Financial Stress in the Oil and Gas Industry:

Strategic Implications for Climate Activism

Institute for Energy Economics and Financial Analysis
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Tom Sanzillo, Director of Finance, IEEFA

Clark Williams-Derry, Director of Energy Finance, Sightline Institute

Table of Contents

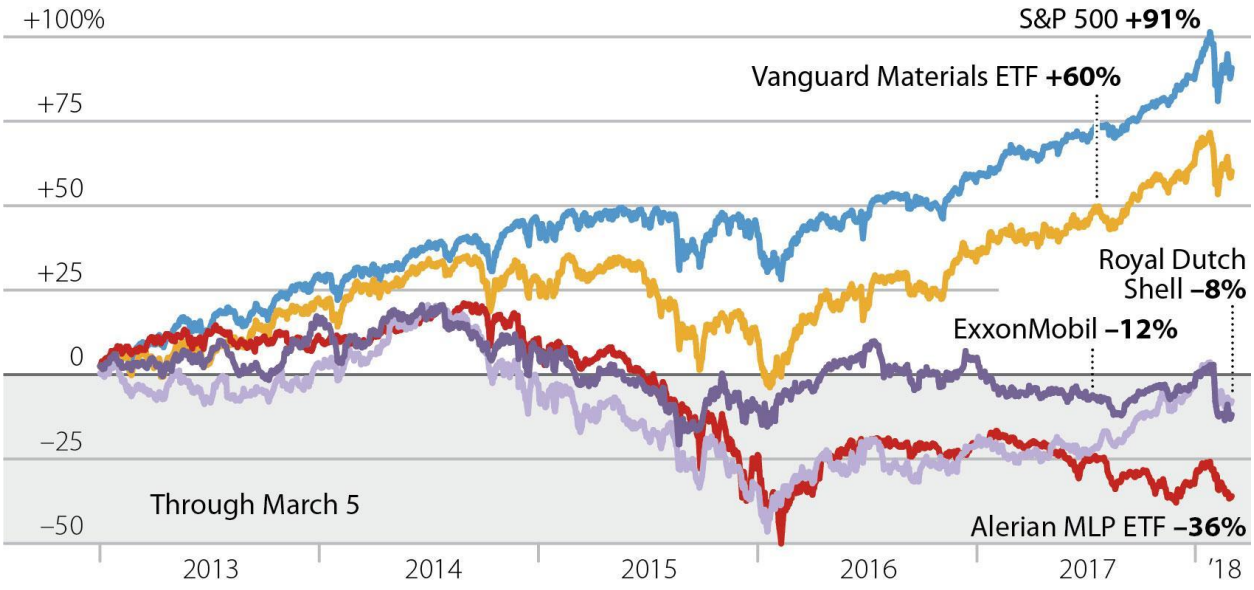
Figures and Tables

Executive Summary

On the surface, the oil and gas industry appears to be enjoying an extended period of prosperity. Fossil fuel companies around the globe—both public sector and government-owned—take in trillions of dollars in revenues each year while employing millions of workers across a sprawling supply chain. Total global oil and gas output continues to rise, and the fracking boom has lifted U.S. oil and gas output to all-time highs, fuelling dreams of geopolitical American energy dominance. The industry is also currently enjoying an oil price spike that has eluded it for the past five years.

Yet in financial terms, **the oil and gas industry is weaker than it has been in decades**. In the past several years, oil industry financial statements have revealed significant signs of strain: profits have dropped, cash flow is down, balance sheets are deteriorating and capital spending is falling. The stock market has recognized the sector's overall weakness, punishing oil and gas shares over the past five years even as the market as a whole has soared.

Five-Year Price Performance of Oil and Gas Stocks



Sources: Nasdaq; Yahoo Finance

Paradoxically, the oil and gas sector's financial troubles can be traced largely to its "successes" in fracking. In truth, **the fracking boom has been a financial bust**, not only for the companies most directly involved in fracking, but also for the fossil fuel industry as a whole. Rising U.S. oil and gas production precipitated the 2014 price crash and has since helped cap upward price pressures, putting tremendous stress on an industry that developed an overreliance on massive, capital-intensive extraction projects dependent on high prices for financial success.

The oil and gas industry's financial stress will not merely linger, it likely will intensify in the years ahead, as three key factors create lasting headwinds:

- First, fracking will continue to disrupt the industry from the inside. By keeping prices lower for longer, fracking threatens to render many oil and gas investments unprofitable. In addition, continued volatility in the oil markets will be a constant reminder to investors, nations, consumers and producers that the path forward with fossil fuels will be increasingly costly to investor profits, national economies and consumer budgets.
- Second, renewable energy and electric vehicle markets will pressure the industry from the outside. Spurred by rapidly declining costs, wind, solar, storage and electric vehicles will steal market share from oil and gas, keep energy prices in check, divert capital investments away from fossil fuels and serve as broad reminders of largescale shifts in the nature of global economic growth.
- Third, an increasingly sophisticated global climate movement will continue to battle the industry. Using a variety of tools—from litigation to lobbying to public relations to direct action—activists will boost industry costs while bending demand downward. The movement will continue to be a strong voice challenging the fossil fuel industry, working in concert with companies and industries building a viable set of alternatives to replace coal, oil and gas.

These structural headwinds will create powerful new opportunities for activists to influence policymakers, financial institutions and industrial decision-makers to accelerate the global transition to clean energy.

Yet to take full advantage of these opportunities, **anti-fossil fuel campaigns must pay attention to the oil and gas industry's bottom lines**. A financial lens can clarify the tactics and strategies that are most likely to have the greatest impacts on public opinion, investment decisions and industry actions. And a view through this financial lens reveals several broad strategies that are poised to yield important successes in today's era of financial stress in the oil and gas sector:

- *Boosting costs and risks* – When profits are razor thin, campaigns that increase costs, create delays and raise execution risks can turn a marginal project into a cancelled one.
- *Bending the demand curve* – The oil and gas sector relies on growing demand to keep prices high and profits flowing. But a virtuous cycle of service-centered economic growth, renewable technology, electric vehicles and climate policy can bend demand downward, trimming new investment and lowering prices.
- *Divestment and defunding* – The dismal financial performance and ongoing volatility of the oil and gas industry has created powerful new arguments for money managers to steer clear of oil and gas investments.
- *Strategic litigation* – A comprehensive litigation strategy—one that includes climate action by states and municipalities as well as a variety of shareholder suits—can create systemic financial risks for the industry as a whole.
- *Targeted research* – Deep dives into oil and gas sector finances will expose new weaknesses and vulnerabilities, both at the project level and for the industry as a whole.

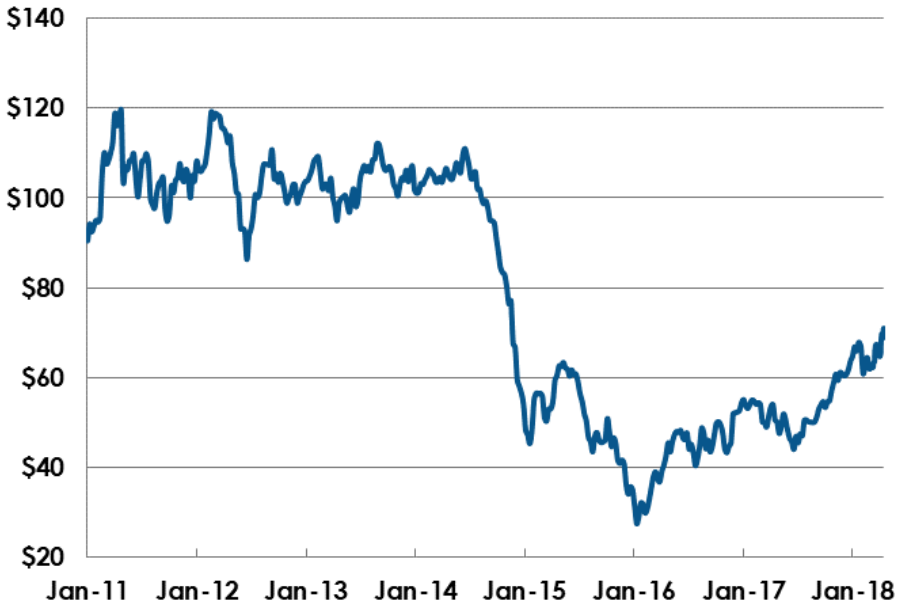
- *Changing the narrative* – The financial world is just beginning to understand the fundamental weakness of the fossil fuel sector, and barely acknowledges the global climate movement's growing power and reach. This has created a powerful opportunity to develop and foster a new storyline on Wall Street: that the oil and gas industry is an unstable financial partner just as it faces its greatest test.

The oil and gas industry's slippery financial footing offers potent new grounds for challenging the industry's public policy initiatives, for rewriting the industry's storyline and for promoting viable alternatives to carbon-intensive fuels. The challenges are great, but the opportunities are greater.

I. The Bust Within the Boom

Ignore the slick rhetoric flowing from oil and gas company public relations departments. An honest analysis of the sector reveals that **the fracking boom has been a bust**. Investors have poured hundreds of billions of dollars into North American oil and gas production over the past decade, and many tens of billions more into oil and gas pipelines, with surprisingly poor results. Oil and gas companies—both large and small, global and U.S.-focused—have lagged far behind broader stock market indices,[1] frustrating investors who had hoped that the shale renaissance would ultimately yield robust profits.[2]

Figure 1: US Oil Prices Adjusted for Inflation



Source: World Bank and Bureau of Labor Statistics

[1] https://www.bloomberg.com/news/articles/2018-04-23/exxon-fall-from-s-p-grace-marks-new-investor-path-for-oil-majors

[2] https://www.wsj.com/articles/wall-streets-fracking-frenzy-runs-dry-as-profits-fail-to-materialize-1512577420

The collapse in global oil prices in mid-2014 (see Figure 1) triggered many of the industry's current financial woes. Prior to that, oil prices regularly topped $100 per barrel, and many market analysts believed prices would continue to rise indefinitely. But today, few forecasters envision a return to $100 per barrel oil; and while some dissenters remain, the oil price mantra on Wall Street has now become "lower for longer."

Low prices yielded a stunning contradiction: in the middle of an oil and gas production boom, the industry's financial clout shrank. Since the oil price rout, the industry has suffered a series of financial problems: declining revenues; narrowed profits; major asset write-downs; rising long-term debt loads and dwindling capital spending that foretells fewer opportunities for profitable growth. Many industry analysts expected that higher oil prices in 2017 would improve the sector's fortunes, but oil and gas stocks notched yet another dismal year, badly trailing the broader market indices.

Understanding the oil and gas industry's current financial weakness—and how the industry so quickly moved from strength to fragility—requires some foundational knowledge in two areas: the current structure of the global oil and gas industry and the history of oil prices leading up to the 2014 price crash.

Overview of the Oil and Gas Industry

The oil and gas sector is vast and, at least in terms of production volume both domestically and internationally, still growing. The 50 largest oil and gas companies in the world, including both state-owned and publicly traded companies, recorded revenues of about $5.4 trillion in 2015. ExxonMobil, Chevron, Marathon, Conoco and Enterprise Products—the U.S.-based corporations among the globe's top 50—accounted for a combined $680 billion of revenues that year. The U.S. produces 11 percent of the world's oil supply, and the 10 largest publicly traded oil and gas companies in the United States have a combined market capitalization of $837 billion.[3]

While the oil and gas industry is sometimes presented as a monolith, it is actually a sprawling set of interrelated sub-industries with activities that fall into three general categories:

- **Upstream.** Also known as the exploration and production (E&P) segment of the oil and gas industry, upstream operations explore for new reserves and use a variety of technologies—conventional onshore drilling, deep-sea drilling, fracking in tight shales and even tar sands mining—to extract hydrocarbons in forms ranging from ultra-light methane to sludgy heavy oils.
- **Midstream.** Midstream operations serve as the oil and gas industry's transportation system, moving raw fuels from producing regions to processing plants, refineries and petrochemical facilities. Midstream companies also transport refined products to consumer markets. The U.S. midstream segment is known primarily for its complex network of pipelines, but it also moves oil and refined produces by rail and marine vessels.
- **Downstream.** This segment refines raw hydrocarbons into a dizzying array of products: fuel for automobiles, trucks, airplanes, trains and boats; gas that is

[3] https://www.statista.com/statistics/241625/top-10-us-oil-and-gas-companies-based-on-market-value/

consumed in homes, power plants and major industries; and petrochemical feedstocks used to provide hundreds of different chemical compounds for manufacturing. Dow Chemical alone, for example, makes more than 7,000 product families, most of them derived from fossil fuels.

The U.S. Department of Energy reports that the oil and gas sector—including extracting and refining hydrocarbons and producing electricity from oil and gas—employed nearly 880,000 workers in the United States in 2016.[4] Other sources place total oil, gas and petrochemical employment at 1.39 million.[5] Yet extraction of oil and gas directly employs fewer than 150,000 workers across the United States, down from 200,000 in late 2014.[6] And despite strong recent gains in U.S. oil and gas output, employment in oil and gas extraction has stabilized: higher production in recent years has not led to more jobs. In fact, the U.S. oil and gas extraction industry employs fewer workers today than it did a decade ago, when the fracking boom was first taking off.

Companies in the oil and gas sector face significant challenges: geological and technological complexity; massive capital costs; long lead times (particularly for major projects); and far-flung operations with often demanding physical, environmental and sociopolitical conditions. Businesses in the sector often share risks and costs through joint ventures and complex partnerships, which themselves introduce their own execution challenges. The sector is buffeted by macroeconomic risks—fluctuations in commodity prices, exchange rates, interest rates and overall economic growth—as well as shifting political climates. And the industry often faces significant costs to mitigate or remediate the substantial environmental harms it causes.

Despite the obstacles the industry faces, for many decades the oil and gas sector has produced value to shareholders and significant revenue for many governments. This makes the industry's slipping financial performance all the more troubling. Governments that rely on oil and gas revenue now face severe funding shortages that, in several notable instances, have resulted in political turmoil and even challenges to government legitimacy. Meanwhile, flagging stock market performance has forced many investors to rethink their strategy toward the entire industry.[7]

Different components of the oil and gas sector face different operating and financial circumstances, as well as different risk profiles. In Appendix 1, we describe five subsets of the oil and gas industry landscape: the integrated supermajors; gas producers; smaller exploration and production companies; midstream companies that transport oil, gas and associated products; and the petrochemicals sector, which in the U.S. is growing both in financial and environmental impact.

[4] https://energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report_0.pdf, p.29.
[5] https://www.statista.com/statistics/539142/united-states-oil-gas-and-petrochemical-employment-by-occupation/
[6] https://data.bls.gov/timeseries/CES1021100001?data_tool=XGtable
[7] https://www.wsj.com/articles/big-oil-investors-rethink-their-bets-1514992061

Oil Prices Since the 1980s

Starting in the early 1980s—when the OPEC-driven oil shocks of the 1970s remained a fresh memory—global oil prices entered a period of decline and relative stability. Adjusted for inflation, oil prices generally trended downward for nearly two decades, falling near all-time, inflation-adjusted lows in the late 1990s. (See Figure 2.)

Figure 2: Oil Prices, 1982-2017

Source: World Bank and Bureau of Labor Statistics

But in the early 2000s, global oil prices began to rise. Unlike the 1970s oil shocks, these increases were due more to geology than geopolitics. Production from larger and older oil fields had begun to decline, and new oil discoveries had grown scarce. Oil prices rose steadily as production growth slowed and new supplies became more expensive. These developments prompted many energy market analysts to conclude that the world had entered a new era of inexorable price increases.

For nearly 15 years—interrupted only briefly by the chaos of the global commodity bubble and economic collapse from 2007 through 2009—forecasts of scarce supplies and high prices gradually tightened their grip on global markets. Confident that oil prices would continue rising, oil and gas investors increasingly turned to capital-intensive "extreme oil" projects, including deep water drilling, arctic exploration and tar sands extraction. Even under the best of circumstances, these projects would take decades to recover their up-front costs, let alone turn a profit. Still, convinced that global oil prices would continue to rise, investors believed that "extreme oil" ultimately would yield handsome returns.

