The Great Suppression

Climate choices spur global contraction in hydrocarbon trade and investment

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In June, the G7 promised to wean human civilization off hydrocarbons by 2100.

G7 LEADERS ISSUE 17-PAGE DECLARATION: "THINK AHEAD, ACT TOGETHER"

Source: Sven Hoppe/dpa/Corbis, as published by The Guardian

REUTERS: *G7 LEADERS BID 'AUF WIEDERSEHEN' TO CARBON FUELS*

Source: Reuters (June 8, 2015) at "the picturesque Schloss Elmau at the foot of Germany's highest mountain, the Zugspitze"

The G7 response is intended to be, and is interpreted as, an historic commitment.

AS REPORTED: "G7 LEADERS AGREE TO PHASE OUT FOSSIL FUEL USE BY END OF CENTURY"

- The G7 leading industrial nations have agreed to cut greenhouse gases by **phasing out the use of fossil fuels by the end of the century, the German chancellor, Angela Merkel, has announced**, in a move hailed as historic by some environmental campaigners.
- On the final day of talks in a Bavarian castle, Merkel said the leaders had committed themselves to the need to **"decarbonise the global economy in the course of this century"**. They also agreed on a global target for **limiting the rise in average global temperatures to a maximum of 2C over pre-industrial levels**.
- Merkel said the leading industrialised countries were **committed to raising $100bn** (£65bn) in annual climate financing by 2020 from public and private sources.

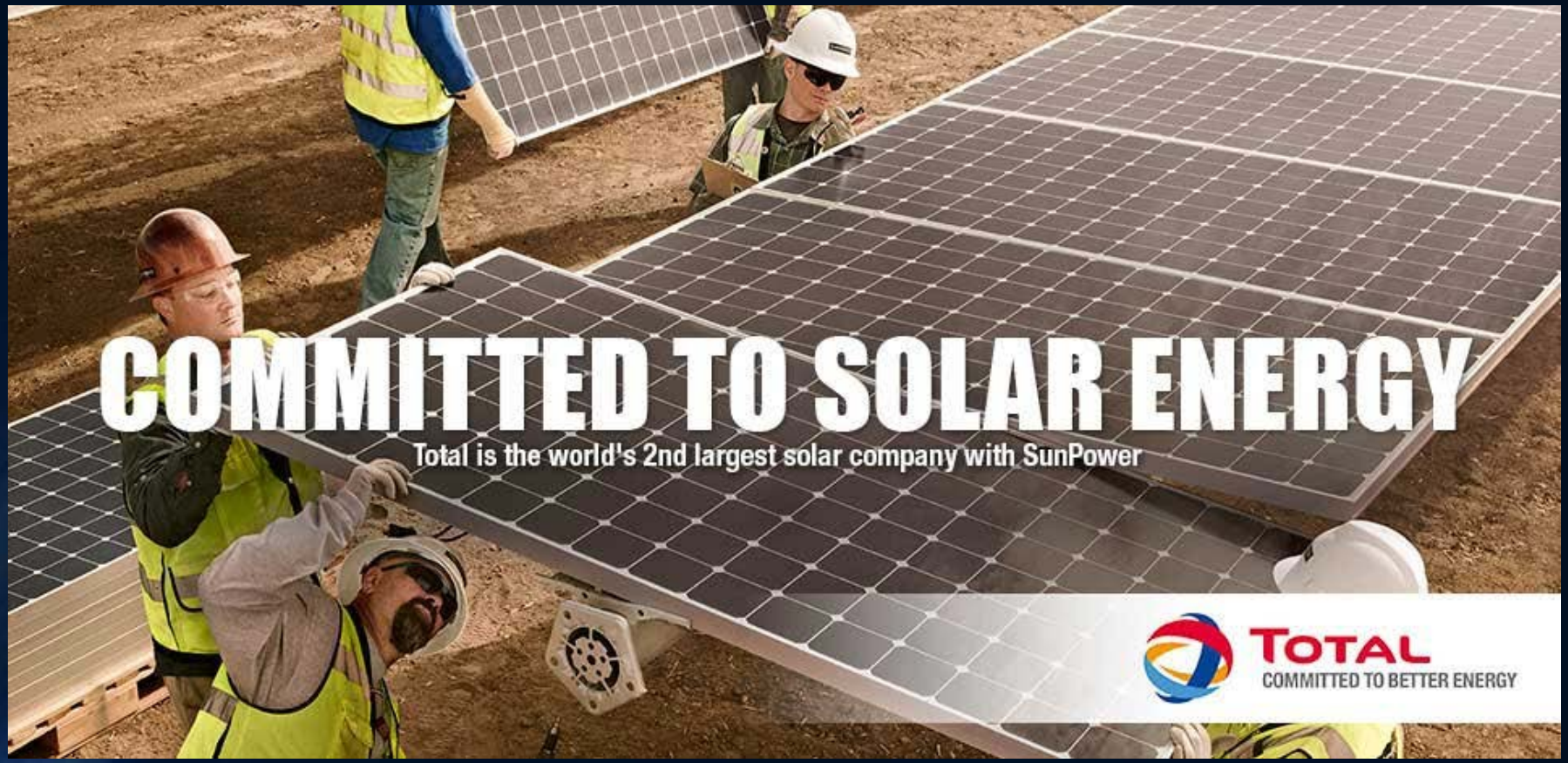
Source: The Guardian (June 8, 2015)

