

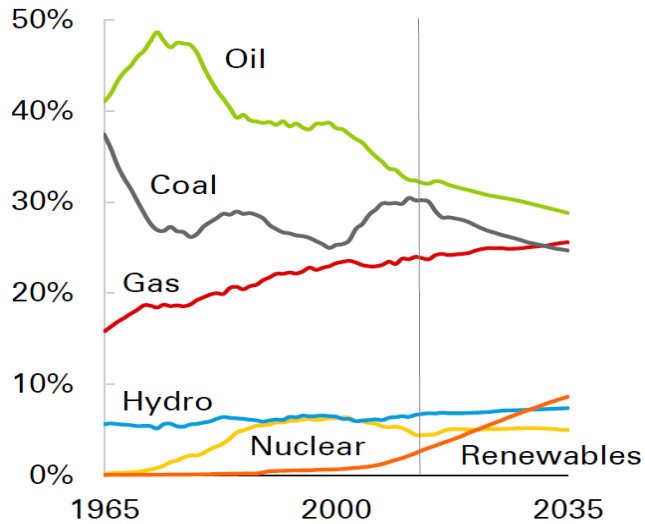
# Israel Energy and Business Convention 2016

## The Dynamic Energy Landscape

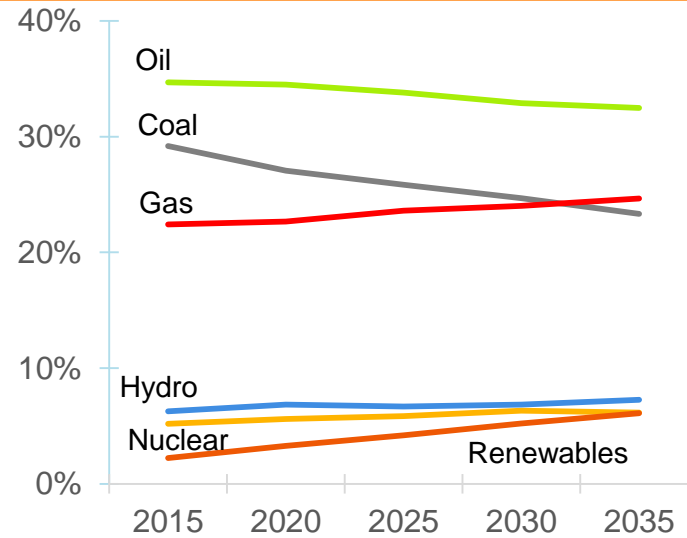
– 21 November 2016, Tel Aviv –

Gürkan Kumbaroğlu, IAEE President

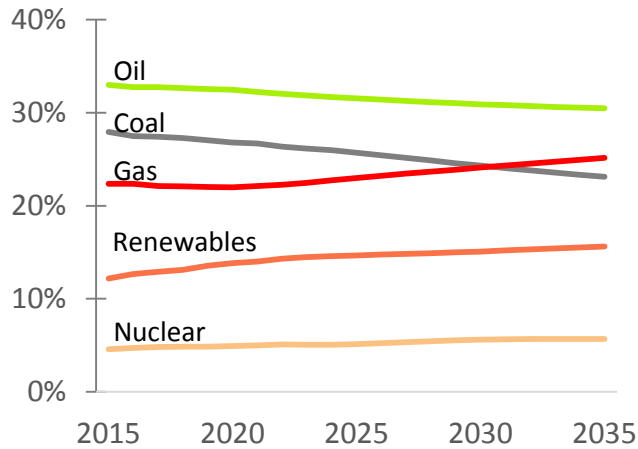
# The Dynamic Energy Landscape



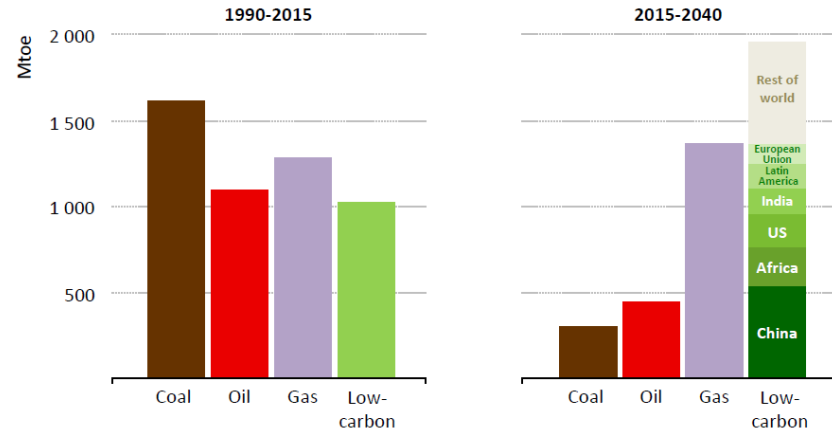
Source: BP Energy Outlook 2016



Data Source: MIT Joint Program Energy Outlook 2016

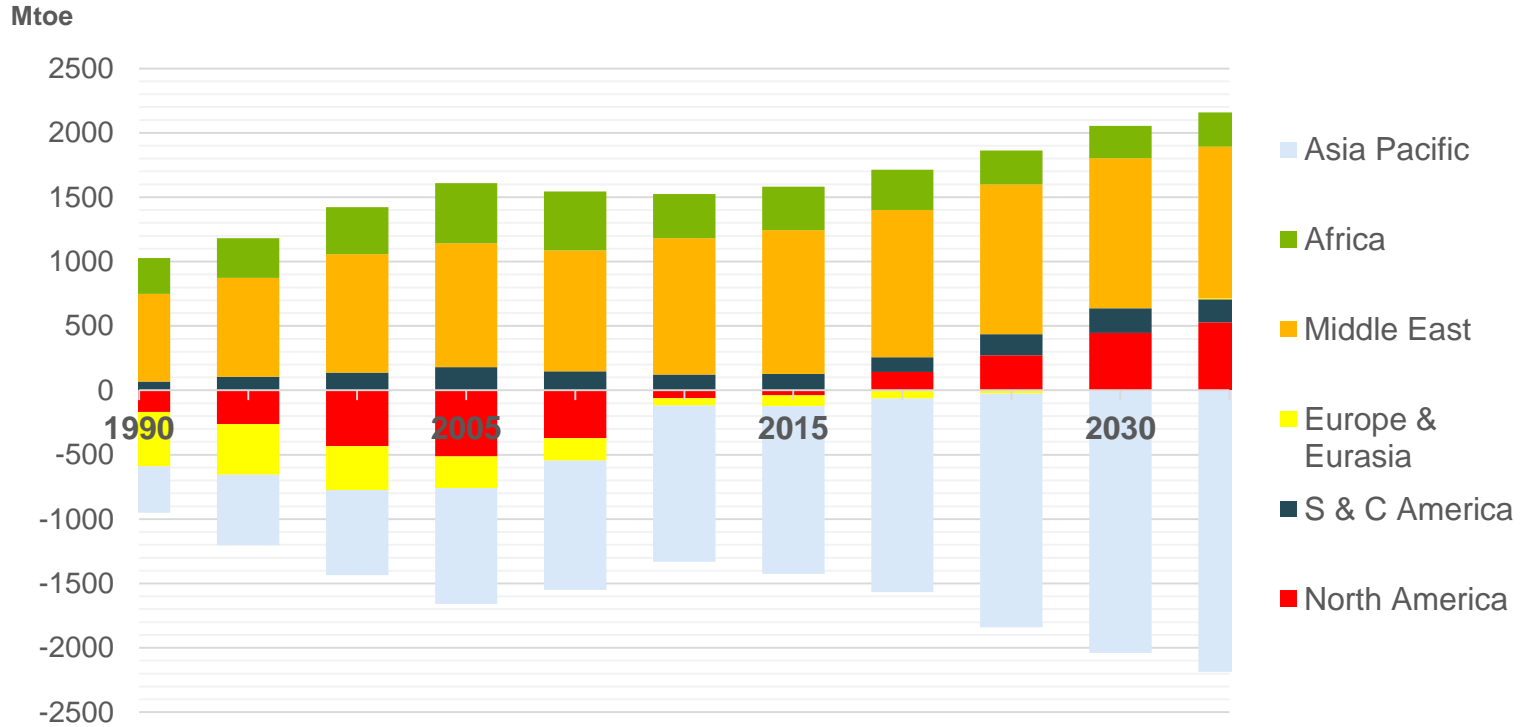


Data Source: EIA International Outlook 2016



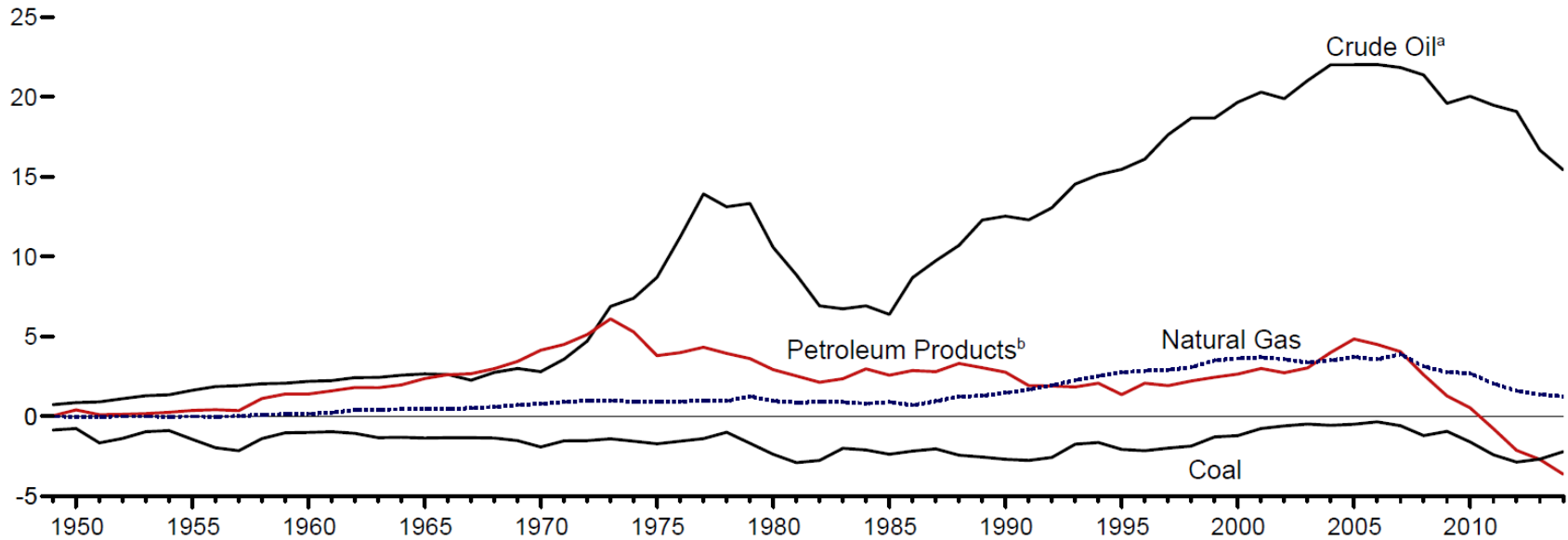
Source: IEA World Energy Outlook 2016

## Primary Energy Net Balances



Data Source: BP Energy Outlook 2016

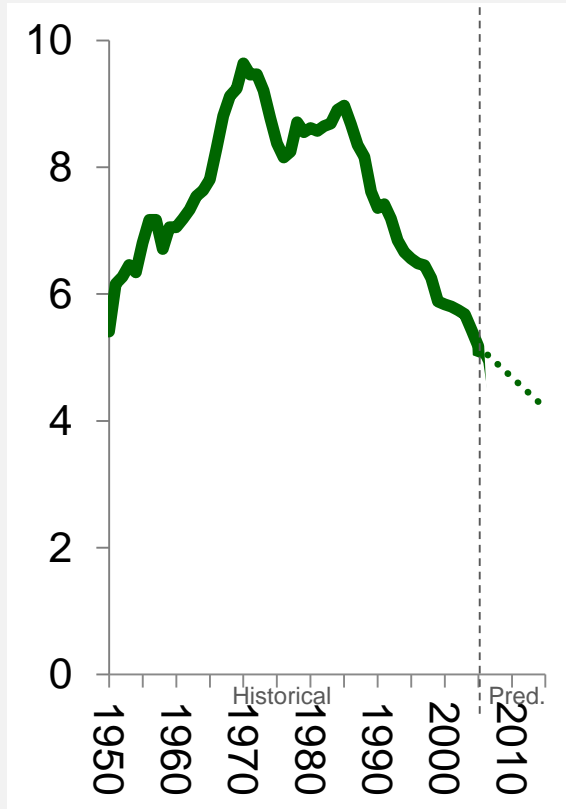
## US Net Energy Imports



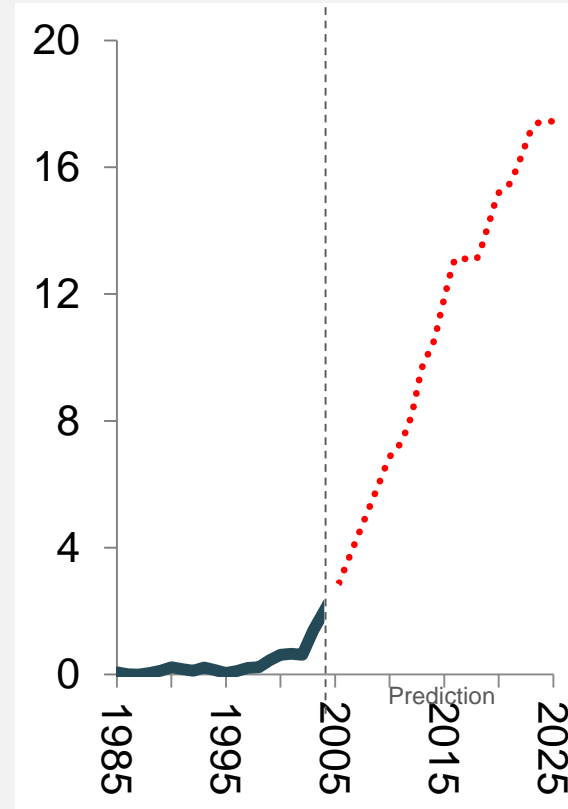