Those convictions began to fall apart in mid-2014. In June 2014, oil prices stood at $105 per barrel, but by January 2015 they had dropped below $50/barrel. The declines continued in fits and starts over the next year, with spot oil prices bottoming out in February 2016 at less than $30 per barrel.

This 18-month price shock stemmed neither from geology nor geopolitics, but from technology and investment. The preceding decade of high prices had encouraged smaller U.S. oil companies to experiment with new ways of coaxing oil and gas out of the ground. Over time, the industry succeeded, combining and refining old technologies, including horizontal drilling, seismic imaging and hydraulic fracturing, or fracking. Wall Street got wind of the frackers' early successes and began to pour capital into the nascent tight shale industry. U.S. hydrocarbon production rose quickly—starting first with gas in the mid-2000s, and later with oil in 2009.

Initially, prices stayed high even as U.S. oil output grew. A key reason why oil prices didn't fall immediately was that some OPEC members trimmed production to keep supplies tight and oil prices elevated. But the continuing rise of U.S. oil production started to erode OPEC's market share, squeezing profits for governments that were heavily reliant on oil revenue. So, in mid-2014, the cartel unexpectedly fought back against the U.S. shale oil industry by refusing to cut production, keeping global supplies elevated.[8] OPEC oil ministers expected that the resulting price crash would undercut the finances of U.S. oil and gas companies, souring investors on U.S. shale oil and thereby eliminating a growing competitor.

In the short term, the oil cartel's strategy worked: the price crash did trigger a major realignment of oil industry finances. Many companies had no choice but to write off costly reserves and "extreme oil" projects launched during the era of high prices. Others sold assets for less than they paid for them. A host of smaller product and service companies filed for bankruptcy. As revenues plummeted, stock prices and capital expenditures collapsed, and the industry took on massive debt to weather the storm.

In the long term, however, OPEC's efforts to cripple the U.S. shale industry look like they will fail. The price collapse forced free-spending oil and gas companies to improve their financial discipline and drilling efficiencies, but after a brief dip, U.S. oil output is again on the rise and likely will top 11 million barrels per day by the end of 2018. And even though new OPEC production restraints have boosted prices from their early 2016 lows, global oil prices have only recently topped $70 and most analysts expect a period of volatility for the foreseeable future.

[8] https://www.vox.com/2014/11/28/7302827/oil-prices-opec

Oil's Powerful Influence on National Budgets and Economies

Due to the central importance of oil to the economy, the rise and fall of oil prices have significant impacts on the budgets in countries that produce oil as well as on consumer nations who are heavily dependent on oil.

Oil-Producing Nations:
Many of the world's largest oil companies are state-owned enterprises, including in Russia, Qatar, Saudi Arabia, Venezuela, Libya, Iran, Syria, Iraq and Norway.

The function and structure of state-owned oil and gas companies differ from those of private companies owned by shareholders. State-owned companies must generate revenues that cover the cost of operations, borrowing, reinvestment, payments to key individuals in the ruling elite and distributions to the government's budget. Privately-owned companies must generate revenue to cover operations, borrowing, reinvestment and distributions to shareholders. A prolonged low-price environment has serious political repercussions for state-owned oil-producing countries whose governments are dependent on industry revenue to support national budgets. As these revenues decline, the governments fall into fiscal distress. Public spending is curtailed, and the legitimacy of those in power can be challenged. The governments of Saudi Arabia, Norway and Qatar, for example, have all recently issued unprecedented national budget-tightening measures along with warnings of further cuts. Recent street protests in Iran, Iraq and Russia all in part stem from social distress caused by the loss of public revenues and subsequent cuts in services.

Rising prices intensify the volatility of the oil and gas sector as a place to do business. As oil prices rise, the government budgets supported by state-owned enterprises improve. The recent rise from $60 bbl. to $80 bbl. is generally good news for these countries. Growing cash reserves for state-owned enterprises can create appetites for expansionary investments overseas in both upstream and downstream projects, all of which (particularly the downstream ventures) come with risk. Rising prices also drive pressure, particularly among U.S. owned drillers, to increase production and disrupt OPEC's current supply cuts. In the short run, there will be continued market volatility as prices climb and the perception of the negative impacts from higher prices starts showing in inflation, trade deficits, currency weaknesses and diminished expectations for economic growth.

Oil-Consuming Nations:
In the past, oil and gas price shocks caught consumer nations—including India, Japan, China, South Korea and much of Europe—flat-footed. With no alternatives to oil and gas, national governments at first try to buffer consumer price increases with subsidies and market interventions, adding pressure to national budgets. For consumer nations such as Japan[A] and India, large, long-term oil price increases can sap their economic growth strategies: high prices bring inflation, trade deficits, currency imbalances, fiscal stress and anemic economic growth.[B]

Today, consumer nations and perhaps consumers themselves are positioned differently. Learning from past business cycles and looking to lower the cost of energy these countries are adopting large scale strategies to hedge against global price volatility. The current rising price cycle will be a test of how far along consumer countries are on the path away from fossil fuels. The cycle will also highlight what kind of policy and market incentives these nations will need to further protect themselves from price volatility.

[A] http://www.health.state.mn.us/divs/eh/asbestos/homeowner/howhire.html
[B] https://www.nasdaq.com/article/rising-bond-yields-oil-prices-hammer-asian-currencies-20180508-00101

II. A New Oil-and-Gas Investment Thesis

Like any business, the oil and gas sector's financial health hinges on three critical variables: the total volume of products the industry sells; the cost of producing those products and the prices it receives for its products.

Yet for years, global investors believed that a fourth factor was just as critical for an oil or gas company's long-term financial prospects: the size of its hydrocarbon reserves. According to this investment thesis, global oil and gas production was the fuel for—and synonymous with—economic growth, which was seen as a permanent component of modern economic life. Growth would inexorably lift prices, revenues and profits for the oil and gas sector. Price spikes served a specific financial function: they provided influxes of cash that the industry used to launch capital-intensive projects and acquire new oil and gas reserves. As the global economy grew, demand for oil and gas would periodically collide with supply constraints creating periods of price volatility. The industry, when challenged by conditions to innovate scientifically and technologically, would make improvements and navigate any political conflict.

Companies had to be prepared to deliver returns in any investment climate. The key was to maintain an abundant portfolio of oil and gas reserves. Investors supported large acquisition budgets as part of the long term bet they made on the industry, and they treated reserves as a key metric of long-term value.[9]

This investment thesis succeeded for decades, and many investors simply assumed that new reserves, even those acquired at great cost, would ultimately yield handsome rewards. Driven by this factor, oil and gas executives placed a high priority on steadily restocking reserves through a combination of exploration, acquisitions and creative accounting. And they bet big on high-cost oil projects—tar sands, arctic drilling and deep-water extraction—that required decades of high prices to recover initial capital costs.

During the early years of the shale boom, the oil and gas sector doubled down on the reserve growth thesis. Small and midsized E&P companies entered bidding wars for shale oil fields and paid high costs to drill and prepare new wells for production. Integrated supermajors, such as ExxonMobil, Shell and BP, spent lavishly on shale oil assets, sometimes by swallowing smaller companies whole. Pipeline companies piled up debt to build (and often overbuild) new oil and gas transportation networks to service the vast amounts of oil and gas that the industry was preparing to produce. The industry quickly gained experience and confidence in coaxing oil out of basins that had previously been dismissed. And Wall Street—long accustomed to viewing oil reserves as a key metric of financial value—flocked to the sector.

But even as the oil and gas industry and investors poured money into the shale revolution, **the production boom they had unleashed was steadily upending the investment thesis that equated oil and gas reserves with long-term value**.

[9] Steve Coll, Private Empire: Exxon Mobil and American Power, New York: Penguin Books, 2012, pps. 186-193.

Fracking undermined the old reserve-based investment thesis in two ways. First, it eroded the assumption that global oil and gas supplies would be subjected to periods of constraint. Burgeoning oil and gas output in the United States—along with hints that fracking technology could spread globally—rendered old estimates of total global reserves meaningless. And if oil and gas weren't in short supply (at least on a time frame that mattered to Wall Street) investors couldn't rely on reserves as a gauge of long-term value.

Second, the price collapse actually destroyed the economic value of many reserves. Accounting rules define "proved reserves" as the amounts of oil and gas that can be profitably extracted at expected future prices. But as expectations for future prices fell, many so-called reserves became unprofitable. This forced the industry to "de-book" many reserves and write off many investments as worthless. The result was a seeming paradox: oil and gas production was soaring even as whole segments of high priced reserves were rendered valueless.

As the old, reserve-focused investment thesis withered, oil and gas was gradually becoming just another commodity, subject to the same short-term financial concerns—about prices, profits, cash flows, debt, dividends and asset quality—as the rest of the global market.

Yet by the metrics of financial success that apply to other mature industries, much of the sector had been chalking up dismal results for years. Even when prices were high in the early part of the shale boom, many companies spent more to acquire and develop new reserves than they were earning from production. To sustain their capital spending while maintaining robust dividend payouts, the sector borrowed heavily from the debt markets. For any other mature industry, this sort of debt-fueled spending spree would have set off warning bells. But the old reserve-focused investment thesis fueled investors' belief that profligate capital spending would ultimately yield handsome profits, letting the sector off the hook, at least for a while.

Dismal Financial Performance in an Era of Low Prices

The collapse of global oil prices from mid-2014 through early 2016 did more than upend the old investment thesis that had long buoyed oil and gas sector stock prices. It precipitated a full-blown financial crisis for the industry—a crisis that forced companies into substantial reserve reductions, asset write-offs and fire sales to raise cash, ultimately triggering a tsunami of bankruptcies among smaller oil producers and oilfield service providers.[10] The key takeaway from the financial crisis was that using reserves as a proxy for long-term value was an idea that had come, and gone.[11]

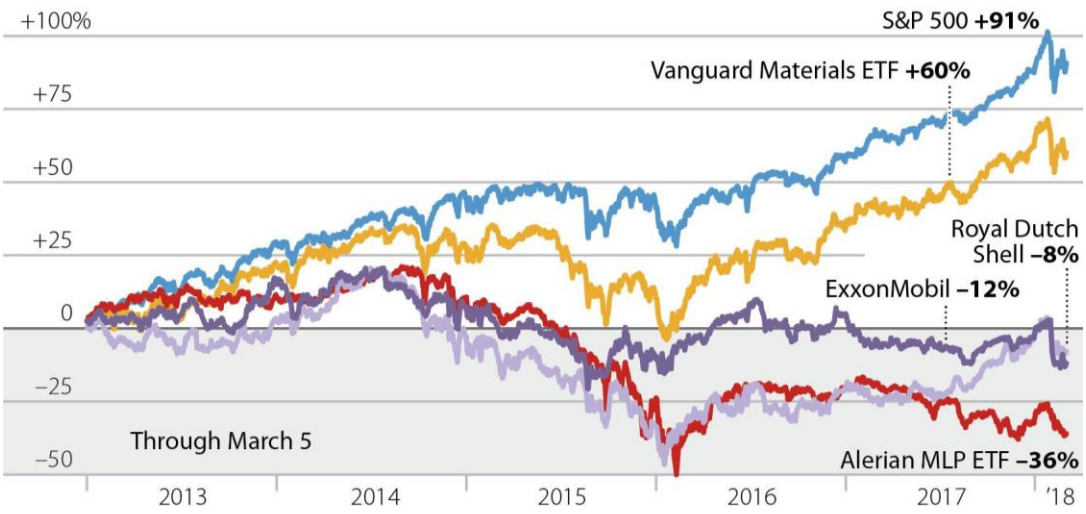
[10] http://www.haynesboone.com/~/media/files/energy_bankruptcy_reports/2017/2017_oil_patch_monitor_20171031.ashx
http://www.haynesboone.com/~/media/files/energy_bankruptcy_reports/2017/2017_ofs_bankruptcy_tracker_20171031.ashx

[11] While New York State and Massachusetts attorneys general have gone to court regarding ExxonMobil's climate disclosures their proceedings have taken them to the question of the accuracy of the company's disclosures to its investors regarding its oil reserve calculations.

This more clear-eyed approach to valuation—where prices matter and reserves not so much—has deeply hurt the industry on Wall Street. For example:

- The S&P 500 as a whole has dramatically outperformed the oil supermajors, as well as indices of smaller companies that produce and transport oil and gas in North America. (See Figure 3.)
- For the past five years, the MSCI Index—a key gauge of global market performance—underperformed a subset of the MSCI index that excludes fossil fuel companies.[12]
- An analysis of 2017 stock returns shows that energy was the second-worst performing sector in the market for the year, losing 4 percent in a year when the S&P 500 overall gained more than 19 percent.

Figure 3: Five-Year Price Performance of Oil and Gas Stocks



Sources: Nasdaq; Yahoo Finance

In short, the shale boom—and the accompanying boom in production and collapse of prices—permanently ended the special status that reserves held in investors' evaluations of the oil and gas sector. As reserves faded in importance, conventional measures of financial accountability—profits, cash flows, dividends and debt loads—came to the fore. More than ever, cash became king. Investors now pay less attention to reserves and more attention to whether a company can produce enough cash from operations to service its debt, make careful capital expenditures, and still have enough left over to reward investors and stakeholders. This is certainly true for private-sector oil producers looking to convince shell-shocked investors that dividends and returns are real and stable. It is perhaps even truer for state-owned enterprises that use real cash to meet public budgets, a major test of political legitimacy in many countries.

https://www.bloomberg.com/news/articles/2016-09-16/n-y-said-to-be-probing-exxon-s-valuation-of-oil-reserves

[12] https://www.msci.com/documents/10199/d6f6d375-cadc-472f-9066-131321681404

As a leading indicator of what the new paradigm could mean for oil and gas sector investment, the managers of Norway's sovereign wealth fund—the world's largest[13]—recently recommended removing fossil fuel companies from the fund's indexed investments, largely due to the sector's high volatility and poor returns. (See Sidebar.)

Norway's Wealth Fund Drops Fossil Fuels

Last November, Norges Bank, the manager of Norway's trillion-dollar sovereign wealth fund, put forward a landmark investment recommendation to remove all oil and gas stocks from the fund's indexed investments.

It was a remarkable proposal in a country whose economy and budget are so closely tied to oil. Fund managers recognize that low oil prices will likely constrain revenues from the nation's oil industry through at least 2050, necessitating quick action by fund managers to sustain returns and limit systemic risk to their portfolio and the nation's economy. Fund managers recognized that oil and gas stocks are plagued by volatility and poor returns, and were pulling down the gains made by the index more broadly. In short, Norges Bank's recommendation amounted to a judgment that oil and gas equities no longer possess the blue-chip qualities of the kind of stock a prudent investor would put into a long-term index.

The bank has not recommended full divestment from fossil fuels, but instead would place oil and gas investments in a separately managed portfolio that can use more speculative strategies akin to those of day traders, hedge funds or private equity firms. The bank subscribes to the thesis that valuing oil and gas companies requires active management and deep expertise and can no longer be seen as a suitable passive investment. Oil and gas stocks are no longer investment assets that are inextricably linked to economic growth. Unlike many other funds, Norway's sovereign wealth fund is a major owner of oil reserves and is probably better positioned than other funds to take on this level of investment risk.

III. The 21st-Century Risk Landscape for Oil and Gas

The elevation of cash flow, rather than reserves, as the key metric of value in the oil and gas industry is forcing a comprehensive re-evaluation of the sector's financial health. Investors increasingly view oil and gas companies—even the supermajors such as Exxon and Chevron—as speculative investments whose fortunes are intimately tied to the ups and downs of commodity markets.

And now that cash flow matters to investors, *oil and gas prices matter*. The direction of oil prices, and the specific effects of prices on revenue and profit, increasingly

[13] https://www.cnbc.com/2015/07/17/the-worlds-biggest-sovereign-wealth-funds.html#slide=11

determine how investors evaluate oil and gas companies. And unfortunately for the oil and gas sector, there are financial and political risks at both ends of the spectrum.

The results of the low-price environment have been on display for the past several years: a sharp decline in revenue, reserve write-offs, poor stock market performance, numerous bankruptcies and defaults and a general decline in public and investor confidence. Expectations of a prolonged low-price environment have also forced companies to move aggressively to cut costs and curtail capital spending.

