



**Written Testimony of Robert McNally
President, Rapidan Energy Group
Before the Committee on Energy and Natural Resources
United States Senate
July 24, 2018**

“Factors that are impacting global oil prices”

Chairman Murkowski, Ranking Member Cantwell, and members of the Committee:

It is a pleasure to share perspectives on factors impacting global oil prices. I approach this subject with twenty-seven years of professional experience as an oil market, energy policy, and geopolitical analyst and policy official. I currently run Rapidan Energy Group, an energy market, policy, and geopolitical consulting firm. I also served as Special Assistant to the President for Economic Policy on the White House National Economic Council from January 2001 to June 2003 and Senior Director for International Energy on the National Security Council from January 2003 to June 2003. I am a non-resident fellow at Columbia University’s Center on Global Energy Policy and am delighted to join its Director Jason Bordoff on the panel today.

I would like to recognize and thank my colleagues at Rapidan Energy Group, whose continuous, deft analysis of the global oil market, energy policy and regulations, and geopolitical trends and events have fortified my views presented in this testimony. That said, views represented here and in the question and answer session are mine only and do not reflect those of Rapidan Energy Group or its clients.

May I first thank you and your colleagues on the Senate Energy and Commerce Committee for holding this important hearing and inviting me to testify. While petroleum is used in many different applications, from aspirin to Ziploc bags, oil’s biggest and most important use is for transportation. Oil fuels nearly every car, school bus, military aircraft, tractor, airplane and truck on the planet. Electricity, alcohol, hydrogen, or some other competitor may one day vanquish oil. Meanwhile, we must continue to manage its environmental and security externalities. But for the foreseeable future, oil will remain nothing less than the lifeblood of modern civilization; its price, abundance, and stability are therefore of paramount concern to the American people, Congress, and this Committee.

Recent market and price developments

Over the past year, the global oil market transitioned from a glut to a more “normal” state regarding observed commercial inventories in the OECD. Excessive inventories accumulated after 2014 as producers ramped up production and US shale oil proved resilient to lower prices. The daily price of WTI crude oil fell from a high of \$108 per barrel in the summer of 2014 to a low of \$26 in February of 2016. Since the beginning of the modern oil market in 1859, crude oil price busts have terrified the oil industry and often induce producers to restrain production collectively. The price plunge to \$26 was no different: Over the course of 2016, Saudi Arabia and Russia assembled a new coalition of producers with the aim of eliminating oversupply to prevent oil prices from falling to ruinously low levels. Their efforts were uneven but partially successful due to robust demand for oil and a spate of unfortunate

events in the second half of last year that disrupted crude and refined product supply including the Harvey superstorm, Keystone and North Sea pipeline outages, and geopolitical disruptions in northern Iraq. These factors have mostly removed the inventory glut, enabling prices to recover to around \$68 currently. Crude oil prices are near three-year highs. A price chart for WTI is shown below.

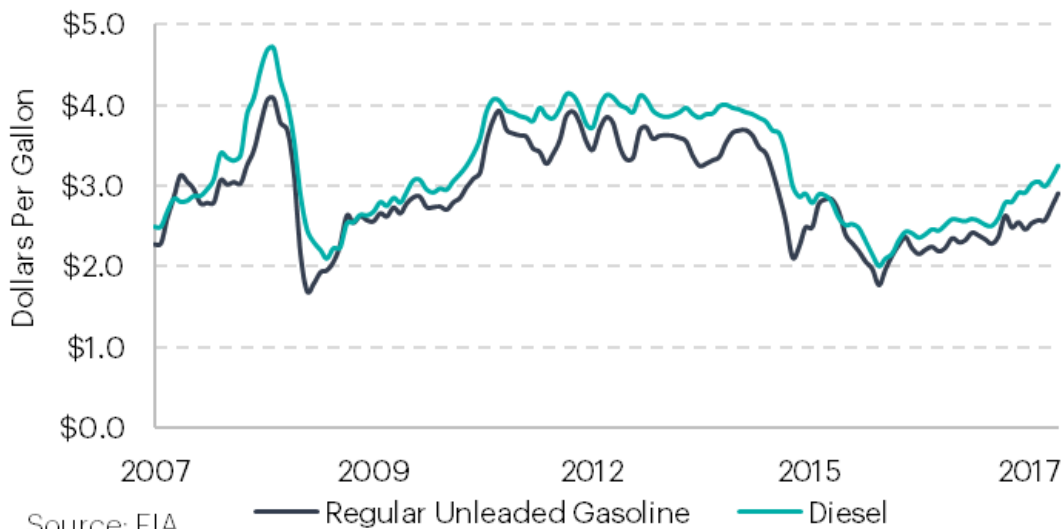
WTI Crude Oil Prices



Source: EIA

Of course, most consumers and businesses do not see “crude oil” prices but instead refined product such as road diesel or heating oil. Global crude oil prices, however, are the primary determinant of refined product prices. In the United States, refined product prices usually follow crude oil prices with a roughly three-week lag. The chart below shows weekly pump prices for the main petroleum products consumed in our country - regular gasoline and distillate. Like crude oil, gasoline and diesel pump prices are near three-year highs.

