TESTIMONY OF KEVIN BOOK
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BEFORE THE
U.S. SENATE COMMITTEE
ON ENERGY AND NATURAL RESOURCES

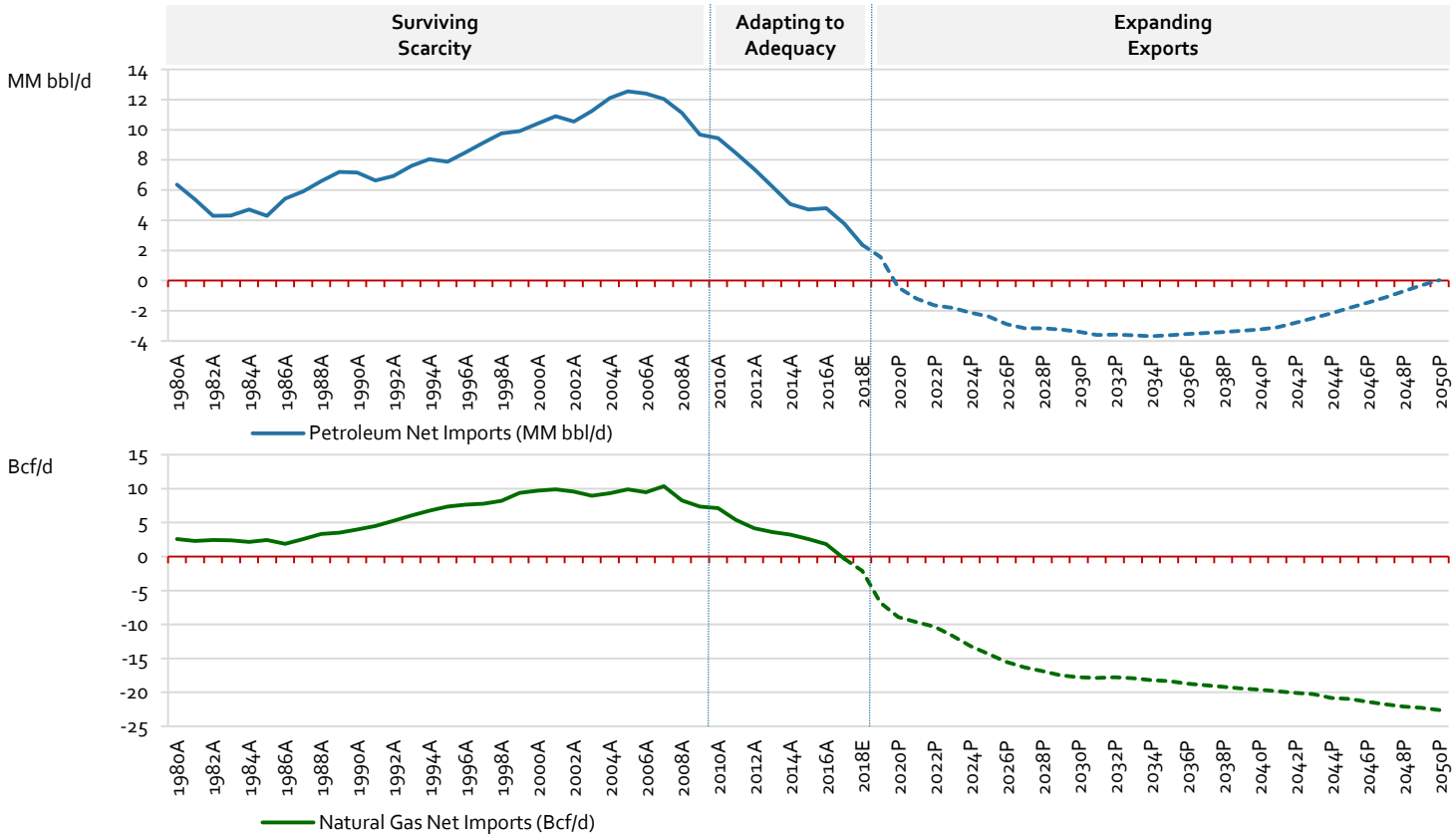
FEBRUARY 5, 2019

Good morning, Chairman Murkowski, Ranking Member Manchin and distinguished Members of this Committee. My name is Kevin Book, and I head the research team at ClearView Energy Partners, LLC, an independent firm that serves institutional investors and corporate strategists.

Thank you for inviting me to contribute to your outlook for energy and minerals markets for the 116th Congress. I am grateful for the work this Committee does to maximize economic and environmental security. The rapid pace of change and the complexity of energy markets can make the task as difficult as it is important.

Sometimes, however, even amid such complexity, a single picture can tell a very clear story. For example, Figure 1, presented below, may offer a useful summary of the fundamental circumstances that underpin today's oil and gas policy opportunities and challenges.

Figure 1 – Framing Current Circumstances: U.S. Petroleum and Natural Gas Net Imports, CY 1980A – 2050E



Notes:
- Data from 1980 to 2017 reflect historical, actual (A) volumes.
- CY 2018 and beyond reflect estimates (E) and projections (P) from EIA's *2019 Annual Energy Outlook* reference case, Tables 11 and 13.

Source: ClearView Energy Partners, LLC, using EIA data

Using data from the Energy Information Administration (EIA), Figure 1 traces more than three decades of our nation's long history as a net importer of both petroleum and natural gas and conjoins those historical trends with EIA's latest reference case projections from the *2019 Annual Energy Outlook* (AEO). The blue line represents historical net petroleum imports, the green line represents historical net natural gas imports and, in both cases, the dashed lines correspond to calendar year (CY) 2018 estimates and forward projections for CY 2019 through CY 2050.

As you and your colleagues know well, sound energy policy comprises more than an assessment of net imports. Even so, at the risk of oversimplification, I have divided the past and future of net imports into three distinct oil and gas policy eras:

- **Surviving scarcity,** a multi-decadal interval of fast-growing net import reliance;
- **Adapting to adequacy,** a directional shift over the course of roughly a decade during which both net import trends inverted and then accelerated to the downside; and
- **Expanding exports,** the present and near future. The U.S. became a net natural gas exporter during CY 2017. By the EIA's assessment, our country could become a net petroleum exporter by the end of CY 2020.

As is often the case in energy markets, the shift from scarcity to adequacy came on subtly at first, then suddenly. Thanks in large part to strong leadership from you, Madam Chairman, and your colleagues on this Committee, the Congress worked to reconfigure America's expansive, legacy energy security apparatus as our nation regained a measure of economic freedom.

