



AUGUST 2015

US CRUDE OIL AND THE INTERDEPENDENT SUPPLY CHAIN

US oil market developments and assessing the economic impact of a US crude oil free trade policy

Kurt Barrow
Vice President Oil Markets & Downstream

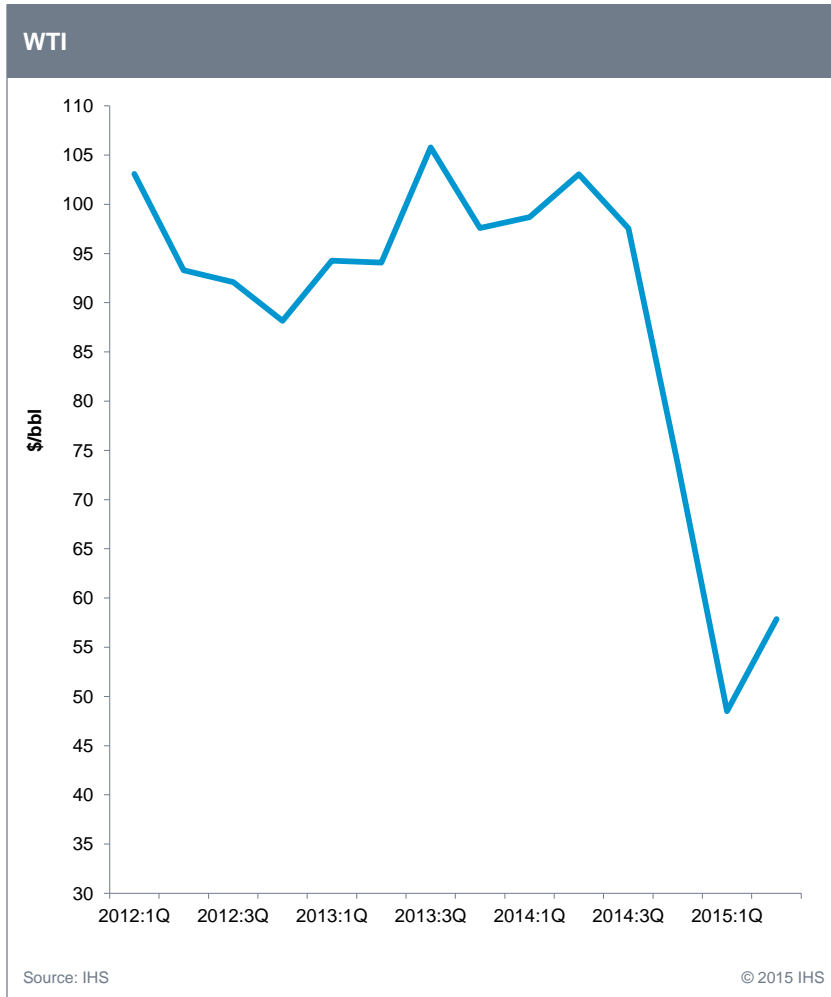
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U.S. Crude Market Response

