Kimmeridge

Shale's Golden Years:

Can Consolidation Keep the Industry Young?

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Contents

Shale's Golden Years: Can Consolidation Keep the Industry Young?

Is Google wielding too much power? Should Amazon be split up? Is Kroger becoming too dominant in the grocery sector? Conversations about monopoly power are more prevalent than ever. The equities market has reached unprecedented levels of concentration, largely driven by technology companies with monopolistic business models. Regulators are increasingly scrutinizing these giants, attempting to block more mergers than ever before.

With energy consolidating at a record pace, questions arise around these mergers. Is the industry becoming overly concentrated? Should regulators be concerned about market power?

At this stage of E&P consolidation, the answer is clear: no, companies are not gaining monopoly pricing power. The industry is far too fragmented for any single player to wield such influence. For instance, the top five smartphone companies control 90% of their market, and the leading five software firms control 87% of the software business. That's concentration. By comparison, the top five E&P companies produce only 29% of the country's oil and gas–not a monopoly by any standard. Combinations in the E&P space are not driven by a quest for monopoly power, but rather a rational response to anticipated declines in capital efficiency. E&P companies need to squeeze more out of less through economies of scale. They are combining because they are worried.

A Maturing Industry

The industry is worried because shale is getting old. The major shale plays were discovered years ago, and while the business model has stabilized, the landscape has shifted. Compensation plans have evolved too, shedding the juvenile excesses of the past, like paying CEOs for reserve growth that was uncorrelated to shareholder value. Today, shale is wiser and more cautious, offering steady dividends while grappling with its own longevity. All this before age 20.

When we say that shale is "old," we don't mean that the US is about to stop drilling shale wells or that shale production will plummet to zero. On the contrary, we expect shale drilling to continue for years, remaining the primary source of US production. Instead, our focus is on long-term trends in capital efficiency. In the early days of shale, the mindset was all about growth: find the resource, delineate the core of the play, and acquire acreage at any cost, and capital efficiency will get better. Cash flow was reinvested into more drilling, attracting outside capital that fueled inflated expectations and led to an oversupply of commodities, and ultimately, widespread value destruction.

Following a painful reset, one that began before the pandemic but was accelerated by it, a new industry has emerged. This revamped sector is surprisingly disciplined, and keenly focused on returns and profitability. The years 2021 and 2022 showcased some of the best recycle ratios in shale's history, reflecting a more sustainable and prudent approach.

The maturity of shale has quickly transitioned into the aging of shale. Finding and development (F&D) costs rose in 2022 vs. the year before, and they rose again in 2023. Even though the industry is getting smarter, quality resource is declining. Ultimately, the geology will prevail, F&D will continue to rise, and capital efficiency will sputter, putting upward pressure on the cost of supply.

This story of rising cost of supply provides crucial context for understanding energy M&A. Larger companies tend to be more efficient, and enhancing efficiency is essential to offsetting the impacts of a dwindling resource base. We continue to advocate for further mergers, especially those that have true synergies, as we've highlighted in our previous white papers, and that have the potential to drive further efficiency.

In the pages that follow, we will explore several themes:

1. **Declining Capital Efficiency:** A deep dive into the recycle ratio and why it matters

2. **The Benefits of Scale:** Larger companies achieve greater efficiency

3. **Value-Add Consolidation:** Basin overlap governs which mergers generate the most value

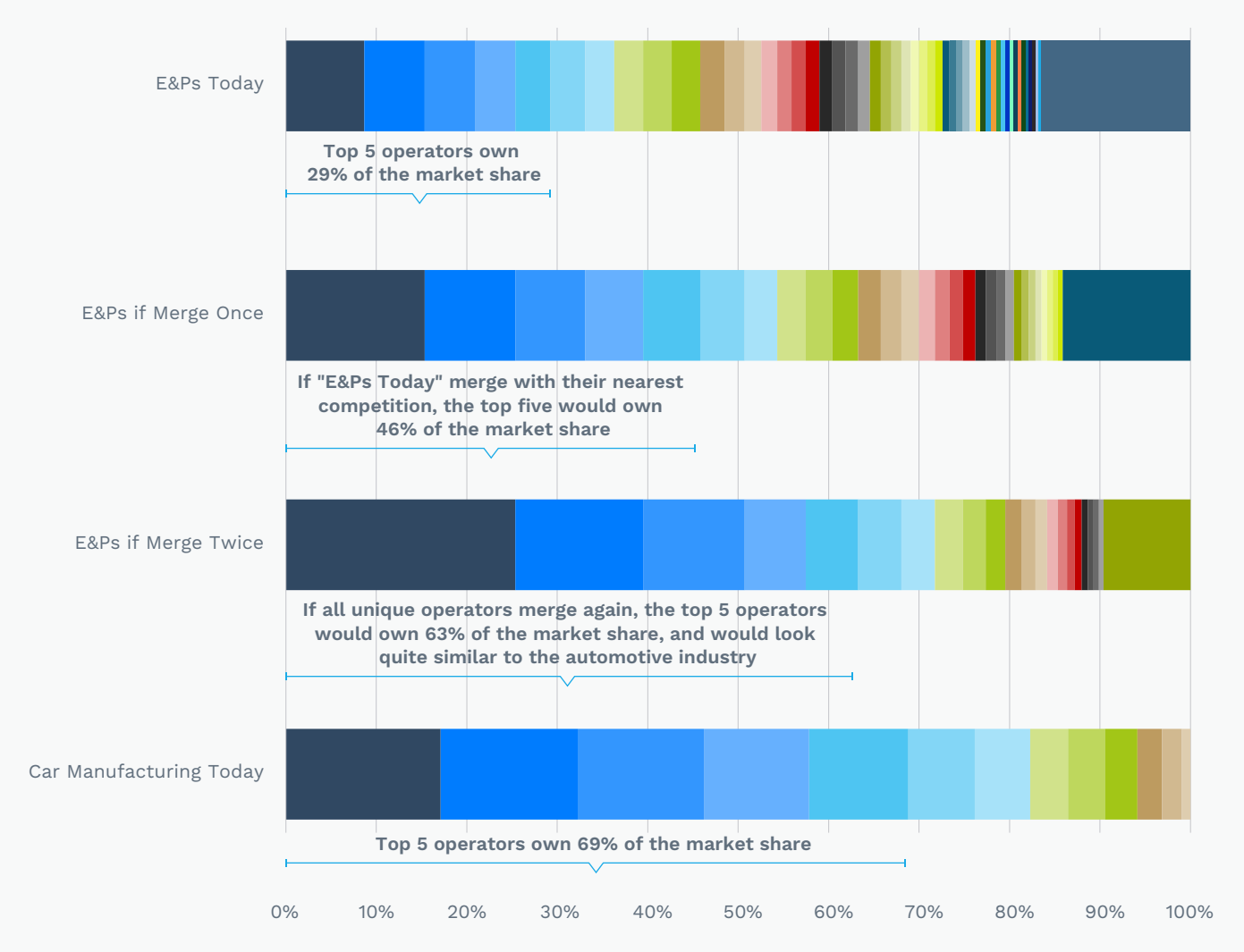
4. **The Right Number of E&Ps:** The ideal number of E&P companies is still significantly lower than what currently exists

The implications of rising F&D, coupled with declining capital efficiency, will be significant. For investors, there will be greater differentiation between companies whose capital efficiency is falling rapidly and those that can extend their operational runway. The winners will have valuable currency for consolidation, while the losers will increasingly find themselves trading down to their blowdown value or overpaying in M&A out of desperation, an approach already evident in some recent deals (we see you, SM).

