CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES

ENERGY AND NATIONAL SECURITY

April 2017

U.S. Oil in the Global Economy: Markets, Policy, and Politics

Sarah Ladislaw, Adam Sieminski, Frank Verrastro, and Andrew Stanley

This note provides highlights from a one-day CSIS workshop held March 22, 2017, with government, industry, financial, and policy experts exploring the role of U.S. tight oil production in the global energy landscape. The workshop addressed a limited set of key issues concerning the role of U.S. oil in the global markets, and is being followed by two related CSIS workshops dealing with societal and environmental risks in U.S. onshore development, and the global natural gas markets.

Background: The rapid rise in unconventional oil output in the early part of this decade returned the United States to a prominent position as a major oil supplier. Over the course of the past 10 years, U.S. liquid production has risen by over 150 percent as net import dependence has fallen by over 60 percent. The United States is now the world's largest exporter of refined petroleum products and in 2016/2017 became a net exporter of natural gas. The resource endowment coupled with the success of quick cycle development of light tight oil (LTO) continues to affect global oil markets.

Current Trends and Issues in the Global Oil Markets

To help set the scene for U.S. onshore production, three questions were addressed:

- What is the state of play in global oil markets?
- What is the status of U.S. onshore production?
- What role does U.S. onshore production play in the market?

After two years of a low-price environment, a potentially bumpy market rebalance is underway.

The average forecast among Organization of Petroleum Exporting Countries (OPEC), Energy Information Administration (EIA), and International Energy Agency (IEA) data puts world GDP (PPP) growth at 3.4 percent in 2017 and 3.7 percent in 2018. With this, growth in oil demand is forecast to be somewhere between 1.3 and 1.5 million barrels per day (mb/d) in 2017. At the same time, the three organizations estimate a range of 0.4–1.0 mb/d in global supply growth. The EIA, at the high end of

the range at 1.0 mb/d in 2017, shows supply and demand rebalancing in Q3 of 2017. Even with global oil supply stocks at a level significantly higher than historical averages, the stronger oil market fundamentals imply higher price forecasts. For example, the EIA forecasts that the price of West Texas Intermediate (WTI) will average $54 in 2017 and $56 in 2018. A variety of factors, some outlined below, could influence the pace of the rebalance throughout the course of this year into next.

Figure 1. World GDP, Oil Demand, and Non-OPEC Oil Supply Forecasts for 2017 and 2018

Change 2017 from 2016

	World GDP (%)	World Oil Demand (mb/d)	Non-OPEC Supply (mb/d)
IEA	3.4	1.3	0.4
EIA	3.4	1.5	1.0
OPEC	3.3	1.3	0.6
Avg	**3.4**	**1.4**	**0.7**

Change 2018 from 2017

World GDP (%)	World Oil Demand (mb/d)	Non-OPEC Supply (mb/d)
3.6	1.3	1.3
3.8	1.6	1.3
na	na	na
3.7	**1.5**	**1.3**

Source: IEA, EIA, OPEC April 2017 reports, and IEA Oil 2017 report.

