focusing on cash flow stability and debt levels instead of pure asset growth.
- Capital discipline replaced aggressive expansion, and capital-intensive drilling strategies were re-evaluated in the light of the unpredictability of the market.
- Companies began to focus more on generating immediate returns rather than long-term value appreciation, as volatility made it difficult to rely on future assets at premium prices.

For O&G entrepreneurs, the post-2000 investment strategy has had to adapt. Today, the emphasis is on cost efficiency, balance sheet health, and maintaining flexibility in the face of a more uncertain future.

Income-Focused Play

In the years leading up to the oil price crash of 2020, the value play in oil and gas investment was primarily driven by value added through drilling. Investors were focused on selling the upside of undeveloped locations, where companies had proven reserves but had yet to tap them. Essentially, the strategy was to demonstrate the potential of these reserves, then sell to the next player who would take on the risk and capital to drill and develop those fields. It was similar to the **dot-come bubble**, where investors were selling the promise of a future value, often before that value was fully realized.

However, the COVID-19 pandemic and the accompanying collapse in oil prices changed the landscape dramatically. The oil and gas industry, like many others, was hit hard as capital institutions found themselves unable to return capital to their limited partners. This forced a significant shift in the investment approach—from a value play centered around long-term upside to a more **income-focused play**.

In the past, capital was relatively cheap, thanks to low interest rates, and private equity was able to deploy large amounts of money into O&G projects. Investors were willing to take on more risk, betting on future high returns. But when prices

THE EV EFFECT

plummeted in 2020, private equity and institutional capital **dried up** almost overnight. The cash flow models and exit strategies that many companies relied upon fell apart, and the once-plentiful flow of investment capital slowed to a trickle.

Compounding the problem was the growing pressure from ESG (Environmental, Social, and Governance) criteria. Many limited partners in private equity funds—such as endowments, pension funds, and other institutional capital sources—began to move away from hydrocarbons entirely, driven by the desire to invest in cleaner, more sustainable energy sectors. As a result, a significant number of investors exited the oil and gas market altogether, further drying up capital.

But this exodus of capital and the broader industry downturn have also introduced a much-needed discipline into the sector. In the previous environment, with abundant and relatively cheap capital, many projects were funded without the strictest attention to financial discipline. Companies could afford to take on high levels of debt and pursue aggressive growth strategies. When prices fell, however, it exposed the unsustainable nature of many of these ventures.

Now, with capital far scarcer and investors prioritizing **stable, reliable income** over speculative upside, oil and gas companies have had to adopt more conservative, cash-flow-focused strategies. Instead of banking on undeveloped reserves or future asset sales, there is a shift towards maximizing operational efficiency, reducing debt, and delivering steady returns to investors.

In this new paradigm, capital discipline reigns supreme. Companies are more cautious about new investments, focusing on mainly healthy balance sheets and generating consistent cash flow. This shift represents a more measured, sustainable approach to oil and gas investment, one that prioritizes resilience and adaptability in an increasingly uncertain and capital-constrained world.

Dividends and Distributions

Since most of the major oil plays have been thoroughly mapped out and understood, particularly in regions like Texas, the industry is no longer experiencing a "land rush" as it once did. The major producing basins are known quantities, and the speculative frenzy to secure untapped land has largely faded. This is especially true as capital has fled the sector in recent years, and both large and small firms are no longer piling on debt to finance expansive drilling projects.

In today's market, the combination of

THE EV EFFECT

scarce capital (both debt and equity) and more cautious investment strategies has caused the prices of producing oil fields to drop significantly. These assets are no longer being valued in the speculative, sky-high way that tech companies were during the dot-com bubble. Instead, the focus has shifted to how much cash flow a company can generate in the near term —next month, rather than years down the line. Investors are far more concerned with dividends and distributions than with long-term growth or potential asset appreciation.

This shift has been driven by a few key factors:

1. **Reduced availability of capital:** As large firms and private equity players have pulled back from the oil and gas space, there's less money available to fund aggressive expansion. Companies are no longer willing (or able) to take on significant debt for the sake of growth, leading to more conservative capital structures.
2. **Discipline in the market:** The oil industry has learned hard lessons from past boom-and-bust cycles, particularly the price crash of 2020. There's now a stronger sense of discipline, not just in how companies manage their capital structures, but also in how they approach production levels. There's a broader effort to avoid oversupplying the market, which could drive prices down again. By carefully managing output, companies are attempting to stabilize prices and maintain profitability rather than flooding the market with excess supply, which was common during previous cycles.
3. **Focus on cash flow and returns:** Investors today are much more focused on income-producing assets. Rather than betting on the potential upside of undeveloped reserves, they want to see immediate, reliable returns. This has led to a marked shift in how assets are valued, with producing fields being priced based on their current cash flow potential rather than their speculative future value.

This has transformed the oil and gas sector from a high-growth, speculative industry into one more focused on steady income and financial discipline. The capital structure of companies is far leaner, and the emphasis is now on capital efficiency rather than expansion for the sake of expansion. As a result, the industry is far more resilient, and better able to weather future fluctuations in oil prices. However, the overall pace of growth is also slower, and the sector is unlikely to see the kind of speculative booms that characterized earlier periods.

This approach, while more disciplined, may also help **stabilize oil prices** over the long term, as companies are less inclined to overproduce and flood the market,

THE EV EFFECT

which would drive prices down. Instead, with a focus on stable returns and market balance, the industry could experience more sustainable growth moving forward.

A More Measured Approach

The phrase "the best cure for high prices is high prices, and the best cure for low prices is low prices" perfectly encapsulates the natural ebb and flow of market dynamics, especially in the oil and gas (O&G) industry. When prices rise, they tend to attract more capital and investment, leading to increased supply, which eventually brings prices back down. Conversely, when prices fall, investment slows, supply tightens, and prices rise again. This cyclical pattern reflects the efficiency of capital markets, which direct resources where they are most needed, adjusting to supply and demand fluctuations.

During the COVID-19 pandemic, oil and gas companies were hit hard. Demand plummeted, prices collapsed, and many firms were left grappling with poor financials and unsustainable debt. However, as prices recovered in 2021-2022, these companies had an opportunity to reassess their strategies. Instead of chasing aggressive growth, many O&G companies focused on getting their balance sheets in order and improving financial discipline. Bank loans were renegotiated, debts were paid down, and firms became leaner and more resilient.

What's different today is that, despite higher oil prices, O&G companies aren't rushing back to their previous high-output models. In the past, when prices spiked, companies would ramp up operations, sometimes running 12 rigs to maximize production and capitalize on the price surge. But now, many companies are only running 5-6 rigs, choosing to be more conservative and cautious in their approach. There is far less appetite for chasing speculative upside, as the industry has learned hard lessons about the risks of overexpansion and overleveraging.

Several factors contribute to this mindset:

1. **Capital Discipline:** O&G companies are now focused on capital efficiency and financial health. They are more interested in maintaining stable operations and cash flow than aggressively expanding production. Instead of flooding the market with new supply (which could lower prices), they are carefully managing their output to maintain profitability.
2. **Investor expectations:** Investors, too, have shifted their focus. They are no longer clamoring for the speculative upside of undeveloped reserves or new drilling projects. Instead, they want to see dividends and stable returns. This shift has reinforced a more disciplined approach across

THE EV EFFECT

the industry, where the priority is generating reliable income rather than chasing growth at all costs.

3. **Market caution:** Companies are wary of repeating the mistakes of the past. After being "kicked" during COVID-19, they understand that overleveraging and overexpanding during times of high prices can leave them vulnerable when the market turns. By maintaining fewer rigs and a more stable production profile, they are better positioned to weather future downturns.

No one is chasing the upside today, and that's a significant departure from the pre-pandemic mindset. Companies have adopted a longer-term view, prioritizing stability, capital preservation, and consistent returns over the speculative booms of the past. As a result, the industry is more resilient, and although prices may fluctuate, O*G firms are less likely to engage in reckless overexpansion that could destabilize both the market and their balance sheets.

This more measured approach could also help prevent the sharp booms and busts that have historically plagued the industry. By not rushing to ramp up production during times of high prices, companies can avoid oversupplying the market, which would otherwise lead to another crash. Instead, the industry is focusing on sustainable growth and long-term profitability, creating a more balanced and stable market for oil and gas moving forward.

Structural Changes in the Energy Market

When oil prices hit $120 a barrel, a significant deviation from past behavior was evident: you didn't see a surge of new production coming online, nor did you see a rush of new capital flowing into the sector. Traditionally, high prices like this would have triggered a wave of investment in new drilling projects and infrastructure as companies and investors sought to capitalize on the price boom. However, this time around, that didn't happen, and several key factors explain why.

One of the main reasons for this shift is that **investment allocators**—such as pension funds, endowments, and private equity firms—are far more cautious now. After the painful lessons of the 2020 oil crash, when prices went negative and many oil and gas investments had to be written down, these investors are much more reluctant to dive back into fossil fuels. Having been burned once, they are hesitant to be the ones left holding the bag again if prices were to collapse unexpectedly.

In 2020, when oil prices plummeted, a lot of institutions had to write down significant portions of their energy investments, causing a massive hit to their

THE EV EFFECT

portfolios. The memory of these losses looms large, and it has fundamentally changed the way these allocators approach the oil and gas sector. Even with oil prices surging to $120 a barrel, the risk of another sharp decline makes it difficult for these investors to justify pumping large amounts of capital into new oil production.

This reluctance to invest is compounded by broader structural changes in the energy market:

1. **ESG pressures:** Environmental, social, and governance (ESG) considerations have also become a major factor. Many institutional investors—especially pension funds and endowments—are under increasing pressure to divest from fossil fuels and allocate capital to greener, more sustainable investments. Even though high oil prices might offer attractive short-term returns, the long-term trend is toward cleaner energy, and many investors don't want to be associated with hydrocarbons anymore.
2. **Risk of volatility:** The oil and gas industry is inherently volatile, as seen in 2020. Allocators are wary of the boom-bust cycles and the uncertainty that comes with them. The industry's unpredictability makes it difficult for investors to feel confident about long-term returns, especially after seeing prices swing wildly between negative territory and record highs in just a couple of years.
3. **Conservative capital deployment:** O&G companies themselves have become more conservative in deploying capital. After years of underinvestment and consolidation, many companies have tightened their belts, focusing on efficiency and cash flow rather than growth. The fear of overextending during times of high prices, only to see the market crash again, has led companies to adopt a more measured approach to production. Instead of flooding the market with new supply, they are maintaining stable production levels, keeping rig counts lower than they would have been in past price booms.

Ultimately, while $120 a barrel might have sparked a rush to expand production in the post, today's environment is different. Investors are more cautious, wary of being caught in another downturn, and oil companies are focusing on capital discipline rather than chasing speculative upside. The result is that **new production is limited**, and the inflow of capital to the sector has slowed, despite high prices. This hesitancy to invest in the face of high prices could signal a more prolonged period of supply constraints, as the industry continues to grapple with the balance between managing risk and meeting global energy demand.

THE EV EFFECT

The Burst of the Fracking Bubble

The oil and gas industry has seen its share of boom-and-bust cycles, and one of the most notable before COVID was the 2016 crash, which hit after a period of intense overinvestment driven by the fracking revolution. This revolution, powered by new horizontal drilling and hydraulic fracturing technologies, unlocked vast oil and gas reserves in the U.S. shale plays. Excitement around these technologies led to a massive influx of capital, with companies rushing to develop previously untapped basins in pursuit of high returns. However, what followed was a case of **"Blue Sky" exuberance** that ultimately led to overdevelopment, an oversupply of oil, and a collapse in prices.

By 2016, the market was flooded with oil from all these new drilling projects, and the sudden oversupply caused prices to plummet. Many companies, especially those that had taken on high levels of debt to finance their aggressive expansion into shale, found themselves in precarious positions. A significant portion of the industry went bankrupt during this period, and they were unable to service their debt or generate sufficient cash flow at the lower price points. The 2016 crash marked **the burst of the fracking bubble**, forcing a painful industry-wide reckoning.

One of the key mistakes of that period was that some companies tried to drill their way out of a bad situation. Faced with declining oil prices, these companies doubled down on their strategy, drilling more wells faster, hoping to increase production and offset the lower prices. But this strategy backfired. As they continued drilling, they added even more supply to an already oversupplied market, driving prices down further and earning less and less for each new well they brought online. It was a race to the bottom, with many companies collapsing under the weight of their debt and oversupply.

The lessons from the 2016 crash, combined with the more recent crash in 2020, have fundamentally changed the approach to the oil and gas sector. The space is now far more **risk-averse** than it once was. The industry has learned that overdevelopment and chasing speculative upside without regard for market fundamentals can lead to financial ruin. As a result, companies today are focused on **capital discipline** and **sustainable operations**, with a much more measured approach to development.

Instead of the old model of overdevelopment, where companies would drill aggressively regardless of market conditions, the industry has shifted to a more cautious and conservative strategy. Now, it's about developing just the right amount of resources—or even underdevelopment—to ensure that production levels are in

THE EV EFFECT

line with market demand. Companies are no longer chasing output for output's sake; they are focused on maintaining profitability, managing cash flow, and ensuring they don't repeat the mistakes of the past.

This **new discipline** has reshaped the oil and gas landscape. Companies are drilling fewer wells, being more selective about where and how they invest capital, and prioritizing financial health over growth at all costs. In a way, the industry is now more focused on **value retention** and **stability,** rather than the boom-time mentality of constant expansion. This approach, while less exciting in terms of growth, is far more sustainable in the long run and better prepares companies for the inevitable ups and downs of the global market.

Underdevelopment in U.S. Oil Production

After the 2016 crash, the oil and gas industry faced a perfect storm of challenges that fundamentally altered the landscape. In addition to the oversupply and debt issues that triggered widespread bankruptcies, several other major factors compounded the industry's struggles. Capital fled the sector, with investors becoming wary of the inherent volatility in oil and gas. At the same time, there was a growing focus on ESG (Environmental, Social, and Governance) criteria, which significantly shifted the flow of capital toward renewable energy projects.

This trend was further driven by **activist investors**, who began prioritizing investments in renewables over traditional oil and gas. This shift has been great news for renewable energy development, but it has been a significant challenge for oil and gas companies, particularly in the U.S., where development has long depended on smaller, independent oil and gas firms. These independent companies, not the major players like Exxon or Chevron, have historically taken the risks and done a lot of the actual drilling that drives U.S. oil production.

Unlike the big, integrated oil companies with vast balance sheets and diversified global operations, independent oil and gas companies rely heavily on access to capital from external sources like institutions, private equity, or banks. This access has been increasingly difficult to secure in the post-2016 and post-COVID world. The combination of investors exiting the space, concerns about the future viability of fossil fuels, and the growing push for ESG-friendly investments has dried up many traditional avenues of funding for these smaller players.

For independent companies, the inability to access capital means they cannot drive the level of development needed to replace depleting reserves or ramp up production to meet demand. This capital constraint is stifling new drilling and exploration, even though oil prices have

THE EV EFFECT

rebounded and demand has stabilized.

This situation has led to a noticeable underdevelopment in U.S. oil production. The risk-averse environment, combined with the flight of capital to renewables, means that the independent firms—those who historically took on the exploration and drilling risks—are struggling to maintain production levels, let alone increase them. With fewer new wells being drilled, the U.S. oil and gas sector is at a risk of falling behind in meeting future energy needs.

In essence, the perfect storm of 2016, exacerbated by factors like capital flight, ESG priorities, and the shift toward renewables, has left U.S. oil and gas development in a precarious position. While this has been positive for the growth of renewable energy, it poses significant challenges for oil and gas. Without independent companies driving new exploration and production, and with limited access to the capital needed to fund these projects, U.S. oil and gas production is facing a potential slowdown, just when the global market needs it most.

OIL AND GAS GEOLOGY

TECHNICAL CONSIDERATIONS

At the heart of oil and gas production lies geology—specifically, the nature of the rock formations beneath the Earth's surface. Oil and gas are trapped in subsurface rock formations, unlike other energy sources like coal or minerals, which can be mined and extracted directly from the earth's surface.

Understanding the subsurface geology is critical to determining whether an area has the potential to produce oil or gas economically, considering both commodity prices and the associated production expenses.

"FIRE IS THE TEST OF GOLD; ADVERSITY, OF STRONG MEN."

– MARTHA GRAHAM

OIL & GAS GEOLOGY

Subsurface Reservoirs

Oil and gas are stored in porous rock formations deep underground. The rock acts as a reservoir, trapping hydrocarbons within its pores, and these reservoirs can vary greatly in depth, quality, and size. Depending on the region and geological structure, oil or gas deposits might be found anywhere from a few thousand to tens of thousands of feet below the surface. For example, natural gas in parts of Kansas was historically extracted from shallow coal mines as close as 100-1,500 feet deep. This gas was then transported to end users via pipelines, marking the beginnings of the **mid-continent interstate pipeline business.**

Horizontal vs. Vertical Drilling

Traditional **vertical drilling** involved drilling straight down to tap into oil or gas reservoirs. This method, while effective, limited access to horizontal formations where much of the oil or gas was trapped. The introduction of **horizontal drilling** revolutionized the industry. Instead of just drilling straight down, horizontal wells were drilled laterally through the rock formation, allowing operators to access significantly more of the reservoir and extract more hydrocarbons from a single well.

Hydraulic Fracturing ("Fracking")

The other breakthrough came with hydraulic fracturing (or fracking). This technology involves injecting a mixture of water, sand, and chemicals into the rock formation at high pressure to create small fractures. These fractures allow oil or gas to flow more freely through the rock and into the wellbore for extraction. Fracking has unlocked previously inaccessible reserves, particularly in shale plays, and was instrumental in the U.S. **shale revolution**.

The combination of horizontal drilling and fracking has allowed oil and gas companies to produce more from each well and access reservoirs that were once considered uneconomical.

OIL & GAS GEOLOGY

Economic Considerations: Production and Profitability

Once a reservoir is identified, the question becomes whether it will be **economically viable** to produce, given fluctuating commodity prices and the costs of production. Depth plays a major role here. Shallow wells—like those found in early Kansas gas operations—are less expensive to drill, but deeper wells can produce significantly larger volumes of hydrocarbons. However, drilling deeper wells is more expensive and requires more sophisticated technology. Companies must carefully weigh these factors to determine whether they can achieve a profitable return on investment (ROI).

Different Types of Oil & Gas Investing

Oil and gas investment structures vary depending on the type of involvement an investor is seeking. The primary forms of ownership and involvement include:

Mineral Interests vs. Working Interests

- **Mineral Interest** holders own the land and the resources beneath it but may not be involved in the actual operation of drilling and production. They typically receive royalties from the production.
- **Working interest** holders, on the other hand, are actively involved in the drilling and production process. They bear the cost of production but also receive a larger share of the profits once the oil or gas is produced.

- **Operating vs. Non-Operating**
  - **Operating** companies are those that actively manage the drilling and production operations.
  - **Non-operating** interests may hold a stake in the production but do not manage day-to-day operations, instead leaving that to an operator.
- **Wildcat vs. Infill Drilling:**
  - **Wildcat drilling** refers to drilling in areas that are not yet proven to have oil or gas reserves, which carries higher risks but also potentially higher rewards.

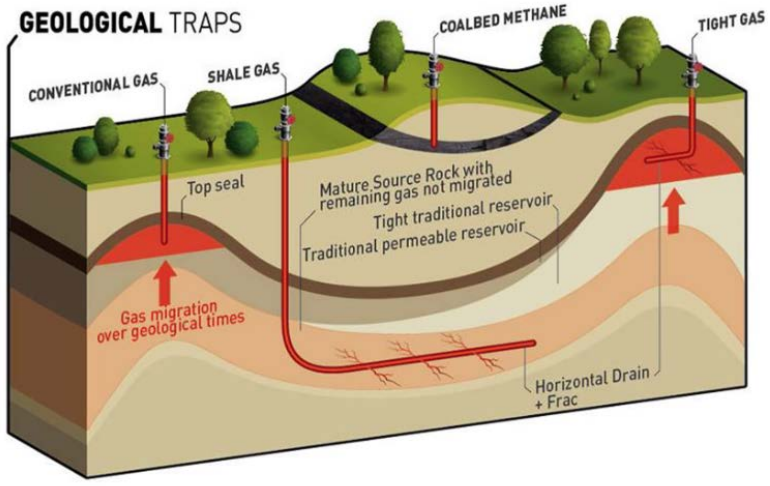
OIL & GAS GEOLOGY

Infill drilling happens in areas that are already proven to have reserves, where wells are placed between existing wells to manage extraction from a known reservoir.

