

NINTH ANNUAL

# HYDRAULIC FRACTURING

SYMPOSIUM

Thursday, October 3, 2019

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# Today's Agenda



## I. Regulatory

- Larry Nettles, Vinson & Elkins

## II. Safety/OSHA

- Chris Bacon, Vinson & Elkins

## III. Litigation

- Nick Shum, Vinson & Elkins

## IV. Fracking in Other Countries

- Anna Mikulska, Baker Institute | Kleinman Center

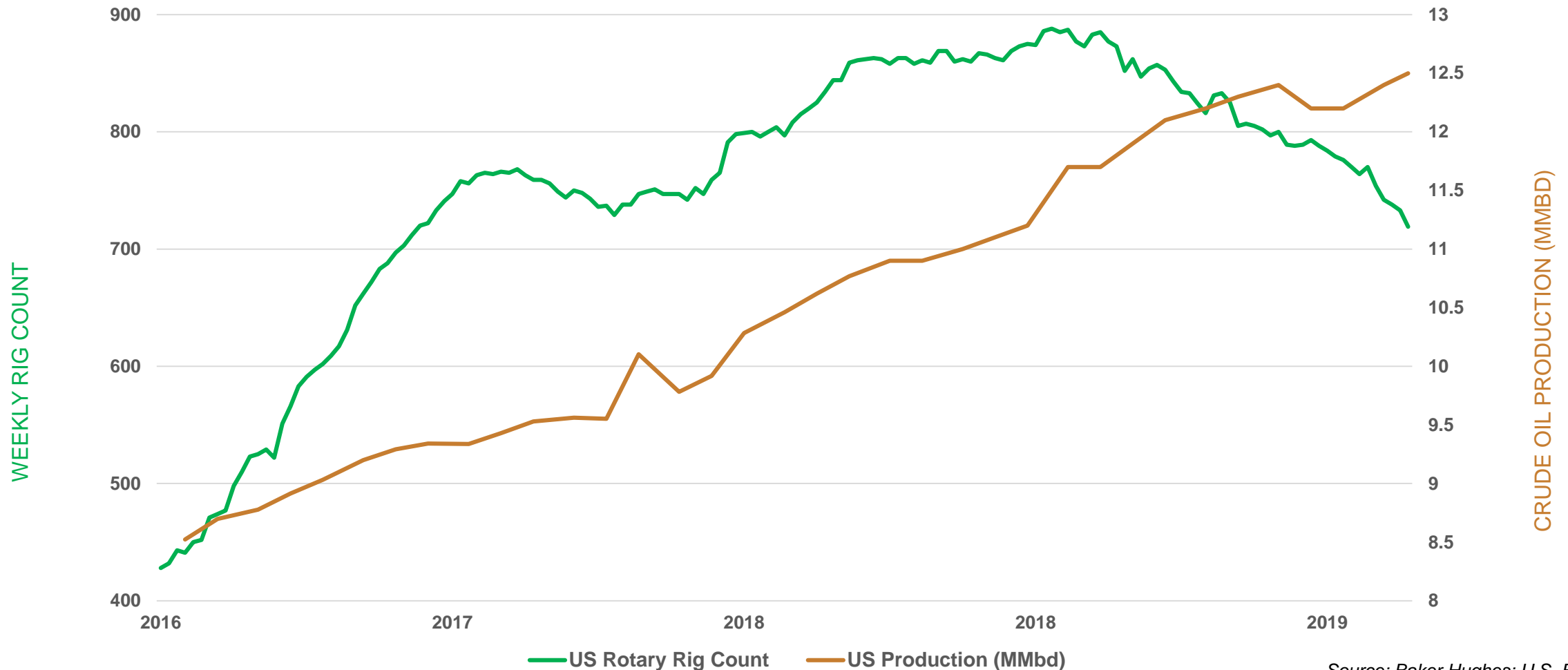
## V. Market Update

- John B. Connally IV, Vinson & Elkins

## VI. Q&A

# U.S. Rig Count & Production Trends

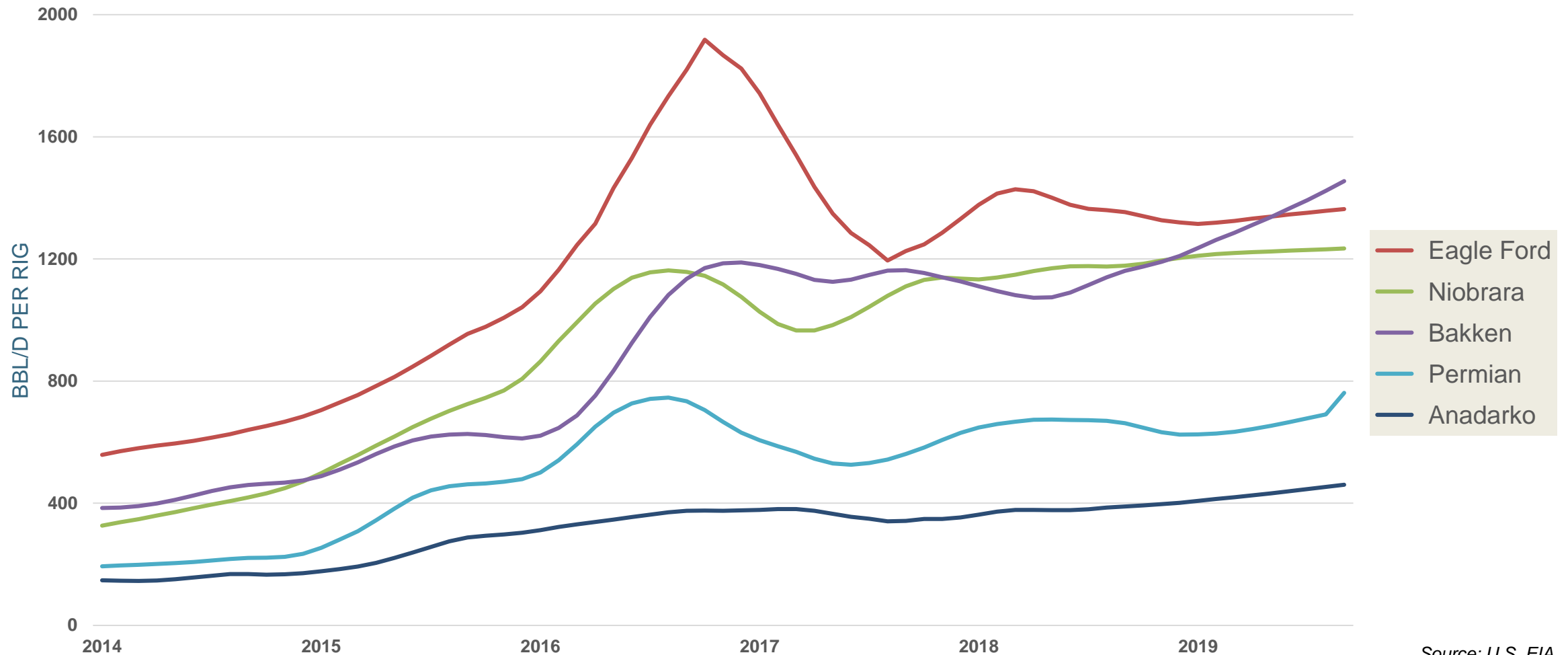
September 2016 – September 2019



Source: Baker Hughes; U.S. EIA

# Oil Production at Select Shale Fields

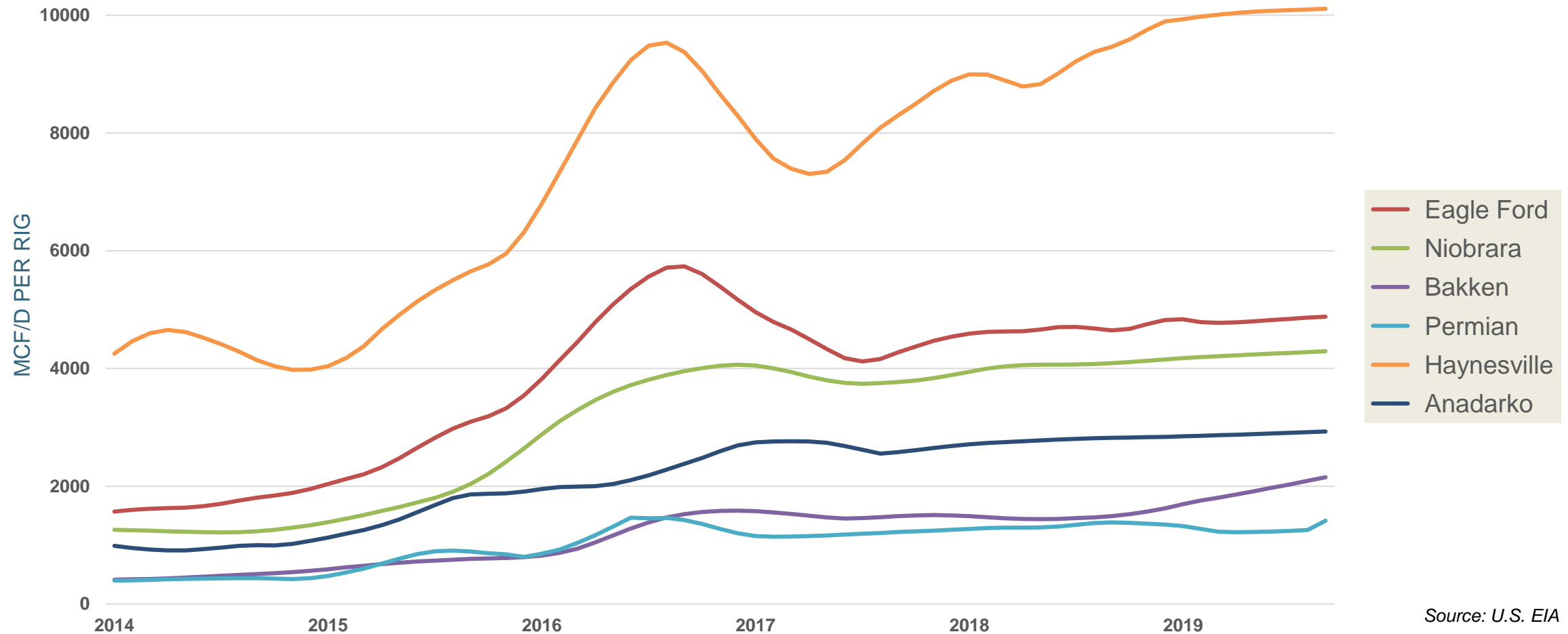
January 2014 – September 2019



Source: U.S. EIA

# Gas Production at Select Shale Fields

January 2014 – September 2019

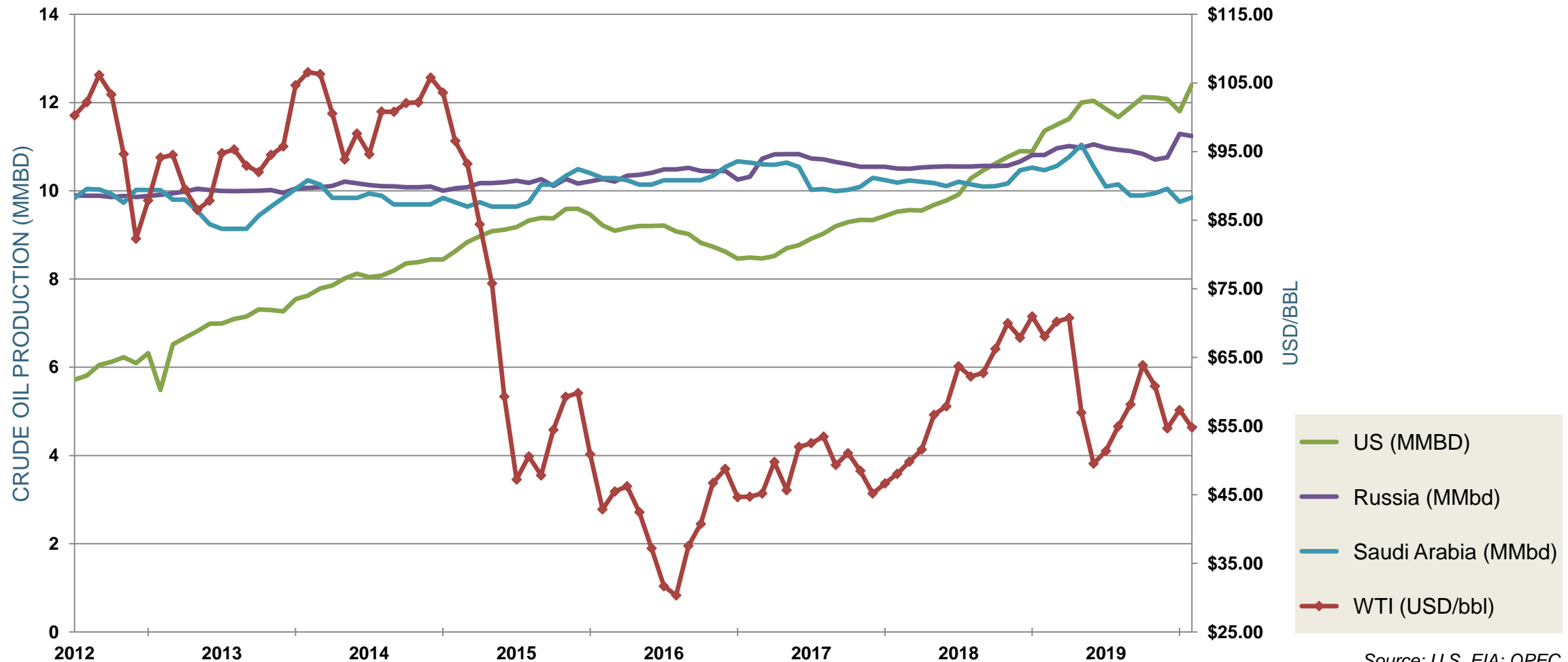


Source: U.S. EIA



# Crude Oil Production vs. WTI

January 2012 – August 2019

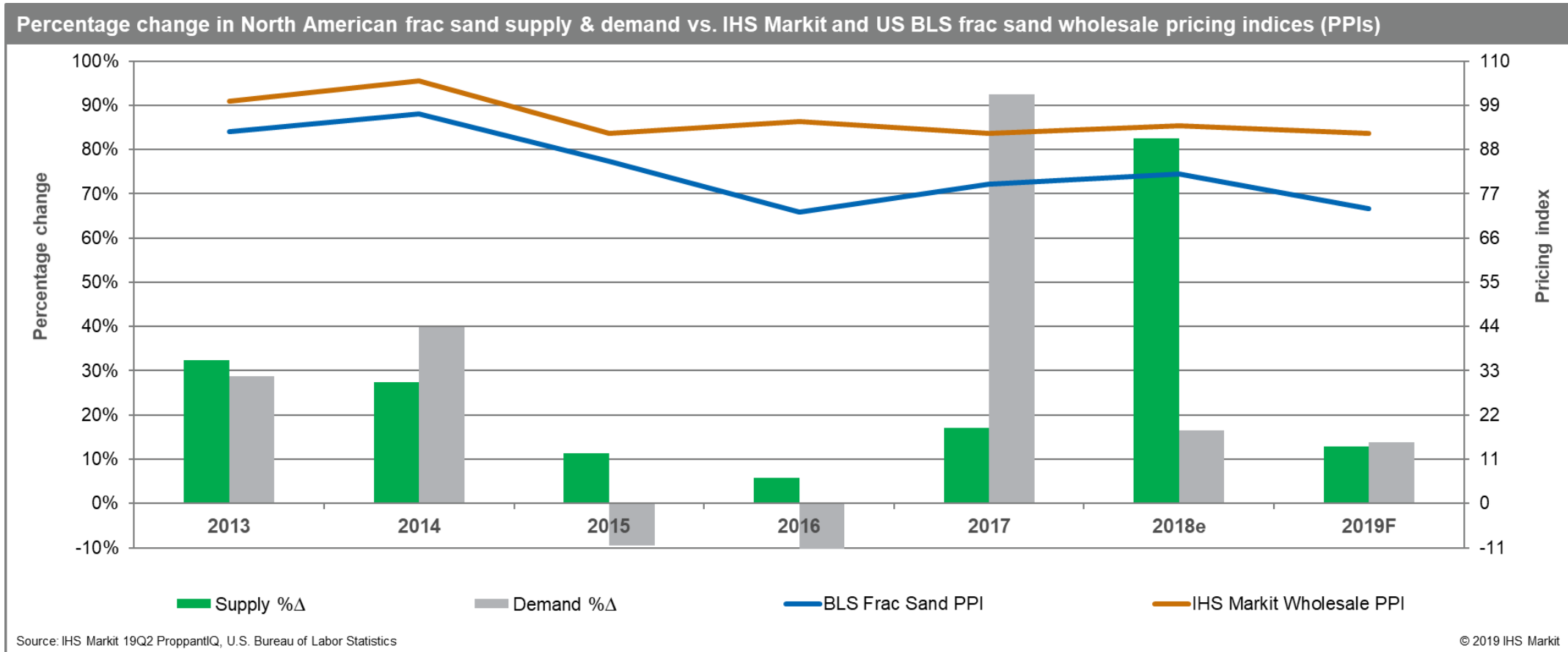


Source: U.S. EIA; OPEC

# Frac Sand Market Stabilization



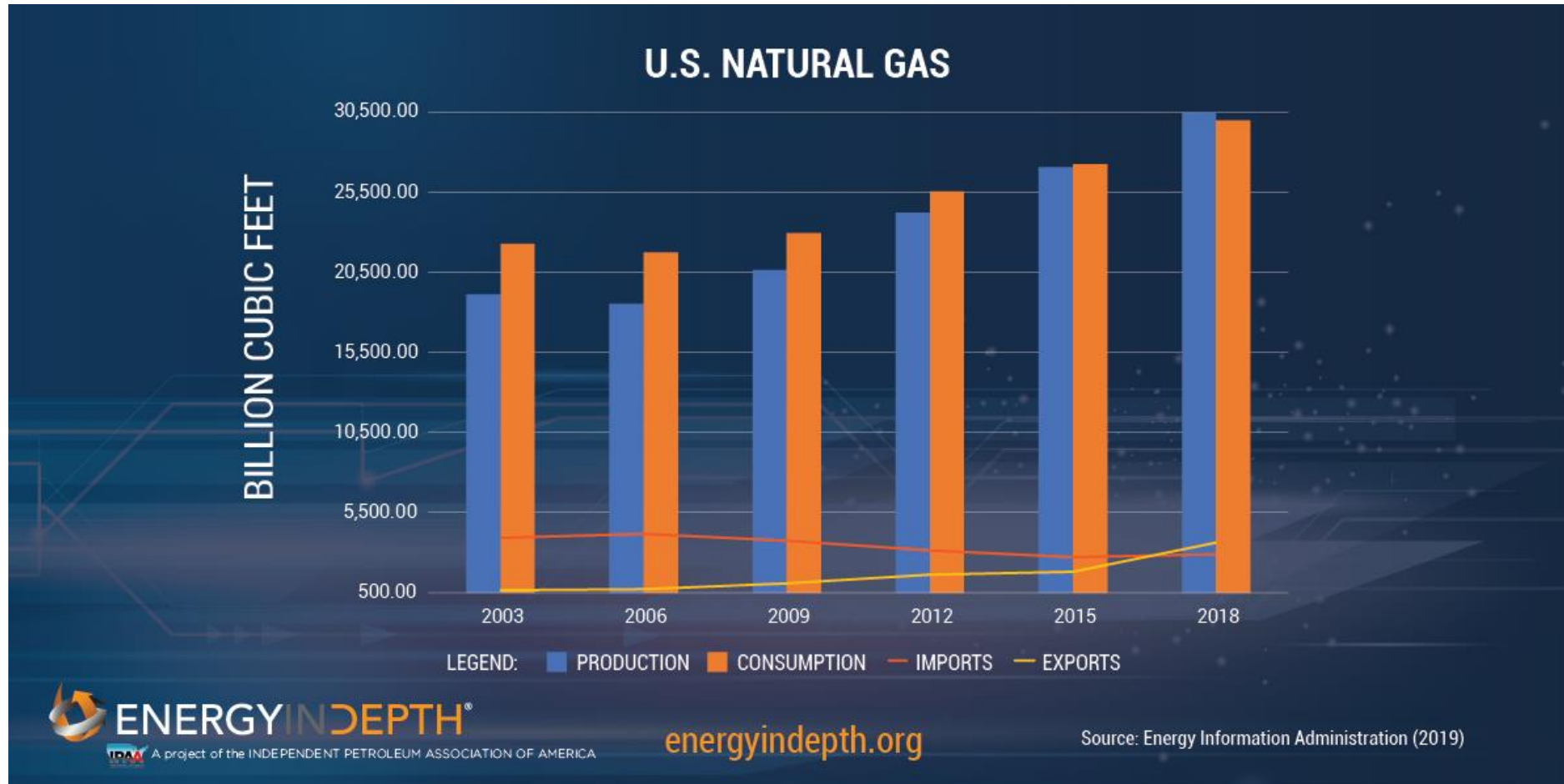
Trend toward in-basin and regional sourcing



# The Rise of U.S. Natural Gas

59% growth in natural gas production from 2003-2018

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# Natural Gas Consumption & CO<sub>2</sub>

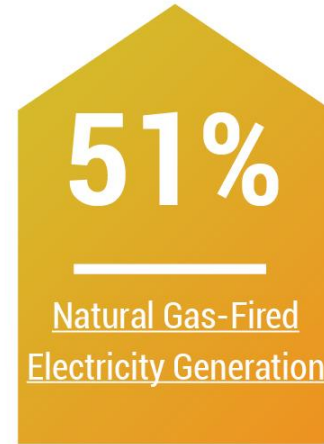
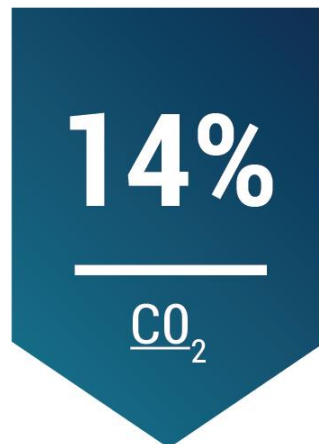
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Natural gas-fired generation outpaces renewables in CO<sub>2</sub> emissions reductions since 2005



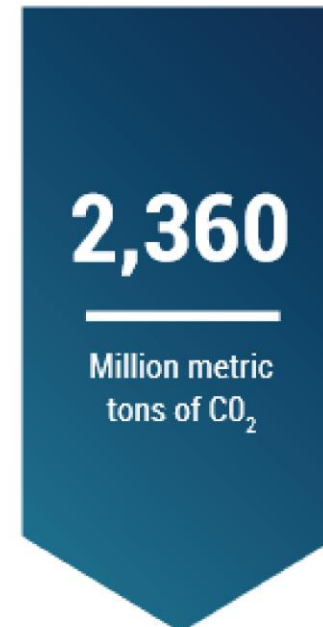
**Increased Natural Gas Use Drove U.S. Electric Power Sector CO<sub>2</sub> Emissions Reductions from 2005 to 2017**



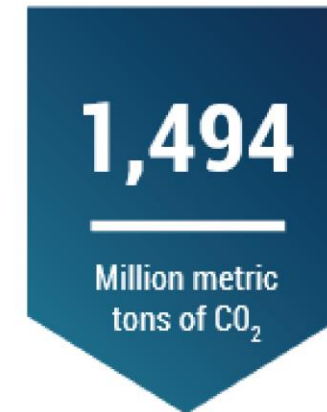
Sources: U.S. EPA GHGI, 2019 and U.S. EIA, 2006, 2019



Natural Gas  
Emissions Savings



Renewables  
Emissions Savings



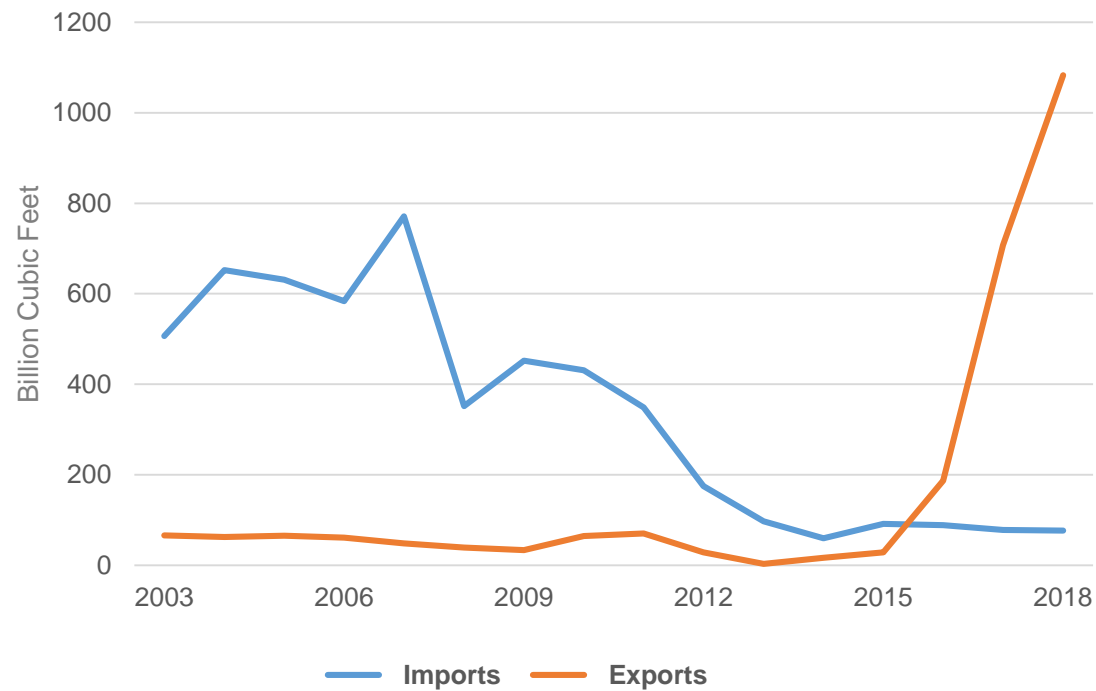
Energy Information  
Administration, 2018.