At the other end, high prices could offer a reprieve of sorts for oil and gas companies through higher revenue, but higher prices tend to tamp down overall demand and run the risk of strengthening competing resources. Prices for clean renewable energy resources already are falling fast, and any increase in oil and gas prices simply improves the economic competitiveness of the alternatives. (See Appendix II for a more thorough discussion of the risks the industry faces in both low-price and high-price environments.)

In addition to price risk oil and gas executives now face a confluence of forces—some continuations of past trends and others newly emerging—that will continue to pressure the industry's finances in the years ahead.

Fracking will continue to disrupt the industry. The havoc caused by fracking has not yet run its course. Fracking threatens to keep prices low for the foreseeable future, keeping the squeeze on the global oil and gas sector's finances. In the short term, spare production capacity built up during the fracking boom[14] will moderate price spikes. In the long term, the potential for fracking to spread beyond U.S. borders,[15] while certainly disturbing from a climate perspective, could also could maintain the low-price environment for decades.

Low prices, in turn, will continue to erode oil and gas industry balance sheets forcing new write-downs of capital intensive projects and a more cautious outlook on future investments in high cost ventures like tar sands, deep water drilling and arctic exploration. Meanwhile, the shale boom will continue its evolution, turning small towns into boomtowns and boomtowns into ghost towns. Left behind will be a trail of stranded or overbuilt capital, including oil and gas wells that failed to yield robust profits and underutilized pipelines and terminals that could lose customers after 10-year contracts expire. All the while, frackers themselves will chase the thinnest of profit margins as the globe's de facto swing producers.[16]

Oil and gas face growing competition from renewable energy and electric vehicles. Fossil fuel companies depend on rising demand to keep supplies tight and prices rising. In this context, even small losses in market share to renewables or electric vehicles

[14] https://www.reuters.com/article/us-opec-meeting/opec-russia-agree-oil-cut-extension-to-end-of-2018-idUSKBN1DU0WW

[15] https://www.forbes.com/sites/woodmackenzie/2017/12/19/where-are-the-tight-oil-plays-outside-the-us/#653d64441a99

[16] https://www.forbes.com/sites/timworstall/2017/05/29/opec-can-cut-production-but-fracking-controls-the-oil-price-now/#711ae5834810

could have outsized impacts on both oil prices and profits. Renewables offer key advantages over coal and gas, including both climate benefits and freedom from energy price fluctuations. A growing renewables sector is poised to steal market share from gas, keeping energy prices in check and diverting capital investments away from fossil fuels.[17] In the U.S., wind and solar already have begun to put downward pressure[18] on gas prices.

Meanwhile, the auto industry—a key driver of oil demand—increasingly sees its future in electric vehicles. GM, for example, plans to launch up to 20 new all-electric vehicles by 2023, and a top executive stated that the company "believes in an all-electric future."[19] Ford[20] announced a pivot toward becoming a "mobility company"[21] rather than a car company, saying that its future is now in "smart, connected vehicles, including… electric vehicles." Last fall, Volkswagen announced that it would invest $84 billion in electric cars, including massive new battery factories. Nissan, Toyota, Daimler and Tesla—the list of major global car companies that have made big bets on EVs goes on and on. And perhaps most importantly, electric vehicles have made major inroads in the Chinese market. The growing technological successes of autonomous vehicles also could speed the transition to EVs, further crimping petroleum demand.

Campaigns against fossil fuels are gaining in scope, sophistication and success. The growing global climate protection movement has emerged as a material financial risk to the oil and gas industry. In addition to traditional lobbying and direct-action campaigns, climate activists have joined with an increasingly diverse set of allies—particularly the indigenous rights movement—to put financial pressure on oil and gas companies through divestment campaigns, corporate accountability efforts and targeting of banks and financial institutions. These campaigns threaten not only to undercut financing for particular projects, but also to raise financing costs for oil and gas companies across the board.

Although U.S. climate policy is in a period of retrenchment, climate and fossil fuel activism continues to score major policy victories around the globe, creating profound and growing policy challenges for the oil and gas industry. Public opposition to Kinder Morgan's TransCanada pipeline has delayed the massive project and exposed its financial weaknesses.[22] A protracted political battle lies ahead. Great Britain, France, Norway, Scotland and China have all proposed phase-outs of conventional gasoline and diesel vehicles. Jurisdictions as varied as India, California, Germany and the Netherlands may follow suit. At the same time, many nations and subnational jurisdictions have enacted carbon prices that could dampen demand for carbon intensive fuels.

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[17] http://ieefa.org/wp-content/uploads/2018/02/Power-Industry-Transition-Here-and-Now_February-2018.pdf

[18] http://ieefa.org/u-s-renewables-reach-price-parity-natural-gas/

[19] http://www.gm.com/mol/m-2018-mar-0307-barra-speech.html

[20] https://www.reuters.com/article/us-autoshow-detroit-ford-motor/ford-plans-11-billion-investment-40-electrified-vehicles-by-2022-idUSKBN1F30YZ

[21] https://www.greentechmedia.com/articles/read/ford-steps-up-its-game-on-mobility-services-and-electric-vehicles#gs.ovw=hKM

[22] https://www.maritime-executive.com/article/kinder-morgan-halts-spending-on-trans-mountain-pipeline#gs.MokYgtM

Capital investment in oil and gas has become a conundrum: Combined capital expenditures for the oil and gas industry will likely approach $500 billion in 2018[23]—an increase over the last three years, which featured capex freezes and cutbacks. Some companies still limit their capital outlays, while others view higher prices and reduced production costs with cautious optimism, potentially signalling a new wave of capital spending.

Yet capital investment in the oil and gas sector has become a game with no winners. Companies that pour money into capital projects put shareholder money at risk, while aggravating investors clamouring for short-term dividend growth and share buybacks. Companies that fail to make capital investments will inevitably shrink, yet the "oil is growth" mindset now lures companies towards high-risk capital projects with poor prospects. And while gas investments may look promising because of long-term demand growth, they offer low margins and meager profits. Meanwhile, petrochemical companies struggle to chart a course through the turbulent markets for both feedstocks and the specialized "cracked" products the industry produces. In today's market, oil and gas executives now must view capex decisions as a series of puzzles that may have no good solutions.

Investing in oil and gas is becoming more challenging. As mentioned above, investors once had a clear (if not necessarily accurate) idea of how oil and gas companies would generate profits: prices would steadily rise, and even expensive projects would eventually yield handsome returns. The shale boom and the accompanying price collapse has undercut that idea, but no new investment narrative has emerged to take the place of the old one.

There is also a broader backdrop creating both policy and market challenges for fossil fuels. Economic growth is shifting from energy-intensive industries to less energy-intensive service industries.[24] This is a global phenomenon, as many mature economies now concentrate growth in low-energy sectors, while rapidly growing emerging economies face powerful incentives to reduce energy costs in order to grow even faster.

ExxonMobil's most recent Energy Outlook estimates that the fastest growing countries by GDP through 2040 will be China and India. They will also be the countries with the most rapid decline in energy intensity. More broadly, non-OECD nations will grow faster than OECD nations and do so with declining energy intensity. Older economies, like the U.S. and Europe (already countries with lower energy intensity) will continue to improve, though their economies will grow at slower rates.[25] The trend toward lower energy costs and more energy innovation tilts away from fossil fuel investment that is largely inflationary, volatile and disruptive to national economic growth strategies.

The absence of a coherent, industry-wide value thesis that complements these broader

[23] https://www.rigzone.com/news/capex_among_worlds_largest_og_firms_to_rise_to_just_under_500b_in_2018-17-apr-2018-154268-article/

[24] https://www.eia.gov/todayinenergy/detail.php?id=27032 and http://cdn.exxonmobil.com/~/media/global/files/outlook-for-energy/2018/2018-outlook-for-energy.pdf

[25] http://cdn.exxonmobil.com/~/media/global/files/outlook-for-energy/2018/2018-outlook-for-energy.pdf, p. 60.

trends creates major challenges for investors. Successful oil and gas investing now requires expertise, judgment, an appetite for risk and a strong understanding of how individual companies are positioned with respect to their competitors both inside and outside the industry. Passive investors could once choose from a broad basket of oil and gas industry securities with little reason to fear they would lose money. Today, that is no longer the case, pushing passive investors into other blue-chip stocks with stable returns.

IV. Turning Analysis Into Action and Action Into Analysis

Two unifying themes can inform strategic direction for activism on oil and gas industry issues and can be incorporated into any campaign: the oil and gas industry is shrinking financially, and alternatives to fossil fuels are growing.

The Oil and Gas Industry is Shrinking Financially

The oil and gas sector was slammed by several years of falling revenues, increasing competition, a diminished market for reserves and a negative outlook. Although the industry is still profitable and quite powerful, and boasts some of the best scientific and technical resources in the world, it is of less financial relevance than it was 10 years ago, with lower profits in the present and at best a more modest future.

Framing the industry in a negative light—as shrinking, declining and weak—runs directly counter to the oil and gas industry's self-perception, public profile and investment rationale. For decades, the cornerstone of this rationale has been that fossil fuel growth is synonymous with economic growth, if not the march of modernity itself. CEOs and boards of fossil fuel companies see it as anathema to preside over declining companies or industries. Yet this is precisely what is going on.

The decline of the oil industry even runs counter to the framing often used by environmental organizations, many of which still call the industry "Big Oil."[26] This inaccurate frame cedes power to an industry that is actually losing its grip on power. Yet it would also be incorrect to describe the industry as dying, dead, gone or never to recover.

Volatility, the rise and fall of prices in the oil and gas markets is an almost daily news story. The recent spike in oil prices driven by OPEC's supply reductions and President Trump's May 2018 announcement to renew oil sanctions on Iran have pushed prices higher. It is likely that the OPEC supply agreements will remain intact, but there are real pressures now for some participating countries to break ranks and pump more oil. There is also growing pressure within U.S. oil producers to increase production. The impact of the decision regarding Iran on oil prices may settle out and prove to be less important as most member nations that have participated in prior U.S.-led sanctions have announced their intention not to follow the U.S. policy. No matter how this most recent

[26] https://www.nrdc.org/stories/small-towns-fight-big-oil-hudson

cycle pans out, the role of fossil fuels as an unstable global force is becoming more apparent.

It is more important than ever to take an objective view of the industry's actual financial performance and then to use that assessment to forge strategies for climate change activists. A clear, precise understanding of industry cross currents should be used to assess trends and use that information as part of campaigns for climate action.

Alternatives to Fossil Fuels Are Growing

The industry's general position toward climate issues ranges from evasive cooperation to outright hostility. Many of the major companies have refused to embrace the energy transition underway around the world or even to consider investing in alternatives energy sources. Nevertheless, some individual fossil fuel companies are investing in alternative energy (renewable energy and electric vehicles). When these efforts are valid, they need to be commended and used to support the thesis that capital is moving away from fossil fuels.

Five Key Points Provide an Accurate Description of the Industry's Financial Condition

The following five assumptions about the industry's current financial condition and approach to environmental issues can be backed up by analysis and used to inform environmental and community campaigns, litigation and policy work:

1. Oil and gas are weak investments. Financially, the industry is shrinking.
2. Oil and gas are climate pariahs.
3. Oil and gas interests are less politically relevant than they once were, though still powerful.
4. Oil and gas face significant, long-term competitive challenges.
5. Oil and gas companies are poor partners for national and global economic development efforts.

Strategic and Tactical Functions of Climate Related Financial Research

The main functions of financial research for the climate movement are to:

- Assist existing campaigns by providing information that can stop projects, increase risks for future projects, sway public opinion away from fossil fuels and undercut corporate reputations.
- Build a base of analysis, or an idea infrastructure, that can undergird activism. A deep base of information and analysis provides movement leaders and participants with confidence in their own advocacy, and the knowledge that if they do not have answers, the answers exist and they know where to go to get them.
- Create a robust presence in conventional and social media with a climate message that is attractive to media outlets and convincing to social and political elites.

As a practical matter, most campaigns can benefit from financial analysis to help sharpen strategic and tactical decisions. It is difficult, if not impossible, to know what strategies and tactics will work before those strategies and tactics are implemented in a real world campaign. But understanding the opposition's financial strengths and weaknesses can help significantly in developing successful campaigns.

Substantial resources should be devoted to testing strategies and tactics that build upon careful financial analysis of projects, companies and even entire industries. It looks the environmental community years to figure out how to exploit the financial weaknesses of the coal industry. Strategies and tactics that worked were tweaked and strengthened while strategies and tactics that did not work were jettisoned. The same patient approach must be implemented with oil, gas and petrochemicals, which are larger and more complicated industries than coal.

For example, over the last ten years, climate and local activists in Mississippi fought the creation, development and operation of the Kemper plant—an iconic, pioneer "clean coal" technology, designed to be the flagship for the next generation of coal plants. The technology of the plant was unproven, and the financial model relied on ratepayers bearing the costs—which ultimately totalled over $7 billion. Community opposition persisted throughout a public service commission process that rubber-stamped the plant. Financial research in the form of research reports, testimony, opinion pieces and countless discussions with journalists complemented the ongoing public opposition campaign, which eventually included the election of a new slate of public service commissioners. Although the plant was built and put into operation, the technology didn't work properly and the costs of the project skyrocketed. The owner and public service commission eventually had to write off hundreds of millions in shareholder value and a $270 million federal grant, and in 2017 Mississippi Power announced it was ending the clean coal experiment.

Financial research has already been an important tool in the climate movement's work targeting ExxonMobil as a major climate denier. Campaigners and public officials have documented a long-term effort by the company to suppress information from its investors and the public regarding its findings on climate change. ExxonMobil has responded by attempting to discredit climate activists, shareholders and duly elected law enforcement officials. Financial analysis of ExxonMobil's company's weak financial performance—in the form of reports, support for litigation, shareholder information, opinion pieces and briefings for public officials—has opened up a whole new series of campaign actions. This growing body of information has fuelled divestment campaigns led by advocates and institutional investors, encouraged shareholder class action litigation, pushed shareholders that are engaged directly with the company to change its climate policy, supported law enforcement actions by state attorneys general, and an SEC investigation.

Defining the Scope of Action

The activist work we look at in Table 1 below is ongoing, and addresses a range of organizing interests and needs. In the section below, we will look at these initiatives through a financial lens to tease out implications of this work and to suggest ways to

assist these efforts with financial tools. From there we look at how these initiatives and changing events could help to shape new research and organizing efforts.

Table 1: A Menu of Current Organizing Efforts on Oil and Gas Issues

Arena	Research	Actions/Targets
Oil		
Financial Conditions		
	Trends	Media/Litigation/Campaigns
Oil Pipelines		
	Land, Environmental, Indigenous Rights, Financial	Media/Litigation/Campaigns
	Leases- Giveaways	Reports/Investigations
Drilling		
	Arctic National Wildlife standards	Company Derivative Suits
Refineries		
	Permits, Toxics,	Litigation/Regulation
Corporate Campaigns		
	Company Profiles- Context	Specific Finance, Governance
Gas		
Financial Conditions		
	Trends	Media/Campaigns
Pipelines		
	Land- Private Rights*	Specific Campaigns
	Regulation- FERC*	Specific Campaigns
	Environmental- Permits	Litigation/Regulation
LNG Terminals		
	Trends	Specific Litigation/Regulation
Petrochemicals and Plastics		
Financial Conditions		
	Trends	Campaigns (In Formation)
Alternative Products		
	Rethinking Industry	New Campaigns: Shareholder and Policy Work Positive and Negative
Recycling Plastics	Legislative	Government/Elected Officials
Oceans	Environmental	Litigation/Administrative
Toxic Chemical Pollution		
	Specific Campaigns	Global Concerns/Local Efforts
Energy and Economic Transition		
Finance and Economics		
	Options: Legislative/Philanthropy	Local Campaigns
Public Policy		
	Options: Legislative/Philanthropy	Local Campaigns
Education and Workforce Issues		
	Options: Legislative/Philanthropy	Media Campaigns
Energy and Transportation Sector Alternatives		
	Renewable Energy	Monitoring/Advocacy
	Electric Vehicles, CAFE standards	Monitoring/Advocacy

Arena	Research	Arena
Industry-Wide Issues		
National Policies Around the World		
	Climate/Finance	Global Consensus/Investment
Energy/Climate Models	Energy Planning/Emissions	Debating the Experts
Divestment/Investment		
	Climate/Finance	Science/Moral Message
	Finance: Fund Specific New York City/New York State/Norway	Analysis/Resolutions/Trustees
	Student/University	Analysis/Trustees
	Governance- Fiduciary Duty	Analysis/Debate
	Industry Critiques	Notes/Letters/Reports
Shareholder Engagement		
	Climate/Finance/ Governance	Analysis/Promoting Alternatives
Industry Litigation	Engagement	Damages- Shareholders and Government

Source: IEEFA analysis

The scope of action outlined below cover five areas: oil, gas, petrochemicals, economic transition and an overall industry-wide grouping.