Understanding the geology and technical considerations behind oil and gas production is critical to making informed investment decisions.

Arguably, one can get swindled without deeper knowledge of how oil and gas deals are structured, and what requirements they must meet when it comes to due diligence.

The combination of geological knowledge, technological advances like horizontal drilling and fracking, and careful economic analysis and detailed due diligence (technical, regulatory, and economic) all come together to determine the success or failure of an oil and gas venture.



EVOLUTION OF ENERGY

The evolution of oil and gas drilling has come a long way from the early days of tapping into high-pressure, easily accessible reservoirs. Now, the process is far more complex and relies on sophisticated technology to bring hydrocarbons to the surface, particularly as reserves are found deeper and further offshore.

Depth and Complexity of Drilling

Reserves can range from shallow deposits at 1,000 feet to ultra-deep reserves as far down as 30,000 feet below the Earth's surface. Then, there's offshore drilling, which can happen several miles off the coast and beneath thousands of feet of water, adding layers of complexity. It's not just about sinking a well straight down anymore; drilling today is an engineering marvel involving advanced technology and precise planning to bring oil and gas up from these extreme depths.

A good analogy is to imagine a cup filled with oily rock, and the straw you insert into that cup is the wellbore. Just like pulling liquid through a straw, oil and gas are extracted from underground reservoirs, except instead of free-flowing liquid, you're extracting hydrocarbons trapped in rock. Unlike the old stereotype where oil shoots out of the ground, modern production is much more controlled. In many cases, you're dealing with oil rock formations, not large, open reservoirs.

Traditional Reservoirs vs. Shale Plays

In the past, particularly in the 1950s and 1960s, traditional wells were drilled into geological formations where oil and gas had accumulated under salt caps or other natural traps. These formations were under pressure, and when drilled, the oil would naturally flow or even gush to the surface. But finding these geological formations was a challenge, and much of that easier-to-access oil has already been tapped. The industry largely knows where these traditional reservoirs are, and a lot of that has already played out.

Today, the focus has shifted to shale plays. Shale rock is tight and not very porous, meaning that unlike traditional reservoirs, where oil and gas flow relatively freely through the rock, shale

EVOLUTION OF ENERGY

requires a lot more effort to extract hydrocarbons. The rock must have porosity (small spaces in the rock to hold oil) and permeability (the ability for oil to move through the rock). Shale is low in permeability, which makes extraction more difficult.

This is where new technologies, particularly horizontal drilling and hydraulic fracturing (fracking), have revolutionized the industry. Shale plays are composed of layers of oil-bearing rock, and these layers can stretch horizontally and travel through the layer, allowing companies to access a much larger portion of the oil-bearing rock from a single well.

Layered, Predictable Shale Plays

Shale formations are layered. You might have one layer of oil-bearing rock a few thousand feet down, then another layer below that, and another beneath that. These layers are spread across vast areas, making the resource predictable once the formation is identified. This is a key difference from traditional drilling, where oil might be concentrated in a small, specific trap. In shale plays, the oil is spread out horizontally, and companies can drill multiple wells from a single pad to extract from different layers.

With horizontal drilling, instead of just tapping into the top of one small area of the reservoir, operators can drill laterally across these long, thin layers of oil-bearing rock, accessing far more of the resource. This approach maximizes the productivity of each well, making shale plays viable despite the challenging rock formations.

The process of extracting oil and gas has evolved from the days of striking oil from high-pressure reservoirs to using advanced horizontal drilling and fracking technologies to extract hydrocarbons from tight shale formations. These shale plays consist of layers of oil-bearing rock, which are far more predictable but harder to extract due to their low permeability. Thanks to these technologies, the industry can now tap into vast resources previously considered uneconomical, turning tight rock into valuable reserves. It's not about striking oil that shoots out of the ground anymore—it's about engineering solutions to extract hydrocarbons from the earth's complex, layered subsurface formations.

Breaking the Fracking Code

In the earlier days of oil and gas exploration, as we've explored, vertical drilling was the standard approach. The goal was to drill straight down into a

EVOLUTION OF ENERGY

target reservoir where oil and gas had migrated and become trapped. As drilling operations progressed, geologists and engineers would often encounter shale formations, which looked promising due to their organic richness. However, these shales couldn't produce economically using traditional vertical drilling methods because the oil and gas were tightly trapped within the rock's microscopic pores, and the rock lacked the permeability to allow the hydrocarbons to flow freely to the wellbore.

This challenge persisted for years—shale formations had the potential, but they were essentially locked down, unable to deliver the hydrocarbons needed to justify further investment.

Enter a young engineer named **George P. Mitchell**, who is credited as being the **"Father of Fracking"** for his work as the leader of Mitchell Energy & Development Corporation. Mitchell pioneered the commercial use of hydraulic fracturing (fracking) to extract natural gas from shale. It was the team led by the pioneering oilman who would ultimately break the code on how to unlock the vast reservoirs stored within these shale formations.

Two-Fold Breakthrough

The breakthrough was two-fold. First came the development of **horizontal drilling**. The traditional vertical method drilled straight down into a formation, limiting the contact between the wellbore and the oil-bearing rock. With shale formations, though, the oil and gas were spread out horizontally over large areas, not concentrated in one spot. Mitchell realized that by drilling vertically down into the shale and then **turning the pipe 90 degrees**, you could follow the horizontal layers of oil-bearing rock for thousands of feet.

This approach allowed operators to maximize the exposure of a wellbore to the resource, effectively accessing more of the shale and increasing the amount of recoverable oil or gas from each well. The trick, however, was in maintaining a straight and steady horizontal section. If the pipe bends too much ore created "**P-traps**" (bends or kinks in the wellbore that trap fluids, like how water might get stuck in a kinked pipe), the oil and gas wouldn't be able to flow smoothly to the surface.

But horizontal drilling alone wasn't enough. Once they had the well drilled, they still needed a way to coax the oil or natural gas out of the tight shale rock. That's where the second piece of the puzzle came in: hydraulic fracturing

EVOLUTION OF ENERGY

(or fracking). The team at Mitchell Energy figured out how to pump a mixture of water, sand, and chemicals into the wellbore at high pressure, creating small fractures in the shale. These fractures allowed the trapped oil and gas to flow more easily through the rock and into the wellbore, unlocking the previously trapped hydrocarbons.

Revolutionizing the Industry
This combination of horizontal drilling and fracking fundamentally transformed the oil and gas industry. What was once seen as unproductive rock became some of the most prolific oil and gas plays in the world. The **Barnett Shale** was the proving ground for this technology, and its success opened the door for massive shale developments in the **Permian Basin, Eagle Ford,** and **Marcellus Shale**, among others.

By drilling horizontally and keeping the wellbore steady and straight within the shale layer, operators could avoid the pitfalls of inefficient designs, like the creation of P-traps. And by fracturing the rock in a controlled way, they could extract hydrocarbons that had been inaccessible using vertical drilling.

This technique not only unlocked vast new reserves of oil and natural gas but also significantly increased **U.S. energy independence** and reshaped global energy markets. Shale plays are not among the largest contributors to oil and gas production in the world, and the success of this approach has influenced drilling practices globally.

The Impact of the Barnett Shale Breakthrough
The Barnett Shale breakthrough by this young engineer (at the time) and the team of Mitchell O&G was a watershed moment in the history of oil and gas production. It wasn't just about the discovery of new resources; it was about discovering new ways to access those resources. Today, nearly all shale plays around the world use variations of this method—horizontal drilling combined with hydraulic fracturing—to produce oil and gas from formations that were once considered uneconomical.

In essence, the industry's success in overcoming the challenges of shale has fundamentally altered the way we approach oil and gas geology, making previously overlooked formations not only viable but some of the most productive and profitable in the world.

As we continue onward in the evolution of our quest for cleaner energy, it is precisely these types of working epiphanies that lead to breakthroughs.

EFFICIENCY AND COST ADVANTAGES

The cost dynamics and efficiency of horizontal drilling versus traditional vertical drilling have revolutionized the oil and gas industry. To drill a vertical well a mile down, it costs around $250 million to get the will drilled, and then you typically need to spend another half a million or more to complete it by installing the casing, pumping systems, and other surface equipment necessary to bring the oil or gas to the surface.

In contrast, horizontal wells are far more cost-effective in the long run. While the upfront drilling cost for a horizontal well may range from $5 to $10 million, these wells can do much more work from a single location. Horizontal wells are drilled down a mile (or more) vertically, and then the well is turned and drilled 1-3 miles horizontally through the oil or gas reservoir. This allows operators to access far more of the resource from one location compared to vertical drilling.

Efficiency and Cost Advantages

One of the greatest advantages of horizontal drilling is that it allows operators to drill in multiple directions from a single well pad, effectively hitting multiple points of the reservoir. For example, in the past, on a 659-acre tract of land, you might need 10-15 vertical wells to properly drain the reservoir and tap into the oil and gas spread across that area. Each vertical well would require separate drilling, completion, and infrastructure, leading to higher costs, more operational complexity, and greater environmental impact.

Now, with horizontal drilling, a single well can drain the same amount of oil or gas that previously required numerous vertical wells. This offers several significant benefits:

- **Lower capital expenditure:** Fewer wells mean lower drilling costs. Instead of drilling multiple vertical wells, operators can achieve the same production levels with one horizontal well. Fewer wells also mean reduced costs for completion, equipment, and infrastructure.
- **Reduced operational complexity:** Horizontal wells simplify field operations. With fewer wells, there's less need for surface infrastructure, less equipment to maintain, and

EFFICIENCY AND COST ADVANTAGES

fewer points of failure. This reduces both operational risks and long-term maintenance costs.

- **Lower drilling risks:** In a vertical well, you're drilling straight down, and if you miss the target zone (don't trust an operator who claims they've never missed), the well could be unproductive. Horizontal drilling, however, has significantly reduced the risk of **missing the reservoir**. By following the horizontal layers of oil-bearing rock, the chances of missing the target are much lower, making each well more reliable and productive.
- **Maximized reservoir contact:** Horizontal wells can be **several miles long** once turned, meaning they come into contact with much more of the reservoir than a vertical well would. This increases the production potential of each well, often delivering significantly higher yields than traditional methods.

Scalability and Impact on Field Development

The scalability of horizontal drilling also allows operators to develop large tracts of land more efficiently. Instead of building separate well pads and infrastructure for each vertical well, companies can now drill multiple horizontal wells from a **single pad**. This reduces the environmental footprint, minimizes surface disturbance, and maximizes the amount of oil or gas that can be produced from a field.

Furthermore, as horizontal drilling technology has advanced, companies have become adept at drilling multiple lateral branches from a single wellbore. This allows them to cover more ground and extract oil and gas from different parts of the reservoir, all from the same initial well. In areas with **layered shale formations**, they can also target different layers of oil-and gas-bearing rock without having to drill separate wells.

The Future of Drilling: Efficiently and Optimization

Horizontal drilling, combined with fracking, has made oil and gas extraction more efficient, both in terms of **cost and resource recovery**. The industry has moved from a model where numerous vertical wells were required to drain a field, to a streamlined process

EFFICIENCY AND COST ADVANTAGES

where fewer wells can access significantly more oil and gas.

The ability to hit multiple points of a reservoir from one location means companies are drilling **fewer wells** while extracting **more hydrocarbons** with less risk and capital investment. As a result, **horizontal drilling** has not only become the dominant method for developing shale plays, but it has also reshaped the economics of oil and gas production, allowing operators to remain profitable even in a volatile pricing environment.

While vertical drilling costs hundreds of millions of dollars for each well, horizontal drilling offers lower capital costs, **greener efficiency**, and the ability to cover more ground with fewer wells, making it the preferred method in today's oil and gas industry. By reducing the number of wells, minimizing operational complexity, and lower the overall risk, horizontal drilling has revolutionized how oil and gas fields are developed and produced.

Critical Mechanical Risk
There is a critical mechanical risk involved in the process of completing a well. Drilling into the right **geological formation** is just the first step, but the way the well is completed plays a significant role in determining whether the well becomes **economically viable** or not.

In the oil and gas industry, **completing a well** means preparing it for production after drilling is finished. This involves several technical steps, such as installing casing, cementing, perforating the wellbore, and, if needed, performing hydraulic fracturing (fracking). The goal of the completion process is to enable the oil and gas to flow from the reservoir rock into the wellbore and up to the surface.

However, if the completion is not done properly, even a well drilled in the **best geological formation** could fail to produce oil and gas at levels that justify the investment. There are some basic reasons for this:

1. Inadequate Stimulation (Fracturing)
In shale plays, where the rock is tight and not very porous, hydraulic fracking is often required to create fractures in the rock that allow oil and gas to flow. If the fracturing process is not executed

EFFICIENCY AND COST ADVANTAGES

correctly—such as by not applying enough pressure or not injecting the right mixture of fluids and proppants—the fractures may not be sufficient to allow hydrocarbons to move through the rock. Without these fractures, the oil and gas can remain trapped in the formation, and the well might not produce at economic levels.

2. Poor Casing and Cementing
The casing is the steel pipe that is inserted into the wellbore to provide structural integrity to the well and prevent fluids from contaminating the surrounding rock layers. Cementing is used to fill the space between the casing and the wellbore, sealing off different rock layers and keeping the well secure. If the casing or cementing is done poorly, it can lead to leaks or a loss of well integrity. This can reduce the flow of oil and gas or even make it impossible to safely extract the hydrocarbons, turning a potentially productive well into a **financial liability**.

3. Inadequate Perforations
To allow oil or gas to flow from the reservoir into the wellbore, the casing and cement must be perforated at the right depth, in the precise location where the oil or gas is trapped. This involves creating small holes through the casing and cement into the formation. If the perforations are not placed correctly, or if not enough perforations are made, the well may not achieve the desired production levels. Improper perforations can result **in inefficient drainage** of the reservoir, leaving hydrocarbons behind that could have been recovered.

4. Fluid Flow Issues
In horizontal wells, maintaining a smooth flow of oil or gas to the surface is critical. If the wellbore is not designed or completed properly, you could create flow restrictions, like P-traps, where oil or gas gets stuck, similar to how water might stagnate in a kinked hose. Poor flow management can lead to reduced production or make it difficult to extract hydrocarbons consistently. Even though the well may have encountered a **geologically productive reservoir**, mechanical issues related to flow can turn it into a poor economic environment.

5. Reservoir Damage

EFFICIENCY AND COST ADVANTAGES

In some cases, completion operations themselves can cause damage to the reservoir. For example, improper use of chemicals during fracking or completion fluids can **clog the pores** in the rock, preventing oil or gas from flowing. This is known as **formation damage** and can permanently impair the productivity of the well, even if the rock formation is rich in hydrocarbons.

6. Insufficient Well Control
Drilling and completing wells require maintaining precise control over pressures in the wellbore. **Blowouts** or other well control issues during the completion phase can damage equipment, the reservoir, or the surrounding environment, further compromising the economic viability of the well.

7. Geological Well vs. Economic Well
Ultimately, the difference between a **geological well** and an **economic well** comes down to proper execution during the completion process. A geological well is one that is drilled in the right location, in a formation that contains oil or gas. However, a well doesn't become economic unless the hydrocarbons can be efficiently and profitability extracted. This means the well must produce oil or gas at rates that justify the drilling and completion costs, while also providing a reasonable return on investment.

The process of **completing a well** is just as important—if not more so—than the drilling process itself. A well drilled into a rich geological formation can still fail to produce economically if it is not properly completed. The risks involved in well completion are largely **mechanical and technical**, and ensuring that the well is designed and executed properly is key to turning a geological opportunity into a profitable asset. Therefore, oil and gas entrepreneurs and even larger O&G companies and consortiums must carefully manage these risks to maximize the productivity and financial success of their wells.

High Success Rate
If a horizontal well is completed correctly, the success rate of hitting economic goals is quite high. From 2008 to 2016, the industry experienced a rapid reduction in risk as drilling technologies advanced, completion techniques improved, and shale plays

EFFICIENCY AND COST ADVANTAGES

became more predictable. This significant drop in risk was driven by the collective experience gained in the field and the application of **best practices** developed over time.

One key example of this shift in understanding and efficiency can be seen in places like Oklahoma, where horizontal drilling is widely used. Typically, companies will start by drilling a **parent well**—a main horizontal well that taps into a new formation. After completing the parent well, engineers and geologists analyze the results and can often identify the potential to drill additional **"child wells"** off the same formation, increasing the total output from the reservoir.

The Parent-Child Well Dynamic
Early on, there was excitement around the idea of drilling multiple child wells off a parent well to maximize output from a given area. For instance, a geologist might suggest drilling an additional 10 wells from the parent well to capture more oil or gas. However, what the industry learned through experience is that, by the time they reached the **6th or 7th well**, the production from those new wells started to **interfere with the production of the parent well**. Essentially, these new child wells were tapping into the same reservoir as the parent well, and instead of adding new production, they were consuming the resource, leading to **diminishing returns** on each additional well.

This realization led to a smarter, more **capital-efficient approach**. Instead of drilling 10 or more wells of a parent, the industry shifted to a model where companies drill **5-6 child wells** around the parent well. This ensures that the production is optimized, the **capital investment is conserved**, and the wells don't interfere with one another. By limiting the number of child wells, operators can better manage the reservoir and extract the maximum value without wasting capital on wells that won't produce as efficiently.

Reducing Risk Through Experience
This shift in strategy is a prime example of how the oil and gas industry has reduced risk through trial and error and the accumulation of operational data. Data is a CEO's trusted source for making sound business decisions.

EFFICIENCY AND COST ADVANTAGES

In the early days of horizontal drilling and fracking, much of the work was exploratory—testing new techniques, learning what worked and what didn't. Over time, as more wells were drilled and more data was gathered, the industry gained a much better understanding of how these complex **shale reservoirs** behave. This allowed companies to develop best practices that not only reduce the mechanical risks involved in well completion but also improve the overall **economics** of each project.

A few key factors that have reduced risk over time include:

1. Improved Reservoir Understanding: Today, operators have a much better understanding of how oil and gas reservoirs behave, particularly in shale plays. This means they can predict with greater accuracy where to drill, and how many wells to drill, and how to maximize production without over-drilling.

2. Data-Driven Decisions: Advances in **geological modeling** and **real-time data** have allowed engineers to optimize drilling and completion strategies, reducing the risk of mechanical failure or poor well performance. This data also helps identify the **optimal spacing** between wells to avoid interference.

3. Refined Completion Techniques: As the industry gained experience with horizontal drilling and fracking, operators developed more efficient methods to **stimulate the well**, ensuring better production rates and more consistent results across multiple wells.

4. Capital Efficiency: Early in the shale revolution, companies often took a scattershot approach—drilling as many wells as possible to see what worked. Over time, they've learned to **conserve capital**, focusing on **high-quality wells** that are more likely to deliver strong returns, rather than simply drilling more wells.

Lessons from Experience
The ability to drill a parent well and follow it up with a handful of **strategically placed child wells** has become a standard approach, allowing companies to extract the **maximum value** from each formation while

EFFICIENCY AND COST ADVANTAGES

avoiding the pitfalls of over-drilling. This approach demonstrates the importance of **learning from experience**—much of what the industry knows today could only have been learned by actually drilling the wells and seeing the results.

This cumulative knowledge dating back to Edwin Drake's drilling of a 69-foot (21m) oil well in 1859, on Oil Creek near Tutusville, Pennsylvania, for the Seneca Oil Company, has allowed the industry to significantly reduce the risk involved in horizontal drilling. While there are still risks involved—such as mechanical issues or commodity price fluctuations—the overall process has become **far more predictable** and **economically viable**. Companies are now able to develop fields with greater confidence, knowing that they can achieve consistent production results while managing their capital more efficiently.

Through experience and innovation, the oil and gas industry has significantly reduced the risks associated with horizontal drilling. By learning to balance the number of child wells drilled off a parent well, companies have been able to optimize their production and avoid the pitfalls of over-drilling. The application of best practices—from completion techniques to capital management—has transformed horizontal wells into highly efficient and economically successful assets. The industry's **collective knowled**ge has enabled operators to **approach drilling with confidence**, knowing that the risk of failure has been dramatically reduced compared to the early days of the shale boom.

FRACKING'S IMPACT ON THE INDUSTRY

Fracking, which has been around since the late 1930s and 1940s, is a well-established technique in the oil and gas industry that has evolved dramatically over time. It's a method that has garnered a lot of attention, both for its economic potential and environmental concerns, but the basic principles behind it are key to understanding how the industry has unlocked vast reserves of oil and gas, particularly in shale formations.