AS RECEIVED: UNBRIDLED ENTHUSIASM FROM GREEN ACTIVISTS

- "Merkel's G7 says '**Auf Wiedersehen' (farewell) to fossil fuels**," global activist network Avaaz declared in a statement.
- "**Elmau delivered**", enthused environmental pressure group Greenpeace, adding that "**the vision of a 100 percent renewable energy future is starting to take shape**."

Source: Reuters (June 8, 2015)

Total’s “Better Energy” advert campaign has been emphasizing solar since Oct. 2, 2014.

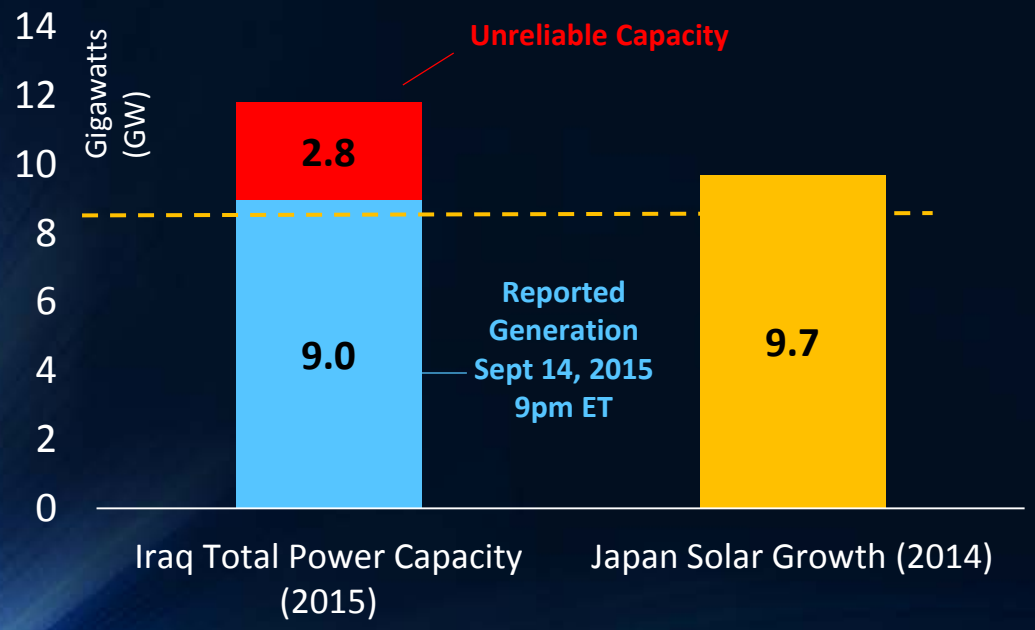


Source: Total

Iraq: long high-quality resource, short cash.

