Securing America's Future Energy

Issue Brief

June 1, 2016

The OPEC (Saudi) Strategy

Summary

- At the conclusion of its November 2014 meeting, OPEC, led by de facto swing producer Saudi Arabia, went against decades of historical precedent and initiated a global price war. The price of oil tumbled from June 2014 highs of over $110 per barrel (bbl) to less than $50/bbl in January 2015. Prices fell as low as the mid $20s in January 2016. Saudi Arabia, in fact, flooded the market using spare production capacity even as prices were dropping—increasing output from 9.6 million barrels per day (mbd) in November 2014 to 10.2 mbd by March 2015. Oil price volatility increased dramatically as a result, hitting levels in early 2016 last seen in the wake of the 2008-9 financial crisis.
- The strategy aims to use an extended period of extremely low oil prices to structurally rebalance the oil market on terms that will benefit OPEC and other large global oil exporters. Their goal is to return the market to a condition of relative short-term scarcity in which sellers have substantial leverage over buyers, thereby maximizing OPEC's ability to manipulate prices and extract large resource rents from oil consumers across the globe.
- The strategy has four main components: (1) recapture short-term market share from U.S. shale and other responsive sources of global supply; (2) undermine investment in capital-intensive, long-term, non-OPEC oil supplies such as global deepwater resources and Canadian oil sands; (3) stimulate short-term oil demand through low prices; and (4) undercut global policy to reduce oil consumption, including fuel economy standards, as well as competition to oil, such as electricity and natural gas. There is compelling evidence that all four components are already succeeding.
- U.S. Supply Impact: Since peaking in October 2014 at more than 1,600, the number of active oil drilling rigs operating in the United States has plummeted 78 percent to about 340 today. Low oil prices have triggered a wave of more than 100,000 layoffs and dozens of bankruptcies in the U.S. oil industry, production has declined and the country's exposure to less stable oil imports has increased. The price collapse has seen private investment in new production capacity suffer, with over $380 billion in global deferred capital expenditures (as of January 2016), equivalent to 27 billion barrels of oil.
- U.S. Demand Impact: In part due to lower gasoline prices, U.S. vehicle miles traveled (VMT) is expected to exceed 3.2 trillion miles in 2016, an all-time record. Sales of SUVs in the United States have also skyrocketed, increasing 13 percent year-over-year in 2015. Sales of smaller, more efficient cars are suffering, and in 2015 the average fuel economy rating of new light-duty vehicle sales posted its first decline in years. Lower oil prices have also prompted

automakers to pressure regulators to loosen federal fuel economy standards, potentially threatening the mid-term review of the 2009 CAFE standards and creating a significant setback for fuel efficiency and advanced fuel vehicles.

Energy Security in the New Oil Market Paradigm

In November of 2014, the Organization of the Petroleum Exporting Countries (OPEC) convened for what would become a historic meeting in Vienna, Austria. After peaking at more than $115/bbl in June of that year, as Islamic State militants captured large portions of Iraq and appeared on the verge of threatening Baghdad, the price of oil declined steadily to less than $80/bbl on the eve of the cartel's deliberations, sharply eroding its members' export revenues. Initially, the decline in prices was driven by the realization that Iraq's southern oil complex near Basra was unlikely to be seriously threatened by insurgents. But over time, an emerging imbalance in global oil markets, driven largely by the upstart American shale industry, came into focus as the key driver of continuously falling oil prices.

Between 2012 and 2014, the American shale industry grew at an unprecedented rate, increasing its production of crude oil and other liquid fuels by a total of more than 1 mbd each year over that time period. By the end of 2014, the dozens of independent energy companies that comprise the U.S. shale industry were pumping an incremental 3.8 mbd of total oil supply into the global market compared with 2011 levels—a level of production that made them collectively the sixth largest oil producer in the world. While this rapid growth presented the American economy and consumers with a wide range of benefits—from reduced spending on imported oil to increased job growth and capital spending—it represented an existential threat to OPEC.

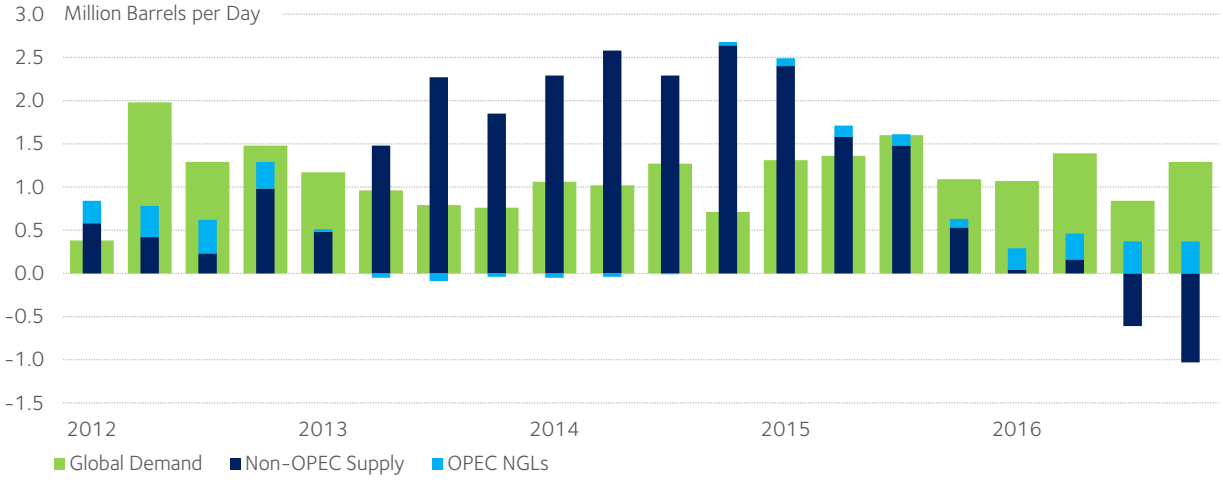
Beginning in mid-2013, oil supply growth outside of OPEC began to consistently outpace global oil demand growth for the first time in decades, a situation that would have been nearly unimaginable just a few years earlier (Figure 1). For a significant period of time, the effects of this shift in the balance of power in oil markets was masked by supply disruptions in Libya as a result of that country's civil war and sharply reduced oil production in Iran as a result of sanctions. But by the time OPEC convened to discuss its strategy in late 2014, the world was becoming less dependent on OPEC oil in a way that presented the cartel with its first structurally shrinking market in at least a generation (Figure 2).

Based on OPEC's decades-long strategy of market manipulation—sometimes executed effectively, sometimes not—in pursuit of favorable oil prices, most market observers and participants anticipated that the cartel would respond to these dynamics with a reduction in output intended to erode or eliminate the market imbalance, preserving high prices and maximizing its short-term oil export revenues. Instead, Saudi Arabia and other Arab Gulf states including Kuwait, Qatar, and the United Arab Emirates, broke with the rest of the cartel and embarked on a different strategy. Facing rising levels of competition from outside the cartel—as well as soaring production from Iraq and the impending re-integration of Iran into global oil markets—Saudi Arabia and its allies initiated a global price war designed to recapture the market.

The Saudi Strategy

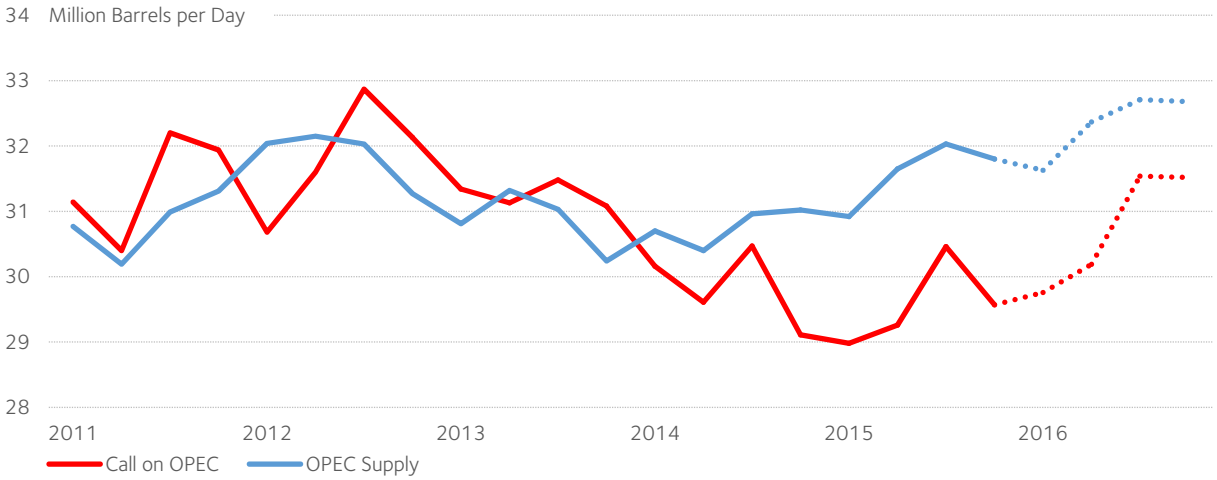
In the months that followed the November 2014 OPEC meeting, oil prices collapsed. The 2014-2016 fall in oil prices ranks among the most precipitous in history in terms of both speed and magnitude (Figure 3). While several factors supporting the initial decline in prices can be traced to normal market dynamics, two other factors played important roles in making this price correction especially severe and destructive. First, the typical process of price discovery does not work in the oil market, because of an utter lack of transparency in OPEC's decision-making process. While participants in markets for other goods can make educated guesses about other participants' plans based on their best estimate of a competitor's costs, OPEC members often establish quotas based on non-market criteria or goals