How Fracking Works:
After you drill a well—either vertically or horizontally—you're dealing with **natural permeability** in the rock. In some formations, the rock has enough permeability (the ability for fluids to flow through it) that oil and gas can naturally seep through small pores in into the wellbore without much assistance. In these cases, you can simply install steel casing into the wellbore, lower a tool called a perforating gun down the hole, and use it to shoot tiny holes into the casing. These holes allow the oil and gas to seep into the casing from the surrounding rock, and from there, it can be produced up to the surface.

In certain reservoirs, **natural pressure** is enough to push the hydrocarbons up to the surface without must additional intervention. However, in tight formations like shale, the permeability is so low that **oil and gas can't move freely** through the rock, and that's where hydraulic fracturing, or fracking, comes into play.

The Fracking Process:
Fracking is used to **coax** oil and gas out of low-permeability rock like shale. The process involves going into the well after it has been drilled and cased and using **high-pressure** or **high-temperature** fluids to create fractures in the rock.

Technically speaking, here's how it works:

1. Pressurization: A mixture of **water, sand, and chemicals** is pumped down the well at high pressure. The pressure

FRACKING'S IMPACT ON THE INDUSTRY

is so great that it forces the rock to fracture, creating **tiny cracks** or **fissures** in the formation. The water creates these fractures by pressurizing the rock until it breaks.

2. Proppants: As the fractures are created, the sand in the fracking fluid, known as a proppant, enters the cracks. Once the pressure is relieved, the rock would normally try to close back up, but the sand stays behind in the fractures, **propping them open**. This keeps the cracks from closing, allowing oil and gas to flow through the newly created pathways and into the wellbore.

3. Flowback: After the fracking process, some of the fracking fluid flows back to the surface, but the sand stays in place, holding the fractures open. At this point, the oil or gas can now flow more easily through the rock and into the well, where it can be produced up to the surface.

Unlocking Shale Plays

This ability to create fractures and hold them open is what **unlocked** vast reserves in **shale plays** across the U.S. Before the development of modern fracking, shale formations were known to contain significant quantities of oil and gas, but the tight nature of the rock meant that it was extremely difficult, if not impossible, to produce economically. Traditional vertical wells simply couldn't access enough of the rock, and the natural permeability was too low for the hydrocarbons to flow out without help.

With horizontal drilling and fracking, however, operators can now drill laterally through miles of shale and create fractures that extend outward from the wellbore. The combination of horizontal drilling (increasing the contact with the reservoir) and hydraulic fracturing (enhancing the flow of oil and gas) has made it possible to tap into these once-inaccessible reserves.

Reservoir Variability

FRACKING'S IMPACT ON THE INDUSTRY

One important thing to note is that reservoir pressure varies greatly depending on the formation. In some cases, like certain conventional reservoirs, the pressure is naturally high, and oil or gas will flow on its own without needing much additional stimulation. In these cases, fracking may not be necessary, and the well will produce based on the reservoir's own energy.

In shale formations, however, the pressure is often lower, or the rock is too impermeable, meaning that the oil and gas won't flow freely without some form of stimulation, hence the need for fracking. In these cases, fracking becomes essential to making the well productive.

Fracking's Impact on the Industry
Fracking has had a transformative effect on the oil and gas industry, particularly in North America, where it has unlocked enormous shale formations. These plays have not only driven a resurgence in U.S. oil and gas production but have also significantly shifted the global energy landscape, making the U.S. one of the world's top producers of both oil and natural gas.

In essence, hydraulic fracturing allows operators to turn previously uneconomical reservoirs into some of the most productive and profitable plays in the world. By creating fractures in tight rock formations and keeping those fractures open with proppant, fracking has revolutionized the industry's ability to extract hydrocarbons from formations that were once considered impossible to produce.

Bad Press and Greener Alternatives
Fracking has received significant bad press, particularly around concerns about its potential environmental impact on aquifers and the chemicals used in the process. Much of the public outcry stems from fears that fracking could contaminate groundwater and affect public health, largely due to chemical additives used in the fracking

FRACKING'S IMPACT ON THE INDUSTRY

fluid. However, the reality is more nuanced, and while there are valid concerns, much of the industry operates with stringent safeguards in place to **protect water sources** and the environment.

Protecting Aquifers: Depth and Casing
One of the most common concerns about fracking is the potential for it to **contaminate aquifers**, which are shallow underground layers of water-bearing rock that provide drinking water. In most cases, aquifers lie **300 to 600 feet** below the surface, whereas fracking operations occur **much deeper**—often **a mile or more below the aquifer**. This substantial distance between the aquifer and the drilling activity provides a natural barrier, making direct contamination from fracking less likely.

To further protect these water sources, companies typically use **steel casing and cement** to seal off the wellbore as it passes through the aquifer. This **casing** creates a protective layer that prevents any fluids from the well from migrating into the aquifer. When done correctly, this ensures that the chemicals used in fracking don't come into contact with drinking water sources.

Chemical Additives in Fracking Fluid
The other major concern revolves around the **chemical additives** mixed with the sand and water during fracking. These chemicals serve various purposes, such as reducing friction, preventing bacterial growth, and helping to carry the sand (proppant) into the fractures. While many of these chemicals are similar to household or industrial chemicals, some are more hazardous, and this has raised alarm among environmental groups and the public.

That said, most fracking operations are subject to **regulations** that require companies to disclose the chemicals they use and ensure that these chemicals are handled and disposed of safely. Many companies are also investing in **greener alternatives**, using

FRACKING'S IMPACT ON THE INDUSTRY

more **environmentally friendly chemicals** or even experimenting with alternatives like **recycled water** for fracking to reduce their environmental impact.

Natural Fracturing and Industry Best Practices

It's also important to note that **natural fracturing** has always existed in the Earth's crust. Long before human intervention, natural geological processes caused fractures in rock layers, allowing hydrocarbons to move through the subsurface. **Hydraulic fracturing** simply accelerates and enhances this process in areas where oil and gas are trapped in less-permeable formations.

While most companies take great care to ensure fracking is done **safely and responsibly**, it's true that, as in any industry, there are occasionally **bad actors** who cut corners or fail to follow proper procedures. These companies may fail to properly install casing, handle chemicals irresponsibly, or neglect environmental regulations, which can lead to problems such as spills or leaks. These **isolated incidents** are often what generate negative headlines, but they don't represent the **majority** of the industry, which operates under strict safety and environmental standards.

Responsible Fracking and Regulation

The vast majority of fracking operations are conducted **responsibly**, with multiple safeguards in place to protect water sources, air quality, and the surrounding environment. Many countries, including the U.S., have **regulatory frameworks** that govern how fracking is conducted, ensuring that wells are properly cased and cemented, chemicals are handled safely, and operations don't threaten public health or the environment.

Some of the measures in place to ensure responsible fracking include:

- **Well Integrity:** Proper casing and cementing are critical to ensuring that the well is sealed off from

FRACKING'S IMPACT ON THE INDUSTRY

surrounding formations, including aquifers. Most companies follow rigorous standards to ensure the integrity of their wells.

- **Chemical Transparency:** Increasingly, companies are being required to disclose the chemicals used in fracking fluids, allowing regulators and the public to understand the potential risks and ensure proper safety measures are in place.
- **Water Management:** Many companies are adopting water recycling practices, reducing the overall water usage and minimizing the amount of wastewater that needs to be treated or disposed of.
- **Monitoring and Enforcement:** Regulatory agencies often require ongoing monitoring of wells, including pressure testing and seismic monitoring, to ensure that operations are conducted safely. Enforcement mechanisms, including fines and penalties for non-compliance, help deter bad actors.

Fracking is a critical technology that has unlocked enormous energy resources, particularly in **shale formations**, but like any industrial process, it comes with potential risks. The **concerns** about aquifer contamination and chemical use are real, but they are largely **addressed through best practices** and regulatory oversight. Most oil and gas companies operate with a high level of responsibility, ensuring that fracking is done safely and with minimal environmental impact.

The industry is aware that **bad actors** can tarnish its reputation, and there is a concerted effort to **self-regulate** and comply with government standards to ensure that fracking continues to be a viable and safe method for producing energy. While there will always be a need for continued vigilance and improvement, the vast majority of fracking operations are done **right**, and they have played a crucial role in boosting energy production while protecting the environment.

MINERAL VS. WORKING INTERESTS

Mineral Interests
From a real estate perspective, holding a mineral interest means you own the rights to the minerals beneath the land. This might include oil, gas, coal, or other valuable resources. In some cases, the same person or entity owns both the **surface rights** and the mineral rights, but it's not uncommon for these rights to be **bifurcated** or split between different owners.

In states like Colorado or Wyoming, for example, a rancher might own the surface of the land, but the mineral rights could be held by the Department of the Interior or Bureau of Land Management (BLM), which is part of the federal government. This is known as a **split esta**te, where one party owns the land's surface while another party owns the minerals below.

Investors interested in mineral interests typically receive a **royalty** when oil and gas are produced from their land, but they are not involved in the operations. They do not bear the costs of drilling, completion, or production, making it a lower-risk investment. The upside is more passive, as mineral owners earn income without directly funding the drilling or operational expenses.

Working Interests
On the other hand, a working interest refers to an ownership stake in the actual operations of the oil and gas production process. Investors with working interests are directly involved in drilling and production, and they share in both the costs and the profits of the operation.

Working interest owners pay for a portion of the expenses involved in bringing oil or gas to the surface, including drilling, completing, and maintaining wells. This type of investment carries higher risk because it requires significant upfront capital, and if the well does not produce, these costs are not recovered.

However, the reward is potentially higher because working interest owners also receive a larger share of the production revenue, rather than just a royalty.

Leasing the Minerals to Drill
When it comes to developing oil and gas, those interested in drilling often need to lease the mineral rights from the

MINERAL VS. WORKING INTERESTS

mineral owners. Whether it's a private owner, a federal entity, or a combination of both, the company or investor must secure a lease agreement that gives them the right to drill and produce oil or gas from the minerals below the surface.

The lease will typically cover a defined area, referred to as **net acres**, and in most cases, a company needs **at least 100 net acres** to drill a well. This ensures that the company can access enough of the underground reservoir to make the drilling operation economically viable. The lease agreement usually outlines key terms, including:

- The **royalty rate** to be paid to the mineral owner.
- The **duration** of the lease, specifying how long the company has to drill.
- The **terms** for development, including where and how wells can be drilled.

In many cases, multiple parties might own the mineral rights to a given area. In these instances, the company seeking to drill must negotiate with each owner to acquire the necessary acreage before they can begin operations. Once secured, the **working interest** owners bear the cost and responsibility for drilling, where the **mineral interest** holders are entitled to a share of the production profits without having to invest in the development itself.

Whether an investor is interested in mineral interests (which can provide passive income through royalties) or working interests (which involve higher risk and reward through direct participation in drilling), each investment structure in oil and gas has its unique opportunities and challenges. Understanding the legal and operational differences is essential for making informed decisions and managing risk effectively.

Royalty Investments: Passive Yet Strategic

Buying mineral rights is similar to purchasing farmland on the outskirts of a city, with the anticipation that the area will become valuable in the future as development expands. It's a **passive investment strategy**, but one that requires a long-term outlook. Mineral rights can sit dormant for years, much

MINERAL VS. WORKING INTERESTS

like land awaiting urban expansion, until the right conditions are met for development.

There are a lot of royalty investments available in the oil and gas industry, where investors buy royalty interests or mineral ownership and earn a share of the revenue from any oil or gas produced from the land. However, these investments only generate value when actual production takes place. In other words, owning mineral rights or royalty interests is only profitable if oil or gas is successfully extracted and sold.

Key Considerations for Mineral Rights Investments

For mineral rights or royalty ownership to become valuable, several factors need to align. As an investor, it is important to look beyond just owning the mineral rights and assess the **development potential** and market conditions.

1. **Active Operators**:
    - The most crucial factor for any royalty or mineral interest is **whether active drilling** is taking place on the land. When you buy mineral rights, it's important to identify **who is drilling** in the area. Are there **active operators** exploring and developing the land you own rights to? If so, this significantly increases the likelihood that your mineral rights will start generating income.
    - Established and **reliable operators** in the area are a good sign, as they will likely have the experience and capital needed to develop the well and bring the hydrocarbons to the surface.
2. **Infrastructure**:
    - **Infrastructure** is another key factor in determining the value of mineral rights. For oil or gas to be **marketable**, there must be a way to **transport** it from the well to **refineries** or **distribution points**. This means that the area should have pipelines, processing plants, and storage facilities in place.
    - **Natural gas** requires particularly specialized infrastructure, such as pipelines and processing plants, to be transported and sold. If you own mineral rights in an area that produces natural gas, ensure that the necessary

MINERAL VS. WORKING INTERESTS

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MINERAL VS. WORKING INTERESTS

infrastructure is either in place or being developed.

1. **Product Sales:**
    - Simply extracting oil or gas isn't enough to generate returns on your investment. You only get paid if the product can be sold. If there's no infrastructure or market access, even producing a well might not lead to immediate royalties.
    - Check whether there is **demand for the product** in the market. For instance, if natural gas prices are low and infrastructure is lacking, operators may hold off on production until market conditions improve.
2. **Potential for Development:**
    - Much like the farmland analogy, some mineral rights investors look for areas where there is potential for **future development**, even if no immediate production is planned. Areas near **active oil or gas fields** or locations where **geological studies** suggest significant potential are often targets for mineral rights investments.
    - These investments require patience, as production may not begin for several years. However, if operators eventually begin drilling in the area, the value of the mineral rights can increase significantly.

The Passive Nature of Royalty Investments

Royalty investments are inherently **passive** because the mineral rights owner typically has no involvement in the actual drilling, production, or sale of the oil or gas. Instead, the owner receives a **royalty payment** based on the **volume of production** and **market prices** at the time the oil or gas is sold. This is similar to owning land and leasing it to developers who manage the construction and sale of properties, while the landowner earns a portion of the proceeds.

However, unlike owning real estate where rents may be more predictable, royalties can fluctuate based on **production volumes** and **commodity prices**. Therefore, mineral rights investors must be prepared for **income variability** depending on how much oil or gas is

MINERAL VS. WORKING INTERESTS

produced and how market conditions affect prices.

Investing in mineral rights or royalty interests is a strategic and passive way to invest in the oil and gas sector, but it's only valuable if the land is actively developed and if there's sufficient infrastructure to bring the product to market. Investors need to do their homework by evaluating **active operators** in the area, assessing infrastructure for **oil or gas transportation**, and understanding the market conditions that will influence the sale of the product. Ultimately, while mineral rights investments can be lucrative, they require patience and careful evaluation of the development potential and market access to ensure success.

Working Interest vs. Royalty Interest: Key Differences

In the world of oil and gas investments, there are different ways to approach participation in the industry, and one key distinction is between **owning a working interest** and owning a **royalty interest** in a well. Both options come with their own set of risks, rewards, and responsibilities, and understanding the differences can help investors make more informed decisions.

Working Interest vs. Royalty Interest: Key Differences

1. **Working Interest**:
    - Owning a **working interest** in a well means you are directly involved in the **drilling, production, and operation** of that well. Investors with working interests share in both the **costs** of drilling and completing the well as well as in the **profits** from the production.
    - This type of investment is generally **more active** because it requires ongoing capital outlay for drilling, production, and sometimes even operational management, depending on the ownership structure. While you stand to earn a larger share of the profits if the well produces, investors also take on the **risks** associated with cost overruns, operational problems, and fluctuating oil and gas prices.
    - **Higher potential rewards, but more risk:** Because you're involved in the operations you'll

MINERAL VS. WORKING INTERESTS

receive a larger portion of the production revenue compared to a royalty interest, but you also have to bear a larger share of the costs. If the well fails to produce or if the operational costs rise unexpectedly, the financial hit can be significant.

- **More speculative, but active involvement:** With a working interest, you are more actively engaged in the well's development, and you might work with the operating company to ensure things run smoothly. It's a more speculative investment because you are betting on the success of the well itself, rather than just passively collecting a share of the profits.

2. **Royalty Interest:**
   - Owning a royalty interest, on the other hand, is generally more passive. As mentioned herein, royalty interest holders do not participate in the actual drilling or production of the well. Instead, the investor owns a portion of the mineral rights and receives a percentage of the revenue from the production of oil or gas. The investor does not share in the costs.
   - Royalty interest is often described as a more land-intensive, waiting game. It's like owning farmland and waiting for developers to come and build, at which point you start earning income. Similarly, with royalty interests, investors are waiting for an operator to develop and produce from the land before any returns are realized.
   - **Less risk = less control:** Royalty interest holders don't have to worry about operational costs or risks associated with the drilling and completion process. However, they also don't have any control over how and when the well is drilled or developed. These investors are essentially at the mercy of the operating company and market conditions.
   - More speculative because investors are waiting for the game to come to them. They don't have the same level of involvement as they would in an working interest. It is important

MINERAL VS. WORKING INTERESTS

- to note that if the operator decides not to drill, drills in a different location, or delays production, returns on investment can be postponed or never even realized.

Speculative Nature of Both Interests
Both **working interest** and **royalty interest** have their speculative elements. While royalty interest may seem more passive and stable because you don't have to worry about covering operational costs, it's still speculative in the sense that you're waiting for the operator to develop the well. If no development occurs, you don't see any return on your investment, no matter how great the potential might have seemed.

For **working interest**, the speculation comes from the **direct financial risks** you face in drilling, completing, and producing the well. If you choose to participate in a working interest, you are "playing in the game" more actively, which can result in higher profits if the well is successful, but also higher losses if it fails or production costs are higher than expected.

Both working interest and royalty interest offer different avenues into the oil and gas industry, and each comes with its own set of risks and rewards. **Royalty interests** are more passive and long-term, requiring patience as you wait for an operator to develop the mineral rights and produce oil or gas. It's a **land-intensive, waiting game** where you're counting on the value of the asset being realized over time. **Working interests**, on the other hand, are more **hands-on** and offer potentially higher returns but come with greater financial risk and active participation in the operational aspects of drilling and production.

The key is to understand your **risk tolerance**, time horizon, and desired level of involvement when choosing between these two types of investments.

OIL & GAS LEASES

Leases in the oil and gas industry are **tradeable assets**, and the leasing of mineral rights is a critical part of how companies gain the ability to explore and develop oil and gas resources. These leases typically have a fixed term of 3-5 years, during which the lessee (the company or individual leasing the mineral rights) has the exclusive right to explore and potentially produce oil or gas from the leased land.

Lease Bonuses and Hot Plays
When companies or operators are interested in a particular region, they typically offer **lease bonuses** to mineral owners as an upfront payment for the right to develop the mineral rights. This **bonus** is separate from any **royalties** that the mineral owner might receive from future production. The amount of the lease bonus can vary greatly depending on how **hot** the play is—i.e., how desirable and active the region is for oil and gas exploration.

An example of this dynamic can be seen in **Texas**, where certain regions have become **hot plays** due to advances in drilling and fracking technology or significant discoveries of oil and gas. Initially, mineral owners might be offered something like **$100 per acre** as a lease bonus to allow operators to explore and drill. However, as more operators enter the region and start successfully producing, competition drives up the perceived value of the mineral rights. Soon, lease bonuses can skyrocket to **$10,000 per acre** or more, reflecting the **increased demand** and **potential production value** of the resource.

The Process of Trading Leases
These are not only held by the companies that intend to drill but can also be **bought and sold** between companies or investors. This process is akin to real estate trading, where land changes hands based on its perceived value and future development potential.

1. **Speculation and Pricing**:
    - Initially, when an area is less developed, leases may be **inexpensive** because there is more uncertainty about whether the mineral resources will be economically viable to extract. This is when lease bonuses might be relatively low —$100 per acre or so.
    - However, if drilling results in the

OIL & GAS LEASES

area turn out to be positive and production increases, the demand for mineral leases can quickly escalate. The land becomes more valuable because operators have a better understanding of the reservoir, and the infrastructure may already be in place. As a result, lease bonuses can jump significantly.

- For example, in hot plays like the Permian Basin or Eagle Ford Shale in Texas, where significant amounts of oil and gas have been discovered, lease prices can skyrocket to **$10,000 per acre** or more, as companies rush to drill.

2. **Lease Flipping:**
   - Some companies or investors will speculatively lease mineral rights with the intent of not necessarily drilling themselves but rather flipping the lease to another operator at the higher price. This practice is similar to flipping real estate, where the original lessee takes advantage of rising demand in the area.
   - Investors who lease land early at a lower bonus can potentially sell those leases at a much higher value once the area becomes proven or more widely developed.
3. **Expiration of Leases:**
   - One key aspect of leasing is that if the lessee does not begin drilling or producing oil or gas within the lease term (typically 3-5 years), the lease expires, and the mineral rights return to the original owner. This ensures that companies are incentivized to either develop the land or release it back to the mineral owner, who can then lease it to another party.
   - If the lessee starts producing within the lease period, the lease typically remains in effect for as long as the well is producing, meaning the operator can continue to extract and pay royalties even after the original lease term ends.