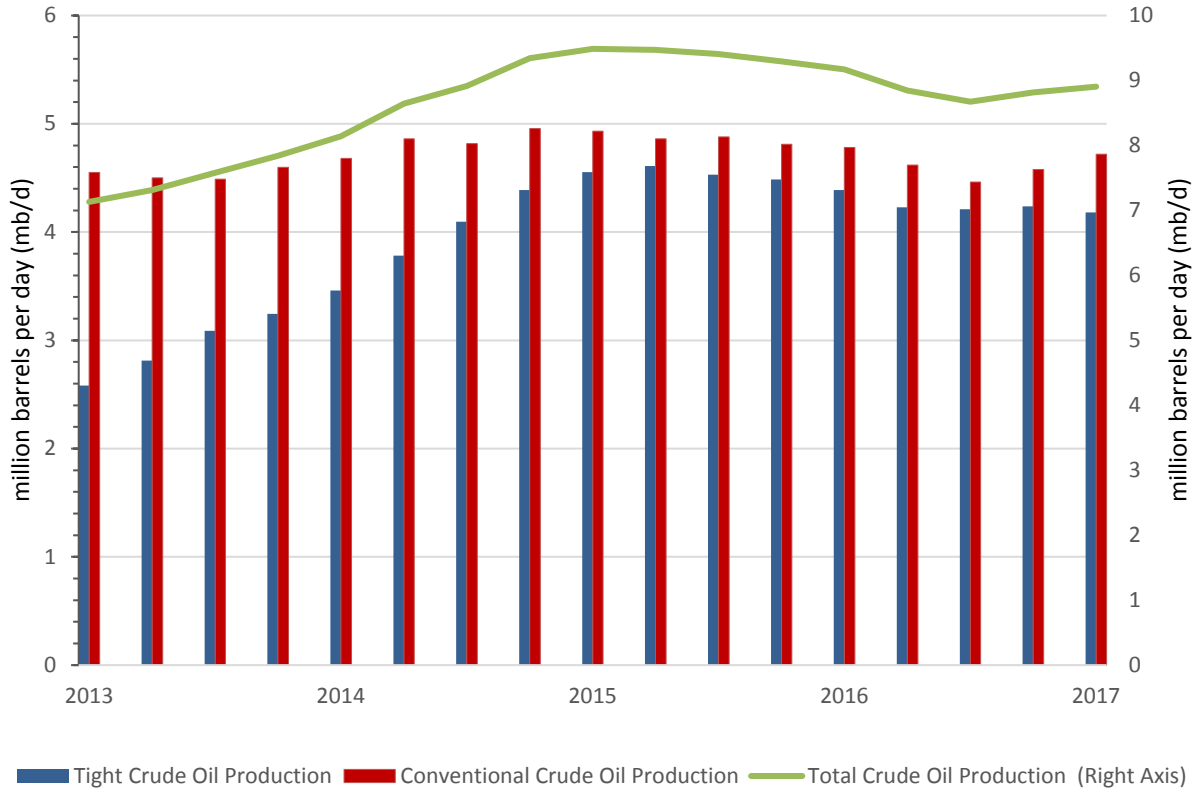
U.S. tight oil production proved even more resilient than expected during the price downturn and early signs indicate that it has been responsive to the recent upturn in prices.

U.S. tight oil production remained relatively resilient in the face of low oil prices due to a variety of factors such as leasing and drilling terms, high grading, declining cost of inputs, and productivity improvements. Moreover, even when tight oil production started to decline, U.S. overall production numbers during this period were bolstered by the onset of offshore oil projects coming online—these factors served to mute the expected decline. While the level of resiliency proved stronger than originally expected, oil production was ultimately affected by lower prices, declining by 0.284 mb/d in 2016 from 2015 output levels. With the recent upturn in prices, an average of 0.16 mb/d has been added in Q1 of 2017 from production levels in Q4 of 2016, showcasing a high level of price responsiveness.

The OPEC decision to cut production bolstered prices with the stated aim to reduce stockpiles.

The downside facing the market in the short term is that there is still a large amount of stock to work through globally—a process that OPEC producers, along with Russia and several other countries, recently sought to expedite by agreeing to cut 1.8 mb/d of production over the first six months of 2017. The key question is whether U.S. production will simply increase because of higher prices and in the process, dampen a global drawdown in stocks and slow down the global rebalance. OPEC production cuts have been successful so far in reducing levels of stocks globally and have bolstered prices; however, the market has yet to reach a balance between supply and consumption. While

Figure 2. U.S. Crude Oil Production Breakdown, 2013–2017 (Quarterly)