From a macro perspective, US shale has been the primary engine of production growth over the last decade, serving as the marginal producer. As costs of US supply rise, the commodity will tighten globally. While a near-term softening in demand could mask this trend—allowing shale producers to maintain capital efficiency by drilling fewer wells—the higher cost of supply will eventually become evident, significantly impacting commodity pricing.

So what? There is considerable room for further consolidation. As we show in Figure 1 below, using the Herfindahl-Hirschman Index (HHI), if all of the US E&P companies were to merge with their nearest peers, reducing their number in half, and then all the E&Ps merged again, reducing in half again, the resulting industry would still be more fragmented than the automotive sector, which is not an industry considered to have monopoly players. In other words, there is no reason to think that the wave of mergers should stop here.

FIGURE 1: E&P Market Share % vs. Automotive Market Share %

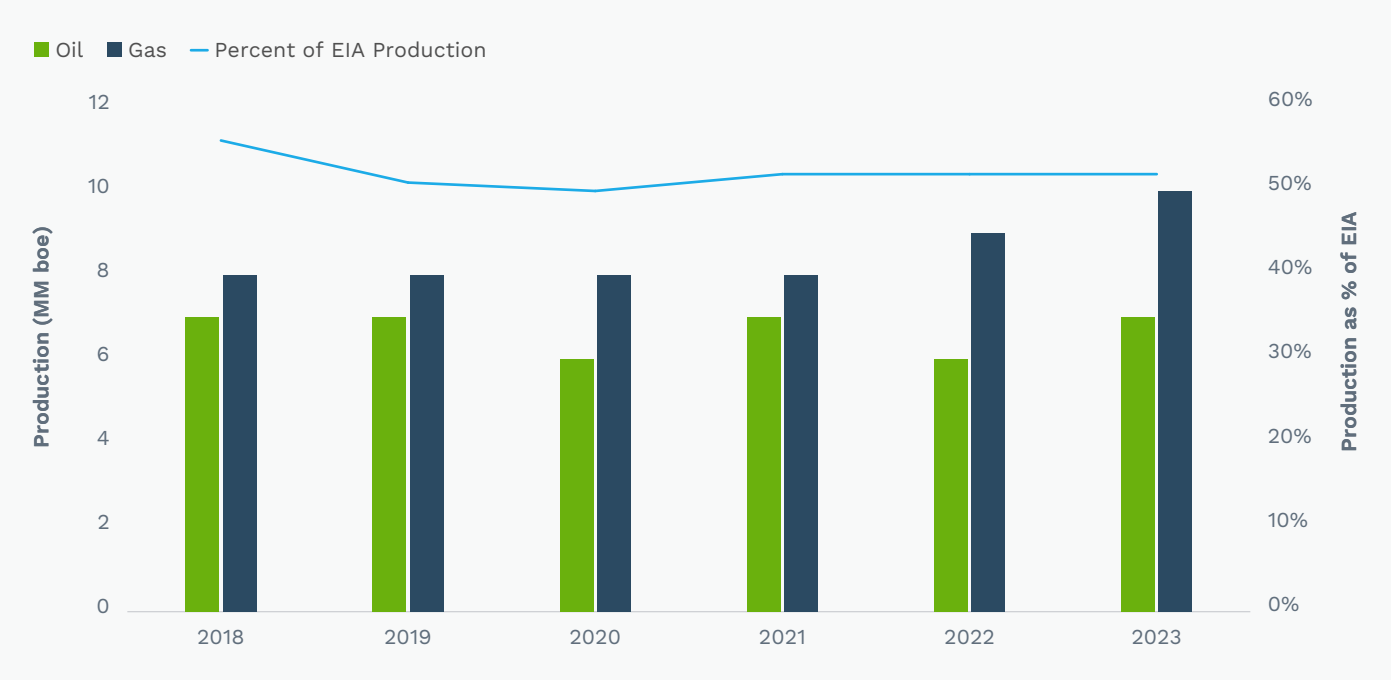


Source: Kimmeridge internal analysis.

Capex, Spending and Production: What Does the Industry Data Show?

For years, we have tracked the annual capital spending and reserves data of the public US E&Ps. This includes data for the majors, who break out their financial and operating results by segment and region, allowing us to isolate US oil and gas metrics. For the past six years, the entire peer group has consistently accounted for 6-7 MMbbl/d, while its gas production has risen from approximately 47 Bcf/d in 2018 to 58 Bcf/d in 2023. Notably, the percentage of US production covered by this group has remained steady at around 52% on a combined basis are.

FIGURE 2: Production from the Industry Group

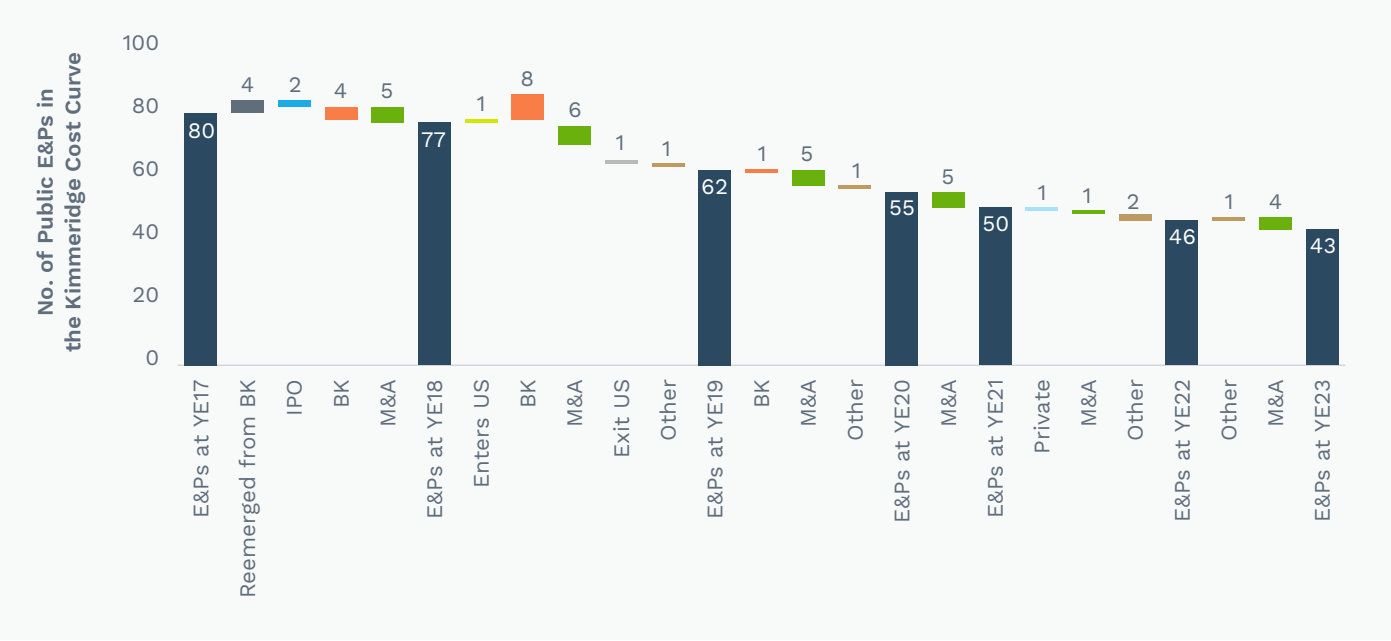


Source: Kimmeridge internal analysis.