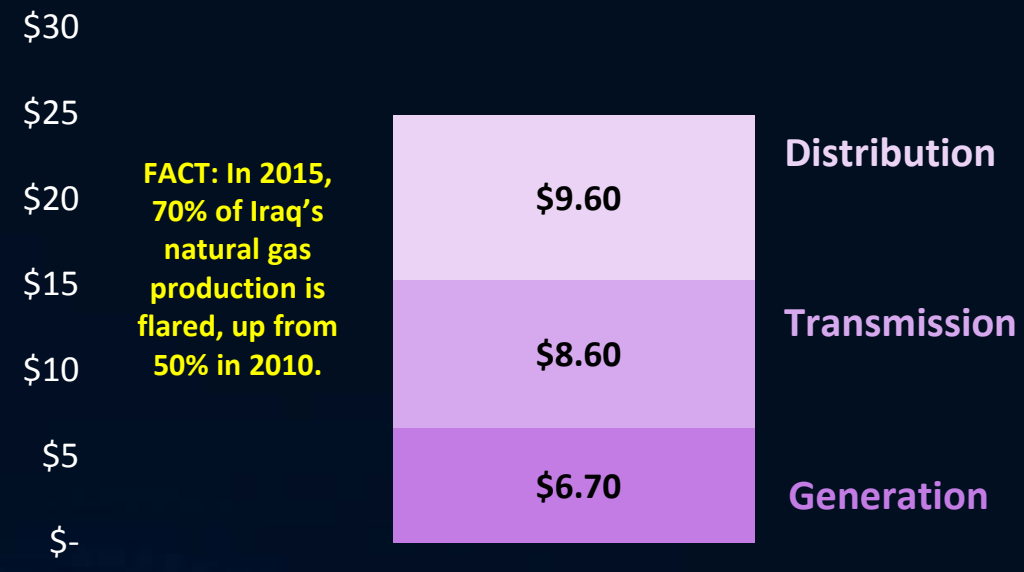
	CRUDE EXPORTS	AVERAGE PRICE	ANN. REVENUE	MTH. REVENUE
PLAN FOR 2015	3.30 million b/d	$56.00 per bbl	US$67.5 Billion	US$5.62 Billion
AUGUST 2015	3.08 million b/d	$40.60 per bbl	US$45.6 Billion	US$3.88 Billion
SHORTFALL	**(0.22 mil b/d)**	**($15.40 per bbl)**	**(US$21.9 Billion)**	**(US$1.74 Billion)**

Japan's 2014 *growth* in solar power capacity is alone larger than Iraq's normal *total* power generation



IMF estimate of Iraq's financial need for electricity investment 2015-2020F: $25 Bn

Billions US$

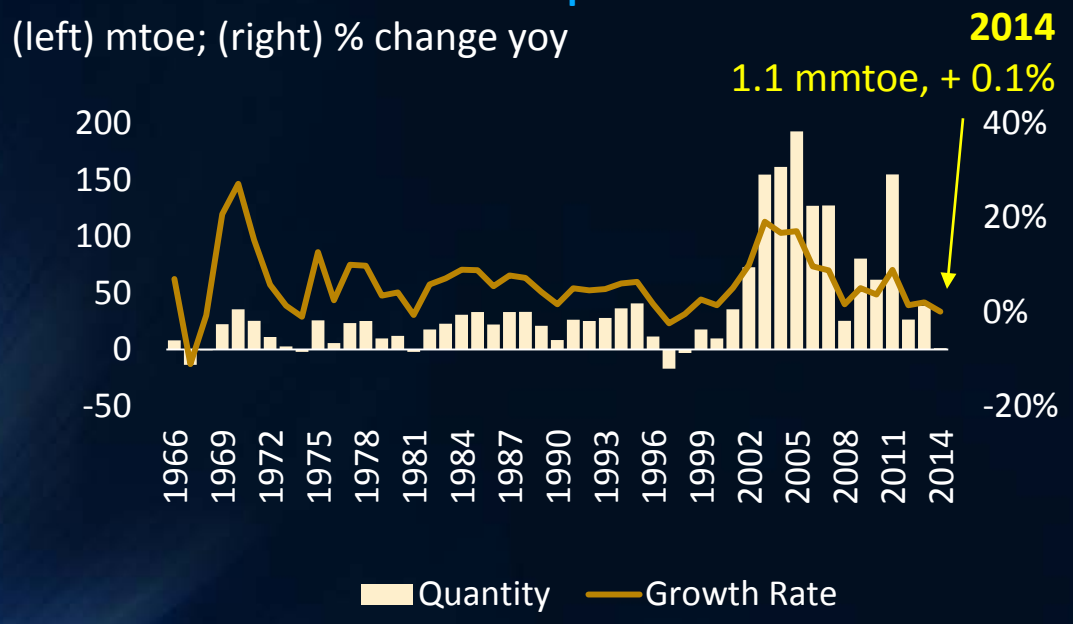


Source: MEES, Iraqi Ministry of Electricity, BP, METI, JREF, Blacklight

A halt in Chinese coal demand growth led the 2014 global slowdown in primary energy demand.