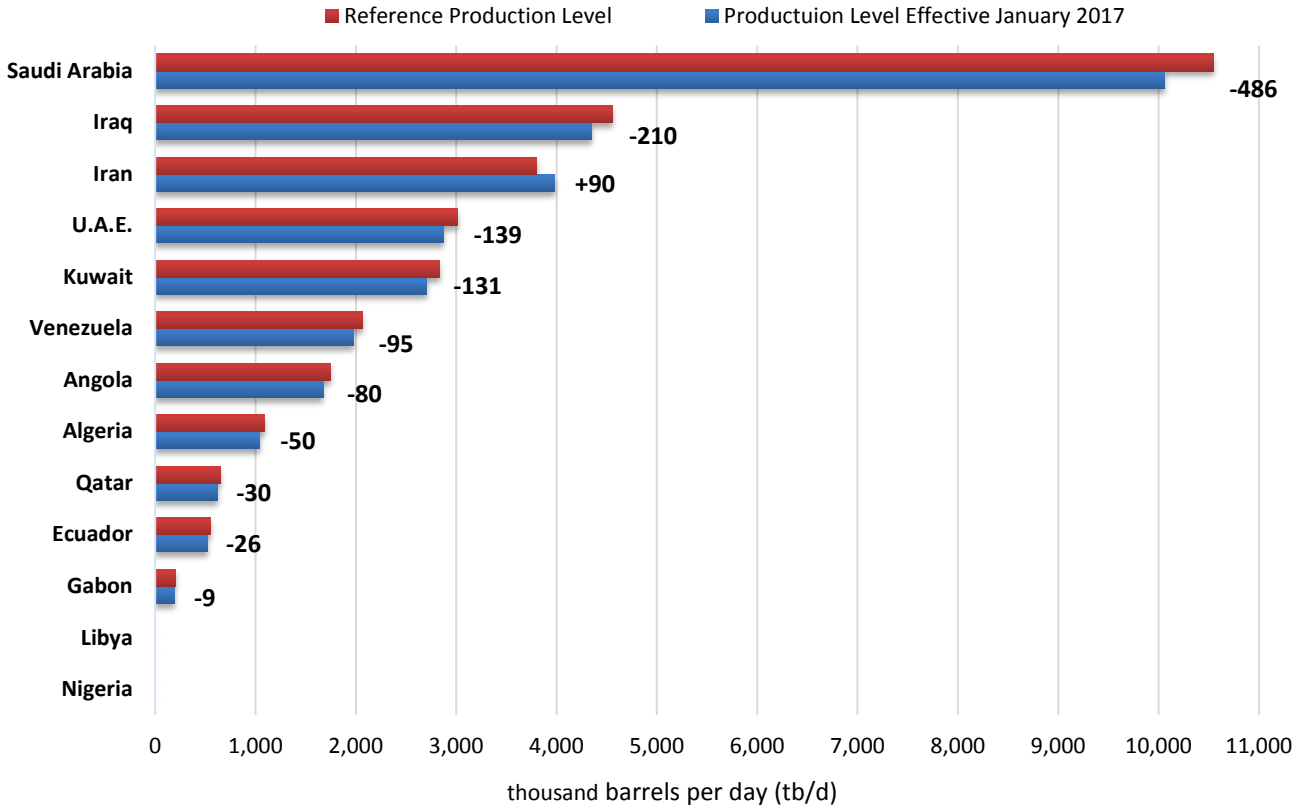
Source: Adapted from U.S. Energy Information Administration data (April 2017).

production cuts have been successful so far in reducing levels of stocks globally and have bolstered prices; however, the market has yet to reach a balance between supply and consumption. While compliance rates have been far from uniform among OPEC producers and public comments made by Russia's minister of energy, Alexander Novak, led to doubts about Russia's commitment to the agreement, the level of cooperation as represented by the most recent production figures appears to be improving. Regardless, to attain the goal of rebalancing the market OPEC must, at minimum, extend the current production agreement into the second half of 2017, otherwise stocks will continue to overhang and prices will remain vulnerable to negative news flow.

An "irrational exuberance" can be observed in the activity of some market players across U.S. basins.

A core criticism levied by OPEC at U.S. tight oil producers and investors is that this immediate production response to higher prices is a form of "irrational exuberance," where the firms and investors take short-term cash flow at the expense of longer-term profitability (i.e., if you increase production in response to higher prices, you increase near-term revenue but depress prices again). It appears that as operators drill out more densely to take advantage of short-term production gains,

Figure 3. OPEC Agreed Crude Oil Production Adjustments and Levels



Source: Adapted from OPEC Secretariat data (April 2017).

this may be coming at the expense of longer-term productivity across U.S. basins. Over the longer run, this could affect the pace and productivity of certain U.S. tight oil developments.