FIGURE 1 · YEAR-OVER-YEAR CHANGE IN NON-OPEC OIL SUPPLY AND GLOBAL OIL DEMAND



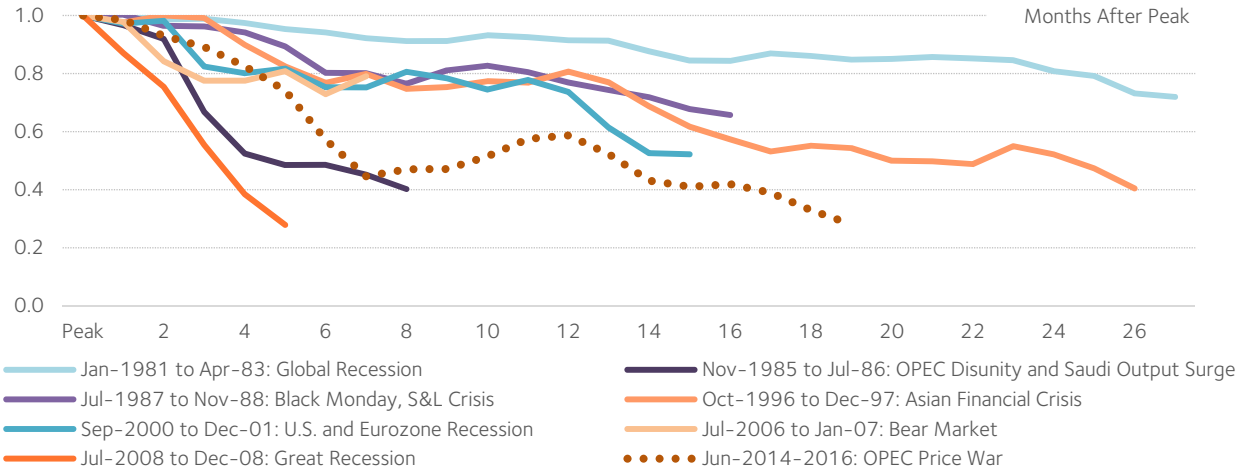
Source: SAFE anaysis based on data from EIA

FIGURE 2 · OPEC CRUDE: CALL VERSUS SUPPLY



Source: SAFE anaysis based on data from EIA

FIGURE 3 · HISTORICAL OIL PRICE DECLINES



Source: SAFE analysis based on data from EIA

which can be far more difficult to estimate. Markets are essentially forced to guess what decision a group of oil producers representing more than one-third of global crude supplies would make—and in 2014 the markets guessed wrong. Given the complex mix of political, social, security and other non-market factors that were at play in OPEC's deliberations, this poor guess was perhaps not surprising.

Second, and more important, in the months that followed the decision, Saudi Arabia initiated a steady and concerted effort to draw down its spare capacity and flood the global oil market with excess supply. In November 2014, Saudi crude production totaled 9.6 mbd. Four months later, in March 2015, it had reached 10.2 mbd, an increase of 600,000 barrels per day.[1] Based on production since then, this appears to be the current floor for Saudi output, with levels rising still higher during months of elevated summer demand within the Kingdom. Combined with increases in Iraqi output as that country seeks to rebuild its economy and fund an ongoing conflict with the Islamic State, the increases from Saudi Arabia have sharply exacerbated the condition of oversupply in global oil markets over the past 18 months. Contrary to the notion that Saudi Arabia is simply allowing the market to rebalance itself, this deliberate action to draw down spare capacity and sharply increase production at a time of low global oil prices suggests that the Saudis—and by extension their allies within OPEC—have a clear strategy.

In short, the Saudi strategy aims to use an extended period of extremely low oil prices to structurally rebalance the oil market on terms that will benefit OPEC and other large global oil exporters over the coming decade. Their goal is to return the market to a condition of relative short-term scarcity in which sellers have substantial leverage over buyers, thereby maximizing OPEC's ability to manipulate prices and extract large resource rents from oil consumers across the globe. The Saudi strategy has four main components: (1) recapture short-term market share from U.S. shale and other responsive sources of global supply; (2) undermine investment in capital intensive long-term non-OPEC oil supplies such as global deepwater resources and Canadian oil sands; (3) stimulate short-term oil demand through low prices; and (4) undercut global policy to reduce oil consumption, including fuel economy standards, as well as competition to oil, such as electricity and natural gas. There is compelling evidence that all four components are already succeeding.

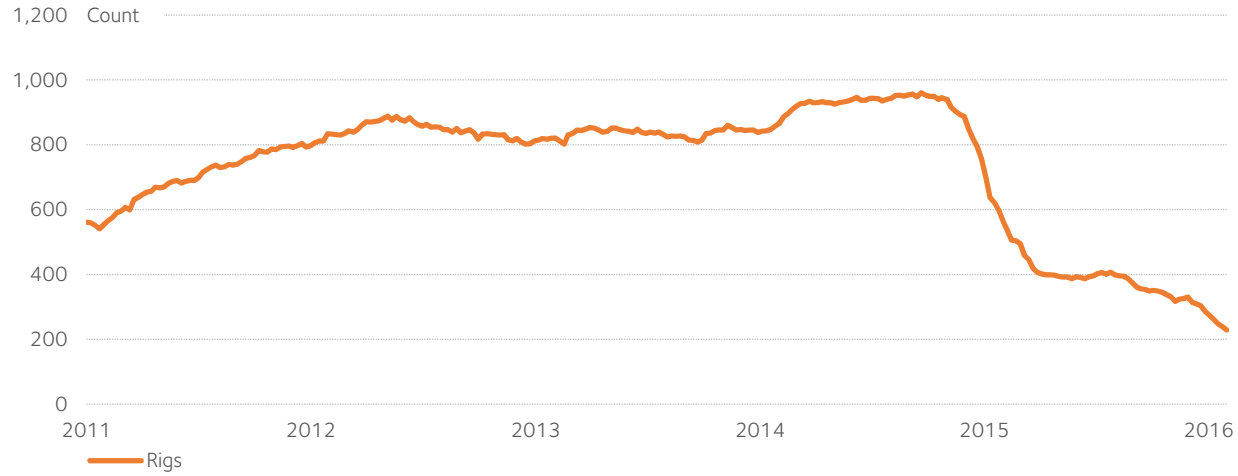
1. The War on Shale

In the near term, U.S. shale production will be a primary casualty of the Saudi strategy. The number of rigs drilling for oil in the Permian, Bakken, and Eagle Ford shale basins peaked at 960 in late October 2014 and held steady between 950 and 940 through mid-November.[2] Almost immediately after the Saudis announced their market share strategy and prices started falling, drilling activity in these basins began to collapse, plunging below 900 by the end of 2014. Over the following five months, the decline in drilling activity averaged nearly 30 rigs per week, before briefly stabilizing at 400 in May, representing a decline of nearly 60 percent from its peak. Following a short stabilization in oil prices, drilling continued to collapse, and the oil-directed rig count in the three key shale plays stood at just 229 in March 2016 (Figure 4).[3]

The sharp drop in drilling activity did not immediately translate to similar declines in oil production as shale operators worked quickly to improve operational efficiency, cut costs, and focus drilling activity on the most productive areas within each region. In fact, despite the fact that drilling slowed sharply in 2015, average annual shale production increased in 2015 relative to 2014 by 0.6 mbd.[4] However, absolute production levels are a fairly misleading metric for evaluating the production impact of the

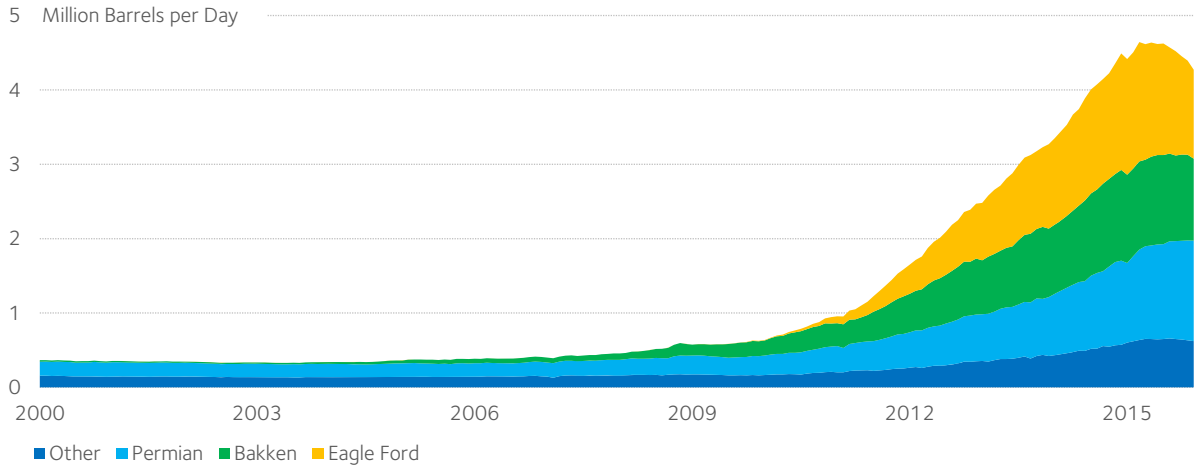
[1] SAFE analysis based on data from IEA.
[2] SAFE analysis based on data from Baker Hughes.
[3] Id.
[4] EIA, *Short-Term Energy Outlook*, March 2016.