Retail Gasoline and Diesel Pump Prices



Source: EIA

— Regular Unleaded Gasoline — Diesel

The oil market is in a new era marked by boom and busts price swings

Before delving into the detail about recent and prospective oil prices, let me step back and note that crude oil prices have exhibited unusually wide swings over the last 15 years. In modern times, crude oil prices don't nearly quintuple over several years absent a war in the Middle East. And they don't normally plunge by 60% in six months without a recession or sudden supply surge as they did in 2014. Oil's unusually wide swings, illustrated in the first chart above, reflect the transition from a nine-decade era of supply management to one in which there is no effective supply manager.¹

Oil prices are unusually prone to volatility because both supply and demand are insensitive or "sticky" in responding to price changes in the short term, while storage is limited and costly.² Oil's notorious price volatility has troubled not only the oil industry but broader economic and government actors, given oil's vital importance for economic growth and security. To vanquish oil's wild swings and stabilize oil prices, governments and producers have resorted to regulating crude oil production with the goal of preventing big surpluses (inventory builds) or deficits and their associated, destabilizing price busts and booms, respectively.

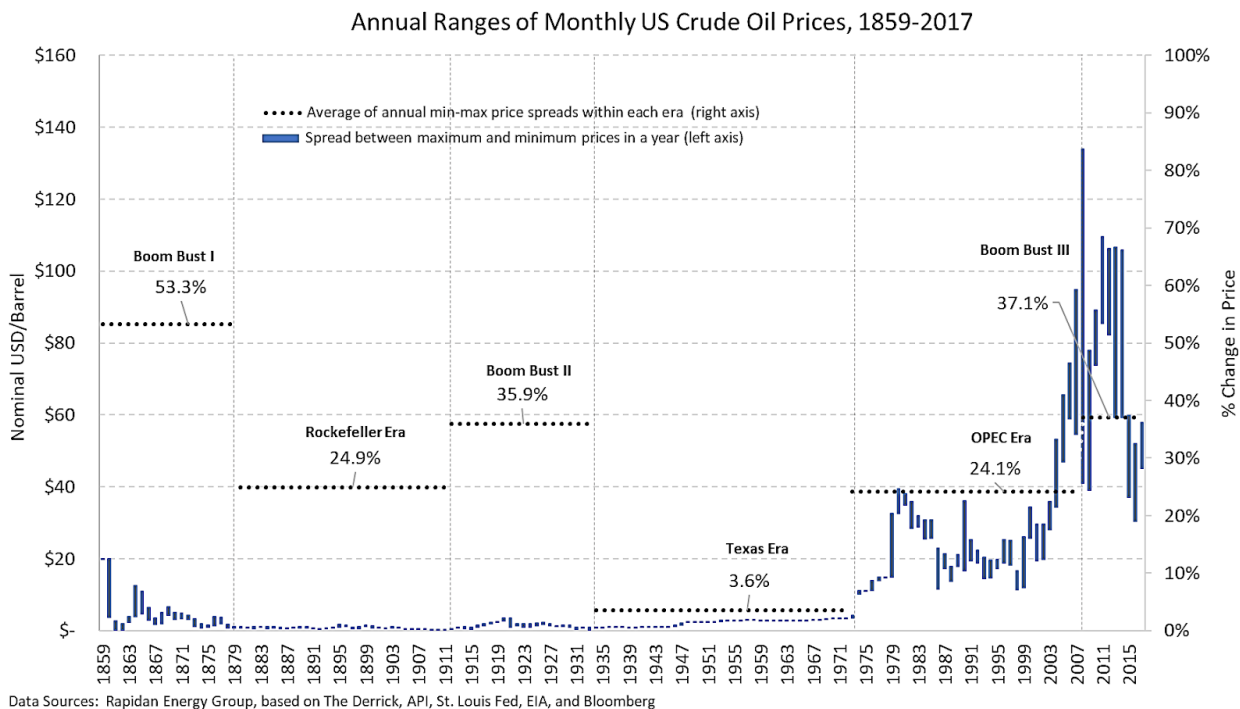
Unpopular boom and bust oil prices during the two decades following the breakup of Standard Oil in 1911 deeply rattled the country and by the early 1930s convinced the US to become the world's first and most successful supply manager or "swing producer." Texas regulators, along with other oil states, the federal government, and major international oil companies, exerted strong control of production over four decades. The Texas Railroad Commission imposed quotas well-by-well, field-by-field, for forty years. OPEC took over from the US in the early 1970s (though not as successful as the volatility chart below illustrates) but has been ineffective since 2008. The crude price bust in 2016 spawned a new group comprised of some OPEC producers (led by Saudi Arabia) and non-OPEC producers (led by Russia) has attempted to play the role of swing producer, but its impact is limited and future success of uncertain.³

The chart below shows how crude oil price volatility has varied through history depending on whether an effective swing producer or supply manager was controlling the market.