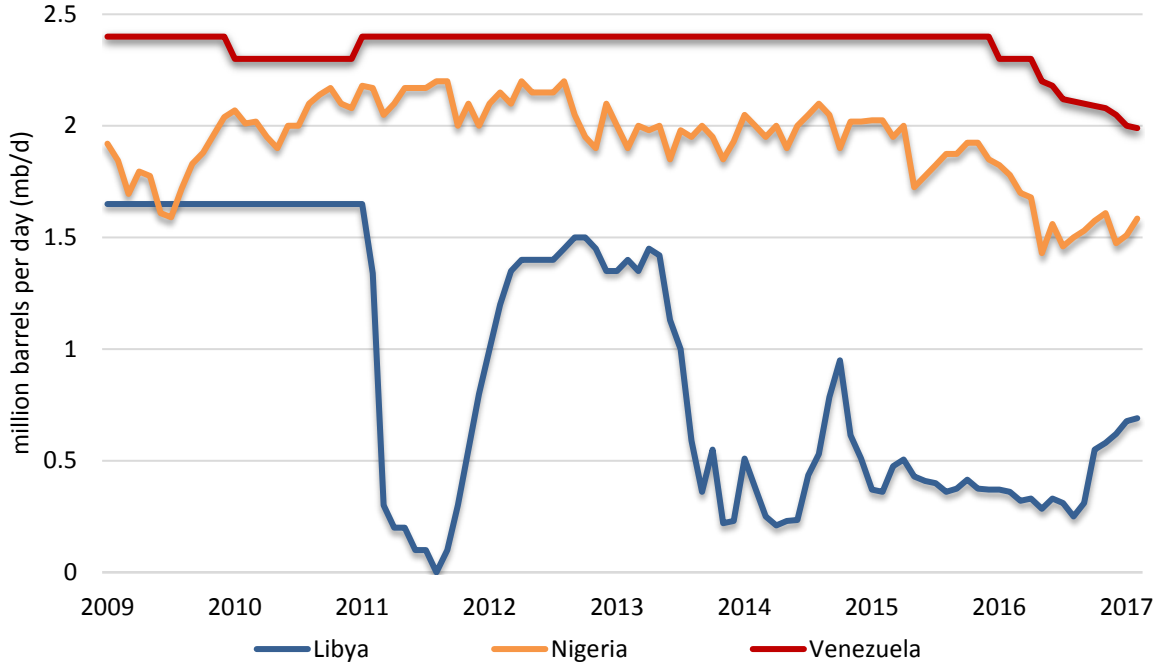
While most of the focus is on market rebalancing, low prices should not breed complacency about the supply risks in the market—the ongoing civil war in Libya, unrest in Nigeria, and the possibility of social collapse in Venezuela.

As the market trends toward balance, supply disruptions and eroding production capacity could expedite the market rebalance and add upward price pressure. Various geopolitical issues to watch out for include the ongoing civil war in Libya, unrest in Nigeria, and the possibility of social unrest in Venezuela leading to collapse. However, for the most part the risks in the short term lie on the side of possible oversupply in the market forcing prices downwards.

Over the medium term, recent underinvestment in upstream development has many analysts concerned about an impending supply shortfall.

In the medium term, there is the possibility of several risks going in the other direction with a possible price shock due to current levels of underinvestment in conventional sources globally. Conventional

Figure 4. Crude Oil Production: Libya, Nigeria, Venezuela, 2009–2017 (Monthly)



Source: Adapted from U.S. Energy Information Administration data (April 2017).

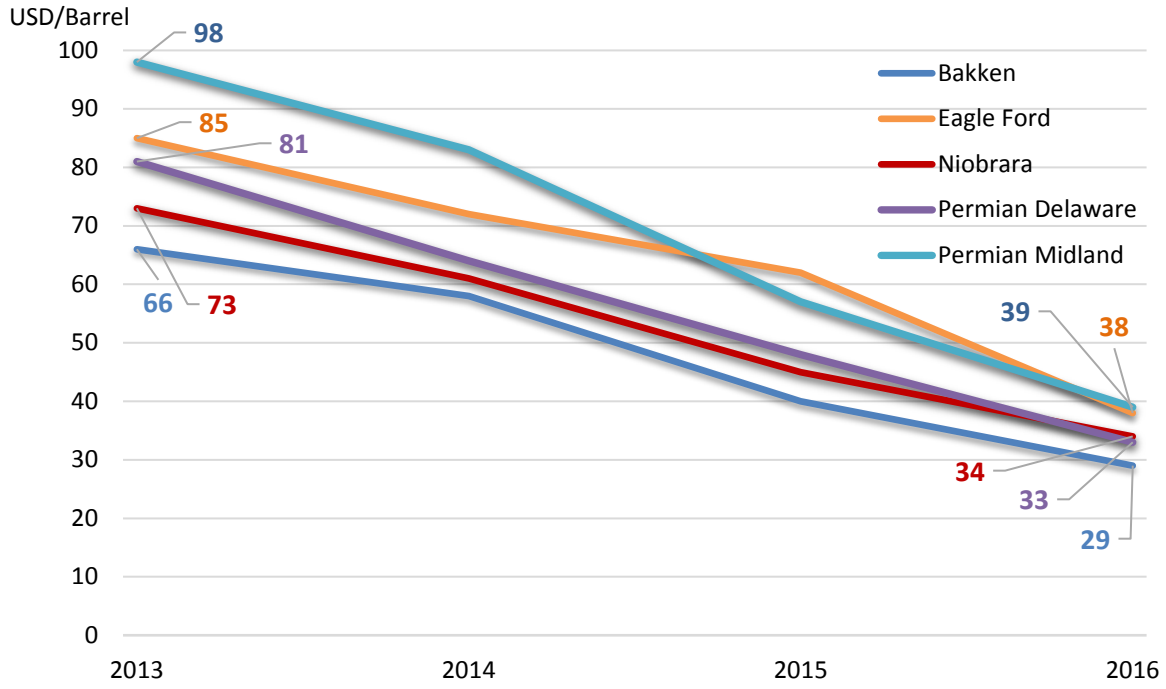
crude oil accounts for 75 mb/d of global oil supply and upstream investment in these sources has been drastically cut over the past two years. Conventional oil assets likely require a sustained price level above $50–$55 a barrel to encourage investment again. The combination of the above, and the fact that demand is expected to grow by 1.1–1.3 mb/d a year, makes a supply gap and a price shock in the medium term a realistic possibility, a gap that depending upon its severity could be met by short-cycle tight oil. The critical issues in examining the potential supply gap are demand estimates, existing production decline rates, and cost and timing consideration of bringing on new incremental projects.