Source: US Energy Information Administration

## U.S. Oil&Gas Projections 2005

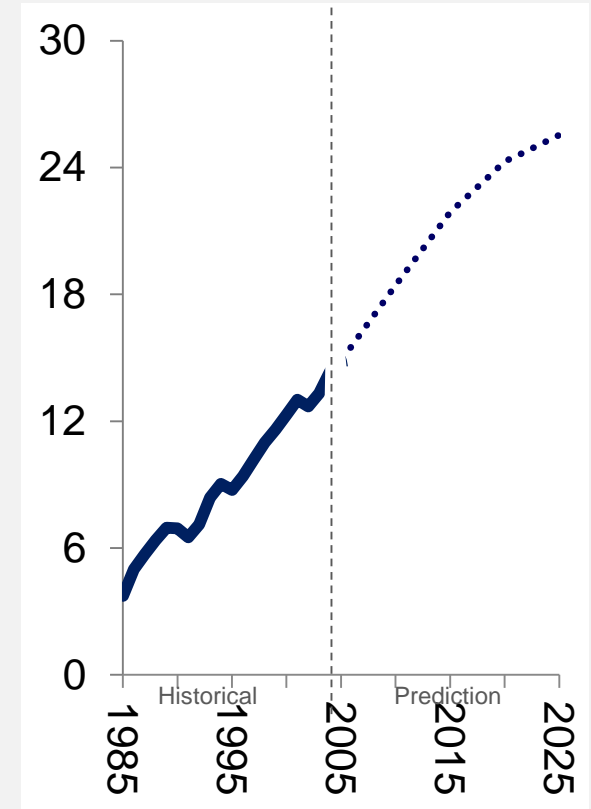
**U.S. Oil Production**  
(millions of barrels per day)



**Liquefied Natural Gas Imports**  
(bcf per day)



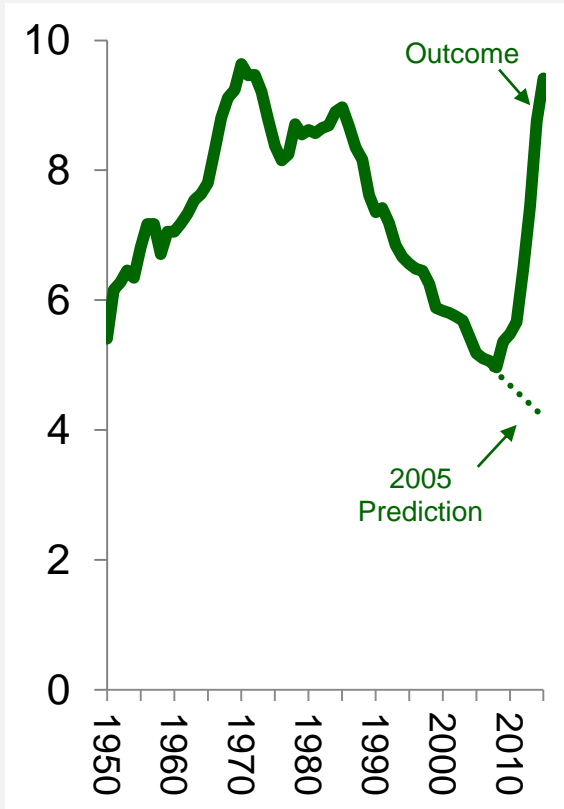
**U.S. Net Energy Imports**  
(millions of BOE per day)



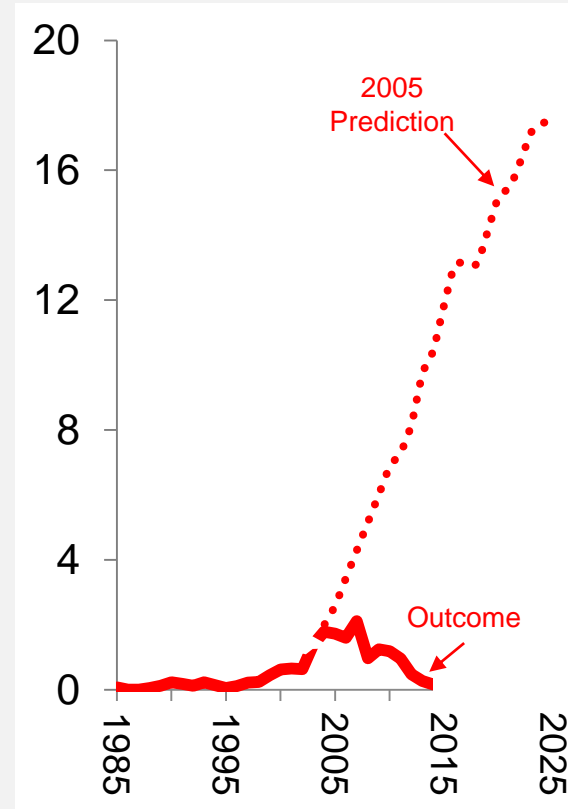
Source: U.S. Dept. of Energy, EIA; Oil = Oil & Condensate (NGLs excluded); LNG and Net Energy Imports predictions from EIA AEO 2005 Report; Oil = extrapolation of trend

## The Unconventional Revolution Dramatically Changed the U.S. Energy Outlook

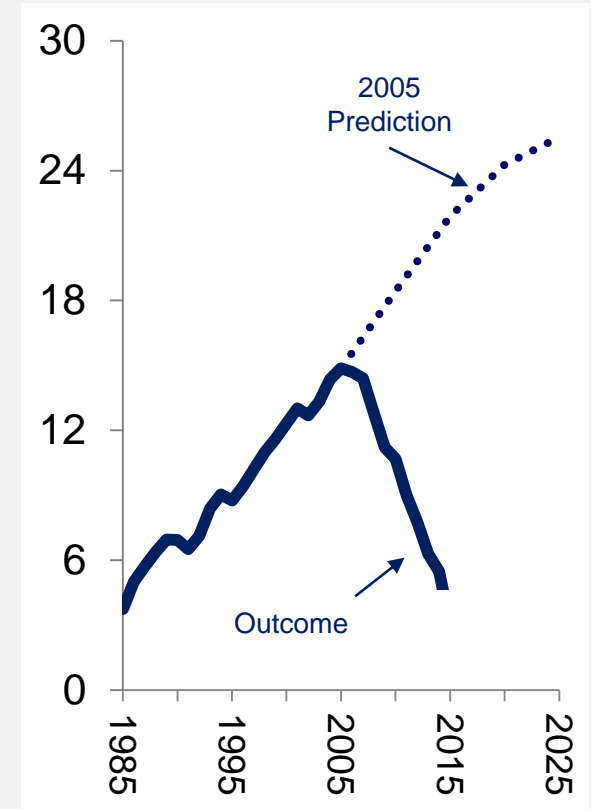
**U.S. Oil Production**  
(millions of barrels per day)