FIGURE 4 · TOTAL RIGS DRILLING FOR OIL: BAKKEN, PERMIAN AND EAGLE FORD



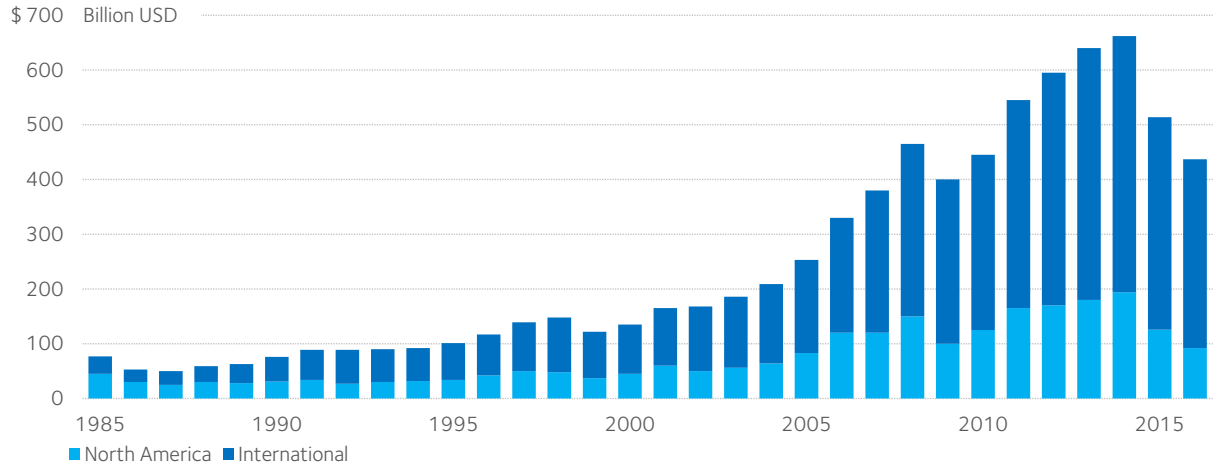
Source: BakerHughes

FIGURE 5 · U.S. TIGHT OIL PRODUCTION



Source: SAFE anaysis based on data from EIA

FIGURE 6 · GLOBAL UPSTREAM OIL SPENDING



Source: Barclays

lower oil prices witnessed since 2014. Evaluating the counterfactual—actual production versus *expected* production prior to the collapse—presents a more useful perspective.

For example, in its November 2014 oil market forecast, the Department of Energy (DOE) projected that U.S. crude production in the onshore region of the lower-48 states (a good proxy for shale production) would increase by 0.5 mbd between January and December of 2015.[5] Today, DOE estimates that lower-48 production actually declined by 0.23 mbd over that period, a swing of 720,000 barrels per day in actuals compared to expectations.[6]

Even in absolute terms, the near term picture for shale suggests significant production declines. On a monthly basis, total shale oil production is estimated to have peaked at more than 4.6 mbd per day in March 2015 before dropping to less than 4.3 mbd by the end of the year—a decline of 8 percent. (Figure 5).[7] The Department of Energy currently expects U.S. crude production in the lower-48 states to decline by nearly 0.9 mbd on average in 2016 compared to 2015 and an additional 0.63 mbd in 2017.[8] These reductions—if they materialize—will be key contributors to a near-term oil market tightening.

2. The Long-Term Supply Crunch

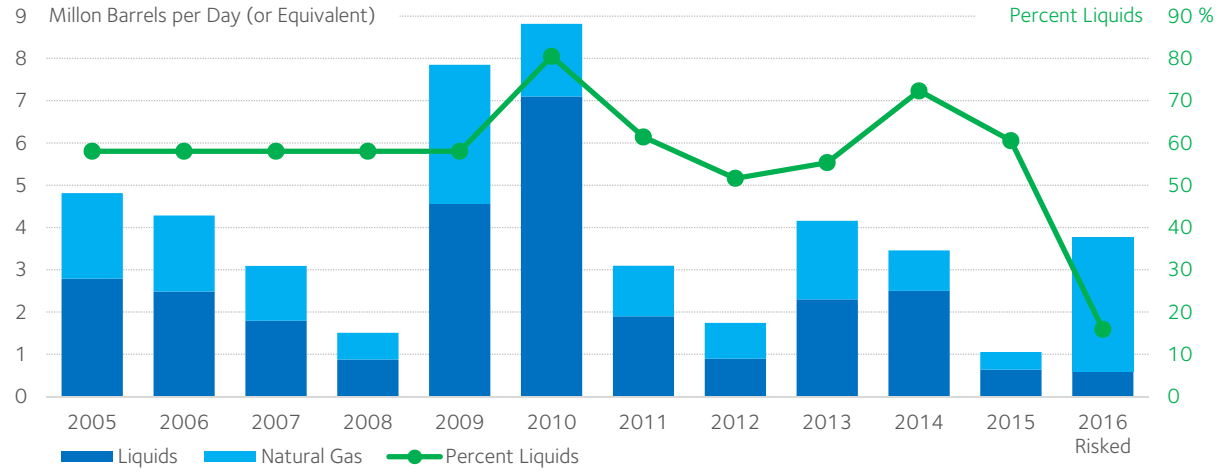
While the reductions in shale production are central to near-term oil market balancing, the impact on more capital intense non-OPEC oil supplies is likely to be of greater importance in the medium- and long-term. In 2015 and 2016, for example, estimates suggest that upstream investment in global oil supplies declined for two consecutive years for the first time since the mid-1980s, a combined reduction of $225 billion (Figure 6).[9] Investment in the Middle East was flat over this period, while investment in Russia dropped 20 percent in 2015 (recovering slightly in the first quarter of 2016). The majority of the reductions in capital spending have occurred in North America—particularly in deepwater resources and Canadian oil sands—and other costly basins such as offshore in Latin America.

The impact of these reductions in spending is likely to be substantial and result in materially tighter oil markets by the end of the decade based on current oil demand forecasts. In early 2016, investment bank UBS estimated that sanctioned oil projects in 2015 and 2016 were running well below normal levels and will add just 0.63 mbd and 0.6 mbd respectively at their peak to future global oil production (Figure 7). This compares with annual additions of 2.7 mbd on average from 2005-2014. As a result, UBS noted, global upstream project cancellations could create a 4 mbd "hole in global oil supplies" by 2020.[10] Similarly, in March 2016, investment bank Morgan Stanley argued that cumulative global oil supply capacity will average 4 mbd less than December 2014 expectations throughout the period from 2018-2020.[11] Nearly half of this 4 mbd supply hole stems from the United States in 2018. By 2020, U.S. production recovers but ongoing supply gaps in oil sands and offshore Brazil keep the gap at about 4 mbd.

The primary means of bridging this gap will be sharply higher oil prices, which will be needed to moderate demand and increase supply. While it is difficult to estimate the exact level that prices will need to reach, one key driver will be cost of developing the marginal barrel of non-OPEC oil globally. Based on current resources and industry economics, this is likely to be a combination of Canadian oil

[5] EIA, *Short-Term Energy Outlook*, November 2016.
[6] Id.
[7] EIA, Presentation on "North American Energy Markets," delivered January 26, 2016.
[8] EIA, *Short-Term Energy Outlook*, March 2016.
[9] Oil and Gas Journal, "Barclays: Global E&P Budgets to See Double Dip in 2016," January 13, 2016.
[10] UBS, "Major Projects Database Update: Trouble Down the Line," February 2, 2016.
[11] Morgan Stanley, Crude Oil Global Supply Tracker, March 23, 2016.

FIGURE 7 · MAJOR UPSTREAM PROJECT FINAL INVESTMENT DECISION BY YEAR



Source: UBS

sands, global deepwater resources, and offshore Arctic. Another key driver will be the oil price needed to stimulate a return to rapid annual growth in U.S. shale.