# The Rise of U.S. LNG

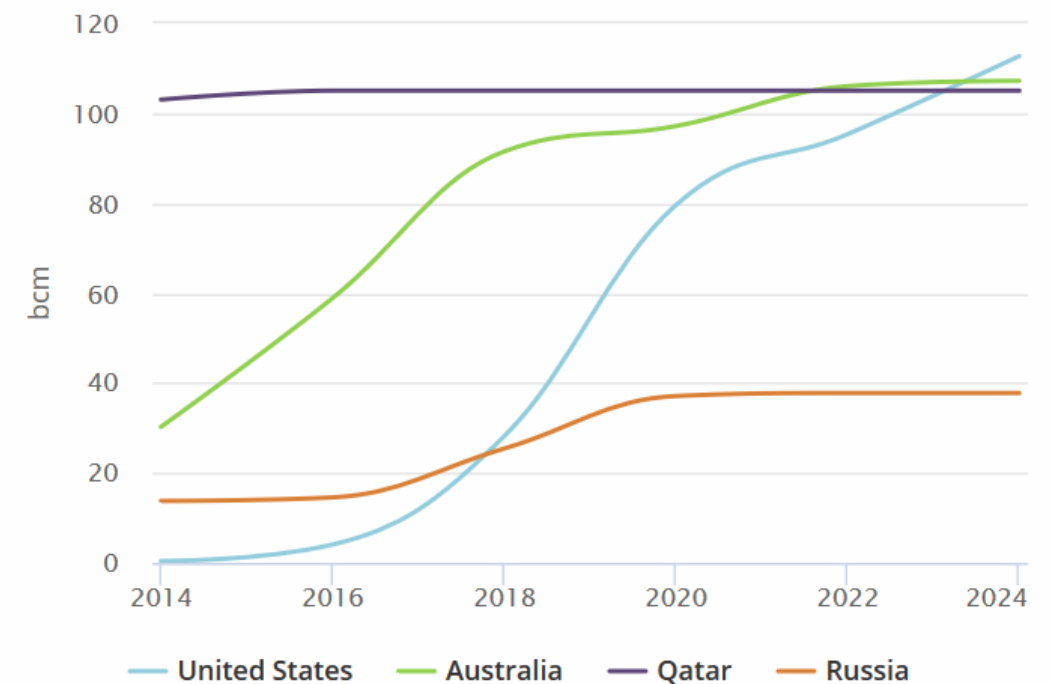
U.S is projected to be the world's top LNG exporter within the next five years



U.S. LNG



LNG exports



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# HYDRAULIC FRACTURING

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The background image shows an industrial oil field under a clear blue sky. On the left, there are several large, orange cylindrical storage tanks with metal ladders. In the center and right, a tall drilling rig with a red and white lattice structure is visible. The rig has a blue section near the top and is connected to a base with various pipes and equipment. The overall scene is a typical oil and gas extraction site.

REGULATORY UPDATE

Larry Nettles, Vinson & Elkins










# Regulatory Rollback

Environmental progress as of September 2019

- Shortly after the inauguration, the Trump Administration issued several Executive Orders calling for the review and potential rescission of many regulations.
- Relatively little existing regulation removed from the books, but a considerable set of significant regulations withdrawn or delayed.
  - As of September 2019, *The New York Times* identified 85 rollbacks of environmental rules.
- Near-universal legal challenges to rollbacks.
- Slowdown in new regulatory activity.



	53	32	85
	ROLLBACKS COMPLETED	ROLLBACKS IN PROCESS	TOTAL ROLLBACKS
 Air pollution and emissions	10	14	24
 Drilling and extraction	9	9	18
 Infrastructure and planning	12	1	13
 Animals	9	1	10
 Toxic substances and safety	4	1	5
 Water pollution	5	2	7
 Other	4	4	8

# Regulatory Rollback

Quad Oa: August 2019 Proposed Rule



- On August 28, 2019, EPA released a proposed rule that would:
  - rescind the methane requirements applicable to sources in the production and processing segments; and
  - remove all sources in the transmission and storage segment from the oil and natural gas industry source category subject to NSPS regulation.
- If promulgated as proposed, producers would no longer be required to inspect for methane leaks from existing wells, storage tanks, pipelines and other infrastructure.
- Rule is premised on the value of methane and producers' incentive to minimize leaks.



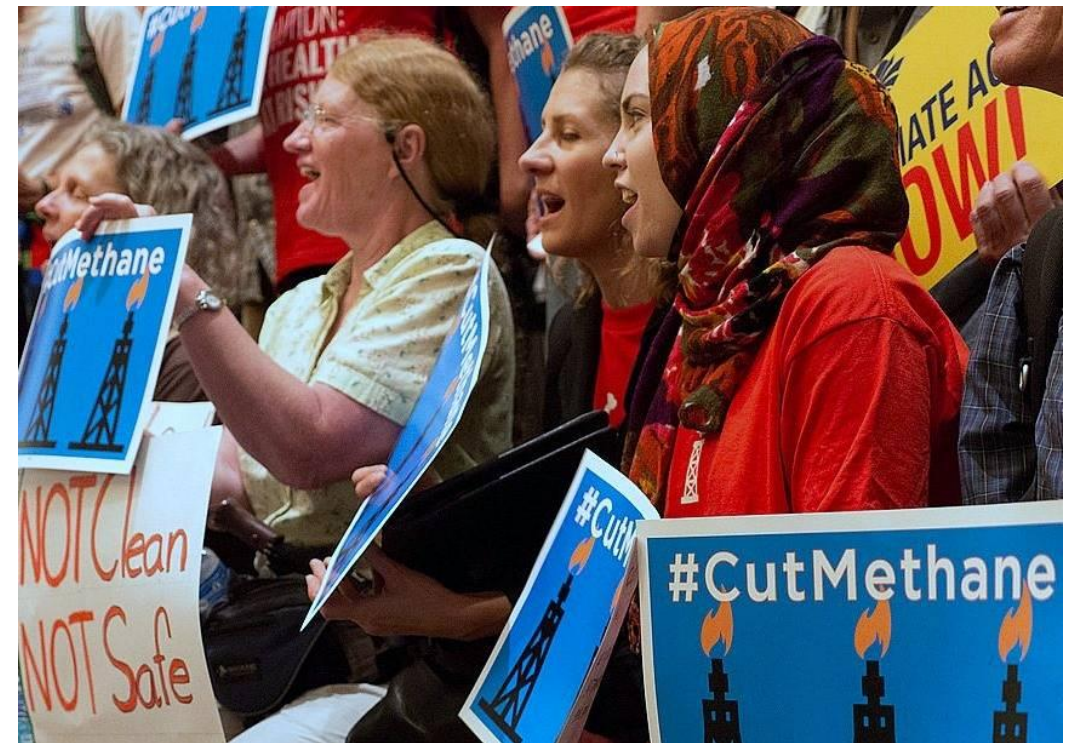


# Regulatory Rollback

Quad Oa: August 2019 Proposed Rule

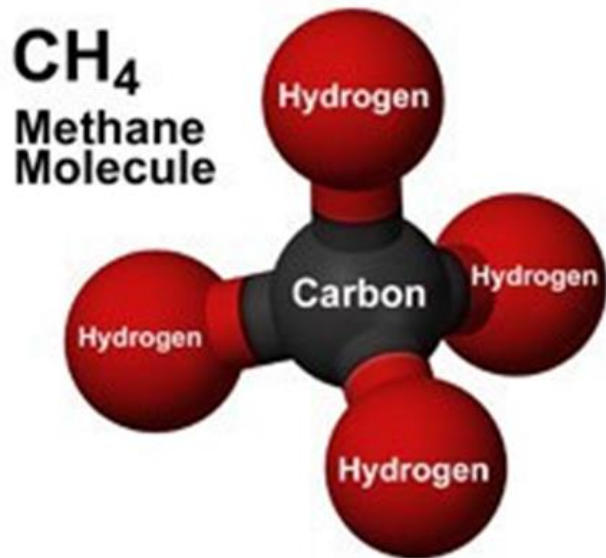


- EPA's proposed rule includes an alternative proposal whereby EPA would:
  - rescind the methane requirements that apply to all sources in the oil and natural gas industry,
  - but retain sources in the transmission and storage segment within the oil and natural gas industry source category subject to NSPS regulation.
- EPA estimates that its proposed rule would result in savings to industry ranging from \$97-123 million through 2025.



# Regulatory Rollback

Quad Oa: August 2019 Proposed Rule



- EPA has also solicited comment regarding “alternative interpretations” of its legal authority to regulate pollutants (i.e., methane) under Section 111(b) of the Clean Air Act (CAA).
    - Does the CAA require EPA to make a pollutant-specific finding that GHG emissions (primarily methane) from the oil and natural gas industry cause, or significantly contribute to, air pollution that may endanger public health or welfare?
- EPA’s proposed rule will be subject to a 60-day comment period following publication in the Federal Register.
- EPA has also announced that it will hold a public hearing on the proposed rule on October 17, 2019 in Dallas, Texas.

# Regulatory Rollback

Quad Oa: October 2018 Proposed Rule



- Meanwhile, EPA's October 15, 2018, proposed rulemaking consisting of "targeted improvements" to Quad Oa remains pending.
  - Modified schedule for fugitive emissions monitoring and repairs at well sites and compressor stations.
  - Ability to meet certain existing state fugitive emissions requirements as an alternative to NSPS compliance (including well sites in Texas and Colorado).
  - Expanded technical infeasibility exception to pneumatic pump requirements.
  - Streamlined process for requesting an alternative means of emissions limitation.





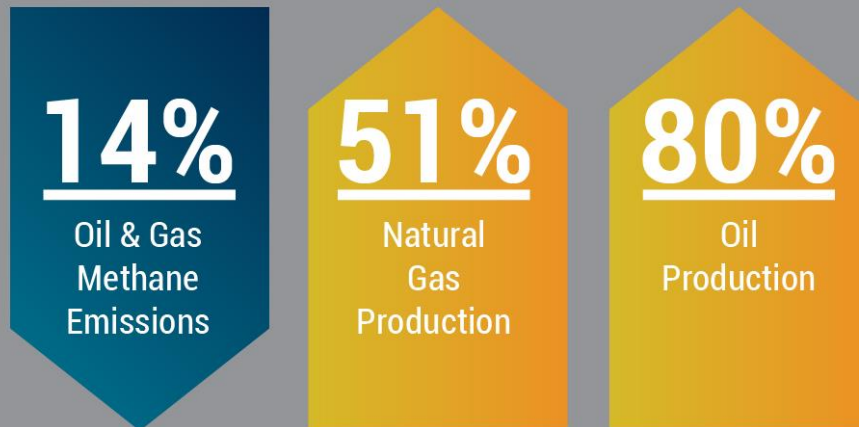
# Regulatory Rollback

Quad Oa: Methane Emissions in Context

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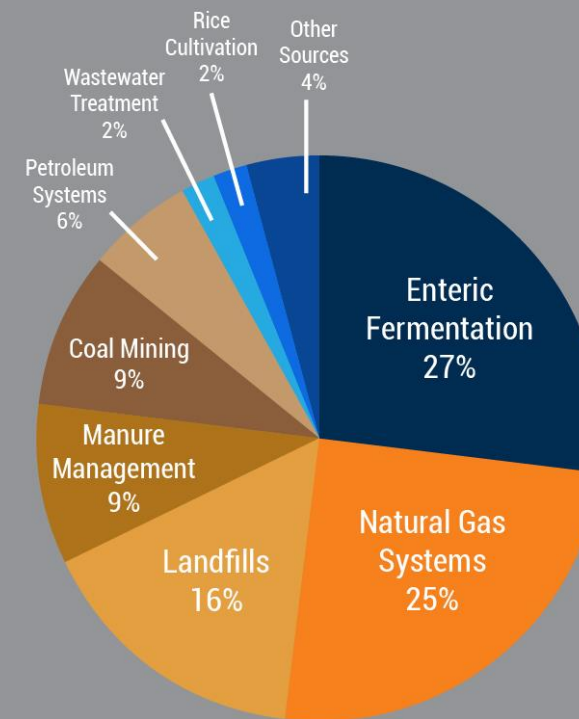
## METHANE EMISSIONS DECLINE AS OIL & GAS PRODUCTION GROWS



Sources: U.S. EPA,  
U.S. EIA; 1990-2017

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IPAA A project of the INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA

## U.S. METHANE EMISSIONS BY SOURCE



Source: U.S. EPA  
(GHGI, 2019)

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# Regulatory Rollback

Clean Power Plan → Affordable Clean Energy Rule



- President Trump's March 2017 Executive Order on Energy Independence called for EPA to review the Clean Power Plan (CPP).
- On July 8, 2019, EPA published its final replacement rule—the Affordable Clean Energy Rule (ACE)—in the Federal Register. The ACE:
  - repeals the CPP; and
  - establishes emission guidelines for states to develop plans to address GHG emissions from existing coal-fired power plants.
- EPA's proposed New Source Review program reforms aimed at incentivizing efficiency improvements remain pending.





# Regulatory Rollback

Clean Power Plan → Affordable Clean Energy Rule

- On September 17, 2019, the D.C. Circuit granted motions to dismiss litigation challenging the CPP, reasoning that the ACE renders the petitions moot.
  - The challenges to the CPP had been held in abeyance since April 2017.
- Several aligned groups have already filed suits challenging the ACE, including states, cities, public health groups, and a group of utilities calling itself the Power Companies Climate Coalition.

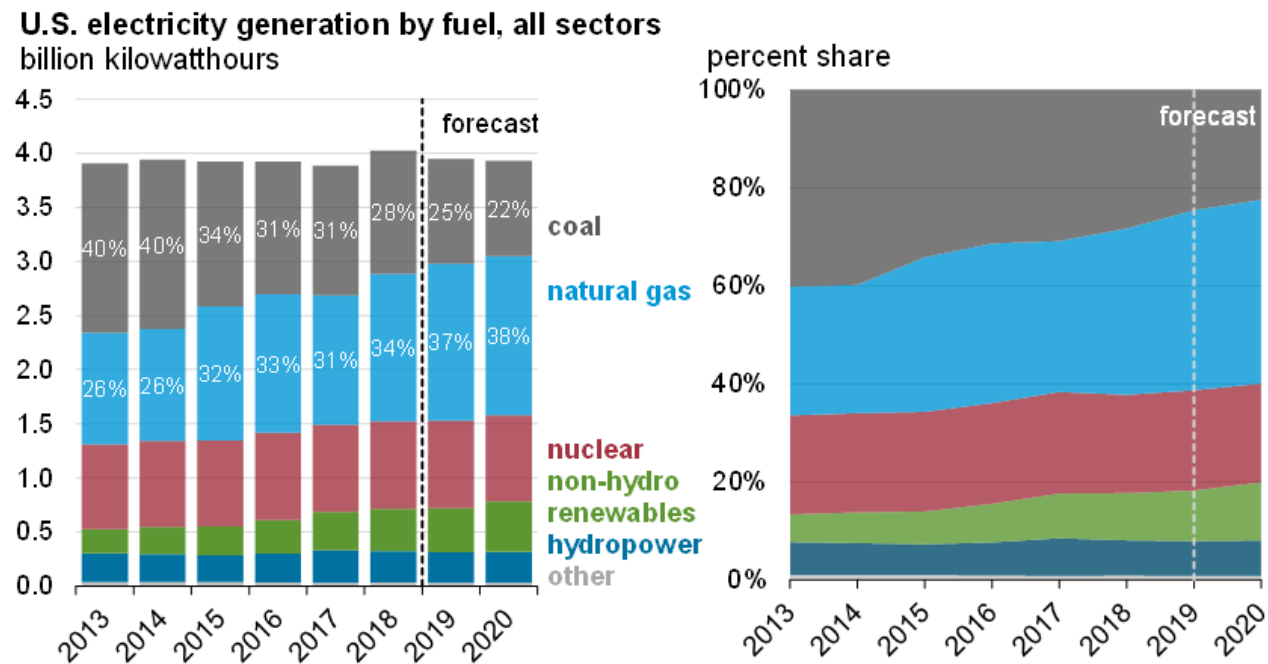


# Regulatory Rollback

## The Affordable Clean Energy Rule & Trends in Power Generation



- Notwithstanding the ACE, underlying economic trends continue to support an increasing role for natural gas-fired power generation.



# Regulatory Rollback

## The Affordable Clean Energy Rule & Trends in Power Generation

- However, regulatory developments that limit hydraulic fracturing or constrain pipeline capacity risk upsetting these trends.



### Just In...

Schumer demands GOP investigate, issue subpoena over whistleblower complaint

SENATE — 9M 48S AGO

Florida detective resigns after mass shooting threat

STATE WATCH — 12M 4S AGO

Trump is right to counter Iran's terror — combat vets have seen its effects

OPINION — 21M 26S AGO

## Fracking ban could have unintended consequence of boosting coal

BY ELLEN R. WALD, OPINION CONTRIBUTOR — 09/22/19 03:00 PM EDT  
THE VIEWS EXPRESSED BY CONTRIBUTORS ARE THEIR OWN AND NOT THE VIEW OF THE HILL

638 COMMENTS

57 SHARES



© Getty Images

A big environmental talking point this election season is a call to ban

### Most Popular

1 Giuliani can't say 100 percent...

613 SHARES

2 Juan Williams: Black Republicans...

520 SHARES

3 Ukraine controversy follows Trump...

378 SHARES

4 Warren comes under new pressure...

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In photos and video: Climate protests snarl D.C.'s morning commute

Karen Clay Sep 20, 2019

### EXPERT VOICES

## Stalled gas pipelines could push power grids back to oil and coal



Construction of a Spectra Energy pipeline in Peekskill, N.Y., in Aug. 2016. Photo: Erik McGregor/Pacific Press/LightRocket via Getty Images



# Regulatory Rollback

## “Waters of the United States”

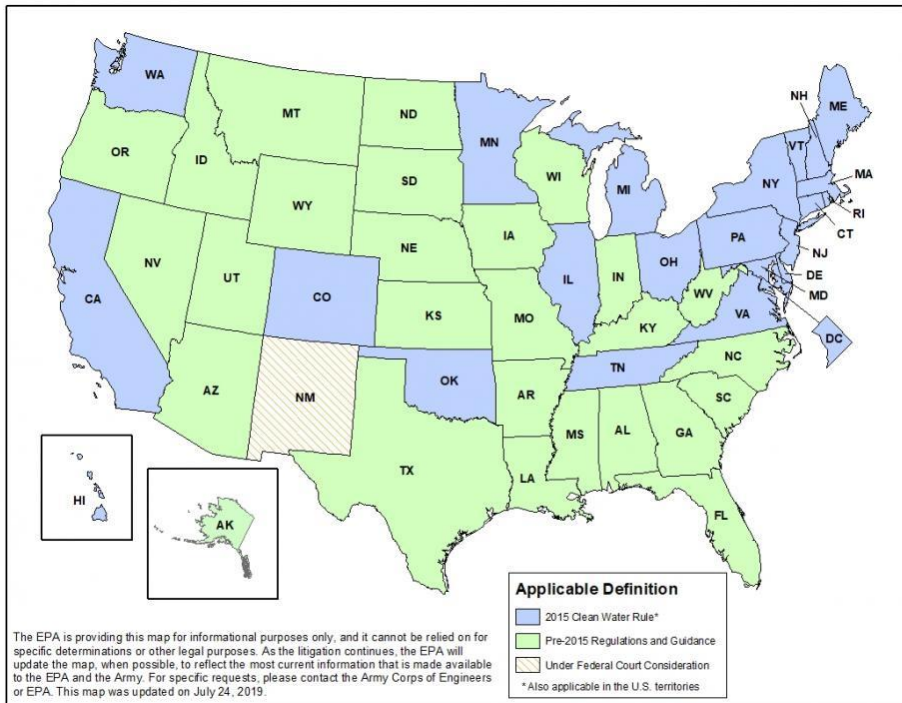


- In August 2015, a federal court in North Dakota enjoined EPA’s expansive “waters of the United States” rule (WOTUS) in 13 states.
  - Shortly thereafter, the Sixth Circuit stayed the rule nationwide.
- On February 28, 2017, President Trump issued an Executive Order calling for EPA to review the WOTUS rule.
- EPA’s proposed rulemaking process will proceed in two steps:
  - First, EPA will repeal the 2015 version of the WOTUS rule and replace it with the pre-2015 version.
  - Second, EPA will reevaluate and revise the definition of “waters of the United States” under the Clean Water Act (CWA).