**Liquefied Natural Gas Imports**  
(bcf per day)



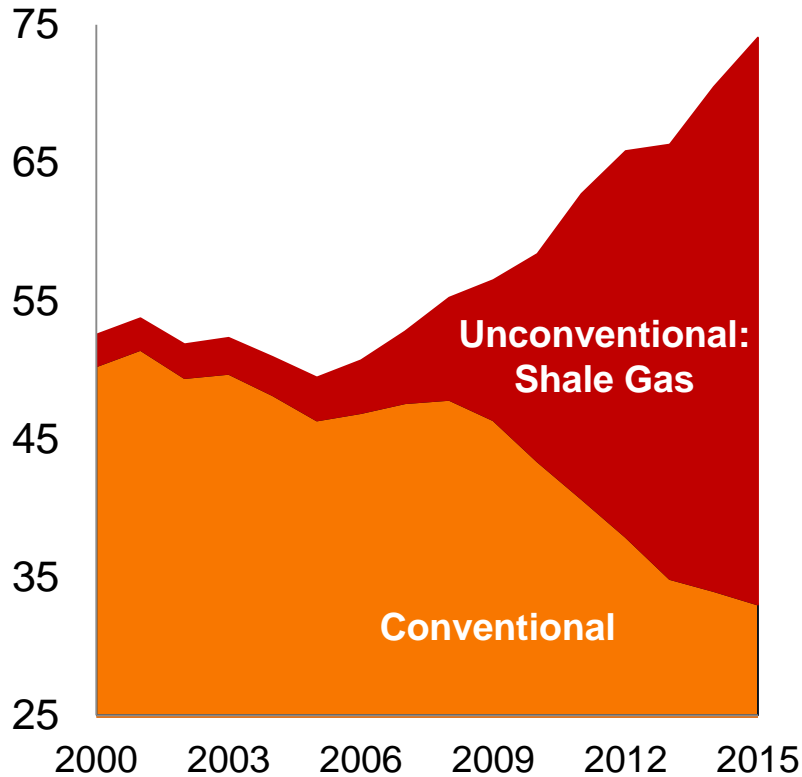
**U.S. Net Energy Imports**  
(millions of BOE per day)



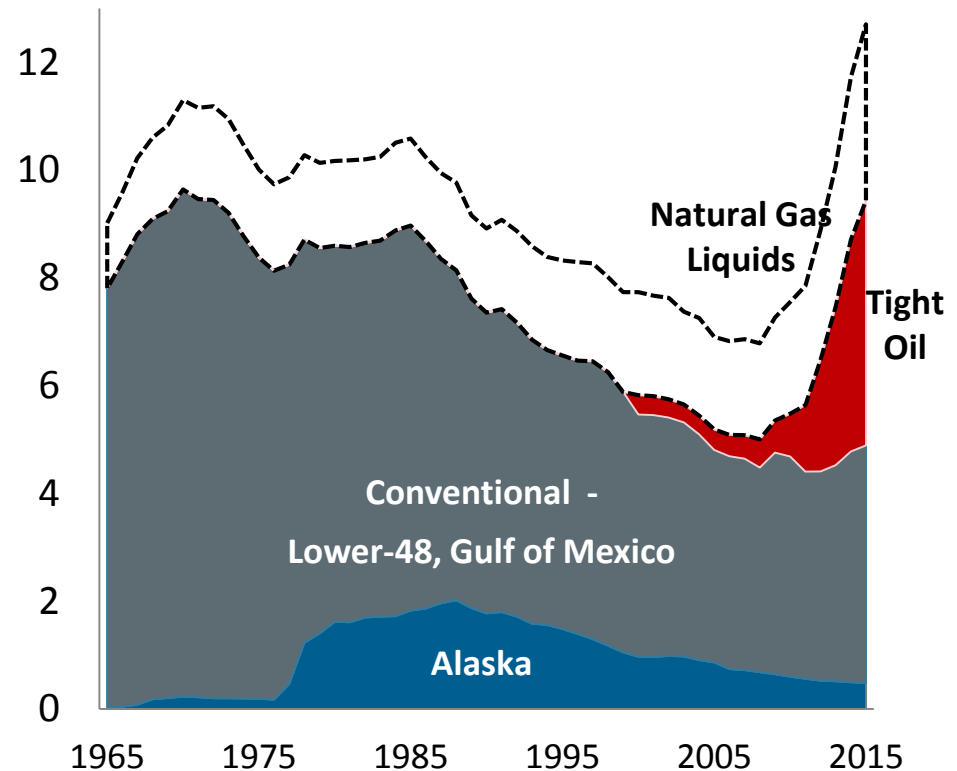
Source: U.S. Dept. of Energy, EIA; LNG and Net Energy Imports predictions from EIA AEO 2005 Report

## Game-Changers: U.S. Unconventional Natural Gas and Oil Production

**U.S. Natural Gas Production**  
(Billions of cubic feet per day)



**U.S. Oil Production**  
(Million barrels per day)



Source: U.S. Department of Energy, Energy Information Administration



**Table 2. Top 10 countries with technically recoverable shale oil resources**

Rank	Country	Shale oil (billion barrels)	
1	Russia	75	
2	U.S. <sup>1</sup>	58	(48)
3	China	32	
4	Argentina	27	
5	Libya	26	
6	Australia	18	
7	Venezuela	13	
8	Mexico	13	
9	Pakistan	9	
10	Canada	9	
<b>World Total</b>		<b>345</b>	<b>(335)</b>

<sup>1</sup> EIA estimates used for ranking order. ARI estimates in parentheses.

**Table 3. Top 10 countries with technically recoverable shale gas resources**

Rank	Country	Shale gas (trillion cubic feet)	
1	China	1,115	
2	Argentina	802	
3	Algeria	707	
4	U.S. <sup>1</sup>	665	(1,161)
5	Canada	573	
6	Mexico	545	
7	Australia	437	
8	South Africa	390	
9	Russia	285	
10	Brazil	245	
<b>World Total</b>		<b>7,299</b>	<b>(7,795)</b>

<sup>1</sup> EIA estimates used for ranking order. ARI estimates in parentheses.

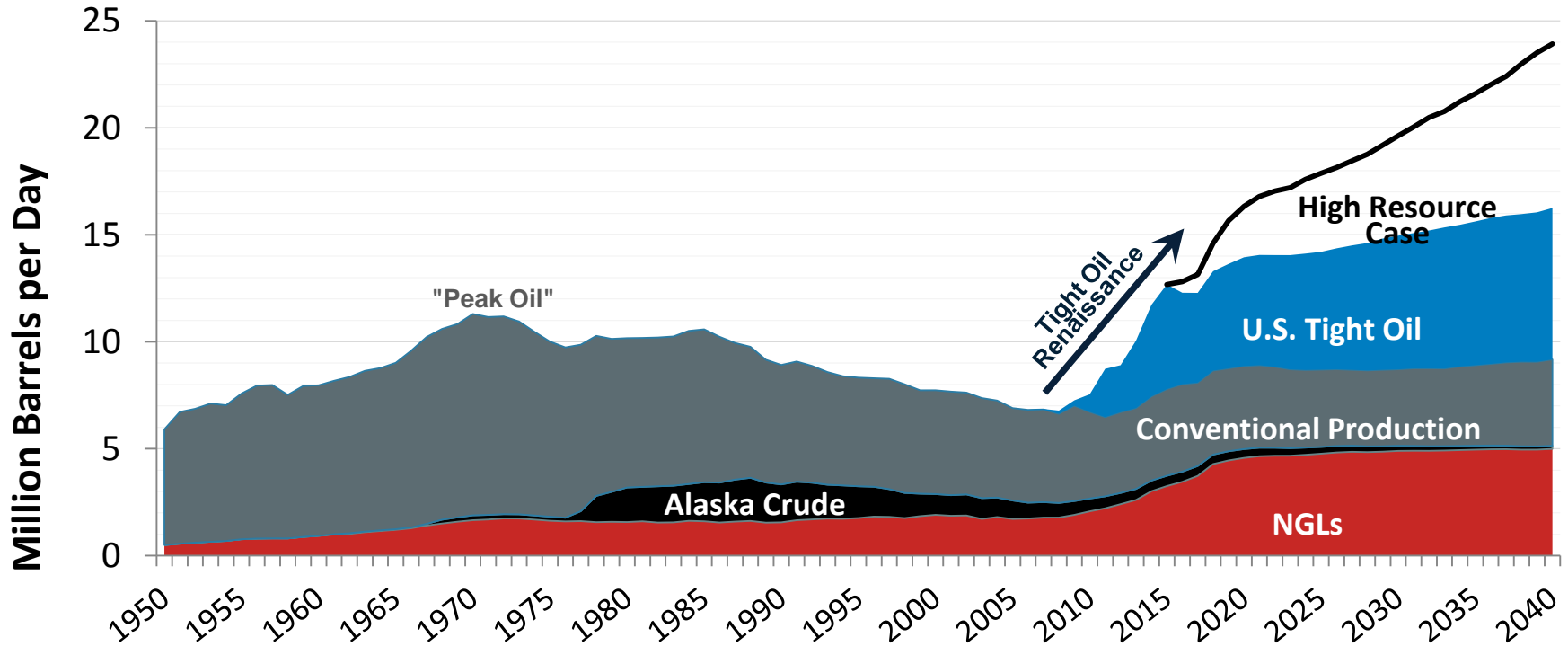
Source: U.S. Department of Energy, Energy Information Administration