Oil

Financial Conditions – The fact that the oil industry is in financial distress is not widely understood, and is generally limited to industry insiders, active investors and some media outlets. Others, including many in environmental organizations, have not yet caught up to the facts.[27]

Getting this new reality into the broader public realm will help strengthen efforts to combat climate change and strengthen existing climate campaigns. For example, campaigns can point out that the current oil supply balance means there is no need to open up additional government lands for development efforts that will abuse public resources for speculative returns, at best. Activists can also challenge company plans to increase capital expenditures on straightforward financial grounds, asking whether those dollars are being wisely invested.

Oil Pipelines – Although the overbuilding of oil pipelines and oil to rail[28] proposals is a certainty, it is difficult to predict exactly which pipelines or rail projects will not be needed and will fail. Market forces enable activist opposition and frequently help it to succeed, but not always in a straightforward manner. Activists can build specific campaigns upon the general knowledge that all the proposals aren't necessary, and then use existing systems of environmental, tribal and land rights to challenge, delay and/or defeat specific pipeline projects. Infrastructure investments in a low-price environment are risky and project-based budgets have limits, even if they are hard to see from the outside. Continued community pressure can serve as the tipping point,

[27] https://www.wsj.com/articles/wall-streets-fracking-frenzy-runs-dry-as-profits-fail-to-materialize-1512577420
[28] http://priceofoil.org/rail/

prompting a corporation to cancel a project it already evaluated as risky and low return.

Drilling – Activists can challenge oil drilling, whether it is being done as a result of either public or private decisions. From a financial perspective, public policy designed to induce more drilling is really little more than publicly subsidized speculation, and can be challenged as such. On the private side, most oil and gas industry efforts to invest in new drilling are taking place in a period where failed legacy investments linger, oversupply continues, and new investments have a weak rationale—meaning that once again outside pressure may serve as the tipping point.

Refineries – Communities across the United States have challenged corporate polluters on the location and operation of refineries for years.[29] Many of the campaigns are local in nature and focus and raise issues related to water, land and air pollution.[30] Legal opposition, particularly for major efforts is lengthy, complex and resource intense but create ample leverage points along the way to publicize the environmental community message. The results can shape industry behavior.[31] Litigation efforts also spawn greater interest and participation of additional project opponents,[32] as well as new policies in the regulatory arena.[33]

Corporate Campaigns – All corporate decisions, whether on pipelines, drilling projects or refinery issues, are made in the context of the company's corporate strategy, history, business cycles and the tenure of its CEO. The finances and internal dynamics of the company show the strengths and weaknesses—in other words, the risks of the strategy. For example, a pipeline project is related to and a part of the company's strategic investment policy, linking sources of oil with customers, capital planning, business partnerships, managerial competence, community relations and future profits. A sound financial understanding of a company strengthens a climate campaign's resource base.

Gas

Financial Conditions – Demand for gas has been increasing in the United States, but supply has increased even more, keeping prices low. Some companies have loaded up on debt in order to keep drilling, others have been forced to declare bankruptcy and have written off massive assets. Campaigns against gas extraction, particularly fracking,[34] have had only limited success, although the ban on fracking in New York State was a major achievement. Gas markets will continue to be distressed, and new opportunities for activism can be expected on the environmental side as more drilling provokes more public opposition.

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[29] https://projectearth.us/the-inside-story-of-how-this-u-s-city-just-denied-the-1796423863
[30] https://www.prnewswire.com/news-releases/south-texans-against-the-refinery-star-coalition-formed-to-oppose-proposed-raven-petroleum-refinery-300399629.html
[30] https://www.cnn.com/2017/10/20/health/louisiana-toxic-town/index.html
[31] https://www.sierraclub.org/texas/blog/2017/06/historic-legal-victory-against-exxonmobil
[32] http://www.environmentalintegrity.org/pdf/publications/HANDBOOK_FINAL_121007.pdf
[33] https://earthjustice.org/our_work/cases/2014/defending-fenceline-communities-from-oil-refinery-pollution
[34] http://www.yesmagazine.org/planet/gas-industry-report-calls-anti-fracking-movement-highly-effective

Pipelines – Much like oil pipelines, gas pipelines face a challenge of oversupply and some evidence of contract cancellations that destabilize projects. To date, land rights arguments challenging eminent domain practice,[35] FERC regulatory and environmental permitting challenges,[36] requests for congressional intervention through government audits and popular opposition have met with some success in challenging gas pipelines. At times, these efforts have resulted merely in delay, but delay increases the cost of projects and can sometimes lead to cancellation.

LNG Terminals – For decades, the environmental community[37] has opposed oil and gas terminals for both import and export purposes.[38] Citizens have worked to oppose ports (and often attendant pipelines) in Georgia, Oregon, Louisiana, Maryland, Texas and British Columbia. The industry's plans for widespread expansion of terminals[39] are driven by advances in fracking technology. The drive for more production is forcing a reconsideration of the number of LNG ports needed,[40] as well as the terminal size, purpose and use.[41] It is also creating a new operational environment for activism. These fights have local[42] and international dimensions,[43] raising environmental and climate issues but also highlighting conflicts over local economic development choices.[44]

Petrochemicals and Plastics[45]

The petrochemical industry creates at least three types of risks that create pathways for effective climate action: financial and economic, alternative products and traditional toxics.

Financial Conditions[46] – The industry produces products with high and broad demand. It is reasonably profitable and has been quite stable during the more turbulent times for oil and gas, without the highs and lows of upstream investments. Uncertainty is the watchword here, though, as stiff global competition flows from the fact that many oil

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[35] https://www.eenews.net/stories/1060060443
[36] https://www.ncsl.org/Portals/1/Documents/energy/ESTF_Pincus_present_8_16.pdf
[37] https://www.ecowatch.com/landslide-opposition-to-lng-port-and-industrialization-of-the-ocean-1881799409.html and https://www.citizen.org/our-work/climate-and-energy/proposed-and-recently-approved-liquefied-natural-gas-facilities
[38] http://citizensagainstlng.com/wp/sample-page/
[39] https://www.eia.gov/todayinenergy/detail.php?id=25232
[40] https://www.ferc.gov/industries/gas/indus-act/lng/lng-existing.pdf
[41] https://www.reuters.com/article/us-lng-companies-technology/next-wave-lng-terminals-get-smaller-to-offer-flexible-supply-deals-idUSKBN1FP0IP
[42] https://grist.org/climate-energy/fracktivists-fight-liquefied-natural-gas-terminal-near-nyc/
[43] https://www.theguardian.com/us-news/2017/mar/02/texas-fracking-bnp-paribas-environment and https://www.forbes.com/forbes/welcome/?toURL=https://www.forbes.com/sites/jamestaylor/2016/11/21/chinese-pollution-opens-door-for-u-s-natural-gas-exports/&refURL=https://www.google.com/&referrer=https://www.google.com/ and https://uk.reuters.com/article/us-grigas-russia-commentary/commentary-how-to-derail-russias-energy-war-idUKKCN1GQ290
[44] http://www.themonitor.com/opinion/columnists/article_af716272-c0dd-11e7-9236-1fd549be89a7.html
[45] http://cdn.exxonmobil.com/~/media/global/files/summary-annual-report/2016_summary_annual_report.pdf
[46] https://markets.ft.com/data/indices/tearsheet/summary?s=SPET:SET (stock chart 5 year – better 1 and 3 years)

producers[47] are looking to the petrochemical space for some stability in revenues and profits. Global competition and commodity market fluctuations pose the greatest risks to the construction of new facilities in the United States.

Grassroots activism challenging the industry has taken the form of opposition to new plants. These campaigns have the difficult challenge of responding to the industry's promise of new jobs and local prosperity. Nevertheless, expansion plans can be contested on financial grounds, given the financial risks and outlook for these companies. Community opposition to the harmful effects of toxic chemical discharges, combined with high risk finances, provide a good basis for potentially stopping or changing investment patterns.

Alternative Products – Environmental campaigns around consumer single use convenience products, particularly plastic bags, have resulted in passage of legislation in at least 15 states.[48] Plastic bag production requires oil drilling—estimates suggest that 100 billion bags require 12 million barrels of oil.[49] These efforts to regulate plastic bag use can mitigate harmful impacts to oceans[50], rivers, lakes, forests and the wildlife that inhabit them. Reducing bag use can also relieve pressure on landfills and waste management. While some states are focusing on implementing effective recycling programs, others are attempting to impose bans or fees to discourage the use of plastic bags altogether. Reducing the use of plastic bags lowers the demand for oil and gas[51] extraction, refineries and cracking facilities. Another important aspect of campaigns to ban plastic bags is that they call attention to the threats posed more broadly by an integrated oil, gas, petrochemical and plastics industry.

Public policy research and campaigns to date suggests that more public discussion on plastics design and production could spur an era of innovative investment away from fossil fuels.[52] Campaigns could pursue the governmental/regulatory model used in the plastic bag efforts and be complemented by corporate campaigns targeted at both getting companies to change behavior[53] and rewarding those that have already introduced innovation.

Toxic Chemical Pollution[54] **–** The oil and gas industry has run roughshod over communities, particularly minority communities, for years.[55] Nowhere is this more

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[47] http://blogs.wsj.com/experts/2017/05/23/big-oil-is-betting-on-plastics-it-may-be-a-risky-bet/. See also: https://oilprice.com/Energy/Natural-Gas/India-Is-The-Best-Bet-For-National-Oil-Companies.html, for an analysis of the growth in downstream investment by state owned enterprises.

[48] http://www.ncsl.org/research/environment-and-natural-resources/plastic-bag-legislation.aspx

[49] http://www.biologicaldiversity.org/programs/population_and_sustainability/expect_more_bag_less/facts.html

[50] The U.N. Climate Change conference has shown the link between climate and change and ocean degradation from plastics. http://www.euronews.com/2017/11/14/oceans-drowning-in-plastic-un-climate-change-conference

[51] https://www.eia.gov/tools/faqs/faq.php?id=34&t=6

[52] https://www.ellenmacarthurfoundation.org/assets/downloads/New-Plastics-Economy_Catalysing-Action_13-1-17.pdf

[53] https://www.asyousow.org/our-work/waste/ocean-plastics/

[54] https://www.prnewswire.com/news-releases/south-texans-against-the-refinery-star-coalition-formed-to-oppose-proposed-raven-petroleum-refinery-300399629.html

[55] https://www.cnn.com/2017/10/20/health/louisiana-toxic-town/index.html

apparent than in the location and operation of refineries.[56] The toxic releases and CO2 emissions from the petrochemical sector, especially refineries, make this sector arguably a substantially greater environmental risk than oil and gas production.

From a financial perspective, the net effect of stepping up actions in this area furthers the discussion of innovation within the fossil fuel sector. It also furthers arguments for better product design and stimulates interest in competitive alternatives.

Energy and Economic Transition

Campaign activity concerning climate change is itself a market signal to financial actors about investment as well as a broader civic and cultural discussion about how we live together, where we live, where we work, what we eat, how we move and how we go about our lives.

The need for support for transition efforts is enormous and the potential is equally great.

Finance and Economics – Technology is reducing the cost of energy in both the electricity and transportation sectors, meaning that a low carbon future will be a future with lower energy cost. Production of fossil fuel energy is expensive, and cheaper energy costs will provide significant economic benefits for households and businesses. But this transition will also cause economic hardship in some communities. This vast industry employed 468,000 people in 2016.[57] It supports the tax base of many communities and countries. It even determines where a lot of economic activity takes place and where many people live. At the macro level, economic transition initiatives will need to address the fact that the benefits of a low carbon future come with costs—lives are being disrupted, communities uprooted and the future is being made uncertain.

Public Policy – The U.S. economy has several historical examples where economic transitions have been achieved with some success—as well as transitions that have been handled poorly at the policy level.

One can view Roosevelt's New Deal as one big transition plan bringing the economy from a period of unbridled growth into an era where the social costs of this growth required a new integration of the economy, one where profit was produced not solely in the marketplace but at the nexus of private and public cooperation and regulation.

The federal government involvement's policy response to military base closings provides another example of how to manage economic transition. From a local and regional economic standpoint defense plants serve a very similar function to that of most fossil fuel facilities. They dominate host communities, employ a lot of people, pay most of the tax bill, spur other economic investment and are long term in outlook. The Department of Defense base closure program[58] has been in place since the early 1960s. It includes

[56] http://www.inforum.com/opinion/letters/4331413-letter-we-must-voice-our-opposition-building-oil-refinery-near-badlands

[57] https://www.energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report_0.pdf

[58] http://www.oea.gov/what-we-do/base-closure

planning for investments in new economic development investments (often beyond defense related industries); labor force interventions to protect income, wages, health, pensions and future employment opportunities; and fiscal supports for local and state tax bases, to ease the transition when they lose revenues as a result of plant closures.[59]

It is unrealistic, however, to expect the current government in Washington to adopt a meaningful response to the problems created by the movement of capital into a lower carbon economy. The global climate movement is likely to make more progress in other countries. Despite current political limitations in this country, there are meaningful ways to pursue these issues in the United States through local and state initiatives.

Oil and Gas Transition Must Differ from Mistakes Made in Coal Transition – Unfortunately, the public policy response to the decline of the coal industry provides a telling example of what not to do in the move to a low carbon economy. Coal has lost 37% of its production over the last ten years and may lose more in the coming decade. Most coal industry and government stakeholders have denied the obvious signs of the steady downturn in the coal industry, making it impossible to have a productive discussion of jobs, taxes and new economic activities. The public discourse surrounding these economic jolts has been dominated by coal industry leaders blaming environmental policies and the leaders who supported those policies. The divisions and bitterness were fed by innumerable missteps by public officials who were seen as supporting the "war on coal."

The financial impact of the coal industry's decline has been characterized by bankruptcy proceedings, wholesale worker layoffs and abandonment of mines and towns. There is still a need to find a better set of tools for the decline in the coal sector. Groups are mobilizing and some solid plans[60] have been put forward to find a way to better protect communities from the negative effects of coal plant and mine closures.

The inevitable economic transition away from reliance on oil and gas will have a broader impact on the economy and likely take on a different tone and direction.[61] The magnitudes of these changes make it more likely that local and corporate leaders will entertain discussions of low carbon transitions as changes in the fossil fuel sector occur in their communities.

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[59] Office of Technology Assessment, *After the Cold War: Living with Lower Defense Spending*, 1992. https://babel.hathitrust.org/cgi/pt?id=umn.31951d00357335a;view=1up;seq=6

[60] http://ieefa.org/proposing-payment-job-well-done-ieefa-publishes-redevelopment-plan-anticipation-shutdowns-navajo-generating-station-kayenta-mine/ and https://drive.google.com/file/d/0B_qWeYLAqoq1QUFEeUhKbmRiU2c/edit

[61] Opinion leaders in the academic, international agencies, trade union associations and business community are already discussing the opportunities and ways to manage the change. The next few years will determine whether these efforts come to full bloom. https://www.ilr.cornell.edu/worker-institute/intiatives/labor-leading-on-climate
https://www.oecd.org/g20/topics/employment-and-social-policy/greeningjobsandskills.htm
http://laborcenter.berkeley.edu/pdf/2016/Advancing-Equity.pdf
http://www.goldmansachs.com/our-thinking/archive/archive-pdfs/trans-low-carbon-econ.pdf
https://about.bankofamerica.com/assets/pdf/Environment-Economic-Impact-Report-2017.pdf
http://unfccc.int/press/news_room/newsletter/guest_column/items/4608.php
https://www.ituc-csi.org/IMG/pdf/ituc-frontlinesbriefing_december_en_final.pdf

Education and Workforce Issues – Plant, drilling and factory closures in the oil and gas sectors have received less public attention in the U.S. than those in the coal sector, but the loss of employment in the industry has actually been quite pronounced. Over the course of the last downturn in oil prices, which started in mid-2014, 440,000 people worldwide, including 178,000 in the U.S., lost their jobs in the oil and gas sector.[62] During the current period of growth in the sector, some of these individual workers have been re-employed. The overall low employment rate in the U.S. shows that some of these workers, who are typically highly skilled, have been able to find jobs in other parts of the economy.