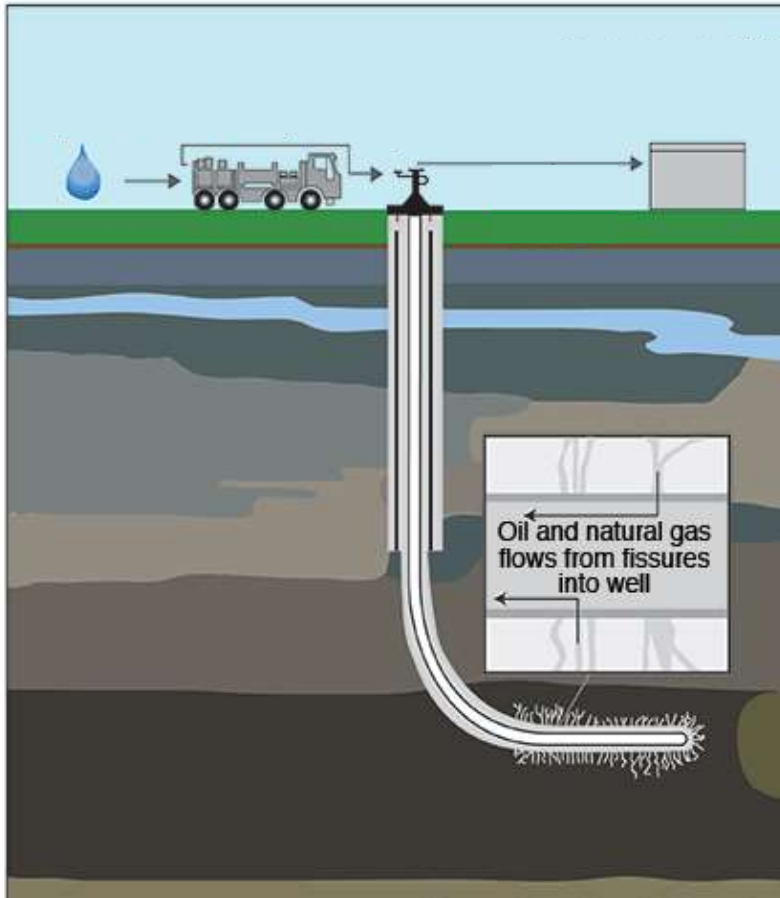
U.S. Crude Oil Export Policy

Unleashing the Supply Chain with Crude Exports

Oil prices have declined sharply creating a dramatic drop in oil drilling



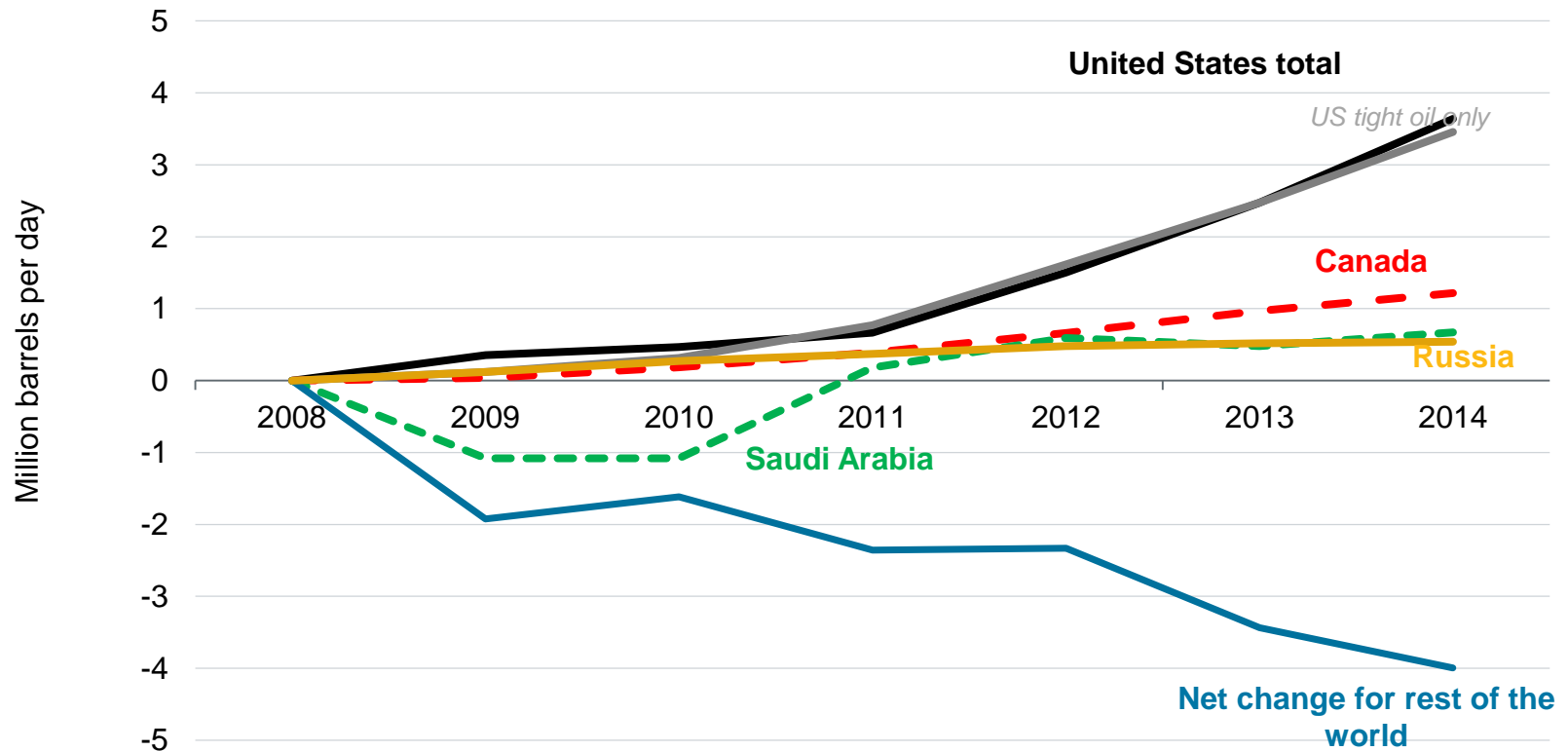
US Energy Revival



- Application of horizontal drilling and hydraulic fracturing accessing “source rock”
- First applied to gas plays – now the US has one of the lowest gas prices globally
- “Recently” applied to oil fields
- Complete reversal in energy outlook
 - Crude production – long assumed to be in decline – has nearly doubled since 2008
 - LNG import assumption now exports
- “Unconventional” oil and gas has been one of the major contributors to the US economic recovery
 - Estimated to have added nearly 1% to GDP on average over past six years

The US has supplied most of the world's growth – result of new applied technology and innovation

Cumulative change in crude oil production from 2008-2014



Note: Figures do not include OPEC condensate and OPEC/non-OPEC NGLs. The term "North America" in the title of this slide refers only to Canada and the United States.

Source: IHS Energy

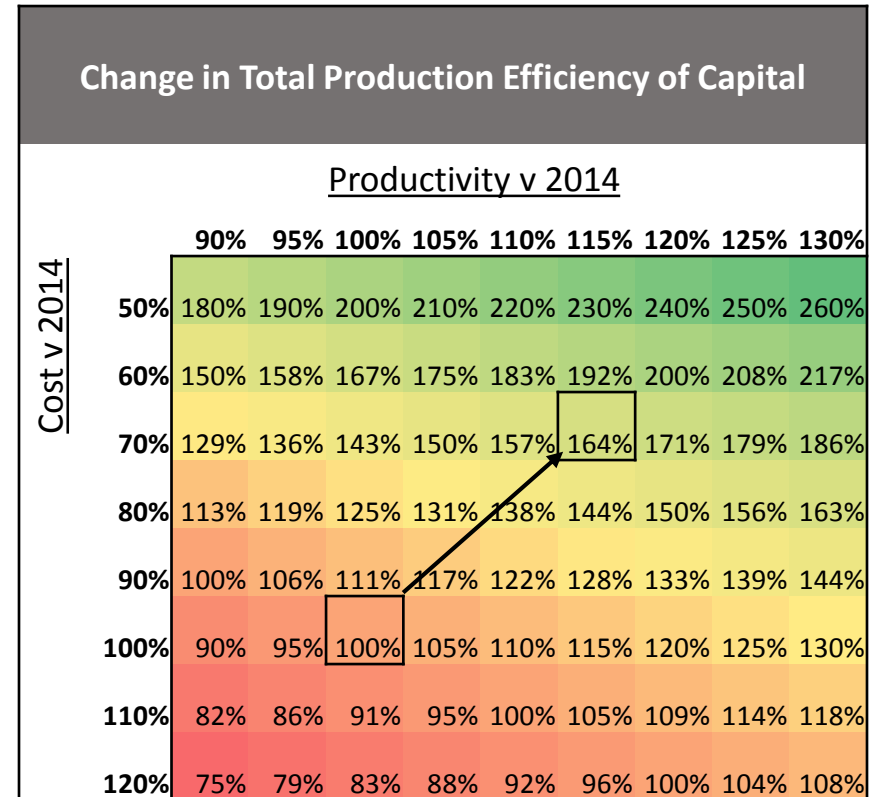
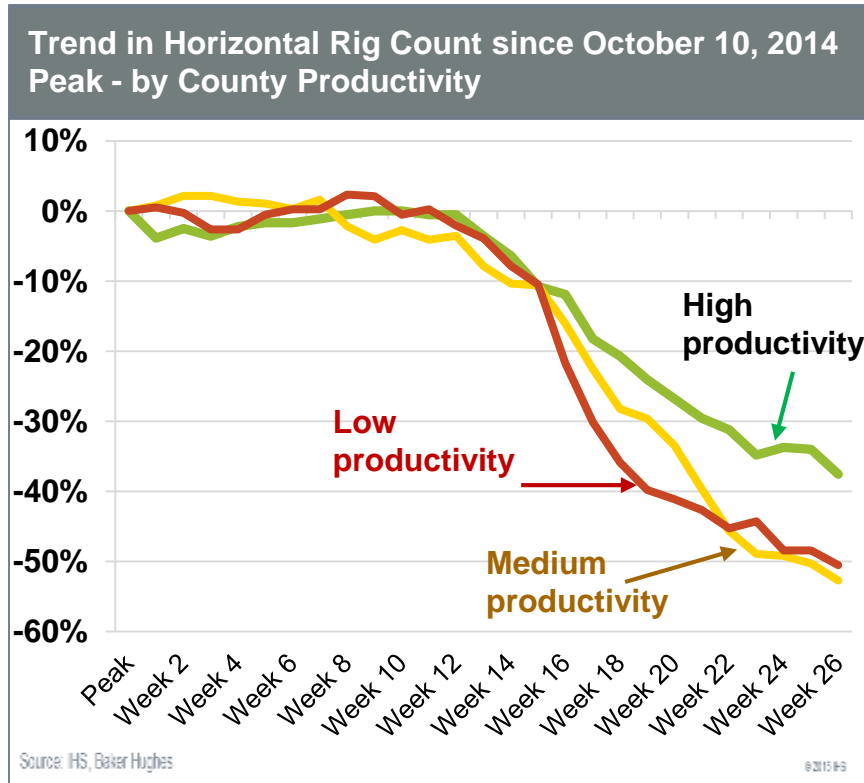
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The US has a new role in global crude markets – the “inadvertent swing supplier”