## New Era of Abundance for U.S. Oil Supply

### U.S. Crude, Condensate and Natural Gas Liquids Production

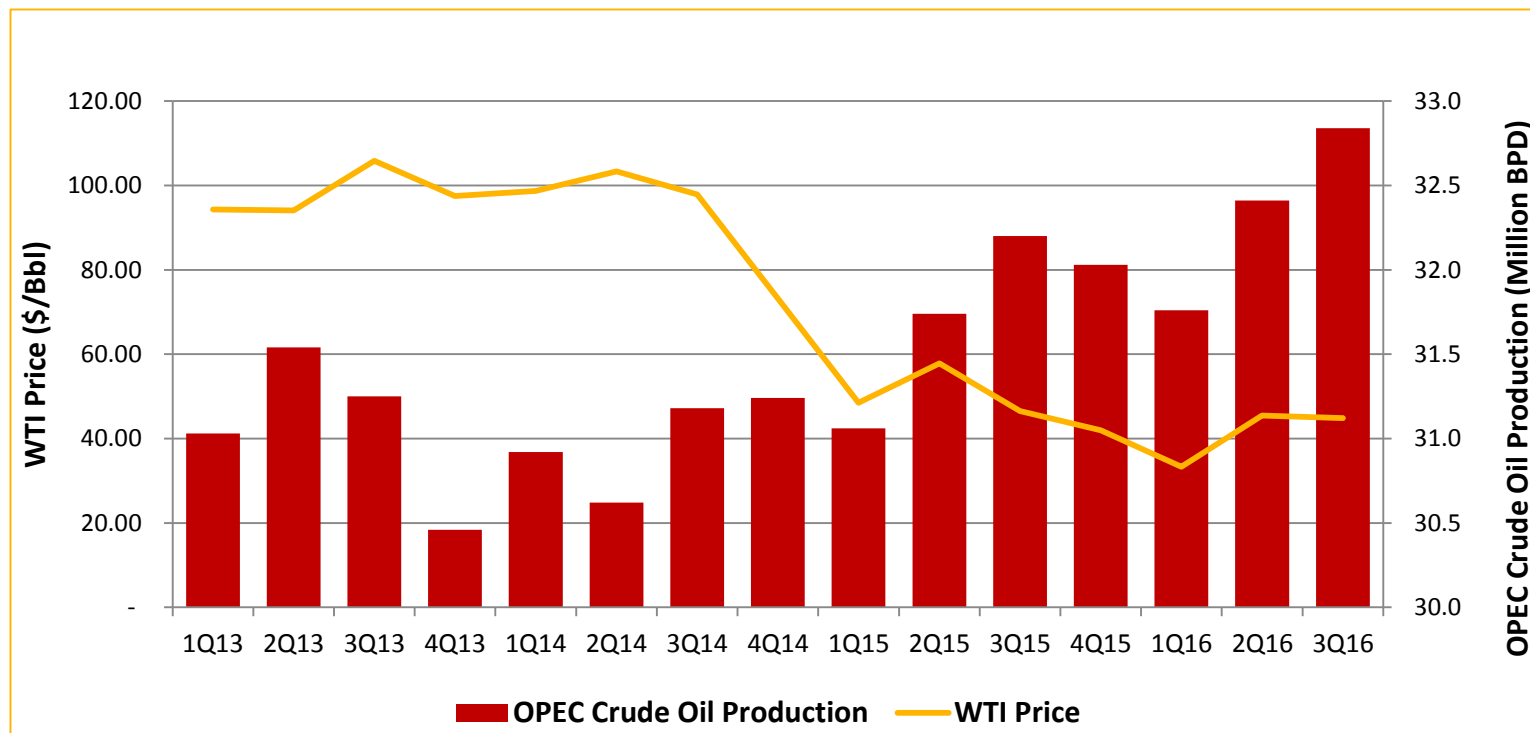
U.S. Department of Energy Forecast



U.S. crude production nearly doubled between 2008 and 2015 after falling by half during the previous four decades

Source: U.S. Department of Energy, Energy Information Administration

## OPEC Crude Production Volume and WTI Prices

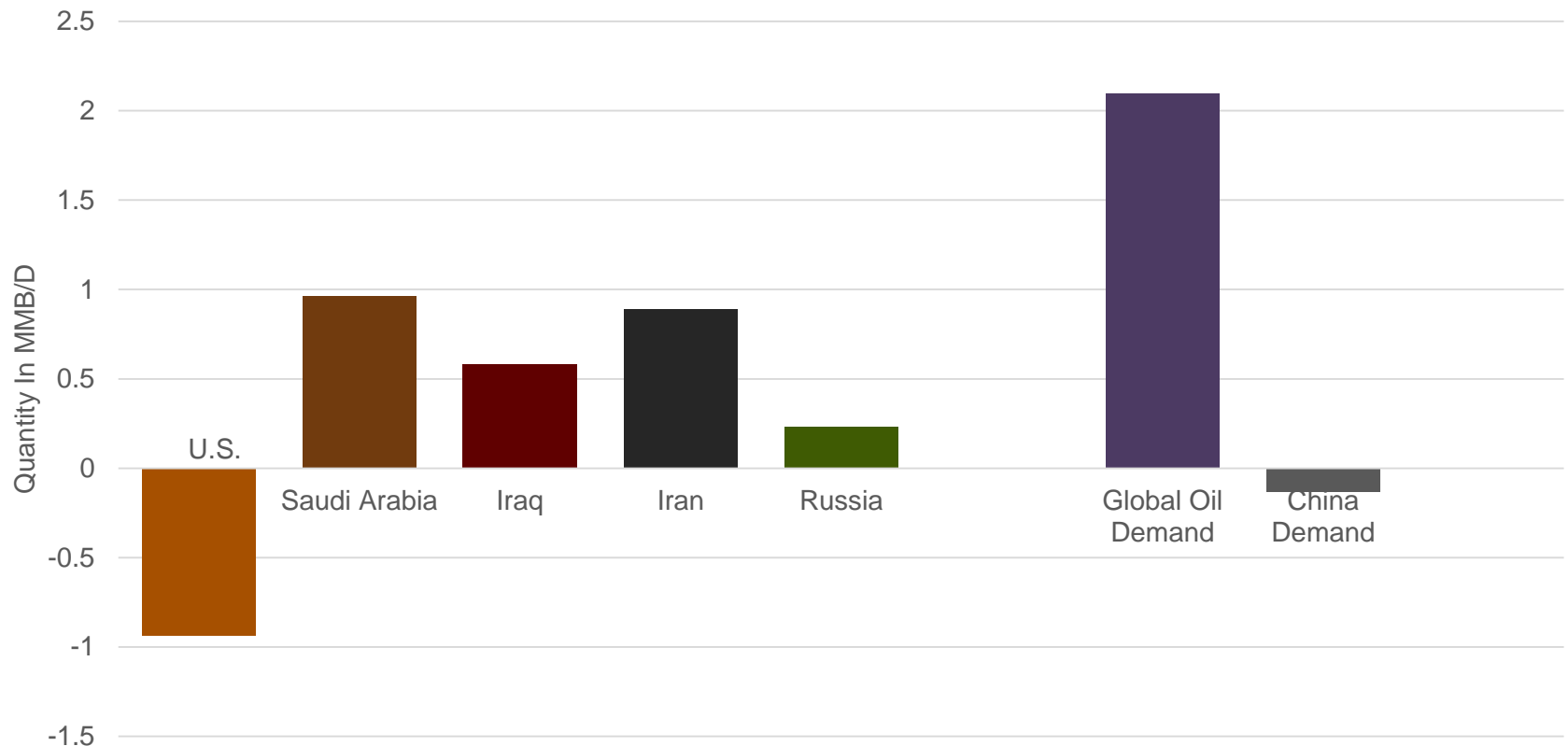


Source: U.S. Department of Energy, Energy Information Administration

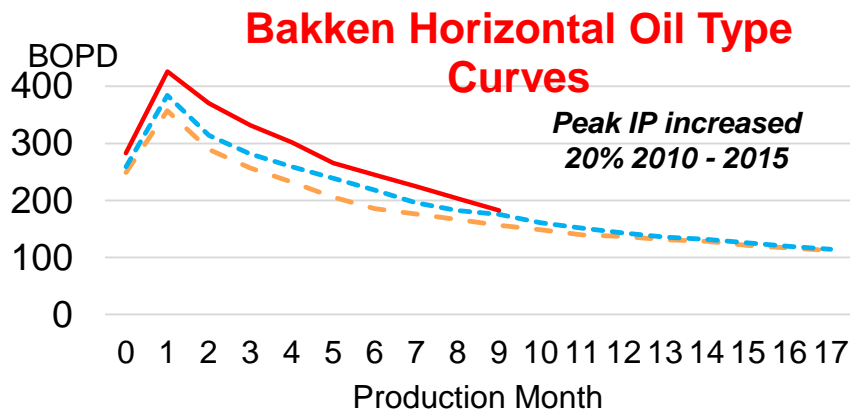
## Supply and Demand

Change in U.S. Production and Chinese Demand: a Surprising Set of Facts

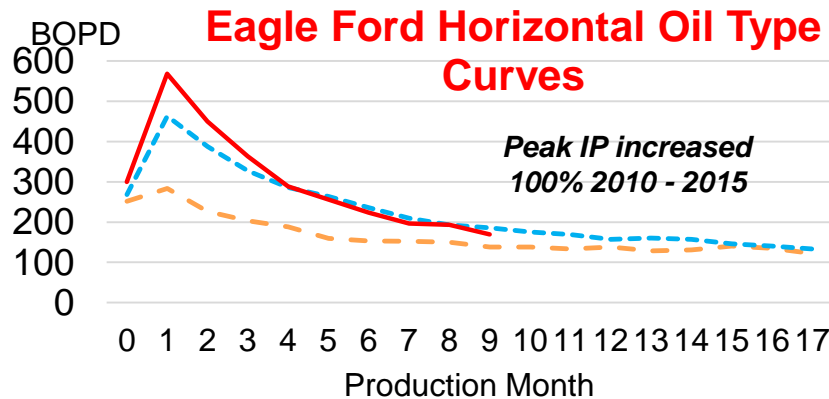
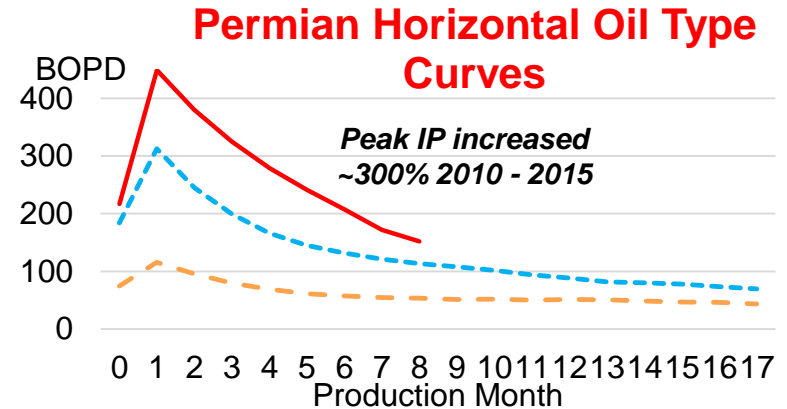
Incremental Oil Production & Demand for Selected Countries  
(Dec. 2014 vs. Aug. 2016)