The United States as a Global Oil Supplier—Key Strategic Issues

To assess how the United States strategically stands as a global oil supplier, the following questions should be addressed:

- What is the outlook for U.S. tight oil production and does the United States now play a role as swing supplier in the market?
- What potential does shale hold in the market to fill supply gaps?
- What is the outlook for the U.S. downstream sector?

Figure 5. Average Wellhead Breakeven Prices for Key U.S Shale Plays, 2013–2016



Source: Adapted from Rystad Energy (April 2017).

The resiliency of U.S. shale has continued to surprise the market.

U.S. tight oil production is responding well to the recent oil price rise. Significant increases in drilling and start-up activity in the first quarter of 2017 have been recorded, leading to upward revisions of U.S. oil production outlook. In fact, it is now forecast that U.S. production will increase by approximately 0.4 mb/d between the second and fourth quarters of 2017. This could increase even further if prices climb again. As such, U.S. shale production is a source of price resistance in the market. Whether and how U.S. tight oil production will continue to play this role in the market is dependent upon several other factors, namely the overall supply-and-demand balance in the market, access to capital, drilling economics and infrastructure bottlenecks, and the evolving role of storage.

Well costs significantly fell across the major U.S. shale plays in 2016; however, producers are now facing significant service cost inflation in 2017.

Today, the five largest shale plays in the United States—the Permian Midland, Permian Delaware, Eagle Ford, Bakken and Niobrara—make up 80 percent of shale production. Base decline rates have significantly fallen across these plays due to productivity gains and cost reductions from service providers, which has driven down wellhead prices. The Permian operators have enjoyed the largest decrease in costs and it is forecast that the Permian will account for 60 percent of growth of shale production in the United States until 2020. While operators in the big five plays are now facing an

inflationary environment in 2017, WTI prices above the $55 mark should be enough for shale growth to thrive for many operators in these regions but it will not be enough for growth in other areas. So, beyond the five big plays, there does not appear to be that much potential for additional growth in the near to medium term if prices remain in the $55–$60 range.

Significant cuts to exploration and production capital expenditure for conventional sources create a potential underinvestment supply hole in the market in the medium term.

Upstream investment for conventional sources among OPEC member states and around the world has seen little activity over the past two years due to the price collapse. However, as recent global inventory levels have been rebalancing thanks to the OPEC supply cuts and if OPEC continues to manage supply and extends these cuts further into 2017, then we will likely see prices go back to the $60 range. Until we see this happen, conventional upstream investment levels will remain suppressed.

In the immediate aftermath of the OPEC-led supply cuts, shale has displayed that it can respond on the margin due to its high level of price elasticity. Shale drilling activity takes only three months to respond to market price signals. So, the recent dip in WTI below $50 should not immediately affect activity but if WTI is sustained at a level below $50 over the longer run it will negatively affect tight oil production gains in the United States.