¹ McNally, Robert. *Crude Volatility: The History and the Future of Boom and Bust Oil Prices*. (Columbia University Press, 2017).

² Ibid. Chapter Four.

³ For an astute and balanced appraisal of the Vienna Group, see Jason Bordoff's Foreign Policy column "This Isn't Your Father's OPEC Anymore." June 26, 2016. <https://foreignpolicy.com/2018/06/26/this-isnt-your-fathers-opec-anymore/>



Shale oil is neither swing production nor spare capacity and will not keep oil prices stable

When in late 2014 Saudi Arabia and other OPEC producers refused to cut production under soaring US, Canadian, and Brazilian supply, many hoped that US shale oil producers would replace OPEC as the swing producer, keeping oil price stable. These hopes were disappointed, however, and for a good reason: US shale oil producers are in no way a replacement for swing producers, and shale oil does not constitute “spare production capacity” that the market has traditionally relied upon to stabilize oil prices.

Shale oil production is *more* responsive to price signals than conventional production, with lead times for new supply measured in months or quarters instead of years. But shale does not respond fast and large enough to prevent global inventory imbalances and large price swings. To ensure long-term price stability, swing producers must be able, willing, and legally authorized to change oil supply in large amounts, within weeks, and for long periods of time. In some respects, swing producers are akin to central banks that control the supply of base money. The Texas Railroad Commission, Seven Sisters cartel, and OPEC (mainly Saudi Arabia) all constituted genuine swing producers. Shale oil is produced by many dozens of highly idiosyncratic public and private companies, each competing with each other to maximize reserves and production. Shale producers are extremely diverse regarding resources and capital structure, they pursue growth targets instead of price stability, and they abide by punitive anti-trust laws that prevent them from even appearing to cooperate in stabilizing prices.

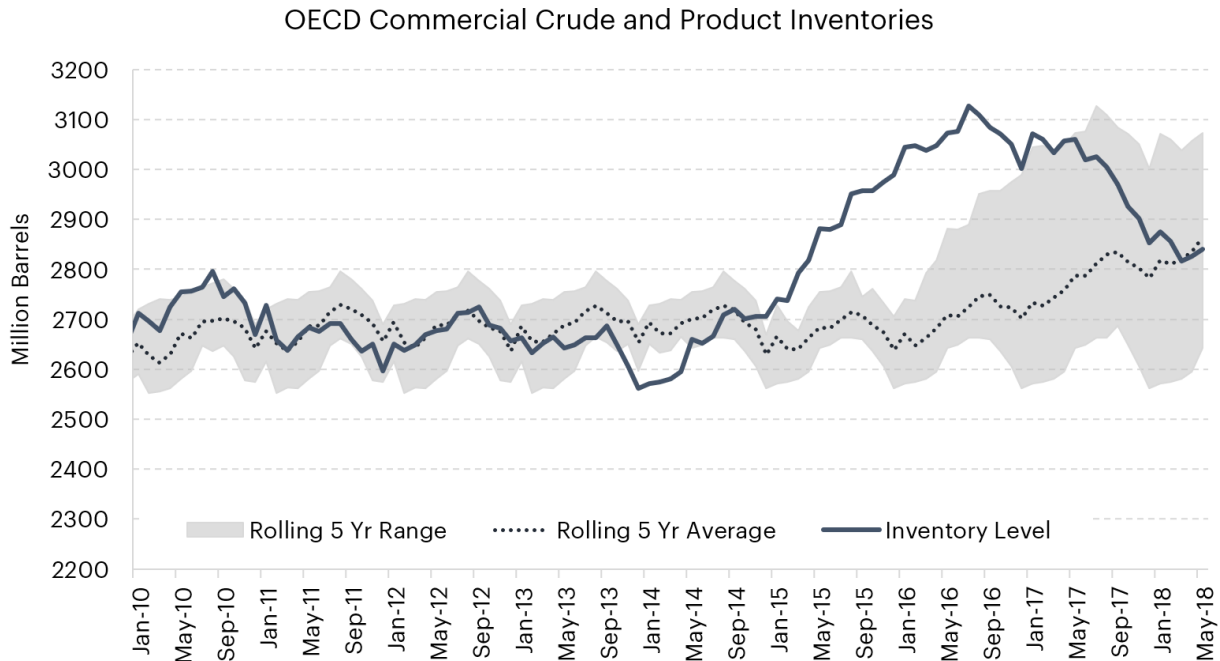
Shale oil production has also proven much more resilient to price declines than many expected in 2014, primarily due to a combination of widespread capital availability and efficiency gains, with the latter driven by innovation and service cost reductions.