Sources: U.S. Energy Information Administration  
Energy Intelligence Group  
OPEC



Vintage
2015
2013
2010



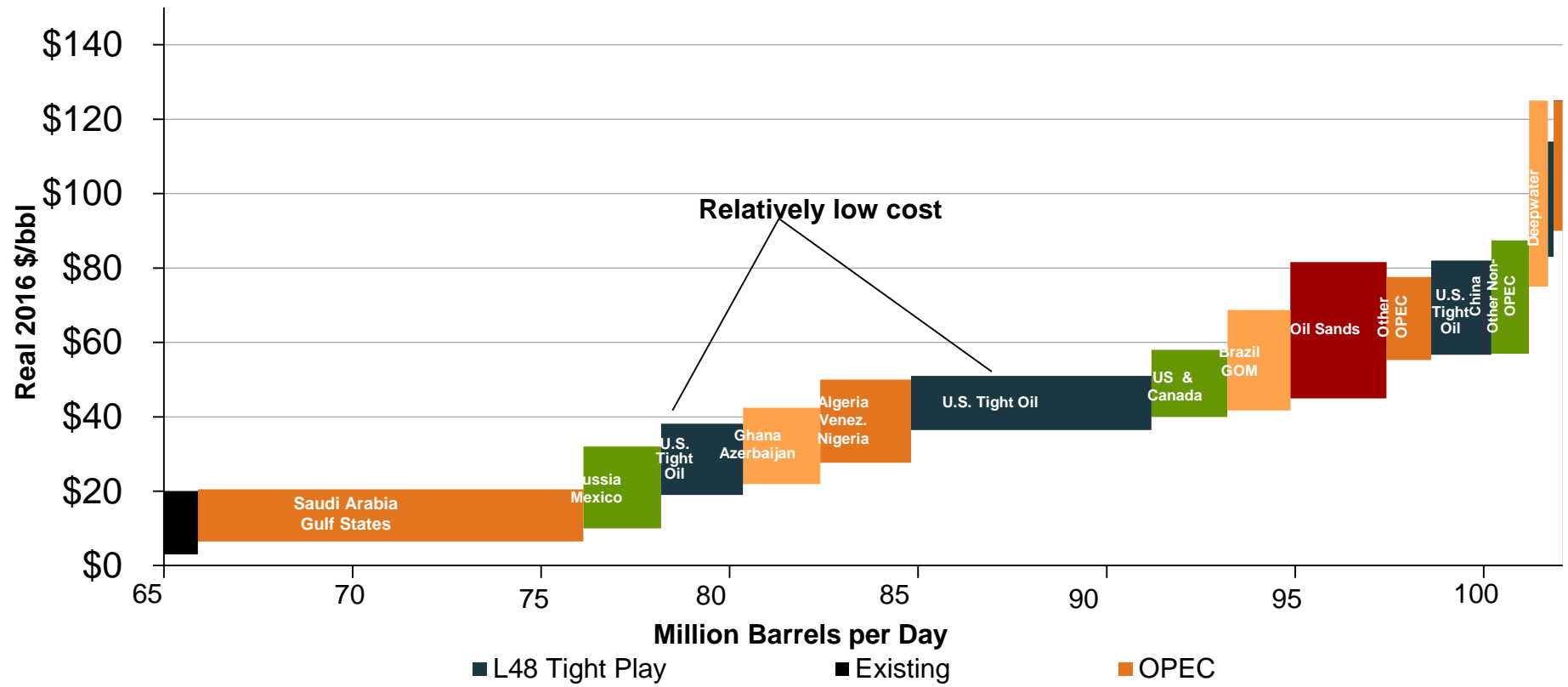
#### Future Productivity Improvements

- Longer laterals
- Multi-laterals
- Increased drilling efficiency
- More perf clusters per well/stage
- More consistent proppant placement

Continued productivity improvements are likely

Source: Drillinginfo, compiled by C.Phillips. Charts represent production profiles for the average of all wells drilled in that year

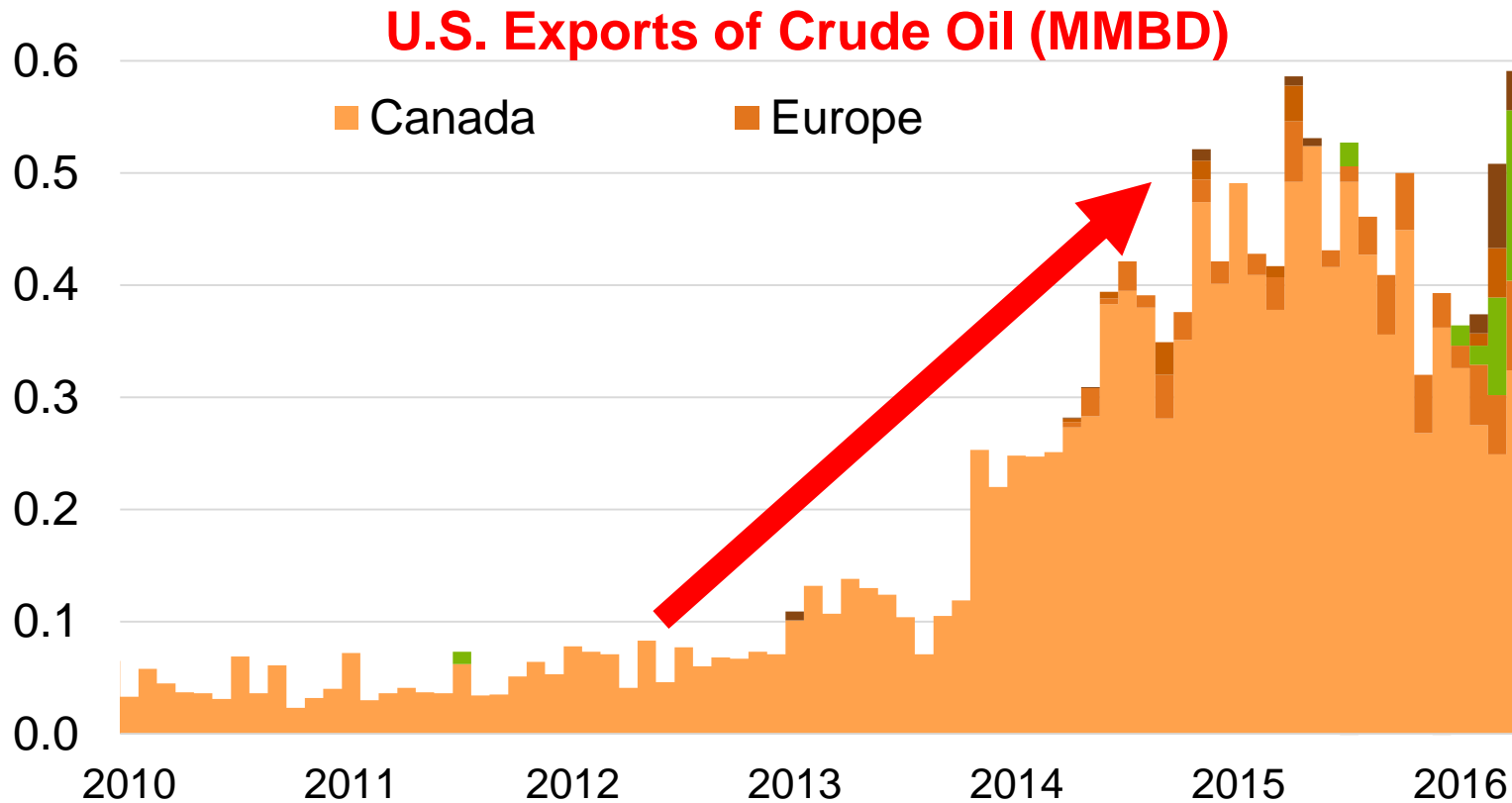
## Incremental Global Oil Supply



Large portions of U.S. tight oil are in the middle to lower end of the oil supply curve