While breakeven costs for oil projects are notoriously difficult to pinpoint, it is important to appreciate that resources such as deepwater oil and oil sands are among the most costly supplies to develop and require oil prices well in excess of today's prices to initiate project cycles. For example, oil consultancy Rystad Energy estimates the average 2020 breakeven price for developing Canadian oil sands to be $88 per barrel, with some projects requiring in excess of $100 per barrel.[12] The estimate for global ultra-deepwater resources ranges from as low as $45 per barrel to as much as $70 per barrel. While U.S. shale will undoubtedly play an important role in increasing global oil supplies as prices rise, most observers suspect that driving annual growth to pre-2015 rates in excess of 1 mbd annually would require prices of at least $80 per barrel.[13]

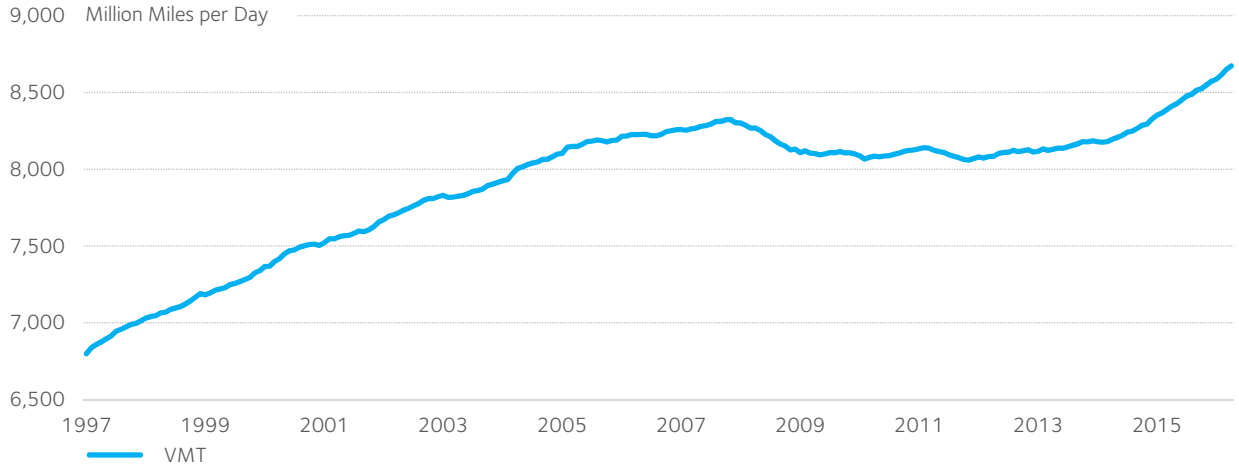
It is also important to note that tighter market conditions—and therefore higher prices—could last for a period of years, not months. This is because large capital projects such as oil sands development or offshore drilling in the Gulf of Mexico require significant lead times to be developed. For global deepwater, the time from discovery to a final investment decision currently averages 5 years.[14] After a decision to invest is made, the typical project cycle lasts three years, after which a field enters production. In other words, even currently sanctioned projects that have been delayed due to low oil prices will require three years of development to reach first production when oil prices increase. New discoveries in global offshore will require nearly 10 years to reach production. To the extent that investment in these resources is required to meet future global oil demand, these project cycles will help determine the length of the next high price cycle.

3. Short Term Demand Rebalancing

While undermining growth in U.S. and other non-OPEC oil supplies is a critical component of the Saudi strategy, the Kingdom's goals for the broader market are comprehensive and designed to drive meaningful changes in oil consumption as well as production. Saudi Arabia aims to leverage the

[12] Rystad Energy, "Global Liquids Cost Curve," October 2015.
[13] SAFE conversations with oil company executives. See also, e.g., Bank of America Merrill Lynch, "Global Energy Weekly: Look out for W in WTI," March 18, 2016.
[14] Christopher M. Barton, "Industry continues to provide solutions for deepwater production challenges," Offshore Magazine, May 6, 2015.

FIGURE 8 · U.S. VEHICLE MILES TRAVELED, 1997-2016



Source: SAFE analysis based on data from EIA

extended period of low prices to stimulate oil demand in key regions in the short term—including the United States and China—and to undermine technological and policy-related threats to oil in the long term.

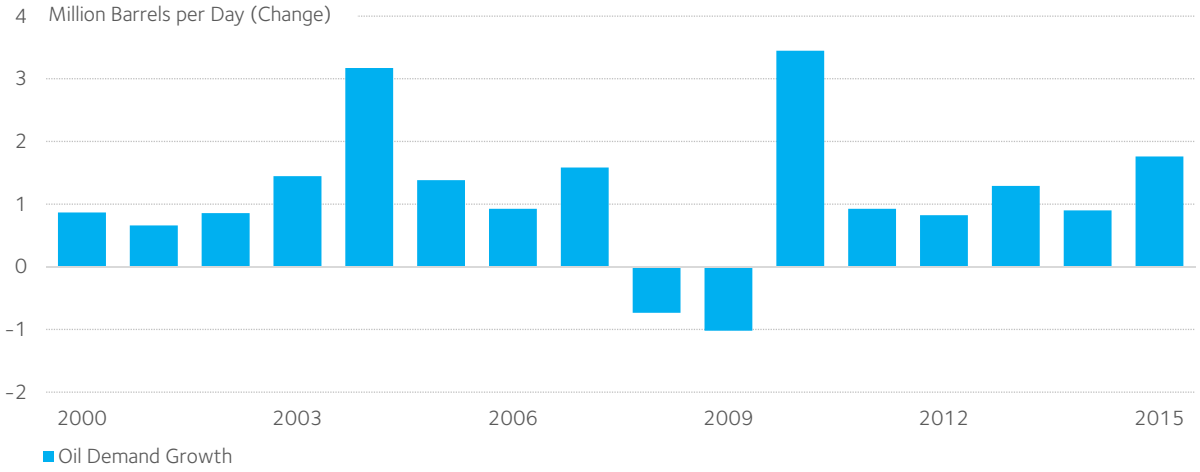
First, it is important to understand that a number of trends developed in the years immediately following the 2007-09 financial crisis that were almost certainly worrisome for OPEC and other global oil exporters. Most prominently, numerous observers suggested that global oil demand growth would moderate in the short term and diminish more significantly and fundamentally in the long term.

In the United States, the number of miles traveled on roads and highways throughout the country declined by 2.5 percent during the recession and was effectively flat from 2009 to mid-2014, the first such period since federal records began in 1970 (Figure 8).[15] In fact, measured on a per capita basis, U.S. vehicle travel actually declined in all but one year from 2004 to 2013, an unprecedented decline.[16] Combined with modest increases in the efficiency of the U.S. vehicle fleet due to fewer purchases of trucks and SUVs, reduced travel resulted in a significant drop in American gasoline demand over this period. Gasoline demand, which peaked at 9.3 mbd in 2007, averaged just 8.8 mbd from 2011 to 2014.[17]

Globally, a similarly-challenging picture was emerging for oil demand. According to the International Energy Agency, after oil demand growth averaged 1.4 mbd annually from 2000 to 2007, it averaged less than 1.0 mbd annually in the post-recession period from 2011 to 2014 (Figure 9).[18] While it is certainly the case that a significant portion of this slowdown was driven by trends in industrialized countries—OECD demand actually declined by 1.0 mbd between 2011 and 2014—developments in emerging markets also raised concerns for oil exporters.[19] In China, a key future market for Middle East oil exporters, demand growth averaged just 340,000 b/d annually in 2013 and 2014 after averaging nearly 500,000 b/d over the previous decade.[20] Given rapidly rising levels of oil production outside of OPEC—and increased competition from Iraq and Iran within the cartel—this flattening of demand presented Saudi Arabia and its allies with a rapidly shrinking market for their oil exports.

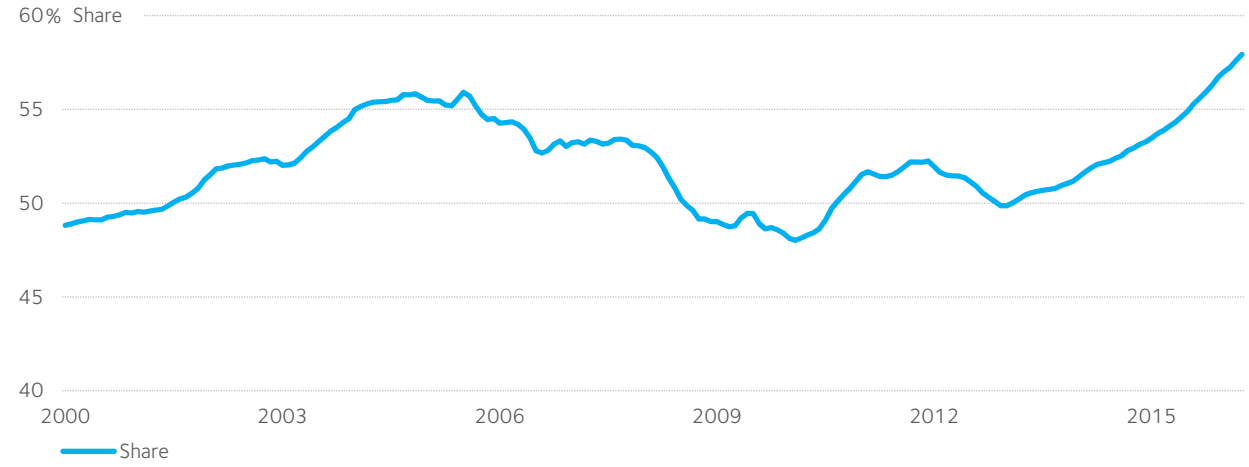
[15] Federal Highway Administration, Traffic Volume Trends Report Archive.
[16] SAFE analysis based on data from Federal Highway Administration and Bureau of Economic Analysis.
[17] EIA, *Petroleum Supply Monthly*.
[18] IEA, Data Services.
[19] Id.
[20] Id.