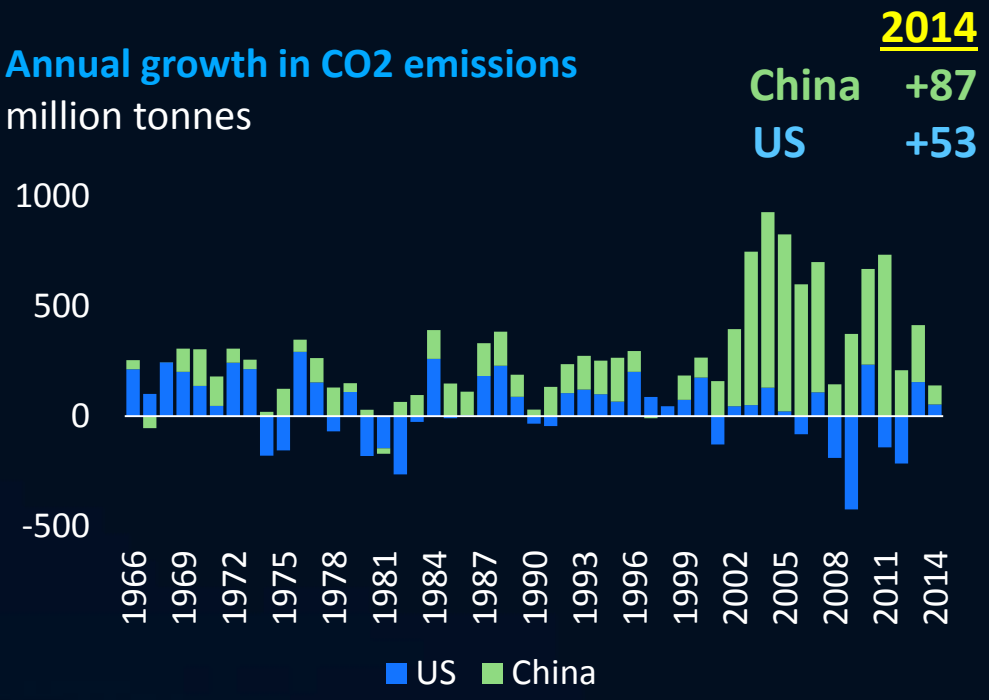
COAL CONSUMPTION HAD DRIVEN INDUSTRIALIZATION

Growth in Chinese coal consumption
(left) mtoe; (right) % change yoy



BUT IT HAD ALSO BROUGHT THE CO2 EMISSIONS SURGE

Annual growth in CO2 emissions
million tonnes



Source: BP, CGA, EIA, NBS, Blacklight Research LLC

Summary statistics for the US Embassy's Beijing PM2.5 hourly data set (2008-15).

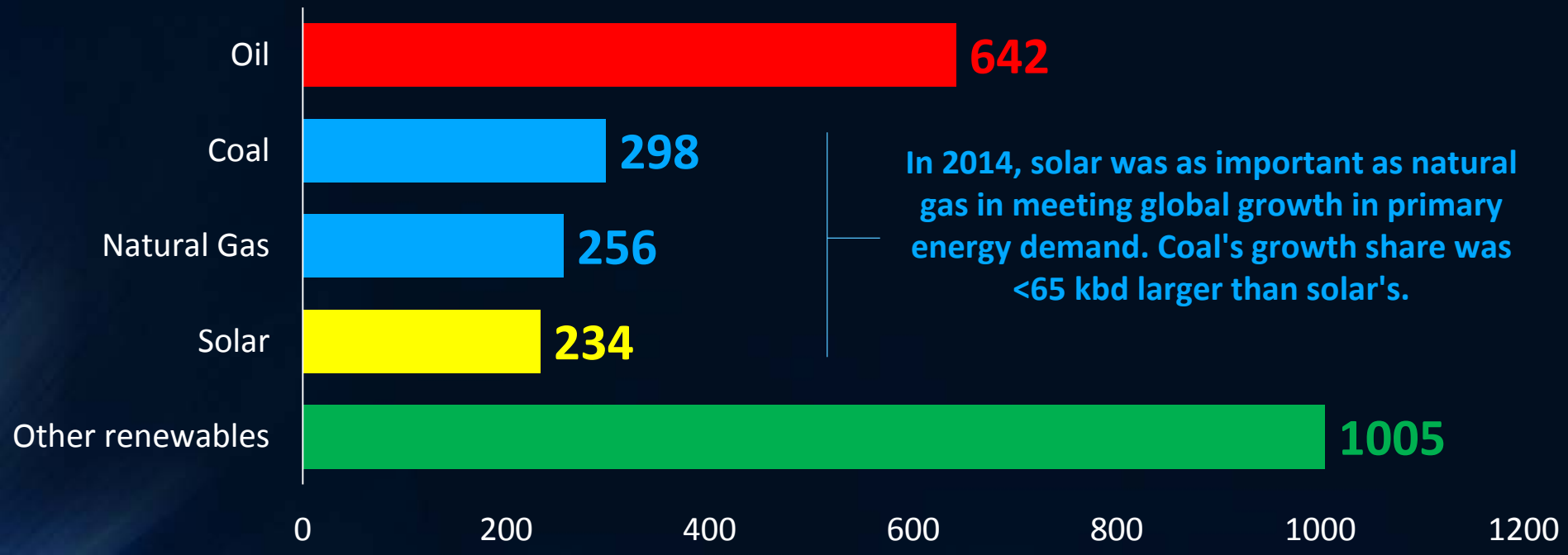
Beijing AQI readings, hourly, April 8, 2008 through August 31, 2015 (µg/m³)									
	Total	**2015**	**2014**	**2013**	**2012**	**2011**	**2010**	**2009**	**2008**
Observations	**59,093**	5755	8661	8678	8275	8033	8091	6779	4821
Hours in Survey	**62,334**	5832	8760	8760	8760	8760	8760	7615	5087
% Observed	**94.8%**	98.7%	98.9%	99.1%	94.5%	91.7%	92.4%	89.0%	94.8%
Max	**994**	722	671	886	994	595	980	712	610
Min	**1**	1	2	2	1	2	1	1	2
Average	**95**	73	98	102	90	99	104	102	85
Stan. Deviation	**87**	68	94	98	82	93	92	84	62