As we'll discuss later, the industry is highly fragmented, and many operators are private and not subject to the same disclosure requirements. But given that our data set represents over half of US production and consistently reflects a stable percentage of the total year after year, it can serve as a useful proxy for industry-wide cost and spending trends. While we analyze some metrics on a company-by-company basis, for others, we aggregate data across all companies, effectively creating a "mega-company" that represents the entire upstream sector.

Although the percentage of US production attributed to our industry group has remained steady, the number of companies included in our data set has shrunk. The average company has therefore grown considerably in size. At the end of 2017, our data set included 80 companies; today, that number has dropped to just 43, a nearly 50% reduction. Figure 3 illustrates the companies that were acquired, those that went bankrupt, and others that exited the data set for various reasons.

FIGURE 3: Public E&P Count in Kimmeridge Cost Curve Sample Set



Source: Kimmeridge internal analysis.

The Recycle Ratio: Why Does It Matter?

The key metric we analyze from public E&P disclosures is the recycle ratio, a measure of capital efficiency. The numerator of the recycle ratio is cash flow per barrel produced (how much cash is generated on a per-unit basis), while the denominator is the finding and development (F&D) costs to add a barrel to reserves. We calculate this ratio on a proved developed (PD) reserves basis.[1]

The recycle ratio is a key measure of capital efficiency. For instance, if a company generates $20 of cash flow per barrel and incurs F&D costs of $10 per barrel, the recycle ratio is 200%. That's a respectable number–at the most basic level, it means that the company can grow without relying on outside capital. A larger reserve base supports higher production, and the company is adding reserves faster than it's depleting them.

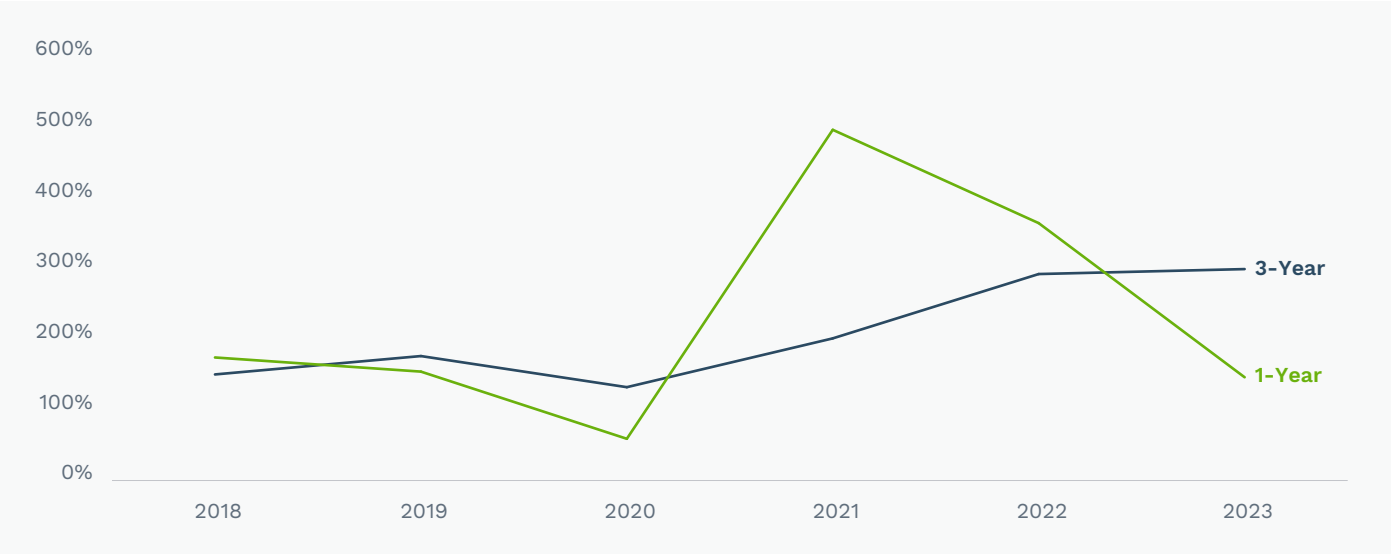
[1] Another way to calculate the recycle ratio would be to include proven undeveloped reserves (PUDs). There are two key issues with this approach. First, PUDs represent known reserves where the capital for development has not yet been spent, making them an inaccurate reflection of capital spending. Second, PUD booking methodologies vary between companies, which creates comparability issues. Additionally, we exclude acquisitions and divestitures from our calculations to ensure that the metric accurately reflects the true cost of drilling and completing wells.

Alternatively, instead of pursuing growth, the company could return excess cash to shareholders, as only a portion of its cash flow is needed to replace reserves.

Conversely, if the same company generates $20 of cash flow per barrel but incurs costs of $20 to add a barrel to reserves, the recycle ratio is only 100%, and the company is essentially treading water. To maintain flat production, it would need to use all its cash flow to add reserves and produce no free cash flow.

We have often looked at the recycle ratio over a three-year period to smooth out revisions to reserves and other lumpiness that can confound the data. However, the rapid changes in the E&P business model that began in 2021 have led to some strange outcomes. Because 2020, marked by the COVID-19 pandemic, saw very low oil and gas prices, reserves were significantly revised downward, making it one of the worst years ever for recycle ratios. A three-year analysis that includes 2020 thus distorts the picture. When we move forward to 2023 and drop 2020 data, it makes 2023 appear to be the best three-year period ever.

FIGURE 4: One-Year and Three-Year Recycle Ratios



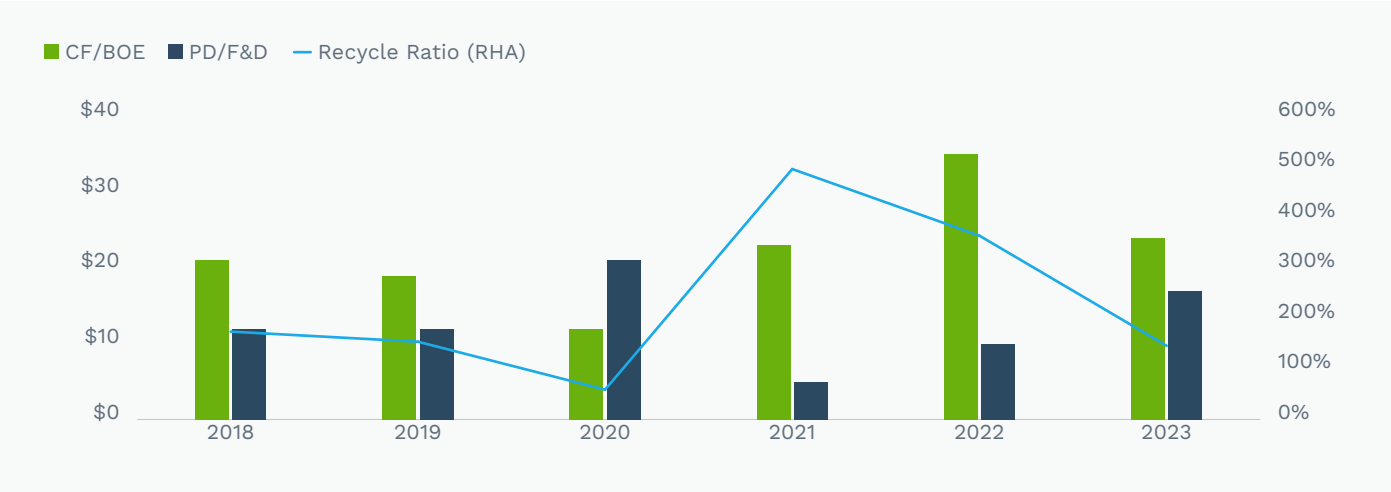
Source: Kimmeridge internal analysis.