FIGURE 9 · GLOBAL OIL DEMAND GROWTH



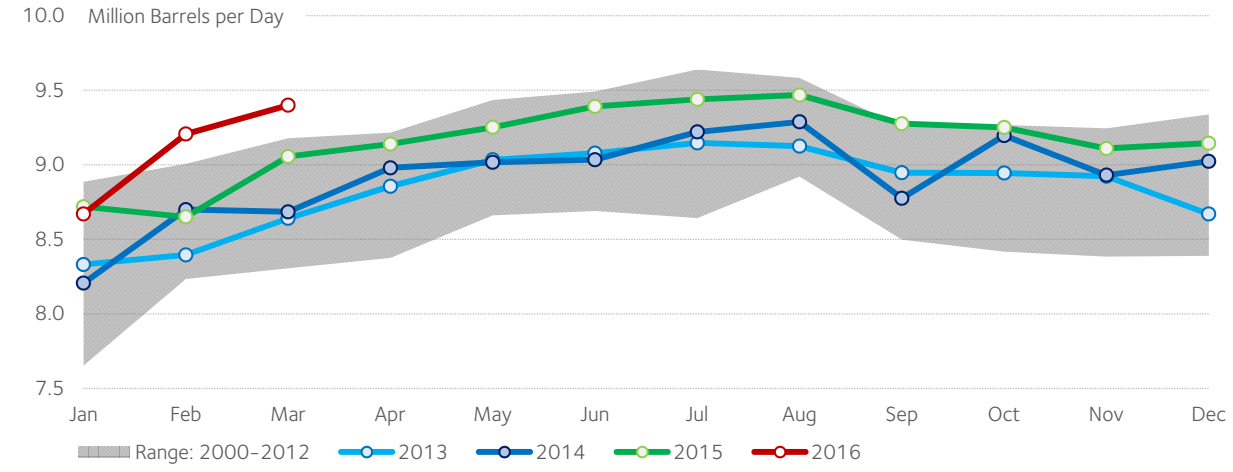
Source: SAFE analysis based on data from IEA

FIGURE 10 · LIGHT TRUCK SHARE OF U.S. AUTO SALES



Source: SAFE analysis based on data from BEA

FIGURE 11 · U.S. MOTOR GASOLINE DEMAND



Source: SAFE analysis based on data from EIA

Measured against these near-term demand metrics, the Saudi strategy is clearly succeeding. Once considered an early indicator of peak demand for travel and fuel consumption in America, U.S. vehicle miles traveled (VMT) increased at its fastest pace in at least 45 years in 2015, and now stands at its highest level in history (Figure 8). Even on a per capita basis, VMT in 2015 surged to levels last seen in 2007, prior to the financial crisis. Meanwhile, the light-truck and SUV share of passenger vehicle sales set an all-time record in December 2015 at more than 60 percent of total light-duty sales and has been steadily rising for months (Figure 10). As a result, U.S. gasoline demand averaged 9.2 mbd in 2015, very near its all-time high (Figure 11).[21]

Similar effects have unfolded around the world as a result of low oil prices. Total demand in China surged by nearly 600,000 b/d in 2015, the third-highest annual growth of the century as demand for consumer fuels like gasoline began to play a more important role than industrial fuels like diesel.[22] Globally, oil demand increased by 1.8 mbd last year according to IEA, also the third highest annual increase since 2000, trailing only 2004 and the post-recession recovery in 2010 (Figure 9). Taken in the aggregate, these data suggest that newly invigorated global oil demand growth will play an important role in helping to balance the oil market in the years to come. More importantly, they suggest that the global economy and consumers around the world remain heavily dependent on oil.

4. Long Term Demand

While short term increases in oil demand stimulated by lower prices and higher levels of driving will help balance markets in the near term, they will not preserve oil's dominance in transportation over the long term. The Saudis recognize that high prices will inevitably return, placing downward pressure on miles driven and once again incentivizing American and other global motorists into more efficient cars and even cars powered by fuels other than oil. This is a key reason for the extended nature of Saudi Arabia's effort to facilitate low oil prices: while a short period of low prices is not capable of affecting long-term change, an extended period of low prices could accomplish multiple goals that will have lasting effects on oil demand and U.S. energy security.

First, low oil prices are likely to undermine technological competition to oil in transportation in the United States, most notably advanced fuel vehicles (AFVs) powered by electricity and natural gas. The threat to these technologies follows a decade of concentrated investment. Federal government spending on advanced vehicle research, development, and deployment (RD&D) alone totaled more than $4.1 billion since 2000.[23] In terms of private investment, Bloomberg New Energy Finance places U.S. venture capital and private equity investment in electric vehicles at $4.5 billion between 2007 and 2012.[24]

Although these significant levels of investment clearly indicate a strong commitment to AFVs by policymakers, automakers, and even advanced fuel companies, the technologies for the vehicles are generally more expensive than internal combustion engine vehicles. The individual value proposition for plug-in electric and natural gas vehicles is that their higher purchase price is offset by lower fuel and maintenance costs over their lifetime. Indeed, most analysts argue that this total cost of ownership proposition must be significantly positive for AFVs in order for potential customers to be willing to overlook other sacrifices, including range limitations and longer refueling times.

[21] EIA, *Petroleum Supply Monthly*.
[22] IEA, *Oil Market Report*, March 2015
[23] Kelly Sims Gallagher and Laura Diaz Anadon, "DOE Budget Authority for Energy Research, Development, and Demonstration Database," Energy Technology Innovation Policy, John F. Kennedy School of Government, Harvard University, September, 2015.
[24] SAFE interview with Bloomberg New Energy Finance.

As a result of the plunge in oil prices, petroleum fuels like gasoline and diesel are now among the least expensive transportation fuels in the United States (Figure 12). As of January 2016, for example, both gasoline and diesel fuel were less expensive than compressed natural gas (CNG), meaning an owner of a CNG-powered vehicle might never recoup the higher purchase price of their vehicle unless prices rise.[25] Similarly, while electricity still remains less expensive than gasoline on an energy-equivalent basis, the margin has narrowed to such a significant extent that the owner of a Ford Focus EV, for example, has seen their payback period increase from approximately two and a half years at $4.00 gasoline to more than five years at today's prices when compared to a gasoline-powered Focus.[26]

This altered economic playing field is having a clear impact on U.S. AFV sales. Annual sales growth slowed dramatically beginning in mid-2014, just as oil prices began falling, and turned negative in early 2015. After increasing from just 17,000 in 2011 to nearly 120,000 in 2014, U.S. sales of plug-in electric vehicles (PEVs) declined year-over-year by 4 percent in 2015.[27] Models that most clearly compete based on economic value, such as the Nissan Leaf, Chevy Volt, and most Ford models experienced the sharpest declines as oil prices plummeted. Models that compete in luxury segments, where consumers are less price sensitive, have fared slightly better.

It is certainly too early to write-off the global electric and natural gas vehicle industries. High fuel taxes in Europe and substantial air quality issues in China will likely provide important support for the industry in the coming years, and many analysts continue to expect strong sales growth in these regions. Indeed, despite trends in the United States (Figure 13), global electric vehicle sales surged by nearly 60 percent in 2015, reaching 462,000 units compared to 289,000 in 2014.[28] The growth was entirely driven by sales in the Chinese and European markets, both of which surpassed the United States for the first time.

Sales in Europe and China may continue to lead the way. Research by investment bank UBS released in March 2016 suggested that electric vehicles would be cost-competitive with internal combustion engine vehicles in Europe by 2021 and China by 2025.[29] The same analysis found that EVs would *not* be cost-competitive in the United States for the foreseeable future based on current and expected fuel prices and existing public policy. Whether an extended period of weak sales reduces automakers' willingness to invest in marketing and selling PEVs in the United States remains to be seen. The United States, however, cannot relinquish leadership on the various technologies despite the threat low oil prices pose to the rate of adoption.

An additional and perhaps more significant threat of low oil prices relates to U.S. policy, and fuel economy standards in particular. The current U.S. standards, enacted in 2011 and 2012 and covering light-duty vehicles sold between 2012 and 2025, were projected by the Environmental Protection Agency (EPA) to reduce U.S. gasoline consumption by 3.2 mbd in 2030 compared to business as usual (Figure 14).[30] The standards are a cornerstone of U.S. oil policy and contain key incentives for electric and natural gas vehicles that are core to sustaining investment in those technologies as well as to achieving continuous improvements in gasoline engine technology.