A more plausible replacement for OPEC than shale is the new entity founded by Saudi Arabia and Russia, comprising some 25 OPEC and Non-OPEC producers, which I call the Vienna Group, but is also known by “OPEC-plus” or “ROPEC.” This group agreed to restrain production starting in early 2017 and as noted above contributed to the normalization of inventories and recovery of crude oil prices.

The jury remains out as to whether this new Saudi-Russian led entity will prove to be a successful long-term supply manager or instead join the list of ad hoc, temporary cartels formed after price busts but that dissolved afterward. Saudi Arabia and Russia’s recent decision to maximize production despite opposition from Iran and other members of the Vienna Group will put the entity’s cohesion to the test.

Commercial inventories may have normalized, but the risk of big crude price moves remains high

Turning to the recent past, and as noted above, the oil market has shifted from oversupply to “normal” characterized by commercial inventories near their five-year range (though that range itself has risen in recent years as the average captured the glutted levels post-2014).



Source: IEA, Rapidan Energy Group

This return to normal inventories is due to several factors:

- 1) Robust demand. Oil demand has generally surprised to the upside. For example, oil demand grew by nearly 1.6 mb/d last year, some 23% higher than initially projected by the International Energy Agency.
- 2) Unexpected production outages due to geopolitical disruptions in Venezuela, Iraq, and Libya.
- 3) Large storms Harvey and Nate along with major pipeline outages in the US and the North Sea in the second half of last year.
- 4) Production restraint by Saudi Arabia, Russia, and other OPEC and Non-OPEC producers starting in early 2017.

But the “normal” to which the oil market has returned is precarious and may well be fleeting. Extraordinary shifts and risks arising from supply and demand, geopolitical trends and events, and policy are likely to extend this 15-year old era of boom and bust price cycles, especially if an effective swing producer remains absent.

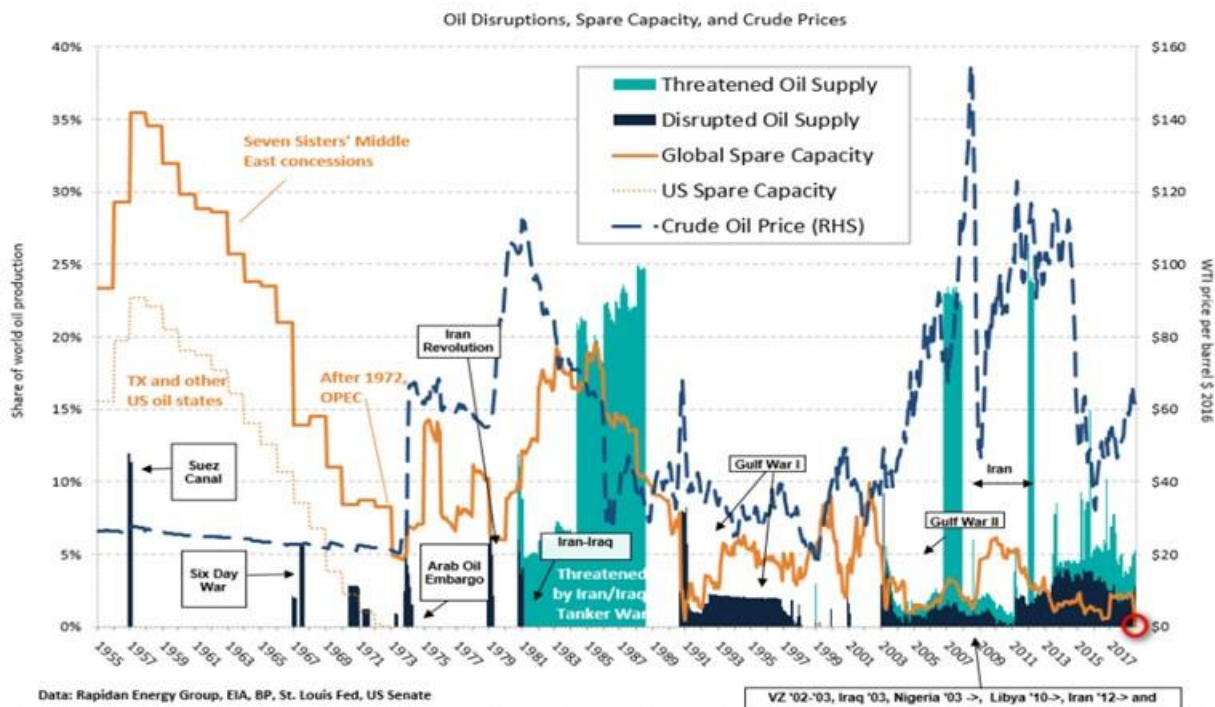
Looking forward, the outlook for crude oil prices resembles a “tug of war” between supply and demand factors that point to lower oil prices and geopolitical disruption risks that point to higher ones. My colleagues and I at Rapidan Energy Group expect geopolitical risk will keep a floor under crude prices near term but that by next year the weight of expected new supplies should exert downward pressure on prices. However, we see pronounced risks that oil prices could rise or fall much more than currently expected. A recession could lead to much lower prices while geopolitical risks and disruptions, with Iran, Libya, and Venezuela near the top of the list, could send crude oil prices back into the triple digits and prices well above \$3 per gallon. I am happy to discuss the details of my firm’s oil price forecast in the question and answer session or afterward.