# Regulatory Rollback

## “Waters of the United States”—Repeal



- On September 12, 2019, EPA issued a pre-publication version of its final rule to repeal the 2015 version of the WOTUS rule and replace it with the regulatory text that existed prior to the 2015 WOTUS rule.
  - The rule will be effective 60 days following the date of its publication in the Federal Register.
  - EPA will implement the pre-2015 WOTUS rule regulatory text “informed by applicable agency guidance documents and consistent with Supreme Court decisions and longstanding agency practice.”
  - Due to various litigation surrounding the 2015 WOTUS rule, this approach was already in effect in most states.



# Regulatory Rollback



## “Waters of the United States”—Replace

- On February 14, 2019, EPA published its proposed replacement rule in the Federal Register.
- The proposed rule identifies six categories of waters that would be considered “waters of the United States”:

Categories	Notes
Traditional Navigable Waters	Used in interstate commerce
Tributaries	To Traditional Navigable Waters
Certain Ditches	Those that are navigable, were constructed in a tributary, or were built in adjacent wetlands
Certain Lakes and Ponds	Those that are navigable, or those that are flooded by waters of the United States in a typical year
Impoundments	Of jurisdictional waters
Adjacent Wetlands	That physically touch jurisdictional waters (including by flooding in a typical year)

# Regulatory Rollback



“Waters of the United States”—Replace

- The proposed rule also identifies several categories of waters that would not be considered “waters of the United States”:

Excluded Waters
Ephemeral features
Groundwater
Ditches not defined as a “water of the United States”
Prior converted cropland
Stormwater control features created in upland
Wastewater recycling structures created in upland
Waste treatment systems



# Regulatory Rollback

“Waters of the United States”—Replace

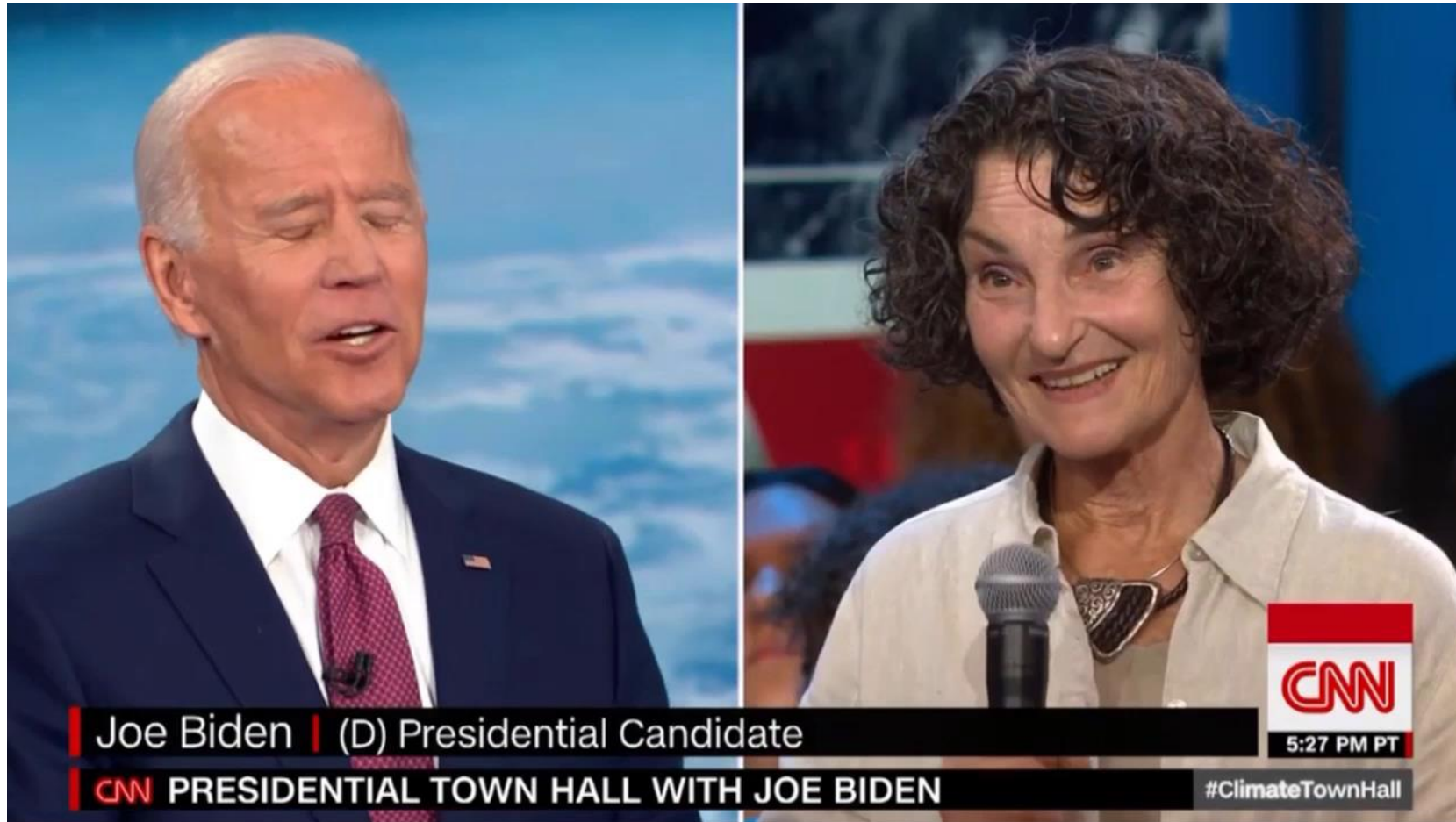


- EPA expects that its replacement rule would result in \$28-266 million in annual avoided costs under the CWA Section 404 program.
- Final action on EPA's proposed replacement rule remains pending.
  - 60-day public comment period closed on April 15, 2019.
  - Over 11,000 comments filed on regulations.gov.
- According to the Office of Management and Budget's Spring 2019 Unified Agenda and Regulatory Plan, a final rule is expected in December 2019.



# Election 2020

Joe Biden





# Election 2020

Elizabeth Warren



**Elizabeth Warren** ✓  
@ewarren



On my first day as president, I will sign an executive order that puts a total moratorium on all new fossil fuel leases for drilling offshore and on public lands. And I will ban fracking—everywhere.

♡ 119K 4:26 PM - Sep 6, 2019 ⓘ

💬 37.4K people are talking about this >

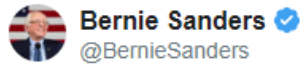
— **END DRILLING** —  
**OFFSHORE AND ON PUBLIC LANDS**

**We have a president who's taking  
a bad problem and making it worse.**



# Election 2020

Bernie Sanders



**Bernie Sanders** ✓  
@BernieSanders



Any proposal to avert the climate crisis must include a full fracking ban on public and private lands.

♥ 14.4K 2:40 PM - Sep 4, 2019



💬 2,804 people are talking about this



# Election 2020

The Rest of the Pack (candidates currently qualified for the October 15 debate as of September 24)



- [Amy Klobuchar](#): supports regulations on hydraulic fracturing\*; “as president in my first 100 days, I will review every fracking permit there is and decide which ones should be allowed to be continued and which ones are too dangerous.”\*\*
- [Cory Booker](#): supports a ban on hydraulic fracturing\*; climate plan calls for “phasing out fracking.”
- [Pete Buttigieg](#): “I favor a ban on new fracking and a rapid end to existing fracking so that we can build a 100 percent clean energy society as soon as possible.”\*
- [Kamala Harris](#): “There’s no question I’m in favor of banning fracking, and starting . . . with what we can do on day one around public lands, right? And then there has to be legislation, but yes . . . .”\*\*

## Sources:

\*Statement by candidate or campaign to *The Washington Post*

\*\*Sept. 4, 2019 “CNN Climate Town Hall”

# Election 2020

The Rest of the Pack (candidates currently qualified for the October 15 debate as of September 24)



- Andrew Yang: supports a ban on fracking “in any place that public water quality could be put at risk”\*; “would not be in favor of banning fracking completely, but in most cases.”\*
- Beto O’Rourke: “would ban new fracking on public lands and get to net zero emissions by 2050.”\*
- Julian Castro: “I support local communities and states that want to ban fracking. I have not called for an immediate ban on fracking”\*\*; would end leasing of federal lands for fossil fuel extraction and exploration.\*
- Tom Steyer: “I’m not sure you can just say there is no fracking for starters. You can say there’s no fracking on federal land. You can say, no new federal leases for fracking. I would do that.”\*\*\*
- Tulsi Gabbard: “Yes, I support a ban on all hydraulic fracking operations.”\*

## Sources:

\*Statement by candidate or campaign to *The Washington Post*

\*\*Sept. 4, 2019  
“CNN Climate Town Hall”

\*\*\*Sept. 10, 2019 report by *The Washington Post*

# Election 2020

## The Limits of Executive Power

- A President cannot ban hydraulic fracturing, or end oil and gas leases on federal lands by executive order alone.
- The Energy Policy Act of 2005 excludes hydraulic fracturing from regulation under the Safe Drinking Water Act's underground injection control program—the so-called “Halliburton Loophole.”
  - At various points, both industry and anti-oil and gas groups have (mistakenly) claimed that this provision exempts hydraulic fracturing from federal regulation more broadly.
- President Obama's attempted six-month moratorium on pending, current, or approved offshore drilling in 2010 was tossed by a federal district court as an unjustified “blanket, generic, indeed punitive, moratorium.”



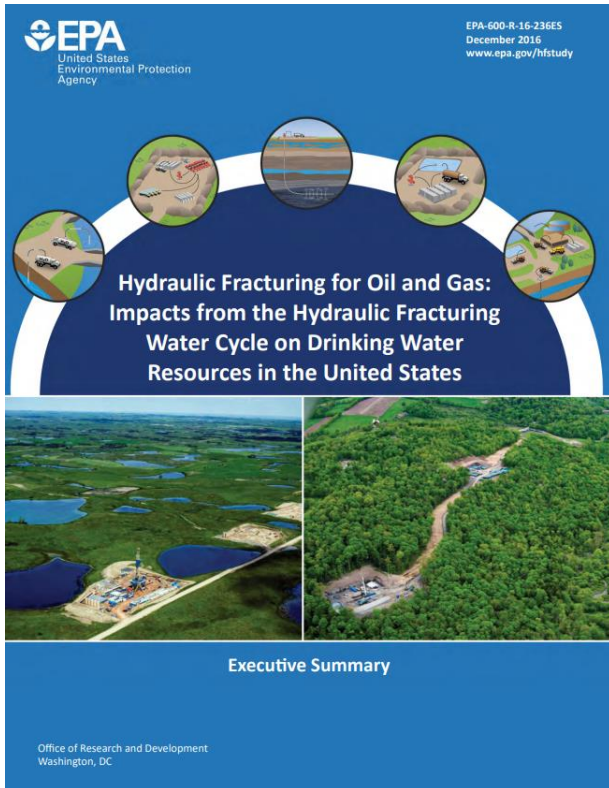


# Election 2020

## The Limits of Executive Power



- Any effort to ban hydraulic fracturing at the federal level would have to overcome a robust administrative record of prior determinations relating to hydraulic fracturing. For example:
  - EPA 2016 final report regarding impacts to water resources deleted the draft report's conclusion of no "widespread, systemic impacts," but still contains favorable findings regarding the ability to reduce the frequency or severity of potential impacts in almost all cases.
  - 2015 BLM rule preamble includes a detailed response to comments seeking a ban on hydraulic fracturing.
    - "A ban or moratorium would not satisfy the BLM's multiple-use responsibilities under the FLPMA when regulations can adequately reduce the risks associated with hydraulic fracturing operations."



# State Developments

Colorado: S.B. 19-181



- **Nov. 6, 2018:** Initiative 97 rejected by Colorado voters.
- **Jan. 14, 2019:** Colorado Supreme Court issues decision in *Colorado Oil and Gas Conservation Commission (COGCC) v. Martinez*, affirming COGCC's role in "foster[ing] the development of [Colorado's] oil and gas resources."
- **March 1, 2019:** Democratic lawmakers in Colorado introduce S.B. 19-181.
- **March 14, 2019:** S.B. 19-181 passes Colorado Senate.
- **March 29, 2019:** S.B. 19-181 passes Colorado House of Representatives.
- **April 3, 2019:** Colorado Senate passes amended bill.
- **April 16, 2019:** Governor Polis signs S.B. 19-181 into law.



Gov. Polis signs S.B. 19-181 into law on April 16, 2019.  
(Source: Denver Post).

# State Developments

Colorado: S.B. 19-181—Practical Effects

- COGCC mandate changes from “fostering” development to “regulating” the industry (a direct response to *Martinez*).
- Increased role for local governments with respect to surface impacts and siting.
- Changes to COGCC composition, including the immediate addition of a commissioner with public health expertise.
  - New “professional” Commission by July 1, 2020.
  - Must include one appointed member with “substantial experience in environmental protection, wildlife protection, or reclamation.”
- Drilling and spacing conflicts move from COGCC decisions to administrative law judges.



# State Developments



Colorado: S.B.19-181—A Sample of Significant COGCC Mandates

- “adopt rules to minimize emissions”;
- “review its rules for oil and natural gas well production facilities and compressor station and specifically consider adopting more stringent provisions”;
- “regulate oil and gas operations in a reasonable manner to protect and minimize adverse impacts to public health, safety, and welfare, the environment, and wildlife resources and shall protect against adverse environmental impacts on any air, water, soil, or biological resource resulting from oil and gas operations”;
- adopt rules for an “alternative location analysis process and specify criteria used to identify oil and gas locations . . . to be located near populated areas”;
- adopt rules that “evaluate and address the potential cumulative impacts of oil and gas development”;
- “promulgate rules to ensure proper wellbore integrity of all oil and gas production wells”;
- “review and amend its flowline and inactive, temporarily abandoned, and shut-in well rules”; and
- “adopt rules to require certification” for certain oil and gas industry workers.



# State Developments

Colorado: S.B. 19-181—COGCC Progress

- COGCC staff have held over 200 meetings with stakeholders regarding the implementation of S.B. 19-181.
- COGCC staff have already generated over 160 rulemaking suggestions.
- Full rulemaking schedule available at [http://cogcc.state.co.us/sb19181\\_calendar.html#/calendar](http://cogcc.state.co.us/sb19181_calendar.html#/calendar).
  - Public hearings in various communities already scheduled through January 2020, with others to come through June 2020.
- COGCC already accepting public comments on its four initial rulemaking topics—alternative location analysis, cumulative impacts, flowline, and mission change.
  - [https://cogcc.state.co.us/sb19181.html#/public\\_comments](https://cogcc.state.co.us/sb19181.html#/public_comments).



SENATE BILL 19-181

BY SENATOR(S) Fenberg and Foote, Court, Gonzales, Lee, Moreno, Story, Williams A., Winter;  
also REPRESENTATIVE(S) Becker and Caraveo, Arndt, Benavidez, Bird, Buckner, Duran, Gonzales-Gutierrez, Gray, Herod, Hooton, Jackson, Jaquez Lewis, Kennedy, Kipp, Lontine, McCluskie, Melton, Michaelson Jenet, Mullica, Roberts, Singer, Sirota, Snyder, Sullivan, Tipper, Valdez A., Weissman.

# State Developments

California: A.B. 1440

- Even prior to the introduction of S.B. 19-181 in Colorado, lawmakers in California had introduced A.B. 1440 on February 22, 2019.
- Similar to S.B. 19-181, A.B. 1440:
  - revises the purpose of the state’s Oil and Gas Supervisor to remove all references “encouraging” the development of oil and gas resources; and
  - revises the Supervisor’s mandate to “help ensure the wise oversight of oil and gas development used to meet oil and gas needs in [California].”
- The California Legislature passed A.B. 1440 on September 5, 2019. The bill is now on Governor Newsom’s desk.



# State Developments

## California: DOGGR Drama

- Governor Newsom fired Ken Harris, California's Oil and Gas Supervisor and head of the Department of Conservation's Division of Oil, Gas, and Geothermal Resources (DOGGR), on July 11, 2019.
  - The firing followed an investigation by *The Desert Sun* reporting that the pace of DOGGR's issuance of permits for hydraulic fracturing had doubled since Newsom took office.
  - Additionally, *The Desert Sun* reported that eight senior DOGGR employees were invested in, or consulting for, oil companies.
- California Natural Resources Secretary Wade Crowfoot is conducting an internal review of thousands of permits issued by DOGGR in the wake of *The Desert Sun's* reporting.



# State Developments

## California: A De-Facto Moratorium and Other Developments



- California has not issued any permits for hydraulic fracturing activities since June 28.
  - A spokeswoman for the Secretary of Natural Resources said Newsom's administration "has been working to develop a thorough understanding of the permit approval process to ensure all permits meet regulatory requirements."
- A.B. 345, which would require a 2,500 foot setback for all new oil and gas development and rework operations on non-federal land, remains pending.
  - Measure is similar to Colorado's failed Proposition 112.
  - Hearings on the A.B. 345 were postponed by Senate Committee on Appropriations in May.





# State Developments

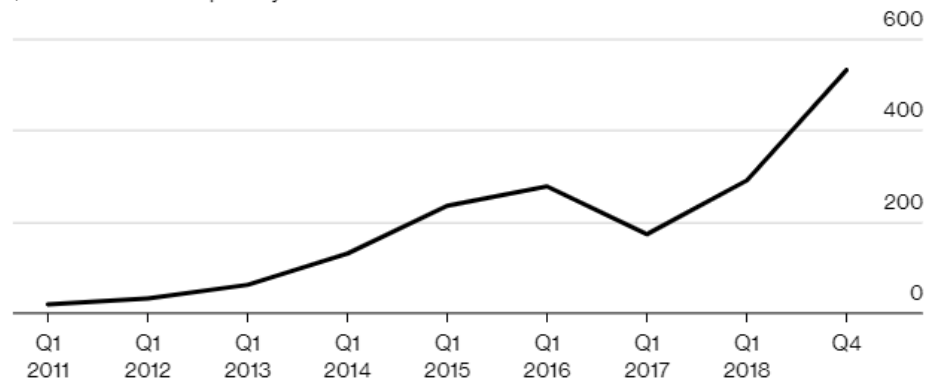


## Texas: Flared Gas in the Permian

### Burning Gas

Flaring has increased in the Permian as oil production surges, pipelines fill up

✓ Million cubic feet per day



Source: Rystad Energy

- Rose 85% in 2018.
- Hit a record high in June 2019.
- Is a direct result of inadequate pipeline capacity (9.5 bcf of pipeline capacity vs. 13 bcf of production).
- Is enough to fuel the full residential demand of Texas.
- Resulted in negative spot prices at the Waha hub in March 2019.

- About 4 bcf of additional pipeline capacity is expected to come on-line in the next year.
- The Gulf Coast Express pipeline, which adds about 2 bcf capacity, entered into service ahead of schedule on September 24.
- Waha hub prices have been consistently higher since the late August 2019 announcement that the Gulf Coast Express pipeline was preparing to enter service.

# State Developments

## Texas: Flared Gas in the Permian



- In August 2019, the Railroad Commission (RRC) approved a flaring permit seeking to flare nearly all of the gas produced by a group of wells, even though the wells were connected to a pipeline.
  - This was the first such request by a producer, and the first such protest by a midstream company to a flaring permit.
- The RRC's 2-1 decision reasoned that the pipeline contract was uneconomic.
  - However, Railroad Commission Chairman Wayne Christian voted against the permit in a rare split decision, and questioned “whether the current level of flaring is in the long-term best interest of the state of Texas, the industry and the Railroad Commission.”



# What to Watch

## Federal Developments

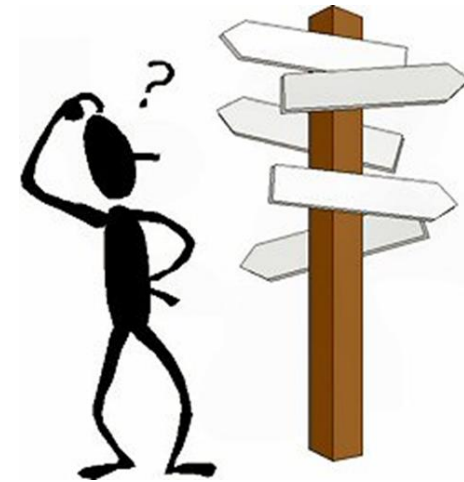
- How broadly will EPA act with respect to its rollback of methane emissions regulations? Will industry be on board?
- Continued developments regarding judicial challenges to regulatory rollbacks, both completed (e.g., ACE Rule) and forthcoming (e.g., methane, WOTUS).
- How will the 2020 election impact the industry? What regulations could be subject to Congressional Review Act disapproval if there is a change in administration?



# What to Watch

## State Developments

- How drastically will rulemaking efforts arising out of S.B. 19-181 change the regulatory landscape in Colorado? To what degree will other states look to Colorado's S.B. 19-181 as model legislation?
- How will local governments in Colorado exercise their increased role?
- What will come of the California investigation of issued permits? How long will hydraulic fracturing permits be subject to a de facto moratorium? Will California seek to reform its permitting program?
- Is forthcoming pipeline capacity in Texas enough to help curb flaring? According to consulting firm RBN Energy, Texas's gas production is expected to increase 30% over the next five years...
- Is RRC Chairman Christian signaling a potential change in the RRC's view on flaring?





# Speaker Biography

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SYMPOSIUM



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Larry, a partner in Vinson & Elkins' Houston office, has been practicing environmental law full-time since 1981 and has an exceptionally broad range of environmental law experience that makes him particularly well suited to advise clients with multi-faceted environmental problems, such as those frequently encountered in large business transactions. Larry currently serves as the Environmental and Natural Resources Practice Group Leader, Co-Chair of the firm's Energy and Infrastructure practice group and Chair of the Shale and Hydraulic Fracturing Task Force. He is also a member of the firm's Climate Change practice group.

Larry has been recognized as the top environmental lawyer in the United States for the past twelve years by *United States Lawyer Rankings*. He has also been recognized as one of the best environmental lawyers in the nation in the most recent edition of *Best Lawyers in America*®; one of the best environmental law attorneys in Texas on the "Texas Super Lawyers" list published in *Texas Monthly*, and by *Chambers & Partners* in its recent guidebook on *America's Leading Lawyers for Business*.