The era of adequacy now appears to be giving way to a new era of net exports that could bring even greater economic and security benefits. But realizing those opportunities could also present this Committee and other centers of U.S. energy policy leadership with even vaster challenges than retooling scarcity-based policy for an era of adequacy.

Much of that recent adaptation required regulators to reinterpret old laws for new circumstances. The resulting rulemakings and decisions have faced legal challenges that created investment delays and project uncertainties, especially for energy transportation infrastructure. Securing the economic and security benefits of expanded exports may require further substantive policy renovations that, among other things, alleviate these delays and uncertainties.

The balance of my testimony offers a market overview with an eye towards the next phase of America's oil and gas history.

Market Conditions: U.S. Production Supplying Global Demand

Figure 2 summarizes U.S. and global supply and demand figures from EIA's most recent *Short Term Energy Outlook* (STEO).

Figure 2 – U.S. Production Accounted for ~68% of Global Liquids Supply Growth between CY 2008 and CY 2018

Year	U.S. Liquids Supply (MM bbl/d)	Global Liquids Supply (MM bbl/d)	U.S. Share of Change (%)	U.S. Demand (MM bbl/d)	Global Demand (MM bbl/d)	U.S. Share of Change (%)
2008	8.56	86.66		19.50	86.83	
2013	12.36	91.63		18.97	92.26	
2018	17.87	100.40		20.46	100.00	
Change, 2013 vs. 2008	+ 3.80	+ 4.96	77%	– 0.53	+ 5.43	-10%
Change, 2018 vs. 2013	+ 5.50	+ 8.77	63%	+ 1.49	+ 7.74	19%
Change, 2018 vs. 2008	+ 9.30	+ 13.74	68%	+ 0.96	+ 13.17	7%
5Y CAGR, 2018	7.6%	1.8%		1.5%	1.6%	
10Y CAGR, 2018	7.6%	1.5%		0.5%	1.4%	

Source: ClearView Energy Partners, LLC, using EIA data

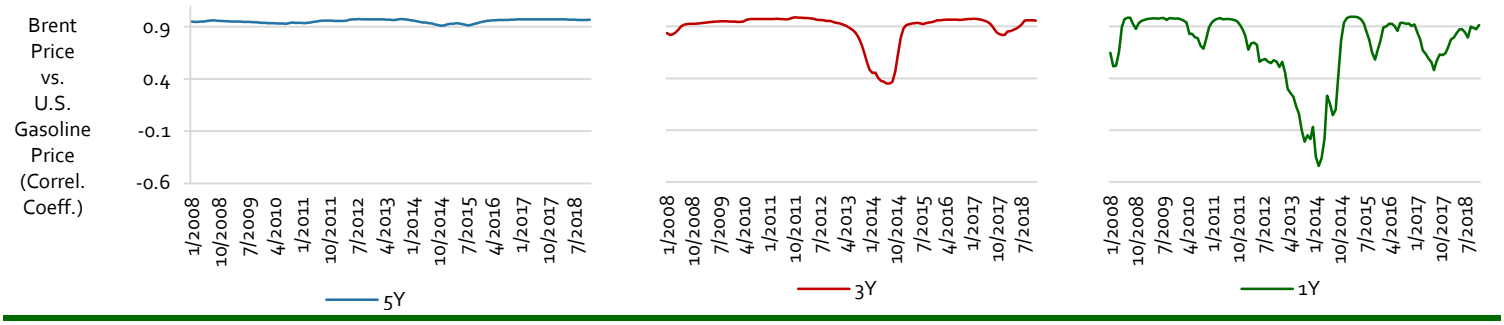
According to EIA data, U.S. liquids supply – that is, inclusive of crude oil, refined products, natural gas liquids (NGLs) and biofuels – grew by 9.3 MM bbl/d between CY 2008 and CY 2018, a compound annual growth rate (CAGR) of ~7.6%. That pace far outstripped global liquids supply, which grew by 13.74 MM bbl/d, a ~1.5% CAGR. Taken together, the two figures imply that the U.S. accounted for ~68% of global supply growth over the ten-year interval, a statistic that would have defied imagination a decade ago.

U.S. liquids demand grew much more slowly than U.S. liquids supply, rising only ~0.96 MM bbl/d, a ~0.5% CAGR, over the course of the decade. Global demand, by contrast, grew at a faster pace over the interval, climbing by 13.17 MM bbl/d, a ~1.4% CAGR (~1.6% during the latter five years of the decade).

Supply growth in excess of domestic demand may form the fundamental underpinnings for exports, but I would suggest that there may be more to the story. Not only can U.S. additions to global supply economically benefit U.S. producers and overseas importers, but also U.S. drivers, because U.S. gasoline prices tend to reflect global oil market supply balances and, concomitantly, prices.

Over the decade from CY 2008 to CY 2018, average U.S. pump prices correlated closely with the Brent crude prices (the principal international benchmark for light, sweet oil), as presented in Figure 3.[1]

Figure 3 – Domestic Implications of Global Balances: U.S. Gasoline Prices Correlates Closely with Brent Crude, 1/2008 – 12/2018