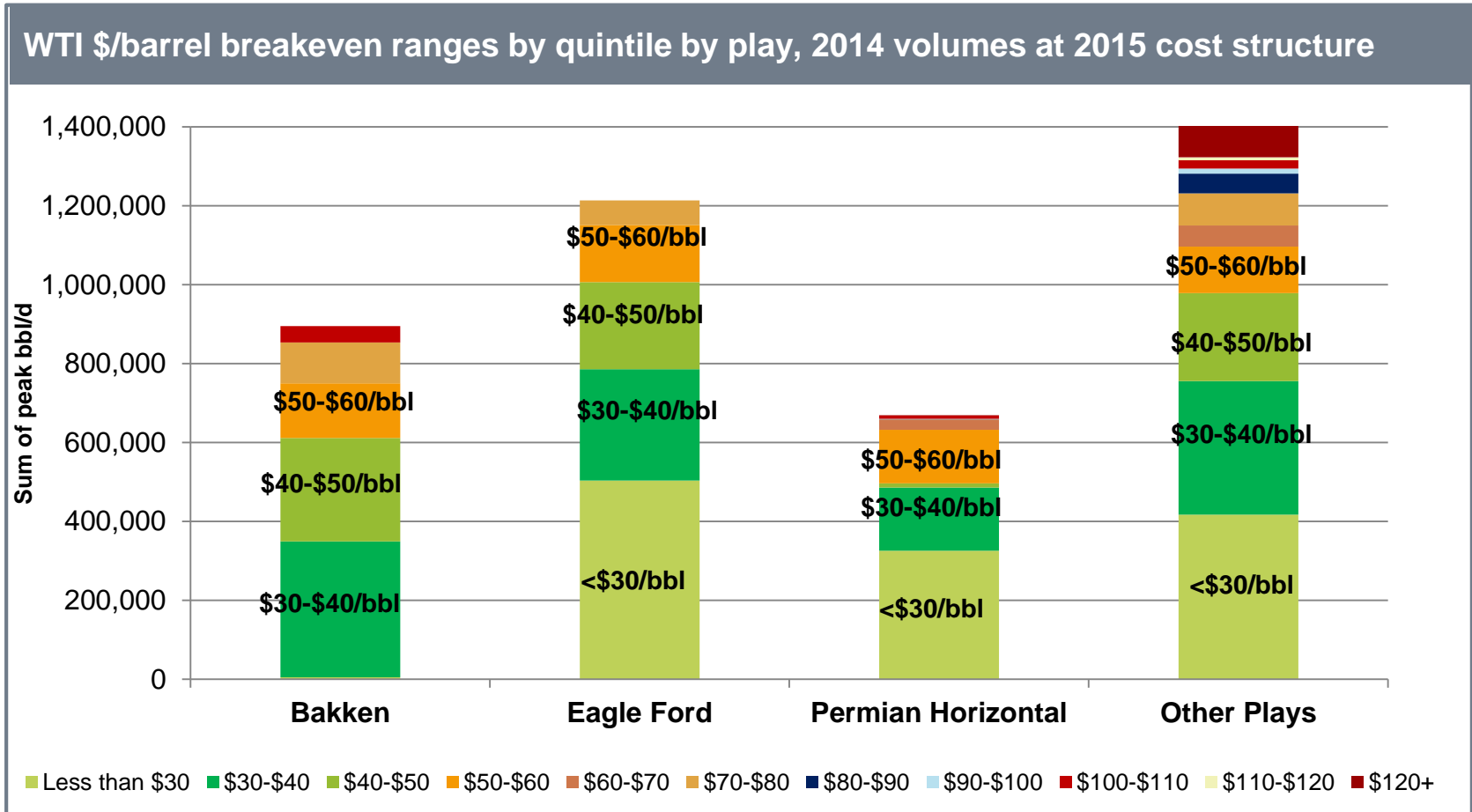
- Historical market structure: OPEC as swing producer, non-OPEC at full utilization
- OPEC is on sideline – at least for now
- High cost production will need to slow and accelerate to match demand
- US onshore tight oil is central to the rebalancing
 - Financial markets also important as the ultimate funders of high cost production
- We are in uncharted waters – pace and magnitude of response and feedback loop unknown