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# HYDRAULIC FRACTURING

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SAFETY/OSHA UPDATE

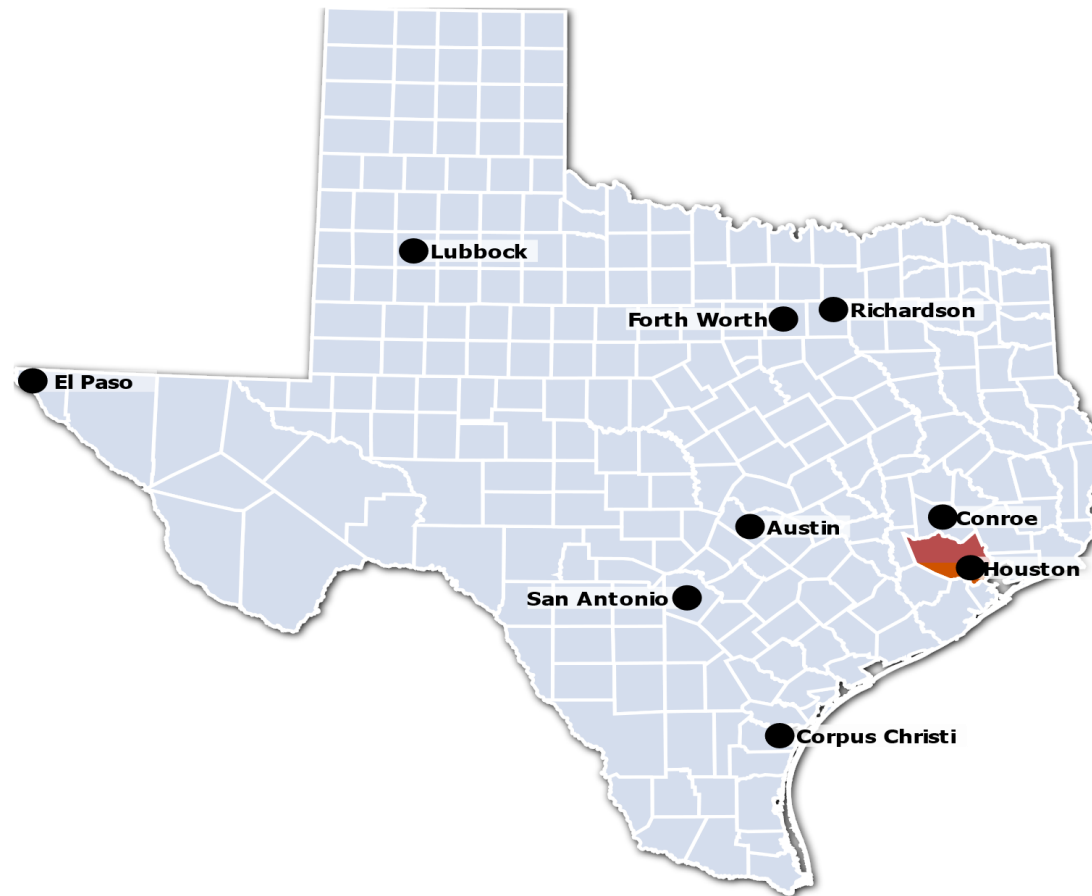
Chris Bacon, Vinson & Elkins

# Where are we on the silica standards?

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**The sky  
is falling!**





# Construction industry is being scrutinized



- **June 23, 2016:** Standard went into effect: The Permissible Exposure Limit (PEL) for respirable crystalline silica was reduced from 100 to 50  $\mu\text{g}/\text{m}^3$  (micrograms per cubic meter).
- **October 27, 2017:** OSHA began fully enforcing the entire standard in the construction industry.
- **573 Citations issued in construction industry in the first year (Oct. 1, 2017 through Sept. 30, 2018).**



- **June 23, 2018:** All employers required to comply with most obligations of the standard. Medical exams must be offered to employees exposed above the PEL for 30 or more days. Exception for fracking industry which does not have to comply with engineering controls.
- **June 23, 2020:** Medical exams must be offered to employees exposed above Action Level ( $25 \mu\text{g}/\text{m}^3$ ) for more than 30 days.
- **June 23, 2021:** Fracking industry must comply with engineering controls requirement.

# What have we learned from the construction industry?



- Inadequate or absent air monitoring
- Inadequate or absent written exposure-control plans
- Failure to provide training
- Failure to provide respiratory protection
- Medical Surveillance program issues

# SAND INDEMNIFICATION ISSUES



**BUYER ACKNOWLEDGES THAT THERE MAY BE TERRIBLE HAZARDS ASSOCIATED WITH HANDLING OF SAND.**

**PURCHASER ASSUMES ALL RESPONSIBILITY FOR ANY AND ALL SUCH WARNINGS OR OTHER PRECAUTIONARY MEASURES RELATING TO HAZARDS TO PERSON AND PROPERTY ASSOCIATED WITH THE SAND.**

**PURCHASER SHALL DEFEND AT ITS OWN EXPENSE, INDEMNIFY FULLY AND HOLD HARMLESS SELLER FROM AND AGAINST ANY AND ALL CLAIMS CAUSED BY THE FAILURE OF SUCH PRECAUTIONARY MEASURES.**



# Most common OSHA citations in fracking industry



- Wiring methods
- Powered industrial trucks
- Hazard communications
- Walking-working surfaces
- Personal Protective Equipment
- Respiratory Protection
- Scaffolding

# Speaker Biography

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Chris's practice is primarily devoted to the litigation of employment matters on behalf of private employers. In addition to his trial practice, Chris's three years as an assistant federal public defender have given Chris a unique vantage point when advising clients facing governmental investigations. Chris represents companies in OSHA and MSHA investigations including investigations into fatalities and serious injuries. In addition to defending companies against MSHA “unwarrantable failure” and discrimination claims, Chris has advised clients on issues related to compliance and training and frequently authors content on OSHA and MSHA developments. Chris also has advised clients on Dodd-Frank MSHA reporting obligations.

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# HYDRAULIC FRACTURING

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LITIGATION UPDATE

Nick Shum, Vinson & Elkins

# Litigation Update

## Presentation Overview

- Hydraulic Fracturing v. Rule of Capture
- Surface Use and Hydraulic Fracturing
- Royalty Litigation Update
- Frac Hits (Vertical Operators vs. Horizontal Operators)
- Litigation Risks relating to Reporting and Disclosures
- Midstream Disputes





# Trespass by Hydraulic Fracturing

## Pennsylvania



- In September, the Pennsylvania Supreme Court heard oral argument in ***Briggs v. Southwestern Energy Production Co.***, a case pitting hydraulic fracturing against the Rule of Capture.
- The Pennsylvania intermediate appeals court ruled that the Rule of Capture does not protect operators fracing wells because the fractures may propagate across lease lines.
- Distinguishes free movement of gas under conventional oil and gas extraction versus “forced extraction” of gas in trapped areas by methods such as hydraulic fracturing.
- Conflicts with the Texas Supreme Court’s ***Coastal Oil & Gas v. Garza Energy Trust*** decision, which found that trespass claim for drainage as a result of hydraulic fracturing was precluded by the Rule of Capture.

# Briggs Impact will be Far-Reaching



Will the Pennsylvania Supreme Court “Right the Ship”?

- “To upend the rule of capture here would upend the economic viability of the natural gas industry in Pennsylvania” – Southwestern Energy
- “The proppants serve the same purpose as a drill bit” – Briggs
- Justices – Does this implicate the Rule of Capture or is this a simple trespass case?
- Justices also questioned how plaintiffs would prove the extent of frac propagation across lease lines or calculate damages.
- Operators in Pennsylvania should closely monitor the outcome of this case.

# Surface Use and Horizontal Drilling

West Virginia

- The West Virginia Supreme Court issued two fracturing-related decisions in 2019 – one pro-surface owner; one pro-operator.



# Surface Use and Hydraulic Fracturing

West Virginia



- In ***EQT Production Company v. Margot Beth Crowder***, No. 14-C-64, the Court held that an operator could not use a surface owner's land to drill horizontal wells into only neighboring leases without the surface owner's permission.
- Generally, a lessee can make use of surface as "reasonably necessary" to develop underlying mineral rights.
- Implied right to use surface lands "in any way reasonable and necessary" to develop minerals below the tract does not extend to using surface lands to benefit drilling beneath neighboring lands.
- ***Crowder*** appears to set bright line rule on limit to use of surface for horizontal drilling activities.



# Surface Use and Hydraulic Fracturing

West Virginia



- In ***Andrews v. Antero Resources*, No. 14-C-3000**, the Court narrowly held in a plurality opinion that horizontal drilling was a valid exercise of the operators' leasehold interest.
- The plaintiff land owners argued that horizontal drilling methods were not within the contemplation of the parties at the time that the severance deeds were executed (early 1900s).
- The plaintiffs also alleged nuisance claims against the operators, arguing that they lost use and enjoyment of their properties due to the annoyance, inconvenience, and discomfort caused by excessive heavy equipment and truck traffic, diesel fumes and other emissions from the trucks, gas fumes and odors, vibrations, noise, lights, and dust.

# Surface Use and Hydraulic Fracturing

West Virginia



- The Court resolved ***Andrews*** in favor of operators based on contract and property law, concluding that plaintiffs failed to show that horizontal drilling methods: (1) are not reasonably necessary for development of the underlying minerals; (2) that they are being substantially burdened by the development activities; and (3) that the off-site well pads caused any damages to their surface estates.
- Concurring opinion emphasizes that the Court leaves open the question of whether operator's actions would give rise to private nuisance claim.
- Operators in West Virginia should continue to monitor case law developments on surface rights.

# Royalty Litigation Update

## Texas – Deducting Post-Production Costs



- In ***Burlington Resources Oil & Gas Company, L.P. v. Texas Crude Energy, LLC et al.***, No. 17-0266 (Tex. March 1, 2019), the Texas Supreme Court held that “into the pipeline” language established an “at the wellhead” valuation point, allowing the operator to deduct post-production costs from ORRI calculation.
- Operator-friendly decision that clarifies the Texas Supreme Court’s ***Hyder*** decision in 2016, which held that “amount realized” or “proceeds lease” language did not entitle operator to deduct post-production costs.
- Reiterates the need to read the lease or assignment language as a whole.

# Royalty Litigation Update



## Other Considerations in Royalty Claims

- The Court's analysis in ***Burlington Resources*** raises two other considerations:
  - (1) Are there any related agreements that may inform royalty valuation?
    - ORRI Assignments had been issued subject to JOA between Burlington and Texas Crude.
    - JOA contemplated that the parties would account to each other based on "net proceeds received" (language indicating right to take deductions).
  - (2) Does "course of performance" impact the analysis?
    - Texas Crude received royalty payments for years with deductions and never complained.
    - Course of performance is irrelevant if contract is unambiguous.



# Frac Hits



## Vertical Well Operators vs. Horizontal Well Operators

- A “frac hit” is interference with existing wells as a result of new hydraulic fracturing in neighboring wells.
- Potential for “frac hit” litigation continues to increase as more and more new wells are drilled and fracked.
- ***Capital Star Oil & Gas Inc. v. XTO Energy Inc.*** filed in Harris County District Court on September 11, 2019.
  - Plaintiffs allege that XTO is improperly fracking Eagle Ford wells into the Edwards formation, damaging the formation and Plaintiffs’ vertical wells.
- Litigation can arise after interference or in anticipation of interference in the form of injunctive relief.

# Litigation Risks Relating to Reporting and Disclosures



## Importance of Accurately Reflecting Reserves

- Several operators have reported disappointing results from close spacing of horizontal laterals. Have you adjusted your reserves reporting to account for the lower production, or increased well spacing and decreased the number of PUDs in your reserves?
- Have you booked any reserves that may be curtailed by induced seismicity regulations, without accounting for a reduction of reserves?
- Have you updated your type curves to reflect unexpected acceleration of production decline, or an unexpected shift in Gas to Oil/Gas to Liquids ratios?
- Are your investor decks up-to-date with accurate reserves and production projections reflecting the engineering realities of your fields and formations?
- Failure to accurately reflect reserves can manifest in securities actions or SEC investigations.

# Midstream Disputes

Transportation Curtailments and Force Majeure



- Disputes involving oil and gas pipeline systems is another active area to monitor as hydraulic fracturing continues to increase production in various basins across the United States.
- ***Antero v. Washington Gas Company and WGL Midstream***, No. 2017-CV-3390 (District Court in Denver, Colorado)



# Antero v. WGL

## Recent Jury Verdict

- Breach of long-term gas sales contracts for failure to take certain contract quantities of gas from April 2017 – November 2017.
- Force majeure defense based on curtailment of certain transportation arrangements on Columbia Gas Transmission pipeline system.
- Right to declare “force majeure” governed by NAESB (North American Energy Standards Board) Base Contract.
- After a two-week trial, jury awarded Antero damages of approximately \$96 million.
- Rejected WGL’s force majeure defense and WGL’s claim that Antero was required to deliver gas to a different delivery point.





# Speaker Biography

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Nick is a trial attorney who represents and advises clients in their complex commercial disputes in both litigation and arbitration. Nick has litigated and arbitrated many cases through a jury verdict or final award, and has resolved many more disputes without the necessity of trial to achieve favorable outcomes for his clients.

Nick's practice focuses on complex commercial disputes in the energy industry, including various upstream and midstream contract disputes, fracing disputes, royalty disputes, leasing disputes, joint development/operating agreement disputes, and disputes arising from purchase and sale transactions. Nick received his J.D. from the University of Houston Law Center (*magna cum laude*; Order of the Coif; Houston Law Review) and his B.A. in Business and Political Science from Southwestern University.

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# HYDRAULIC FRACTURING

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FRACKING IN OTHER COUNTRIES

Anna Mikulska, Ph.D., Baker Institute | Kleinman Center

# Fracking in Other Countries

## Summary

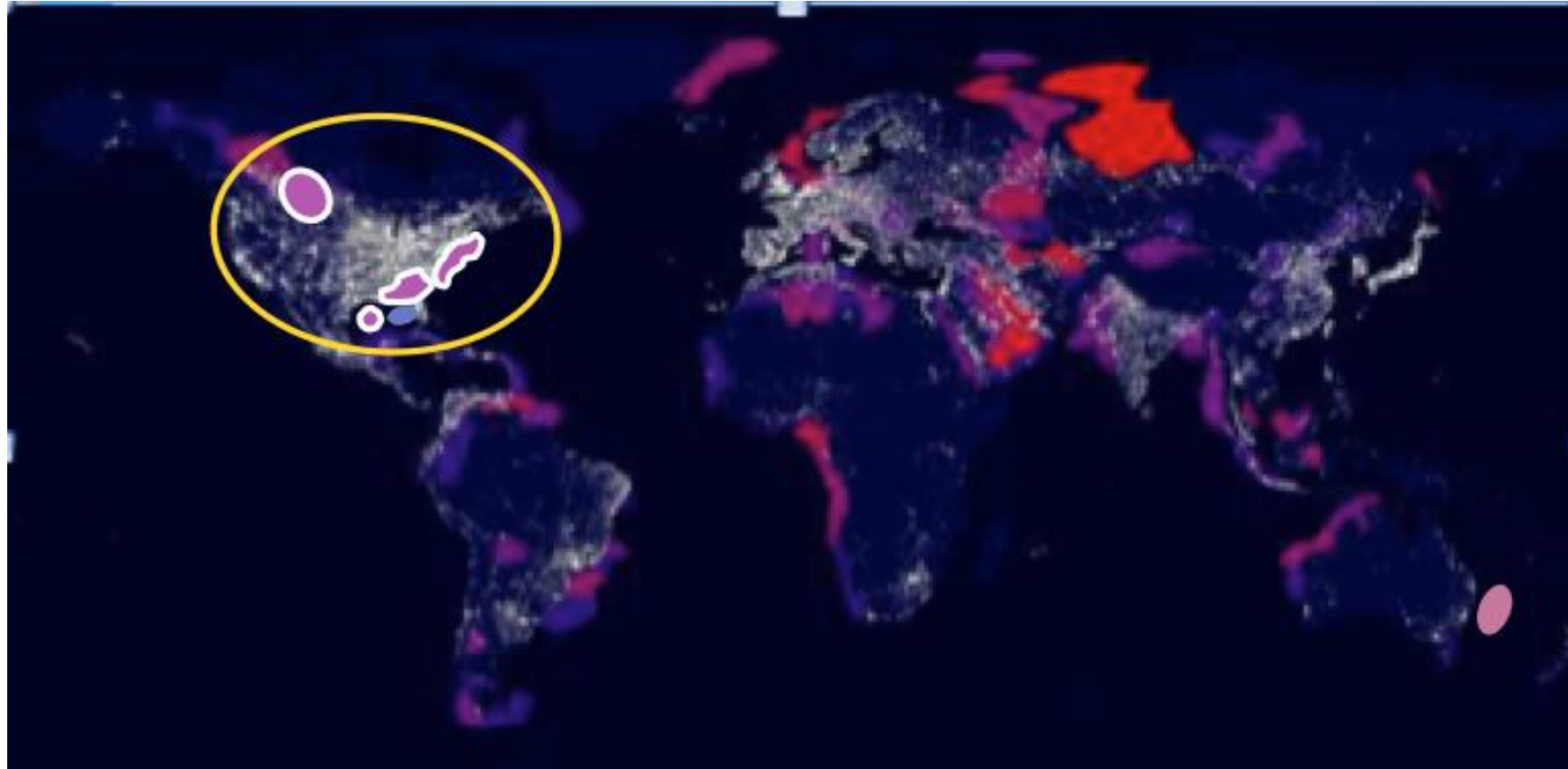
- U.S. shale drives significant change
- Shale is everywhere but can it happen everywhere?
- Case Study #1: Poland's failed "shale revolution"
- Case Study #2: China: shale and water
- Case Study #3: Argentina: shale and the state





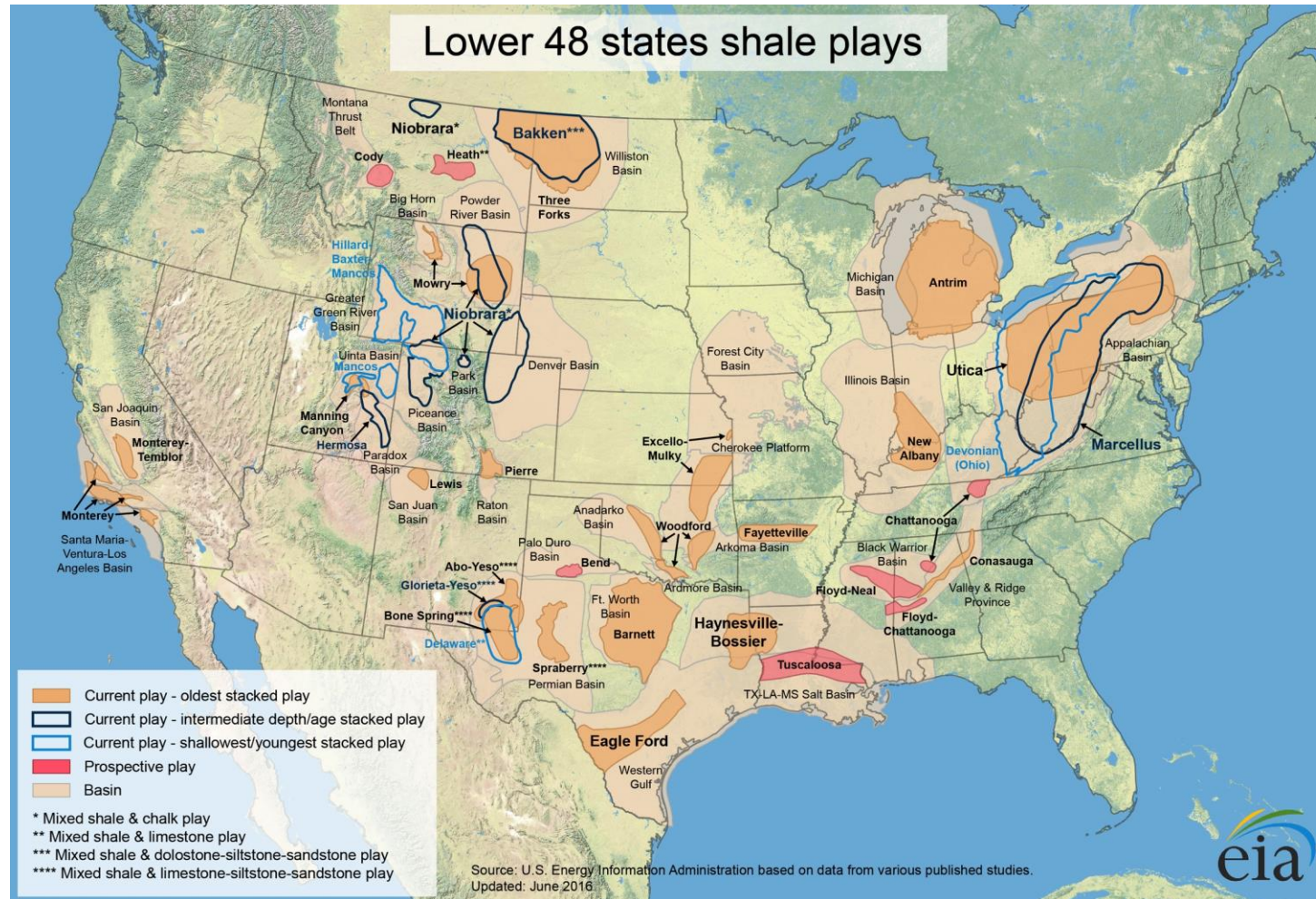
# 2003: LNG is coming to America Then, shale happens...

In the U.S. & Canada





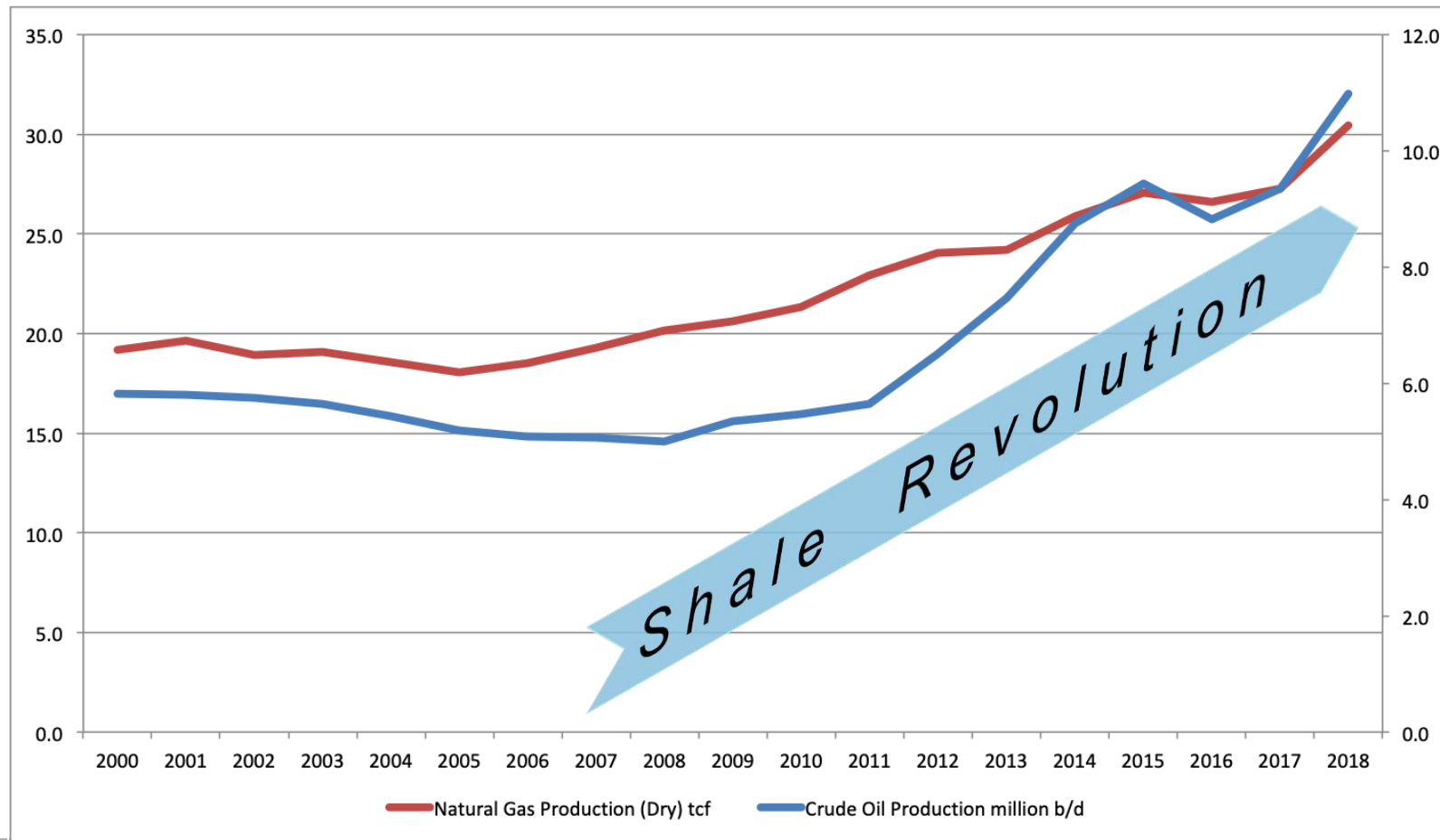
# Where is Shale in the U.S.?