Source: US Department of State, Blacklight Research LLC
Note: Data for February 29, 2012 excluded for consistency in seasonal comparison across years.
Negligible effect on reported summary statistics.

The sharp deceleration in energy demand growth helped solar to catch up with gas and coal in mix.

Global primary energy demand growth in 2014

thousand b/d oil equivalent

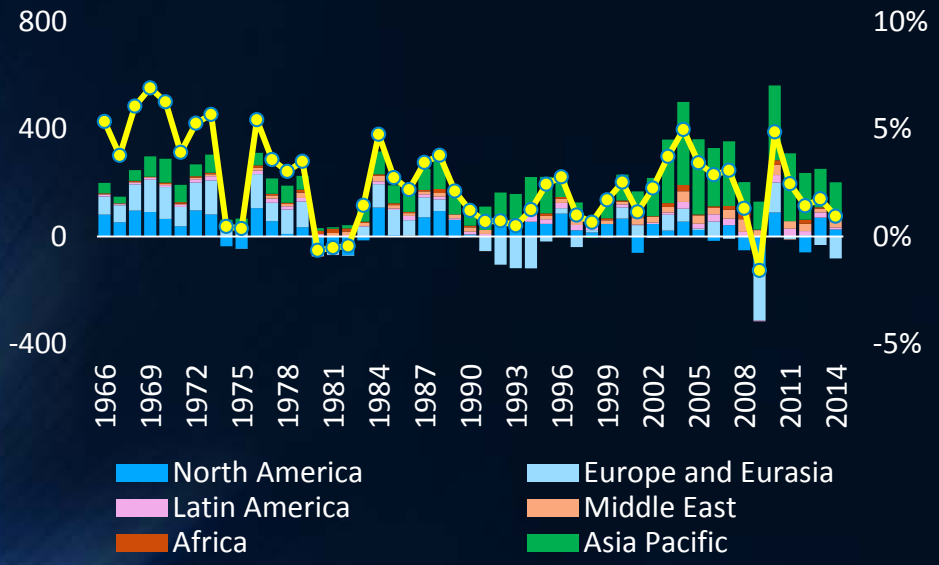


Source: BPSR, Blacklight Research LLC

Low price has reversed the oil demand softness of 2014.

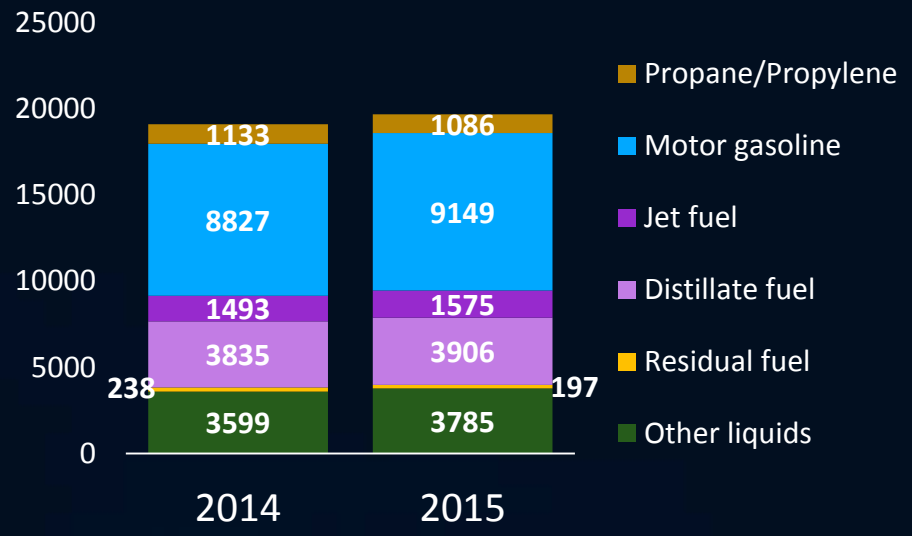
2014 GLOBAL DEMAND WAS +0.9%, NORMAL IS +2.5%