Capital Efficiency is keeping production from falling in face of lower prices

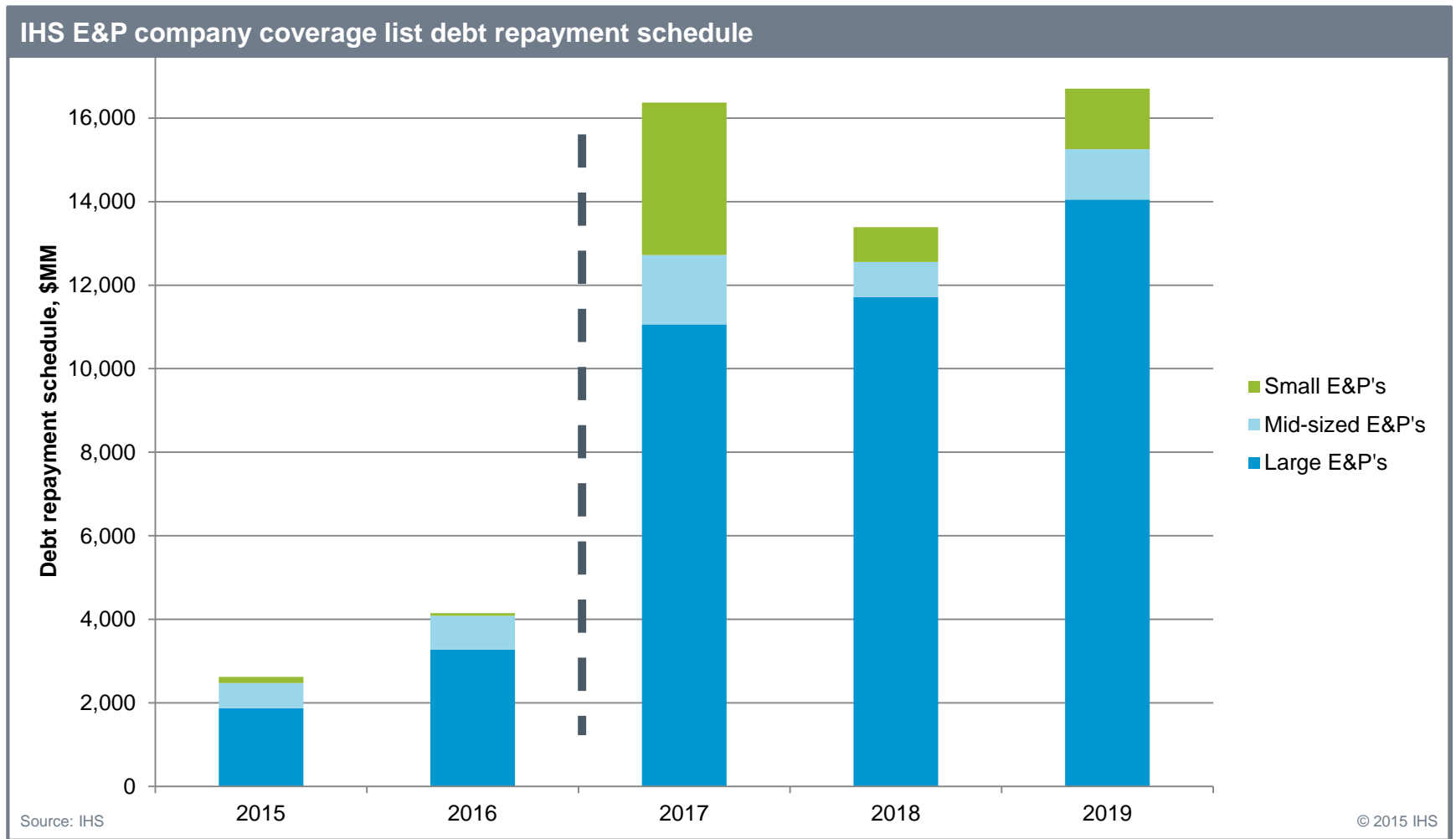
- Compared with 2014, IHS expects capital to be 65% more efficient at the start of 2016 than the start of 2015 due to compounding productivity and cost cuts.



Cost deflation puts much of the Eagle ford, Bakken and Permian at a WTI \$60 or less breakeven