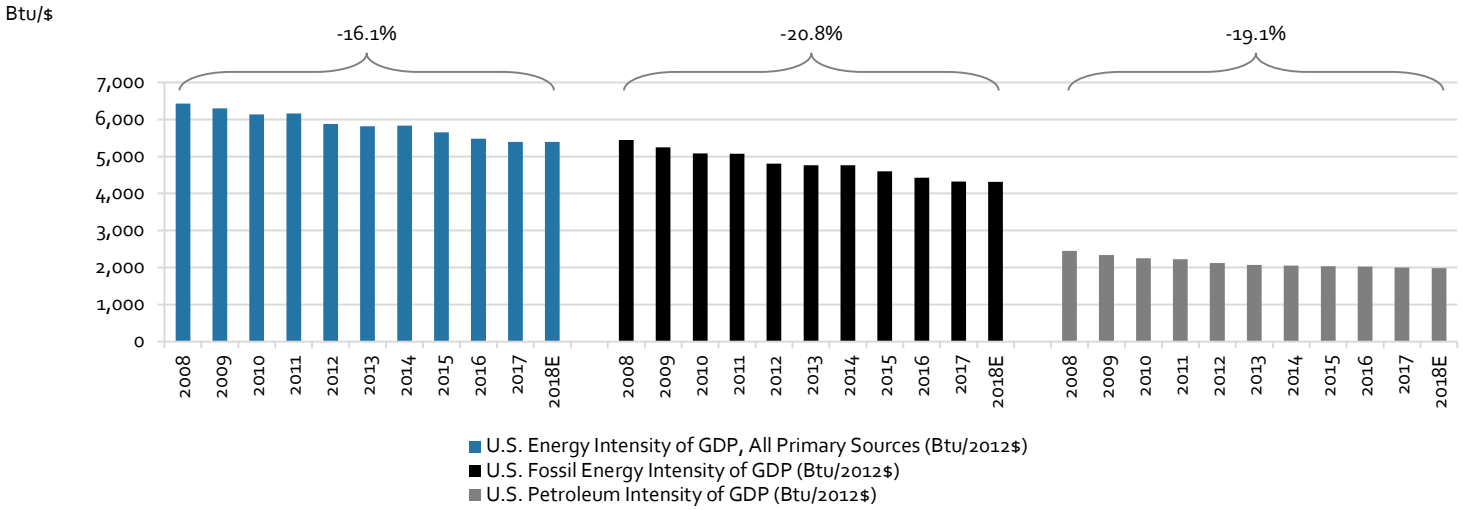


Source: ClearView Energy Partners, LLC, using EIA data

As it turns out, economic circumstances for many U.S. drivers may be changing in other ways, too. Much of the flattening of domestic consumption appears to reflect both diversification and structural efficiency gains across the U.S. economy, including the transportation sector. Such changes tend to reduce the economic vulnerability of energy end-use sectors to petroleum price shocks.

Figure 4, below, shows that real U.S. energy intensity of GDP – in this case, the amount of primary energy required to generate a dollar of economic output in chained 2012 dollars – declined by ~16% between CY 2008 and CY 2018.

Figure 4 – A More Intensely Resilient Economy: Energy Intensity of U.S. Real GDP, CY 2008 – CY2018E



Note: CY 2018 estimates reflect year-to-date averages through September.

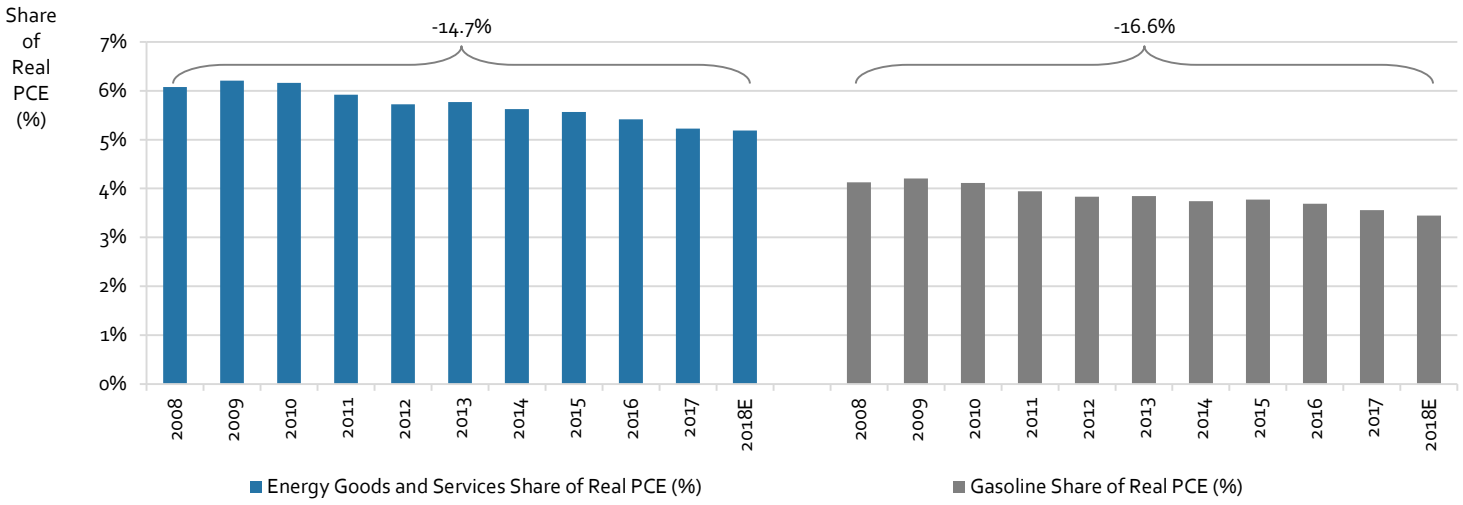
Source: ClearView Energy Partners, LLC, using BEA and EIA data

Fossil energy intensity of GDP declined by ~21%, which can be explained in part by the rapid growth of non-hydro renewable generation, but also by thermal efficiency gains as generators shifted from steam-cycle coal plants to combined cycle gas turbines. Similarly, the ~19% decline in petroleum intensity of GDP can be explained in part by the brisk introduction of ethanol and biodiesel in the fuel mix, but also by efficiency gains in cars, trucks and airplanes.

[1] The correlation breakdowns in the one- and three-year series reflect deep discounts for U.S. crude, as measured by the differential between Brent and the West Texas Intermediate (WTI) benchmark, due to oil gluts in the Midwest and Gulf Coast prior to the 2015 lifting of the crude oil export ban.

Lower prices and greater energy efficiency, in tandem with rising incomes, reduced U.S. energy outlays as a share of real personal consumption expenditures (PCE, Figure 5, below). Over the ten-year interval between CY 2008 and CY 2018, energy PCE as a whole fell by ~15%, according to data from the Bureau of Economic Analysis (BEA), and gasoline PCE fell by ~17%. Simply put, the average U.S. driver now appears to be better insulated against pump price volatility.