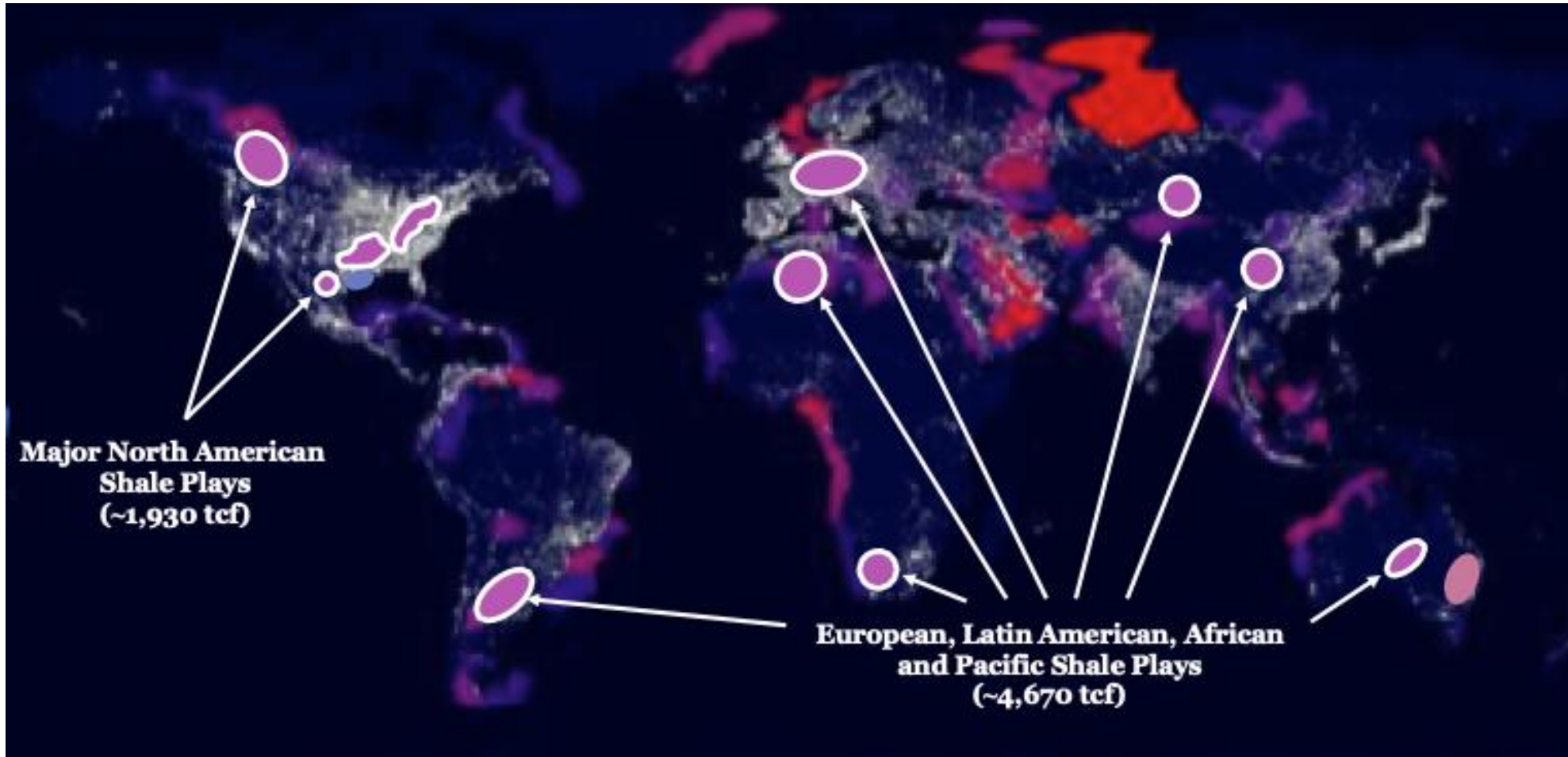
# Shale Drives Significant Change

U.S. Dry Natural Gas (tcf) & Crude Production (Million b/d) 2000-2018

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... we quickly realize  
shale resources are everywhere





# Shale Revolution: Only in America?



- Private ownership of mineral rights
  - Landowners have incentive to promote drilling
- Open capital markets, and long history of lending to oil/gas projects
- Light-touch regulatory system
- Competitive energy sector w/ 6K firms
- Lots of experience
- The big one: INNOVATIONS IN TECHNOLOGY
- Gathering and delivering infrastructure

## **SOME OBSTACLES TO INTERNATIONAL SHALE DEVELOPMENT:**

- Resources owned by the state
  - Landowners have incentive to *oppose* drilling
- Lack of market liberalization
- Limited financing
- Less experience
- Fewer companies
- Bureaucracies
- Environmental Opposition
- Water Access Limitations



# Geology: Poland's failed “shale revolution”



## Early estimations of Poland's shale gas resources:

- 1.4 Tcm per Advanced Resources International (2009)
- 3 Tcm per Wood McKenzie (2009)
- 5.3 Tcm by EIA (2011)
  - EIA estimate puts Poland's shale potential higher than that of France and largest in Europe (EIA, 2013)



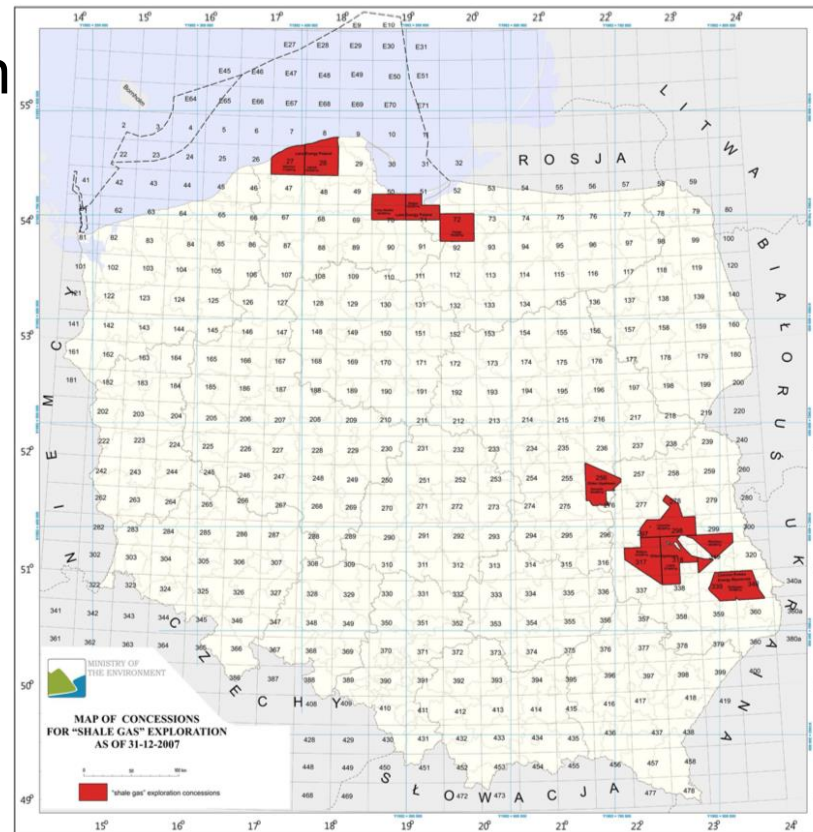
# Investors Take Note: Concessions



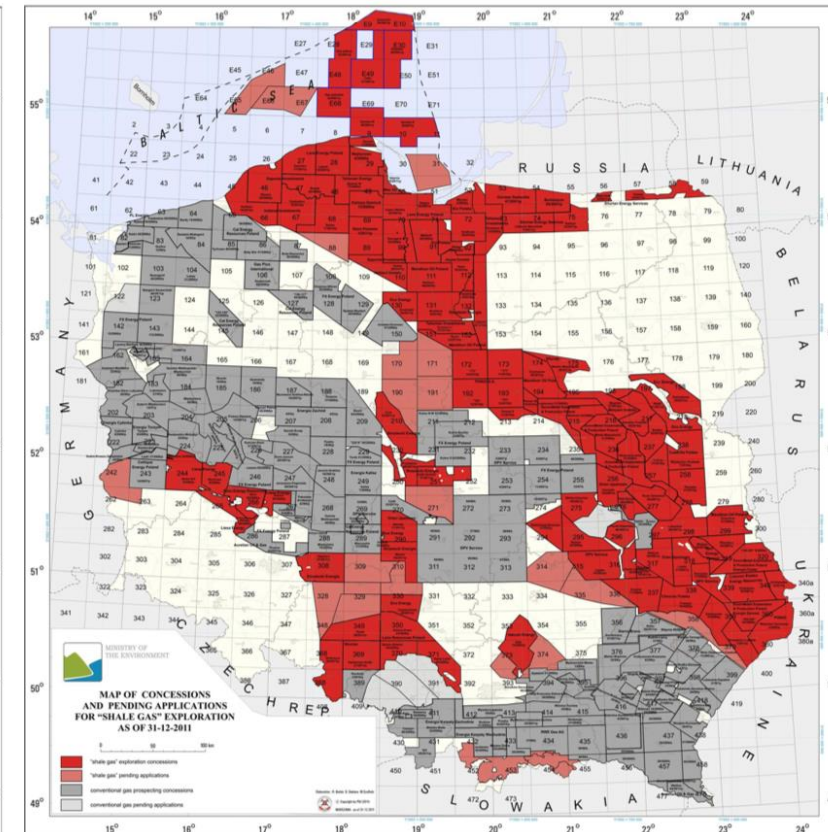
## Companies:

- Poland's: PGNiG, Orlen
- Internationals:
  - ExxonMobil
  - ConocoPhillips
  - Chevron
  - Eni
  - Talisman Energy
  - Lane Energy
  - Marathon Oil

Concessions (in red) grow from 11 in 2007 to the peak of 111 in July of 2012



As of 12/31/2007



As of 12/31/2011

# 2012: Sharp Turn

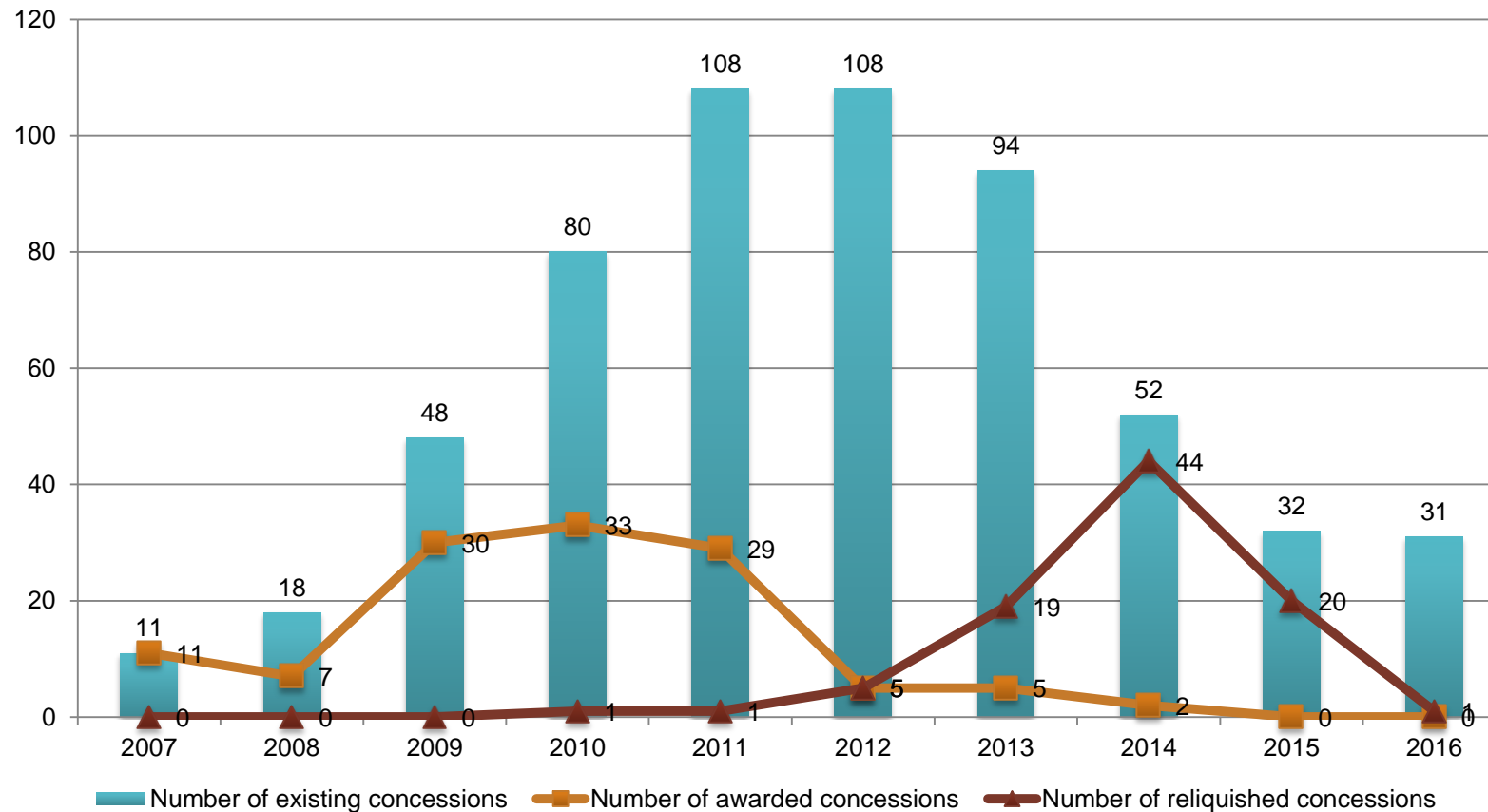


## New assessment by Polish National Geological Institute:

- Cuts Poland's shale potential from EIA's **5.3 Tcm** to **0.346-0.768 Tcm**
- Does not extrapolate from the U.S. experience as previous reports
- Based on Poland's historic data from 1950 to 1990
- Findings confirmed in 2015 based on data collected since 2007

# Concessions 2007-2016

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As of 11/30/2017

- 20 concessions

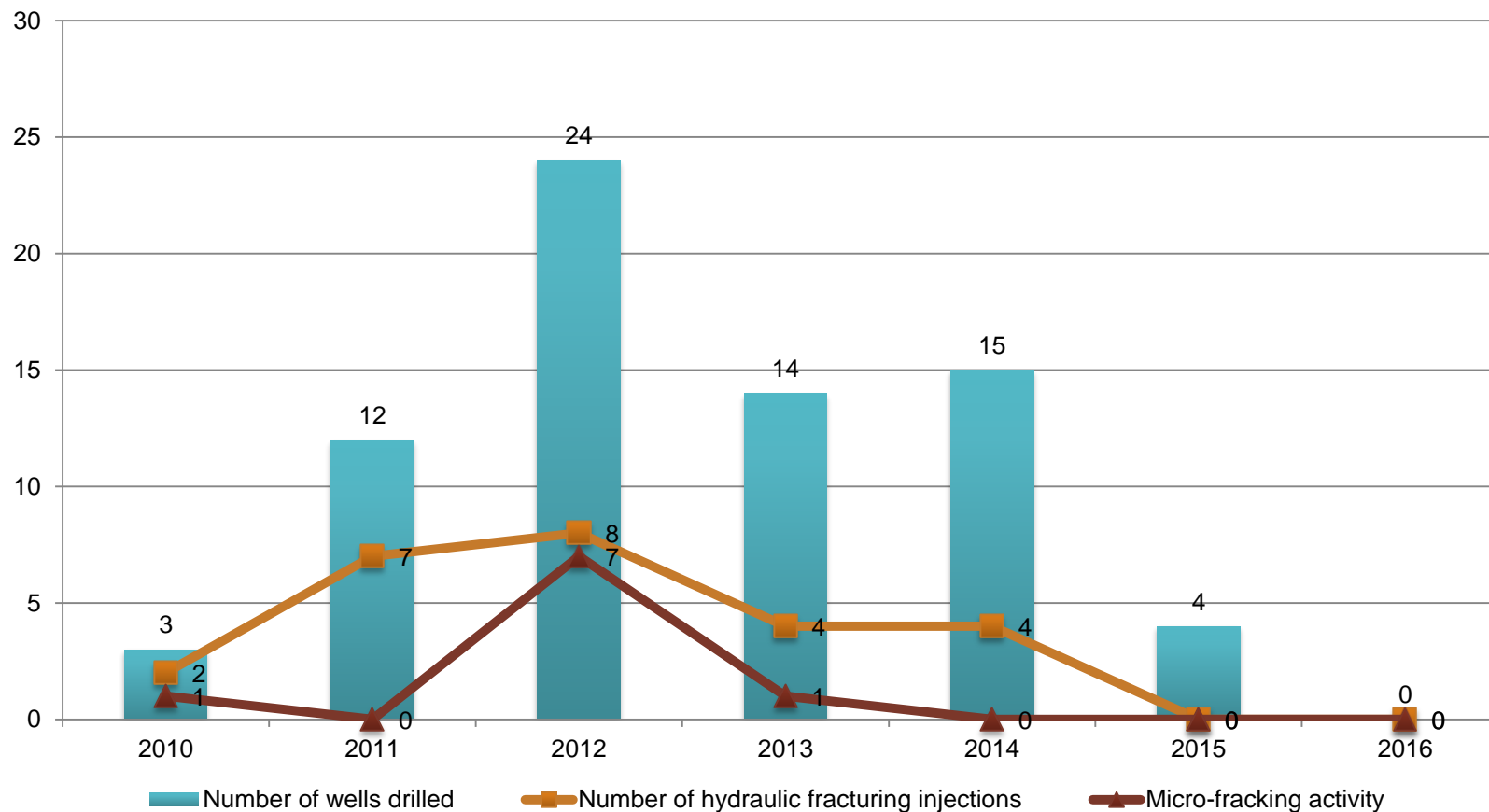
7 concession holders

- **PGNiG S.A.**
- **Orlen Upstream**
- **LOTOS Petrobaltic**
- **Baltic Oil & Gas (San Leon)**
- **Rawicz Energy (Palomar/San Leon)**
- **ShaleTech Energy (Stena Investment)**
- **Strzelecki Energia (Hutton Energy PLC)**



# Wells in Numbers

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## By 2015: 72 wells drilled

- Fracking activity: 28
- Micro-Fracking (DFIT\*): 4
- No fracking activity : 40
- Vertical: 54
- Horizontal: 18

**\*DFIT — Diagnostic Fracture Injection Test**

# No Drilling, No Wells, No Gas



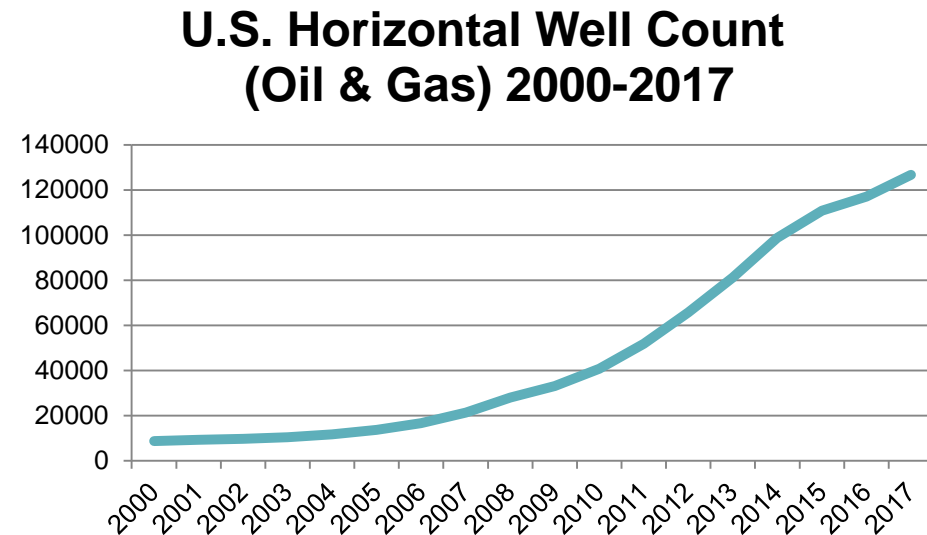
**Low drilling activity** = less opportunities of finding the so called “sweet spots”

Sources: Approx. 200 wells must be drilled to “guarantee” success

In Comparison:

## **Marcellus:**

- 500 vertical wells drilled in 2009
- 1350 wells drilled in 2013 (peak of activity)
- Over 18,000 wells operating in 2018



# So What Happened?



## Unfavorable geology

- Depth of shale location: 2.5 to 4 km vs. 0.6 to 1.8 km in the U.S.
- Thinner shale plays: max. 50 meters vs. 290 meters in U.S.' Marcellus
- % of organic carbon indicating viability of drilling success at 3-5% vs. 11% in U.S.
- Low permeability

## Economics:

- Avg. \$15 million vs. 5.2 in Delaware Basin and max. 7.2 in Midland Basin in the U.S.
- Avg. output at 10,000 m<sup>3</sup>, half of what would support commercial drilling

# And What Else Happened?



## **Type of companies involved:**

- Large, vertically integrated majors like Exxon, Chevron
- Large state conglomerates: PGNiG, Orlen, LOTOS
- Few companies involved
- Large concession territories

## **In the U.S., thousands companies involved**

- Independent, small operations
- Entrepreneurial
- Drilling on small areas



# And This Happened Too...



## Legal and Regulatory Environment

- State ownership of mineral rights
- Cumbersome concession application process: i.e., no guarantee that a company that finds commercially viable shale will have right to exploit the resource (until 2015)
- Not conducive to activity of small and/or independent entities
- Large concessions were to attract investors
- Until 2015, law allowed for concessions for up to 5 years with max. 2 year extension (far too short for shale)

## New law adopted – too late

- Concessions 10-30 years
- One type of concession

# Look Who's Back ...

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## Pura Vida Energy to scoop up 35% stake in onshore Polish oil and gas assets

By *Lorna Nicholas* - July 4, 2019



Pura Vida can earn a 35% interest in Nowa Sol and Gora oil and gas concession by spending \$6.5 million.