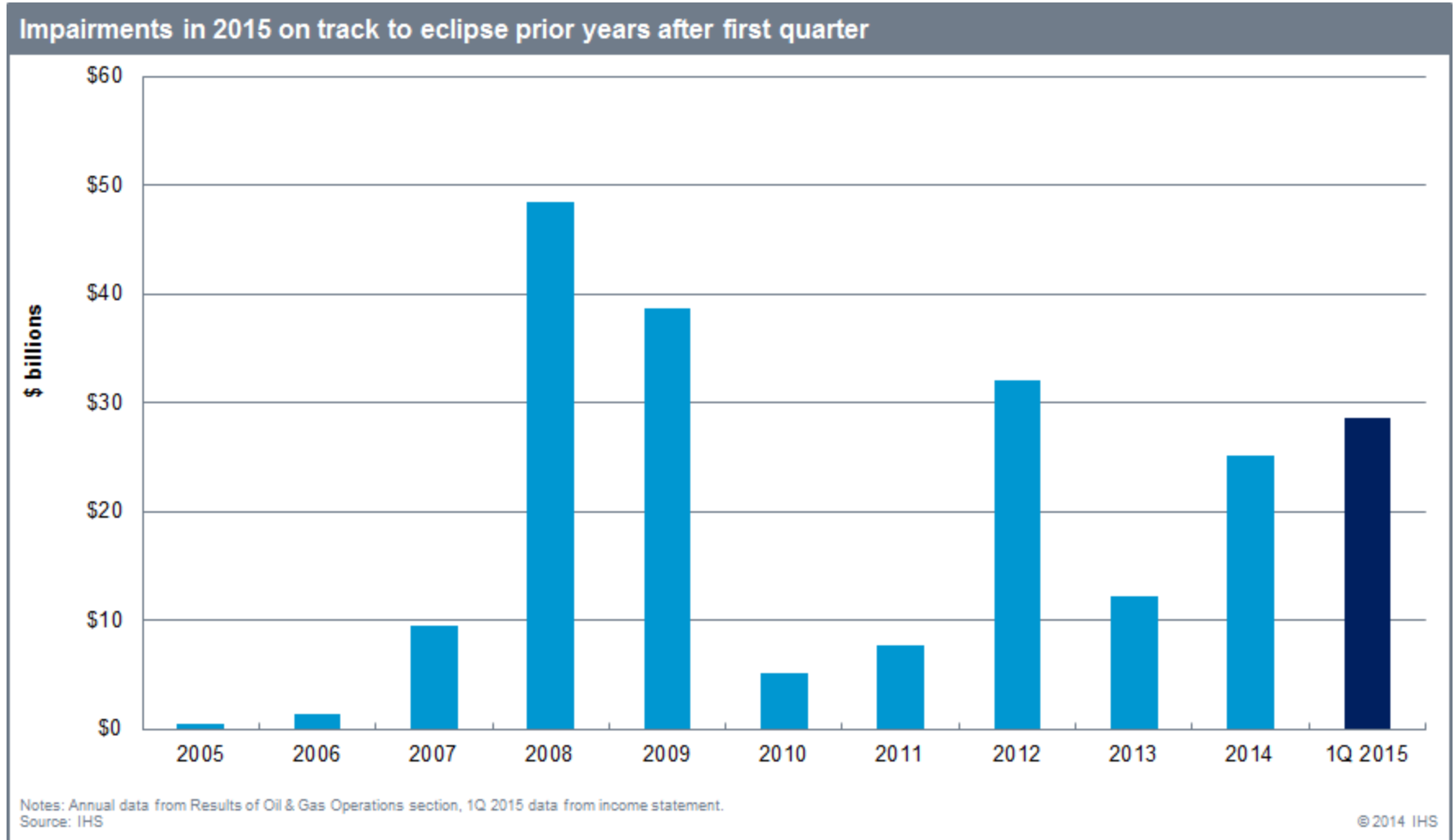


Great Wall of Debt



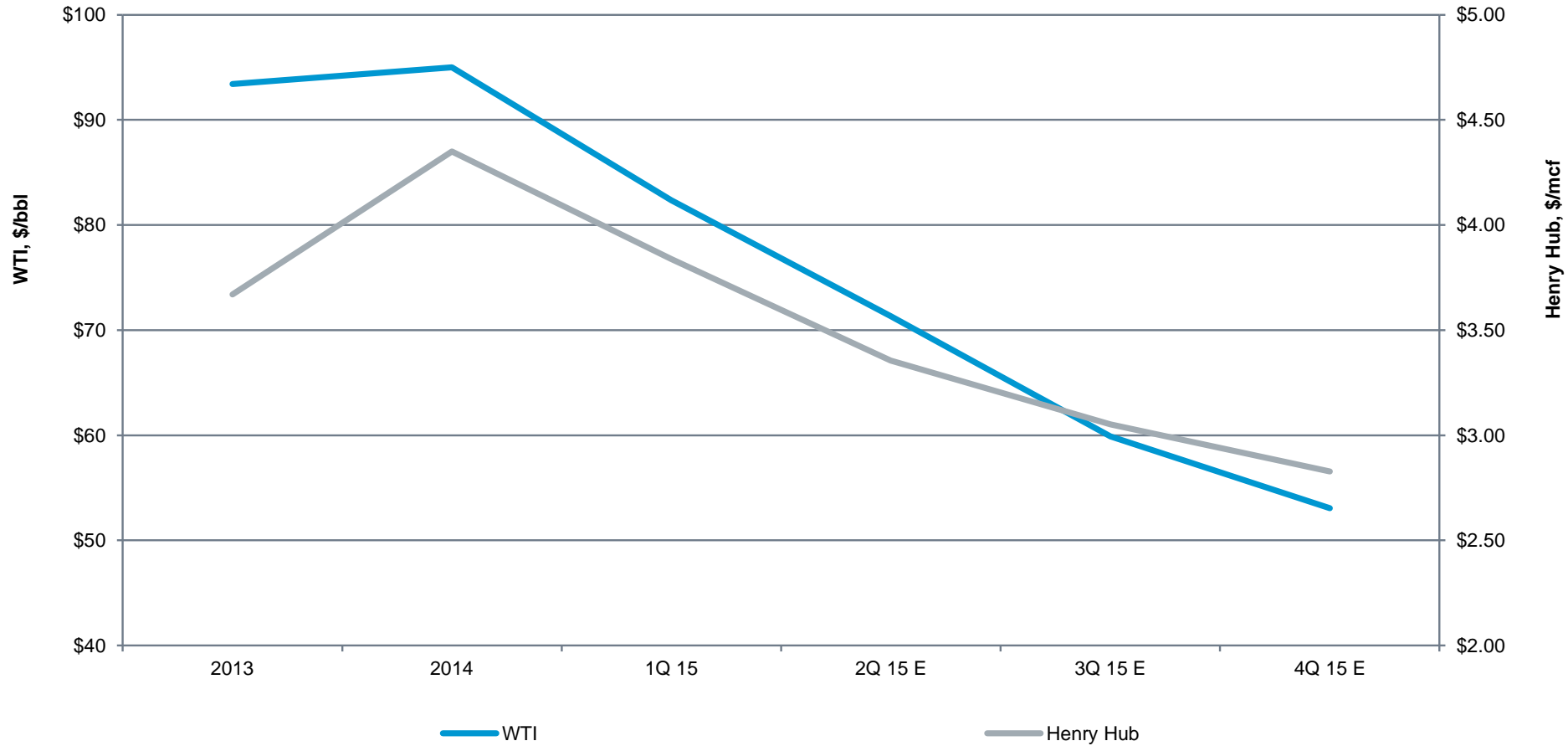
Heavy debt repayment burden in 2017 & beyond If prices don't turnaround

Impairments (asset write downs) are rising quickly



More impairments coming unless prices rebound

SEC benchmark pricing



Source: IHS

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Outlook

- Expect low crude prices to remain rest of this year and in 2016
 - Need two quarters below \$45 WTI (HIS base case forecast)
 - Rig count projected to drop further from ~600 to ~400
- Will add further pressure to state oil revenues
- Expect notable increase in mergers, bankruptcies and layoffs
- Consumers receive lower gasoline prices
- Past 2016, prices expected to increase notably but remain under \$100 on average

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IHS Crude Export Decision (first study)

- Oil industries Gridlocked by export policy and refining system
- Large economic impact from capital intensive business
- Benefits*:
 - Jobs of 394,000 – 859,000 more per year
 - Lower gasoline price by 8 – 12 cents per gallon
 - Add \$86 – \$170b to GDP per year
 - Cumulative government revenue of \$1.3 – \$2.8b
- Broad state-level benefits
 - All states benefit, not just producing states
 - One-quarter of benefits in non-producing states

* Range based on base and potential crude oil production cases

Gasoline pricing implications

- Added US crude production increases global supply
- Reduces global oil prices – which are closely linked to US gasoline
- Gasoline is freely traded – imported and exported
- Analysis is clear – crude exports lower gasoline prices