Figure 5 – A More Resilient End-User: Energy Share of Personal Consumption Expenditures, CY 2008 – CY 2018E



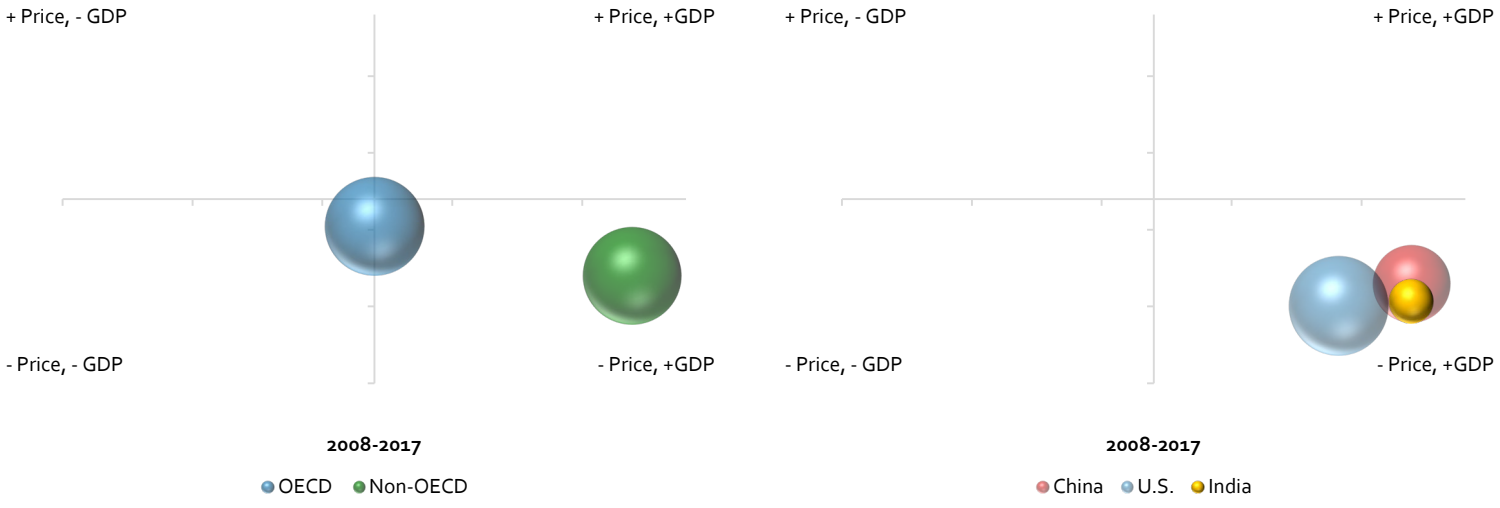
Note: CY 2018 data reflect averages through November (all energy) and September (gasoline).

Source: ClearView Energy Partners, LLC, using BEA data

U.S. consumption also appears more price-responsive and less-GDP bound that other major consumer nations. As presented in Figure 6, below, overall OECD petroleum consumption (represented by the dark blue bubble in the chart on the left side) did not correlate significantly with real Brent crude prices or with real GDP over the ten years from CY 2008 to CY 2017. Non-OECD consumption (dark green bubble), by contrast, exhibited a strong inverse correlation with price (i.e., consumption trended up when prices fell and *vice-versa*) and a strong positive correlation with GDP.

Compared to China (the world's #2 petroleum consumer and #1 importer, represented by the red bubble in the chart on the right side of Figure 6), and India (the #4 global consumer, but growing fast, yellow bubble), U.S. consumption inversely correlated more strongly with real Brent crude prices and less strongly with real GDP. One interpretation may be that the U.S. was a more flexible, less-captive petroleum consumer than China, India or the OECD as a whole.

Figure 6 – Strong, Positive GDP Linkages in Key Emerging Markets: 10Y Consumption Correlations with Price and GDP



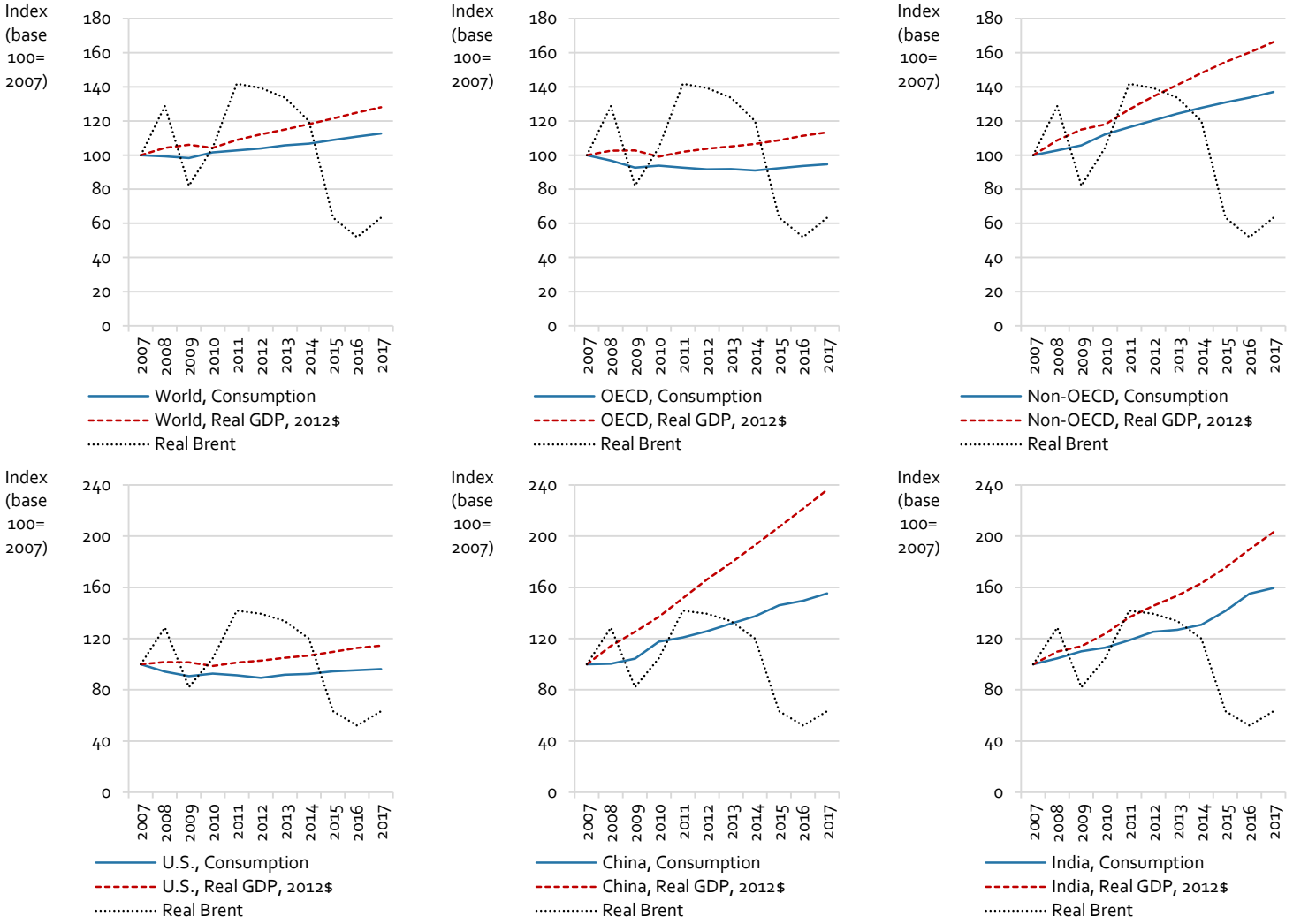
Note: Bubble size corresponds to average share of global consumption over the 10Y correlation interval (i.e., from CY 2008 to CY 2017).