Low spare production capacity and high geopolitical disruption risks

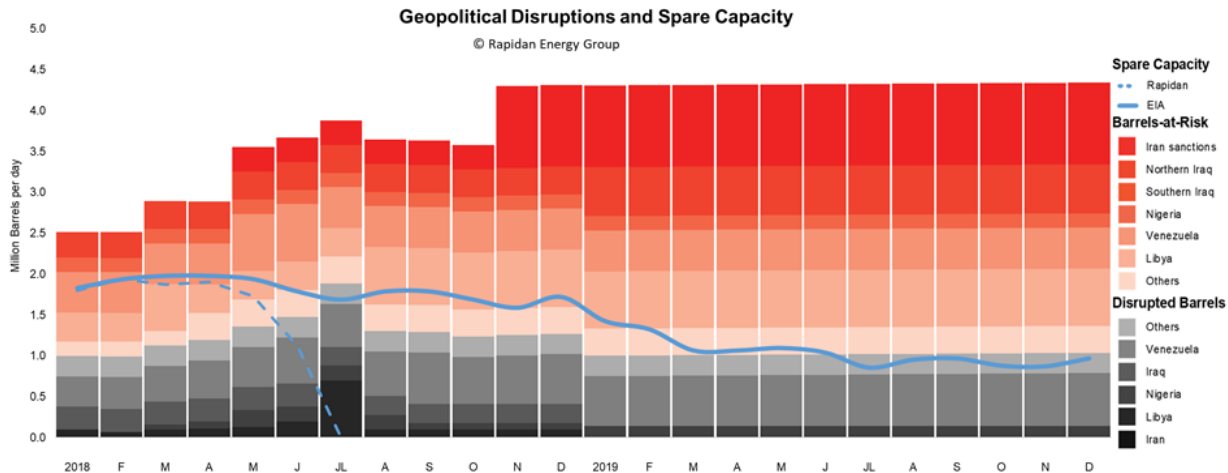
With inventories back to normal and geopolitical disruption risks proliferating, a critical question becomes the amount of quickly producible oil the world can call on in the case of an outage – commonly called “spare capacity.” Oil supply is vulnerable to disruptions from geopolitical conflict, storms, and accidents. The rigidity of oil demand short term means a supply outage can trigger large price spikes. Having a sufficient “spare capacity” buffer is critical for crude oil price stability in general and especially for preventing unexpected outages anywhere from triggering economically harmful price spikes everywhere, including here. Former EIA Administrator Adam Sieminski recently noted academic research finding spare production capacity reduces oil price volatility and generates between \$170 and \$200 billion of annual economic benefits.⁴

Genuine power in the oil market comes less from how much a country produces and instead whether it can stabilize prices and offset major disruptions. Spare capacity is one measure of that power. The US and Seven Sisters cartel controlled spare capacity from 1932 until 1972. Since then Saudi Arabia has held the lion's share of spare capacity. But with the Kingdom's recent decision to surge production it has likely approached if not reached zero. Whether zero or extremely low, spare capacity is very tight.

⁴ See <https://www.kapsarc.org/news/the-200-billion-annual-value-of-opecs-spare-capacity-to-the-global-economy/> and <http://www.iaee.org/energyjournal/article/3057>



Tight spare production capacity poses a risk of oil prices spikes given a large number of disruptions and threatened disruptions in the oil market today. The chart below shows our forecast of oil supply likely to be disrupted or threatened alongside both our and EIA's forecast of OPEC spare production capacity.