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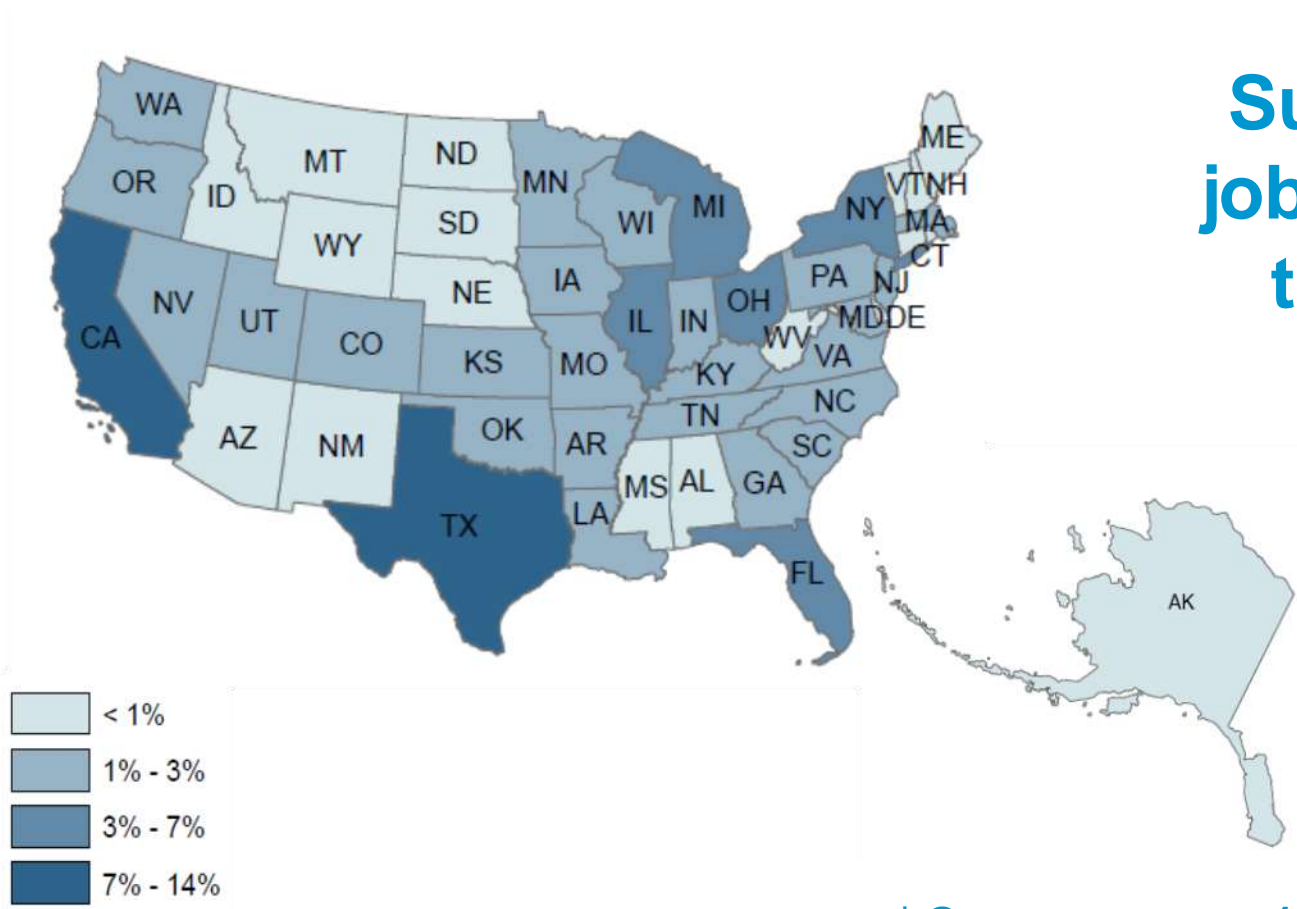
Unleashing the Supply Chain with Crude Exports

Unleashing the Supply Chain (second study)

- The **Supply Chain** impact is less well understood but affects the entire country
- This study builds on macroeconomic impact of changing US policy
- Examines the impact on an intricate and interdependent supply chain that supports the oil industry – and has made the scale-up of tight oil production possible
- The analysis quantifies granular impact
 - 60 separate supply chain industries
 - impact at the congressional district level

Supply chain employment impacts

Employment distribution in 2017: US crude oil export supply chain
(percent, difference free trade vs. restricted trade)