Impact of High Demand on Lease Prices

In high-demand regions, the price per acre for leasing mineral rights can become extremely competitive, as companies vie for a share of the resource. What started as a relatively

OIL & GAS LEASES

low-cost opportunity can quickly evolve into a **multi-million-dollar transaction** for mineral owners who leased their land early on.

For instance, in areas like the Permian Basin or other prolific shale formations, the value of these leases can increase by factors of 100 or more within a few years. Mineral owners who initially signed leases for modest bonuses can suddenly find that the land they leased is now worth **thousands of dollars per acre**, thanks to the efforts of operators who have de-risked the play through successful drilling and production.

Leasing in the oil and gas industry is a dynamic, **speculative market**, where both mineral owners and operators stand to benefit from **increased competition** and **successful development**. While mineral owners might start with relatively low lease bonuses, if the play becomes hot and operators achieve successful production, those values can increase dramatically, making lease trading an **important aspect** of the industry.

For investors and companies, securing mineral leases early in **unproven areas** can be a high-risk, high-reward strategy. Those who are willing to invest in speculative regions can potentially flip those leases to larger operators at a significant profit once the area's potential has been established.

Key Considerations for Buying Oil & Gas Leases

Timeframe for Drilling:
Leases typically give the operator 3-5 years to start drilling and bring the well into production. If the operator fails to drill within this period, the lease expires, and the mineral rights revert to the landowner.

This initial period is often referred to as the **primary term** or the lease. The operator must either drill or pay a fee, known as a **delay rental**, to maintain the lease during this time. If drilling commences and production begins, the lease moves into the **secondary term,** which lasts as long as oil or gas is produced in **economic quantities.**

Held by Production (HBP):
Once a well is drilled and production starts, the lease can remain in effect for as long as the well is producing and

OIL & GAS LEASES

royalties are being paid to the mineral owner. This is known as the lease being **"held by production"** (HBP). As long as the well produces economic quantities of oil and gas, the operator can continue to extract resources from the land.

The key is that the well must produce in **economic quantities**, meaning that the revenue generated from the production must exceed the operating costs, ensuring a profit is made. If the well is no longer producing economic quantities or production stops altogether, the lease is lost, and the mineral owner can lease the rights to another operator.

Historical Production:
Before purchasing a lease, it's essential to review the **historical production** data to ensure that the operator has met the terms of the lease and that the well has been producing economic quantities. This data is typically available from public records or regulatory bodies.

Reviewing historical production helps confirm that the operator is in compliance with the lease terms, and it gives you insight into the productivity of the well and the expected future production.

Title and Ownership:
One critical step in purchasing a lease is ensuring that the **title is clear** and that there are no disputes or encumbrances on the mineral rights. This is where **"landmen"** and **title professionals** come into play, often operating similarly to a real estate title company.

Landmen are specialists in oil and gas property who conduct title research, ensuring that the seller has the legal right to lease or sell the mineral rights. They also check for any liens, easements, or other claims that could affect the property or its development potential.

Due Diligence
Buying a lease requires thorough due diligence to confirm that the property is a real asset and that it holds the value being presented.

This includes checking:

- The validity of the lease and ensuring that it is still in effect.
- Reviewing the terms of the lease to understand the obligations of both the operator and the

OIL & GAS LEASES

mineral owner.
- Ensuring that the title is clean, with no competing claims to the mineral rights.
- Verifying that the well is producing and has historically met production targets.
- Confirming that the operator is paying royalties in line with the lease terms.

Production Verification
It's crucial to check the **production reports** from the well to ensure that production is ongoing and in economic quantities. This involves reviewing regulatory filings that show the volumes of oil or gas produced, the revenue generated, and whether the operator is continuing to meet their obligations.

Many states have publicly accessible databases where you can pull historical production data, lease details, and operator performance to verify the asset's viability.

Lease Terms:
When purchasing a lease, make sure you understand the full terms of the agreement. This includes:

- **Royalty rates:** What percentage of production revenue goes to the mineral owner?
- **Obligations** for the operator: Are there specific production or drilling targets?
- **Termination clause:** Under what conditions can the lease be terminated?

Importance of Clear Title and Production
In oil and gas, having **clear title** to the mineral rights is crucial to avoid any legal disputes or future challenges to your ownership. The title must be thoroughly vetted, and **any defects in the title** must be resolved before closing the deal. Working with a professional **landman** or title company specializing in mineral rights is essential to ensure that all documentation is in order and that you are purchasing a legitimate interest in the lease.

Additionally, verifying **ongoing production** is key to ensuring that the lease is **still active** and held by production. Without active production, the value of the lease diminishes significantly. This makes **due diligence** on production data, lease terms, and operator performance vital to any lease

OIL & GAS LEASES

acquisition.

Working Interest:
One of the simplest and most crucial distinctions between working interests and mineral interests (or royalty interests) is that working interest owners are responsible for the expenses associated with drilling and production, while mineral or royalty interest owners are not.

Working Interest:
Pays for expenses. If you hold a working interest, you are directly involved in the operations and financial responsibilities of the well. This means you are responsible for your share of the costs of drilling, completing, and producing the well. These expenses include:

- Drilling costs
- Completion costs (e.g., hydraulic fracturing, well completion services)
- Operating and maintenance costs (e.g., equipment, labor, and materials to keep the well producing)
- Environmental compliance and other regulatory requirements

While a working interest provides significant revenue potential, it also comes with a higher level of financial risk. If the well doesn't produce as expected or operational costs run high, the working interest owner could end up **paying out more in expenses** than they receive in revenue. The **reward**, however, is a potentially larger share of the profits when the well is productive.

Mineral Interest / Royalty Interest:
Does not pay for expenses. In contrast, mineral interest or royalty interest owners are not responsible for any of the costs associated with drilling or production. These owners hold a passive interest and receive royalties from the production of oil or gas on their land. This means they get a percentage of the revenue generated from the sale of the oil or gas but do not contribute financially to the development or operational costs of the well.

- The royalty payment is a **set percentage of gross production,** typically negotiated in the lease agreement.
- While royalty owners are not exposed to the operational risks or expenses, their revenue is dependent on the well's

OIL & GAS LEASES

production and the fluctuating process of oil or gas.

In Summary:

1. **Working Interest = More Risk, More Reward:** Investors pay for the expenses of drilling and production but receive a larger share of the revenue if the well is successful.
2. **Mineral/Royalty Interest = Less Risk, Less Involvement:** Investors don't pay for any operational costs, but receive a smaller percentage of the revenue, usually in the form of royalties.

This fundamental distinction is a key consideration for investors looking to participate in oil and gas projects. If an investor is comfortable with greater financial risk and wants a larger potential payoff, a working interest may be more attractive. On the other hand, if an investor prefers a more passive investment with less financial exposure, a royalty interest might be the better option.

Operated Working Interest:
Operator (or Majority Working Interest): This is typically a majority stakeholder in the well, often a large oil company like Exxon, Chevron, or Continental Resources. The operator is responsible for managing the well—this includes overseeing the entire process, from drilling and completing the well to day-to-day operations and maintenance.

- The operator makes key decisions on how the well is developed, manages the logistics, handles safety and environmental compliance, and directly oversees production.
- They are the active participant and are responsible for all operational aspects, which means they also bear the full financial responsibility for ensuring the well is completed and produces as expected.
- Typically, operators have the largest stake in the well, but they don't always own 100% of the working interest.

Non-Operated Working Interest:
Non-Operative Working Interest Owners. These are investors or companies that have purchased a share of the working interest in the well but do not participate in the actual operations. They own an **undivided interest** in the well, meaning they share in both the expenses and

OIL & GAS LEASES

revenue.

Key Differences
Control & Decision-Making:

- **Operated Working Interest:** The operator has full control and decision-making power regarding the well's development and operations.
- **Non-Operated Working Interest:** Non-operators do not have a say in how the well is run; they simply share the financial aspects (costs and revenues).

Financial Responsibility:

- Both operated and non-operated working interest owners are responsible for their share of the expenses, but non-operators rely on the operator to manage those expenses effectively.
- Non-operating interest holders don't have to worry about running the well themselves but still bear the financial risks if costs exceed projections.

Operational Role:

- **Operated Working Interest:** The operator is actively involved in the execution of drilling, completing, and producing the well.
- **Non-Operated Working Interest:** These owners have an undivided ownership in the well but are not responsible for any hands-on operations. They are passive participants in the day-to-day operations but active in terms of financial participation.

This distinction is important for investors to understand because while both operated and non-operated working interest owners share in the financial outcomes, the **level of involvement** and **control** differs significantly. Non-operating working interests can be attractive to investors who want exposure to oil and gas production without having to manage the complexities of day-to-day operations, but they still need to carefully assess the capabilities and trustworthiness of the **operator** they are partnering with.

The Structure of the Deal:
A common scenario in the oil and gas industry is where an investor or smaller entity **buys a lease from a royalty owner**, then **partners with a major producer** to develop the well. In this arrangement,

OIL & GAS LEASES

the major producer operates the lease while the investor retains a non-operated working interest in the well.

Here's a breakdown of how this works:

Buying the Lease from a Royalty Owner:
As the investor, you buy a lease from the mineral or royalty owner, agreeing to pay them a royalty percentage from the production (e.g., 15% to 25%). This gives you the right to explore and develop the minerals under that land, but you still owe a portion of the production revenue to the original mineral owner as royalties.

Partnering with a Major Producer:
Instead of taking on the operational risk yourself, you partner with a major producer who has the resources, expertise, and capital to drill and operate

Sharing Costs and Revenues (80/20):
In this 80/20 split, the major producer, the operator, will handle all the logistics, management, and execution of the drilling and production, while you, as the non-operating partner, share in the costs and revenues based on your ownership percentage.

If the well is successful, you get 20% of the profits after covering 20% of the drilling and production costs. This allows you to ride the investment without taking on the full operational responsibility.

Why Majors Prefer Working Interest Partners:

Risk Management:
Major producers often prefer not to own 100% of the working interest in a well because it involves taking on too much risk. By having working interest partners, they can spread the financial risk and make their dollars go further. This is particularly important in exploratory wells or new fields, where the outcomes are uncertain.

Capital Efficiency:
Sharing the costs of drilling and operating the well with partners allows the operator to maximize their capital across multiple wells. For example, if a major company only retains 80% working interest in several wells, they can drill more wells with the same capital, rather than committing all their resources to fewer wells.

Technical Partners and Expertise:

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Working Interest partners are often highly technical groups, such as engineering firms or geologic consultancies, that bring valuable expertise to the table. While they may not operate the well, they often contribute **technical insights** that can improve the well's design, execution, or completion.

Major Producers will typically run **ideas and plans** past their working interest partners, particularly when dealing with complex geologies or challenging drilling environments. A **good engineering firm** or **geologic team** can bring innovative ideas and technical solutions to ensure that the well is drilled and completed successfully.

This collaborative approach helps reduce risks, improve efficiencies, and maximize the well's potential. By partnering with technical teams and geologists, the operator ensures they are taking the best possible approach based on the subsurface conditions and engineering challenges.

Benefits of This Approach
Leverage Major Producer's Experience:
The investor, as the non-operating partner, benefit from the major producer's operational expertise and financial strength. You don't have to worry about managing the well directly but can still have share in the profits.

Risk Sharing:
By partnering with a major producer, you mitigate the financial risk by only taking on 20% of the costs. The major producer, who takes the lead, absorbs most of the risk but also the majority of the rewards.

Technical Advantage:
By working with technical experts, the well is more likely to be drilled and completed successfully. This collaborative approach between the operator, geologists, and engineers ensures that technical challenges are addressed, and that the well's production potential is maximized.

Reduced Capital Outlay:
For both the major producer and the investor, the capital investment required for each well is reduced, which allows both parties to invest in more wells or spread their investment across more projects.

OIL & GAS LEASES

In this type of structure, the non-operating working interest investor buys a lease from a royalty owner, retains a percentage of the working interest, and then partners with a major producer to operate the well. The **80/20 revenue and cost sharing model** allow the non-operator to ride the investment while letting the major producer take the lead in operations. This approach allows the major to reduce their risk and spread their capital more efficiently, while the non-operator shares in the profits without the operational burden. Additionally, technical groups often play a crucial role in ensuring the well is designed and executed successfully, adding value to both the operator and the working interest partners.

Flexibility in Non-Operated Working Interests:
A common and flexible investment strategy in the oil and gas industry is when investors participate in existing wells or new drilling projects without being required to commit to every opportunity. This structure gives investors the right, but not the obligation, to participate in drilling new wells or acquiring non-operated interests in existing wells. There are benefits to this flexibility.

Investing in Existing Wells:
As an investor, you can buy into an **existing non-operated working interest** in wells that are already producing. This gives you the opportunity to immediately **generate cash flow** from wells that are already drilled, tested, and producing oil or gas, without waiting for a new well to be developed.

Because you're buying into an existing well, you have access to **production history** and can see how the well has performed, allowing you to make more informed decisions about the potential return on investment.

You are not obligated to commit to future drilling in the field, which gives you flexibility to pick and choose your level of involvement.

Joint Development Agreements (JDA):
In some cases, an operator and an **investment group** may jointly own or have access to a large acreage position, sometimes hundreds of thousands of acres. To develop these assets, they enter a Joint Development

OIL & GAS LEASES

Agreement (JDA), where both parties agree to collaborate on the development of new wells and share in the costs and revenues.

The investment group, which might include non-operating partners and technical teams, work closely with the operator to identify new assets or target areas for drilling. This partnership allows the technical team to conduct detailed geological and engineering analysis to select the best areas for new wells.

Option to Participate:
A key feature of many non-operated working interest agreements is that you have the option, but not the obligation, to participate in new wells. For example, after entering a joint development agreement, the operator may identify a target and propose drilling 100-120 wells in a particular area. As a non-operated working interest holder, you can decide on a well-by-well basis whether to participate.

If the technical team reviews a target and believes it has strong potential, you might choose to **exercise your option** and invest in the well. This allows you to share in the drilling costs and, if successful, receive a proportionate share of the revenue. However, if you're not interested in a particular area or well, you can choose to **pass** on that opportunity without incurring any costs.

This flexibility allows you to allocate your capital more efficiently, only investing in wells or fields that align with your risk profile or financial goals.

Proposing Wells:
In some joint development agreements, the technical team or investment group also has the right to propose wells in areas they find attractive. If the technical team identifies a high-potential target, they can recommend that the operator drill a well in that location.

The process is collaborative: the operator and non-operating partners share their insights, and the technical team proposes new wells based on their analysis. If both parties agree, they move forward with drilling.

This flexibility goes both ways. If the operator proposes a well and the non-operated partner decides to pass on that opportunity, the operator can find

OIL & GAS LEASES

another partner or operator to drill the well. Likewise, if the technical team proposes a well and the operator isn't interested, they can seek out another operator to pursue the project.

Benefits of this Flexible Structure:
Selective Investment:
The ability to choose which wells to invest in allows non-operated working interest holders to be **selective** in how they deploy their capital. You don't have to commit to every opportunity, which reduces financial risk and ensures you're only involved in wells or areas that align with your strategy.

Collaborative Development:
The partnership between the operator and non-operated working interest holders, including the technical team, brings together different perspectives and areas of expertise. This collaboration can lead to better decision-making and **improved results**, as the technical team provides detailed analysis on where to drill and the operator handles the execution.

Diversification:
By having access to a large acreage position, you have the option to **diversify** your investment across multiple wells, fields, or even different geological formations. Rather than committing all your capital to a single well or field, you can spread your investment over a **portfolio of wells**, reducing your overall risk.

Lower Risk:
The ability to invest in **existing wells** or participate in **new drilling** on a well-by-well basis significantly lowers your risk. For existing wells, you have the benefit of reviewing historical production data before investing. For new wells, you can rely on the **technical team's analysis** to make informed decisions.

Collaborative Risk Management:
The technical group and operator share ideas and insights. By working together and pooling expertise, both parties help manage **geological and engineering risks**. Good engineering and geological analysis can improve well design, minimize costs, and increase the chances of success.

Capital Efficiency:
This approach allows operators and non-operated working interest holders to make their capital go further. Instead of

OIL & GAS LEASES

committing to every project, the ability to selectively participate in high-potential wells ensures that capital is deployed where it's most likely to generate a return.

This **flexible investment model** in non-operated working interests provides a lot of opportunities for investors to tailor their participation based on their risk tolerance, financial goals, and technical assessments. By partnering with a major operator through a joint development agreement, non-operating partners can leverage the operator's expertise while retaining the option to participate in new drilling opportunities. This approach allows for **selective involvement**, collaboration on new well proposals, and a diversified portfolio of wells, giving investors the chance to **ride the investment** while reducing risk and making more efficient use of their capital.

WILDCATTING VS. INFILL DRILLING

In today's oil and gas landscape, there is a contrast between wildcatting (exploratory drilling) and infill drilling, and how these strategies impact both the risk profile and investment approach for those involved in non-operated working interests.

1. Wildcatting vs. Infill Drilling
Wildcatting (Exploratory Drilling):
Wildcat wells are drilled in areas where little to no drilling has been done before, often far from existing production. These wells are drilled with the hope of discovering new oil or gas reserves in **unexplored basins** or regions where geological data suggests there may be hydrocarbons, but it hasn't been proven by existing wells.

High Risk, High Reward:
Wildcatting involves significant geologic risk because you're drilling in areas where the presence of oil or gas is not yet confirmed. If successful, these wells can offer high rewards by opening up new fields or plays that have not yet been developed. However, the majority of wildcat wells often turn out to be dry holes or non-commercially viable.

10 Years Ago vs. Today:
Ten years ago, much of the industry was focused on exploration, with geologists and engineers testing the potential of **new basins** through wildcat wells. However, today, there is much more emphasis on **infill drilling** in proven fields rather than wildcatting. The industry has matured, and conservative investors tend to focus more on **lower-risk, proven reserves**.

2. Infill Drilling:
Infill wells are drilled in areas that are already **proven** and **producing**, typically within existing fields or basins where there is known production. These wells are drilled to "fill out" the development of a field, often referred to as drilling **child wells** off a **parent well**.

Lower Geological Risk:
Since infill drilling is done in areas where production is already established, the **geologic risk** is significantly lower than wildcatting. The geological characteristics of the reservoir are well-known, and the **mineral structure** is clearly defined. The focus is on maximizing the extraction of hydrocarbons from already-proven

WILDCATTING VS. INFILL DRILLING

reserves.

Development Potential:
For investors, infill drilling represents a more **conservative investment**. The risk is lower because you're drilling in areas where the **reservoir is already understood**, and you're building on the success of prior wells. That said, while geological risk is lower, there's still mechanical risk (whether the well will perform as expected), and **commodity price risk** (whether oil and gas prices will support the economic viability of production).

Understanding Reserve Classifications and Risk with Infill Drilling
To better understand the **risk profiles** of oil and gas wells, industry standards (e.g., from the **SEC** or **Society of Petroleum Engineers**) use specific terms to describe reserves based on their level of development and associated risk. This helps investors gauge the potential risks and returns on different types of wells. Here's how reserves are classified:

Proved Reserves:
These are reserves that are known to exist and are expected to be economically producible under current conditions. Proved reserves are broken down into different categories:

- **Proved Producing**: These are **wells already producing** hydrocarbons. They carry the least risk because production is already happening, and the reservoir has been confirmed.
- **Proved Behind Pipe**: These reserves are in a **producing wellbore**, but the particular reservoir they are located in has not yet been tapped or completed. They are essentially waiting to be developed but are in a well that is already producing economic quantities of hydrocarbons. This also represents a lower risk since the well is already operational.
- **Proved Developed Non-Producing**: The well has been **drilled** and the **reservoir has been established**, but production has not yet started. This could be due to infrastructure delays, waiting for completion, or economic reasons. The geological risk is very low because the reserves are known, but the well isn't producing yet.

WILDCATTING VS. INFILL DRILLING

Proved Undeveloped Reserves (PUDS):

- These reserves are in areas where **production has not yet started**, but the geological data suggests that commercial production is highly likely. For instance, there might be an **offset well** nearby that has demonstrated it can produce commercially, giving confidence that a new well drilled into this area will also produce.
- **Geological Risk Reduced**: Since **offset wells** have proven the geology of the area, the risk is much lower than wildcatting. There might still be some geological variability (Mother Nature can surprise with faults or folds), but the **completion percentages** are generally high (often **80% or more**).
- This makes drilling into proved undeveloped reserves far less risky than wildcatting, but there's still some mechanical risk related to well completion and operational execution.