While the one-year data may not be perfect and contains considerable noise, it is still quite telling when considering a large sample set. Importantly, the one-year data reveals that the recycle ratio declined in 2022 and decreased further in 2023.

Recycle Ratio Components

When we dig deeper into the components of the recycle ratio, we observe that while cash flow per boe has fluctuated due to pricing, a consistent trend since the onset of COVID-19 has been rising F&D costs. In 2021, F&D reached a record low of $5/boe, reflecting positive revisions that year, but it climbed to $10/boe in 2022 and continued to rise in 2023, reaching $17/boe.

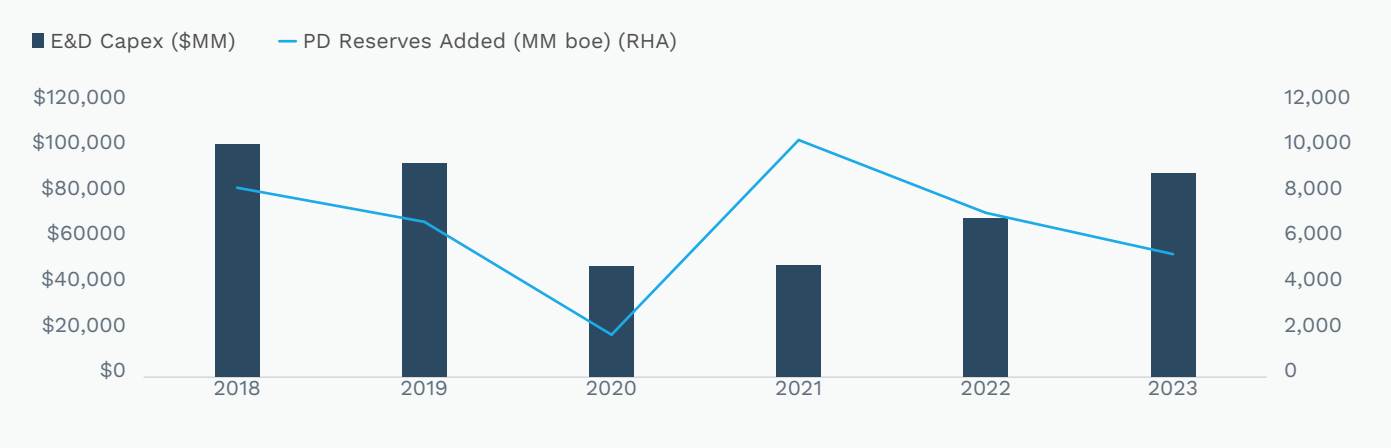
FIGURE 5: Recycle Ratio Components



Source: Kimmeridge internal analysis.

Breaking down that rising F&D reveals the depth of the issue. Capital spending for the group increased in 2021, 2022, and again in 2023. However, during both 2022 and 2023, the amount of reserves added declined. The disparity is striking: in 2022, spending rose 42%, while PD reserve additions fell 31%. In 2023, spending increased by 28%, yet PD reserve additions decreased by 25%.

FIGURE 6: Industry Exploration & Development Capex vs. Added Reserves



Source: Kimmeridge internal analysis.

The results were widespread throughout the industry. Of the 43 companies in our peer group, 40 experienced worse F&D metrics in 2023 compared with 2022.

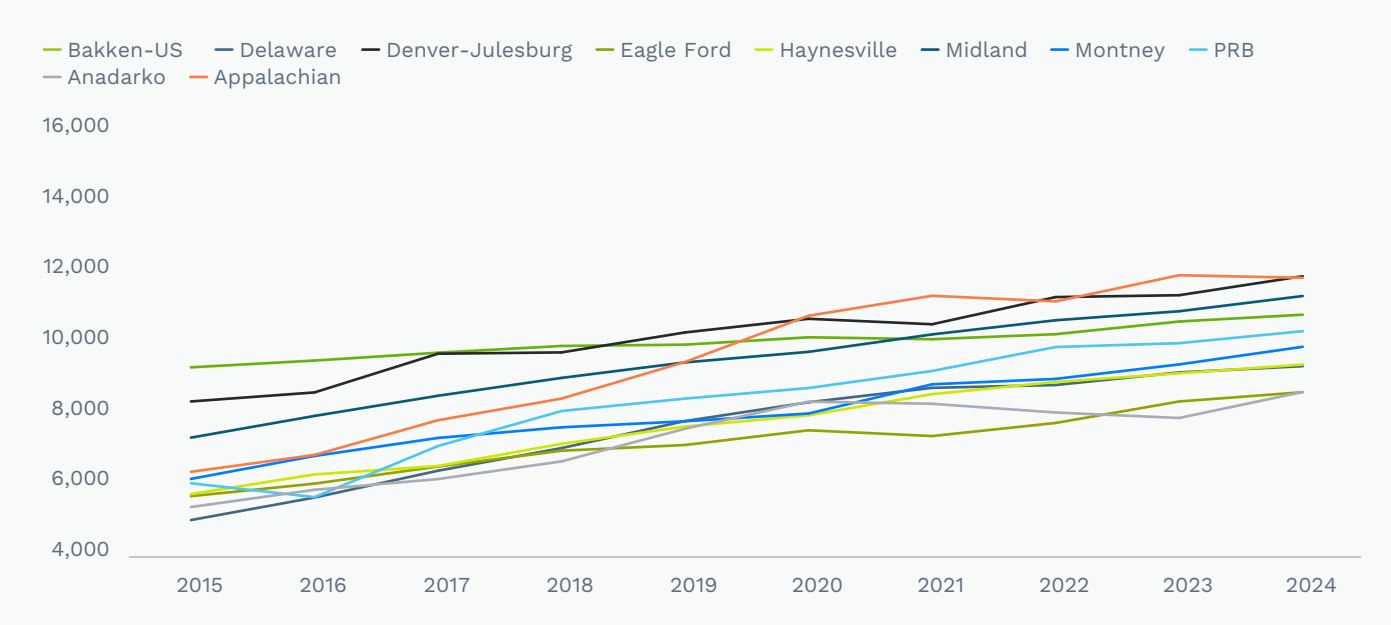
However, this narrative contrasts sharply with the prevailing story in the market. While production growth continues, many claim there are still five to 10 years of valuable inventory remaining, and even though we should worry about declining capital efficiency when this prime inventory runs out, that's a problem for tomorrow, not today. We remain skeptical; the data suggest that the decline is already underway, even as companies convey a different message. Why? Because nobody wants to admit that their time might be running out.

Large vs. Small

While the data shows capital efficiency is declining, companies are reaping certain benefits from scaling. The cost effect of industry consolidation can be studied using various metrics—expenses/boe, EBITDA, F&D, etc. Beyond cost effects, there is also an operational impact worth examining.

One of the most significant tangible advantages of consolidation is the ability to drill longer laterals through optimized land positions. Longer laterals have been a key driver of efficiency gains for E&Ps, but fragmented land positions make it challenging to drill longer lengths. Since 2020, average lateral lengths in the Delaware Basin have increased by 12%, rising from 8,381 feet to 9,402. In the Midland Basin, the increase has been even more pronounced, with a 16% rise from 9,807 feet to 11,387 feet. This trend highlights that horizontal wells in the Midland Basin are now considerably longer than those in the Delaware, facilitated by consolidation and rationalized land portfolios. This shift is a major contributor to operational efficiencies.