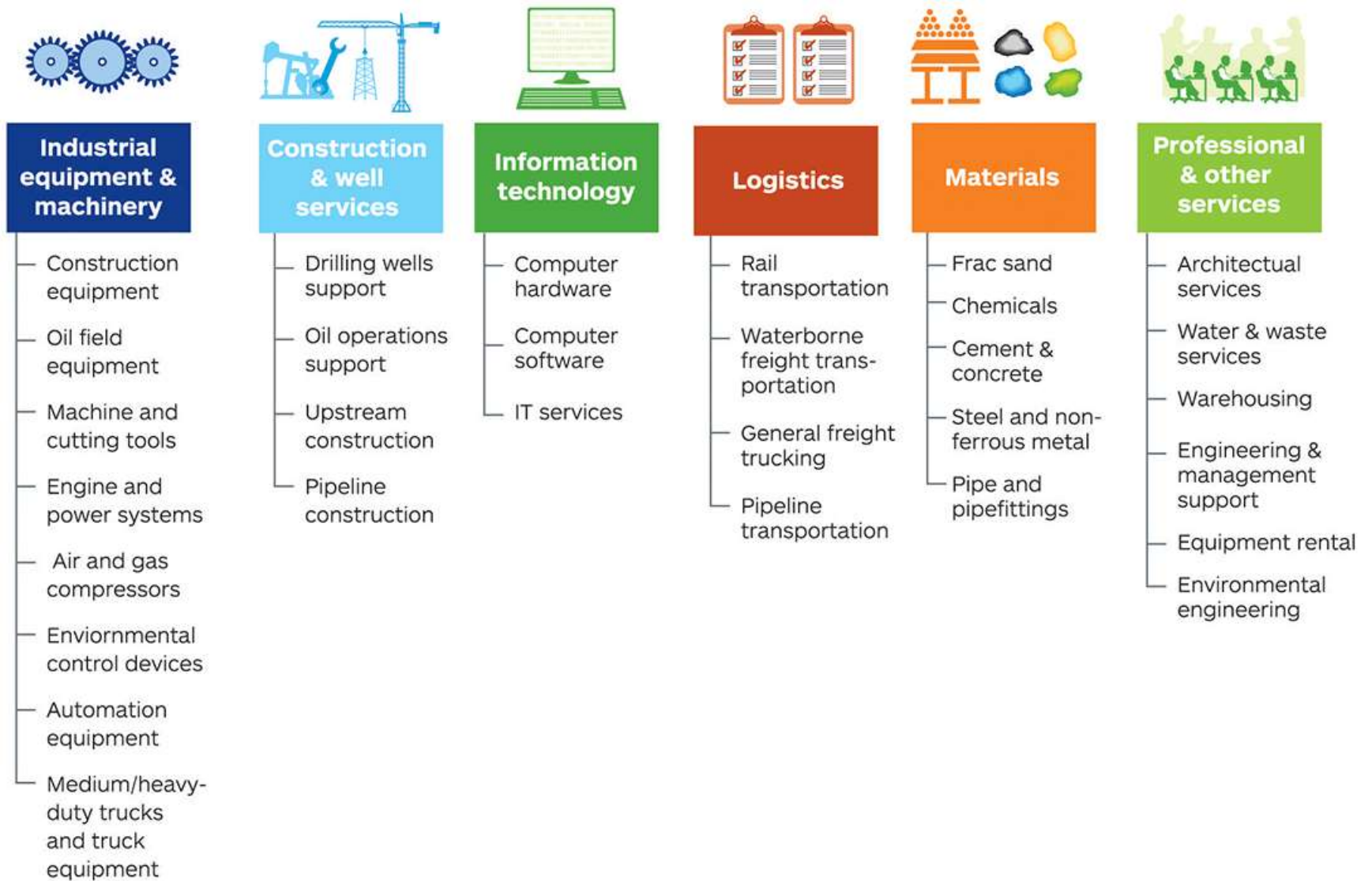


Supply Chain jobs of 124,000 to 240,000*

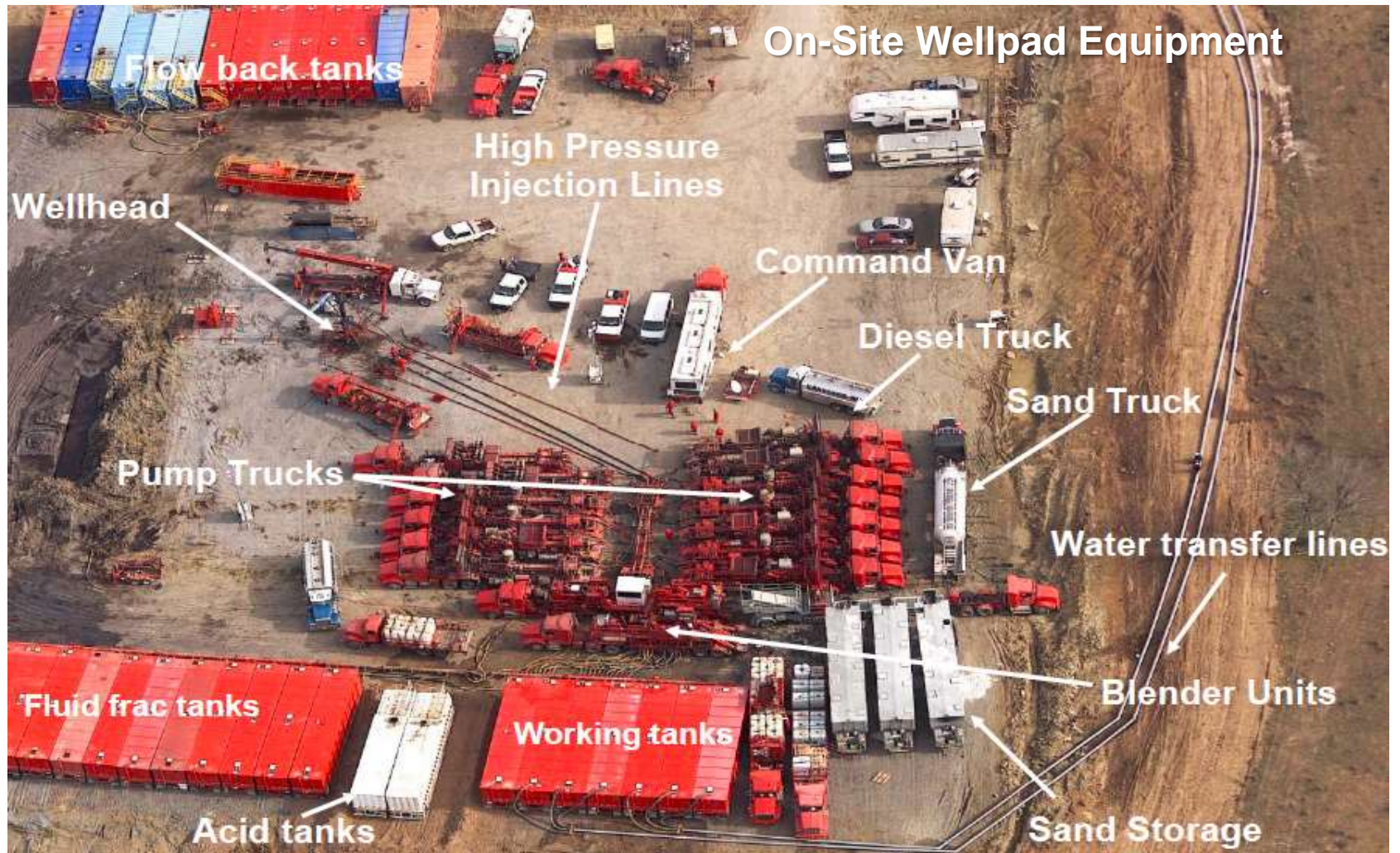
*** On average over 15 years for base and potential production cases**

Source: IHS Economics

What is the crude oil supply chain?



Supply Chain Examined: The Wellpad (post-drilling)



Supply Chain Examined: The pumping unit

Frac Unit/Truck Overview

Typical Equipment



Description

- A frac truck is the central piece of equipment at wellsite
- The unit is highly specialized and assembled from three primary components:
 - pump,
 - transmission, and
 - engine



Frac Pump



Transmission



Engine

Supply Chain Examined: Manufacturing of frac truck components



Engine



Pumps



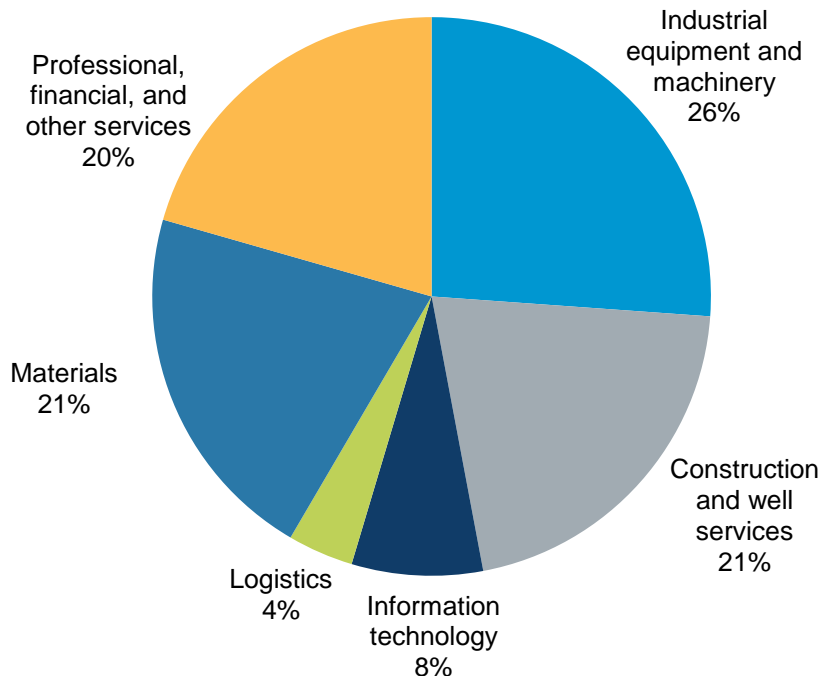
Transmission



Many industries participate in crude oil supply chain

Employment share by core group
(2016-2030 average, difference free trade vs. restricted trade)