Risk Management in Infill Drilling

Investors focusing on **infill drilling** are typically more **risk-averse** and prefer to invest in **proven reserves** rather than taking big bets on exploratory wildcat wells. While geological risk is largely mitigated in infill drilling, other risks remain:

1. Mechanical Risk:

- Even in proven areas, there's still the chance that something could go wrong in the drilling or completion process. For instance, the well might not be properly completed, or there could be issues with wellbore integrity or equipment failures.
- However, with the success rate for completions in proven basins being 80% or higher, this risk is relatively low compared to the uncertainties of wildcatting.

2. Commodity Price Risk:

- Once production starts, the revenue you generate from a well is highly dependent on the price of oil or gas in the market. Even a successful well can become economically unviable if commodity prices drop significantly. This is a key risk for all oil and gas investments, whether infill drilling or wildcatting.

In today's. oil and gas industry, infill

WILDCATTING VS. INFILL DRILLING

drilling has become more common and preferred by conservative investors because it offers lower geological risk compared to wildcatting. Infill wells are drilled in proven fields where the geology is well understood, and reserves are more predictable, allowing investors to take the geologic risk off the table. What remains are mechanical risks and commodity price risks, which still need to be carefully managed.

For investors looking at non-operating interests, focusing on wells classified as proved reserves or proved undeveloped reserves (PUDs) can offer a more conservative pathway to returns. The drilling success rates in these areas are higher because the geology is known, and the risks are more about **execution and market conditions** rather than the uncertainty of finding hydrocarbons in the first place.

This shift in the industry from exploratory drilling to more **development-focused strategies** allows for more **predictable investments** and capital efficiency, appealing to those looking for **lower-risk oil and gas opportunities.**

Drill Co Opportunities and Return Viability:
Drill co opportunities are deals where an operator offers investors the chance to participate in the drilling of wells. These can be infill wells in known, producing basins, or wildcat wells in more speculative areas.

The potential return can vary widely—from 100% return (or more) if the well is successful, to a 0% return if the well is not commercially viable. This is the inherent risk of oil and gas investing, but the structuring of the deal and the operator's intentions can greatly influence the actual risk you're taking on.

Unethical Practices and Geological Risk:
One unethical strategy sometimes used by operators is to hold a small percentage of the working interest (e.g., 5%) while trying to sell the remaining 95% interest to outside investors. The operator knows that the geologic risk is high, but they attempt to offload most of the financial risk onto others while keeping a small stake to hedge their position.

The operator may use aggressive marketing or promises of high returns to

WILDCATTING VS. INFILL DRILLING

attract investors, but they are using others' capital to take on a project they're not fully committed to themselves.

In some cases, the operator will then **de-risk the initial well** by bringing in an outside company to invest in the high-risk phase. Once the first well is drilled and proves out the geology (or fails), the operator might retain **100% interest** in the surrounding wells (offsets), leaving investors stuck with the higher-risk portion and the operator benefiting from the now-de-risked area.

Red Flags to Watch Out For:
To protect yourself from falling into these traps, here are several yellow flags you should look for when evaluating an oil and gas deal:

Operator's Interest:
Check the operator's stake in the well. If the operator only has a small working interest (e.g., 5%) and is trying to sell off the majority (95%), **this can be a sign that they are not confident in the well's prospects.** Operators who believe in the well will often retain a significant working interest.

If they aren't willing to take on a substantial **financial commitment**, it's worth questioning why they're looking to offload so much risk.

Geologic Risk:
Understand the geologic risk involved in the well. Is this a wildcat well with high uncertainty, or is it an infill well in a proven basin? If the operator is using **vague terms** or not providing clear geological data, that's a red flag. Look for deals where the geological risk has been clearly assessed and explained.

If the deal doesn't include **technical reports or third-party evaluations** of the reservoir, proceed with caution.

Ownership of Future Wells:
Ask yourself: What is my ownership if the well is successful? Will you retain a stake in the surrounding wells (offsets), or does the operator retain 100% interest in the next wells after the first one proves out?

Be careful of deals where the operator uses your investment to de-risk a single well but **retains all the rights** to future offset wells. You want to ensure you have a stake in the **entire project**, not

WILDCATTING VS. INFILL DRILLING

just the highest-risk portion.

Full Development Plan:
Make sure to evaluate **wells 2, 3, and 4**, not just the first well. A well-planned development strategy should include a **long-term vision** for the area, not just one well. The operator should be transparent about how they plan to develop the entire lease or field.

If the operator is only talking about a **single well** with no mention of future wells, that can be a sign they're not looking to develop the area fully, or worse, that they plan to keep the future profits for themselves.

Turn-Off Risks:
Be aware that operators can sometimes **"turn off"** a successful first well, stop production, and focus their efforts on drilling offset wells where they retain **100% of the interest**. This leaves the original investors without ongoing production revenue while the operator captures all the profits from the surrounding wells.

Ensure that your investment agreement **protects your interests** in the broader field and secures your **rights to future production**.

Due Diligence on the Operator:
Do thorough due diligence on the operator. Investigate their history with other projects, their reputation in the industry, and how they've handled previous deals. Operators with a history of **selling off risk** or engaging in unethical practices will likely continue those patterns.

A transparent operator should provide **detailed information** on the project, including geology, production forecasts, and a clear breakdown of costs and revenues.

Protecting Your INvestment:
Get Legal and Technical Advice:
Always have an **oil and gas attorney** review the deal structure and ensure you're protected in the agreement. Additionally, working with a technical consultant or geologist to evaluate the project can help you assess the true risks involved.

Avoid Overly Aggressive Marketing:
If a deal seems too good to be true or

WILDCATTING VS. INFILL DRILLING

is marketed with **guaranteed high returns**, be skeptical. While oil and gas investments can be profitable, they are rarely without risk, and anyone promising huge returns without acknowledging the risks should be questioned.

Diversify Your Investments:
Instead of putting all your capital into one deal, diversify your investments across multiple projects or wells. This can help mitigate the risk of any single well failing or underperforming.

In the oil and gas industry, while there are **legitimate opportunities** for high returns, there are also potential pitfalls, especially when operators use tactics to offload **geological risk** onto investors. Look out for **yellow flags** such as an operator holding a small interest while selling the majority, not retaining a stake in future wells, or turning off production to focus on de-risked offsets. By being diligent, asking the right questions, and carefully evaluating each deal, investors can protect themselves from falling into unethical traps and increase their chances of participating in **profitable ventures**.

When evaluating **key risk factors** in oil and gas investing, it's important to take a big-picture view of the environment and operational conditions. For **new investors**, it's crucial to assess the following factors before committing capital to any project:

Key Risk Factors to Include:
1. Geology:
The foundation of any oil and gas project is the geology—the rock itself and its **ability to produce hydrocarbons.** Understanding the geological characteristics of the area is critical in determining whether a well can be successful.

Investors need to ask: **What's producing around it?** The success of nearby wells can provide insight into the potential of a new project. If wells in the surrounding reservoirs have demonstrated consistent production, there's a higher likelihood that the new project will perform similarly.

Look at the **qualities and quantities** of oil and natural gas produced from **neighboring reservoirs**. Has production been steady or has there been a

WILDCATTING VS. INFILL DRILLING

decline? Are there significant geological challenges that could impact new drilling?

2. Commodity Price and Market Transportation:
The commodity price of oil and gas directly affects the profitability of any well. Investors should understand current and projected market conditions. Even a high performing well may become economically unviable if oil or gas prices decline significantly.

Market transportation is also key. Can the product be easily transported to market? Are there existing pipelines, refineries, or processing plants nearby, or will infrastructure need to be built, adding to the cost?

Ensure there is **infrastructure in place** to get the product from the well to the market efficiently, as this directly affects costs and profitability.

Operator Track Record:
The operator is one of the most critical factors in determining the success of an oil and gas project. Their **experience, financial health,** and **track record** on previous projects should be evaluated.

How have they performed on other wells? Have they been able to bring wells to production on time and within budget? Look at **historical performance** and assess if they have a reputation for delivering results.

Financial stability is important, too. If the operator lacks the capital to handle unforeseen challenges, the project may stall or fail. Consider their **financials**, including any **debt obligations** and how they've handled previous project budgets (did they meet the budget? Were they over or under?).

Drilling and Mechanical Risk:
Even in proven areas, there's always **mechanical risk** involved in drilling. The quality of the **drilling plan** and the ability to execute it can make or break a project. Have there been mechanical issues in nearby wells?

This includes the risk of **blowouts**, **wellbore instability**, or failures in **casing and completion**. The best geology can still be wasted if there are mechanical

WILDCATTING VS. INFILL DRILLING

failures or drilling inefficiencies.

Ensure that the **technical team** overseeing the drilling has a good track record and that they are using **modern equipment** and **best practices** in well completion.

ESG Considerations:
Today, Environmental, Social, and Governance (ESG) factors are becoming increasingly important, not just from a regulatory perspective but also for investor confidence and public relations.

Are the operator and project **environmentally responsible**? How do they handle **wastewater, emissions**, and other environmental impacts? Will the project meet **local regulations** and international standards?

The importance of ESG in oil and gas investing cannot be overstated, as poor environmental practices can lead to fines, reputational damage, and challenges in securing financing.

Services and Support:

Oil and gas drilling requires numerous services, such as geologists, engineers, drilling contractors, and equipment suppliers. The availability, quality, and **cost of these service**s can significantly impact the success of the project.

Ensure that the necessary **support services** are available in the region and that the **supply chain** is reliable. Delays in getting equipment or specialized personnel can lead to **cost overruns** and production delays.

Key Due Diligence Considerations:
1. Track Record of the Operator:
Always assess the operator's track record. Have they consistently delivered on their drilling programs? Are they known for hitting budget targets, or do they frequently experience cost overruns? Review their financial statements and past performance to ensure they have the experience and capability to execute the project successfully.

2. Geological Assessments
Ask for a detailed geological assessment. What data is available on the **rock formations** in the area?

WILDCATTING VS. INFILL DRILLING

Has the operator conducted **seismic surveys** or used other techniques to assess the potential of the reservoir? The better the geological information, the more informed your investment decision can be.

Financial Analysis:
Evaluate the financial health of the operator and the project. Are there any hidden costs or liabilities? What are the projected return on investment (ROI) and **payback period** based on current and forecasted commodity prices?

Operational Plan:
Review the operational plan for the well. Does the operator have a clear timeline for drilling, completing, and bringing the well to production? What **contingencies** are in place for mechanical issues or delays?

Production History of Surrounding Wells:
Look at the production history of nearby wells. How much oil or gas has been produced, and over what period? Are there signs of **declining production**, or is the field still producing strong volumes?

For new investors in oil and gas, it's critical to conduct thorough due diligence across these key risk factors before committing to any project. Understanding the **geology**, the **commodity price** environment, and the **operator's track record** is essential in mitigating risk and improving your chances of success. Carefully reviewing **production histories** from neighboring wells and ensuring the **financial health** of the operator are also important steps in protecting your investment. The oil and gas industry can offer high returns, but it requires **vigilance** and a well-informed strategy to navigate the inherent risks.

MOTHER NATURE & COMMODITY PRICES

In the oil and gas industry, two of the biggest risks that investors and operators face are Mother Nature and commodity prices—both of which are notoriously difficult, if not impossible, to control.

The Challenge of Controlling Mother Nature:

1. Understanding but Not Controlling:
While modern geology and technology have improved our ability to understand **subsurface formations,** the **complexities of geology** mean that there will always be uncertainty. You can analyze rock formations, study seismic data, and use the best engineering practices available, but at the end of the day, **Mother Nature doesn't always cooperate.**

Even in areas with proven production, there may be **unexpected faults, folds,** or **pressure changes** that can affect how much oil or gas can be extracted and at what rate. Reservoirs are not always consistent in their behavior, and factors like **permeability**, **porosity**, and **pressure** can vary within the same formation, making it difficult to predict with certainty how a well will perform over time.

2. Geological Variability:
Despite all efforts to map out reservoirs and understand their characteristics, there's always the risk that **drilling might not hit the sweet spot.** Even in infill drilling, where geology is better understood, **unexpected challenges** can arise, such as pockets of non-commercial rock, unexpected water ingress, or pressure depletion.

While technology like horizontal drilling and hydraulic fracturing has revolutionized the ability to extract hydrocarbons from difficult formations like shale, there's always some level of geological risk that can't be fully mitigated.

Commodity Price Volatility:
1. Uncontrollable Market Forces:

MOTHER NATURE & COMMODITY PRICES

Commodity prices, particularly for oil and gas, are extremely volatile and are influenced by a wide range of factors beyond any single company's control. Prices can swing dramatically based on **global supply and demand**, **geopolitical tensions,** and even natural disasters.

For instance, shifts in **OPEC policies**, political instability in major oil-producing regions, or sudden changes in demand due to economic recessions or, as we saw recently, pandemics like COVID-19, can cause wild fluctuations in prices. These external factors can make it difficult for operators to plan for long-term profitability, as their revenue is tied directly to the market price of oil and gas.

2. Geopolitical Factors:
Global geopolitics play a huge role in determining the **supply of oil and gas**. Conflicts in key producing regions, such as the Middle East, or **sanctions** on major producers like **Russia**, can dramatically affect global oil supply and drive prices up or down.

For example, recent geopolitical issues like the **Russia-Ukraine conflict** have caused significant disruptions in energy markets, leading to fluctuations in supply and price volatility. Countries or regions that are heavily reliant on energy imports or exports can see their economies fluctuate drastically based on these events.

3. Mitigating Commodity Price Risk with Hedging:
One of the main tools companies use to mitigate commodity price risk is hedging. By locking in future prices through **hedging contracts** (such as futures, options, or swaps), companies can create a **baseline cash flow** that provides some financial stability, even if market prices fall.

Hedging allows operators to smooth out the volatility of the market, ensuring that they have a **guaranteed price** for a

MOTHER NATURE & COMMODITY PRICES

portion of their production. However, hedging is not without its downsides—it can limit upside potential if prices rise significantly, and it requires careful management to avoid being locked into unfavorable contracts.

The goal with hedging is to create a stable financial foundation, ensuring that the company can cover its operating costs and maintain **cash flow**, regardless of market conditions. This can be especially important in periods of low prices or **price crashes**.

4. All Over the Map:
Commodity prices are indeed "all over the map." One month oil prices may be soaring due to supply constraints, and the next month they could be crashing due to oversupply or reduced demand. This kind of volatility can make it challenging for investors to predict the returns on their investment.

Long-term planning in the oil and gas industry often requires anticipating potential downturns and ensuring that operations can remain profitable even when prices are low. For example, an operator might decide to halt production or delay drilling if prices fall too low, waiting for a more favorable market.

Global Uncertainty and the Geopolitical Landscape:
1. Geopolitical Risk:
The current global environment is particularly unstable, with ongoing conflicts, energy crises, and political tensions affecting commodity prices. For instance, **European energy shortages** due to disruptions in Russian natural gas supply have driven **global demand for LNG (liquefied natural gas)**, while OPEC's production cuts and sanctions have impacted global oil supply.

Renewable energy policies, trade wars, and climate regulations are also shaping the long-term outlook for oil and gas prices. Some governments are pushing for faster transitions to renewable

MOTHER NATURE & COMMODITY PRICES

energy, which could dampen demand for fossil fuels over time. However, short-term demand for oil and gas remains strong as the world's economy continues to rely on these resources.

Impact on Investments:
For investors, this uncertainty means that oil and gas investments can be both high-risk and high reward. Global events can dramatically alter the market landscape in ways that are difficult to predict, making it important to stay informed and have a strategy in place to mitigate downside risk.

While **hedging** helps mitigate some of the commodity price risks, many investors are looking at **diversification** to reduce their exposure. This might involve spreading investments across different projects, regions, or even commodities (such as natural gas, oil, and LNG) to hedge against price swings in a specific market.

In the oil and gas industry, the challenges posed by Mother Nature and commodity price volatility are constant realities. While geological risk can be reduced through technology and understanding, it can never be fully eliminated. Likewise, commodity prices are driven by global forces—geopolitics, supply and demand, and economic factors—that are beyond any single company's control.

However, some mitigation strategies, such as hedging, can provide a cushion by ensuring a baseline cash flow, especially in volatile markets. Still, it's essential to recognize that even the best planning can't fully insulate an operation from the unpredictability of commodity markets or the natural variability of geology.

Ultimately, success in oil and gas investing requires a keen understanding of these risks, smart financial strategies to mitigate them, and realistic expectations about the uncertainties inherent in the industry, particularly in the

MOTHER NATURE & COMMODITY PRICES

face of today's complex geopolitical environment.

While ESG (Environmental, Social, and Governance) is an overly used term, it is important to highlight regulatory risk factors as major risks for oil and gas investments. These are becoming increasingly critical in today's industry landscape, especially as governments, environmental agencies, and **activist investors** exert more influence over where and how companies can operate. Here's a deeper diver into how regulation and ESG concerns impact oil and gas operations:

Regulatory Risk:
1. Permitting Delays and Inconsistencies:
A significant regulatory risk in the oil and gas industry is the **time it takes to secure permits** to drill. This can vary dramatically from one region to another.

In Oklahoma, which is generally considered to be pro-business and oil-friendly, securing a drilling permit might only take a month.

In contrast, in states like Colorado, where there are stricter regulations and more bureaucratic hurdles, it can take up to three years to get a permit. This makes the process far less predictable and can delay projects significantly.

Federal lands and other protected areas are also increasingly subject to more stringent regulations, with environmental impact assessments required before drilling can begin. Bureaucratic backlogs, environmental review requirements, and public opposition can all delay or stop projects, increasing costs for companies.

2. Mineral Acreage Being Taken Off the Table:
Regulatory changes and new government policies are leading to significant areas of mineral acreage being taken off the table. For example, bans on new oil and gas leases in

MOTHER NATURE & COMMODITY PRICES

certain regions or the imposition of **moratoriums on fracking** can greatly reduce the amount of land available for exploration and production.

Governments, particularly in places like **California** or **Europe**, are pushing for a transition away from fossil fuels, and this has led to the closure of certain oil and gas fields or restrictions on new development. This shift is occurring even as demand for oil and gas remains strong, creating a difficult balance for operators trying to plan long-term projects.

3. Local and Federal Regulations:
Both local and federal regulations have become more stringent in recent years. On a local level, municipalities might impose their own zoning restrictions or ordinances that limit oil and gas development. On a federal level, regulations such as those enforced by the Environmental Protection Agency (EPA) in the U.S. can impose additional compliance costs and delays.

Internationally, different countries have their own regulatory frameworks, which may be influenced by international climate agreements, trade policies, or political changes. Operators working in emerging markets may face even greater uncertainty due to changing political landscapes and evolving regulations.

4. Regulatory Risk for Investors:
For investors, regulatory risk means that projects can be delayed, canceled, or face additional costs due to changes in permitting rules or environmental requirements. This is especially problematic for companies operating in regions where regulations are constantly evolving or where public opposition to oil and gas projects is strong.

In areas where regulatory risk is high, such as Colorado or California, investors should expect longer timelines, higher compliance costs, and increased scrutiny from both government bodies and environmental groups.

MOTHER NATURE & COMMODITY PRICES

ESG (Environmental, Social, and Governance) Factors:

1. Environmental Concerns and Public Pressure:
Environmental regulations are becoming increasingly strict as governments and international organizations push for a transition to **renewable energy**. This has led to increased pressure on oil and gas companies to reduce **carbon emissions,** limit **flaring**, manage **wastewater**, and minimize their **environmental footprint**.

In some regions, there are now **carbon taxes** or **emissions trading systems** that penalize companies for producing greenhouse gases. These policies can add significant costs to oil and gas operations, making it harder for smaller operators to remain profitable.

Additionally, companies that don't comply with ESG standards may face **public backlash** or even **litigation** from environmental groups, which can damage their reputation and lead to costly legal battles.

2. Social and Community Impact:
Beyond environmental concerns, the social impact of oil and gas operations is also a key consideration. Companies are increasingly expected to engage with local communities, ensure safe working conditions, and promote diversity and inclusion within their workforce.

If companies are seen as neglecting their social responsibilities, they may face community opposition, labor strikes, or even boycotts. This is especially true in regions where indigenous groups or local communities are directly affected by oil and gas activities.