Source: ClearView Energy Partners, LLC, using BEA, BP, EIA and World Bank data

Figure 7, below, offers a different view of the same data set. Each chart shows consumption (blue lines), real GDP (red dashed lines) and real Brent prices (black dotted lines). All three data series are presented as 2012-based indices (i.e., where 100 corresponds to CY 2012 average levels), and the Brent index is the same in each of the six charts.

The top row of charts illustrates the degree to which, in the aggregate, fast-growing, emerging economies also happen to be fast-growing petroleum consumers, compared to advanced economies and to the world as a whole. In the bottom row of charts, which revisits the comparison between the U.S., China and India, the latter two nations' historical correlations between GDP growth and petroleum consumption growth seem even more pronounced.

Figure 7 – Fast-Growing Non-OECD Consumption vs. Flat-to-Down OECD Consumption



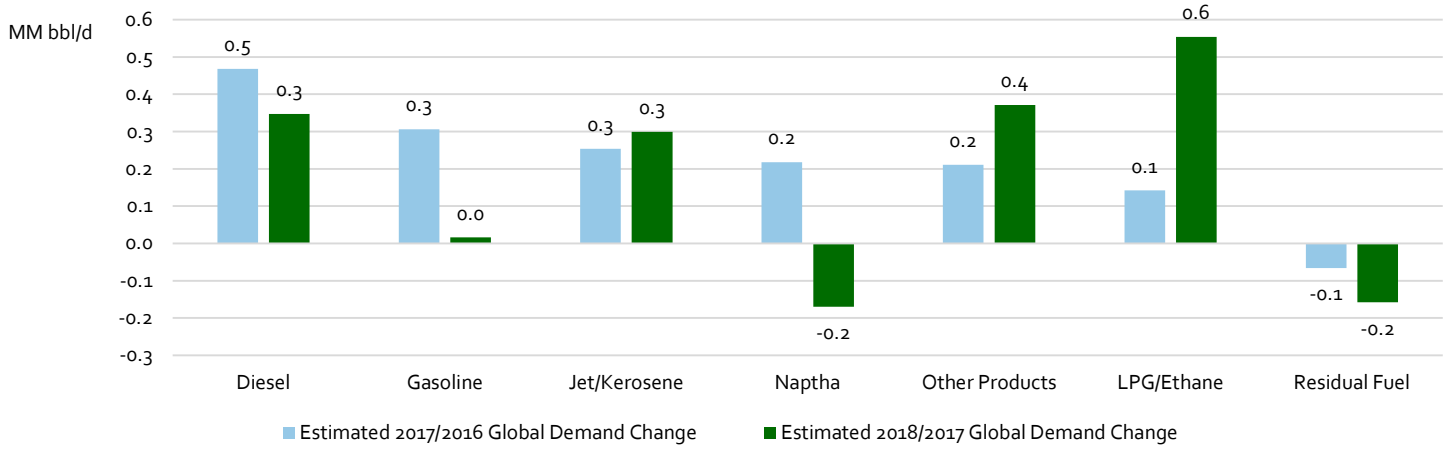
Source: ClearView Energy Partners, LLC, using BEA, BP, EIA and World Bank data

One might interpret Figures 6 and 7 as proxies for U.S. producers' export opportunity set: overseas demand appears robust and relatively inflexible, particularly in the near term. The International Energy Agency's (IEA) January 2019 *Oil Market Report* projects 1.4 MM bbl/d of CY 2019 liquids growth, and the EIA's January 2019 STEO projects 1.5 MM bbl/d.

In this context, I would suggest that "peak demand" *zeitgeist* may be as premature today as "peak supply" prognostications were more than a decade ago when I had the honor of appearing before this Committee during a period of high prices.[2] That said, our Firm sees several potential downside risks to IEA and EIA CY 2019 demand forecasts. For one, the composition of global demand growth appears to have changed recently. Using IEA data, our Firm estimates that gasoline demand increased only 0.1% relative to year-ago levels during CY 2018, well below its 2.4%/Y annual average growth rate over the CY 2013-2017 interval. Volumetrically speaking, the largest year-on-year (Y/Y) demand increases during CY 2018 came from liquefied petroleum gas (LPG)/ethane, other refined products and jet fuel, as presented in Figure 8 (next page).

[2] For details, please refer to testimony I delivered at an April 3, 2008 Full Committee Hearing *To examine the influence of non-commercial, institutional investors on the price of oil.*

Figure 8 – Gasoline Stopped Driving Global Oil Demand Growth in CY 2018

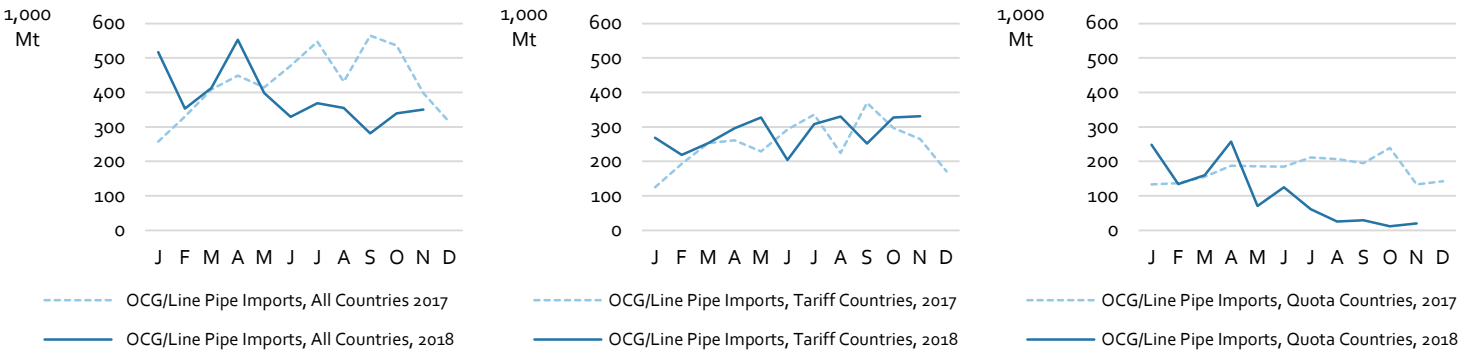


Source: ClearView Energy Partners, LLC, using IEA data

This flattening of gasoline demand seems likely to reflect a combination of light-duty vehicle efficiency gains and a demand retracement in response to CY 2018 petroleum price increases. Drivers purchasing refined products in countries with weak currencies may have been particularly affected by last year's combination of dollar strength and crude price appreciation.