At the same time, global demand for oil will continue to grow for the foreseeable future. For example, the International Monetary Fund (IMF) still forecasts that the Chinese economy will grow by 6.5 percent this year, and while there is potential for this to be revised downwards given the levels of growing debt, this estimate nonetheless suggests that China will still account for large levels of growth in demand. Furthermore, OECD demand for oil is also up due to gains in transportation and industrial output. These factors of continued growth in demand and reduced levels of investment may result in the formation of a supply gap in the market in the medium term. With this potential supply hole coming down the road, U.S. shale will likely smooth the price spikes in the market and may potentially continue to provide a price ceiling, due to the superior price responsiveness of U.S. shale as exhibited by the gains made in the first quarter of 2017. However, the extent to which U.S. tight oil will provide a price ceiling will of course depend on the size and severity of any supply shortfall, as well as the outcomes of existing field decline rates and cost compression in future upstream projects.

In terms of downstream prospects the outlook for growth remains mixed, with the sector facing both challenges and opportunities alike.

In a short period of time, the United States has transformed from being the world's largest importer of refined petroleum products to the largest exporter with potentially important strategic implications. Today the United States has 50 percent of global refining capacity and produces 56 percent of global oil products. Furthermore, growth of refining capacity has been robust as of recent, with 1.7 mb/d of capacity added between 2012 and 2017. One factor in recent growth has been the decline seen in Venezuelan refining capacity, alongside an increase in product demand globally.

1616 RHODE ISLAND AVENUE NW
WASHINGTON, DC 20036
TEL. (202) 887.0200
FAX (202) 775.3199

The U.S. downstream will face challenges. Competition is increasing with refineries being developed in product-importing countries like India and in several Southeast Asian nations, many of which are collaborating with the Middle East and Russia. Furthermore, refining capacity has stagnated on the U.S. west coast due to poor margins; however, 50 percent of U.S. refining capacity is now located on the Gulf Coast where margins are better. New environmental regulations affect refinery performance but the prospect for increased regulation within the United States has lessened relative to expectations before the 2016 elections.

Regardless of the above challenges, refineries in the United States are massive by volume and remain technically superior in comparison to overseas competition. For example, U.S. refiners are better able to cope with international regulations to improve environmental performance, like the International Maritime Organization (IMO) sulfur standards, relative to many other refineries since they remain at the cutting edge in terms of capabilities and are therefore able to adapt more easily. Moreover, the ability to take a wide variety of crudes and turn them into products gives the United States an added advantage in global oil markets because they can compete equally well in global refined product markets or crude markets as the prices dictate.

The United States as a Global Oil Supplier: Key Strategic Issues in Policy Choices

The United States has abundant natural resources, world-class innovators, and a robust private sector-led approach to energy development. For decades, U.S. energy policy has sought to provide affordable reliable energy supplies to a growing and prospering population while also improving environmental performance and lessening imports of energy in the name of greater energy security. With the slowdown in U.S. economic growth, greater efficiency, the improved development of a variety of energy resources (including tight oil), and the growing imperative to reduce emissions to deal with climate change, U.S. energy policy and regulation underwent some remarkable changes. Both federal and local rules were changed to accommodate a shifting market and technological environment but also to drive particular outcomes in the energy sector. With the election of a new administration with different energy priorities from the previous administration, the question of how U.S. policy might affect tight oil production and consumption and in turn influence global oil markets is increasingly relevant.

The following categories may be useful to assess how the United States may shape its evolving role in global oil markets given the policy priorities advanced by the new administration:

- Tax and revenue
- Environmental regulation reforms
- Trade
- Energy Independence

1616 RHODE ISLAND AVENUE NW
WASHINGTON, DC 20036
TEL. (202) 887.0200
FAX (202) 775.3199

The new administration has proposed broad-based tax reform, a priority for Republican leaders in Congress as well—one prominent proposed plan could give a boost to U.S. exports. However, the implications for importers and dollar-denominated commodities remains uncertain.

One of the top priorities of the new administration is that of tax reform, which will likely be a deeply contentious issue. Historically tax reform has required a great deal of political capital to achieve and since the Trump administration has many proposed policy priorities on the table, others will likely have to be sacrificed to get tax reform through. Tax reform does, however, happen to be a major priority for the Republican-controlled Congress as well.

The provision of proposed tax reforms that has drawn most attention is the destination-based border adjusted corporate tax (BAT). The essential elements of the BAT include a lowering of the corporate tax rate from 35 percent to 20 percent; immediate expensing of investments; taxation in the United States only; no tax on exports; and a 20 percent tax on imported goods and services (the so-called border adjustment). The BAT is often labeled as a trade policy, but it is more appropriately referenced as a tax policy with trade effects. The goal of the BAT is to eliminate incentives to locate business operations outside of the United States by essentially taxing imported goods and providing for a tax break on exported goods. Sponsors claim that the appreciation of the dollar, which they expect to rise by 25 percent because of this policy, will offset the 20 percent tax that importers will pay.