NATURAL GAS NEWS

## OZ PURA VIDA ENTERS POLISH TIGHT OIL, GAS PLAYS

Sep 24, 2019 6:05:am

### SUMMARY

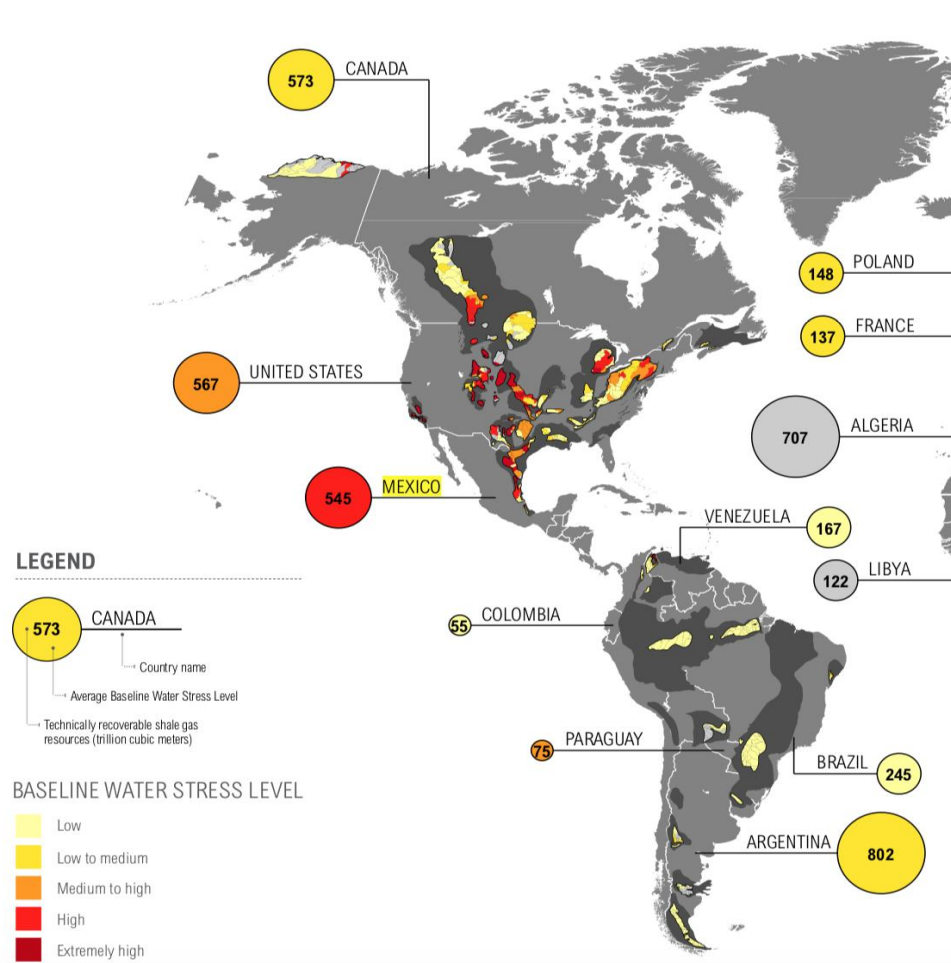
*Pura Vida has pledged to spend \$4.2mn assessing the commerciality of the plays.*

BY: **JOSEPH MURPHY**

Australia's **Pura Vida Energy** closed a deal with UK-based Gemini Resources to acquire stakes in two unconventional oil and gas plays in Poland's Permian basin, it said on September 24.

The Sydney-listed firm said in a statement it had earned a 35% position in the Gora and Nowa Sol projects by pledging to spend A\$6.15mn (\$4.2mn) on work programmes. It will work with Gemini to prove the commercial value of two potentially large unconventional resource plays within the concessions.

...we quickly realized that shale is everywhere,  
but is water?



**Average Exposure to Baseline Water Stress across Shale Plays in 20 Countries with the Largest Technically Recoverable Shale Gas Resources**

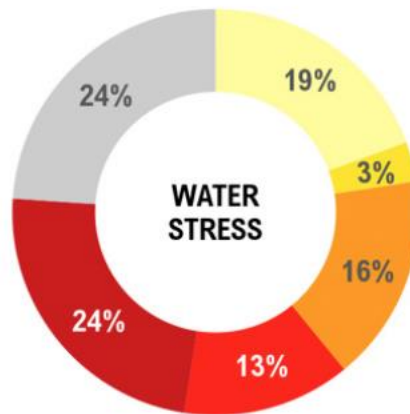
RANK <sup>a</sup>	EIA ESTIMATED SHALE GAS TRR (TRILLION CUBIC FEET) <sup>b</sup>	COUNTRY	AVERAGE EXPOSURE TO BASELINE WATER STRESS OVER SHALE PLAY AREA <sup>c</sup>
1	1,115	China	High
2	802	Argentina	Low to Medium
3	707	Algeria	Arid & Low Water Use
4	573	Canada	Low to Medium
5	567	United States	Medium to High
6	545	Mexico	High
7	437	Australia	Low
8	390	South Africa	High
9	287	Russian Federation	Low
10	245	Brazil	Low
11	167	Venezuela	Low
12	148	Poland	Low to Medium



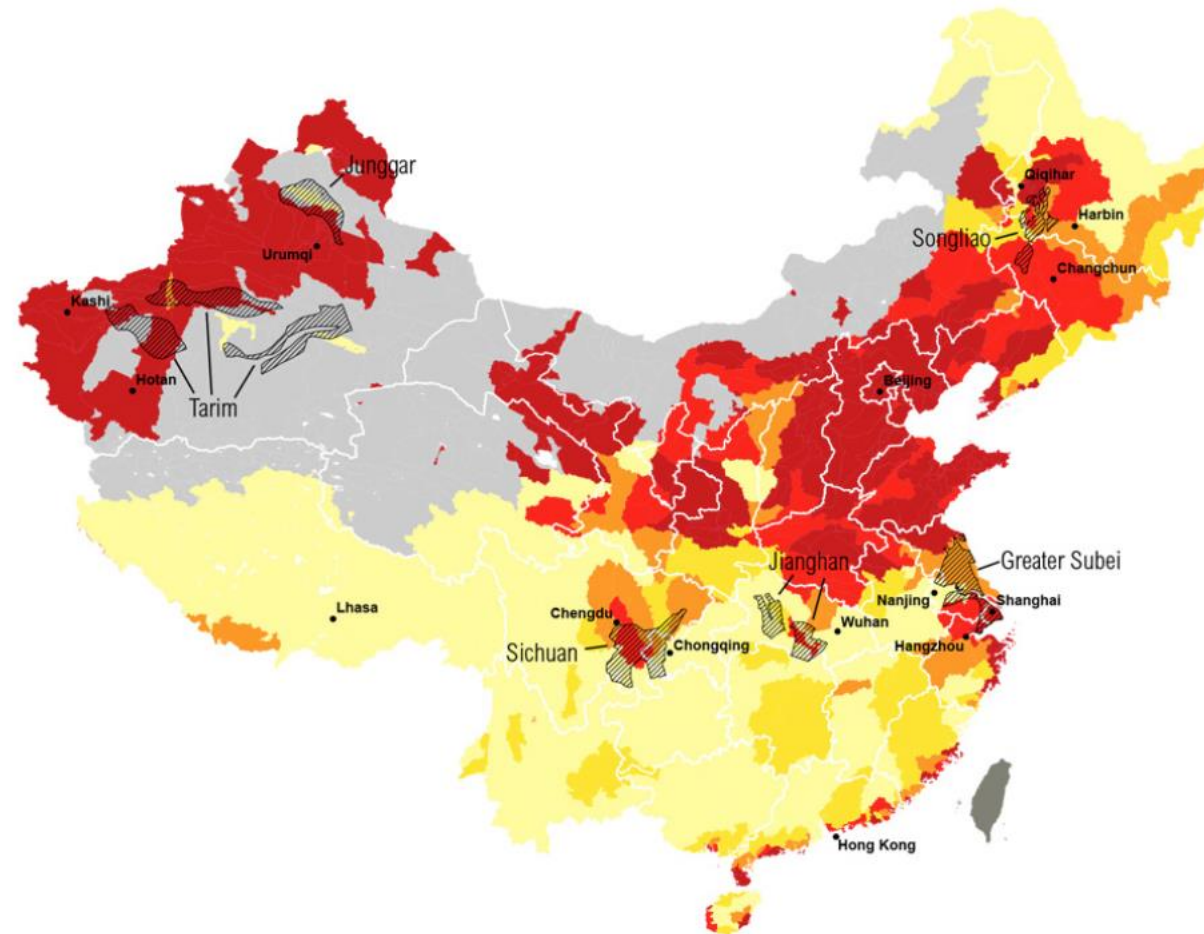
# China: Shale – Water Mismatch

Source: World Resources Institutes | [www.wri.org/water-for-shale](http://www.wri.org/water-for-shale)

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- Low
- Low to medium
- Medium to high
- High
- Extremely high
- Arid & low water use
- Shale play





...we quickly realized that shale is everywhere,  
but it can be a risky business...



Price risk can be hedged against, **political risk** cannot

- The liberalization/expropriation cycle

### **The Case for Shale in Argentina:**

- Great geology: 4<sup>th</sup> largest holder of natural shale oil and 2<sup>nd</sup> of shale gas reserves

### **But**

- Previous expropriations
- Weak institutions

### **But**

- Rise in investment in Vaca Muerta from \$3 billion in 2013 to \$7.5 billion in 2019 (\$13 billion in total since 2013)

# The Case for Shale Investment in Argentina ...and elsewhere



## **Unconventional resources' distinct nature offers shale a chance**

*(Krane et al. upcoming)*

- Short production cycle: rapid decline rate of shale wells
- Lower sunk cost
- Much smaller capital investment at any given time
- Potential for quick repay and positive returns (though short lived)
- Higher economic activity, including jobs

## **Other pro-shale factors in Argentina**

- Current government's support
- Organized labor

# Not all shale is created equal: crude vs. natural gas



## **Both issues with:**

- Pipeline capacity
- Shortages of sand and/or water
- Rail infrastructure

## **But:**

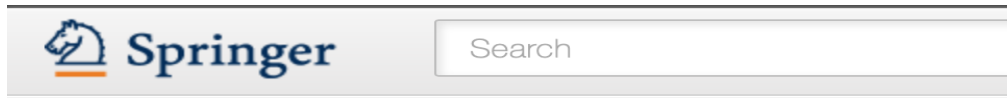
### **Shale crude:**

- Easy and relatively cheap to store and ship
- Better margins

### **Shale gas:**

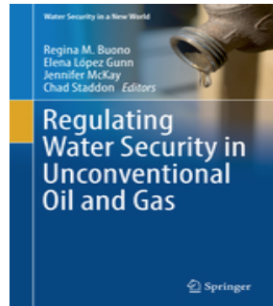
- Difficult and pricey to store and ship
- Low margins
- Higher investment needed: LNG export terminals, pipeline and storage infrastructure

# Two sources to look for, coming soon:



» Energy » Policy, Economics, Management & Transport

Water Security in a New World



© 2020

## Regulating Water Security in Unconventional Oil and Gas

Editors: **Buono**, R.M., **López-Gunn**, E., **McKay**, J., **Staddon**, C. (Eds.)

Offers global coverage, representing developments in all world regions either actually producing shale gas or seriously considering it as of 2017

## “Shale Renders the ‘Obsolete Bargain’ Obsolete: Political Risk and Foreign Investment in Argentina”

- By Jim Krane, Francisco Monaldi, Gabe Collins, Mark P. Jones and Ken Medlock
- Rice University’s Baker Institute for Political Science



# Speaker Biography

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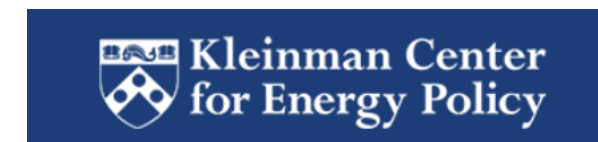


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Anna Mikulska, Ph.D., is a fellow in energy studies at the Baker Institute's Center for Energy Studies and a senior fellow at University of Pennsylvania's Kleinman Center for Energy Policy. Her research focuses on the geopolitics of natural gas within the EU, former Soviet Bloc and Russia, and U.S. strategic position in the global energy market. Her current projects include creating a comprehensive database of state-level fracking legislation in the U.S., assessing potential use of natural gas as a geoeconomic tool, and investigating ways to leverage U.S. LNG exports to bolster European energy security. Mikulska is also a fellow at the Foreign Policy Research Institute and serves on the editorial board of the law review at Adam Mickiewicz University. She speaks Polish, English, German, Farsi and Russian.



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# HYDRAULIC FRACTURING

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The background image shows an industrial oil field under a clear blue sky. On the left, there are several large, orange cylindrical storage tanks with metal ladders. In the center-right, a tall drilling rig with a red and white lattice structure is visible. The rig has a teal-colored section and is supported by a concrete base. Various pipes, valves, and smaller equipment are scattered throughout the site. The overall scene depicts a large-scale hydraulic fracturing operation.

MARKET UPDATE

John B. Connally IV, Vinson & Elkins

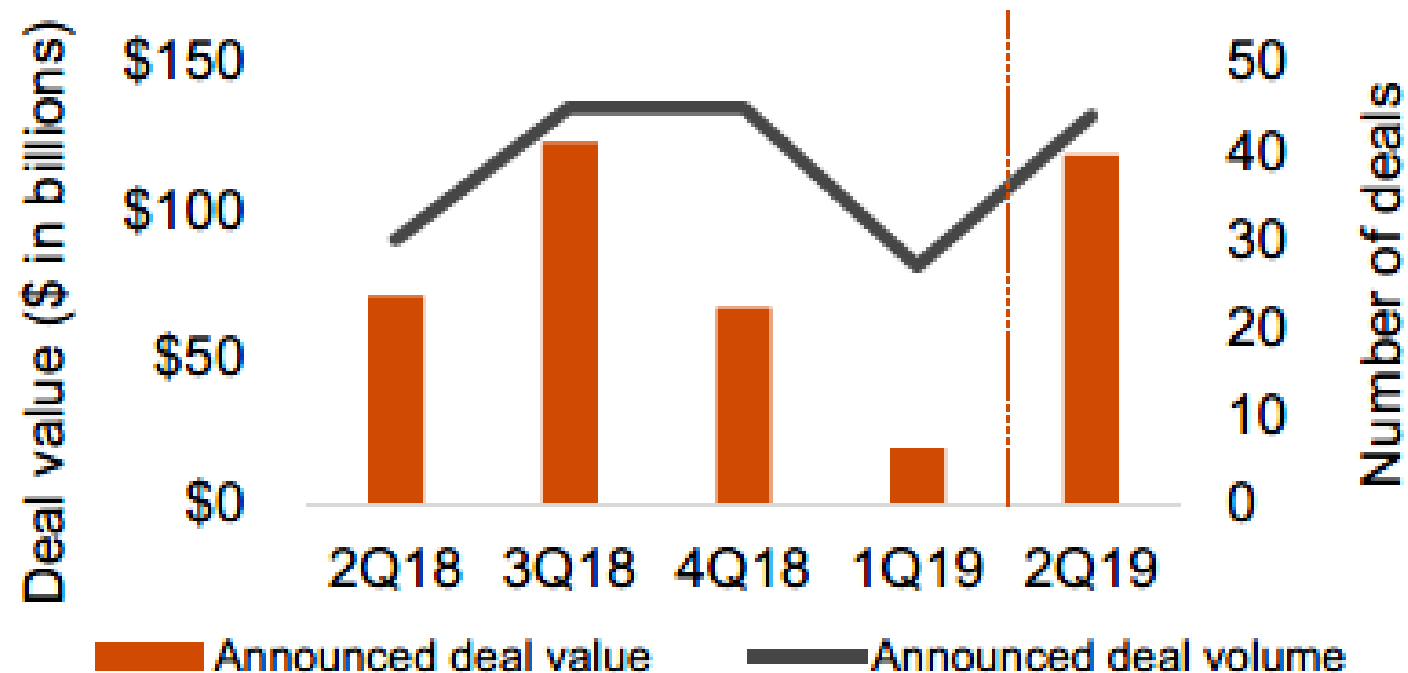
# TRENDS IN OIL & GAS

2Q19

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## Oil & Gas deal volume and value



\*Includes Upstream, Midstream and Downstream transactions

Source: IHS Markit; PwC Deals US Oil & Gas Deal Insights Second Quarter 2019



# TRENDS IN OIL & GAS

2Q19

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## Top 10 U.S. Upstream Oil & Gas Transactions: 2Q19

Date	Buyers	Sellers	Value (\$MM)	Type	Region/Play
04/24/19	Occidental	Anadarko	\$57,000	Corporate	Permian/DJ/GOM/ et al.
06/10/19	Comstock	Covey Park	\$2,185	Corporate	Haynesville
04/23/19	Murphy Oil	LLOG Bluewater	\$1,375	Property	Gulf of Mexico
05/13/19	Equinor	Shell	\$965	Property	Gulf of Mexico
05/06/19	Midstates	Amplify Energy	\$512	Corporate	Multiple Conventional
06/28/19	Oil Search	GMT; Armstrong	\$450	Acreage	Alaska
05/07/19	Sabinal; et al.	Diamondback	\$322	Property	Permian
04/22/19	Northern O&G	Flywheel Bakken	\$310	Property	Bakken
04/08/19	Sequitur	Callon	\$260	Property	Permian
05/02/19	Undisclosed	California Resource	\$203	JV	California

Source: Drillinginfo – Oil & Gas M&A Review and Outlook – Q2 2019



# TRENDS IN OIL & GAS



1H19

## Q1 – Domestic Upstream

- U.S. Upstream market saw deals worth roughly \$1.6 billion, a 10-year low and a 92% decrease compared to \$22.3 billion in Q1 2018

## Q2 – Domestic Upstream

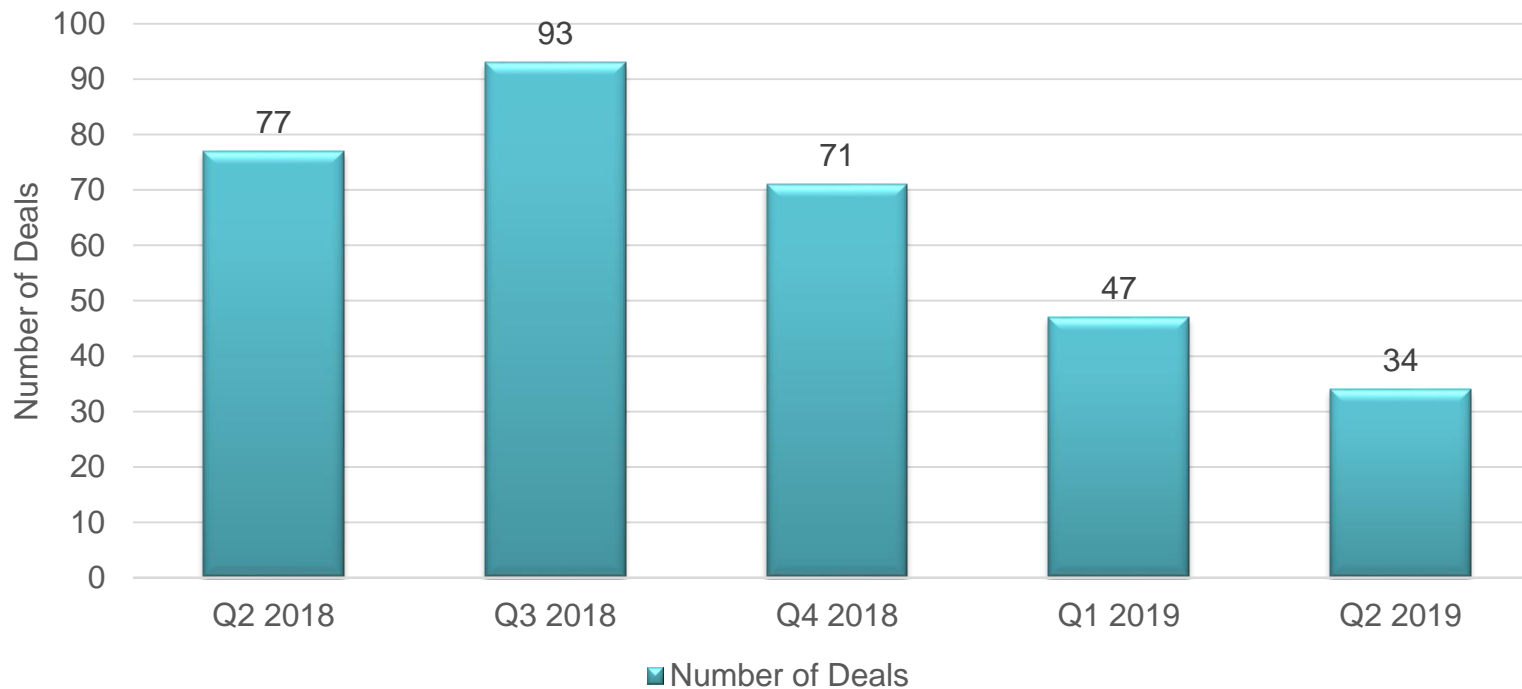
- Upstream segment saw an increase in total deals worth \$64.6 billion, a 609% increase compared to roughly \$9.1 billion in Q2 2018
  - Approximately \$57 billion, or roughly 88%, of Q2 2019 value is from Occidental's acquisition of Anadarko
  - Excluding Occidental-Anadarko, total Q2 2019 value of \$7.6 billion, a 16% decrease compared to Q2 2018 value of \$9.1 billion
- M&A shale activity was dominant in Texas, reporting the highest number of deals with 10 and the biggest share of total deal value of \$60.5 billion

# TRENDS IN OIL & GAS

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## M&A in U.S. Shales, Number of Deals



- 34 M&A deals were registered in the U.S. shales in Q2 2019, compared to 47 deals in Q1 2019.
- A year-on-year comparison shows a decrease of 56% in the number of deals in Q2 2019, as compared to 77 deals in Q2 2018.