Weaker global growth could be another source of demand downside. The International Monetary Fund (IMF) has twice downgraded its CY 2019 economic forecast due, in part, to the implications of U.S.-China trade war. We see three principal trade-related risks for oil and gas producers. First, U.S. import adjustments can impair producer economics. Tariffs increase producers' cost of line pipe and oil country goods (OCG, tubular steel used in wells), and quotas can create temporary supply-chain dislocations that limit well or pipeline construction. Figure 9 presents our analysis of data from the U.S. Commerce Department's International Trade Administration (ITA).

Figure 9 – As of November, CY 2018 Oil Country Goods and Line Pipe Imports Had Declined ~12% vs. CY 2017



Country, Region or Grouping (1,000 MT)	2015	2016	2017	TTM 11/2018	YTD 11/2017A	YTD 11/2018E	TTM 11/2018E vs. CY 2017 (%)	YTD 11/2018E vs. YTD 11/2017A (%)
Oil Country Goods and Line Pipe								
World	4,336.7	2,289.9	5,126.6	4,570.3	4,813.6	4,257.3	-10.9%	-11.6%
-- Imports from Quota Countries								
Argentina	90.7	50.3	199.1	158.6	181.0	140.5	-20.4%	-22.4%
Brazil	104.9	30.2	200.8	147.9	172.1	119.2	-26.4%	-30.8%
Korea	1,341.5	757.2	1,711.8	978.4	1,616.0	882.7	-42.8%	-45.4%
All Quota Countries	1,537.1	837.7	2,111.7	1,284.9	1,969.2	1,142.4	-39.2%	-42.0%
-- Imports from Excluded Countries								
Australia	0.010	0.008	0.045	0.000	0.045	0.000	-99.7%	-99.7%
-- Imports from Tariff Countries								
Total E.U.	868.0	402.8	683.8	877.1	646.6	839.9	28.3%	29.9%
Canada	434.8	94.6	338.8	418.9	311.4	391.5	23.6%	25.7%
Mexico	328.7	327.8	581.1	593.9	533.1	545.8	2.2%	2.4%
All Tariff Countries	2,799.6	1,452.2	3,014.8	3,285.4	2,844.4	3,114.9	9.0%	9.5%

Source: ClearView Energy Partners, LLC, using ITA data

Overall line pipe and OCG steel imports year-to-date (YTD) through November 2018 were down about ~12%, slightly more than steel imports of all kinds over the same interval (~10%, but not included in Figure 9). Imports from the three countries subject to quantitative restrictions – Argentina, Brazil and South Korea – were down ~42% vs. year-ago levels, and volumes from countries subject to tariffs were up ~10%. This suggests a growing producer reliance on tariff-adjusted imports.

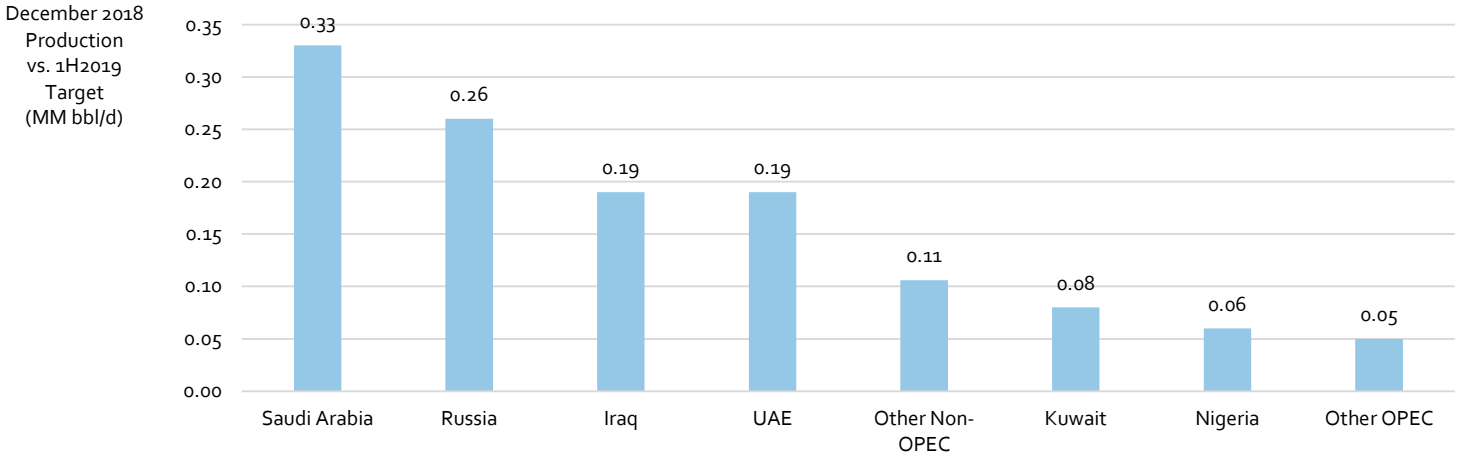
In a favorable oil and gas price environment, it may be difficult to assess the first-order impacts of such policies. Sponsors of marginal projects may not wish to communicate the fragility of their economics to competitors (or shippers, in the case of infrastructure projects). A less-favorable oil and gas price environment can make more projects marginal, however, meaning that steel tariffs that inflate 10% to 15% of overall project costs by 25% (i.e., 2.5% - 3.75% of the whole) could potentially deter or delay investment in production and transportation capacity.

Second, trade war can result in lost market access. Crude oil and petroleum products tend to be highly fungible if not perfectly interchangeable. Mismatches between crude quality and refinery complexity (i.e., facilities' capabilities to economically process heavy, sour crude) can force producers to sell at discounts relative to prevailing prices in optimal markets, particularly during times of seasonal or cyclical demand weakness. LNG, in particular, requires specialized regasification infrastructure that can render U.S. exporters more vulnerable to trade strictures.