Growth, global primary energy demand
million tonnes oil equivalent yoy



US PRODUCT DEMAND IS UP 575 KBD (+3.0%) YTD VS A YEAR AGO

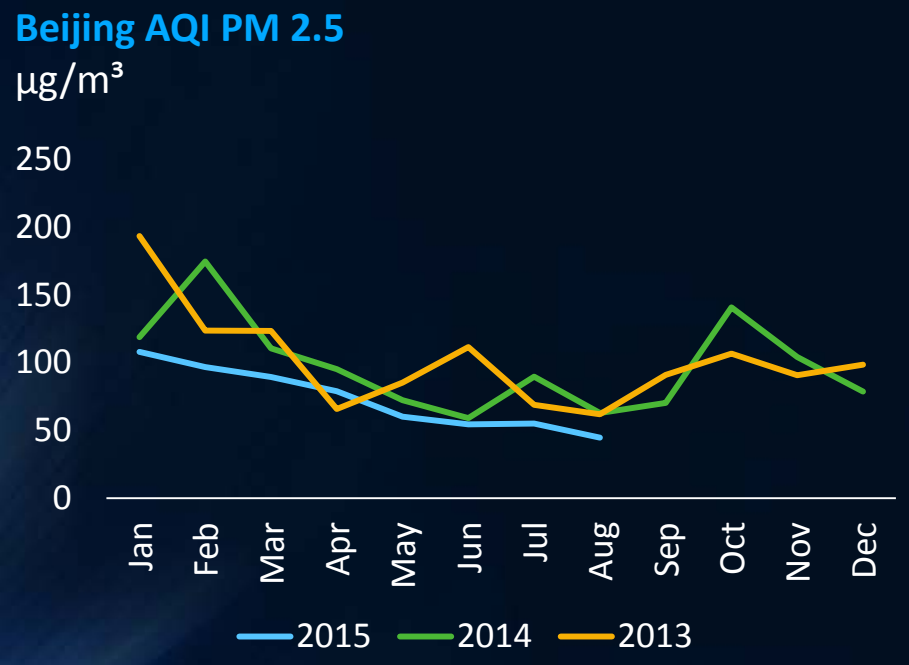
US product demand by fraction
thousand b/d (ytd through Dec 4)



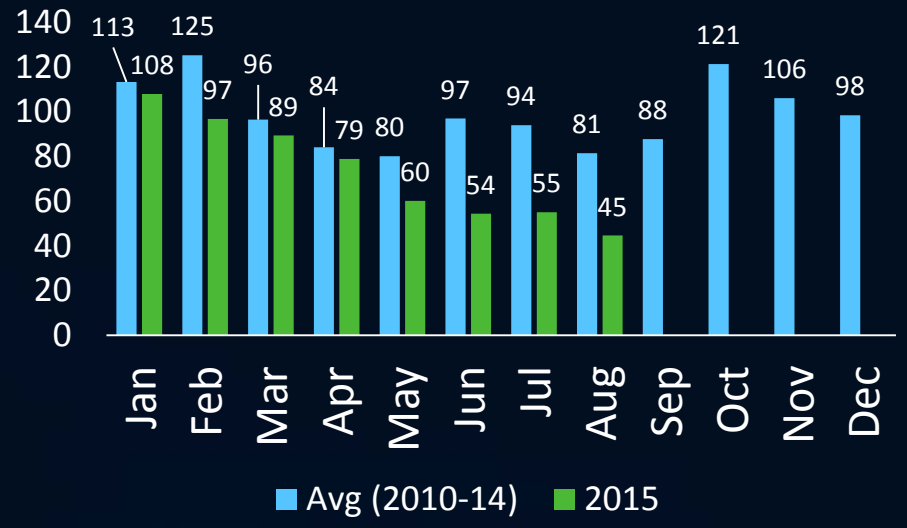
Source: BP, EIA, Blacklight

Lurking beneath the positive trend of lower air pollution: China's economic distress.