FIGURE 7: Average Lateral Lengths of Horizontal Wells Drilled by Basin

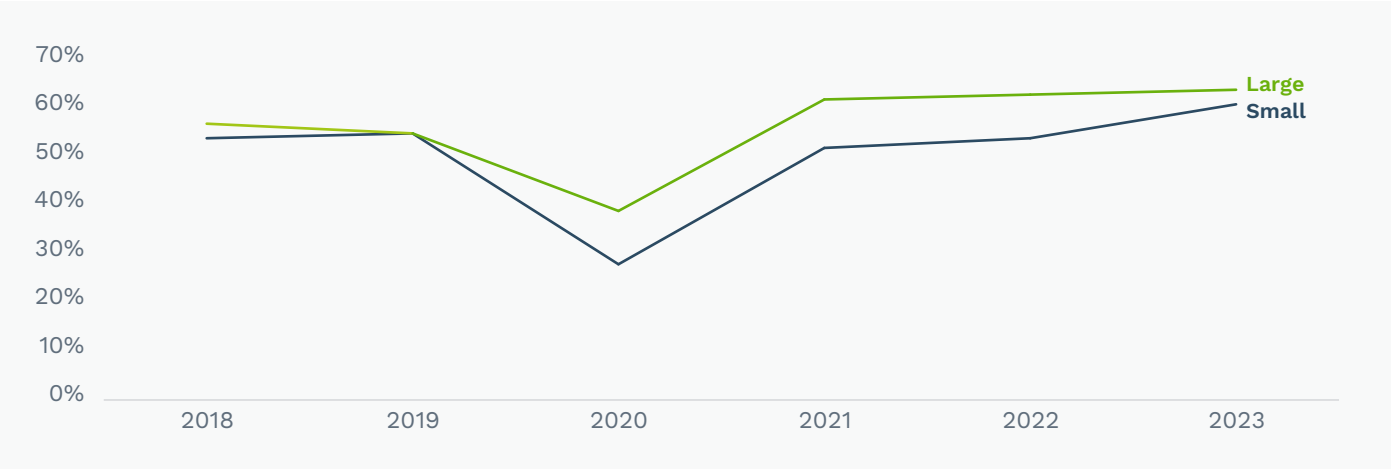


Source: Kimmeridge internal analysis.

Cost efficiencies become tangible as companies scale. We classified any company that produces over 250 mboe/d each year as a "large company" to quantify these cost efficiencies. As companies grow, their margins improve, which has a direct impact on F&D costs and the recycle ratio.

To understand the cost efficiencies that operators gain from scaling, we first examined their EBITDA margin. We calculated each company's benchmark revenue based on average WTI and HH prices to eliminate the bias and variability associated with realized pricing. We anticipated that larger operators would exhibit a better EBITDA-to-benchmark revenue ratio, as they would be able to capture greater synergies that enhance their margins. The data confirm just that: on an EBITDA-to-benchmark revenue basis, large operators have a higher margin than their smaller counterparts.

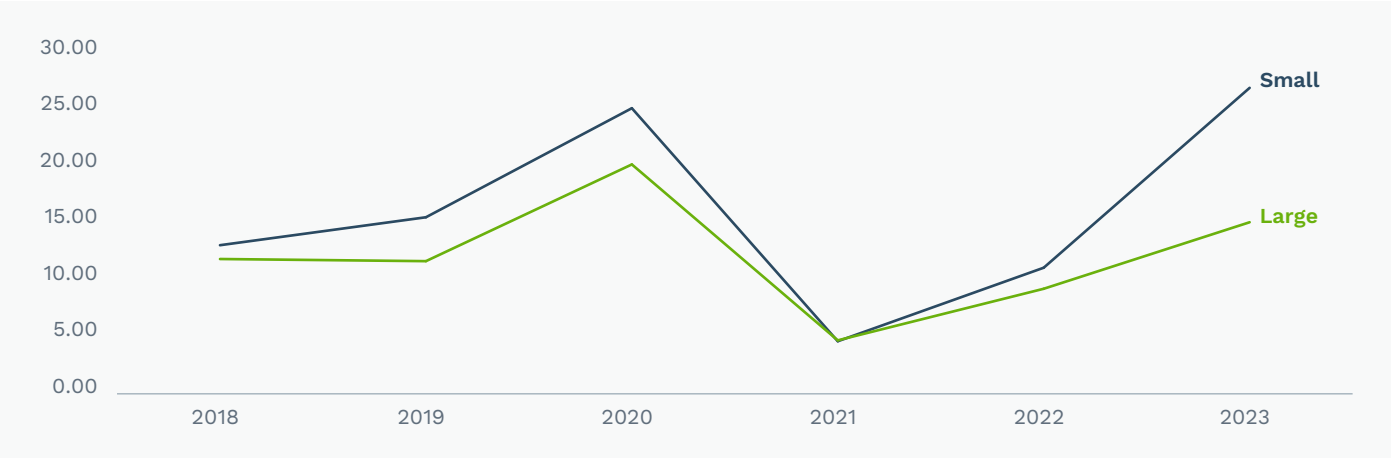
FIGURE 8: Large vs. Small Companies EBITDA-to-Benchmark Revenue



Source: Kimmeridge internal analysis.

But the advantages of scale extend beyond cash realized; they also manifest as operational efficiencies reflected in F&D costs. Our data set shows that over the past six years, larger companies consistently have lower F&D costs than smaller companies, with an average difference of 15-20% in favor of the larger firms.

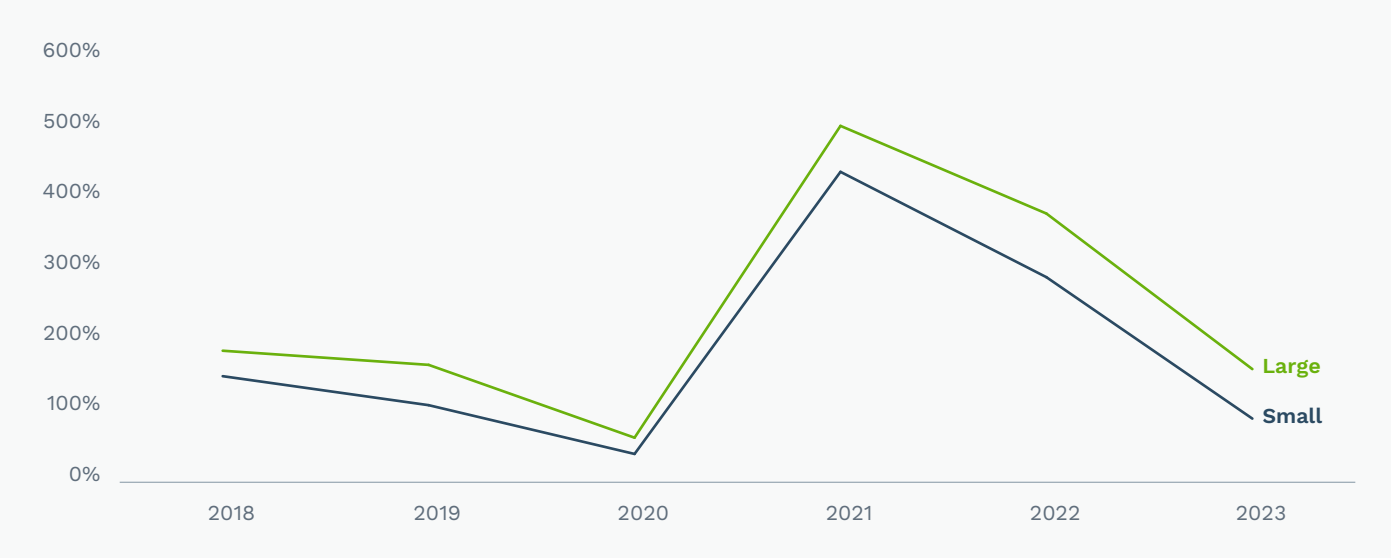
FIGURE 9: Large vs. Small Companies F&D ($/boe)



Source: Kimmeridge internal analysis.