Finally, trade war has potential to chill global economic activity, both explicitly (i.e., from the frictional costs associated with redirecting trade flows and reallocating global value chains) and implicitly (i.e., from forgone investment due to uncertainty). As with factor cost inflation, it can be difficult to directly gauge the scale and duration of foregone investment, but the deals that don't happen today may show up as export opportunities that fail to materialize in the future. In addition, the current composition of demand growth may be particularly exposed to trade risk: weakening logistics and travel demand could weigh on jet fuel consumption, and retaliatory tariffs could put U.S. exports of petrochemical feedstocks at relative disadvantage to competing sources.

Notwithstanding the recent centrality of U.S. production to global supply growth, output decisions by the Organization of the Petroleum Exporting Countries (OPEC) and cooperating producers (collectively, "OPEC+") continue to play a major role in global balances. Last year, Saudi Arabia's average monthly production ranged from 9.9 MM bbl/d at the low end to 11.1 MM bbl/d at the high end, reinforcing its role as a swing producer. As such, the Kingdom continues to lead OPEC+ market balancing efforts. By our analysis, the 1H2019 production targets that OPEC+ established last month imply that production levels must decrease 1.3 MM bbl/d from December 2018 levels to achieve 100% compliance, as presented in Figure 10.

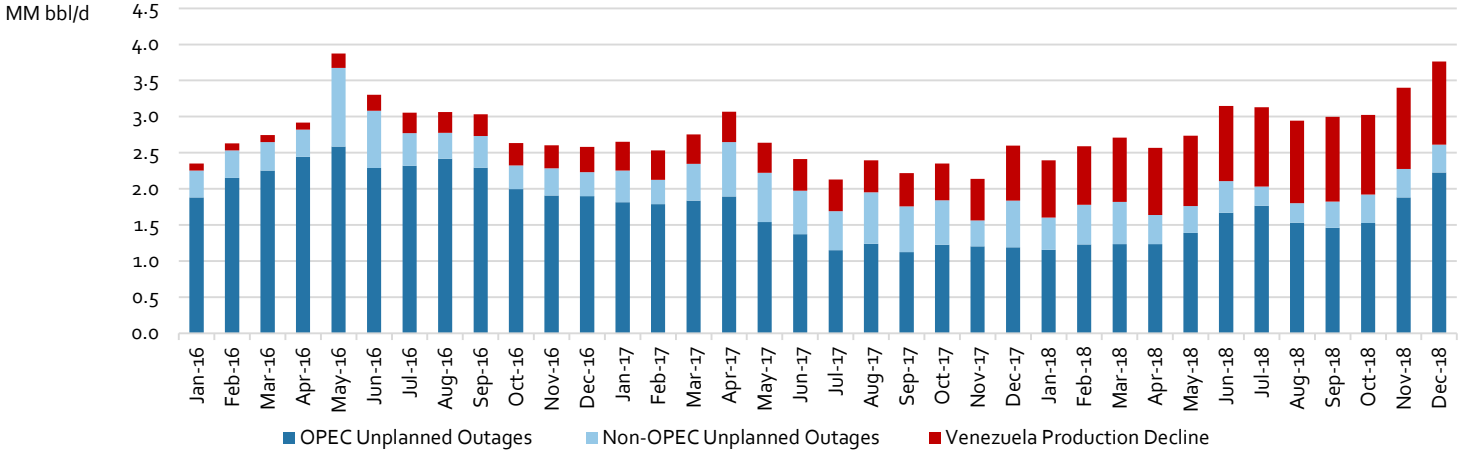
Figure 10 – In December 2018, OPEC+ Production Exceeded 1H2019 Target Levels by 1.3 MM bbl/d



Source: ClearView Energy Partners, LLC, using IEA data

Unplanned outages and production impairments often impact global balances, as well. EIA data indicate that unplanned outages increased by ~0.5 MM bbl/d last year, and Venezuela's output collapse further tightened global supply. Figure 11 (next page) presents both impacts.

Figure 11 – Global Oil Production Outages Increased by 0.5 MM bbl/d During CY 2018



Note: Venezuela's production decline is measured against its average production level of 2.4 MM bbl/d over the CY 2006-2015 interval.

Source: ClearView Energy Partners, LLC, using EIA data

After significant declines during CY 2017 and 1H2018, Venezuelan oil production stabilized during 2H2018 at monthly averages in a tight range between 1.25 MM bbl/d and 1.27 MM bbl/d, according to IEA data. The January 28 U.S. petroleum-sector sanctions on Venezuela could accelerate production declines as CY 2019 wears on. Prohibitions barring U.S. diluent exports to Venezuela could reduce the country's heavy oil production capabilities. In addition, the discontinuation of heavy oil exports to the U.S could force Venezuela to discount formerly U.S.-bound barrels in order to draw new buyers and/or accommodate greater shipping costs, consuming cash that could fund upstream operations.

Even so, our Firm currently anticipates a slightly oversupplied crude market in CY 2019, with Iran and Saudi Arabia producing a combined ~13 MM bbl/d. Major project start-ups in Angola and Nigeria could help to offset potential production declines in Venezuela. In addition, Iraqi production reached a record high of 4.7 MM bbl/d in December 2018 due, in part, to exports from Northern Iraq rising to 0.5 MM bbl/d, the highest level in more than a year. Iraq has exceeded its OPEC production target since August 2018, and we expect this trend to continue in CY 2019. Figure 12, below, summarizes our projections.

Figure 12 – We Expect Iranian Plus Saudi Arabian Oil Production to Total ~ 13.0 MM bbl/d in CY 2019

(MM BBL/D)	1Q2018	2Q2018	3Q2018	4Q2018	1Q2019P	2Q2019P	3Q2019P	4Q2019P
Global Oil Demand	98.3	98.7	99.8	100.1	99.5	100.4	101.3	101.4
Non OPEC Oil Supply	60.9	61.9	63.2	63.4	63.0	63.7	64.6	64.7
OPEC NGLs	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7
Call on OPEC Oil Supply	31.8	31.2	31.0	31.0	30.8	31.0	31.0	31.0
Actual OPEC Oil Supply	31.7	31.5	32.0	32.2	31.1	31.1	31.1	31.1
Oil Supply - Oil Demand	-0.1	0.3	1.0	1.2	0.3	0.1	0.1	0.1
Iran Production	3.8	3.8	3.6	3.0	2.8	2.6	2.6	2.8
Saudi Arabia Production	10.0	10.1	10.4	10.8	10.2	10.4	10.4	10.2
Other OPEC Countries Production	18.5	18.2	18.6	18.4	18.1	18.1	18.1	18.1

Note: OPEC totals exclude Qatari production of 0.6 MM bbl/d of oil and 1.3 MM bbl/d of NGLs because Qatar exited OPEC as of January 2019.