3. Governance and Investor Expectations:
Governance refers to the internal policies and procedures that companies use to manage risks, comply with laws, and ensure ethical behavior. Investors

MOTHER NATURE & COMMODITY PRICES

are increasingly focusing on how companies are governed, with **institutional investors** like **pension funds** and **endowments** requiring oil and gas companies to meet certain ESG benchmarks before they will commit capital.

Many **activist investors** are pushing for companies to transition away from fossil fuels or to invest heavily in **clean energy**. Companies that fail to meet these expectations may struggle to raise capital, as large investment funds shy away from businesses that aren't committed to ESG principles.

ESG ratings are now widely used by investors to assess companies' performance in these areas. Poor ESG ratings can lead to **capital flight**, where investors pull out of a company or refuse to invest due to concerns about long-term sustainability.

Example of the Impact:
A good example of the growing impact of **regulatory** and **ESG** factors can be seen in **Colorado**. Colorado's oil and gas industry has faced increasing regulatory hurdles, especially following the passage of **Senate Bill 181** in 2019, which granted local governments more control over oil and gas development and required the state to prioritize **public health and safety** over the promotion of oil and gas activities.

- As a result, the permitting process has slowed down, and **ESG-driven regulations** have added more layers of complexity for companies operating there. What might have taken a few months to get a permit a decade ago now can take **years**, leading to project delays and additional costs.
- At the same time, **investor sentiment** has shifted, and many institutional investors are prioritizing **ESG-compliant investments**, reducing the available capital for oil and gas projects in regions where the industry is facing public opposition.

MOTHER NATURE & COMMODITY PRICES

How to Mitigate Regulatory and ESG Risks:

1. Understand Local and Federal Regulations:

Before investing, make sure you fully understand the regulatory environment in the region where the project is taking place. This includes reviewing the timelines for obtaining permits, the likelihood of new regulations being imposed, and any potential moratoriums on drilling.

Be aware of whether the land in question is **federal land**, **state land**, or **private land**, as the permitting processes and regulatory oversight can differ significantly.

Monitor ESG Trends:

Stay informed about ESG trends and how they're affecting the oil and gas industry. Look for operators who have strong ESG policies in place, as this can help mitigate the risks of regulatory fines, public opposition, or lawsuits.

ESG compliance is not just about minimizing environmental impact—it also involves governance and social factors like ensuring ethical behavior, diversity, and community engagement. Companies that excel in these areas are more likely to attract **investor capital** and avoid costly disputes.

3. Hedge Against Delays:

Consider diversifying investments across multiple regions or projects to hedge against the risk of regulatory delays in one particular area. If you're focused on a region with tough regulations, be prepared for longer timelines and additional costs.

4. Engage with Local Communities:

Proactive engagement with local communities and stakeholders can help mitigate social risks. Companies that are transparent about their operations, engage with local leaders, and prioritize safety and environmental protection are more likely to gain community support and avoid opposition.

MOTHER NATURE & COMMODITY PRICES

Regulatory risk and ESG concerns are becoming increasingly important factors for oil and gas investors to consider. While geological and commodity price risks have long been recognized, the regulatory environment and ESG standards are now just as critical to the success of oil and gas projects. In some regions, projects may face significant delays due to lengthy permitting processes or public opposition driven by environmental concerns. Meanwhile, ESG considerations are playing an increasingly important role in determining where capital flows, as activist investors and regulators push for stricter environmental, social, and governance compliance. By understanding these factors and implementing strategies to mitigate them, investors can better navigate the complex and evolving oil and gas landscape.

Why It's Key to Work with State and Local Authorities:

1. Streamlining the Permitting Process:

Permitting for drilling or other oil and gas activities often involves both **state** and **local** approvals. The process can be complex, with each region having its own set of regulations, environmental standards, and zoning restrictions. By working closely with these authorities, companies can **speed up** the process and **address concerns** early on.

Developing **good relationships** with local regulators can lead to a **more efficient approval process**. For instance, in states like **Texas** or **Oklahoma**, where the regulatory environment is relatively business-friendly, operators who have strong ties with local officials may find it easier to resolve issues or receive expedited reviews.

On the other hand, in states like **Colorado**, where the regulatory process is more stringent, having open communication with **local authorities** can help address environmental or community concerns before they become stumbling blocks, reducing

MOTHER NATURE & COMMODITY PRICES

the chance of delays.

2. Navigating Local Restrictions and Policies:
Local governments have a significant say in oil and gas operations, especially when it comes to zoning, land use, and community impact. Even when a company complies with state regulations, local authorities may impose additional requirements or restrictions based on the specific needs and concerns of the community.

Some municipalities might require companies to implement additional measures to protect the local environment, public health, or infrastructure. Having a cooperative approach with local authorities can make it easier to navigate these regulations and negotiate terms that are mutually beneficial.

In regions where public opposition is high, like in some parts of Colorado or California, working with local authorities can help companies implement community engagement plans that address concerns about noise, traffic, air quality, or water use.

Ensuring Compliance:
By building strong relationships with regulatory bodies, companies can ensure they stay ahead of compliance issues. State and local regulators often have a more detailed understanding of the specific environmental and social concerns in their jurisdictions, and they can provide guidance on how to comply with evolving rules.

Proactive engagement with these authorities allows companies to be informed about potential changes in regulations or policies, such as new environmental standards, emission limits, or water use restrictions. Staying in compliance helps avoid costly penalties, legal disputes, or operational shutdowns.

Mitigating Environmental and ESG Risk:
Many state and local governments have

MOTHER NATURE & COMMODITY PRICES

a strong focus on environmental protection. By collaborating with them, companies can ensure that they are following best practices for environmental sustainability, which is essential for maintaining community support and addressing ESG (Environmental, Social, Governance) concerns.

Early engagement with state environmental agencies can help identify potential environmental risks (e.g., impact on wildlife, water sources, or air quality) and implement mitigation strategies that are acceptable to both the company and the local regulators. This can reduce the likelihood of future challenges or community opposition.

Showing a commitment to ESG principles by working closely with state and local authorities can also help attract institutional investors who are prioritizing ESG-compliant projects.

Securing Community Buy-In:

Beyond regulators, state and local authorities often represent the voice of the local community. Working with them can help oil and gas operators secure community buy-in, which is critical in regions where public sentiment towards oil and gas projects may be mixed.

Developing a **community engagement plan** in partnership with local officials can help address concerns early on. Whether it's about environmental protection, job creation, or infrastructure improvements, ensuring that the community understands the benefits of the project can lead to greater support and fewer disruptions.

In some cases, local authorities may have established procedures for public hearings or community consultations. Being transparent and engaging with the community through these official channels, in collaboration with local officials, can prevent protests or legal challenges that could otherwise delay or derail a project.

MOTHER NATURE & COMMODITY PRICES

Adapting to Regional Differences:
Different states and regions have vastly different attitudes towards oil and gas development. In **Texas**, oil and gas are a major part of the state's economy, and local authorities are often eager to support new projects. In contrast, in states like New York or California, there may be greater resistance due to environmental concerns and public pressure.

Adapting to these **regional differences** is crucial. Operators that take a cookie-cutter approach may find themselves facing unnecessary challenges if they fail to account for the local political and regulatory climates. By actively engaging with state and local authorities, companies can **tailor their operations** to fit the unique needs and expectations of each region.

For instance, in states like **Colorado**, where there are tighter environmental regulations and strong public interest in sustainable practices, oil and gas companies can benefit by aligning their strategies with local environmental initiatives and being proactive about meeting higher standards.

Leveraging State-Level Incentives:
Some states, like Texas and North Dakota, offer incentives for oil and gas development, such as **tax breaks or grants** for energy projects. By maintaining strong relationships with state authorities, companies can better understand and take advantage of these opportunities.

Working closely with **state energy agencies** can also provide access to research and development funding, especially in areas where states are looking to encourage innovation in **carbon capture**, **emissions reductions**, or **renewable energy integration** into oil and gas operations.

Key Considerations for Working with State and Local Authorities:
1. Open Communication:

MOTHER NATURE & COMMODITY PRICES

Establishing open lines of communication with state and local authorities is essential. Regular meetings and updates with regulators and local officials can help ensure that both sides are aligned and that any potential issues are addressed early in the process.

2. Understanding Local Concerns:
Engage with local communities and officials to understand their concerns. These might include environmental impacts, noise, traffic, job creation, and more. Understanding these concerns can help shape your project in a way that is more acceptable to the local population.

3. Regulatory and Legal Expertise:
Having legal and regulatory experts on your team who understand the local landscape is critical. They can help navigate **state-specific laws**, regulations, and permitting processes, ensuring that you remain in compliance and avoid costly delays.

4. Building Trust:
Developing **trust** with state and local authorities is important for the long-term success of your project. Being **transparent**, delivering on commitments, and addressing concerns promptly can go a long way in building a positive reputation and ensuring that future projects move smoothly.

In the oil and gas industry, it is essential to have strong relationships with state and local authorities. They play a critical role in the success of projects by helping to streamline regulatory processes, ensuring compliance with local laws, and securing community support. Engaging early and often with these authorities, understanding local concerns, and being flexible in addressing regulatory and ESG challenges can help companies navigate the increasingly complex landscape and achieve long-term success.

INFRASTRUCTURE IN OIL AND GAS

Infrastructure is a critical aspect of oil and oil and gas development, and its presence (or absence) can make or break the economics of a project. While a region might have rich **hydrocarbon reserves** and promising **geological potential**, without the necessary infrastructure to transport, process, and market those hydrocarbons—especially **natural gas**—even the best fields can face significant operational and financial challenges. The **Permian Basin** is a prime example of this dynamic, where oil production is booming, but the **lack of natural gas infrastructure** is causing inefficiencies and financial losses.

The Importance of Infrastructure in Oil and Gas Projects:

1. Infrastructure Bottlenecks in the Permian Basin:

The Permian Basin in West Texas and southeastern New Mexico is one of the most prolific oil-producing regions in the world. The economics of drilling in the Permian are highly favorable due to the richness of the reservoirs and the ability to produce oil from both **conventional and unconventional formations**.

However, the infrastructure needed to handle the natural gas that is produced alongside oil (known as **associated gas**) is severely lacking in many parts of the Permian. While oil pipelines are relatively well developed, the natural gas gathering, processing, and pipeline systems have not kept pace with the rapid growth in production.

2. Flaring: Wasting Natural Gas:

Because there isn't enough natural gas infrastructure in the Permian Basin to transport and process the gas, operators are often forced to flare the natural gas, which is essentially burning it off at the wellhead. Flaring is a visible indicator of the **inefficiency** in the system—large flames can be seen towering over oil fields as gas is vented and ignited.

Flaring represents a significant **waste of resources**. Not only is it an environmental issue (contributing to carbon emissions), but it's also an economic one. The gas being flared could otherwise be sold and used to generate additional revenue. Instead, operators are literally **lighting money on fire** because there aren't enough pipelines or processing plants to handle the gas.

INFRASTRUCTURE IN OIL AND GAS

In some cases, regulatory limits on how much gas can be flared are forcing operators to slow down or halt oil production because they can't manage the associated gas. This is especially problematic as flaring is coming under increasing environmental scrutiny, with both regulators and ESG-focused investors pushing for reductions in emissions.

3. Stranded Gas: An Economic Loss:
The lack of infrastructure also results in stranded gas—gas that cannot be brought to market due to the absence of pipelines or processing facilities. This can significantly reduce the profitability of a project, as operators are forced to either flare the gas or leave it in the ground.

In a situation where oil prices are high, the focus is often on maximizing oil production, but without adequate **gas takeaway capacity**, the economics of natural gas are often ignored, leading to **suboptimal resource utilization.**

4. Natural Gas Liquids (NGLs) and Processing:
In addition to methane (the main component of natural gas), associated gas often contains natural gas liquids (NGLs) such as **ethane, propane**, and **butane**, which can be valuable products. However, to separate NGLs from natural gas, operators need access to **processing plan**ts that can extract and market these liquids.

Without **proper processing infrastructure**, operators miss out on the potential to monetize these valuable byproducts. The **lack of gas processing** plants in some parts of the Permian means that a significant portion of NGLs is either burned off or left unutilized, further reducing the overall economic return of the wells.

Infrastructure Development is Key to Unlocking Value:
1. Midstream Investments:
To address the infrastructure shortfall, **midstream companies**—the companies responsible for building and operating pipelines, processing plants, and storage facilities—play a critical role in unlocking the full value of oil and gas production.

Significant investments in **new pipeline capacity** and **gas processing facilities** are needed in regions like the Permian Basin to ensure that natural gas can be

INFRASTRUCTURE IN OIL AND GAS

transported efficiently to **markets**, both domestically and internationally (e.g., through **LNG exports**).

Several pipeline projects are currently in development, such as the **Permian Highway Pipeline** and the **Whistler Pipeline**, which aim to increase the capacity to transport gas out of the Permian. These projects are crucial for reducing flaring and ensuring that associated gas can be brought to market.

2. Economic and Environmental Impact:
Investing in infrastructure not only has economic benefits—allowing companies to monetize natural gas that would otherwise be flared—but it also has significant environmental benefits. Reducing flaring helps lower greenhouse gas emissions, making the industry more sustainable and improving its ESG standing.

For investors, the ability to transport and market natural gas adds an additional revenue stream, potentially improving the overall return on investment for oil and gas projects. It also opens up opportunities for LNG exports, which are expected to grow as global demand for cleaner-burning natural gas increases.

3. Regulatory Pressure and ESG Considerations:
The lack of infrastructure is also becoming a regulatory issue. States like **Texas and New Mexico are imposing limits on flaring**, which could force companies to either invest in infrastructure or curtail production. At the same time, investors with ESG mandates are demanding that companies reduce their environmental footprint, which includes minimizing flaring and methane emissions.

Building out infrastructure to handle gas in an environmentally responsible way is critical to ensuring that companies can meet regulatory and ESG requirements while continuing to operate profitably.

4. Timing and Investment Cycles:
Infrastructure development takes time, often several years, from the initial planning stages to construction and operation. Companies need to **plan ahead** to ensure that infrastructure will be in place by the time new production comes online. **Midstream bottlenecks** can delay the overall development of a

INFRASTRUCTURE IN OIL AND GAS

basin and prevent operators from fully exploiting their assets.

As oil and gas production grows in regions like the Permian, companies will need to coordinate with **midstream providers** to ensure that pipelines, gas processing plants, and storage facilities are developed in tandem with upstream production.

While oil production in regions like the Permian Basin offers some of the best economics in the world, the **lack of natural gas infrastructure** presents a significant challenge. Without adequate pipelines and processing facilities, operators are forced to flare valuable natural gas, leading to financial losses and environmental concerns.

To fully unlock the value of both oil and natural gas in these regions, significant **midstream investments** are required. Building out the necessary infrastructure will not only reduce flaring but also create additional revenue streams from natural gas and NGLs. For operators and investors, ensuring that infrastructure is in place is key to achieving **long-term success** in the oil and gas sector, particularly as regulatory and ESG pressures continue to grow.

Natural Gas Storage: Depleted Fields and Limited Options:

1. Depleted Natural Gas Fields:

The most common form of natural gas storage is in depleted natural gas fields. These are underground reservoirs that were previously used to produce natural gas and have the geological capacity to store large volumes of gas. These fields can be re-pressurized to store gas during periods of low demand and then release it when demand spikes, such as during winter months when heating needs increase.

Depleted fields are ideal for storage because the geological formations have already proven their ability to trap natural gas, and they often have existing infrastructure like pipelines and wellheads that can be reused. This reduces the cost of developing new storage capacity.

However, storage in these fields is not always available near the production areas. This means that gas may need to be transported long distances to reach storage sites, adding to the logistical

INFRASTRUCTURE IN OIL AND GAS

complexity.

2. Other Storage Options:
In addition to depleted gas fields, there are other options for storing natural gas, including **salt caverns** and **aquifers**. Salt caverns are particularly useful for **short-term, high-turnover storage** because they allow for rapid **injection and withdrawal** of gas, making them ideal for handling fluctuations in demand.

Aquifers are less commonly used because they require more preparation and monitoring to ensure the gas can be stored safely. In all cases, however, the **limited number of suitable geological formations** for storage means that there are inherent constraints on how much natural gas can be stored, especially during times of high production.

3. Challenges of Storing Natural Gas:
Unlike oil, which can be stored in above-ground tanks relatively easily, natural gas needs to be **compressed** or **liquefied** to reduce its volume for storage, making the process more expensive and technically demanding.

The need for large underground facilities also limits where gas can be stored, and it often means that storage is **far from the production sites**. For instance, much of the natural gas produced in the **Permian Basin** may need to be stored in fields or caverns located hundreds of miles away, necessitating the development of pipelines to transport it.

Transporting Natural Gas: Pipelines and Midstream Infrastructure:
1. Pipelines: The Lifeblood of Natural Gas Transport:
Pipelines are the primary method for transporting natural gas from the wellhead to **midstream operators** and, eventually, to **consumers**. As soon as natural gas is produced at the wellhead, it is typically fed into a network of **gathering pipelines** that transport it to **processing plants** where impurities (like water, sulfur, and other gases) are removed.

After processing, the natural gas is then sent through **transmission pipelines**, which are large, high-pressure pipelines designed to transport gas over long distances. These pipelines are critical for moving gas from production areas, such as the **Permian Basin** or **Marcellus Shale**, to consumption areas in **urban centers**

INFRASTRUCTURE IN OIL AND GAS

or to **export terminals** for LNG (liquified natural gas).

Because natural gas pipelines are expensive to build and maintain, regions that lack adequate pipeline infrastructure—like parts of the Permian Basin—may experience bottlenecks, leading to flaring or curtailment of production.

2. Midstream Producers: Processing and Packaging Natural Gas:
Midstream companies play a crucial role in **processing** and **packaging** natural gas for the market. Once gas is collected from the wellhead, it often contains **natural gas liquids (NGLs),** water, and other impurities that need to be removed. Processing plants owned by midstream operators are responsible for separating the methane (the main component of natural gas) from these other substances and making it suitable for transport.

After processing, midstream companies may also **compress** the gas to increase its pressure before feeding it into **high-pressure pipelines** for transmission. Some midstream companies also handle the **fractionation** of NGLs, separating out components like **propane**, **butane**, and **ethane** for sale as separate products.

3. Natural Gas Liquefaction (LNG):
In cases where natural gas needs to be transported over **long distances**, such as to **international markets**, the gas is often liquefied into LNG (Liquefied Natural Gas). This process involves cooling the gas to **-162°C (-260°F)** to turn it into a liquid, which reduces its volume by approximately **600 times**, making it easier to transport via **specialized LNG tankers.**

LNG infrastructure, including **liquefaction plants** and **regasification terminals**, requires significant capital investment. As global demand for natural gas grows, especially in regions like **Asia** and **Europe**, LNG is becoming a more important part of the overall natural gas market. However, it still **requires substantial infrastructure investment** and long-term planning.

4. Challenges in Building Pipeline Infrastructure:
Constructing new pipelines to transport natural gas is often a **complex and costly** process, involving **regulatory approvals, land acquisition,** and

INFRASTRUCTURE IN OIL AND GAS

environmental reviews. These challenges can lead to **delays** in building the infrastructure necessary to move gas efficiently from production areas to markets.

In some areas, **public opposition** to pipeline construction, driven by environmental concerns, can further slowdown or block new projects. For example, regions in the **Northeast U.S.** have faced significant opposition to pipeline projects, despite growing demand for natural gas in the region.

Additionally, pipeline operators must account for **geopolitical factors** when building international pipelines, such as those connecting **Russia** to **Europe**, which are subject to shifting political alliances, sanctions, and trade disputes.

Flaring and the Infrastructure Gap:
1. Lack of Infrastructure Leading to Flaring:
In regions like the Permian Basin, the lack of **natural gas pipeline capacity** has led to increased **flaring** as companies produce large amounts of associated gas but have no way to transport or store it. This not only represents a significant **loss of potential revenue**, but it also contributes to **greenhouse gas emissions** and is increasingly seen as unsustainable from both an economic and environmental standpoint.

As **infrastructure development lags** behind production, flaring remains a temporary solution, but it's not ideal. Regulatory authorities and investors are pushing for solutions that reduce the need for flaring by ensuring adequate midstream infrastructure is in place.

2. Need for Long-Term Planning:
To avoid the inefficiencies caused by flaring, companies need to engage in **long-term planning** that ensures pipeline capacity and storage facilities are developed in tandem with new production. **Coordination between upstream operators** (the producers) and **midstream companies** (the transporters and processors) is critical to avoiding bottlenecks.