Source: Deal Analytics, GlobalData Oil and Gas

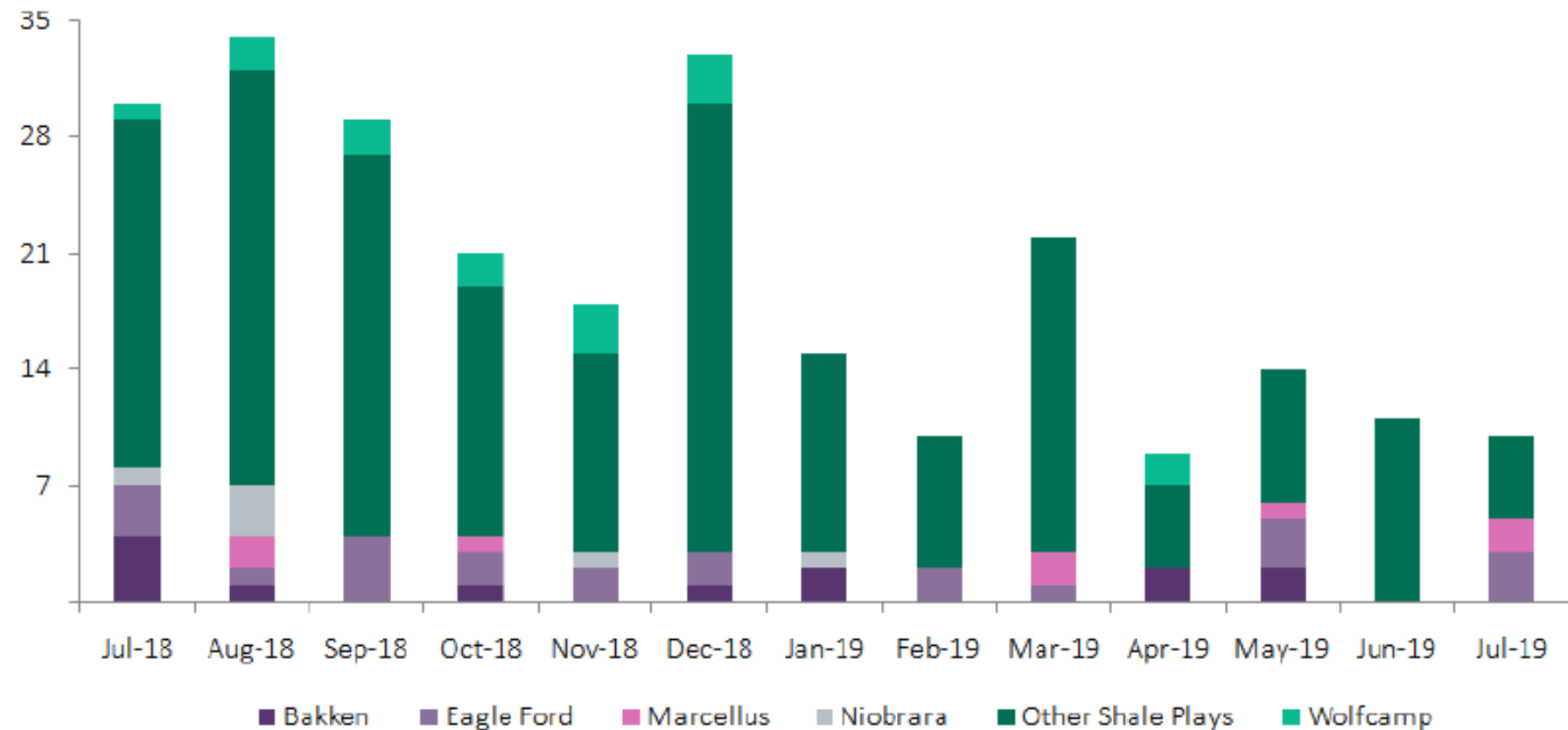
# TRENDS IN OIL & GAS

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- Majority of unconventional deal activity was recorded in the Eagle Ford shale, constituting 23 deals, or 9%, of the major shales in the U.S. recorded for the period July 2018 – July 2019
- Wolfcamp shale followed next, recording 6% of the deals, or 15 deals, during the same period

M&A in U.S. Shales, Number of Deals by Shale Play



Source: Deals Analytics, GlobalData Oil and Gas

© GlobalData

# DOMESTIC UPSTREAM DEAL VALUE BY TOP PLAY



## U.S. Upstream Deal Value (\$billion) by Top Plays

US Play	1Q17	2Q17	3Q17	4Q17	1Q18	2Q18	3Q18	4Q18	1Q19	2Q19	2Q19 Mix
<b>Multiple</b>	\$0.0	\$0.0	\$0.1	\$0.4	\$0.8	\$0.5	\$10.8	\$0.7	\$0.2	\$57.3	89%
<b>Conventional</b>	\$1.2	\$5.7	\$2.0	\$4.4	\$2.8	\$2.8	\$2.3	\$1.5	\$0.4	\$4.3	7%
<b>Haynesville</b>	\$0.0	\$0.1	\$0.7	\$0.0	\$0.0	\$0.2	\$0.0	\$0.8	\$0.0	\$2.2	3%
<b>Midland</b>	\$4.3	\$1.2	\$0.9	\$0.1	\$10.8	\$0.3	\$1.9	\$0.5	\$0.0	\$0.4	1%
<b>Bakken</b>	\$0.2	\$0.0	\$2.0	\$0.4	\$0.0	\$1.4	\$0.6	\$0.0	\$0.0	\$0.3	1%
<b>SCOOP/STACK</b>	\$0.9	\$0.0	\$4.1	\$0.1	\$0.3	\$0.0	\$0.2	\$8.0	\$0.2	\$0.1	0%
<b>Other</b>	\$1.3	\$10.8	\$1.9	\$2.8	\$2.5	\$2.2	\$5.5	\$1.4	\$0.8	\$0.0	0%
<b>Delaware</b>	\$13.8	\$1.3	\$0.6	\$1.3	\$1.8	\$0.7	\$11.2	\$2.0	\$0.2	\$0.0	0%
<b>Eagle Ford</b>	\$3.7	\$0.8	\$0.5	\$1.0	\$3.3	\$1.1	\$0.1	\$4.0	\$0.1	\$0.0	0%
<b>Total</b>	<b>\$25.4</b>	<b>\$19.9</b>	<b>\$12.8</b>	<b>\$10.5</b>	<b>\$22.4</b>	<b>\$9.1</b>	<b>\$32.6</b>	<b>\$18.8</b>	<b>\$2.0</b>	<b>\$64.6</b>	<b>100%</b>

Source: Drillinginfo – Oil & Gas M&A Review and Outlook – Q2 2019



# DOMESTIC UPSTREAM DEAL VALUE BY TYPE



- Corporate acquisitions (mainly Occidental-Anadarko) dominate upstream deal value in Q2 2019, representing 92% of total deal value

## U.S. Upstream Deal Value (\$billion) by Type

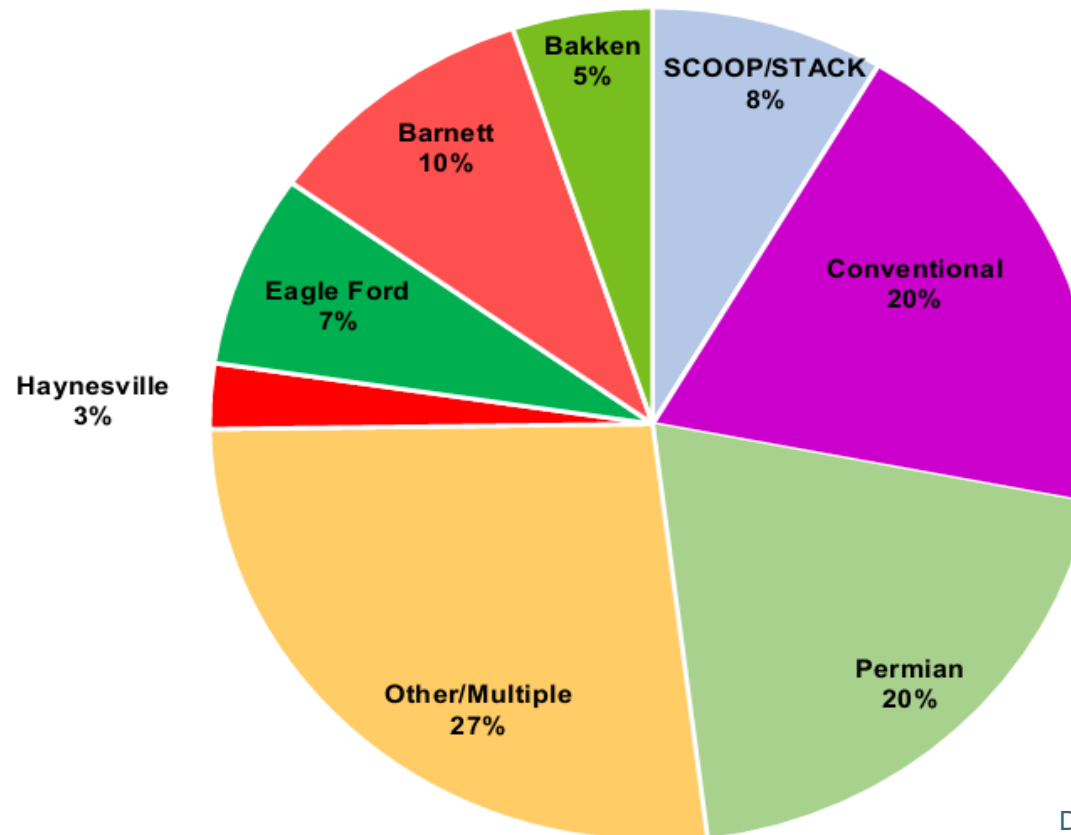
Type	1Q17	2Q17	3Q17	4Q17	1Q18	2Q18	3Q18	4Q18	1Q19	2Q19	2Q19 Mix
Corporate	\$12.2	\$8.2	\$3.8	\$3.2	\$9.6	\$1.1	\$12.1	\$13.5	\$0.1	\$59.7	92%
Property	\$11.9	\$9.9	\$7.2	\$6.3	\$11.5	\$6.0	\$18.3	\$2.8	\$1.5	\$3.6	6%
Acreage	\$0.7	\$0.7	\$0.9	\$0.4	\$0.8	\$0.3	\$1.0	\$0.5	\$0.2	\$0.6	1%
Royalty	\$0.4	\$0.1	\$0.3	\$0.5	\$0.2	\$1.4	\$0.6	\$1.0	\$0.3	\$0.5	1%
Farm-In/JV	\$0.3	\$1.0	\$0.6	\$0.0	\$0.2	\$0.2	\$0.5	\$0.9	\$0.0	\$0.2	0%
<b>Total</b>	<b>\$25.4</b>	<b>\$19.9</b>	<b>\$12.8</b>	<b>\$10.5</b>	<b>\$22.4</b>	<b>\$9.1</b>	<b>\$32.6</b>	<b>\$18.8</b>	<b>\$2.0</b>	<b>\$64.6</b>	<b>100%</b>

Source: Drillinginfo – Oil & Gas M&A Review and Outlook – Q2 2019

# U.S. DEALS IN PLAY AS OF 2Q19



- Assets specifically for sale total roughly \$17 billion



Deals for Sale estimate based on known active marketing processes. Excludes potential sales reported by the media (i.e., Endeavor, 1776 Energy and Equinor). Additionally excludes strategic reviews that could result in sales.

Source: Drillinginfo – Oil & Gas M&A Review and Outlook – Q2 2019

# U.S. AND CANADA RIG COUNT



- U.S. oil rig count lower than a year ago when 863 oil rigs were active
- Despite significantly lower U.S. oil rig counts than a year ago, U.S. oil production has rose to a new record high

Area	Last Count	Count	Change from Prior Count	Date of Prior Count	Change from Last Year	Date of Last Year's Count
<b>U.S.</b>						
Oil	9/27/2019	713	-6	9/20/2019	-150	9/28/2018
Gas	9/27/2019	146	-2	9/20/2019	-43	9/28/2018
Miscellaneous	9/27/2019	1	0	9/20/2019	-1	9/28/2018
<b>Total</b>	9/27/2019	860	-8	9/20/2019	-194	9/28/2018
<b>Canada</b>						
Oil	9/27/2019	88	+6	9/20/2019	-34	9/28/2018
Gas	9/27/2019	39	+2	9/20/2019	-17	9/28/2018
<b>Total</b>	9/27/2019	127	+8	9/20/2019	-51	9/28/2018

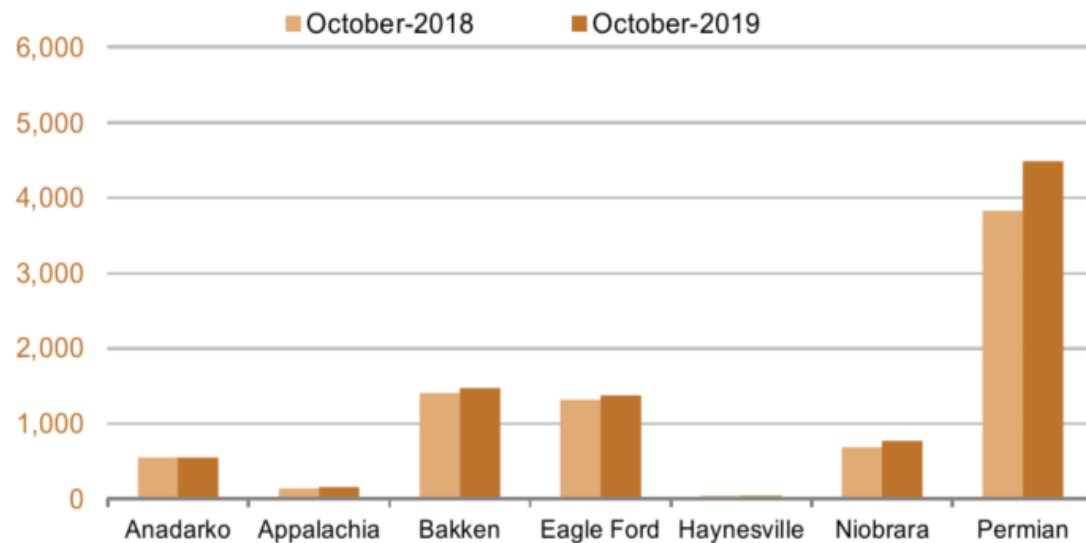
Source: Baker Hughes

# U.S. OIL AND GAS PRODUCTION

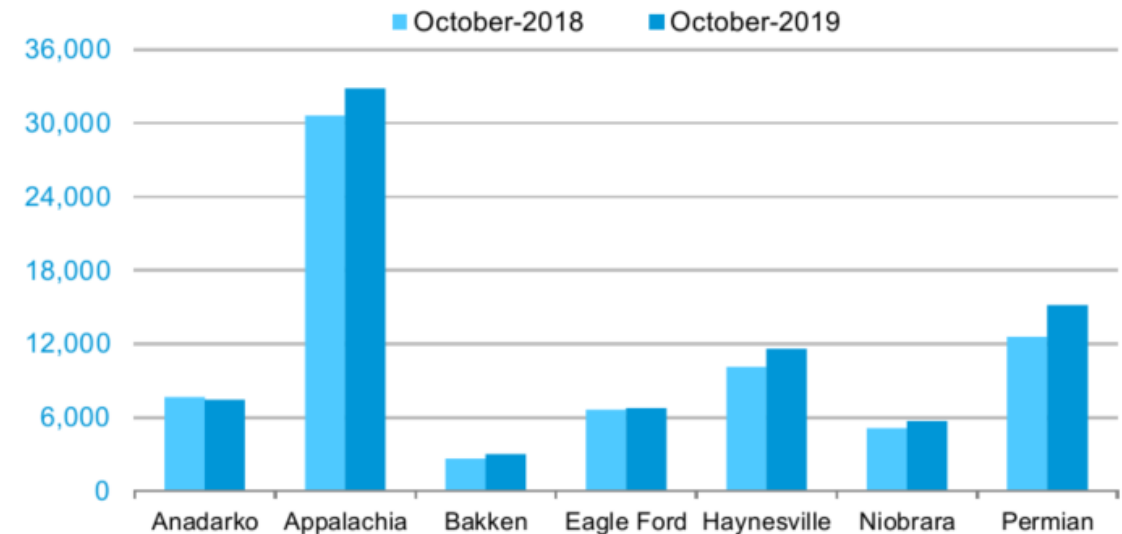
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**Oil production**  
thousand barrels/day



**Natural gas production**  
million cubic feet/day



Source: U.S. Energy Information Administration, Drilling Productivity Report

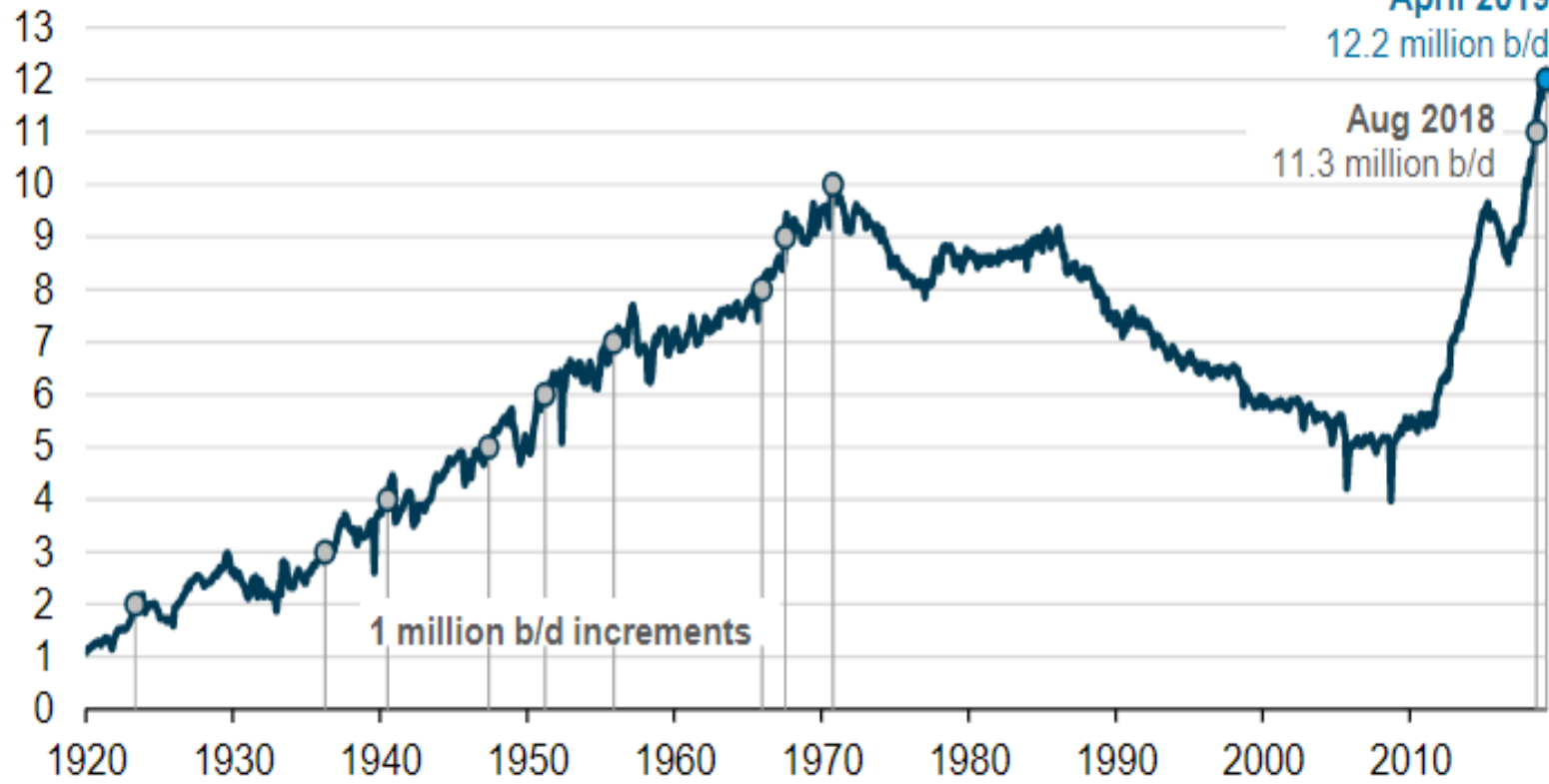


# U.S. CRUDE OIL PRODUCTION



Monthly U.S. field production of crude oil (Jan 1920-Apr 2019)

million barrels per day (b/d)



Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*



- U.S. crude oil production totaled 12.2 million b/d in April 2019, the first time that monthly U.S. crude oil production levels surpassed 12 million b/d
- U.S. onshore crude oil production increase is driven mainly by developing low permeability (tight) formations
- EIA estimates that crude oil production from tight formations in April 2019 reached 7.4 million b/d, or 61% of the U.S. total

# U.S. CRUDE OIL PRODUCTION

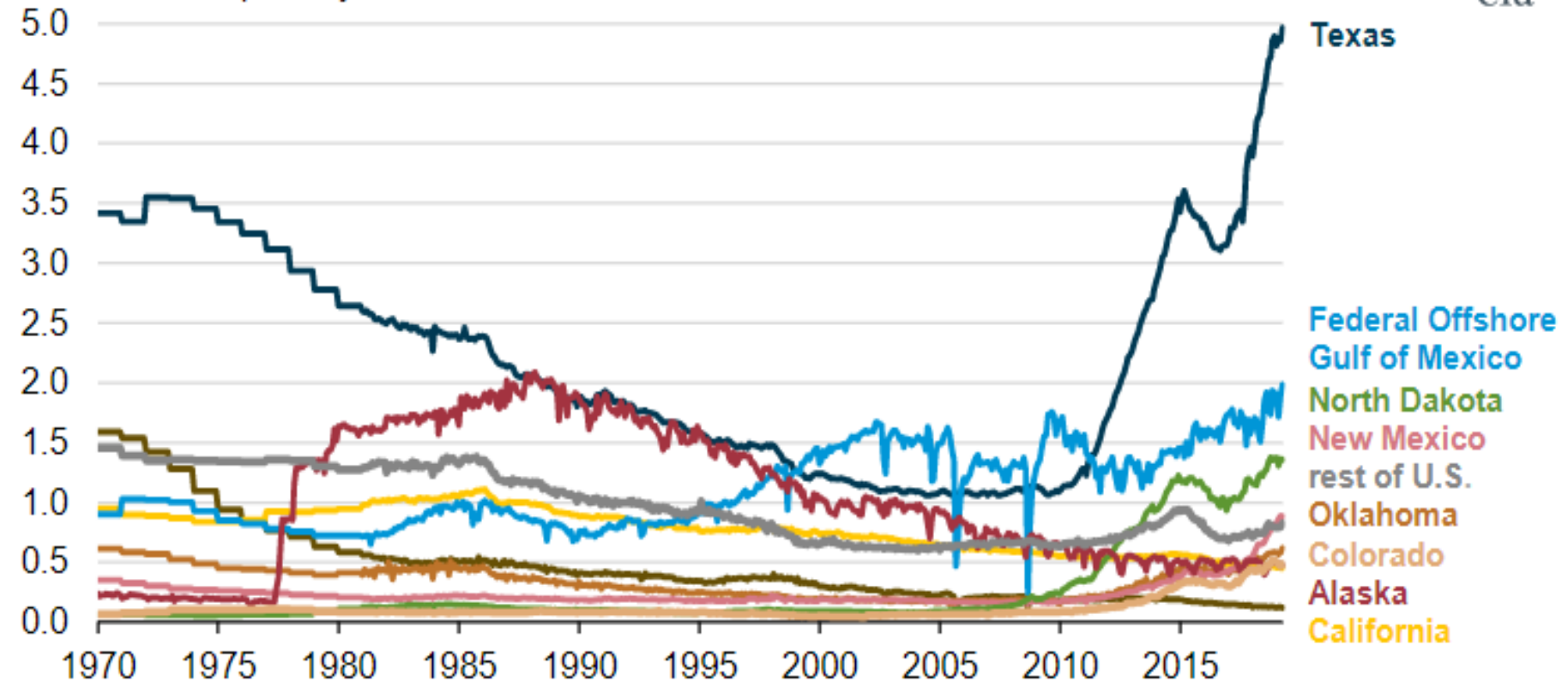
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- Texas and the Federal Offshore Gulf of Mexico, the two largest crude oil production areas in the U.S., both reached record levels of production in April at 4.97 million b/d and 1.98 million b/d, respectively
- Oklahoma also reached a record production level of 617,000 b/d in April