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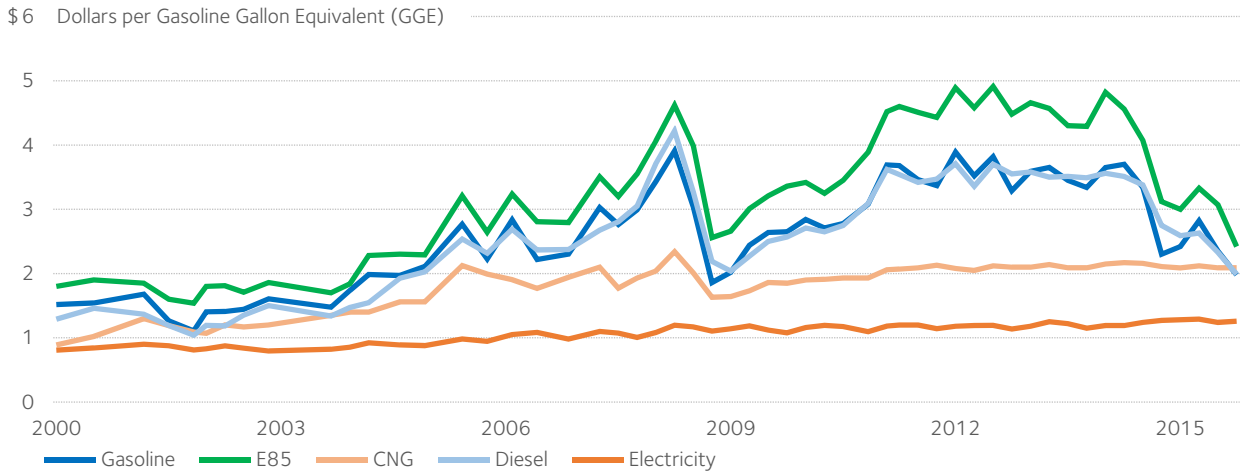
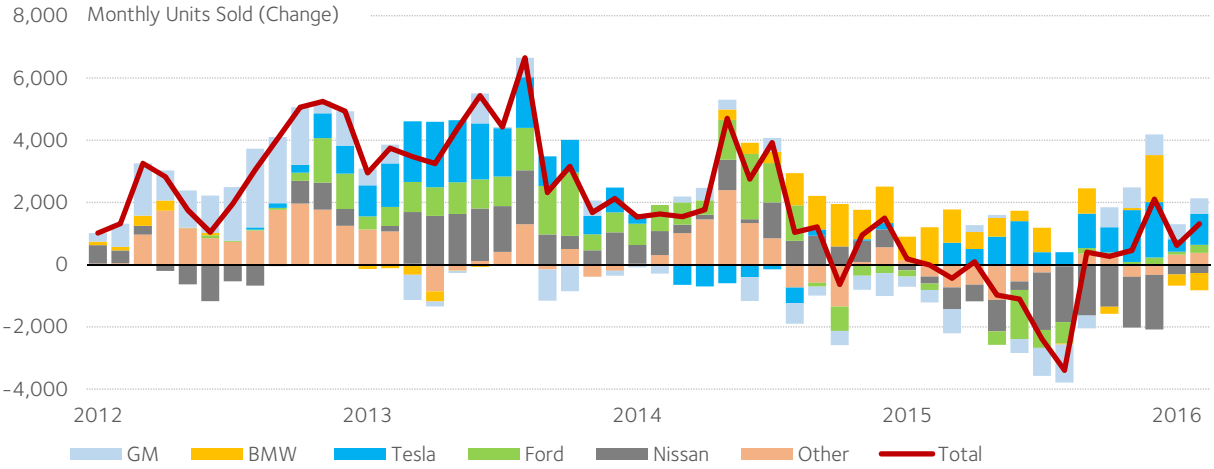
[25] Office of Energy Efficiency and Renewable Energy, Alternative Fuels Data Center.
[26] Note: Includes the federal tax credit and $1,000 cost for EVSE. Does not account for residual value loss.
[27] SAFE analysis based on data from HybridCars.com.
[28] FS-UNEP Collaborating Centre for Climate and Sustainable Energy Finance, "Global Trends in Renewable Energy Investment, 2016," March 2016.
[29] See, e.g., Eric Wesoff, "How Soon Can Tesla Get Battery Cell Costs Below $100 per Kilowatt-Hour?" Greentech Media, March 16, 2016.
[30] EPA, *Regulatory Impact Analysis: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards*.

FIGURE 12 · RETAIL FUEL PRICE



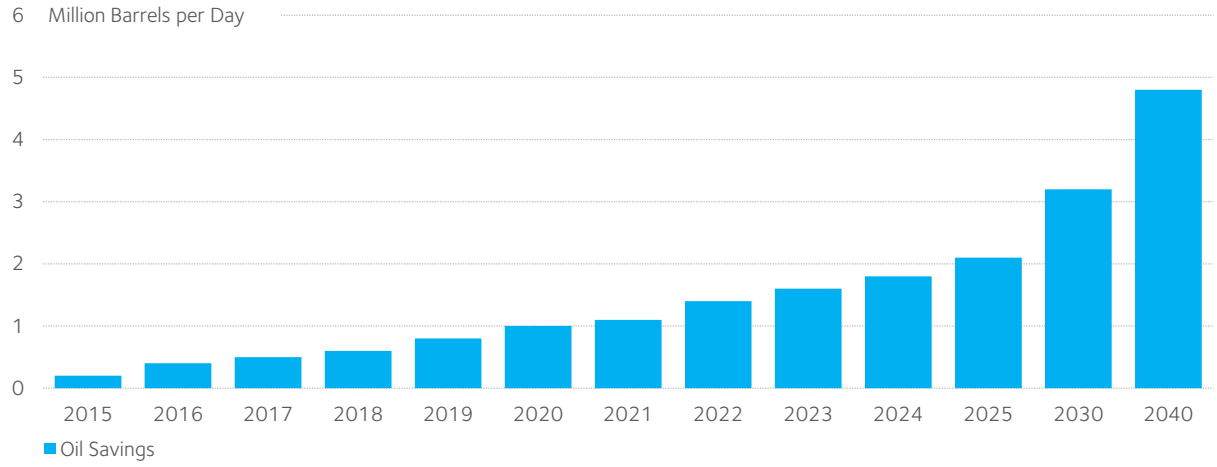
Source: SAFE analysis based on data from Clean Cities Alternative Fuel Price Reports

FIGURE 13 · YEAR-OVER-YEAR PLUG-IN ELECTRIC VEHICLE SALES GROWTH BY MANUFACTURER



Source: SAFE analysis based on data from HybridCars.com

FIGURE 14 · OIL SAVINGS FROM FUEL ECONOMY



Source: EPA

Yet the new standards are now facing their most significant challenge since enactment. As fuel prices have plummeted, American consumers have rapidly turned back to purchasing heavier and less efficient vehicles. In fact, at 25.2 miles per gallon, the fleet-wide efficiency of new passenger vehicles sold in the United States is nearly unchanged from late 2013, when it stood at 25 miles per gallon (mpg).[31] In fact, on a year-over-year basis, fuel economy has actually been declining since April 2015 (Figure 15).[32]

In 2016, EPA and the Department of Transportation will initiate a midterm review of the standards to review progress and any new information, including unexpected hurdles that would prevent automakers from meeting the standards. Already, automakers are pointing to lower fuel prices and sagging sales of lighter, more efficient vehicles as reason for EPA to consider relaxing the standards.[33]

This argument ignores an important feature of fuel economy standards since 2010: they are tailored to individual vehicle size, measured by the vehicle's physical footprint. Rather than requiring each automaker to meet a pre-determined, fleet-wide standard, the new standards simply require that each size vehicle improve over time, and the requirements for larger vehicles are less stringent than those of smaller cars. Therefore, while the industry can remain in compliance even as Americans opt for heavier vehicles, the oil savings from the footprint-based standards may fall well short of policymakers' goals.

Yet, regardless of the technical definition of compliance with the standards, it is clear that low fuel prices are undermining the overall efficiency of vehicles sold in the United States. While Saudi Arabia and its allies have not explicitly stated that they expect low oil prices to undermine U.S. policy, they are almost certainly aware of the policy implications of an extended period of low oil prices in the world's largest oil consumer and largest gasoline market. In fact, if past is prologue, the Saudis would be sound in expecting low oil prices to result in a relaxation of U.S. policy. After enacting the nation's first-ever fuel efficiency standards in the mid-1970s during an era of high oil prices, U.S. policymakers allowed the standards to stagnate for more than 20 years from the mid-1980s through 2007 throughout two decades of low prices.[34] This cannot happen again.

The Coming Market Balance

The net result of Saudi Arabia's short term objectives—rising global oil demand and curtailed supply from existing production—is that the oil market is on track to return to a condition of relative balance by 2017, according to the International Energy Agency.[35] Some market observers, including the Department of Energy, expect the balance to come slightly later, while others, including numerous investment banks and oil companies, expect it to come sooner. But very few observers expect oil markets to remain fundamentally oversupplied indefinitely.

Yet, while supply will approach fundamental alignment for a period of time, IEA and other observers expect this alignment to be short-lived, with the market overshooting and moving to a condition of undersupply in relatively short order. In a sense, this is the classic challenge that has long afflicted the oil industry. Inelastic supply and demand fundamentals lead to periods of overshooting and undershooting, which can only be regulated by extreme swings in prices.