Additionally, **government policies** that incentivize infrastructure investment can help reduce the infrastructure gap, encouraging companies to build out pipelines and storage that will allow natural gas to be efficiently transported and marketed.

INFRASTRUCTURE IN OIL AND GAS

The challenges of **natural gas transportation** and **storage** are significant, but they are surmountable with the right infrastructure in place. **Pipelines** are the backbone of natural gas transportation, moving the gas from the wellhead to processing facilities and, eventually, to consumers. **Storage facilities**, often located in **depleted fields**, are necessary to manage supply and demand fluctuations, especially in areas where seasonal demand (like winter heating) creates spikes.

However, the lack of sufficient infrastructure in key production areas like the **Permian Basin** is leading to **flaring**, which wastes valuable natural gas and creates environmental concerns. **Midstream companies** play a key role in addressing these challenges by processing and packaging gas for sale, but the development of pipelines and **LNG facilities** needs to keep pace with production growth to avoid bottlenecks.

Long-term, the solution lies in **coordinated infrastructure development**, regulatory support, and investment in midstream assets that allow natural gas to be captured, transported, and sold efficiently. This will ensure that natural gas, a crucial component of the global energy mix, can be fully utilized rather than wasted through flaring.

Challenges in Transporting Natural Gas
Natural gas is difficult to transport and store, primarily due to its gaseous state and the infrastructure required to handle it. While crude oil can be stored in tanks and transported relatively easily, natural gas requires more specialized systems to handle both its transportation and its storage.

1. Pipeline Dependence:
The vast majority of natural gas is moved through **pipelines** from the wellhead to **midstream operators**, who process, package, and distribute the gas to consumers or to larger distribution pipelines. This reliance on pipelines means that regions without sufficient pipeline infrastructure often face bottlenecks or inefficiencies in bringing gas to market.

Pipelines are a highly **capital-intensive** and **time-consuming** investment. Once in place, they allow natural gas to flow continuously from production sites to consumption areas, but building new

INFRASTRUCTURE IN OIL AND GAS

pipelines involves securing regulatory approvals, right-of-way agreements, and environmental impact assessments, which can significantly delay projects.

2. Limited Flexibility:
Pipelines, while efficient for long-term, large-scale transportation, are not as flexible as other transport options like trucks or ships for oil. Once a pipeline is in place, gas can only flow to specific, pre-determined destinations, making it difficult to respond quickly to changing market demands or sudden surges in demand in different regions.

Regions with insufficient pipeline capacity or where pipeline projects are stalled face issues like **flaring**, where natural gas is burned off because there's no infrastructure to transport or store it.

3. Alternative Transport Methods: LNG:
For international transport, where pipelines are not feasible (e.g., across oceans), natural gas must be liquefied into LNG (Liquefied Natural Gas). The liquefaction process involves cooling the gas to -162°C (-260°F), which condenses it into a liquid form, making it 600 times smaller by volume and easier to transport via LNG tankers.

While LNG offers a solution for international transport, it requires massive infrastructure investments in both liquefaction plants (to convert natural gas to LNG) and regasification terminals (to convert it back into gas at the receiving end). The development of LNG infrastructure is a complex, expensive, and long-term process.

Challenges in Storing Natural Gas:
1. Depleted Fields for Storage:
Natural gas storage is primarily done in **depleted natural gas fields**, which were once active reservoirs of gas but have since been tapped out. These fields are ideal for storage because they have the necessary geological formations to trap and hold gas, just as they did when they were producing gas.

Storage in depleted fields allows producers to inject gas during periods of low demand (usually in the summer) and then withdraw it during periods of high demand (typically in the winter). This ensures that supply can meet fluctuations in demand without drastic price spikes.

INFRASTRUCTURE IN OIL AND GAS

2. Other Storage Options:
Besides depleted gas fields, natural gas can also be stored in **aquifers** or **salt caverns**. Salt caverns are used for **high-turnover storage** because they allow for faster injection and withdrawal, making them ideal for managing short-term demand fluctuations.

However, the availability of these storage options is limited by **geology**. Not all regions have the natural formations needed for gas storage, which means that gas produced in areas without nearby storage facilities may need to be transported long distances to be stored, adding additional costs and complexity.

3. Difficulty in Handling Gas:
Unlike oil, which can be stored in above-ground tanks, natural gas must be compressed or liquefied to be stored in smaller volumes. Compressing gas for storage requires the use of compressors and large underground facilities, further increasing the costs associated with storage.

Additionally, storing gas in pipelines, known as **line pack**, can provide some temporary storage by increasing the pressure in the pipeline, but this is **not a long-term solution** and is typically used for **short-term balancing of supply and demand.**

Midstream Operations and Packaging:
1. Midstream Producers:
Midstream companies are responsible for **processing natural gas** after it's extracted at the wellhead. This typically involves **removing impurities** like water, sulfur, and other gases, and then **compressing** the gas to increase its pressure for transport through long-distance pipelines.

After processing, midstream operators may also **fractionate** natural gas liquids (NGLs) such as ethane, propane, and butane, separating them out from the natural gas stream. These NGLs are valuable commodities and can be sold separately.

2. Packaging for Market:
Once the gas is processed, midstream operators package it for sale to consumers or for delivery to utilities and industrial users. In some cases, natural gas may also be sent to **export terminals**, where it is liquefied for international shipment.

INFRASTRUCTURE IN OIL AND GAS

Natural gas is an essential energy source, but its transport and storage present significant challenges that require **specialized infrastructure.** Pipelines are the primary method of moving natural gas from production to consumption, but in regions where infrastructure is lacking, this can lead to flaring and inefficiencies. For storage, depleted natural gas fields are the most common solution, but limited capacity and geological constraints mean that gas storage is more complicated than oil.

The role of midstream companies is crucial in ensuring that natural gas is processed and packaged for market, and their ability to invest in infrastructure is key to the overall efficiency of the gas supply chain. With global demand for natural gas growing, particularly for LNG exports, addressing these challenges through new **pipeline developments, storage facilities**, and **midstream investments is more important than ever.**

3. Natural Gas Challenges:
If there's not a pipe, you can't do anything except vent it and light a flare. No one wants to do that. Natural gas is therefore highly localized. The U.S. produces more natural gas than it uses. This presents significant challenges when it comes to transportation and storage. Without pipelines, the gas often ends up flared, which is a waste of valuable resources.

In terms of pricing, natural gas is highly localized. In the U.S., natural gas prices are relatively low, hovering around **$2.21 to $2.37 per MMBtu** as of mid-October 2024. Meanwhile, in Europe, due to a combination of geopolitical tensions, infrastructure challenges, and higher demand, prices are around **$7 to $8 per MMBtu**, roughly **three times higher** than in the U.S.

This discrepancy shows how much natural gas prices depend on **local market conditions** and **infrastructure availability**. While the U.S. produces a large amount of natural gas, much of it can't be effectively utilized or transported to markets that need it, especially overseas, without adequate infrastructure like pipelines or liquefied natural gas (LNG) facilities. This results in **inefficiencies** and loses potential revenue, as seen with flaring in places like the **Permian Basin**. Improving infrastructure to connect gas production

INFRASTRUCTURE IN OIL AND GAS

sites to end users, both domestically and internationally, is crucial to reducing flaring and making better use of the resource.

Alan Greenspan and the Federal Reserve (2005):
In 2005, Alan Greenspan, then Chairman of the Federal Reserve, addressed Congress with a dire warning: the U.S. had approximately **10 years of natural gas supply** left. At that time, the U.S. energy landscape was heavily reliant on imports, and there were significant plans to build **LNG terminals** to bring in gas from sources like **Saudi Arabia** and **Russia**. These LNG platforms were meant to address the anticipated natural gas shortages that Greenspan and others predicted.

However, what followed was a **game-changing shift** in the energy industry, thanks to the **Shale Revolution**. Technological advancements, particularly **horizontal drilling** and **hydraulic fracturing (fracking)** completely transformed the U.S. natural gas market. Within just a couple of years, the **U.S. natural gas outlook** went from one of scarcity to **abundance**.

By **2007-2008**, the U.S. had unlocked massive amounts of **shale gas reserves**, particularly in formations like the **Marcellus** and **Barnett Shales**. The combination of **horizontal drilling** and improved **completion technology** allowed producers to extract gas from previously inaccessible, low-permeability rock formations. These advancements, paired with **access to capital**, rapidly scaled the industry.

As a result, the U.S. quickly went from fearing gas shortages to being flush with supply, with estimates of **100 years** of natural gas reserves. Instead of building LNG import terminals, the focus shifted toward **exporting LNG to international markets.** Today, the U.S. is one of the world's leading exporters of natural gas, with terminals along the Gulf Coast and exports flowing to Europe and Asia.

This rapid change demonstrates how technological innovation and capital investment can dramatically alter energy landscapes, transforming a potential energy crisis into an era of **energy independence** and **export opportunities.**

LNG MARKET &CHALLENGE

Let's talk about LNG Producers. Liquify it. Compress it. Cool it; until it turns into a liquid (e.g., taking air and turning it into a liquid). It's very cold. You need special ships to move it. Then, you need to re-gasify it at the location.

In other words, the process of producing and transporting Liquified Natural Gas (LNG) is complex, expensive, and requires specialized infrastructure.

The LNG Production Process

1. Liquefaction:

To turn natural gas into LNG, the gas must be **compressed** and **cooled** to a temperature of around **-162°C (-260°F)**. At this point, the gas becomes a **liquid**, reducing its volume by approximately **600 times**. This makes it easier to transport over long distances, particularly where pipelines are not feasible (e.g., across oceans).

The liquefaction process occurs at **LNG export terminals** or **liquefaction plants**, which are highly **capital-intensive** projects. These facilities require **advanced technology** to ensure the gas is efficiently cooled and stored in its liquid form, often using multi-stage compression and cooling techniques.

2. Storage and Transport:

Once liquefied, the LNG is stored in **specially designed tanks** that maintain the extremely low temperatures needed to keep the gas in liquid form. These tanks are highly insulated to prevent heat transfer and maintain the low temperature.

LNG is then loaded onto **specialized LNG tankers** equipped with **cryogenic systems** to maintain the temperature of the LNG during transport. These ships are essentially floating insulated tanks, and they require careful monitoring and maintenance to prevent any **boil-off** (where a small amount of the gas vaporizes due to temperature rise). In some cases, the gas that boils off is used to **fuel the ship** itself.

3. Regasification:

Upon reaching its destination, the LNG is unloaded and sent to **regasification terminals**, where the liquid is **warmed** and turned back into a gas for distribution into the local pipeline network. This process is also complex, requiring the right infrastructure to safely and efficiently re-gasify the LNG.

Regasification terminals are usually

LNG MARKET &CHALLENGE

located near ports and are connected to local or regional pipeline networks. These facilities can serve major markets such as Europe or Asia, where LNG imports are crucial for meeting energy demand.

The Challenges of LNG:
1. Cost:
The entire LNG value chain—from **liquefaction** to **shipping** to **regasification**—is extremely **expensive**. Building the infrastructure alone, including liquefaction plants, specialized ships, and regasification terminals, requires billions of dollars in investment.

The operating costs are also high due to the **energy intensity** of cooling the gas to such low temperatures and maintaining it during transport. This makes LNG more expensive than piped natural gas, which is why LNG tends to be a premium product, often reserved for markets where pipeline access is limited or non-existent.

2. Technological Requirements:
Liquefaction and regasification are highly **technical** processes that require specialized equipment and expertise. Both involve handling gas at extreme temperatures and pressures, which increases the **technical risk** and cost of operating LNG facilities.

The ships used to transport LNG are also unique. They are built with **double-hull designs** to prevent leaks and are equipped with advanced **boil-off gas recovery systems** to ensure that minimal gas is lost during transport.

3. Market and Geopolitical Factors:
LNG markets are highly sensitive to **geopolitical factors**. For instance, disruptions in major gas-producing regions like **Russia** or **Qatar**, or in key transit regions like the **Suez Canal**, can affect LNG prices globally. Additionally, **export controls**, tariffs, and environmental regulations can impact LNG production and transportation.

4. Infrastructure Development:
LNG infrastructure, from liquefaction plants to regasification terminals, takes years to develop and requires **long-term contracts** to ensure profitability. Given the high upfront costs, companies usually require **off-take agreements** with buyers before committing to the infrastructure investment.

LNG MARKET &CHALLENGE

While **LNG** offers a solution to transporting natural gas across the globe, especially to regions without pipelines, it comes with high costs and technical challenges. The process of **liquefaction, transport, and regasification** is energy-intensive and requires significant investment in specialized infrastructure. Nevertheless, **LNG exports** have become a critical part of the global natural gas market, allowing producers in places like the U.S. to **export gas** to high-demand markets such as **Europe** and **Asia**.

As demand for **cleaner-burning natural gas** continues to rise, particularly as countries seek to reduce their reliance on coal and oil, the importance of LNG in the global energy market is only expected to grow. However, the economics of LNG will always reflect the **high costs** associated with its production and transport.

While natural gas remains a largely local commodity, the rise of LNG has opened new opportunities for international markets, particularly in regions like Europe that have become more reliant on **North American LNG** in recent years. However, LNG still represents a relatively **small percentage** of the overall natural gas market due to the substantial **infrastructure challenges** involved.

LNG's Market Potential and Infrastructure Challenges:

1. Local Commodity with Global Potential:

Natural gas has traditionally been a local commodity because it relies heavily on pipeline infrastructure to move from production sites to end users. Unlike oil, which can be easily transported and stored, natural gas must either be piped directly or converted to LNG for long-distance transport. This makes regional markets important, as **many countries rely on domestic production or neighboring countries' pipelines** to meet their gas needs.

However, as markets in Europe and Asia open to North American LNG, there is a **growing opportunity for global trade in natural gas**. The U.S. has emerged as one of the leading LNG exporters, with exports particularly ramping up in response to geopolitical events such as the war in Ukraine, which has reduced Europe's reliance on Russian gas.

2. LNG: Small Part of the Global Market

LNG MARKET &CHALLENGE

Despite its growing importance, LNG still accounts for a **small percentage** of the total natural gas market. In 2023, only about **12%** of global natural gas consumption was supplied through LNG, with the rest being transported via pipelines or consumed locally. This reflects the **limited capacity** of LNG infrastructure worldwide.

The number of **LNG export and import terminals** is limited, and the process of building new facilities is **extremely time-consuming** and **capital-intensive**. A typical LNG export terminal takes **10 years or more** from the initial planning stages to completion, due to the complexity of the technology and the need to secure long-term contracts and regulatory approvals.

3. Infrastructure Development is Lagging: One of the biggest hurdles to the expansion of LNG markets is the **lack of infrastructure**. The U.S. has built several large LNG export terminals, particularly along the Gulf Coast, but the demand for more facilities remains high. In Europe, while new **regasification terminals** are being built to receive LNG, the infrastructure is still catching up to demand, particularly as Europe seeks to reduce its dependence on Russian pipeline gas.

Gasification plants (which convert LNG back into its gaseous form) are also **not easy** to build. They require access to **coastal areas**, specialized equipment, and integration with existing pipeline networks to distribute the gas to end users. This makes LNG projects complex and lengthy, even in regions with strong demand.

4. LNG's Role in the Energy Transition: LNG is seen as an important **bridge fuel** in the transition to cleaner energy. It's a **cleaner-burning alternative to coal and oil,** and as countries seek to reduce carbon emissions, LNG has become more attractive as part of their **energy mix**.

However, the **high costs** and **timeframes** associated with LNG infrastructure mean that its growth will continue to be gradual. **New projects** are already in the works, but they won't come online for several years, and global LNG capacity remains constrained in the near term. Building both liquefaction and regasification facilities is a complex, multi-year process that requires

LNG MARKET &CHALLENGE

substantial capital investment and regulatory approval. The infrastructure is catching up, but it will take time for LNG to play a larger role in the global natural gas trade.

There are some key dynamics that make oil prices highly volatile, ranging from global supply and demand imbalances to geopolitical influences like OPEC production cuts. As investors underwrite and value opportunities, it must make sense in the current environment.

Oil Pricing Volatility and Current Market Dynamics:

1. Price Volatility:
Oil prices have ranged from **$35 to $120 per barrel** in recent years, and as of today, we are somewhere in the **mid-point of that range**. Valuing opportunities in this environment requires **underwriting** with the assumption that prices could fluctuate widely due to various global factors, including supply chain disruptions, demand recovery post-pandemic, and political factors.

The **volatility** is exacerbated by market expectations, geopolitical tensions, and economic recovery trends, particularly in **China**. As a major consumer, China's demand fluctuations can significantly drive prices either up or down.

2. Global Supply and Demand:
Current global oil production is around **99.7 million barrels per day (mbpd)**, while global consumption hovers around **96.6 mbpd**. This **slight supply surplus** helps keep prices in check and prevents drastic swings, but the gap is small enough that any **geopolitical disruptions**, unexpected demand spikes, or natural disasters could still drive short-term price volatility.

This small gap can shift quickly, depending on factors like economic recovery, weather-related disruptions, or refinery outages. Even slight changes in **OPEC production levels**, consumption forecasts from countries like **China**, or **strategic petroleum reserves** can lead to rapid price swings.

3. OPEC's Role:
OPEC, particularly Saudi Arabia, plays a crucial role in trying to manage oil prices by controlling supply. In 2023, Saudia Arabia announced a **1 million barrel per day (mbpd) production cut**, but that was a big yawn or what we might call a muted impact on prices. This is largely

LNG MARKET &CHALLENGE

because the market recognizes that other producers, such as **Venezuela** and **Iran,** have the potential to fill that gap, limiting the long-term effect of Saudi's cuts. OPEC has historically been able to influence prices by adjusting its output, but the rise of **U.S. shale production** and **non-OPEC countries** with spare capacity (like Venezuela and Iran) means the cartel has **less control** than it used to.

4. Influence of Demand in China:
A major driver of potential price increases is demand from China. If the Chinese economy recovers faster than expected, it could push prices higher due to increased demand. Conversely, slower economic growth in China would keep a lid on prices. This uncertainty is why **underwriting** and valuation models for oil projects need to account for a wide range of potential scenarios.

China is the **world's second-largest oil consumer**, and any changes in its demand—driven by factors such as its **zero-COVID policy**, industrial activity, or economic growth—can heavily influence global oil prices.

5. Geopolitical Risks and Supply Chain Issues:

Countries like Venezuela and Iran are not always reliable producers due to sanctions, political instability, and infrastructure issues. If these countries fail to deliver, it could create tighter supply conditions, exacerbating volatility. However, when they can ramp up production, it can help balance the market and cap prices.

U.S. shale production, while significant, is not immune to regulatory constraints and capital investment challenges. Many U.S. producers have adopted more conservative production strategies, focusing on profitability and debt management over aggressive drilling, which may limit the ability to quickly respond to supply shortages.

Today, we are in a period of relative **price stability,** but the volatility remains due to small gaps between global production and consumption, geopolitical influences (e.g., OPEC's production decisions), and uncertainty over China's demand. When underwriting and valuing new oil projects, it's crucial to factor in this volatility, as prices could fluctuate significantly depending on these variables.

KEY INVESTMENT FACTORS

Key Factors that Could Drive Price Increases:

1. China's Demand:
China is the second-largest oil consumer in the world, and any growth in industrial activity, transportation needs, or economic stimulus could lead to a significant increase in demand for oil. With China's economy heavily reliant on imports for energy, even small shifts in consumption can ripple through global oil markets.

If China ramps up post-COVID recovery efforts or increases industrial output, this could drive oil prices up due to higher consumption, particularly in sectors like manufacturing and transportation.

2. India's Growing Energy Needs:
India, the **third-largest oil consumer**, is rapidly expanding its economy and industrial base. As urbanization and industrialization continue, India's demand for energy, particularly oil, is expected to grow significantly. If India's energy consumption spikes, it will add more pressure to global oil markets, leading to price increases.

India's long-term growth trajectory suggests that it will continue to be a major driver of **global oil demand**.

3. South America's Economic Growth:
South American economies, particularly **Brazil** and **Argentina**, are also poised to increase energy consumption as they industrialize and develop. While they may not have the same demand as China or India, a coordinated increase in consumption across multiple South American nations could contribute to global demand growth.

Furthermore, some countries in South America are still developing their **energy infrastructure**, which means they rely on **oil imports** for transportation and industry.

The Impact on Oil Prices:
When **global consumption** outpaces production, even by a small margin, it creates upward pressure on prices. As you noted earlier, the world is currently producing around **99.7 mbpd** of oil, while consuming **96.6 mbpd**. This gap is narrow, and any increase in consumption from these major regions would push prices higher.