Because large companies outperform on both cash flow per unit as well as F&D per unit, they consistently achieve higher recycle ratios compared with their smaller peers.

FIGURE 10: Large vs. Small Companies One-Year Recycle Ratio



Source: Kimmeridge internal analysis.

Another advantage of being a larger company lies in environmental impact. Larger firms have often taken the lead in the industry on environmental compliance, actively measuring emissions and implementing strategies to mitigate their climate and environmental impact. In contrast, many smaller companies tend to adopt a more passive approach, often failing to prioritize these initiatives. For regulators assessing the implications of mergers, the subsumption of smaller companies by larger ones could present additional societal benefits.

It is important to note that being a large company doesn't fundamentally change the business model compared to smaller firms. As illustrated by the consistent trends shown in the exhibits, both large and small companies are affected by the same fluctuations of the broader industry. While size doesn't insulate companies from volatility or the pressures in the oil and gas sector, it does offer certain advantages on the margin. This is why we are witnessing ongoing efforts to consolidate and grow. Companies pursuing mergers aim to capture synergies as they scale, with the goal of strengthening their competitive edge over their peers.

How Consolidated Are We Now?

While popular media often express concerns about the influence of "Big Oil," it's important to recognize that the E&P industry is actually one of the least consolidated major sectors. For example, while JP Morgan, the largest commercial bank in the US, holds 21% of the country's bank deposits, ExxonMobil, the largest oil company in the US, accounts for only 7% of domestic oil production. In many industries, a handful of large companies dominate, with the top five to 10 players responsible for the vast majority of sales. However, in the US oil and gas sector, it takes the 14 leading companies to reach just 50% of production.

The Herfindal-Hirschman Index (HHI) is a commonly accepted measure of market concentration, with values ranging from 0 to 10,000. A higher HHI value indicates greater concentration, while a lower HHI reading reflects a more competitive market with a larger number of potential competitors.[2]

We compared the oil industry to several other US industries.[3] We calculated the HHI value for each industry using a unique measure that accurately reflects the control each company holds in that sector. For instance, in the airline industry, the market is assessed by US airport capacity, while in the automotive industry, it is measured by annual sales volumes. This tailored approach allows for a detailed and precise calculation of HHI values.

Readers may intuitively recognize which industries are highly consolidated and which are more fragmented. For example, in the cell phone market, nearly everyone we know has a phone made by one of three or four companies. At the other end of the spectrum, when hiring a contractor for home renovations, we know we will be dealing with a small business, not a national brand.

HHI values support that intuition. As illustrated in Figure 11, the smartphone industry is the most concentrated among those we looked at, with an HHI value of 3,744. In contrast, home contractors represent the least concentrated sector, with an HHI reading of only 140. Diving deeper into the data, we see that Apple holds a commanding 55% share of smartphones, and the top five companies collectively own 90% of the market.

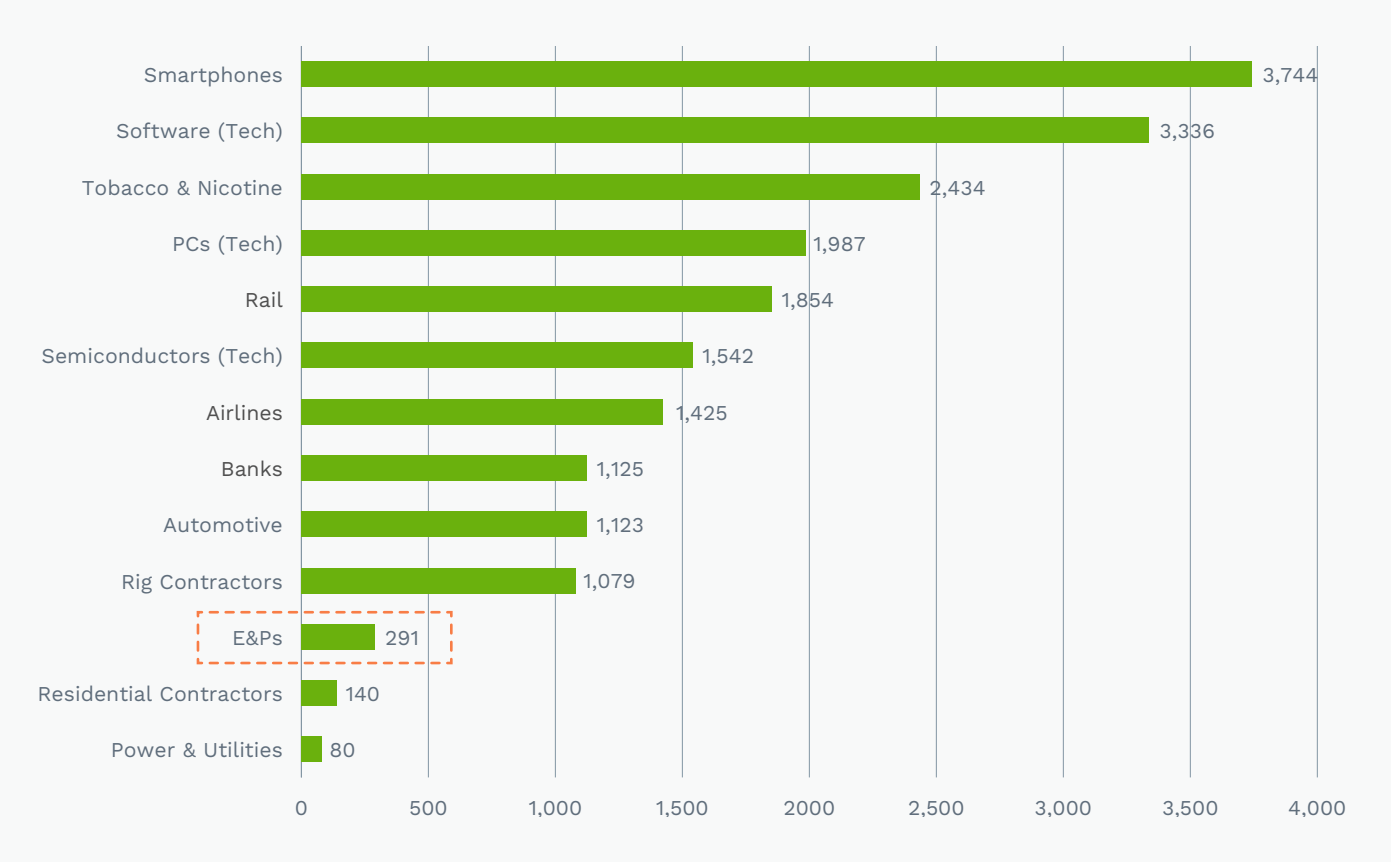
US oil and gas production looks a lot more like residential contractors than smartphones. At an HHI value of just 229, the E&P sector is incredibly fragmented. The top five E&Ps account for only 29% of production, and it takes 14 companies to get to 50% of US production.

[2] The HHI measurement is calculated by squaring the market share of each company and summing the results to determine sector concentration. It ranges from zero, which indicates a market dominated by many firms of relatively equal size, to a maximum of 10,000, which reflects a market controlled by a single firm.

[3] We calculated the HHI values for the following industries: Smartphones, Software (Tech), Tobacco & Nicotine, PCs (Tech), Rail, Semiconductors (Tech), Airlines, Automotive, Banks, Rig Contractors, E&Ps, Residential Contractors, Power & Utilities, and Logistics.