POLICY DROVE THE SUCCESSFUL REDUCTIONS IN 2014 & 1Q2015



ECONOMIC CONTRACTION DRIVES THE RECENT REDUCTIONS

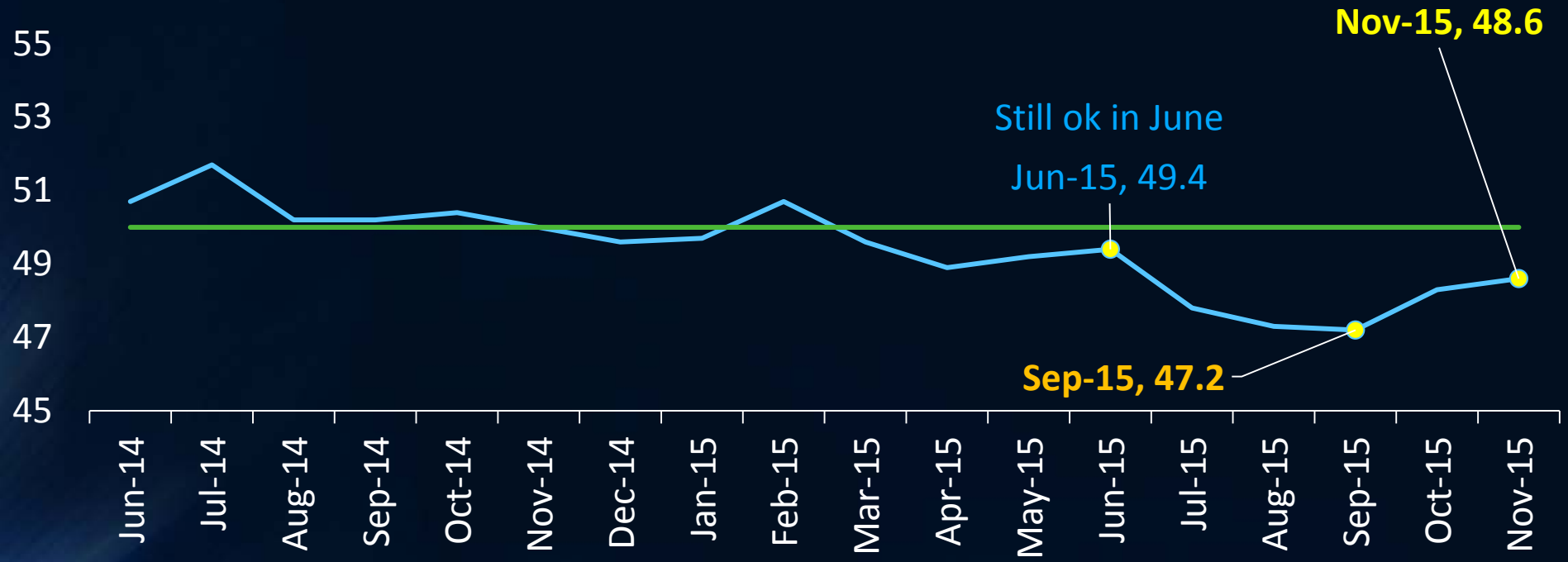


Source: US Department of State, Blacklight Research LLC
Note: Data for February 29, 2012 excluded for consistency in seasonal comparison across years. Negligible effect on reported averages.

PMI data confirm China's manufacturing contraction, but show improvement off the low.