The economic transition is also having an impact on how today's younger workers see their futures. For decades, employment in the fossil fuel sector proved to be a good place to be, providing good wages, benefits and advancement. This is no longer the case.[63] The oil and gas sector is in competition not only with other energy sectors but also with other industries with good employment prospects. New employment in the energy sector is occurring in solar, wind and energy efficiency, with more limited growth in fossil fuels.[64]

Energy and Transportation Sector Alternatives – Activists have devised strategic initiatives to support the renewable energy and electric transportation sectors. Renewable energy efforts have focused on market and technical reports documenting market share growth. In addition, studies have countered fossil fuel industry misinformation regarding the future potential of new innovative energy technologies. Activists have also engaged in renewable energy development in several ways: a) support for proposed projects[65]; and b) support for the market and policy reforms necessary for renewable development.

Activists and researchers have designed policy-level efforts to counter misinformation from the fossil fuel industry that electric vehicle technology is "expensive", "impractical" and "insignificant". These efforts are being carried out at the media, business professional and thought leadership levels. Other steps are being taken to heighten the profile on business to business investment in electric transportation and to forge business links that drive capital toward various parts of the electric vehicle economic chain.[66]

These efforts and more highlight the weakening of the fossil fuel sector's alignment with its historic partners. Utilities no longer support carte blanche coal industry public policy initiatives. Internal debates and business models at automobile companies no longer reflect only fossil fuel automobile design. Activist efforts to foster new relationships between utilities and solar and wind interests, or even electric vehicle interests, have advanced. Consumer and environmental interests at local, state and federal levels can

[62] https://www.rigzone.com/news/oil_gas/a/148548/more_than_440000_global_oil_gas_jobs_lost_during_downturn/
[63] https://www.bloomberg.com/news/articles/2017-07-17/oil-giants-make-a-play-for-millennial-hires
[64] https://www.energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report_0.pdf
[65] https://thinkprogress.org/new-york-new-jersey-wind-c92417fdce52/
[66] https://www.utilitydive.com/news/team-of-rivals-utilities-enviros-unite-to-push-electric-vehicles/517330/

change policy and market incentives, when activist efforts support wind, solar and other non-fossil fuel investments.

Also in the transportation sector, demand for gasoline for traditional internal combustion-engine vehicles will be significantly reduced over time if federal corporate average fuel economy (CAFE) standards finalized in 2012 are defended and upheld.[67] The standards would require automakers to achieve a usage rate of 54.5 miles per gallon for cars and trucks by 2025.

Industry-Wide Issues

National Policies around the World – The Paris Agreement has created multiple venues to push for continued action on climate change. Country participation, goal setting, investment commitments and joint actions are being achieved maintaining aspirational goals, marking progress toward benchmarks, best practices and offering a forum for ongoing assessment and dialogue. The agreement has become the rallying point for the discussion of low carbon policy and initiatives, combining a symbolic global consensus on climate, a force shaping capital markets and a hedge against backsliding on policy. The most recent example of global success in this arena is the announcement by the World Bank to end financing of fossil fuels.[68]

Divestment/Investment – The moral message that the world is better off with a lot less fossil fuels defines this effort. The divest side of the equation creates venues for debate and decision-making at the boards of public and private funds, who are being asked to assess the direction of their individual funds and fiduciary duty in light of climate change. Win, lose or draw the divestment campaigns are powerful tools to elevate the discussion of the future of fossil fuels. The divestment effort has built upon its successes, pivoted when necessary and is an oasis for citizen activism and leadership development. As the market and policy events move against fossil fuels new opportunities emerge to advance divestment, revisit rejections of divestment and lessons learned should help expand constituencies.

The Invest side is proving to be part of the market making process. It is, at the leading edge, a voice saying that alternative investments to fossil fuels are profitable, growing and have a positive outlook compared to fossil fuels. The climate motivation behind this work is simultaneously good for business, making it a potent marketing tool for new investment. As more funds open up to renewable energy and alternatives to fossil fuels, pressure is placed on the finance sector to create new indexes, new investment products and branding that supports redirection of capital into these sectors. The trajectory of any growing industry is not always a straight line up. There will be setbacks, and the sophistication of the invest movement will be tested in its depth and capacity to pivot and move forward.

[67] https://www.nytimes.com/2018/03/29/climate/epa-cafe-auto-pollution-rollback.html
[68] https://www.theguardian.com/business/2017/dec/12/uk-banks-join-multinationals-pledge-come-clean-climate-change-risks-mark-carney

Shareholder Engagement[69] **–** Shareholder "engagement" strategies traditionally[70] consist of dialogue, shareholder resolutions and support for corporate reforms on climate policy. They represent a tool used in the fossil fuel sector with limited success. Most shareholders active in the climate space prefer this method for investment and governance, trying to build a steady record of progress with individual companies that create a set of qualitative changes in support of a solution to climate change. There are inherent tensions between divestment and engagement thinking and strategy. More effort should be made to resolve the two schools into a strategic, if not a philosophical, resolution going forward. As a practical matter it is thought that the two strategies are mutually exclusive—if you engage in dialogue then you should not consider divestment as it undermines the good faith assumed in the engagement process. If you divest, then you no longer hold the stock and cannot engage with the company.

Looking Forward: Strategic Research and Tactical Intelligence

Table II represents a sampling of the kind of data, research and analysis that could assist existing campaigns, stimulate new ones, and help build the climate activism movement internally and externally.

Table 2: Strategic and Tactical Data, Research and Analysis Looking Forward

Topic	Data/Research	Potential Actions
Oil	Weak, Mature, Negative Outlook-Shrinking	Media Campaign
	Company Profiles (Appendix I: ExxonMobil)	Campaign Leverage
	Specific Policy or Drilling Projects: Failed Projects and Losses; Rationale for New Investment	Campaign Leverage
	Lease Giveaways- Federal	Reports/Campaign/Investigation
	Current Investor Losses	Financial Litigation/Investigation
	Fossil Fuel Negative Impacts: Public Costs	Environmental Litigation/Regulation
Pipelines	Overbuild and Stakeholder Disaffection	Media/Specific Campaign Leverage
	Credit Profile Risks	Campaign Leverage
	Financial Intelligence- Money Behind Pipelines	Media/Campaign Leverage
	Land Grabs	Campaign Leverage/Investigation
	Weak Economic Chain/Labor/Material	Media Campaign
Refineries	Low Profit/High Risk	Media/Site Specific Campaigns
	Local Toxics	Site Specific Campaigns

[69] https://www.ceres.org/news-center/press-releases/ceres-joins-forces-investors-and-partner-organizations-worldwide-launch

[70] Other strategies are available to shareholders in addition to dialogue and shareholder resolutions. Those interventions include casting votes on boards of directors, shareholder class action litigation and shareholder derivative suits. These tools are less frequently used by shareholder activists.

Topic	Data/Research	Potential Actions
Gas	Company Profiles	Media/Campaigns
	Lease Scams	Campaign Leverage
	U.S. Production/LNG Export Demand-Trends	Media Campaign
	Port Communities: Jobs, Taxes, Growth	Media Campaigns/Site Specific
Petrochemicals	Global Petrochemical Competition	Specific Campaigns
	Specific Toxics: Brain Development in Children; Chinese Plastics	Specific Campaigns
	Rethinking Industry	New Campaigns: Shareholder/Policy Work Positive and Negative
Transition		
Markets/Policy Progress	EV Growth, Renewables, Capital Redirection, Technology, Institutional Capital Response- Trends	Media Campaign
Electric Vehicles	Research/Shareholder Support for Companies With EV Agendas	Media/Shareholder Campaigns
Technology Advances	Retooling of Technology Giants- GE/Alstom, Others; Battery Storage	Media Campaigns/Investor Education
Corporate Transitions	Corporate Credit Ratings That Close Coal Plants and Mines	Media Campaigns
Renewable/ Alternative Jobs and Taxes	Option and Trend Analysis and Specific Research in Growing Communities	Media Campaign
Education	Higher Education: Renewable Alternatives and Opposition to FF	Potential Campaign
Industry-Wide Issues		
Paris Agreement	Local/State Initiatives	U.S./Global Activists and U.S. Mayors
Divestment	Youth Bias in Fiduciary Opinion	Litigation
	Oil/Gas Trends- Fiduciary	Students/Trustee Venues
	O&G Industry Misinformation	Media Campaign
Investment	Money Managers Design of Fossil Free Funds	Media/Shareholder Campaigns
	Success of Renewable/Alternative	Media Campaigns/Specific Location
	Comparative Bankruptcies: FF and Renewable/Alternatives	Media Campaigns
Engagement	Proxy Issue: Rationale for More Investment	Media Shareholder/Campaign Actions
	Engagements That Work	Media Campaigns
Legacy Promises	Were Divestment Promises Kept? Have Renewable Promises Been Kept?	Media/Shareholder Campaigns

Source: IEEFA analysis

Appendix 1. Oil and Gas Industry Primer

Below, we describe five subsets of the oil and gas industry landscape: the enormous integrated supermajors; gas producers; smaller exploration and production companies; midstream companies that transport oil, gas, and associated products; and the petrochemicals sector.

Oil and Gas Supermajors

The oil and gas industry comprises a vast array of operators and corporations, but the largest and most powerful companies wield disproportionate power, both politically and economically. State-owned enterprises—including Saudi Aramco, China's Sinopec, and Kuwait Petroleum—dominate the top 20 global oil and gas companies. Typically operating as extensions of their respective governments, nationally owned oil and gas companies account for roughly three-quarters of total worldwide oil production and 90 percent of proven reserves.[71]

But despite the prominence of nationally owned companies, the press and public tend to equate "Big Oil" with a handful of publicly traded corporations: ExxonMobil, Royal Dutch Shell, BP, Chevron, Total and Eni.[72] Together, these six supermajors rake in more than $1 trillion in revenues annually from business empires that span continents. Italy's Eni, headquartered in Rome, is the smallest of the six in terms of revenues, yet claims operations in an astonishing 79 nations.[73]

The supermajors boast operations across many facets of the industry. They have upstream operations that explore for new reserves and produce oil, gas and associated liquids; midstream segments that transport raw fuels and refined products; downstream refineries and processors; and ventures that sell refined products, particularly gasoline and diesel, directly to consumers. Over the years, the supermajors have been involved in virtually every hydrocarbon submarket, from ultra-light methane to ultra-heavy tar sands. And they have globe-spanning operations that have produced oil and gas using virtually every conceivable technology, from conventional drilling to offshore production to fracking to tar sands extraction.

Historically, this diversification has allowed the supermajors to thrive in nearly any market condition. When oil prices are high, their upstream operations generate bountiful profits. When prices are low, their refining and consumer businesses take up the slack. Their midstream sectors allow them to capture value from the entire supply chain, while directing their preferred fuels toward their own downstream and consumer operations. And their ample reserves, of both cash and hydrocarbons, cushion them through temporary market downturns.

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[71] http://siteresources.worldbank.org/INTOGMC/Resources/9780821388310.pdf

[72] Although Phillips 66 is sometimes included among "Big Oil" companies, we exclude it from our list because it is strictly a midstream and downstream company. ConocoPhillips spun off Phillips 66 in 2012, and still retains the former conglomerate's exploration and production assets.

[73] https://www.eni.com/docs/en_IT/enicom/publications-archive/sustainability/ENI-FOR-DEVELOPMENT-eng.pdf

The scale of the supermajors has allowed them to take on capital-intensive projects that virtually no other company could afford. Over the last several decades the supermajors launched high-cost offshore drilling projects, poured money into Arctic oil and gas exploration, made major investments in tar sands projects, and dived into fracking after smaller companies pioneered shale oil and gas production techniques.

But these massive capital projects have now become the supermajors' Achilles heel. Projects with enormous up-front costs typically require decades of high prices and robust sales to break even, let alone turn a profit. The collapse of oil and gas prices, however, has left these companies with an overhang of capital assets that may never yield a positive return. As a result, the supermajors have written off significant assets as worthless, and sold others at a loss. The 2014 collapse in oil and gas prices has dramatically shrunk the supermajors' profits, cash flow and financial clout—both by cutting revenue and by forcing major industry players to acknowledge that their production asset portfolios are worth far less than they paid for them.

Gas Producers

The United States currently stands as both the globe's largest producer[74] and top consumer of gas, devouring nearly 20 percent of global gas output to generate electricity, heat homes, power industrial facilities, and provide feedstocks for plastics and other products. In recent years U.S. production has grown faster than consumption, forcing the industry to boost exports to deal with its burgeoning surplus. The United States now sends growing volumes of gas to Canada and Mexico via pipeline and has made major investments in liquefied natural gas (LNG) projects that cool and compress gas and ship it overseas in enormous, specialized tanker ships. Only two LNG export facilities are currently in service in the United States, but 11 new or expanded facilities will be completed by the end of 2019, and others remain on the drawing board.[75] Industry analysts expect domestic gas production and consumption to continue to grow, and that the United States will emerge as the world's second largest LNG exporter by 2022.[76,77]

[74] Of the top ten producing countries in the world the United States produces almost one third of all output.
[75] https://instituteforenergyresearch.org/analysis/u-s-become-major-lng-exporter/
[76] http://www.iea.org/Textbase/npsum/gas2017MRSsum.pdf
[77] https://www.reuters.com/article/us-gas-lng-iea/u-s-on-track-to-be-worlds-no-2-lng-exporter-by-end-2022-iea-idUSKBN19Y0L1

Figure 4: Physical Flow of Gas

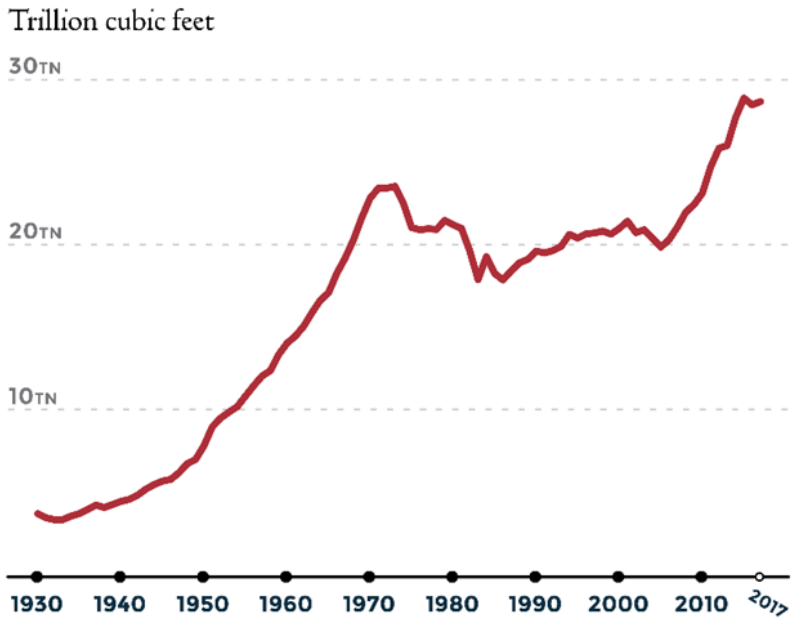
Source: Understanding Natural Gas Markets, The Brattle Group, prepared for American Petroleum Institute, 2014

Major gas producers in the United States range from the integrated oil and gas supermajors such as ExxonMobil and BP, to smaller publicly traded oil and gas companies like Cabot, to publicly traded gas-only concerns such as Chesapeake Energy. The largest gas producing states in the United States are Texas, Pennsylvania, Oklahoma, Colorado, West Virginia, Wyoming and Louisiana.