Source: ConocoPhillips, Marianne Kah & originally Rystad

## U.S. Crude Oil Export Destinations



Canada's share of U.S. exports cut from 90-100% to about 50% in a few months

Source: U.S. Department of Energy, Energy Information Administration

## The Telegraph

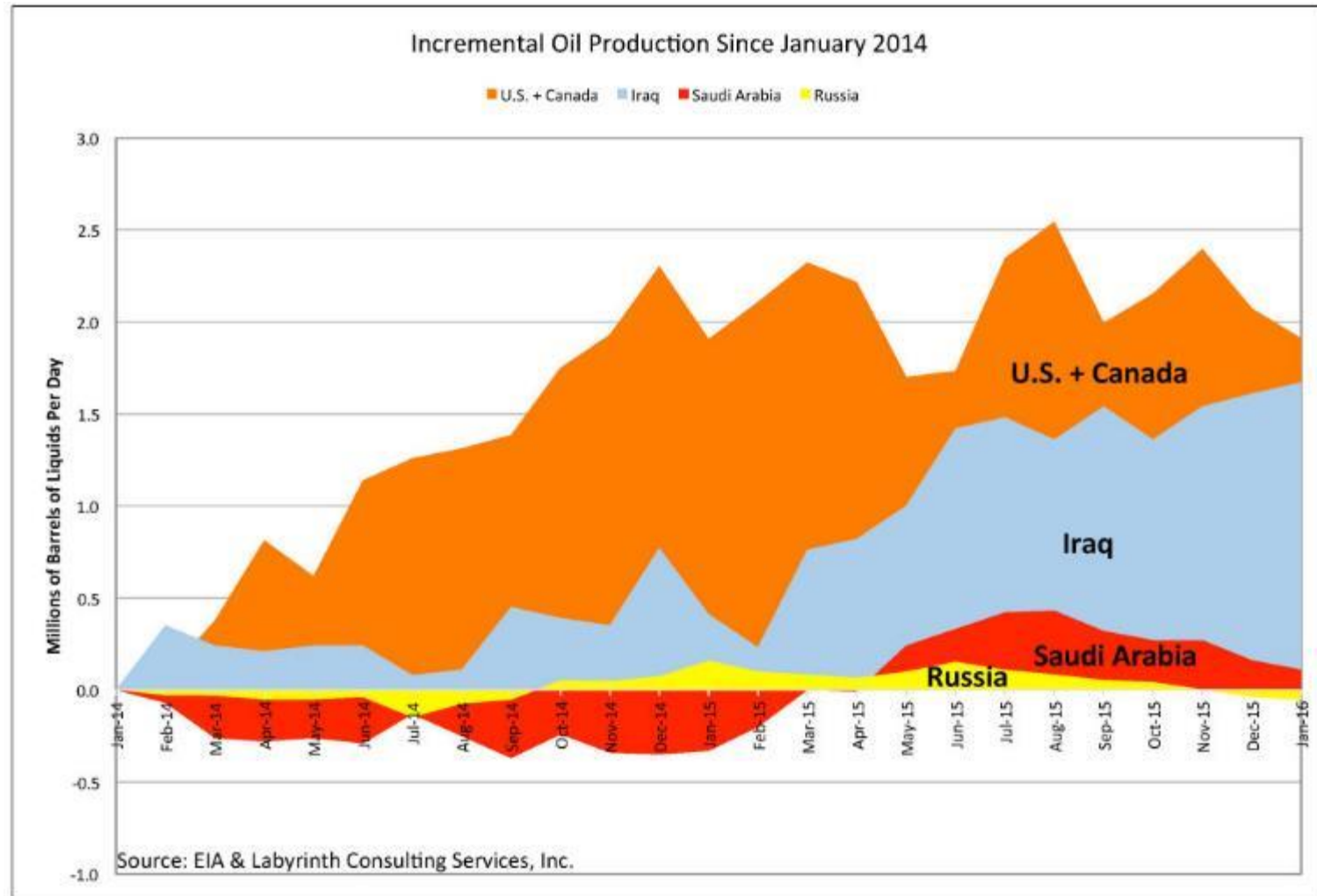
### Texas Shale Oil Has Fought Saudi Arabia To A Standstill

OPEC's worst fears are coming true. Twenty months after Saudi Arabia took the fateful decision to flood world markets with oil, it has still failed to break the back of the US shale industry.



King Salman bin Abdulaziz Al Saud Photo: AFP/Getty

## Production freeze agreement by Russia and Saudi Arabia



Source:  
Forbes, 7 March 2016



# THE WALL STREET JOURNAL.

DOW JONES | News Corp \*\*\*\*\* THURSDAY, SEPTEMBER 29, 2016 - VOL. CCLXVIII NO. 76 WSJ.com ★★★★★ \$3.00

DJIA 18339.24 ▲ 110.94 0.6% NASDAQ 5318.55 ▲ 0.2% STOXX 600 342.57 ▲ 0.7% 10-YR. TREAS. ▼ 3/32, yield 1.567% OIL \$47.05 ▲ \$2.38 GOLD \$1,319.40 ▼ \$6.50 EURO \$1.1219 YEN 100.70

## What's News

### Business & Finance

**OPEC reached** an understanding that a production cut was needed to lift oil prices, but will wait until November to finalize a plan. **A1**

◆ **Stocks rose** as oil prices surged, boosting energy shares. The Dow gained 110.94 points to 18339.24. **C4**

◆ **Redstone's firm** will urge the boards of Viacom and CBS to explore a merger, undating a decade-old split. **A1**

# OPEC Gains Consensus for Cuts

ALGIERS, Algeria—OPEC said its members agreed that they need to cut crude output to reduce the world's supply

By Benoit Faucon,  
Georgi Kantchev  
and Selina Williams

glut, a shift for the 14-member group that was enough to send oil prices higher, even though reaching a deal remains far from certain.

Members of the Organization of the Petroleum Exporting Countries said they reached an understanding after a six-hour gathering in the Algerian capital, but deferred until Novem-

ber the fraught task of finalizing a plan to make those cuts. OPEC officials said a committee would be formed to determine how much each country would have to cut and then report to the group at its next meeting on Nov. 30 in Vienna.

Determining which countries will cut and by how much is a delicate negotiation that has undone previous efforts to curb output and boost prices.

Still, the group's position after a session of informal talks that turned into an emergency meeting represents the first collective acknowledgment since oil prices cratered two years ago that the group will

need to take action to alleviate a situation that has wreaked havoc on their economies.

The prospect of production cuts, which OPEC traditionally has used to prop up oil prices, sent crude oil benchmarks up more than 5% on Wednesday and gave some support to U.S. stocks. The Dow Jones Industrial Average climbed 111 points.

The group proposed cutting its collective output to between 32.5 million barrels a day and 33 million barrels a day, down from August levels of 33.2 million barrels a day.

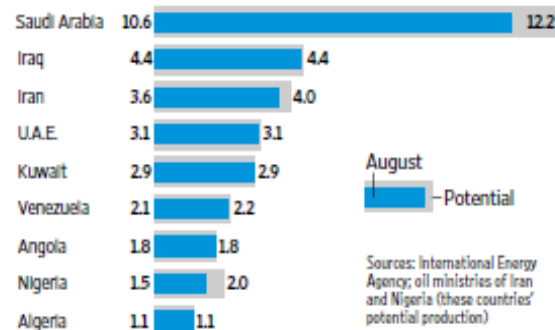
*Please see OPEC page A8*

◆ **Energy sector fuels stocks** as oil prices rise..... C4

## Pumping Up

Most major oil producers in OPEC have been pumping close to maximum capacity in recent months.

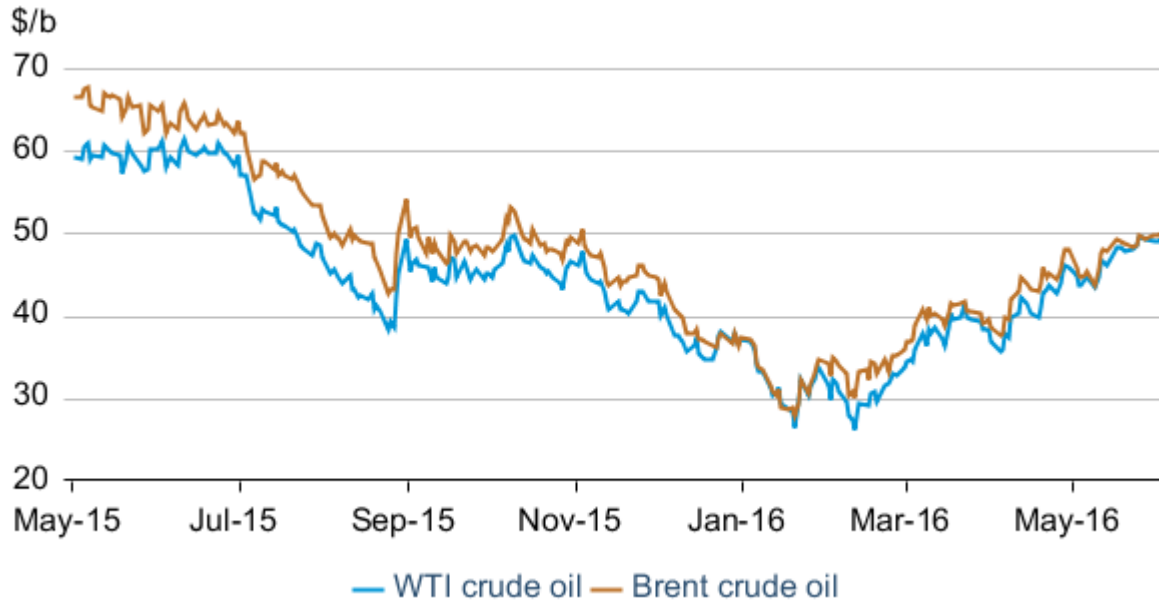
### Average production, millions of barrels a day



Sources: International Energy Agency; oil ministries of Iran and Nigeria (these countries' potential production)

THE WALL STREET JOURNAL.

Crude oil prices



Source: U.S. Department of Energy, Energy Information Administration

The Economist [Subscribe](#)

**Oil supply**

## Rigonomics

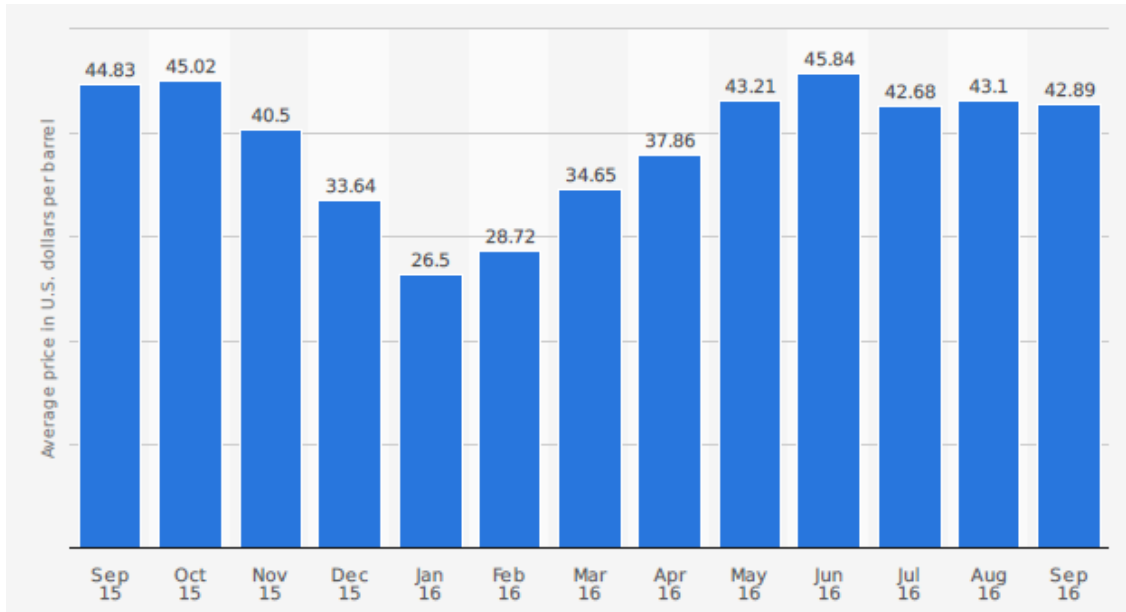
Is \$50 a barrel enough to revive global oil production?