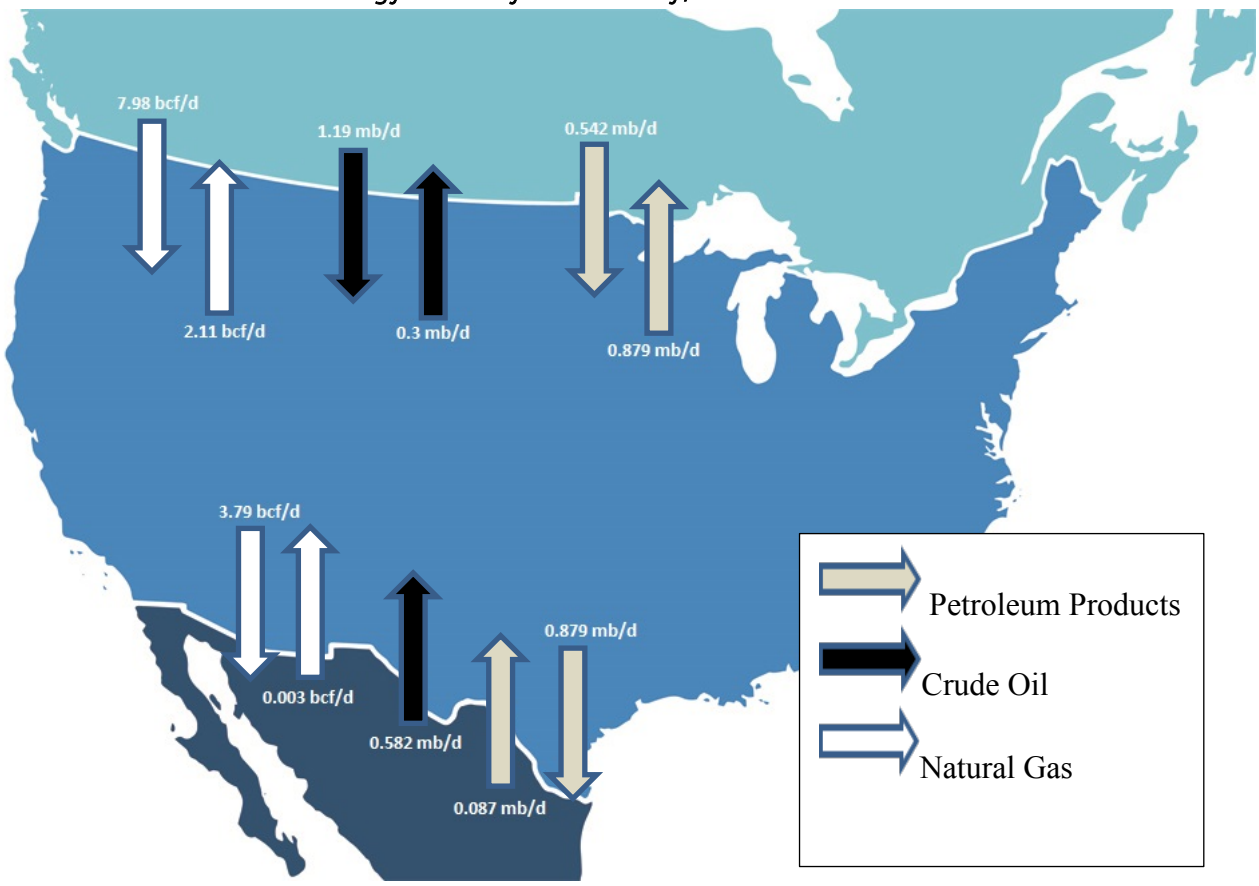
The presumed appreciation of the dollar raises questions about all dollar-denominated trade. The appreciation of the dollar could send prices of dollar-denominated commodities, such as oil, down. However, this proposed change in corporate tax policy faces stiff opposition from major importers (retailers, industrial companies, and coastal refiners) that are concerned about the level of tax and skeptical of the timing and extent of U.S. dollar appreciation.

The extent of how successful the new administration will be in implanting its "deregulatory" agenda remains entirely uncertain, with strong opposition from some state and local governments being the only certainty at this stage.