KEY INVESTMENT FACTORS

If demand from China, India, and South America increases significantly, this could lead to a **tightening supply-demand balance**, particularly if there are no substantial production increases or if geopolitical factors further constrain supply (e.g., OPEC cuts or political instability in oil-producing countries).

If China ramps up post-COVID recovery efforts or increases industrial output, this could drive oil prices up due to higher consumption, particularly in sectors like manufacturing and transportation.

Common Mistakes in Oil & Gas Due Diligence:

1. Over-Reliance on Projections and Rising Prices:

A common mistake is to rely too heavily on **price projections** or the assumption that prices will continue to rise indefinitely. This optimistic outlook can lead to poor investment decisions when markets turn downward. Investors should **exercise caution** if the primary justification for an investment hinge solely on rising commodity prices without accounting for the **technical merits** of the project.

Flags to watch for include a focus on **price speculation** over detailed **technical evaluations**. If the decision-making process is driven primarily by the assumption of favorable future prices without considering potential downside scenarios, this is a clear red flag.

2. Lack of a Technical and Economic Balance:

One of the most significant pitfalls is when **investors focus solely on the economics** (e.g., projected cash flow, expected returns) without giving enough weight to the **technical feasibility** of the project. Oil and gas projects need to be evaluated based on **geology, engineering**, and **infrastructure**.

For example, just because a project is economically feasible on paper doesn't mean it's technically sound. Investors need to ensure the project can be drilled and produce hydrocarbons at a sustainable rate based on the **geological conditions**. This requires a thorough understanding of **geophysical data**, **well design**, **reservoir quality**, and **drilling technology**.

3. Overlooking Dry Holes:

KEY INVESTMENT FACTORS

Be wary of any operator who claims they have **never drilled a dry hole**. Even experienced operators with sound geological models sometimes drill dry holes. A track record of no dry holes can indicate **inflated success claims** or a lack of transparency. Dry holes are part of the business, and the key is how the company handles them in terms of **risk management** and **recovery strategies**.

Investors should conduct due diligence into the operator's **historical success rates** and how they manage projects that don't go as planned. It is crucial to understand how risk is managed after a dry hole.

4. Failure to Conduct Sensitivity Analysis: Investors often fail to conduct thorough **sensitivity analyses**, which evaluate how changes in key variables (such as commodity prices, production costs, and capital expenditures) will affect the project's overall economics. Without sensitivity analysis, investors may not understand how sensitive the project is to **price fluctuations** or **cost overruns**.

Performing this type of analysis allows investors to see how the project performs under different scenarios (e.g., **what happens if oil prices drop 30%?**). This is a critical part of understanding the **risk profile** of any oil and gas investment.

5. Ignoring Infrastructure Limitations: Many investors overlook the importance of **infrastructure** in oil and gas projects. Even if the **geology** and **drilling technology** are sound, a lack of sufficient **pipelines**, **processing plants**, or **storage capacity** can derail an otherwise good investment. Natural gas, for instance, is difficult to transport and requires dedicated infrastructure.

Investors should assess whether the project has adequate **midstream infrastructure** in place to get the product to market. If the necessary infrastructure is lacking, it could result in **bottlenecks** or **flaring**, both of which diminish the economic value of the project.

6. Overconfidence in New Technology: **New drilling technologies** (e.g., horizontal drilling and fracking) have revolutionized the oil and gas industry, but they also come with **risks**. Investors should be cautious of projects that rely heavily on new or unproven

KEY INVESTMENT FACTORS

technologies without adequate track records or case studies demonstrating long-term viability.

While advancements like **hydraulic fracturing** have unlocked vast resources, they also come with operational challenges. Investors should evaluate the project's **technical feasibility** based on proven methodologies and seek independent technical assessments.

7. Overlooking Geology:
Geology is the **foundation** of any oil and gas project. If the geology is unfavorable, no amount of economic forecasting or technological prowess will make the project profitable. Investors must ensure they are working with reliable **geological data** and **geoscientists** who can accurately interpret the subsurface conditions.

Investors should focus on understanding the **reservoir characteristics** (e.g., porosity, permeability), the **pressure regime**, and potential **geological risks** (such as faulting or water ingress) that could affect production.

When conducting due diligence in the oil and gas sector, it's critical to balance **technical assessments** with **economic evaluations**. Relying too heavily on optimistic price projections or incomplete data is a common mistake, but thorough evaluations of **geology**, **engineering**, **infrastructure**, and **sensitivity to pricing fluctuations** can help mitigate risks.

By ensuring that both the technical and economic pieces are aligned, investors can avoid common traps and improve their chances of making sound, profitable decisions.

Beware of Ponzi Schemes:
We've all heard about them, and chances are if you're an active investor in the oil and gas industry, you are well-aware of these schemes.

The **carbon capture** industry has recently been involved in a Ponzi scheme that raised a significant amount of money—reportedly around $250 million—in fraudulent investments. Carbon capture, an emerging technology aimed at reducing carbon dioxide emissions by capturing and storing CO2 underground, has been seen as a

KEY INVESTMENT FACTORS

critical part of addressing climate change. However, this particular scheme was uncovered as a **fraud** when investigators found no substantial efforts to actually implement the promised technology or infrastructure.

Details of the Scheme:
False Promises: The operators behind the scam allegedly claimed they were working on carbon capture projects, offering investors the promise of high returns due to the environmental and regulatory incentives related to carbon capture technologies.

Investor Attraction: Carbon capture has been attracting considerable investment attention, partly due to the growing importance of ESG (Environmental, Social, and Governance) investing and the global push to reduce greenhouse gas emissions. This made it a prime target for fraudsters looking to capitalize on the urgency of climate solutions.

No Substantial Activity: Despite raising substantial capital, there were **no real efforts** to develop carbon capture technologies or build infrastructure. The money was reportedly used to pay off earlier investors, a hallmark of a Ponzi scheme.

Exposing the Fraud: The scheme unraveled when investigators found that the funds were being misused, and there was no substantial **carbon capture** activity being undertaken. As with many Ponzi schemes, it relied on bringing in new investors to pay off earlier ones until the money ran out, and the fraud was exposed.

Lessons for Investors:
1. Due Diligence:
This case highlights the importance of thorough due diligence in emerging industries like carbon capture. Investors should ensure they are backing **legitimate companies** with **proven technologies**, rather than relying on flashy marketing or promises of high returns.

2. Verification of Technology:
Especially in new fields like carbon capture, where the technology is still developing, investors should look for **independent validation** of the company's capabilities and check if the

KEY INVESTMENT FACTORS

company is engaged with recognized industry leaders or regulatory bodies.

3. Beware of Hype: Many scams prey on the urgency of issues like climate change or new technologies. Investors need to stay cautious and avoid being swept up by the hype around "green" industries without confirming the validity of the business model.

This incident serves as a cautionary tale for investors in rapidly growing sectors like carbon capture, where the **legitimate companies** can be overshadowed by fraudulent schemes that exploit the environmental urgency for profit.

Tax Benefits & Opportunities:
Tax benefits are one of the most attractive features for investors in the **oil and gas industry**. These incentives are designed to offset some of the risks and costs associated with exploration, drilling, and production. Two key benefits that investors often take advantage of are **Depletion** and **Intangible Drilling Costs (IDCs)**.

1. Intangible Drilling Costs (IDCs):

IDCs cover expenses related to things like **labor, chemicals, and services** that are required to drill and prepare a well for production. These are considered "intangible" because they do not have any salvage value once the well is completed.

Examples of **IDCs** include **fracking costs**, **geologists' fees**, and **other services** required to bring the well into production.

Under U.S. tax law, **IDCs are 100% deductible in the year they are incurred**, allowing investors to **write off a significant portion of their investment** immediately, which can lead to substantial tax savings. This is especially beneficial for **operating investors**—those who own working interests in the well.

2. Depletion:
Once a well begins producing, the IRS allows investors to take a **depletion deduction** to account for the reduction in the reservoir's resources over time. Essentially, depletion deductions are a way to reflect the **decline in value** of the well as its reserves are depleted.

KEY INVESTMENT FACTORS

There are two types of depletion: cost depletion and percentage depletion.

1. Cost Depletion:
This is calculated based on the total amount of oil or gas produced relative to the total estimated recoverable reserves. It allows an investor to deduct the actual **cost basis** of the investment as the resource is extracted.

2. Percentage Depletion:
This method allows a fixed percentage (usually **15%** for oil and gas) of the well's **gross income** to be deducted. Unlike cost depletion, percentage depletion can continue even after the investor has recovered their initial investment in the well.

The amount of depletion is tied to the **production levels** and is calculated **net to the investor's ownership** in the well.

Importance in Risk Management:
These tax benefits help mitigate some of the inherent risks in oil and gas investments, particularly for **independent investors** and **small producers** who may otherwise be wary of the volatility in oil prices, or the technical risks involved in drilling. The ability to **deduct large portions of capital expenditures** early on, or recover the well's declining value through depletion, makes these investments more attractive.

IDCs and **depletion allowances** provide powerful tax advantages for oil and gas investors, helping to reduce the **financial risk** associated with exploration and production. By understanding and leveraging these benefits, investors can feel more comfortable taking on the risks associated with drilling and production in exchange for potential tax savings.

These incentives make oil and gas an appealing sector, especially for those looking for **tax-efficient investment opportunities**.

As an oil and gas investor, there are multiple ways to participate in a project, with two key roles being as a General Partner (GP) or Limited Partner (LP). Both roles come with distinct tax benefits and liabilities, and can provide unique advantages, especially for **high-income earners** looking for opportunities to **offset income with investment losses.**

KEY INVESTMENT FACTORS

General Partner (GP) Role:
1. Active Income Offsetting:
When an investor participates as a General Partner, they are considered active in the operation and management of the oil and gas project. This **active participation** allows them to take losses from the project and **deduct** those losses against **active income** (e.g., wages, salaries, or other business income).

For high-income earners, this is especially attractive because the losses incurred in the early stages of an oil and gas investment (such **as intangible drilling costs** or other operational expenses) can be used to **reduce taxable income**, thereby lowering overall tax liability.

2. Liability Exposure:
As a **GP**, the investor has **greater liability exposure**, which means they could be personally responsible for the debts or liabilities incurred by the project. However, while there is this additional liability risk, it's often **minimal** in practice due to insurance, well-structured operating agreements, and other risk mitigation strategies.

Despite this, many investors take on the **GP role** to benefit from the tax advantages and later **convert to LP status**, which significantly reduces their exposure to liability.

Limited Partner (LP) Role:
1. Passive Income:
As a **Limited Partner**, an investor's participation is considered **passive**, meaning they do not have management responsibilities in the project. Losses incurred as an LP can only be used to **offset passive income**, which includes income from other passive investments (like rental properties).

While the tax benefits may be less immediate or advantageous than for a GP, LPs still benefit from key tax deductions such as **depletion allowances** and **depreciation**. However, they **cannot use these losses to offset active income**.

2. Limited Liability:
One of the key advantages of being an LP is the **limited liability**. LPs are not personally responsible for the debts or liabilities of the oil and gas project

KEY INVESTMENT FACTORS

beyond their initial investment. This makes it an attractive option for investors who want to participate in the oil and gas industry without exposing themselves to significant legal or financial risks.

As mentioned, some investors may start as **GPs** to take advantage of the ability to offset **active income** and then **convert** to LP status once the project has matured, thereby removing the additional liability while still reaping the financial benefits of the project.

Combining Roles:
Some investors strategically begin as **GPs** to take advantage of the ability to offset losses against **active income** in the early stages of a project, where high initial costs (like **drilling expenses**) result in significant losses. After these early years, they convert to **LP status**, thereby **reducing liability exposure** while still enjoying the **cash flow** and **passive income** benefits of the project.

Oil and gas investments offer significant **tax advantages**, particularly through roles as **General Partners** or **Limited Partners**. **GPs** can offset **active income** with **project losses**, making it an attractive option for high-income earners, though this comes with **increased liability**. However, over time, many investors opt to **convert to LP status** to limit personal exposure to the liabilities of the project while still benefiting from the **passive income** generated by the investment. This flexibility, along with tax benefits such as **IDCs** and **depletion**, makes oil and gas projects highly attractive to the right investor.

Looking ahead to 2025 and Beyond:
There are several attractive opportunities in the oil and gas (O&G) market due to evolving dynamics following the **commodity price spikes in 2022** and the subsequent stabilization:

1. Post-2022 Commodity Price Dip:
The run-up in oil and gas prices in 2022 was driven by a combination of factors, including **post-pandemic recovery**, **geopolitical tensions** (e.g., the Russia-Ukraine conflict), and **supply chain issues**. While prices surged during that period, there has since been a dip as supply constraints have eased, and demand growth has normalized.

KEY INVESTMENT FACTORS

This price fluctuation has presented opportunities for **strategic investments**. Companies are rebalancing portfolios and shedding non-core assets, offering potential for investors to **acquire producing assets** at a **discounted price** due to current market conditions.

2. Companies Rationalizing Portfolios:
Many **large O&G companies** are looking to **divest non-core assets** as part of portfolio rationalization. These companies, focusing on **energy transition** and streamlining operations, are seeking to offload **cash-flowing assets** that may not align with their long-term strategy.

This creates an opportunity for smaller investors or mid-market players to buy into **existing production** at an attractive valuation. You aren't paying for the **"upside potential"**—you're buying into **established cash flow streams** at a **discounted value**, which can be particularly appealing in a market characterized by **pricing volatility**.

3. Volatility as a Strategic Advantage:
The inherent **volatility** in commodity prices, especially in oil and natural gas, brings **risk** but also **opportunity**. With **pricing risk** currently high, investors are looking for deals where the **cash flow** from existing production assets provides stable returns, regardless of short-term price fluctuations. If investors can acquire **cash-flow-positive** projects at a discount, they are well-positioned to benefit from **future price appreciation** without assuming the high costs typically associated with new drilling or exploration.

By **buying proven assets** in the current environment, investors avoid the risk of betting on volatile price swings and instead focus on **solid operational returns** from well-established wells and fields.

4. Opportunities in Non-Core Divestments:
For investors willing to take a **long-term view**, opportunities in **non-core divestments** will be plentiful. As major O&G companies continue to move towards more **sustainable energy portfolios**, there is a growing market for acquiring these **mature assets**. These are often fields that are still productive but no longer fit with the future vision of

KEY INVESTMENT FACTORS

large operators.

For smaller players or private equity firms, these deals can provide **significant upside**, especially when paired with improvements in **efficiency**, **cost control**, or **minor technological enhancements** to extend the life of the field.

5. Attractive Discounted Value:
Discounted asset sales are a major opportunity right now. The current dip in prices means that **cash-flow-producing assets** are available for **less than their potential value**, offering a risk-adjusted return that's particularly appealing. This becomes an advantage when considering the long-term trend of global energy demand, particularly in emerging markets.

Buying into established **cash flow streams** is a **low-risk** strategy compared to new exploration. Investors aren't necessarily paying for future speculative price increases, but rather are securing steady, predictable returns from **ongoing production**.

The oil and gas sector in 2025 and beyond presents some unique opportunities, particularly in acquiring existing production assets that offer stable cash flow. With large companies focusing on rationalizing their portfolios and shedding non-core assets, smaller players can benefit from buying proven assets at discounted prices. While the market is still volatile, investors can capitalize on the opportunity by acquiring **low-risk, cash-flowing properties** at attractive values, ensuring strong returns even if commodity prices fluctuate.

This environment offers investors a way to **avoid paying for speculative upside** and instead invest in proven, reliable production, which is especially appealing in times of market uncertainty.

Key Metrics and Returns:
In the **Appalachian, Midland, and Delaware (AMD) Basin** markets, most **oil and gas production** deals are based on **discounted cash flow (DCF)** models, typically using a **15% discount rate** to determine the **purchase price**. This means that investors are buying oil fields with the expectation of **15% returns** based solely on existing cash flows—

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without accounting for potential **upside** from future price increases or enhanced production.

1. Cash Flow Discounting at 15%:
When acquiring producing oil and gas assets, a **15% discount rate** is applied to expected cash flows to determine the asset's present value (purchase price). Investors can reasonably expect a **15% rate of return** on these assets without leverage.

This approach is conservative and assumes **minimal operational risk**, as the investor is not speculating on price increases or operational improvements but is instead buying into existing production.

2. Leverage and Returns:
If investors choose to add **leverage** to the equation—such as using **80% debt financing**, which is common in **real estate**—the returns could be significantly higher. However, in oil and gas, this level of leverage is **not typical**, as it introduces more financial risk, especially given the inherent volatility in **commodity prices**.

Even without leveraging, the purchase price based on a **15% discount** on cash flows provides a healthy return, and any additional **upside from price increases** or **enhanced recovery** methods would be **pure profit** or "gravy" (as my business partners call it).

3. Internal Rate of Return (IRR) for New Drilling:
When it comes to new drilling projects, the **IRR** tends to be higher due to the additional **operational risks** involved. Drilling a new well carries greater **uncertainty** compared to buying an existing cash-flowing asset. Therefore, returns are typically much higher to compensate for this risk.

The **IRR** for new wells can range from **30-50%**, depending on the **reservoir quality**, drilling costs, and production forecasts.

In some cases, the **IRR of a successful new well** can exceed **50%** within **2-3 years**, especially in **high-quality reservoirs** where production rates are strong, and costs are well-controlled. This reflects the **higher risk/higher reward** nature of new drilling projects.

4. Upside Potential:

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In addition to base returns, investors often see **additional upside** from drilling in fields with **untapped potential** or where **new technology** (e.g., improved fracking techniques or horizontal drilling) can increase production rates. This **upside** is not typically included in the original cash flow projections used to determine the purchase price but can significantly boost overall returns.

Existing production typically offers **15% returns** based on discounted cash flow models, providing **solid value** with low operational risk. With leverage, returns could increase dramatically, but this is less common in the oil and gas industry than in real estate.

New drilling projects offer much higher returns, typically in the **30-50% range**, depending on the risks associated with the reservoir and project. In optimal scenarios, returns from new wells can reach **50% IRR** within just a few years.

This combination of **stable cash flow opportunities** from existing production and **higher potential returns** from new drilling creates a diverse range of investment possibilities for 2025 and beyond.

Wrapping Up the Value Play:
Today's oil and gas investments present a unique value play, and the opportunity lies in **buying cash flow-producing assets** at discounted prices, with the potential for additional **upside** in undeveloped acreage.

Here's Why This Approach is Attractive:
1. Stable Cash Flow with Upside Potential:
When you buy into existing **producing fields**, you're primarily paying for **proven production** and immediate cash flow. The upside is that many of these assets come with **undeveloped acreage** or **untapped locations**, which offer future drilling opportunities—essentially, **free upside** since you're not paying for it upfront.

In this way, you're securing a **high return** from existing operations, and any future developments on the additional acreage become **bonus revenue**.

2. Lack of Competition:
The market for acquiring O&G assets is

KEY INVESTMENT FACTORS

currently less competitive than it has been in the past. Historically, **private equity** firms, **pensions**, and **endowments** were the main players in acquiring these types of assets. However, due to a shift in focus toward **ESG mandates** and **green investments**, much of that capital has **moved away from traditional O&G investments**.

This creates an opportunity for savvy investors to **enter the space at favorable prices**. With **less capital competing for the same assets**, buyers can negotiate better deals and secure high returns without overpaying.

3. Warren Buffet's Investment in O&G: Even high-profile investors like **Warren Buffet** have recognized the value play in O&G today. Buffet's company, **Berkshire Hathaway**, has made **significant investments** in the sector recently, including buying up shares of **Chevron** and **Occidental Petroleum**. Buffet is known for his focus on **value investing**—buying solid businesses when they are trading below their intrinsic value, and O&G currently fits that model.

With **energy prices volatile**, Buffet is betting on the long-term stability and cash flow that O&G can provide. His actions signal confidence in the sector as a **value investment**, even during periods of fluctuating commodity prices.

4. A Value Play in Today's Market: O&G is currently a **value play** because, despite the near-term fluctuations in oil and gas prices, the assets being acquired are **cash-flow positive** and generating returns. The upside potential from undeveloped acreage adds to the attractiveness of these deals.

Energy demand remains strong globally, and even as the world transitions to greener alternatives, oil and gas will continue to play a **crucial role** in energy markets for decades to come. This long-term demand provides stability for O&G investments, especially when acquired at discounted values.

The combination of **discounted pricing**, **cash flow**, and **future upside potential** makes oil and gas an attractive opportunity in today's market, particularly for value investors seeking **long-term stable returns**.