**Crude oil production in selected states and regions (January 1970- April 2019)**

million barrels per day

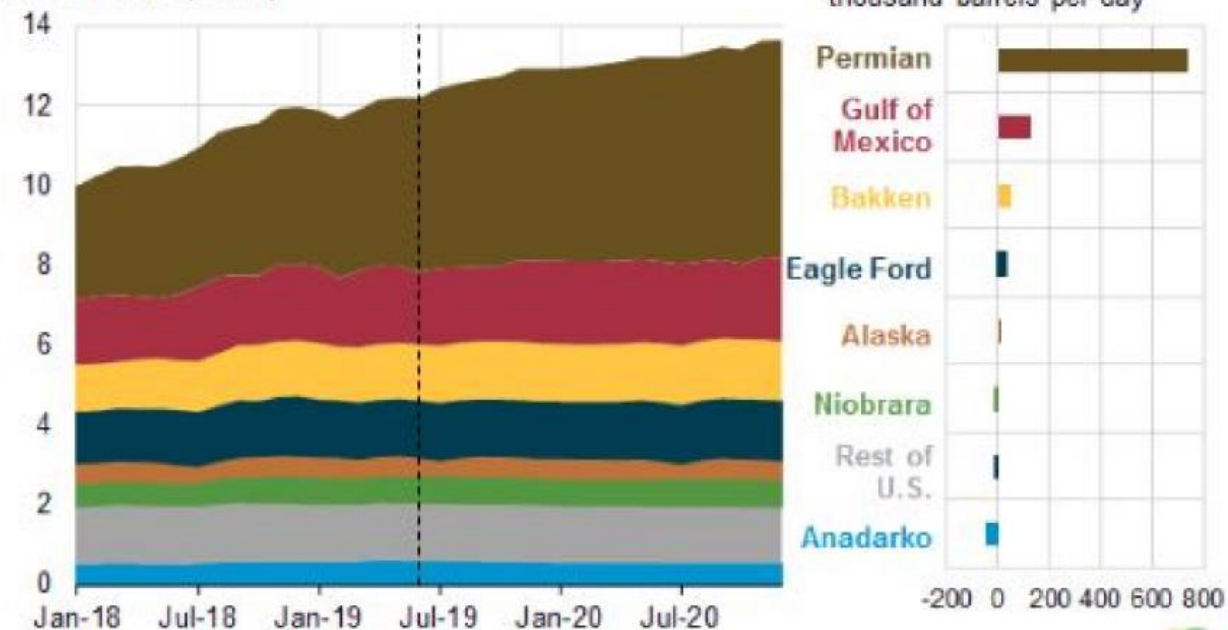


Source: U.S. Energy Information Administration, *Petroleum Supply Monthly* and *State Energy Data System*

# U.S. CRUDE OIL PRODUCTION



Figure 1. Monthly U.S. crude oil production  
January 2018–December 2020  
million barrels per day



Source: U.S. Energy Information Administration, Short-Term Energy Outlook, July 2019



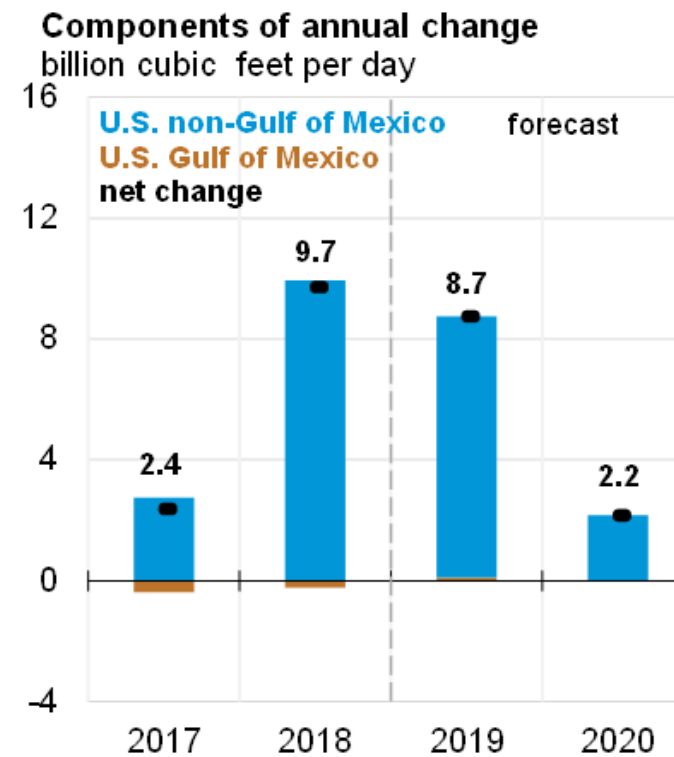
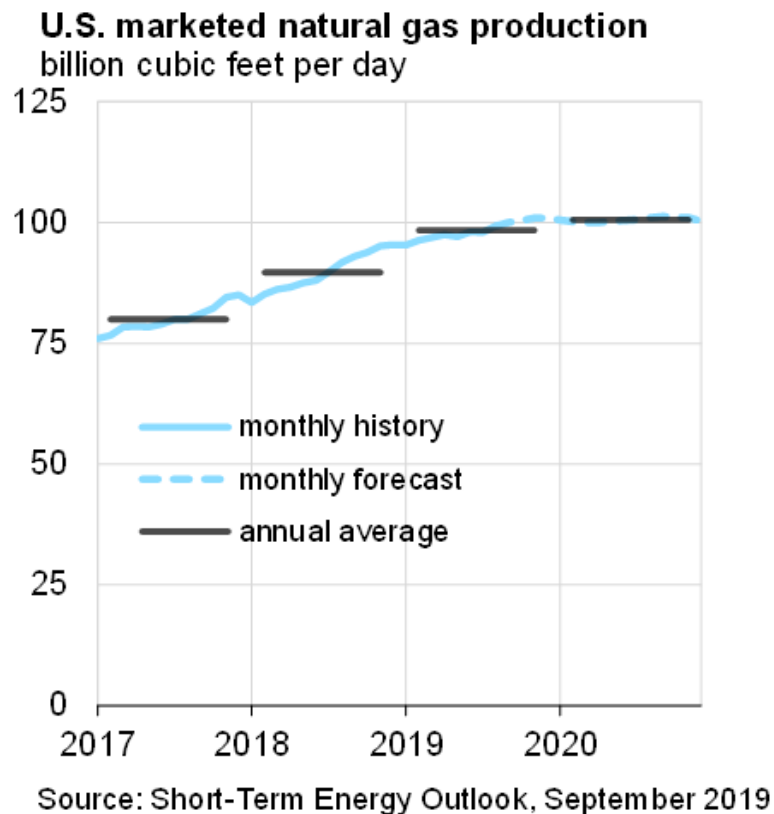
- The Permian Basin in western Texas and eastern New Mexico continues to drive record national oil production growth

(Source: U.S. Energy Information Administration)

# U.S. NATURAL GAS PRODUCTION



- U.S. dry natural gas production expected to average 91.4 Bcf/d in 2019, up 8.0 Bcf/d from 2018





# U.S. SHALE GAS PRODUCTION

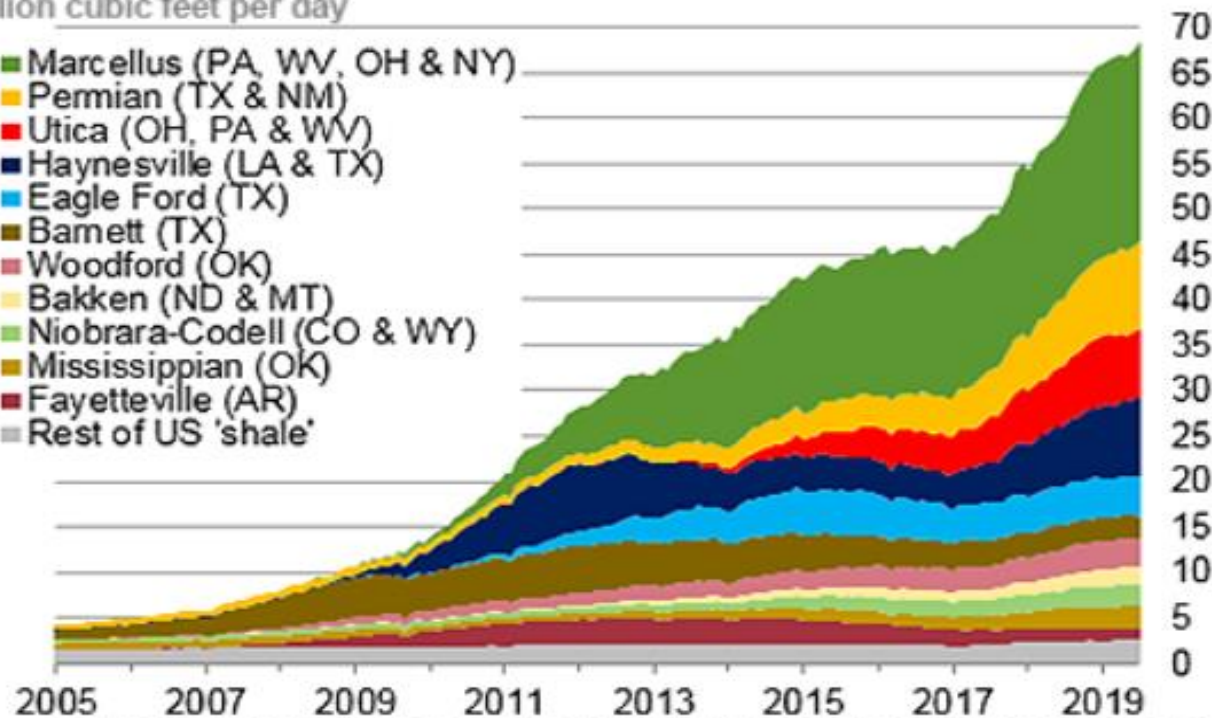


- Marcellus, Permian Utica and Haynesville drive U.S. natural gas production growth

## Monthly dry shale gas production

billion cubic feet per day

- Marcellus (PA, WV, OH & NY)
- Permian (TX & NM)
- Utica (OH, PA & WV)
- Haynesville (LA & TX)
- Eagle Ford (TX)
- Barnett (TX)
- Woodford (OK)
- Bakken (ND & MT)
- Niobrara-Codell (CO & WY)
- Mississippian (OK)
- Fayetteville (AR)
- Rest of US 'shale'

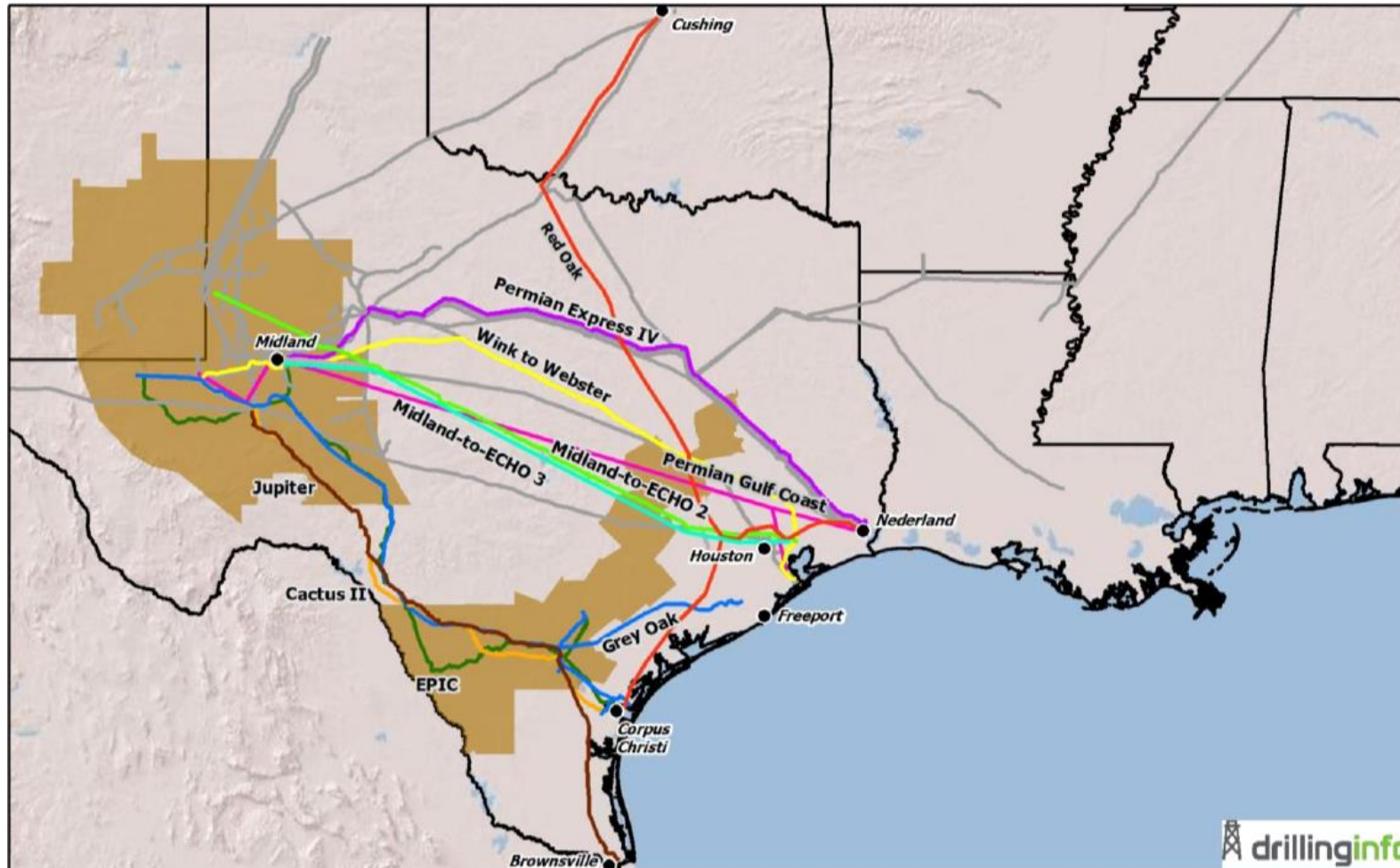


Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through July 2019 and represent EIA's official tight gas estimates, but are not survey data. State abbreviations indicate primary state(s).



# PERMIAN: CRUDE PIPELINE CAPACITY

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- Capacity out of the Permian expected to increase by just under 2.1 MMBbl/d in 2019
- Plains' **Cactus II pipeline** (670 MBbl/d) began line fill in July, with partial service in August
- Energy Transfer's **Permian Express IV** (120 MBbl/d) and the **EPIC NGL pipeline** (400 MBbl/d, temporarily in crude service) have Q3 starts
- Phillips 66 plans to bring its 900 MBbl/d **Gray Oak pipeline** online in late Q4
- Long-haul capacity will see a 150 MBbl/d increase in 2020, when EPIC brings online its 550 MBbl/d dedicated crude oil pipeline (and subsequently takes its NGL pipeline out of crude service)
- Four projects with 2021 startups (Wink-to-Webster, Midland-to-ECHO 3, Permian Gulf Coast, and Jupiter) are competing for shipper interest
- Permian Gulf Coast (600 MBbl/d) is unlikely to proceed due to loss of key backer
- Phillips 66's Red Oak (400 MBbl/d) will provide a connection to Plains' Sunrise pipeline at Wichita Falls

Source: Drillinginfo, Permian to Gulf Coast Midstream, August 2019

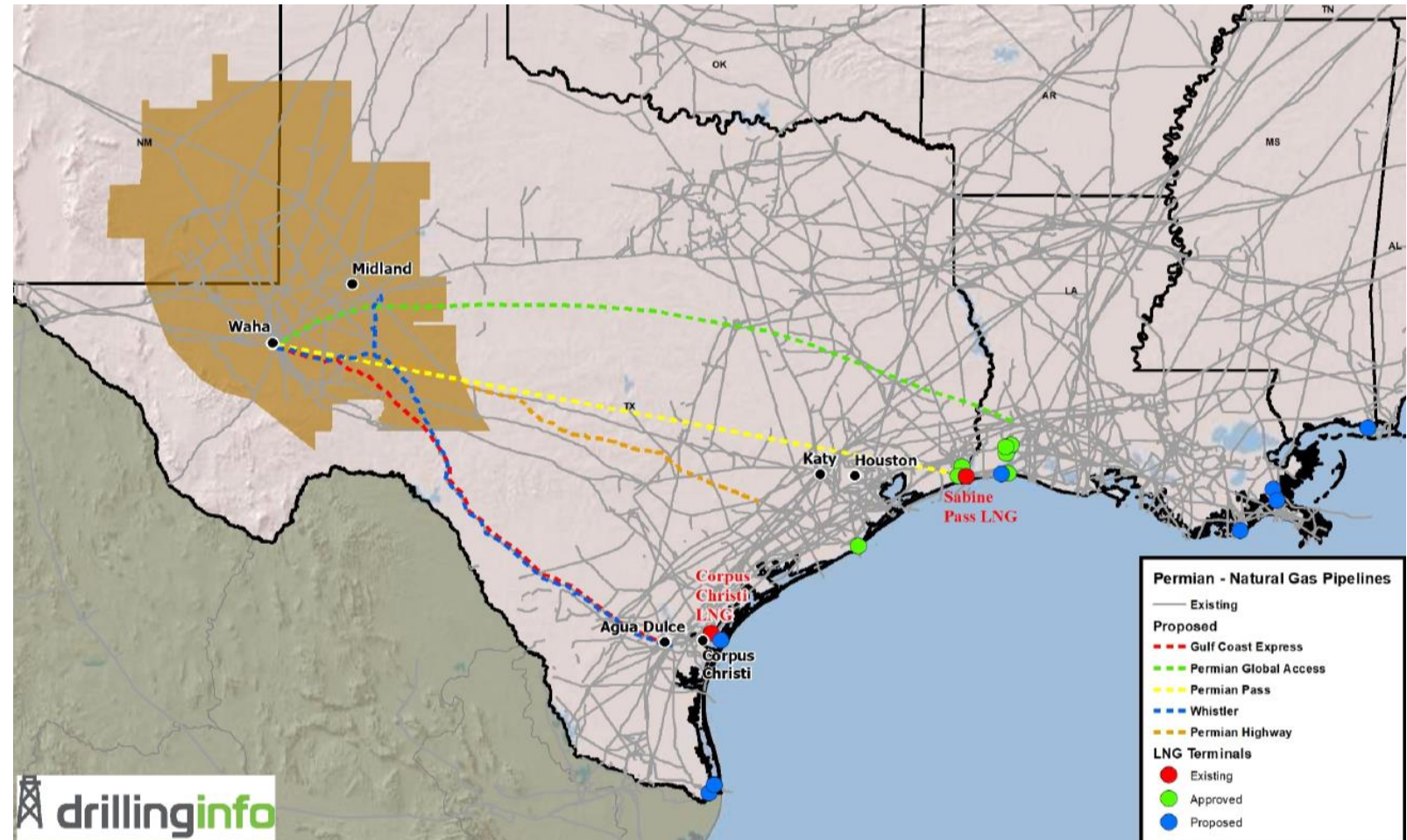


# PERMIAN: NATURAL GAS PIPELINE CAPACITY

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- Dry gas production is expected to increase by 50% (~5 Bcf/d) over the next five years
- **Gulf Coast Express pipeline** (2 Bcf/d), a joint venture between subsidiaries/affiliates of Kinder Morgan, DCP Midstream, Altus Midstream and Targa Resources Corp., remains on schedule for a full in-service date of October 2019
- Kinder Morgan's **Permian Highway pipeline** (2.1 Bcf/d) and **Permian Pass pipeline** (2 Bcf/d) are expected to be in service by Q4 2020, pending approvals
- **Whistler pipeline** (2 Bcf/d), jointly owned by Stonepeak Infrastructure, West Texas Gas, MPLX and WhiteWater Midstream, expected to be in service Q3 2021, pending approvals
- Tellurian's **Permian Global Access pipeline** (2 Bcf/d) is expected to startup in 2023
- Other proposed projects include the **Permian 2 Katy pipeline** (1.7 to 2.3 Bcf/d), **Pecos Trail pipeline** (1.9 Bcf/d) and **Bluebonnet Market Express pipeline** (2 Bcf/d)
- Of these additional projects, currently only the Permian Highway Pipeline and the Whistler Pipeline have reached a final investment decision
- All projects will be transporting the gas east toward South Texas and Louisiana to feed LNG exports as well as growing power and industrial demand



Source: Drillinginfo, Permian to Gulf Coast Midstream, August 2019

# Speaker Biography

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John B. Connally IV is a partner in the Houston office of Vinson & Elkins. He is co-head of the Energy Transactions and Projects practice group. John B.'s practice involves the representation of clients in domestic and international mergers and acquisitions, project development transactions, private equity investments, joint ventures, and a variety of energy matters.

John B. has spent his entire career with Vinson & Elkins, in both New York and Houston. He has worked on projects in more than 20 U.S. states and more than 25 countries. John B. received his J.D. with high honors from The University of Texas School of Law in 1997 (Chancellors; Order of the Coif; Texas Law Review) and graduated from Vanderbilt University with a B.A. in 1994 (Phi Beta Kappa; Founder's Medal). He is admitted to practice law in Texas and New York.



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# HYDRAULIC FRACTURING

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The background image shows an industrial oil field under a clear blue sky. On the left, there are several large, orange cylindrical storage tanks with metal ladders. In the center-right, a tall drilling rig with a red and white lattice structure is visible. The rig has a teal-colored section and is supported by a concrete base. Various pipes, valves, and smaller equipment are scattered across the site. The overall scene is a typical oil and gas extraction facility.

QUESTIONS?



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# HYDRAULIC FRACTURING

SYMPOSIUM



THANK YOU