Starting a little over a decade ago, technological innovations in directional drilling, hydraulic fracking, and geological imaging allowed the U.S. gas industry to tap vast large reserves of gas locked in shale formations.[78] As production costs fell and technology improved, U.S. gas output skyrocketed (see Figure 5).

[78] http://www.api.org/~/media/Files/Oil-and-Natural-Gas/Natural-Gas-primer/Understanding-Natural-Gas-Markets-Primer-High.pdf

Figure 5: US Dry Gas Production



Source: U.S. Energy Information Administration

As just one consequence of the shale boom, gas quickly stole market share from oil and coal. In the electricity sector, for example, gas claimed a modest 15 percent of total U.S. power generation in 2000. But by 2016 gas power had grown to nearly 34 percent of the total, and by the end of that year gas had overtaken coal as the top source of power in the country, a dire harbinger for the future of the U.S. coal industry.

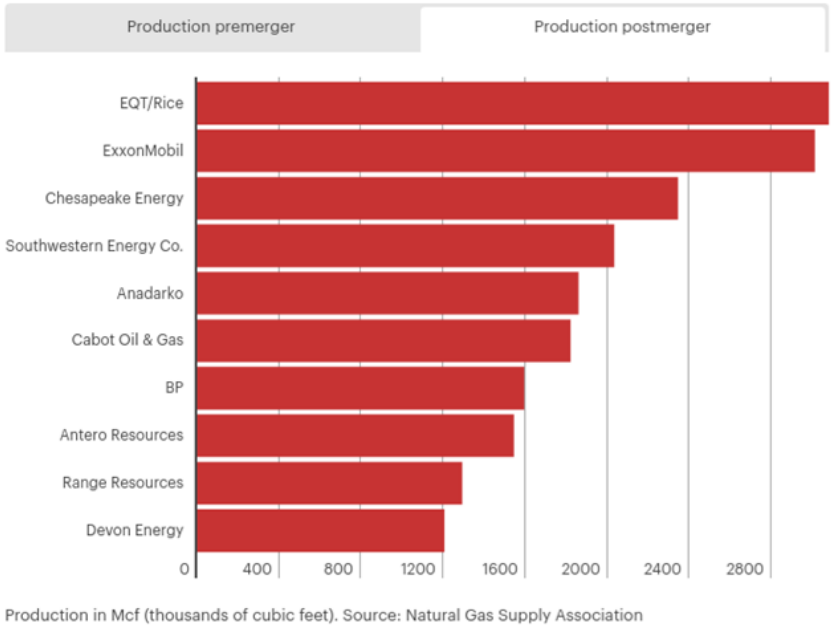
Yet growing gas output did not translate into financial success. Many companies took on large debts to acquire shale reserves and boost production. But overproduction caused U.S. gas prices to collapse—which crimped industry profits and triggered a wave of bankruptcies among companies that could no longer service their debt.[79] The resulting value destruction has left investors skittish about new investments, and forced the sector to refocus on cost discipline and balance sheet repair.[80] Today, most analysts expect continued growth in gas output.[81] But low prices have persisted, and the sector's financial outlook remains stressed and uncertain.

[79] http://www.haynesboone.com/~/media/files/energy_bankruptcy_reports/2017/2017_oil_patch_monitor_20171031.ashx

[80] https://www.wsj.com/articles/big-oil-investors-rethink-their-bets-1514992061

[81] https://www.moodys.com/research/Moodys-Slow-recovery-in-energy-led-by-growing-production-of--PR_376719

Figure 6: Top 10 Gas Producers in the U.S., Post-EQT/Rice Merger



Source: Pittsburgh Business Times, as cited in Marcellus Drilling News, June 20, 2017

Small Exploration and Production Companies: The "Frackers"

Although the supermajors dominate the industry, smaller exploration and production companies (E&Ps) have been part of the sector since its inception and took on a degree of prominence during the shale boom. They were the shale pioneers, making bets on unconventional technologies and basins that the supermajors either had dismissed or never even considered. As global prices boomed, the early successes of fracking turned small and midsized E&Ps into Wall Street darlings. Investors who were used to equating production and reserve volumes with profitability poured hundreds of billions of dollars into companies that promised to quickly boost output. Oil and gas production boomed, stock prices soared, and E&Ps quickly expanded their operations, priming themselves to raise new rounds of capital or presenting themselves as takeover targets for larger conglomerates.

The E&P sector includes some familiar faces, particularly ConocoPhillips, which boasts a market capitalization in excess of $60 Billion. But many of these companies—QEP Resources, Parsley Energy, Carrizo Oil and Gas, and a host of others—have smaller market capitalizations and maintain modest public profiles. One stock fund that focuses on small and midsized oil and gas producers includes 56 different publicly traded E&P companies. And even this is just the tip of an enormous E&P iceberg, which includes myriad smaller players, both publicly traded and privately held.

Smaller E&Ps operate in every shale basin in the United States, scrambling for market share and seeking to survive in a hostile and competitive marketplace. They are found in the Bakken in North Dakota; the Permian and Eagle Ford basins in Texas; the Haynesville and Barnett shale gas plays; the SCOOP and STACK plays in Oklahoma; the

Marcellus and Utica shales in Appalachia; and virtually everywhere else that oil and gas can be coaxed out of the ground.

Although once the toast of Wall Street, the small and midsized E&Ps as a group have racked up a dismal financial track record. In the rush to grow production and boost market share, many companies overpaid for assets, bidding up prices for new reserves to the point that companies that "won" the battle to lock in new reserves often lost the far more important war to rein in costs and produce long-term value. The combination of high prices that companies paid for shale assets, the high capital costs for drilling and completing wells, and the inherently rapid decline in shale well output meant that shale drilling companies quickly burned through the cash entrusted to them by investors. As reported in the *Economist* in mid-2017, the industry spent more cash than it generated in 34 of the preceding 40 quarters.[82] Many companies returned time and again to Wall Street for new infusions of money—revealing the fracking industry's dependence on low interest rates and cheap money following the global economic meltdown.

In many ways, the E&P sector has fallen victim to its own technological success. U.S. shale oil companies coaxed oil and gas out of rock formations that were once considered dead ends—but only at the expense of exorbitant capital outlays and rising debt loads. Meanwhile, rising U.S. oil production has contributed to a global oil price crash, undermining the financial health of the entire industry. Many E&P companies have retrenched, focusing operations on the cheapest and most productive areas of the most economic basins as investors have increasingly called upon executives to prioritize profits over production volumes. The segment is now looking to regain its footing, hoping that rising prices will allow them to return to profitability.

Pipelines and "Midstreamers"

Companies in the midstream segment of the oil and gas industry act as the sector's distribution system. They move hydrocarbons—oil, gas and everything in between—from where they are produced to major trading and refining centers, and then ship refined products onward to consumer markets.

While some integrated oil and gas conglomerates have midstream segments, "pure-play" midstream companies dominate the North American market. Most of these companies specialize in developing and operating massive pipeline networks for gas, associated liquids, oil and refined products.

For tax reasons, U.S. midstream companies typically organize themselves as master limited partnerships, or MLPs. MLPs typically distribute most of their cash proceeds to shareholders, which allows them to avoid corporate taxes. In turn, investors can treat payouts from MLPs as returns of capital rather than as dividends, which defers tax liabilities. If MLP shares are passed on through inheritance, the heirs can entirely avoid taxation on distributions. These and similar advantages give MLPs a lower cost of capital, allowing them to pursue projects that might not be feasible for an entity subject

[82] https://www.economist.com/news/business-and-finance/21719436-exploration-and-production-companies-are-poised-go-another-investment-spree-americas

to standard corporate taxes.[83]

A specialized market metric, the Alerian MLP Index, tracks 42 of the nation's top energy MLPs, and its list is dominated by pipeline companies. All told, the MLPs in the Alerian index boast a market capitalization in excess of $300 billion. The top three MLPs—Enterprise Product Partners, Williams Partners, and MPLX—together have a market capitalization exceeding $100 billion.

Table 3: The 15 largest MLPs tracked by the Alerian MLP Index March 2018[84]

Name	Sector Classification	Mkt Cap (million $USD)
Enterprise Products Partners LP	Pipeline Transportation | Natural Gas	$54,892
Williams Partners LP	Gathering + Processing | Natural Gas	$35,309
MPLX LP	Gathering + Processing | Natural Gas	$28,316
Energy Transfer Partners LP	Pipeline Transportation | Natural Gas	$19,753
Spectra Energy Partners LP	Pipeline Transportation | Natural Gas	$17,582
Plains All American Pipeline LP	Pipeline Transportation | Petroleum	$17,456
Magellan Midstream Partners LP	Pipeline Transportation | Petroleum	$14,260
Cheniere Energy Partners LP	Other | Liquefaction	$14,205
Andeavor Logistics LP	Pipeline Transportation | Petroleum	$9,870
Western Gas Partners LP	Gathering + Processing | Natural Gas	$7,732
Phillips 66 Partners LP	Pipeline Transportation | Petroleum	$6,787
Buckeye Partners LP	Pipeline Transportation | Petroleum	$6,328
Enable Midstream Partners LP	Gathering + Processing | Natural Gas	$5,896
EnLink Midstream Partners LP	Gathering + Processing | Natural Gas	$5,746
Shell Midstream Partners LP	Pipeline Transportation | Petroleum	$5,459

Source: https://www.alerian.com/wp-content/uploads/2018.03.29-AMZ-Facts.pdf

For investors, pipeline MLPs traditionally occupied the same market niche as utilities, producing stable and predictable revenues from fees that were either governed by rate regulations or locked in though long-term contracts.[85] But as shale oil and gas production skyrocketed, many investors began to regard pipeline MLPs as growth stocks, believing that new pipelines serving booming new basins created outsized opportunities for long-term profits. The investment rationale for shale oil allowed MLPs to raise massive amounts of new capital for oil, gas and product pipelines. Yet during the boom, many investors mistakenly still thought of new pipelines as low-risk enterprises because developers typically locked long-term shipping contracts before they began construction. These contracts often fixed transportation rates based on volumes rather than commodity prices, and obligated their shippers to pay penalties if they did not use their contracted capacity. This gave many investors the impression midstream companies had insulated themselves from the ups and downs of commodity prices and fossil fuel demand.

But the oil and gas price collapse hit pipeline companies just as hard as it hit oil and gas producers. As prices fell, production from some basins stagnated or declined, and it

[83] http://news.morningstar.com/classroom2/course.asp?docId=145579&page=4&CN=sample
[84] https://www.alerian.com/wp-content/uploads/2018.03.29-AMZ-Facts.pdf
[85] https://www.bloomberg.com/gadfly/articles/2017-11-21/master-limited-partnerships-face-an-existential-crisis

quickly became apparent that the pipeline industry had overbuilt capacity. Overcapacity triggered a cascade of financial troubles for MLPs, both in short-term performance and long-term prospects. Pipelines with uncommitted volumes faced falling revenues and sales volumes. Pipelines with favorable 10-year contracts signed in the early years of the shale boom faced dramatically lower rates or volumes when contracts came due for renewal. Pipelines serving basins where production was in decline faced the risk of becoming unprofitable stranded assets.[86] Meanwhile, some midstream companies suffered after shippers voided pipeline shipping contracts after declaring bankruptcy. And most recently, an unfavorable ruling by the Federal Energy Regulatory Commission has prevented MLPs from using an important tax allowance, causing MLP stock prices to tumble.

Ultimately, the MLP structure may have become a liability for the pipeline industry. The tax advantages conferred by MLPs allowed the industry to raise too much money, too fast, overbuilding capacity and wasting capital on projects with poor long-term prospects. Meanwhile, these partnerships often funnelled outsized revenues to a handful of general partners who controlled the company's operations and investment decisions. Payouts to general partners weighed heavily on the company's performance, trimming the dividends paid to ordinary investors.

In short, the once-booming pipeline MLP sector in North America has been beset by a mix of short- and long-term financial vulnerabilities similar to the woes that hit the rest of the industry: overcapacity, falling revenues, unstable contacts and a high risk of stranded assets, particularly in areas with declining production.

The Petrochemical Sector

The United States is the largest producer of petrochemicals in the world, with 10,000 firms that manufacture upward of 70,000 products. The industry has a presence in most states, with Texas, Illinois, California, Louisiana and North Carolina leading. The United States stands as the world's second leading exporter of petrochemicals, with the Gulf states serving as the principal launch pad for U.S. products. These plants refine raw feedstocks into primary products such as ethylene, propylene, naphtha, ammonia and methanol, and then into an array of manufactured products—rubber, plastics, solvents and more—that show up in industrial and consumer goods almost everywhere.

U.S.-based petrochemical companies recorded $259 billion in revenues in 2016, and market analysts expect demand to rise 2.3% annually in the coming years. Many of the largest companies in the industry are familiar names: Dow/Dupont, ExxonMobil, Eastman Chemical, Chevron Phillips Chemical and Monsanto. Of these, Dow/Dupont, Monsanto and Eastman Chemical are all standalone chemical companies, while ExxonMobil's petrochemical operations form part of its integrated oil and gas operations.

[86] http://www.bain.com/publications/articles/north-american-midstream-strategy-in-uncertainty.aspx

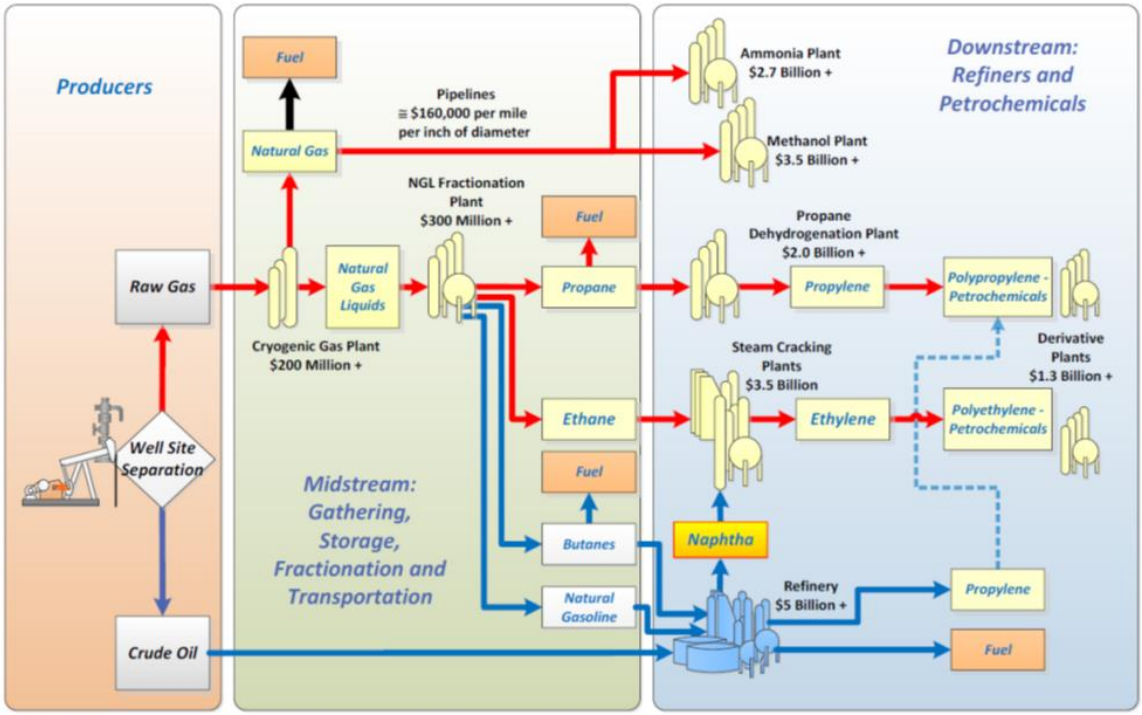
Table 4: Ten Largest Petrochemical Companies in the United States

Company	2016 Revenues ($billions)
Dow/Dupont	$58
ExxonMobil	$26
PPG Industries	$14
Praxair	$11
Huntsman Corporation	$10
Eastman Chemical	$9
Air Products	$8.50
Chevron Phillips	$8.50
Ecolab	$8
Mosaic	$7