Venezuela's production has fallen over 0.7 mb/d in the last year and is expected to continue to implode slowly. The fast exodus of PDVSA workers (Venezuela's national oil company), the lack of sufficient chemicals for blending and upgrading Venezuela's heavy crude oil, and PDVSA's severe cash constraints will continue to drive production lower. Prospects for a recovery in oil production are bleak - even if President Maduro were to leave office tomorrow, Venezuela would struggle to boost production back to levels seen 12 months ago.

By contrast, Libya has seen sharp, but so far temporary disruptions as armed factions (both local and national) seek to gain leverage ahead of expected elections later this year, keeping production in a 0.8-1.0 mb/d range. In western Libya, the lack of a unified security force exposes oil facilities to attacks by militias seeking to extract payoffs, contracts, and other resources from the national oil company and the

government in Tripoli. In the east, oil production that was relatively stable under the control of the Libyan National Army (a coalition of eastern militias fighting under the command of General Khalifa Haftar) is likely to be increasingly rattled as Libya's most significant actors jostle for power.

The oil market is currently grappling with a new disruption risk in the form of the loss of a large amount if not all of Iran's 2.5 mb/d of exports. Uncertainty about how sanctions might impact Iran's oil exports arises from several factors:

- Market uncertainty about the number of exemptions that the Trump administration will grant to Iran's current importers after November 4.
- Whether Chinese, Indian, and other state-owned oil companies may increase imports to offset losses from other customers wary of violating US sanctions.
- Whether Iran will choose to escalate tensions by resuming enrichment or threatening safe passage of the roughly 19 mb/d that passes through the Strait of Hormuz, the world's most important choke point.

Looming regulations on marine fuel sulfur limits to roil the oil market next year

Oil is bound up with many policy debates and discussions, from climate change to ethanol and fuel economy standards. But one important policy issue preoccupying the oil industry and likely to impact oil prices has so far gone remarkably unnoticed in Washington: A mandatory reduction in sulfur limit emissions for ocean-going ships starting on January 1, 2020, commonly referred to as "IMO 2020". IMO 2020 is expected to reverberate onshore and impact consumer oil prices, especially for trucking and airline companies, and home heating oil consumers. The International Energy Agency referred to IMO 2020 as "easily the most dramatic change in fuel specifications in any oil product market on such a large scale."⁵

By way of brief background, in October 2016 the United States along with other nations participating in the UN International Maritime Organization (IMO) confirmed an earlier, tentative decision to implement a reduction in the sulfur content of the fuel used in ships on the high seas ("marine bunkers") from 3.5% to 0.5% sulfur as of January 1, 2020. Ship owners have two main compliance options to meet the looming regulations.

First, ships could continue to burn high sulfur fuel but install exhaust gas cleaning systems commonly called "scrubbers" to remove sulfur from the ship's emissions. Only a small fraction of ships have installed scrubbers however and insufficient time remains to install many more before the deadline. Therefore, most will opt for a second option, to switch from high sulfur, heavy fuel oil to lower sulfur heavy fuel oil or middle distillates ("distillate" also referred to as "gasoil" or "diesel").

A major question hovering over the market is whether a big new demand wave for low-sulfur distillate from shippers would overwhelm the refining industry's ability to supply it while meeting demand needs by other users such as motorists, airlines, and home heating oil consumers. While IMO had considered a 2025 implementation date, the decision taken in 2016 to start in 2020 was backstopped by a report

⁵ <https://www.ft.com/content/d0ae63c4-452f-11e7-8519-9f94ee97d996>

commissioned by IMO that found “the refinery sector has the capability to supply sufficient quantities of marine fuels with a sulfur content of 0.5% or less...while also meeting demand for non-marine fuels.”⁶ But as the IMO 2020 deadline fast approaches, leading official forecasters and private sector experts expect implementation will trigger a large spike in the price of crude oil and refined products, particularly for “middle distillate” fuels. In a recent report, IEA concluded the *global* refinery system would not be able to produce a sufficient amount of low sulfur fuels in 2020 and at least for a few years afterward. As a result, shippers facing a new IMO mandate will bid low sulfur distillate away from other users mentioned above. IEA expects the scramble for clean distillate triggering a 20-30% spike in the price of heating oil and diesel fuel. IEA noted this “sharp increase in the price of [distillate] following the 2020 IMO changes penalizes demand in other sectors.”⁷

Moreover, IEA warned that IMO 2020 could push up global crude oil prices and therefore pump prices.