What this concentration implies is that despite the consolidation we have seen thus far, there is a lot more work to do. Over the past five years, overall E&P concentration has increased only from 123 to 229—an insubstantial rise.

FIGURE 11: Industry HHI Value Summary



Source: Kimmeridge internal analysis.

There is ample room for further mergers without causing the E&P industry to become particularly consolidated. As an exercise, we calculated the HHI value of the E&P sector assuming each company completed a like-for-like merger. In that scenario, the HHI reading would rise to just 576. If we then combined every other company on our list, the HHI value would rise to 1,120.

While this would position E&Ps just behind auto manufacturers on the HHI scale, it would not move the E&P industry up a single rank. In other words, visually, the E&P industry would remain largely unchanged, still exhibiting much more fragmentation than the automotive industry, a comparable industry on the HHI scale.

Where Consolidation Matters: The Basins

The reasons why industries are more or less consolidated are complex and can vary significantly. There are different advantages of scale in different businesses. If you are running an airline, it is far more cost-effective to operate 500 airplanes than just five. If you are manufacturing cars, or semiconductors, there are complex supply chains and vast economies of scale. If you are writing software, network effects multiply as more users adopt your products.

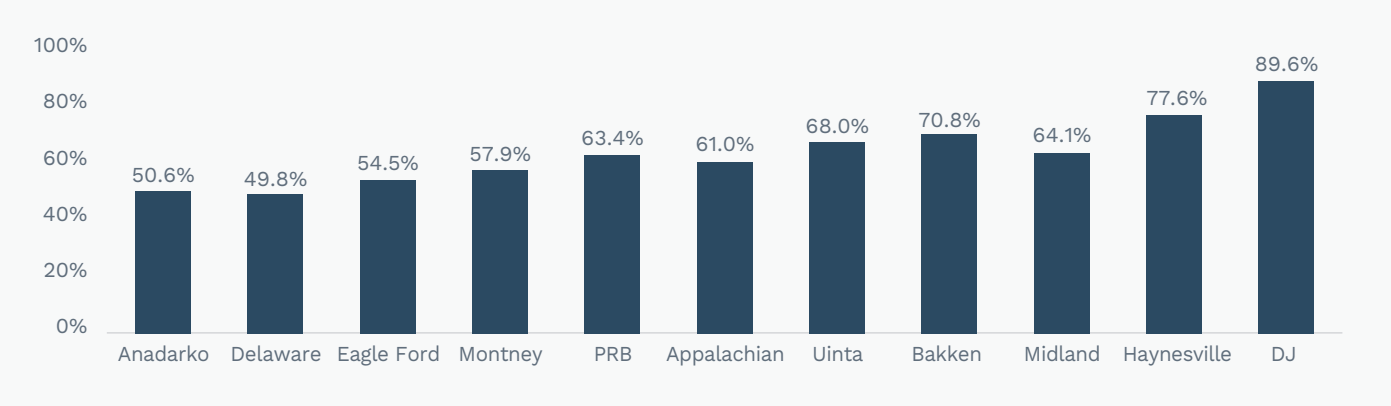
For E&Ps, some advantages of scale resemble those in other industries. If you operate 30 rigs, you should have better pricing power with rig operators vs. running just three. This notion is supported by the data above which shows that larger companies generally have higher recycle ratios than smaller companies, while still being subject to the same overarching industry trends.

However, certain advantages of scale in E&P can be undercut by geography. If you run 30 rigs spread across 30 different counties, the cost savings generated by scale might be offset by increased complexity. In the E&P business, the most significant advantages come from being bigger within a specific area, not just bigger overall.

Consequently, the most intriguing unit of study for consolidation is not the US as a whole, but rather individual shale basins. Being big across multiple basins might not help much; but if you are big within a single basin, you can be a basin champion.

To explore this dynamic, we calculated the HHI value for various basins over different time frames, examining trends over five years and three years, and the latest shifts resulting from the current wave of mergers.[4] The 10 selected basins provide a comprehensive view that reflects the evolution of M&A activity over time. Not surprisingly, market concentration varies considerably depending on the basin. The top five operators hold varying market shares across each basin, averaging around 64% overall. However, this share can range from 50% in the Delaware to 90% in the DJ.

FIGURE 12: Current Market Share of Top Five Operators by Basin



Source: Kimmeridge internal analysis.

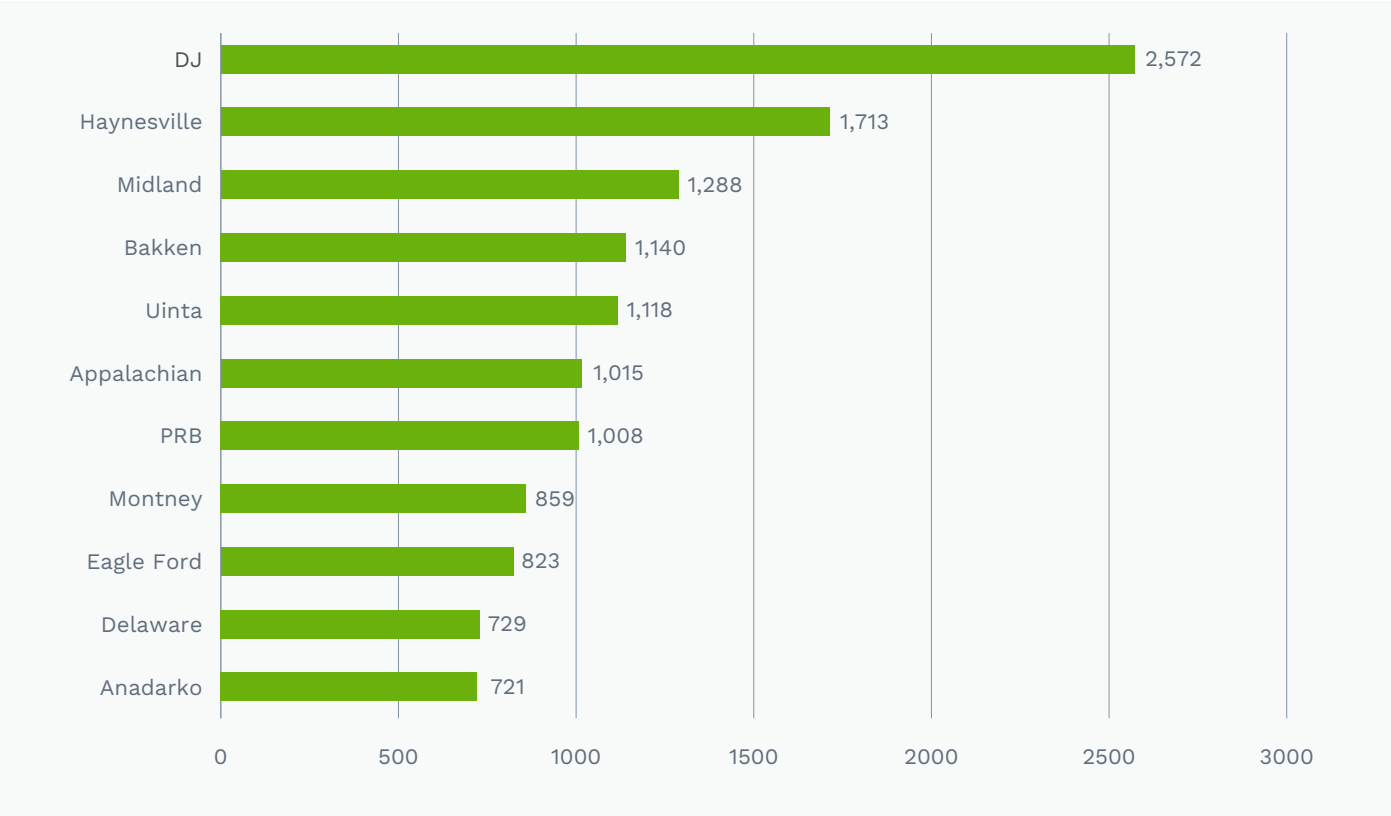
[4] We calculated the HHI value for the following basins at the following years: DJ, Haynesville, Appalachian, PRB, Montney, Bakken, Anadarko, Delaware, and Eagle Ford in 2018, 2020 and 2023.