Both in its campaign platform and through a series of executive orders during its first hundred days, the administration has sought to roll back a series of policy measures and regulations set forth by the Obama administration. These include changes to federal policies in federal land leasing; the Clean Power Plan (CPP); Corporate Average Fuel Economy (CAFE) standards; methane emissions; and the Clean Water Act (CWA). The majority of the proposed environmental regulatory amendments would affect the supply side of the market. For example, the proposed rollback of methane emission limits on new wells and removal of limits imposed on existing wells along with the proposed modification or revocation of the Waters of the United States (WOTUS) rule will reduce compliance costs for the industry and streamline the permitting process.

However, there is uncertainty surrounding how President Trump will accomplish his "deregulatory" agenda using executive orders. Legally, executive orders do not automatically change an agency's administrative rule. For this to occur it would require a new rule from the agency changing the old regulation, which can be subject to litigation for violating the agency's statutory mandate. More

Figure 6. Gross North America Energy Flows by Commodity, 2016



Source: Adapted from U.S. Energy Information Administration data (April 2017).

importantly, these processes are time consuming even absent litigation. This causes some uncertainty as to how quickly these changes will happen. Furthermore, many agencies require people in positions who can oversee the process for modification of existing regulations. Many key positions remain unfilled in the administration, which will make moving these changes forward difficult. There is also uncertainty around how successful the goal of permit streamlining will be. While Trump can ease the burden at the federal level it may not make much of an impact because there is a lot of opposition that can come from the state and local level.

Finally, the bigger risk for the industry is that of a pendulum effect. Could the strong antiregulatory agenda by this administration produce a tough backlash regulatory agenda in a future administration? This is a risk that many in industry have come to expect and requires risk management for investments spanning administrations.

Renegotiation of the North American Free Trade Agreement (NAFTA) could disrupt supply chains and so poses significant risks for exporters of natural gas.

NAFTA, which dates to the early 1990s, appears to be another primary focus for the new administration. While there is scope to strengthen NAFTA in the United States' favor, the biggest threat of a NAFTA renegotiation is the disruption of supply chains and a change to the rules of origins requirements. The negotiations over country-of-origin content requirements in NAFTA could be the most contentious negotiating point. The last nine administrations have tried hard to improve relations with Mexico where it has traditionally been politically pragmatic to be seen standing up to the United States. Any renegotiation increases the threats of increased political tensions and cross-border tariff retaliation. The energy trade situation with Mexico has changed significantly in recent years. In 2015 and 2016, the value of U.S. energy exports to Mexico exceeded the value of U.S. energy imports from Mexico. About 60 percent of U.S. gas exports go to Mexico and this would be detrimentally impacted by any changes to NAFTA.

Once again the border adjustment tax, while it is not necessarily a trade policy, if implemented would have trade implications. Under World Trade Organization rules, the tax break given to exported goods may be interpreted as an explicit export subsidy and so the United States will likely face backlash from the European Union or other major trading partners. Also, the appreciation of the dollar that would come with such a policy would increase all deficits, thus making the goal of renegotiating NAFTA to help reduce the deficit with Mexico more difficult to achieve.

It is worth thinking about how and whether the country's priorities are changing in the face of the new energy profile of the United States and how they are likely to be influenced in the coming years.

A longstanding focus of U.S. energy policy has been the quest for "energy independence." Often accused of being more slogan than a substantive goal, the notion of energy independence was born out of the scarcity in oil supply arising as a result of the oil embargoes of the 1970s. The notion that energy self-sufficiency would free the United States from the insecurity of oil import dependence, the foreign policy leverage and interlinkages with oil exporting regions of the world, and positively impact the trade balance of the United States has been a political driver for much of the policy efforts and strategic posture of U.S. energy policy ever since.

As the United States inches ever closer to energy self-sufficiency, it is worth asking what the overarching priorities of U.S. energy policy might become in the years ahead and whether or not energy independence delivers the strategic advantages it has promised over the last several decades. There are no easy or immediate answers to this, not least of which is because the central tension in U.S. energy policy at the moment hinges on disagreement concerning climate change and not energy independence.

1616 RHODE ISLAND AVENUE NW
WASHINGTON, DC 20036
TEL. (202) 887.0200
FAX (202) 775.3199

About the Authors

Sarah Ladislaw is a senior fellow and director of the Energy and National Security Program at the Center for Strategic and International Studies (CSIS) in Washington, D.C. Adam Sieminski holds the Schlesinger Chair for Energy and Geopolitics at CSIS. Frank Verrastro is senior vice president and trustee fellow at CSIS. Andrew Stanley is a research associate with the Energy and National Security Program at CSIS.