Source: ClearView Energy Partners, LLC, using IEA data

Implications of an Era of Expanding Exports

Scholars and academics have noted that newfound energy security provides American diplomats with greater flexibility to address geostrategic rivals via economic statecraft. The surge of U.S. oil production at the start of the decade helped to keep a lid on prices during the Iran oil sanctions that preceded the *Joint Comprehensive Plan of Action* (JCPOA, the 2015 Iran nuclear deal), and a similar dynamic seems likely to govern the sanctions' November 2018 reinstatement. In a similar fashion, even though the chemical composition of U.S. light, tight oil differs substantially from that of Venezuelan heavy, sour oil, America's continued production growth could provide some degree of cushion against volumetric losses resulting from the aforementioned sanctions targeting the regime of titular Venezuelan President Nicolás Maduro.

In light of those dynamics, I would suggest that – in some ways – oil and gas production growth may have facilitated the updating of U.S. foreign policy faster than the updating of U.S. domestic energy policy. Although this sequencing appears to reflect the urgency that often accompanies security issues rather than a deliberate choice by U.S. policymakers, it does not

seem optimal. Indeed, a policy orientation towards the expansion of oil and gas exports could potentially enhance the foreign policy toolkit that supply security has provided to date. To the extent that the movement of additional American molecules to international markets can buffer global balances against supply shortfalls, U.S. energy could create further economic space for new diplomatic and military options.

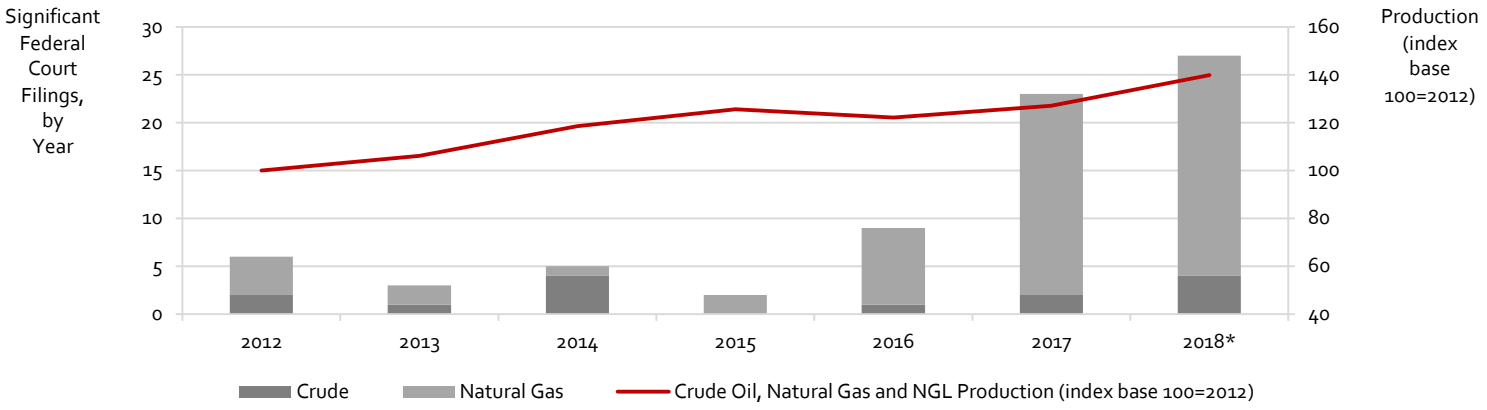
Domestically, the ramifications of low oil prices for our economy could change as U.S. consumption, production and net import dynamics evolve. Let me clearly preface my next point: I do not prefer higher gasoline prices. It does not seem a stretch to suggest that most of the world, with the exception of a small number of undiversified, major, producer-exporter nations, does not favor higher fuel costs, either. Even in some of those producer nations (and the more prolific oil-producing U.S. states), the number of licensed drivers vastly outstrips the number of oil industry and oilfield services employees.

At the same time, if falling oil prices do not yet hurt the overall U.S. economy more than they help it, they soon might. In theory, an investment multiplier could imbue oil and gas capital spending with the power to deliver greater economic upside than the consumer surplus resulting from gasoline price declines. Indeed, given that investment multipliers tend to be higher in economies with low marginal propensities to save, a dollar spent at the wellhead in the U.S. may have potential to drive considerably more economic activity than a dollar saved at the service island. As an added macroeconomic irony, falling pump prices may prove increasingly underwhelming as an economic stimulus for end-users that have become more efficient.

On a net basis, then, as U.S. liquids production approaches parity with U.S. liquids consumption, falling prices could slow economic growth. This tipping point could arrive even though combined U.S. liquids generally sell at a discount to benchmark crudes such as West Texas Intermediate, or WTI (reflecting a rich cut of lower-value NGLs) and gasoline usually sells at a premium to WTI (as a consequence of refining margins).

On a final note, time series data from our Firm's internal database of significant federal court filings (which largely excludes eminent domain proceedings) indicates that domestic production growth has corresponded to a rising number of filings by pipeline opponents, as presented in Figure 13.

Figure 13 – As Domestic Production Grows, Federal Court Challenges Mount against Infrastructure



*Preliminary; CY 2018 court filing data as of early December 2018. CY 2018 production data reflect trailing, twelve-month total crude oil, natural gas and NGL production (in quadrillions of Btu) as of September 2018.

Source: ClearView Energy Partners, LLC, using EIA and PACER and federal courts data

Recognizing that a fulsome discussion of this topic is likely to fall outside the market focus of this hearing, I would cursorily suggest that maximizing the benefits of export expansion may depend on greater regulatory clarity concerning the pipelines that transport liquids and natural gas resources to export facilities. Moreover, to the extent that energy transportation has become a proxy climate battleground, such pipeline challenges may prove to be both less economically efficient and less politically durable than market-based price signals.

Madam Chairman, this concludes my prepared testimony. I will look forward to answering any questions you or your colleagues may have at the appropriate time.