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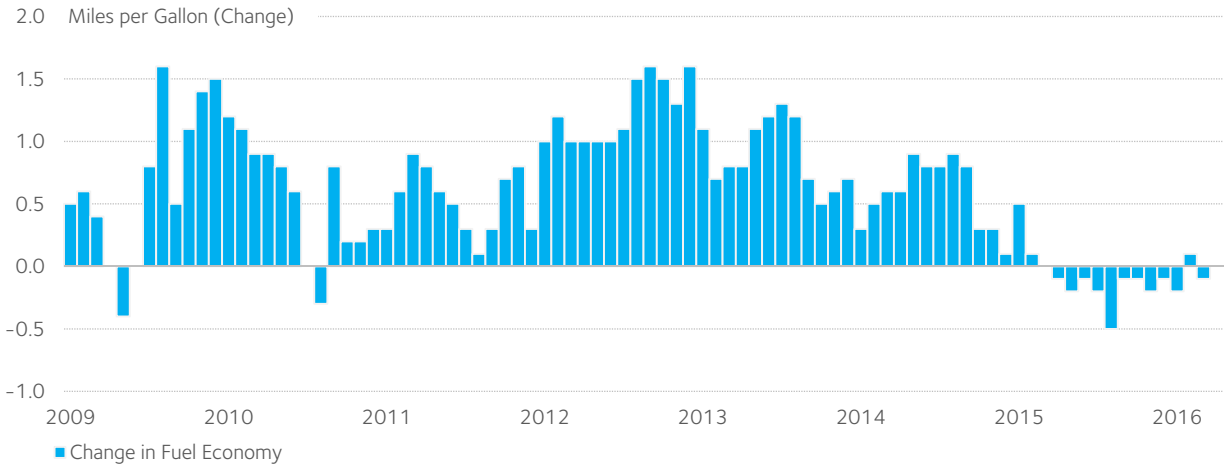
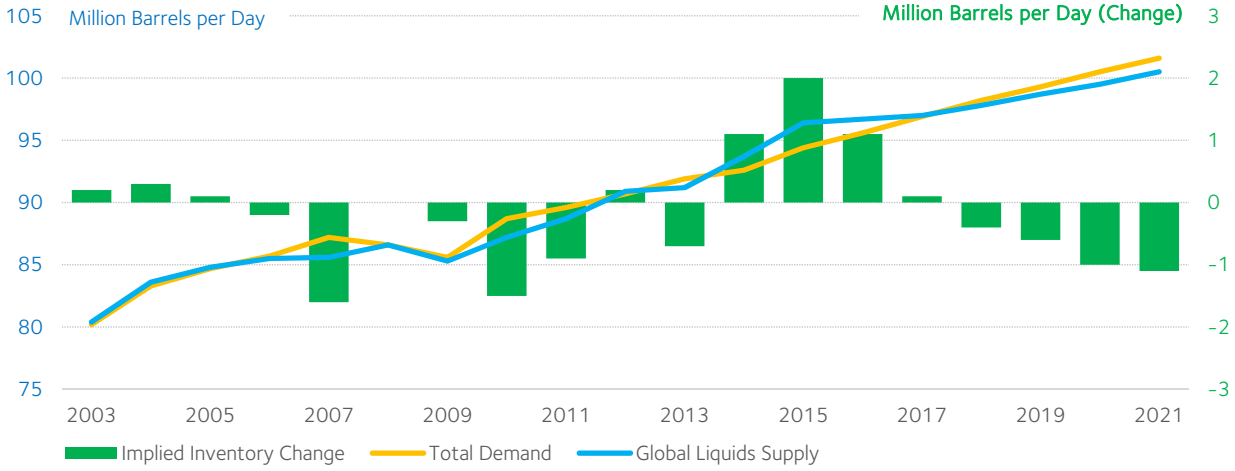
[31] Michal Sivak and Brandon Schoettle, University of Michigan, Transportation Research Institute.
[32] Id.
[33] Mike Spector and Christina Rogers, "Clash Looms Over Fuel Economy Standard," Wall Street Journal, April 20, 2016.
[34] See, e.g., National Highway Transportation Safety Administration, "Summary of Fuel Economy," December 2014.
[35] IEA, *2016 Medium-Term Oil Market Report*.

FIGURE 15 · YEAR-OVER-YEAR CHANGE IN U.S. FUEL ECONOMY



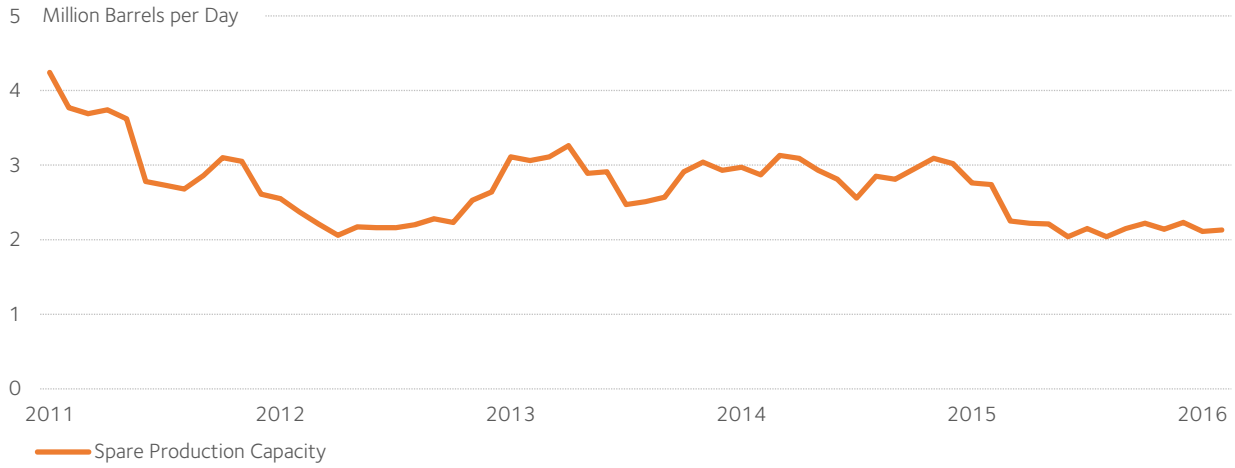
Source: SAFE analysis based on data from Michael Sivak and Brandon Schoettle, University of Michigan Transportation Research Institute

FIGURE 16 · GLOBAL OIL SUPPLY AND OIL DEMAND BALANCE



Source: SAFE analysis based on data from IEA

FIGURE 17 · OPEC SPARE CRUDE PRODUCTION CAPACITY



Source: SAFE analysis based on data from IEA

The coming period of undersupply, characterized by net inventory withdrawals rather than additions, is currently expected to be prolonged and relatively severe by historical standards. As of early 2016, IEA expects markets to roughly balance in 2017 followed by four consecutive years of net inventory withdrawals from 2018 to 2021, which average a steep 1.0 mbd in 2020 and 2021 combined and would remove a total of 1.1 billion barrels of oil from global inventories across the entire period (Figures 16).[36] The most recent analogous oil market occurred between 2007 and 2011, a period of record oil prices. Moreover, it should be noted that there is significant upside risk to these numbers given the fact that initial upstream investment numbers for 2016 are likely to be sharply revised downward.[37]

This anticipated structural imbalance is perfectly consistent with the longer-term elements of the Saudi strategy—including sharply reduced investment in developing new non-OPEC oil supplies, reduced competition to oil in transportation, and potential structural shifts in oil policy in the United States and other consuming countries. In effect, these trends will reduce the market's already-limited capacity to respond flexibly as prices rise, requiring significantly higher prices to balance the market.

The New Oil Market Paradigm

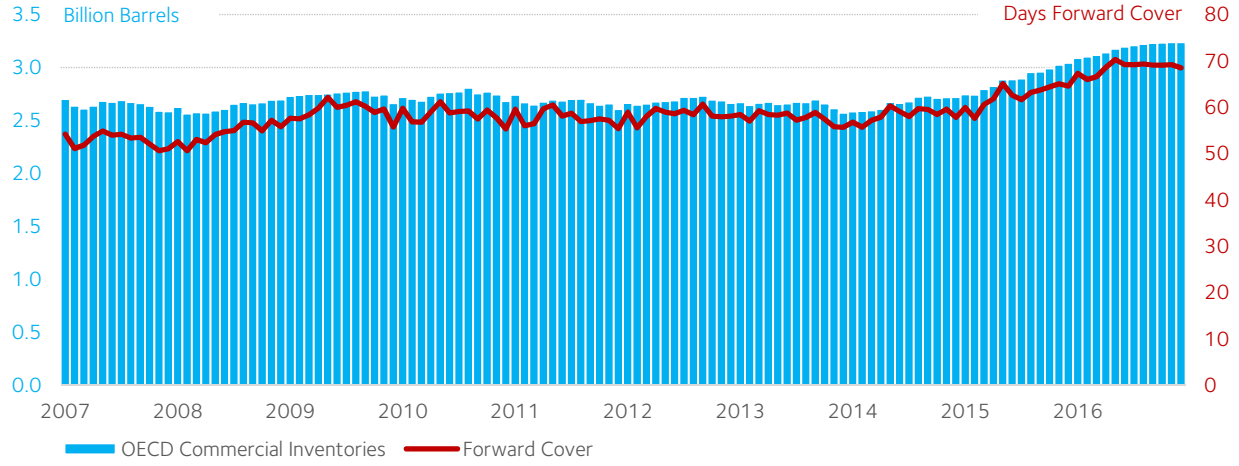
As the oil market emerges from the effects of the Saudi strategy, global oil consumers and producers will be facing a new reality. The defining characteristic of this new reality will be a paradox. On the one hand, the oil market will benefit from the presence of U.S. shale, a more flexible source of non-OPEC oil supplies in the middle of the global oil cost curve. Shale investment cycles are short compared to large, conventional resources—perhaps as short as 18 months versus roughly 40 months for post investment decisions for deepwater projects. The innovation that has occurred in the U.S. shale patch cannot be unlearned, and drillers have achieved large, structural gains in efficiency during the current price route that will ultimately benefit them as prices rise.

Yet, on the other hand, shale resources are not as flexible as OPEC spare capacity. Throughout much of the past 45 years, Saudi Arabia and other OPEC members have maintained ample levels of spare production capacity that could be brought online in a matter of weeks during times of crisis and pump additional crude supplies into the market indefinitely. Over the past several years, OPEC countries such as Venezuela, Nigeria, Iraq, Libya and Iran saw their spare capacity levels dwindle due to domestic political crises, poor investment levels, and violent conflict. Countries such as Angola, Algeria, and Ecuador were widely known to routinely exceed their production quotas and produce at maximum capacity out of dire fiscal and economic need. But Saudi Arabia and its Arab Gulf allies consistently maintained a commitment to hold spare capacity.