The market share held by the top five operators serves as a strong indicator of the HHI value for each basin, significantly influencing each basin's value. It's worth pointing out that while the concentration of market share among the top five players does affect the HHI measurement, the number of unique operators within each basin can keep the HHI value low.

With over $50 billion in M&A activity so far in 2024, HHI values have become an important metric for identifying areas that are potentially interesting to us. Understanding HHI value is becoming integral to our strategic focus as investors, guiding us in determining where we should advocate or push for change, whether through private or public investment arenas.

Figure 13 shows the current HHI value by basin, revealing wide dispersion across regions. As should be obvious, each basin exhibits a higher HHI value than the overall industry, but the differences between them are large.

FIGURE 13: Current HHI Value by Basin

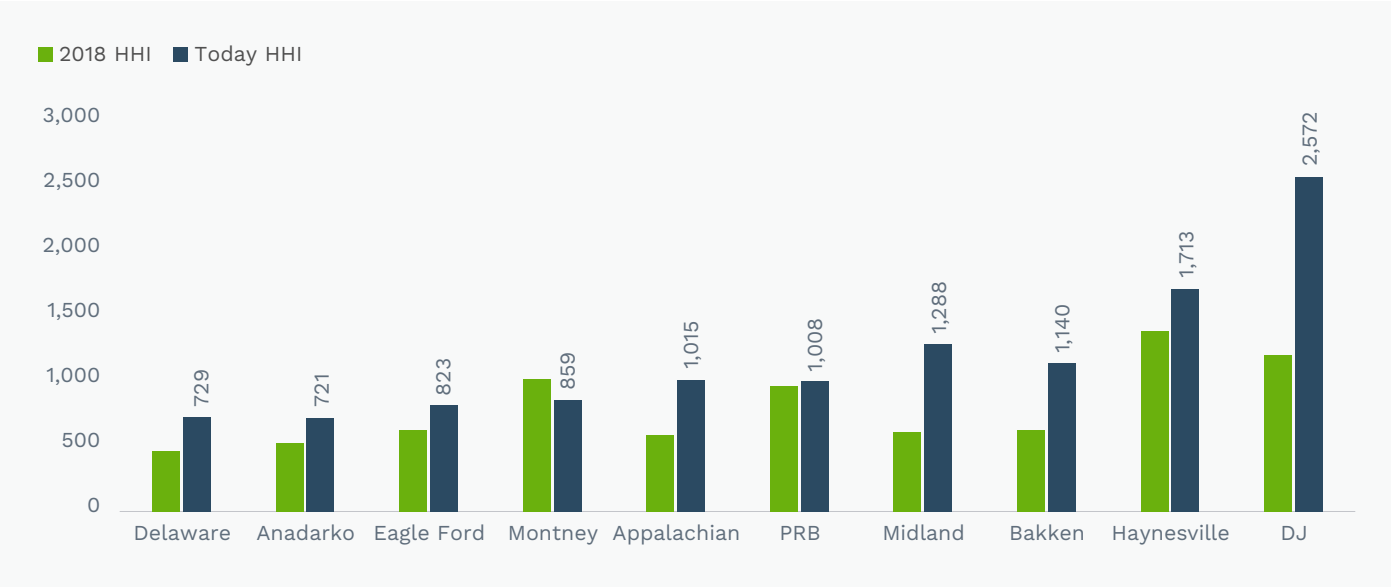


Source: Kimmeridge internal analysis.

A few basins immediately stand out. The DJ Basin is by far the most consolidated, a trend supported by the roll-up of PDC into Chevron, the mergers of Bonanza Creek, Extraction, Crestone Peak and others to create CIVI, and OXY's large position. Following the DJ are the Haynesville and Midland. In contrast, the Eagle Ford, Delaware, and Anadarko basins have not seen the same level of consolidation.

Looking at the five-year trends provides deeper insight, as HHI measures have fluctuated over time, leading to shifts in rankings among the basins. As shown below in Figure 14, the most consolidated basin in 2018 was the Haynesville, followed by the DJ and Montney. Over the past five years, the DJ has surged ahead of the other basins by a wide margin, and the Midland, Bakken and Appalachia have moved from lagging behind the Montney to leading it. The Delaware is perhaps the most surprising case, as it has failed to consolidate, despite being one of the top basins in terms of returns and size, suggesting that it should have been primed for consolidation.

FIGURE 14: HHI Basin Values in 2018 vs. Current



Source: Kimmeridge internal analysis.

Intra-basin consolidation is valuable for many reasons. Larger companies can leverage extensive technical knowledge to enhance operational performance, addressing challenges such as drilling hazards, and refining completion techniques. Additionally, bigger companies enjoy greater negotiating power with service and midstream providers. As previously discussed, a key tangible benefit of in-basin consolidation is the ability to drill longer laterals. We mentioned that while the Delaware Basin's average lateral length has been increasing, it has done so at a slower rate than peers. Coupled with an HHI value of only 729, the data suggest that the Delaware is well-positioned for further consolidation.

The takeaways from studying HHI values are clear: while consolidation is happening, it has varied significantly across basins. Looking at basin concentration provides a valuable perspective on which areas are ripe for further transactions and which are relatively saturated.

Where Do We Go From Here?

The push for consolidation in the E&P sector is advancing at a breakneck pace. In the first quarter of 2024 alone, a record $51 billion in upstream deals were announced, following a record $192 billion in 2023—a massive leap from prior years, with only $58 billion in 2022.

Despite this surge, many more mergers could happen without causing the industry to become particularly consolidated. As previously mentioned, if each company completed a like-for-like merger, and then did it again, the HHI value would only rise to 1,120, making the E&P sector still less concentrated than the automotive industry. In other words, it wouldn't rise to the top in terms of industries to worry about as over-consolidated.

We believe that the current wave of consolidation is motivated by real concerns about declining capital efficiency, which is becoming evident in real time. While merely increasing in size doesn't necessarily lead to a step change in profitability and margins, it does create a more streamlined business that warrants further pursuit. Companies should take a thoughtful approach to their role within the ecosystem and be rational if the smartest deal is a sale.

For investors looking to navigate the evolving landscape, there are several key takeaways:

1. **Identify genuine drivers of consolidation:** Evaluate whether a merger is occurring due to the potential for value creation in a fragmented basin or if it's a move by an acquiror experiencing a decline in capital efficiency. The HHI measurement can signal where consolidation is most beneficial, while capital efficiency data can reveal which companies are best positioned to act as consolidators.

2. **Watch capital efficiency closely:** The industry continues to innovate, so while the larger trend is negative, it's possible that engineering advancements and operational improvements may counteract the effects of declining rock quality. Trust the real reported numbers.

3. **Don't fall for value traps:** Be cautious of companies exhibiting declining capital efficiency, as they are likely to experience a continuous decrease in valuation. This decline will hinder their ability to pursue acquisitions, potentially leading to a downward spiral toward a blowdown value from which recovery is unlikely.

As the shale industry matures, these themes will become increasingly pronounced. After all, aging is a one-way process.

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