A worrying number of refiners, including large integrated oil companies, have publicly stated that one of their options to meet the new sulfur specification would be to use lighter and sweeter crude oil that requires less intensive hydrotreatment. As the two important futures benchmarks, Brent and WTI, are based on light sweet crude oil output, the increased demand for this type of crude oil may fuel a sharp increase in futures prices, with consequences felt across all product markets.⁸

Benefits and winners from lower sulfur limits in marine fuels

There will be clear environmental and human health benefits from reducing sulfur emissions from oceangoing ships. And domestic, deep conversion refiners will benefit from their competitive advantage regarding the production of lower sulfur fuels. If as IEA suggested above IMO 2020 also boosts lighter crude oil prices, our domestic producers will benefit. Longer term, low-sulfur regulations could also enable LNG to see wider use as a bunker fuel.

If policy-driven peak demand disappoints, oil prices will rise sharply

Lastly, a crucial factor driving longer-term drive oil prices is the outlook for oil demand growth in transportation. Transportation accounts for 56 percent of global oil demand, though petrochemicals is an important growth sector for oil use.⁹ Oil market participants and analysts have been preoccupied with the future rapid displacement of oil in transportation due to policies aimed at increasing efficiency or non-petroleum transportation fuels, primarily electric vehicles (EVs). An interesting aspect to this debate - referred to as “peak demand,” “energy transition,” or “decarbonization” of transportation - is the role that autonomous vehicles (AVs) may play in future oil demand.

⁶ *Assessment of Fuel Oil Availability, Final Report*. CE Delft, Stratas Advisors, UMAS, NMRI, Petromarket Research Group, Shinichi Hanayama. July, 2016. https://www.cedelft.eu/publicatie/assessment_of_fuel_oil_availability/1858. A rival study commissioned by shipping and oil industry groups in 2016 and updated this year concluded implementation of IMO regulations in 2020 would lead to 10 to 20 percent spikes in oil prices. <http://www.motorship.com/news101/fuels-and-oils/major-risks-remain-as-sulphur-cap-nears.-study-finds>

⁷ *Oil 2018: Analysis and Forecasts to 2023*. International Energy Agency. March, 2018. Pp. 17, 19. The report’s executive summary stated:

One of the biggest and most pressing issues is the implementation of major changes to marine fuel specifications mandated by the International Maritime Organisation (IMO). The new rules loom ever closer and the maritime and refining industries face a huge challenge to implement them. From the vantage point of early 2018, it is not clear how successful they will be, especially as demand for non-marine [distillate] grades is growing steadily. The new regulations will cause a massive switch out of high sulphur fuel oil demand and into marine [distillate] or a new very low sulphur fuel oil. The total demand for oil products will not be dramatically altered, but the impact of the changes on the product mix is a major uncertainty in our forecast.

⁸ Oil 2018, p. 96

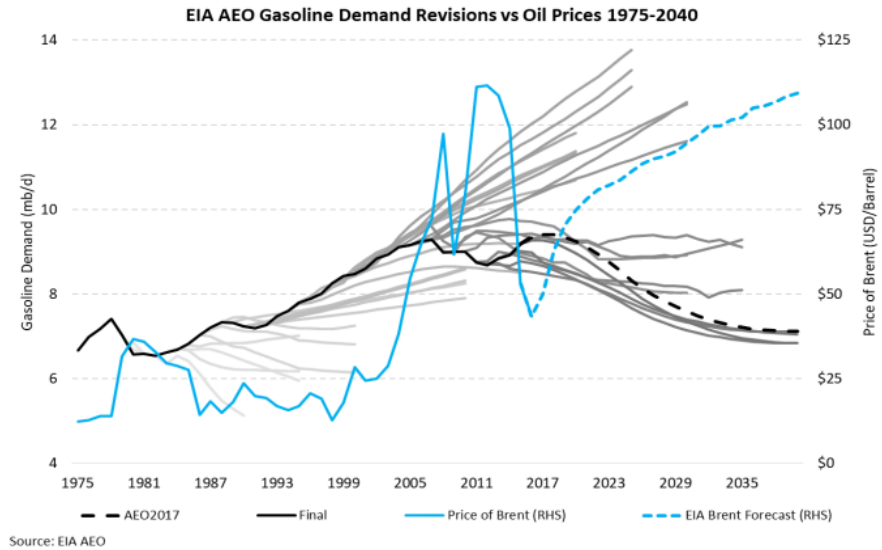
⁹ “World Energy Outlook 2016.” International Energy Agency, p. 117

Leading official forecasts, from both EIA and IEA, assume decarbonization policies will significantly curtail future oil demand growth. For example, both EIA and IEA assume that US gasoline demand will peak this year at 9.36 mb/d and decline sharply in coming years and decades¹⁰ (falling to 8.0 mb/d in 2025 and 7.2 mb/d by 2030, down by 15% and 23% respectively) by in coming years, largely due to federal fuel economy regulations and California’s Zero Emission Vehicle Mandate. Notably, the peak and decline in US motor gasoline demand EIA forecasts would be the first to occur without a recession.