Source: Chemical & Engineering News: https://cen.acs.org/sections/us-top-50.html

Low oil and gas prices have stimulated new petrochemical investment in the United States. West Virginia, hard-hit by coal's decline, has welcomed new investment in petrochemicals, and the industry has funnelled capital to the state to take advantage of low costs and abundant gas supply from the Marcellus Shale.[87]

Figure 7: Crude and Gas Extraction, Refinement and End-Use



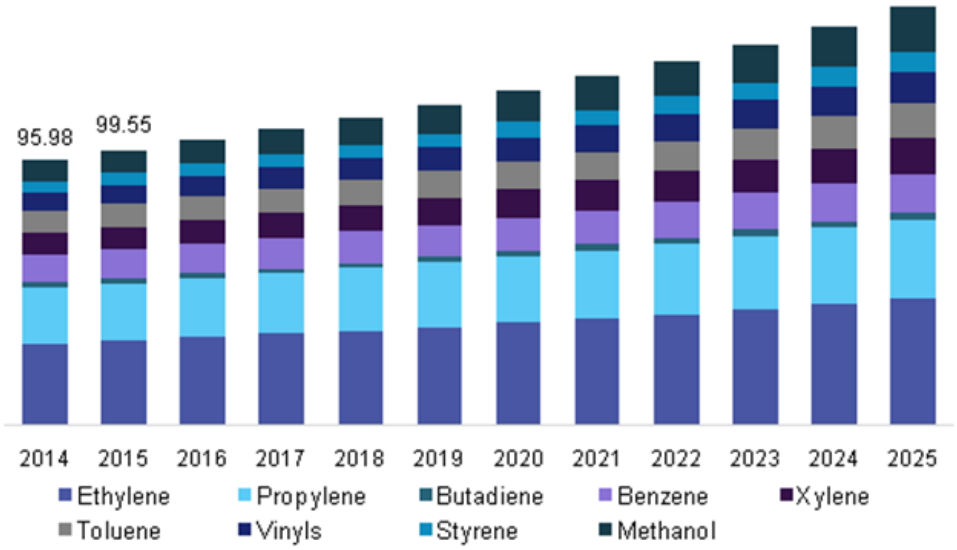
Source: Nick Fowler, Rextac, presentation at March 2016 IEEFA Energy Finance conference

[87] https://www.americanchemistry.com/Appalachian-Petrochem-Study/

Petrochemical plants require significant fossil fuel inputs, both as raw materials and as energy to power the manufacturing process. In fact, the petrochemical industry consumes more energy and emits more carbon than any other U.S. manufacturing sector.[88] Petrochemical feedstocks include not only gas and oil, but also—and perhaps more importantly—lighter in-between hydrocarbons such as ethane, butanes, propane and gasoline.

These latter compounds are often byproducts of conventional oil and gas production. Ethane, for example, is often produced along with its lighter cousin, methane; but pipelines prohibit high levels of ethane for safety reasons, which has left oil and gas producers with a surplus of ethane—and given the petrochemical segment an abundant, low-cost feedstock for polyethylene. A similar situation holds for propane, butanes, gasolines (alternately called liquid petroleum gases or natural gas liquids, depending on whether the main product is oil or gas). While there is some demand for these compounds as fuels for home heating and transportation, fracking has created a surplus of lighter liquid fuels that now serve as inexpensive feedstocks for the petrochemical industry.

Figure 8: North America Petrochemicals Market Revenue, by Product, 2014-2025 (Million Tons)[89]



Source: Petrochemicals Market Analysis By Product (Ethylene, Propylene, Butadiene, Benzene, Xylene, Toluene, Vinyls, Styrene, Methanol) By Region (North America, Europe, China, Middle East, Africa, Latin America) And Segment Forecasts, 2018 - 2025, Grandview Research, October 2016

Despite the volatility in the oil and gas sector as a whole, the petrochemical industry has produced steady profits for shareholders in recent years. Still, the segment has lagged the broader market, despite strong recent performance from Dow/Dupont and PPG Industries. (See Chart: Stock Performance Fossil Fuel Sectors versus the SP 500.) And

[88] https://link.springer.com/referenceworkentry/10.1007%2F978-1-4419-7991-9_10
[89] https://www.grandviewresearch.com/industry-analysis/petrochemical-market

compared to the sector as a whole, the petrochemical segment is not a financial powerhouse; revenues for the top petrochemical producers remain a small fraction of total oil and gas industry receipts. Moreover, petrochemical investments historically have made less money for oil and gas companies than average long-term returns for oil and gas exploration and processing. So, while petrochemicals have generated stable profits, this stability came with lower rates of return and some issues with access to capital.[90]

Although low feedstock and fuel prices have boosted petrochemical investments, the sector still faces a variety of challenges and uncertainties. The industry does best in a growing economy, and when fuel and feedstock prices remain low and stable. But rising prices would boost costs; and past a certain point, increasing feedstock prices would crimp petrochemical demand and profits.

The industry is also the subject of persistent environmental challenges, including toxic discharges, waste disposal and ocean pollution. As investment in the sector has increased, climate and environmental issues, energy resource planning, local toxics issues and competition within the industry and between resource inputs have come to the fore.

The U.S. petrochemical industry also faces uncertainty in the form of growing competition from the Middle East, Asia and South America, which have all entered the market to satisfy domestic needs and enhance employment and revenues with exports.91 Globally, the petrochemical industry also competes with coal use as the basis for chemical production in Asia.

Appendix II. Risks in Both High- and Low-Price Environments

The direction of oil prices, and the specific ways those prices affect revenues and profits, often determine how investors evaluate oil and gas companies. In the past, investors have seen high prices as the key to prosperity. But as the energy landscape changes, both high- and low- price environments present serious financial risks to the oil and gas industry. And in either price environment, the declining prices of and technological advances in renewable energy and electric vehicles are a challenge to the market share of oil and gas.

Market volatility and the ongoing buzzing mass of issues that swarm around oil prices and politics often make the storyline of the industry hard to understand or follow. Focusing on prices brings all of those issues into a much clearer framework. It is essential for the climate movement to follow the daily events of the oil and gas industry and to

[90] http://www.ogfj.com/articles/print/volume-14/issue-11/features/private-equity-jvs.html
[91] https://chemical-materials.elsevier.com/chemicals-industry-news-and-analysis/asia-shift-petrochemicals-led-china-india/

construct a coherent storyline on what is happening with the industry, whether prices are up or down.

What defines prices as either "high" or "low" has varied over time, because oil and gas markets have always been volatile, and it's important to know whether a particular price benchmark is viewed as part of a rising or declining cycle at any given time.[92] For the purposes of this discussion, a low price environment[93] will be defined as below $70 per barrel and a high oil price environment as over $100 per barrel.[94]

Risks in a Low-Price Environment

A low-price environment—such as the one which has persisted over the past several years—can cause the industry to experience significant losses in revenue; decreases in stock value; increases in bankruptcies, defaults and write-offs of reserves and a more general weakening of public and investor confidence. The recent prolonged low-price environment has caused many oil and gas companies to adopt aggressive cost-cutting practices and to curtail capital spending. And the industry sees its long-term outlook as clouded by low prices and the growing complexity and likely necessity of altering its business models and investment patterns to manage climate change risk.[95] The current OPEC supply agreement is a major initiative by OPEC and supporting countries to force a price increase. The supply agreement is needed because left to its own impulses the market, in its collective form, would continue to overproduce and drive down prices to unsustainable levels.

The combined pressures of downward pricing, competition and a negative investment outlook have diminished the character of fossil fuel investments in the stock market. The implications of the industry's declining performance in the stock market should strengthen the chances of success for opposition to any individual fossil fuel projects, as well as demands for market and environmental reforms. It will also add weight to the financial case for divestment from oil and gas companies.

In a lower price environment costs become a crucial determinant of financial success. As prices collapsed in the post-2014 period, company efforts at cost discipline have not been sufficient to right the ship—they have been overcome by the size, pace and duration of the price decline.

Producers can be expected to face continued financial challenges as low prices put pressure on profitability margins, capital access becomes more difficult, and bankruptcies and write-offs increase. A low price, volatile environment makes it more difficult for the industry to continue to justify capital expenditures for drilling, pipelines, mining and other infrastructure, especially as they are also still writing off prior failures.

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[92] The Harvard Business Review in the middle of 2016 carried $50 per barrel as a low price. In early 2016 the price of oil was $27 per barrel and was on the rise.

[93] Current market opinion sees prices higher than $70 per barrel as part of an upward surge that could carry prices still further. https://www.nasdaq.com/article/crude-oil-price-forecast-a-leg-higher-on-shrinking-us-stockpiles-cm949831

[94] https://www.nytimes.com/2018/01/16/business/energy-environment/oil-prices.html

[95] https://www.ft.com/content/cf10c73c-df5d-11e7-a8a4-0a1e63a52f9c

Weak quarterly earnings reports raise questions about company management and decision making.

The recent low oil price period has taken place during an overall economic period of low interest rates, low inflation and growing interest by institutional investors in new opportunities for stable returns. Economic growth and profitability are occurring based upon a new alignment of industry powerhouses in sectors other than energy. The leaders of the stock market are now Information technology, materials, financials, health care and consumer products; and real estate, utilities[96] and industrials have provided steady, stable but more modest contributions. The energy sector has lagged these other areas.

Fossil Fuels Are Losing Share to Renewables, Even in an Environment Where Fossil Fuel Prices Are Low

One might expect that when prices for fossil fuels are low, they would gain in market share related to renewable and alternative energy. The case of coal is a good example. Coal was the principal source of electricity in the U.S. for most of the last several decades, and was considered the least cost option for many years. The industry has seen lower prices over the last five years due to diminished demand. Due to technological advancements gas and renewable energy are both now cheaper alternatives to coal and the combination of cheap gas and growth in renewables has led to a 37.5 percent decline in U.S. consumption of coal over the last decade.

Fossil fuel extraction is expensive—and the oil sector's last growth cycle was based on being able to attract investors for it long-term high cost, high priced extractions from expensive reserves. But things are different now.

The new cycle of technological innovation that swept through the energy sector has pushed down the cost of energy. Gas saw major advances through fracking. The renewable energy sector also advanced further and faster than anticipated as major commercial efficiencies took hold in wind and solar. Over the longer term competition between wind and solar and gas favors the renewable sector.

As renewable energy—particularly wind and solar—have come down in price, the concept of lower cost or no cost energy has taken root. Wind and solar have no fuel costs. The electric vehicle sector is also improving its price competitiveness as major auto companies take larger positions. Cheaper energy sources have become investible and politically accepted, creating a material risk to the financial rationale for oil investments.

During this period, public policy and public opinion have also shifted toward urging major public corporations to 'go green.' And consumer spending and investment decisions are also shifting in that direction.

[96] The utility sector is an energy intensive area with a long history of partnership with the fossil fuel sector. New energy generation decisions by this sector have turned away from coal favoring renewables, efficiency and gas.

Oil and gas company claims that they can compete in a lower price environment have not been demonstrated over a sufficiently broad market experience to determine their reliability. The nature of the economic transition to a low carbon environment at this stage supports the thesis that green energy is cheaper and that the costs involved with producing and using energy are becoming less burdensome on the environment and planet.

In the energy sector the oil and gas industry's historic claims to market superiority are giving way to new industries (solar, wind and energy efficiency) and companies with solid, investible propositions, growing balance sheets and positive stock and credit evaluations.

Table 5: Benefits and Costs to Oil and Gas Industry in a Low Price Environment

Benefits	Costs
Focus on Core Missions- Ridding Non-Core Assets	Shrinking Revenue
Weak Competitors Eliminated	Pressure to Reduce Costs
Potential for Cheap Acquisitions	Lower Capex
Increased Demand	Diminished Stock Prices
Improved Competitiveness of Petrochemical Sales	Downward Pressure on Dividends
Lowers Risk to Investors in Alternatives	Less Institutional Investor Interest/Concerns
	Bankruptcy/Investor Losses
	Failing Industry- Incentive for Alternatives
	Troubled Outlook
	Weakening Economic Chain
	Squeezes Margins in Petro, Conventional and NG

Source: IEEFA analysis

Risks in a High-Price Environment

In the past, the oil industry has been able to count on rising prices, and particularly on periodic and lengthy periods of price spikes, to generate the revenues needed to reward investors and to finance capital expenditures. But even if prices return to higher levels, market fundamentals: competition between oil and gas producers, increased competition from other forms of energy, geological challenges and other economic factors—mean that the spikes will be lower and of shorter duration than they have been in the past. This spells serious trouble for the oil and gas industry, even in an upmarket.

The increasing reliance of the market on political options to prop up prices or to check market forces only demonstrates weak fundamentals. This "wild card" approach to market organization is likely to increase with political alignments coming together and

falling apart; unilateral action by one nation disrupting several well settled market arrangements and the potential for trade wars and military conflict ever present. Prices have more than doubled since falling below $30 per barrel in early 2016, reflecting a working resolution of tensions between OPEC members and certain non-OPEC countries, particularly Russia, over production cuts. Reduced output resulting from a December 2016 agreement[97] and subsequent extensions have constrained global supplies, and U.S. shale producers have not moved quickly to oversupply the markets and drive prices down again. Yet oil prices already have recently climbed to over $70 per barrel based on geopolitical tensions and the longer term impacts of OPEC's supply reductions. Again, volatility is the order of the day.

Higher Prices Aren't as Bullish for the Industry as They Used to Be

Historically, investors and the management of oil companies[98] have tended to view steadily rising oil prices in a positive light—as a signal of a strong economy with robust demand, and a harbinger of strong performance both for oil companies and the market as a whole. Higher oil prices foretold rising dividends, robust investment, and more revenue for state and local governments.[99] And although price spikes could give consumers short-term pain at the pump, many economists believed that stronger income and employment growth for the economy as a whole would quickly offset the pain.

But today, rising oil prices may be seen in a more bearish light for the industry: as a risk to economic growth, as an incentive for investors to shift their resources to lower-cost energy alternatives, and as a potential spur for long-term loss in oil and gas market share.

Rising prices may contain the seeds of their own destruction. As prices rise, so do the incentives for each individual country to increase production and lie about compliance with the OPEC agreements. At the same time, rising prices also give incentives for U.S. oil producers to add new capacity, boosting supplies and driving down prices again.

On the political end, prices haven't risen high enough for long enough to cause public discontent in the United States, or to cause significant harm to the economies of major consuming nations. But major oil importing nations monitor prices closely. Both India[100] and Japan[101], for example, have already identified rising oil prices as a growing risk for economic growth as trade balances, currency values, fiscal stability and inflation are all undermined when oil prices rise for prolonged periods of time.

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[97] https://www.opec.org/opec_web/static_files_project/media/downloads/press_room/OPEC%20agreement.pdf

[98] https://www.wsj.com/articles/are-low-oil-prices-good-for-the-economy-1479092581

[99] Daniel Yergin, The Quest, New York, Penguin Books, p. 236-237

[100] https://www.moneycontrol.com/news/business/markets/rising-oil-prices-may-deliver-a-crude-shock-here-are-3-factors-to-be-cautious-about-2552381.html

[101] https://www.reuters.com/article/us-japan-economy-tankan/japans-manufacturers-mood-sours-as-yen-oil-prices-rise-reuters-tankan-idUSKBN1HQ39C

A New Ballgame: Renewable Energy and New Technologies Have Become Competitive

Recent price increases are taking place against a wave of technological change brought on by the growth of renewable energy and electric vehicles. The question now is: have these newer technologies and markets evolved to a point that creates a cap on the size and duration of oil price spikes?

From a financial perspective, the energy battle for market share between fossil fuels, renewable energy and electric vehicles is a rough proxy for the progress of the climate movement. In the past, rising prices have led to a variety of defensive economic adjustments by consumers and governments, including lower consumption which saves businesses, households and governments money, lower fuel taxes that protect consumers on the price side but stress public budgets, and reliance on short term fiscal deficits to afford the higher prices. Today, however, a new dynamic is at play: renewable energy and electric vehicles is having an impact on the fossil fuel monopoly. Because lower-price energy alternatives are available, high energy prices can have the effect of curtailing demand for fossil fuels and accelerate the shifting of demand towards renewables, likely for the long term.