That commitment appears to be over for the time being. Without question, Saudi Arabia and other members of OPEC will return to a policy of limited production and even production cuts in the future as market conditions evolve to support it. Indeed, even in early 2016 several OPEC members and Russia openly discussed an "oil production freeze" at January 2016 levels, a policy that would have resulted in a de facto cut of nearly 600,000 barrels per day by Saudi Arabia during the summer months as domestic demand surged due to summer power demand.[38] Nonetheless, such temporary reductions aside, Saudi Arabia and other Gulf Cooperation Council (GCC) members have apparently abandoned their role as the world's swing suppliers for the time being, having drawn spare capacity levels down sharply from 3.1 mbd in November 2014 to an average of 2.2 mbd during the second half of 2015

[36] SAFE analysis based on data from IEA, *2016 Medium-Term Oil Market Report* and *2015 Oil Market Report Statistical Annex*.
[37] Tenzin Pema, "Global E&P spending may drop 15 percent in 2016, says Barclays," Reuters, January 13, 2016.
[38] SAFE analysis based on data from Joint Oil Data Initiative.

FIGURE 18 · OECD INVENTORIES AND DAYS FORWARD COVER



Source: SAFE analysis based on data from EIA

(Figure 17).[39] These figures reflect official balances. Numerous market observers have suggested that current spare capacity is likely no more than 1.0 mbd.[40]

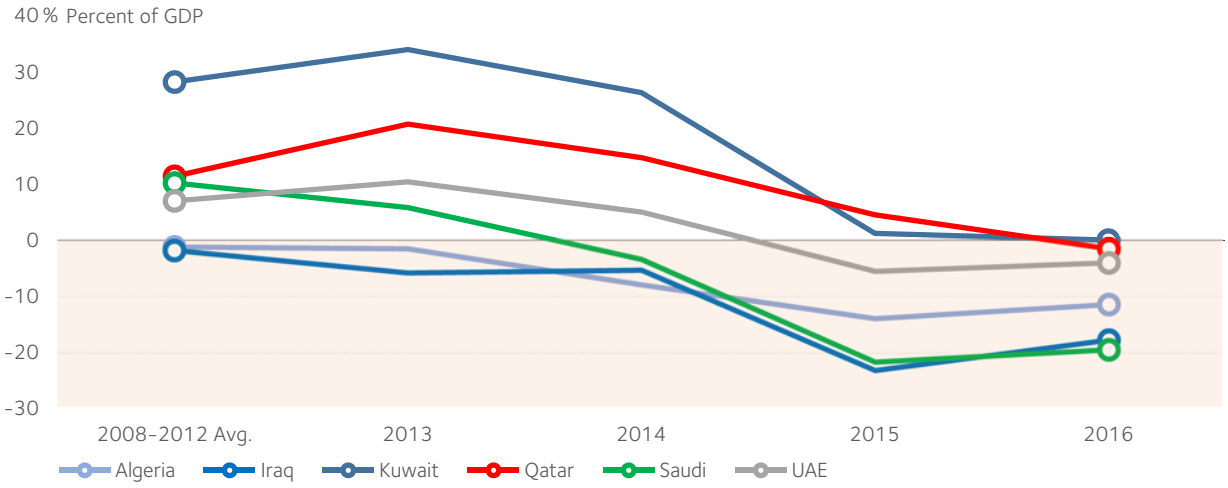
Going forward, the market may increasingly rely on inventories to balance supply and demand during emergencies and other shortfalls. In one sense, this is advantageous. Inventories are stored above the ground, and the majority are held in industrialized countries. The excess oil that has been pumped into markets over the past two years has made its way to storage tanks throughout the United States, Europe, and Japan. In fact, OECD commercial inventories currently stand at 3.2 billion barrels, nearly 600 million barrels in excess of their 2000-2013 average and enough, in theory, to meet total OECD oil demand of approximately 46 mbd for 70 days (Figure 18).[41] Inventories in government-owned strategic stocks in the United States, Europe, and China bring total world oil stocks to more than 4 billion barrels.

Yet, there are important downsides to this approach as a means for balancing markets during crises. Most importantly, stocks are finite and the market is acutely aware of this. A crisis on the order of the Libyan Civil War, which removed 1.5 mbd from the market in 2011, would eliminate the OECD commercial crude oil surplus in approximately one year unless other global stocks were also drawn down. A crisis that removed Iraq's or Saudi Arabia's oil production from the market would eliminate the OECD surplus in five or two months respectively. Perhaps more tangibly, the net inventory withdrawals envisioned by IEA between 2018 and 2021—which are simply the result of market dynamics—will alone eliminate 75 percent of the increase in global inventories witnessed between 2014 and 2017.[42]

The economic and security risks of this new oil market paradigm are potentially significant. At some point within the next two years, the market is likely to shift from a period of near-record surplus to one of near-record deficit. Yet unlike previous such periods, there may be very little if any OPEC spare capacity that can be tapped in the event of an emergency. Already, the odds of such an emergency are growing increasingly sizeable. From Venezuela and Russia to the Middle East, North Africa and Central Asia, major oil exporters across the globe are confronting sharply reduced oil export revenues, soaring public debt, stalled economic growth, and rising unemployment.

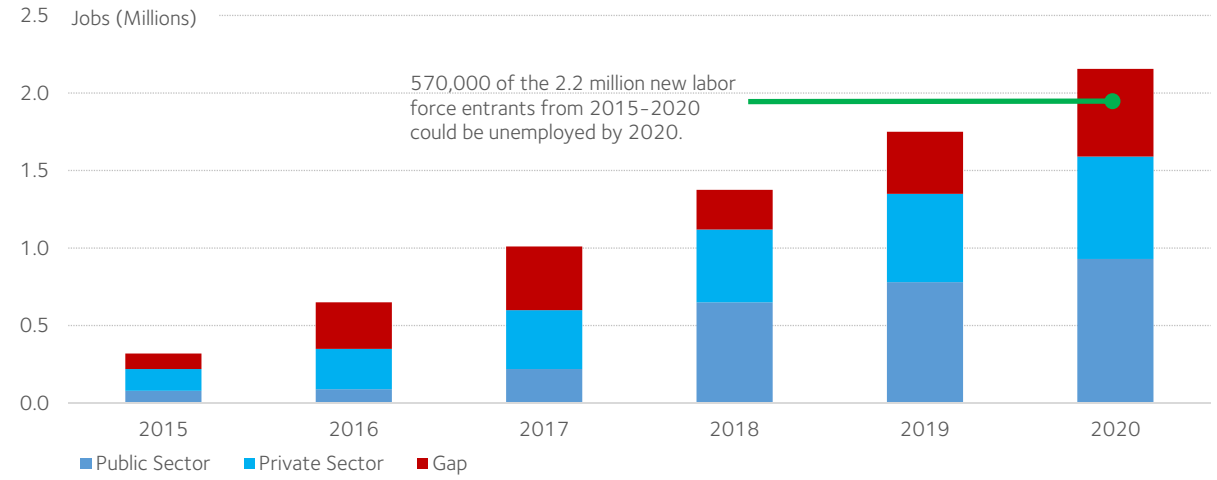
[39] SAFE analysis based on data from IEA, *Oil Market Report*, February 2016.
[40] See, e.g., Morgan Stanley, Crude Oil Global Supply Tracker, March 23, 2016.
[41] SAFE analysis based on data from EIA, *Short-Term Energy Outlook*, March 2016.
[42] SAFE analysis based on data from IEA, *2016 Medium-Term Oil Market Report*.

FIGURE 19 · FISCAL BALANCES OF SELECT GCC COUNTRIES



Source: SAFE analysis based on data from IMF

FIGURE 20 · EMPLOYMENT OUTLOOK IN THE GCC



Source: SAFE analysis based on data from IMF

In the Arab Gulf states alone, the IMF estimates that more than 570,000 new labor force entrants between 2005 and 2020 will be unable to find employment as public sector hiring stalls amid soaring fiscal deficits (Figures 19 and 20).[43] As the Islamic State and other militant groups continue to recruit, grow and metastasize in the heart of the world's key oil-producing region, such figures should raise alarm.

Conclusion

In the near term, confronting these challenges amid the rise of the new oil market paradigm will require careful policy consideration to manage risk. But over the longer term, as the conditions of the global oil market evolve in new and unpredictable ways, the lessons of the past five years should be clear: U.S. dependence on oil as basically the sole transportation fuel is the core problem. As long as America remains singularly dependent on the current oil market as it is structured to provide the fuel that powers mobility throughout its entire economy, the country will be at substantial risk. In the best case, this risk amounts to the steady extraction of wealth and economic rents through anti-competitive

[43] IMF, *Regional Economic Outlook, Middle East and Central Asia,* October 2015.

practices. At worst, it amounts to a likely social and economic crisis for which the country remains poorly prepared today—more than four decades after OPEC first struck at the American way of life.

For more details about OPEC's strategy and solutions to reduce U.S. oil dependence and strengthen energy security please read the Energy Security Leadership Council's *National Strategy for Energy Security: The Innovation Revolution* released on May 19, 2016.

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