There are good grounds for caution that we will see such a big, imminent “policy peak” in gasoline demand in the United States. As illustrated in the chart below, EIA had predicted peak gasoline demand in the 1980s after a big oil price run up and implementation of federal fuel economy standards. But lower oil prices, strong consumer preference for larger vehicles, and accommodative public policies (the federal government eased CAFE rules in the late 1980s and mid-1990s) ended up proving these forecasts premature, as illustrated below. My firm and I studied the US CAFE and California ZEV programs last year and concluded, for largely the same reasons, they are unlikely to drive a peak in US gasoline demand in the coming years.¹¹

RAPIDAN **EIA Has Forecasted Peak Demand Before, After Late '70s Price Spike and New CAFE Regs**
 But pump price relief and CAFE relaxation led to consistent upward demand revisions

- Mid-1980’s peak demand forecasts followed an oil price spike, recession, and implementation of first CAFE laws
- Afterward, oil price crash and eased CAFE regs caused demand to rise and forecasts to show trend growth
- The mid-2000s peak demand forecasts followed an oil price spike, recession, and tighter CAFE laws



“Peak US Gasoline Demand is a Mirage.” Rapidan Energy Group proprietary analysis, July 2017.

Whether or not U.S. gasoline demand peaks in the coming years will resonate globally. The U.S. gasoline demand market is massive – accounting for nearly one in ten barrels per day consumed on the planet - and enjoys symbolic importance among leading energy media, forecasters, and analysts. My firm also tracks decarbonization policies around the world, particularly those impacting transportation, and took a hard

¹⁰ EIA, Annual Energy Outlook 2018, Table 11.
¹¹ “Peak US Gasoline Demand is a Mirage.” Rapidan Energy Group proprietary analysis, July 2017.

look at the top 20 most material of such policies - from 9 countries accounting for 57 mb/d, or 58%, of global oil demand. What we found is that when accounting for the realities of actually implementing these policies like the US CAFE program - the use of credits, different testing procedures, and other features that reduce stringency - that those policies only resulted in about 53% of the demand destruction assumed “on-paper” by the regulations.

Automated vehicles could significantly boost or reduce oil demand

Whether or not automated vehicles (AVs) will proliferate in the future lies well beyond the scope of my testimony and could occupy a hearing by itself. National Renewable Energy Laboratory (NREL) researchers noted AVs have a “wide range of possible energy impacts.”¹² Energy impacts of widespread AV adoption are highly uncertain, with estimates ranging from a 60 percent decline to a 200 percent increase.¹³ Factors that could increase energy demand include ease of travel, lower perceived and actual cost per mile, and underserved populations obtaining travel services.

But whether mass adoption of AVs would increase or decrease oil demand depends largely on which fuels – oil or electricity - AVs will use. Many assume that AVs will be EVs. If so, oil demand growth would sharply slow. But if widespread AV adoption occurs before EVs proliferate, then oil demand could increase significantly. For example, a 2016 NREL¹⁴ found that widespread AV adoption could *triple* US gasoline consumption from current levels of 9.3 mb/d (2017 average) assuming a fully autonomous fleet, petroleum-fueled vehicles, \$3 gasoline and current fleet wide efficiency. Another NREL¹⁵ study in 2016 similarly found that mass adoption of conventionally powered AVs could have the “unintended consequence” of doubling fuel demand.

If future global oil demand turns out to be stronger than many governments and companies currently expect, oil prices would be higher than currently anticipated. Strong demand would collide into insufficient investment in oil production.

While a recession could send oil prices lower, I expect the next boom phase in oil prices will arise due to faster-than-expected demand, both because policies will turn out weaker than expected and because the recent bust has encouraged demand while hampered investment in new oil fields and production facilities. Again, oil’s demand rigidity means price increases will be significant. And with spare production capacity wafer thin, geopolitical disruption risks will result in further oil price spikes.

Conclusion

In 2012 I had the honor of testifying to your colleagues on the House Small Business Committee and noted crude oil and therefore pump prices had entered a new “Space Mountain” era of boom and bust price cycles. I maintain that view. If a new swing producer does not emerge, we should all buckle up for continued, roller-coaster ride on Space Mountain.¹⁶

¹² <https://www.nrel.gov/docs/fy13osti/59210.pdf>

¹³ https://www.eia.gov/conference/2018/pdf/presentations/nicholas_chase.pdf Slide 10.

¹⁴ <https://www.nrel.gov/docs/fy17osti/67216.pdf>

¹⁵ https://link.springer.com/chapter/10.1007%2F978-3-319-05990-7_13

¹⁶ “Space Mountain” Pump Prices. Testimony by Robert McNally to the House Committee on Small Business. May 9, 2012. https://smallbusiness.house.gov/uploadedfiles/mcnally_testimony.pdf