Base Production



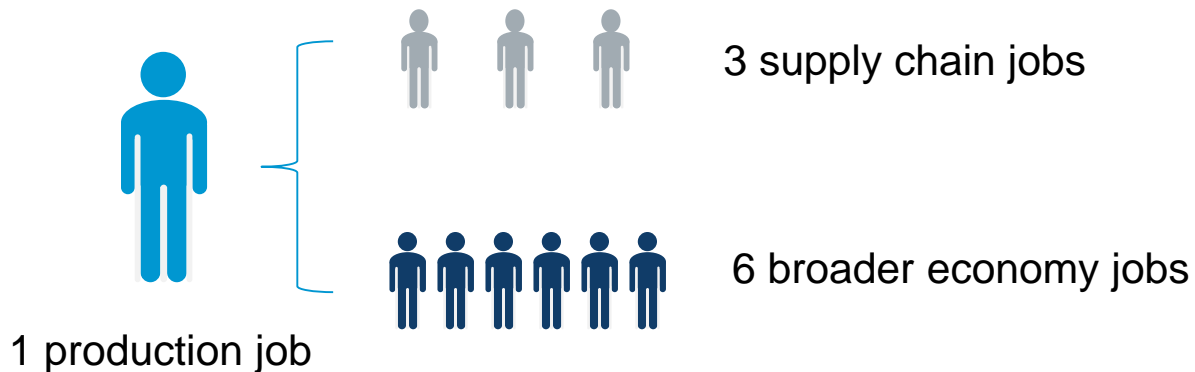
- Direct suppliers – such as construction and well services – witness largest impact
- Indirect suppliers – such as information technology and finance – emerge as major contributors of additional jobs, value added to GDP, and labor income

Average number of workers: 123,577

Source: IHS

Oil and gas sector multiplier effects

- The economic benefits of oil and gas activity throughout its extensive supply chain far exceed benefits to the industry itself.



- Every new production job creates three jobs in the supply chain and another six jobs in the broader economy.

Free trade impacts on the supply chain

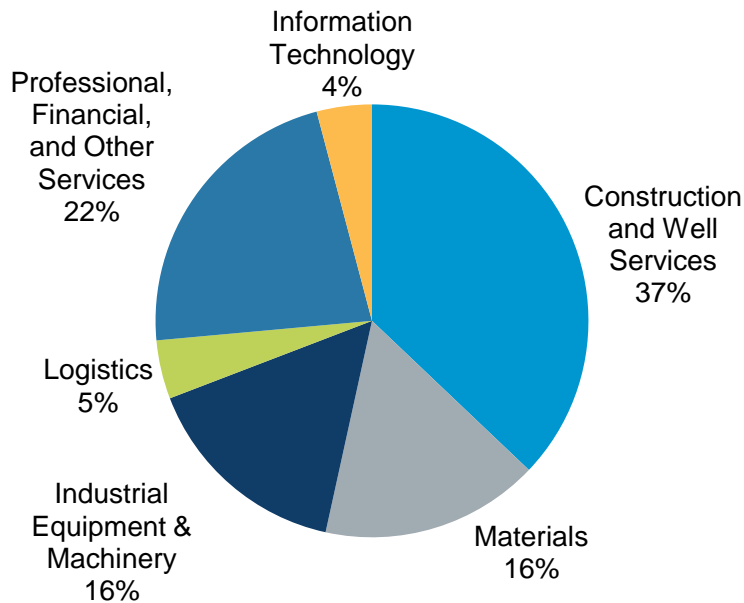
- Add \$26 – 47b to GDP per year
- Jobs of 124,000 – 240,000 more per year
- Labor income improves \$158 – \$285 per year for each household
- Cumulative government revenue of \$429 – \$868b

- *Above supply chain impact represents roughly one-third of total impact for each category*

Supply chain impact diversity

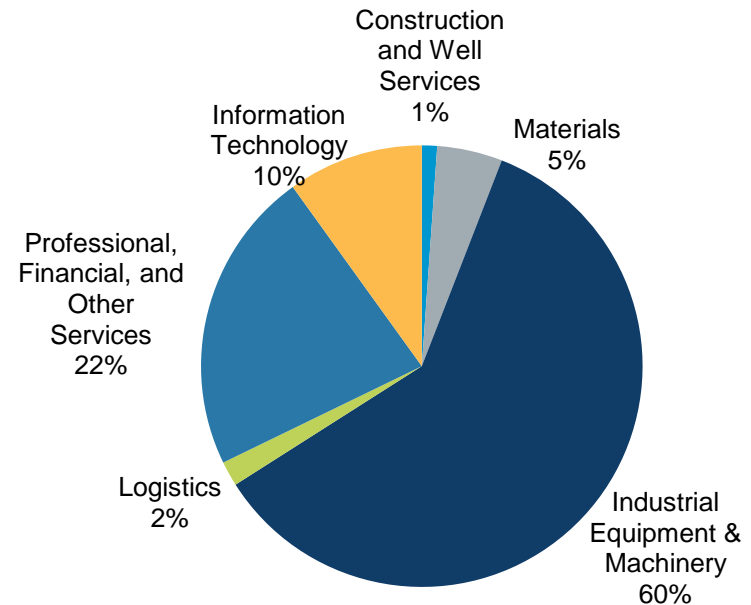
Supply chain employment impact – Base production
(2016-2030 average, difference free trade vs. restricted trade)

Texas



Supply chain average impact:
13,226 Peak impact : 32,279
(number of workers)

Florida



Supply chain average impact:
6,138 Peak impact : 12,213
(number of workers)

Source: IHS

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Why now?

- US crude price remains low relative to global price
- Lower global oil prices have the effect of increasing—rather than decreasing, as some might expect—the impact of the export ban.
 - Every \$3 per barrel change in a \$50 environment can have the same effect as a \$10 change in a \$100 environment
- Far-reaching macroeconomic benefits begin immediately

Further information

- www.ihf.com/crudeoilexport
- www.ihf.com/unleashingsupplychain
 - Link to interactive data tool to access granular congressional district level information on impact of export policy decision
- Hardcopies available by request
 - kurt.barrow@ihf.com / lesle.alvarado@ihf.com