Jun 18th 2016



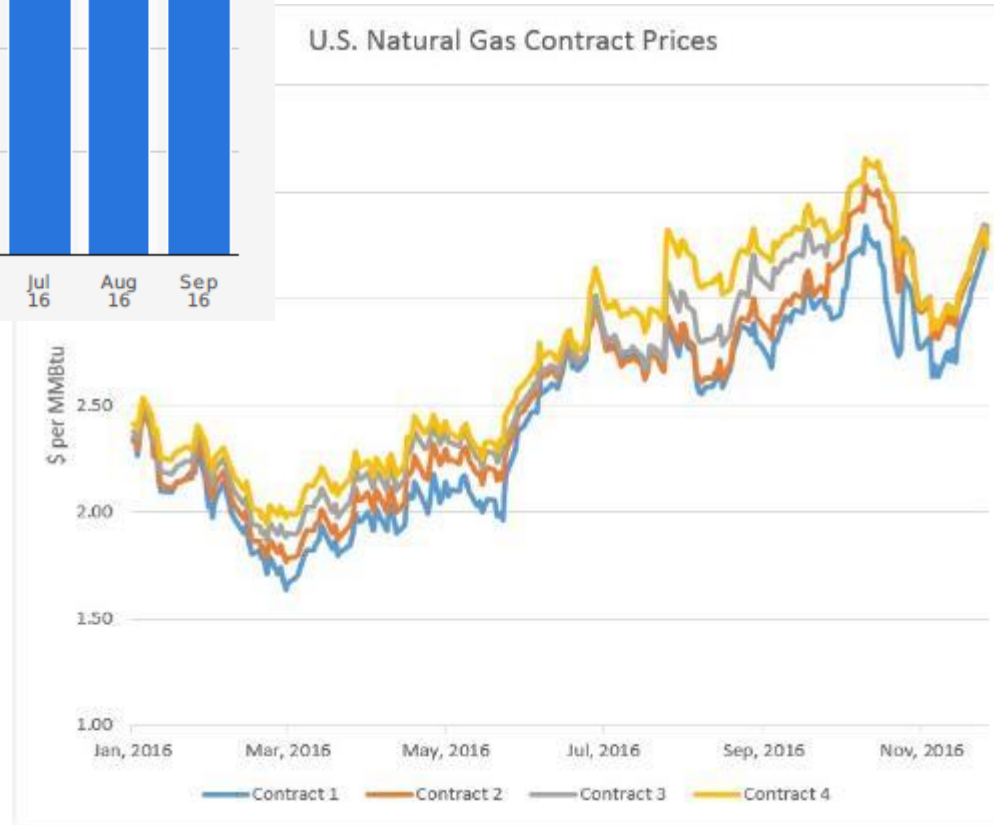
IN THE wilds of western Texas, a flicker of life has returned to the fracking, or hydraulic-fracturing, industry. In the past four weeks nine idled oil rigs have been put back to work in the Permian basin,

## Average monthly OPEC basket crude oil price



Given the current cost structure in the oil industry, prices are expected to remain low

U.S. Natural Gas Contract Prices



## Impact of continued low oil&gas prices on upstream

- ✓ Need for oil & gas producers to adjust to lower prices
- ✓ US\$380 billion of total project capex deferred
- ✓ Companies are forced to rework projects with high breakevens, large capital requirements and high costs
- ✓ OPEC loses power on oil markets

IHS CERAWEEK

## U.S. exports of LNG mark a turning point in the market

Patti Domin | @pattidomin  
Thursday, 25 Feb 2016 | 10:16 AM ET



**Bloomberg** 🔍

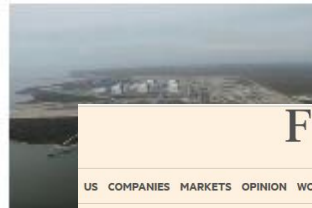
## U.S. Shale Gas Bound for Europe After Leaving Cheniere

by Anna Shiryaevskaya Harry Weber  
HarryRWeber

April 19, 2016 – 5:54 PM CEST  
Updated on April 20, 2016 – 8:15 PM CEST

- ▶ Sixth tanker from Sabine Pass plant headed for Portugal
- ▶ Asia has become less attractive

## Cheniere ships first Sabine Pass LNG export cargo to Brazil's Petrobras



Cheniere has on Wednesday shipped the long-awaited first cargo from its Sabine Pass liquefaction and export facility in Louisiana. This event also marks a new era in global LNG trade as the U.S. is set

**FINANCIAL TIMES** myFT

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Shale Oil and Gas + Add to myFT

## US exports gas to the Middle East

American shale revolution upends established global flows of resources



Cheniere Energy's LNG plant at Sabine Pass

🔗 📄 📌

JULY 18, 2016 by: Ed Crooks in New York

For the US to sell gas to the energy-rich Middle East might seem like sending coal to Newcastle, but it has started to happen as the American shale revolution upends the global flows of resources.

Read latest:  
US crude output up in August for first time since March  
NOVEMBER 1, 2016

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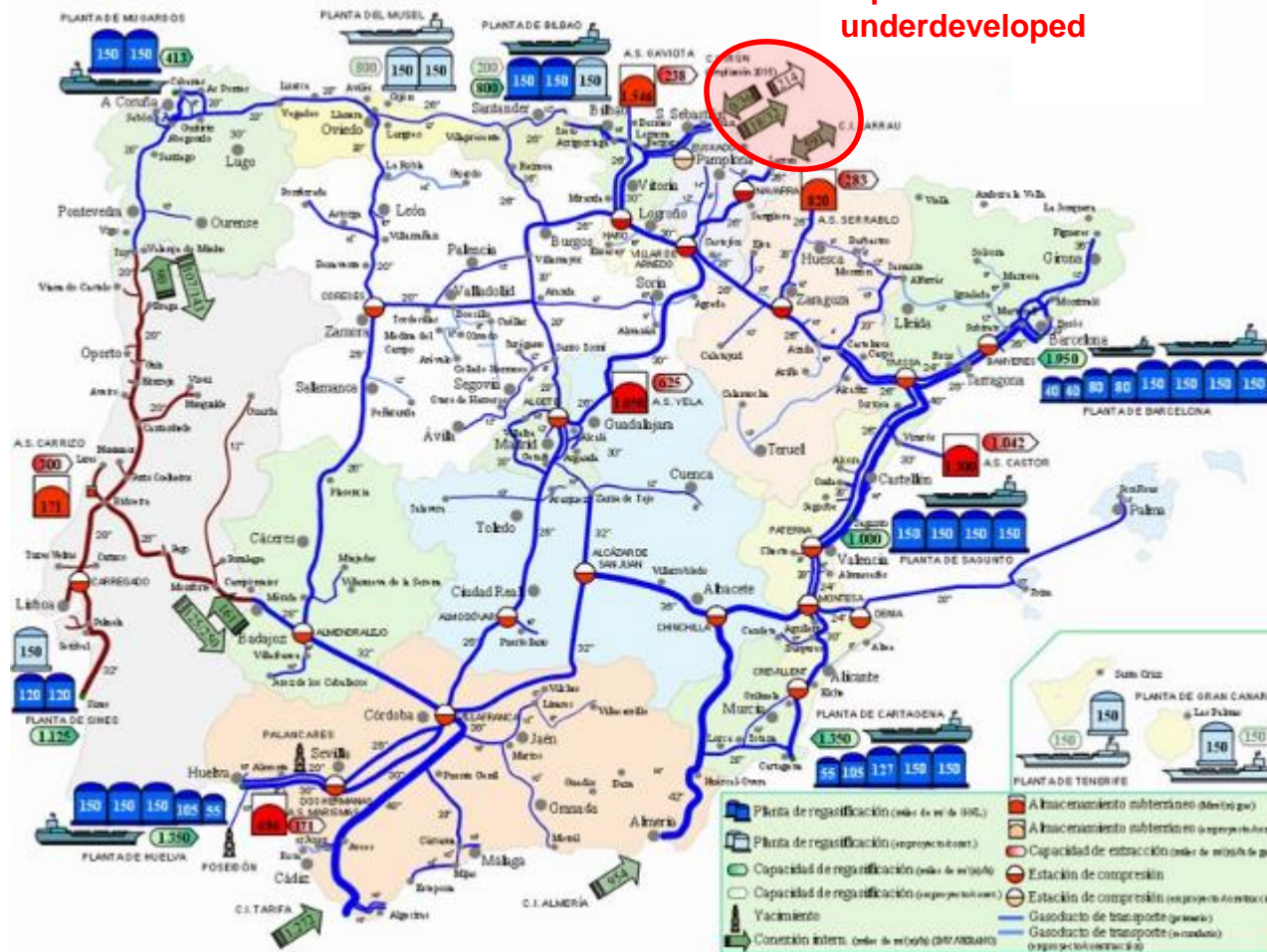
More on this topic  
Suggestions below based on Shale Oil and Gas

US crude output up in August for first time since March  
Rise deals new blow to hopes that global oil oversupply could be eased

Prepare for the US post-election natural-gas war  
The enemies of pipeliners are plotting their economic demise, says John Dizard

Shell to sell Canadian shale assets

## American gas brings supply security, diversification and competition in Southwestern Europe



Spain and Portugal account for about 45% of all LNG imports into Europe

## Southeastern Europe



high-cost countries

**Non-EU Eastern Europe**

Albania, Bosnia  
Herzegovina, Kosovo,  
Macedonia, Montenegro,  
Serbia

**Southern Corridor Needed**



## **CESEC Central Eastern and South Eastern Europe Gas Connectivity – A European Commission initiative**

**Aim:** to build a single internal energy market, in which energy flows freely and in which prices are affordable, without any fragmentation of Europe.

**July 10, 2015 – Thirteen countries from Central Eastern Europe (CEE) and Southeastern Europe (SEE) sign a MoU on creating an integrated gas market**



## CESEC priority projects:

**Trans-Adriatic Pipeline**

**Interconnector Greece-Bulgaria**

**Interconnector Bulgaria-Serbia**

**Bulgaria & Romania System Reinforcement**

**LNG terminal in Croatia and evacuation system towards Hungary**



European Commission - Press release

### **Energy: Successful energy cooperation for Central and South-Eastern European Countries continues**

Brussels, 9 September 2016

#### **Energy cooperation**

**European Commission Vice-President Maroš Šefčovič, Commissioner for Climate Action and Energy Miguel Arias Cañete and Energy Ministers from 12 EU and Energy Community countries and contracting parties in Central and South-Eastern Europe signed important infrastructure and regional cooperation agreements today in Budapest.**

Cooperation under the European Commission Initiative on Central and South-Eastern European Gas Connectivity (CESEC), launched in 2015, has produced tangible results.