The battle has largely been fought in the arenas of capital investment, technological innovation, tariffs, employment opportunities, public policies and public opinion. Overt governmental repression in many areas of the world is ever present for climate activists, but state sanctioned violence against citizens directly related to climate issues has been rare but a powerful reminder when it has occurred. For example, a demonstrator was shot to death by police in Bangladesh during a demonstration against a new coal plant.[102]

Key questions that arise as these changes take place include:

- Is renewable energy—and the financing structure needed to support it—mature, resilient, reliable and affordable enough to displace fossil fuels permanently?
- And under what terms, at what level and by what measure do we gauge the trajectory?
- How will the new industries (solar, wind, electric vehicles and its economic chain) push their way into the investment, political and public imagination to displace fossil fuel interests?

These questions will be tackled by advocates and analysts in a variety of arenas: financial policy debates, competing scenarios in arcane statistical models[103] used by companies and national and international energy agencies and local, state and regional examinations of specific fossil fuel projects.

[102] https://www.theguardian.com/environment/2016/apr/06/bangladesh-coal-plant-protests-continue-after-demonstrators-killed

[103] http://priceofoil.org/2018/02/06/eia-once-again-projecting-a-future-that-will-not-come/ and https://www.carbontracker.org/reports/expect-the-unexpected-the-disruptive-power-of-low-carbon-technology/

Table 6: Benefits and Costs to Oil and Gas Industry in a High Price Environment

Benefits	Costs
Improved Company Balance Sheets- More Cash	Financial Incentive to Oversupply
Maintenance/Increase Dividends to Investors	Decreased Demand Due to Higher Prices
Improved Stock Performance	Higher Prices for Oil Consuming Businesses
Longer Term Potential for New Investments	Higher Consumer Costs- Inflation
Improved Fiscal Condition Oil Producing U.S. States	Currency/Trade Pressures Oil Consuming Countries
Improved Fiscal Condition Oil Producing Countries	Long Term Incentives for Alternatives
Validation of Prior Public Policy Support and Opportunity for New Ones	Decreased Efforts to Diversify in Emerging Oil Dependent States
Greater Political Cooperation Among Nation States	New Pressure to Curtail Price Increases
Growth in Institutional Investor Interest	Demands on Profit Distribution: Dividend, Debt, Research, M&A
Positive Outlook	Decreases Competitiveness of Petrochemical Sales
Strengthening of Economic Chain	
Bolstering Local Economies	
More Drilling- Higher Short-Term Revenues	

Source: IEEFA analysis

Appendix III. Case Study: ExxonMobil[104]

Ever Upward

ExxonMobil[105] is the largest private sector oil and gas company in the United States, with a current market value of $321 billion. It is the only oil and gas company in the top 10 of the Standard and Poor's 500 index. For most of the last 40 years, and particularly during the 1990s and 2000s, the company was one of, if not the, best performing stock in the world.

The company's investment thesis was that large-scale, macroeconomic growth was tied to fossil fuel use. The post-World War II economy had launched a long-term global expansion requiring ever-greater amounts of oil and gas. The quality of economic growth concentrated in manufacturing, construction and reconstruction ran in tandem with rising levels of worldwide GDP, and oil fuelled it all. ExxonMobil's investment strategy was to continually buy oil and gas assets in order to be prepared to ramp production up and down. The company would take advantage of price spikes to

[104] http://ieefa.org/ieefa-issues-red-flag-report-exxonmobil-%E2%80%A8core-financials-show-oil-giant-decline-institutional-investors-owe-shareholders-fiduciary-review/

[105] Exxon merged with Mobil Oil Company in 1998.

accumulate cash and then deploy that cash during down cycles to purchase more assets. The oil and gas portfolio also allowed the company to regularly sell assets as needed to adjust for strategic production needs and short-term cash fluctuations.

The company is divided into four profit centers: upstream oil and gas, downstream refineries, processing and distribution, and petrochemical production and trading.

2014 Until Today: Decline and Recovery?

Some have argued that ExxonMobil's investment thesis was never sound, since it wasn't predicated on the company's ability to cover expenses, shareholder profits, and new investment with current revenue. Others trace the company's problems to the economic collapse of 2008 and the relatively weak recovery for the world's industrial bases since then. There are important insights to be gathered from both critiques.

For the purpose of this paper, we focus on the price collapse in 2014 and its repercussions. Many of the fissures observed by earlier analysts came into sharper relief as prices fell and the low-price environment took hold of the industry.

The financial metrics of the company demonstrate significant stress:

- ExxonMobil's annual revenues collapsed from a decade high of $486 billion in 2011 to a low of $208 billion in 2016—a 58% decline. Revenues increased in 2017 to $244.[106]
- ExxonMobil's annual net income dropped from $45.22 billion in 2008 to $7.8 billion in 2016. Net income rose to $19.7 billion in 2017, the first increase in five years.
- ExxonMobil's long-term debt increased from an average of about $8 billion for the decade 2003-2013 to $29 billion by 2016.
- ExxonMobil's payout to shareholders fell from a modest $26 billion in 2014 to a low of $13 billion in 2016.
- The company, which had been spending on average $50 billion annually on property plant and equipment, only spent $15.4 billion in 2016.[107]

These bottom line balance sheet displays of financial stress were reflected in several company losses that garnered worldwide attention[108] in the business community. These include:

- Exxon's move to achieve an ever-larger share of the U.S. fracking market with a $41 billion acquisition of XTO's assets in 2010 failed. By 2013 CEO Rex Tillerson

[106] http://news.exxonmobil.com/press-release/exxonmobil-earns-197-billion-2017-84-billion-fourth-quarter

[107] There is a conflict in the 2017-10K regarding the amount to be attributed to PPE. The Price Waterhouse table of Consolidated Cash Flow found on page 66 states that PPE additions equal $15.4 billion. This amount is restated by Exxon Mobil in its accounting of Liquidity and Capital Resources on page 48. Exxon Mobil also carries a different, higher tally of additions to PPE on pages 36 and again on page 97. Here the 2017 tally is $24.9 billion. There are no notes to explain the variance. Throughout this paper IEEFA has relied upon the independent auditor's information as the definitive amount.

[108] https://qz.com/861403/the-exxon-that-tillerson-is-leaving-behind-hidebound-secretive-and-doubling-down-on-its-traditions-at-a-time-of-mind-boggling-change/

disclosed that the returns would be of a much longer-term nature as gas prices had collapsed and were likely to stay low for the foreseeable future.
- ExxonMobil's much publicized deal with Russia for access to various Arctic and North Sea oil reserves foundered as Russia's invasion of Ukraine resulted in sanctions against Russia that put the ExxonMobil/Russia deal on indefinite hold.
- ExxonMobil's decade long acquisitions in Canadian tar sands came to an end when the company disclosed in late 2016 that it would be writing down its reserves. The write down removed 20% of ExxonMobil's reserves. ExxonMobil has not disclosed to investors how much was actually invested in these reserves.[109]
- Over the past two years, the company has taken additional write-downs of its U.S. gas holdings amounting to $2.5 to $3 billion.

Recently, the company announced that it will increase its investments in U.S. oil and gas reserves at a time when its upstream U.S. investments have lost money for more than three years. All signs are that the company will ramp up its capital spending in the coming years even though it has offered no clear rationale for those investments.

Competition, Climate and Governance

The company's handling of risks related to competition, climate and governance also are causing it trouble.

Competition

First, ExxonMobil has run afoul of law enforcement and some investors regarding how it accounts for its oil reserves. While the rest of the industry began taking write-downs in 2014, ExxonMobil took the position that it does not do write-downs. By not taking write-downs while the rest of the industry is doing so, ExxonMobil, at least on paper, appears to be weathering the low-priced environment better than its competitors. The SEC is looking into how the company values its reserves and how it amends those valuations as market conditions change. Attorneys general from two states are suing the company on this matter and related climate disclosure issues. Some shareholders have included questionable valuations as the basis of damage claims against the company.

Second, the company has addressed the issue of product competition from other energy sources as immaterial to the company's business success. Echoing the International Energy Administration and other pro-industry sources ExxonMobil has declared that the increase in electric vehicles pose no threat to the company's bottom line even if electric vehicles achieve better than anticipated market share growth.

Third, the company has derided the rise of renewable energy—pointing out that renewable energy requires public subsidies to compete.

Climate

While Exxon is no longer an active climate change denier, it continues to downplay both the risks of climate change and continues to raise questions about the causes. The

[109] IEEFA has estimated that these reserves cost the company approximately $22 billion to acquire. http://ieefa.org/ieefa-investor-memo-exxonmobil-xom-company-outlier-reports-write-offs-canadian-oil-sands-assets/.

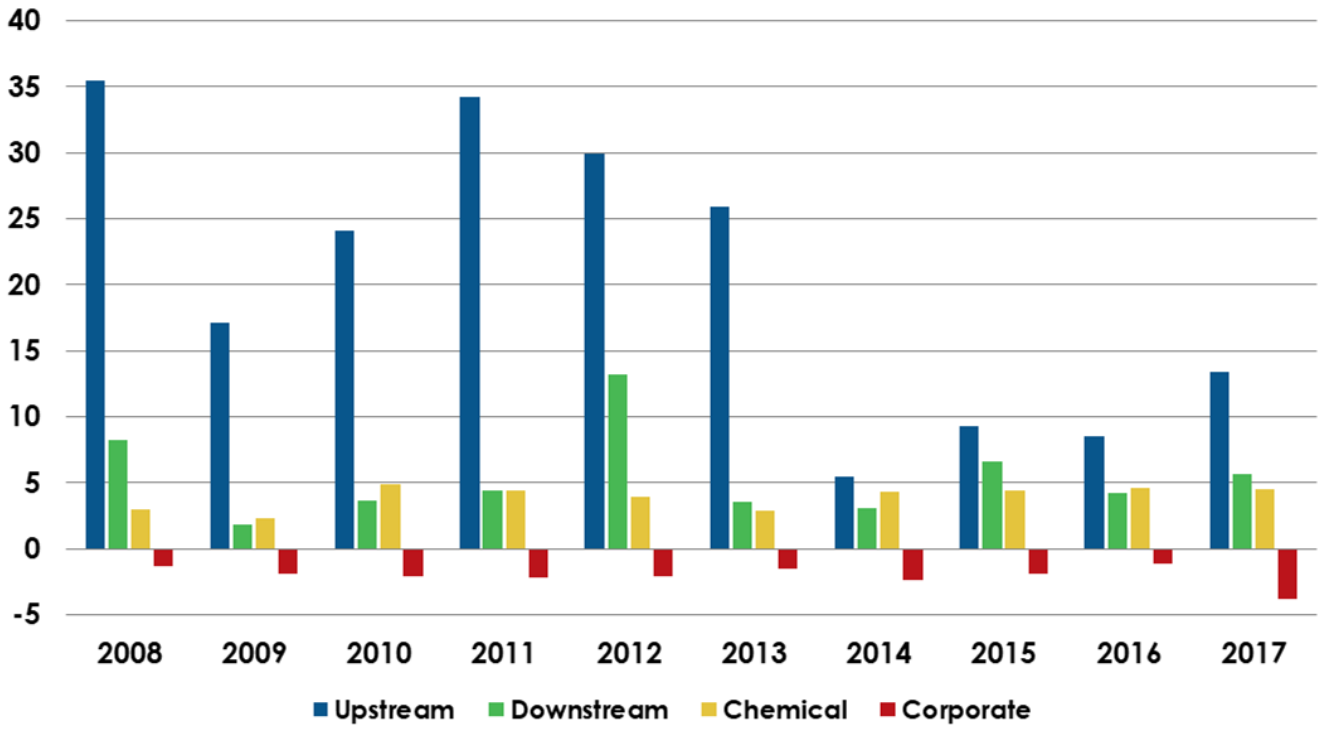
company acknowledges that climate change poses a risk to the global environment, but argues that the extent of the risk is debatable and its cause also uncertain. And, the company is certain that the extent of the physical risks to the climate and potential for disruptive policy interventions to the company are small. Therefore, it is business as usual.

Among the strategic and tactical steps it has taken are:

- Adding a board member with climate credentials.
- Agreeing to complete a new report on climate risk after 62 percent of its shareholders voted in favor of it. The report, released in February 2018, offers no new directions.[110]
- Speaking more favorably about a carbon tax.
- Agreeing to conduct long-term shareholder engagement with institutional investors on climate issues.

Nonetheless, the company is sticking to its strategy of resistance against the New York and Massachusetts attorney general inquiries into the company's climate disclosures and reserve calculations. It continues to support studies and reports that challenge climate change analysis on the science and the logic used by divestment campaigners.

Figure 9: ExxonMobil Profits (in Billions)



Source: ExxonMobil financial statements, IEEFA analysis

[110] http://ieefa.org/wp-content/uploads/2018/03/ExxonMobils-Climate-Risk-Report-Defective-and-Unresponsive-March-2018.pdf

Table 7: Selected Financial Data, ExxonMobil, 2006-2017

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Price of Oil ($/bbl)	81.16	71.50	102.95	46.86	79.70	98.00	102.09	100.58	98.92	48.51	28.50	53.23
Basic Information												
Total Revenues	377.64	404.55	477.36	310.59	383.22	486.43	480.68	438.25	411.94	268.88	208.10	244.44
Total Costs	310.23	334.08	393.96	275.81	330.26	413.17	401.95	380.54	360.31	246.92	200.14	225.69
Net Income	39.50	40.61	45.22	19.28	30.46	41.06	44.88	32.58	32.52	16.15	7.9	19.7
Long Term Debt	6.65	7.18	7.03	7.13	12.23	9.32	7.93	6.89	11.65	19.93	28.9	24.4
Free Cash Flow to Equity												
Net Cash by Operating Activities	49.29	52.0	59.72	28.43	48.41	55.35	56.17	44.91	45.12	30.34	22.08	30.0
Additions to Property/Plant/Equip.	15.46	15.39	19.32	22.49	26.87	30.98	34.27	33.67	32.95	26.49	16.16	15.4
(IEEFA Free Cash Flow (FCF)	33.90	36.61	40.40	5.94	21.54	24.37	21.90	11.24	12.17	3.85	5.92	14.6
Share Distributions												
Dividend	7.867	7.910	8.433	8.303	8.77	9.33	10.42	11.18	11.82	12.26	12.453	13.0
Stock Buybacks	28.385	30.741	34.981	18.951	12.050	21.1	20.9	15.95	13.15	4.03	.9	.7
IEEFA Total Distributions	36.252	38.653	43.414	27.254	20.829	30.434	31.32	27.13	26.00	16.29	13.3	13.7
Cash End of Year Balance	28.24	33.98	31.48	10.69	7.8	12.66	9.58	4.64	4.61	3.71	3.58	3.2

Source: ExxonMobil financial statements, IEEFA analysis

IEEFA

The Institute for Energy Economics and Financial Analysis conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy. http://ieefa.org

Sightline Institute

Sightline Institute promotes sustainable policy and monitors regional sustainability progress in the U.S. More can be found at www.sightline.org.

About the Authors

Tom Sanzillo

Tom Sanzillo, director of finance for IEEFA, is the author of several studies on coal plants, rate impacts, credit analyses and public and private financial structures for the coal industry. He has testified as an expert witness, taught energy-industry finance training sessions, and is quoted frequently by the media. Sanzillo has 17 years of experience with the City and the State of New York in various senior financial and policy management positions. He is a former first deputy comptroller for the State of New York, where he oversaw the finances of 1,300 units of local government, the annual management of 44,000 government contracts, and where he had oversight of over $200 billion in state and local municipal bond programs and a $156 billion pension fund.

Clark Williams-Derry

Clark Williams-Derry, Director of Energy Finance for Sightline Institute, researches U.S. and global energy markets, particularly in the Western US and Canada. Williams-Derry's recent research has covered the finances of the Dakota Access Pipeline and the proposed Trans Mountain pipeline expansion; liquefied natural gas projects in British Columbia; "self-bonding" for coal mine reclamation; West Coast coal export projects; greenhouse gas accounting for coal export projects; coal industry bankruptcies and the interactions between federal coal leasing policy and coal exports.

Important Information

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