At today's meeting the Bulgaria-Romania-Hungary-Austria (BRUA) [Connecting Europe Facility](#) Grant agreement of 179 million euros was signed. In addition Joint Statements were signed by the Governments and Transmission System Operators (TSOs) from Greece, Bulgaria, Romania and Hungary on cooperation on gas projects along the so-called "Vertical Corridor". Furthermore a Memorandum of Understanding was signed by the TSOs from Ukraine, Romania, Bulgaria and Greece on reverse flows on the Trans-Balkan pipeline. Ministers also welcomed



## EUROPEAN COMMISSION JOINT STATEMENT

Malta, 11 July 2014

### Security of gas supply: the role of gas developments in the Mediterranean region

#### Mediterranean gas - Another corridor?

The European Commission recommended developing a **Mediterranean gas hub** as part of efforts to improve the EU's energy security by diversifying gas routes and suppliers.

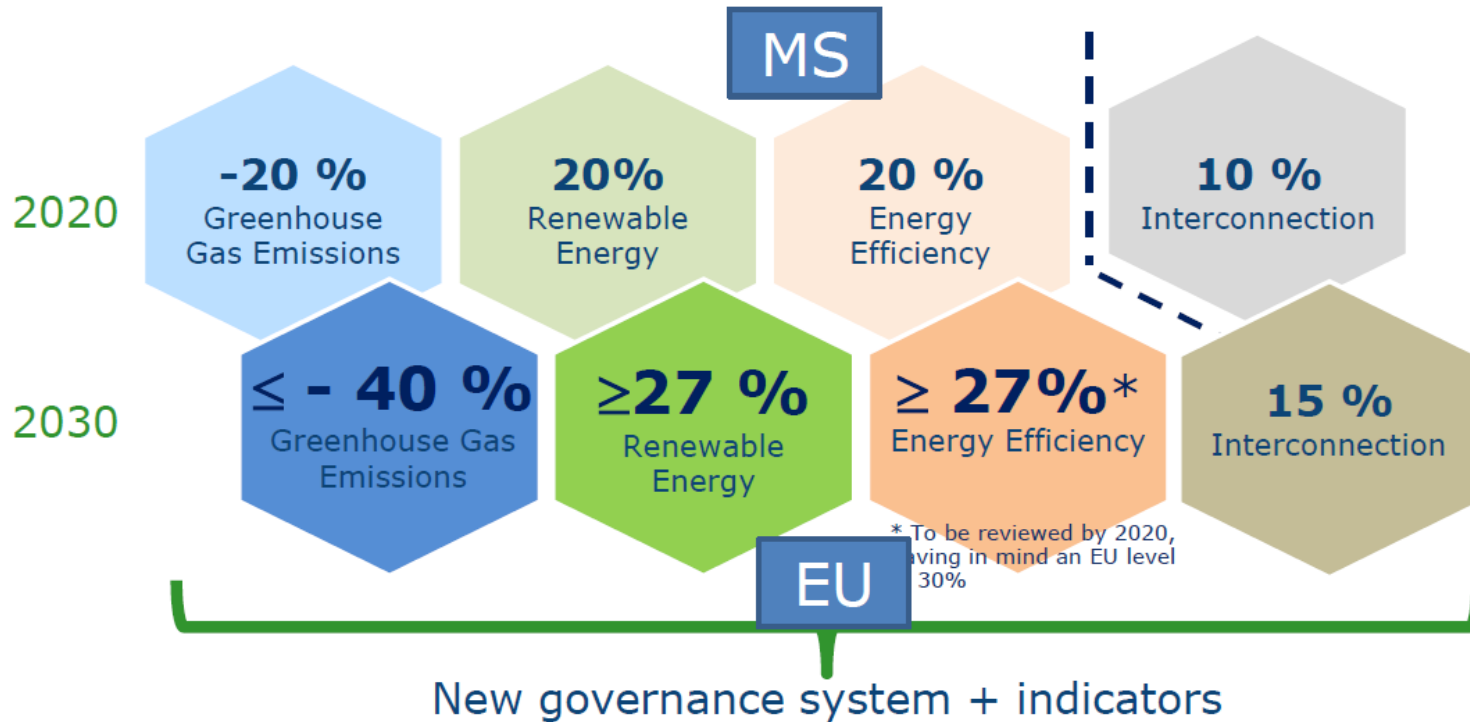


## Mediterranean gas



- ✓ If sufficient volumes are attained, the pipeline option offers economies of scale and **lower cost**
- ✓ Turkey offers the only economically viable pipeline route option for East Med gas supply to Europe

## Agreed headline targets 2030 Framework for Climate and Energy



Source: EC, DG-ENERGY

## The Need to Reduce Global GHG Emissions

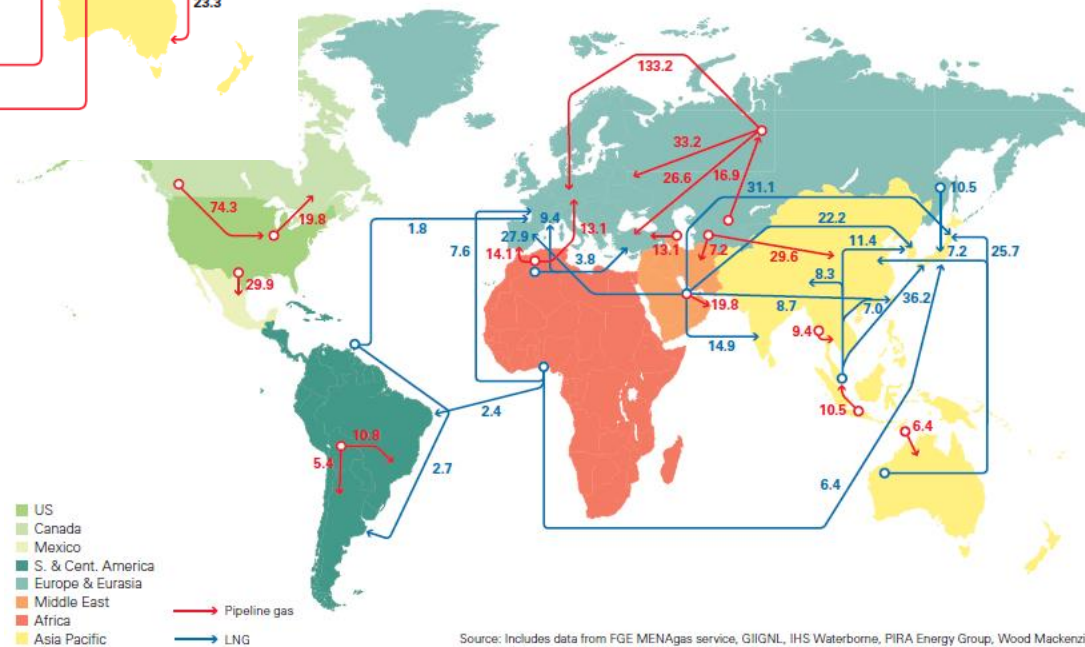
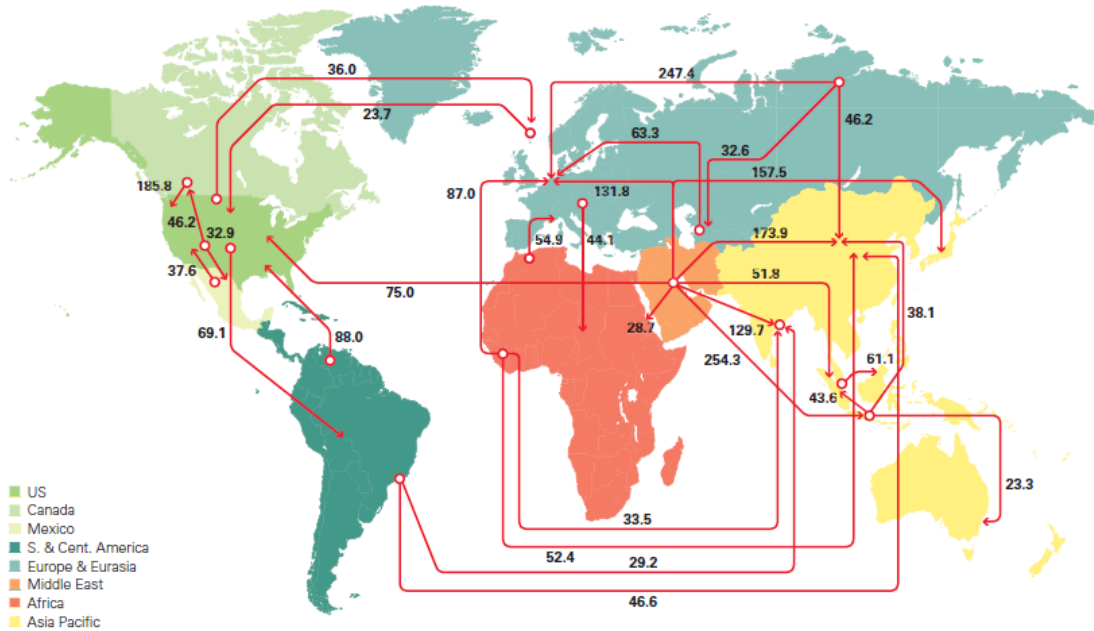
Country	INDC Target	Deadline	Base Year
United States	25 to 28%	2025	2005
China	60 to 65% (EI)	2030	2005
EU	40%	2030	1990
India	33 to 35% (EI)	2030	2005
Japan	26%	2030	2013
Australia	26 to 28%	2030	2005
Switzerland	50%	2030	1990
Israel	26%	2030	2005
Turkey	21%	2030	BAU

## What's coming up ?

### Oil

### Gas

Major trade movements 2015  
Trade flows worldwide (million tonnes)



Source: BP Statistical Review of World Energy, 2016

Source: Includes data from FGE MENAgas service, GIIGNL, IHS Waterborne, PIRA Energy Group, Wood Mackenzie.



# Thank You

## For More Information

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President, IAEE & TRAEE

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