China Manufacturing PMI

Diffusion index, SA

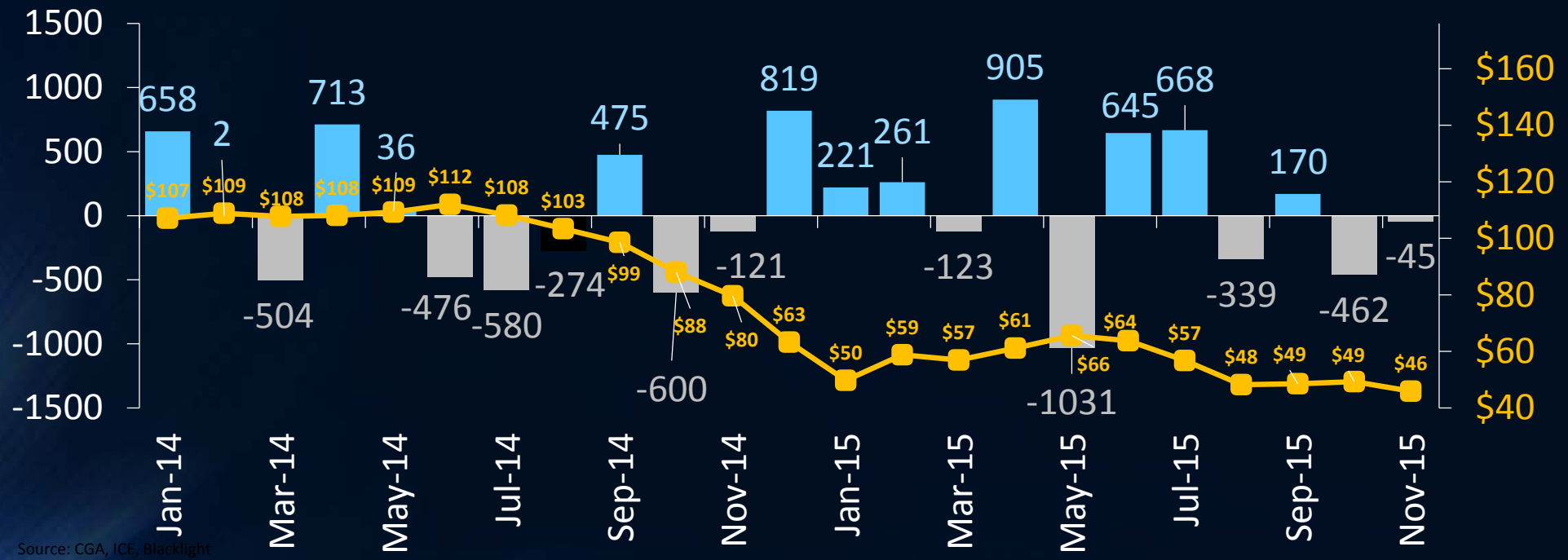


Source: Markit, Blacklight

China's crude imports have been below trend in 3 of past 4 months, echoing last year's buyer strike.

China crude oil imports, relative to trend, plotted on Brent oil price

(Left) thousand b/d above or below trend, (Right) avg oil price in $/bbl



Source: CGA, ICE, Blacklight

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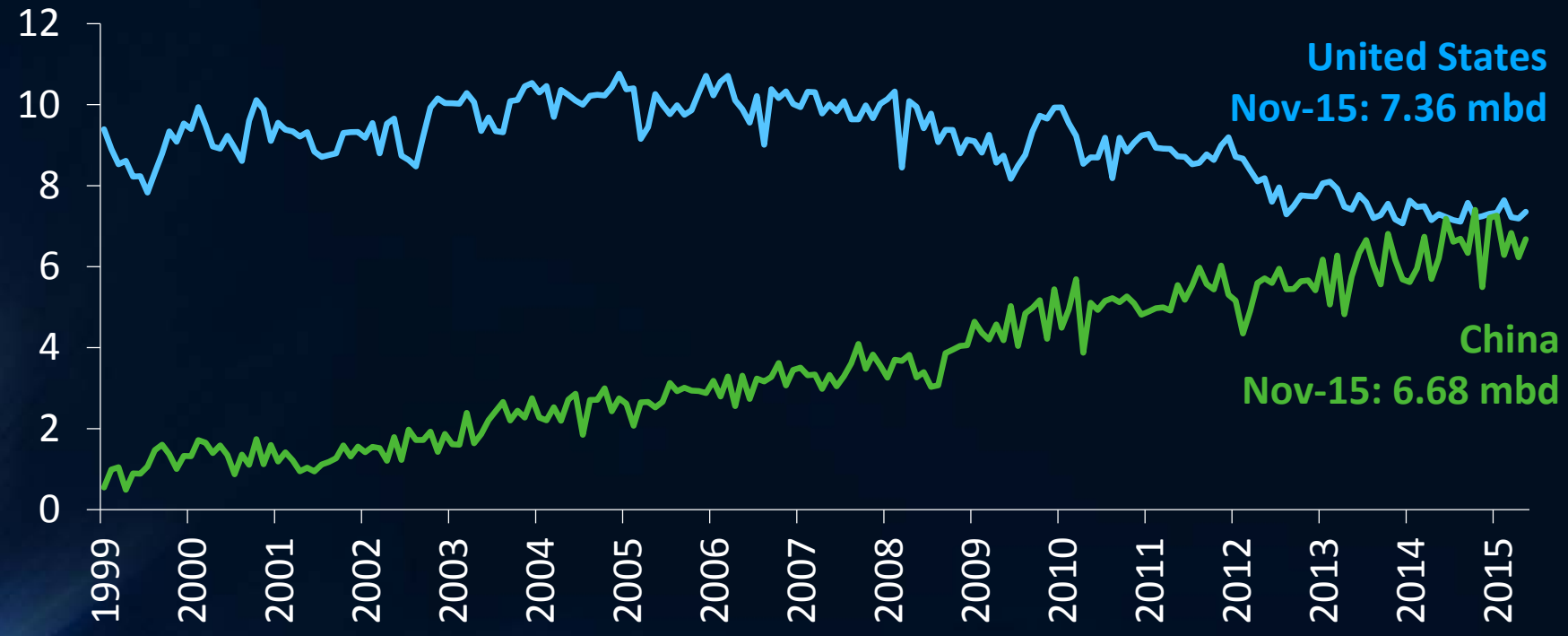
China's crude oil import demand is on track to be world's largest on sustainable basis.

China crude oil imports

million b/d

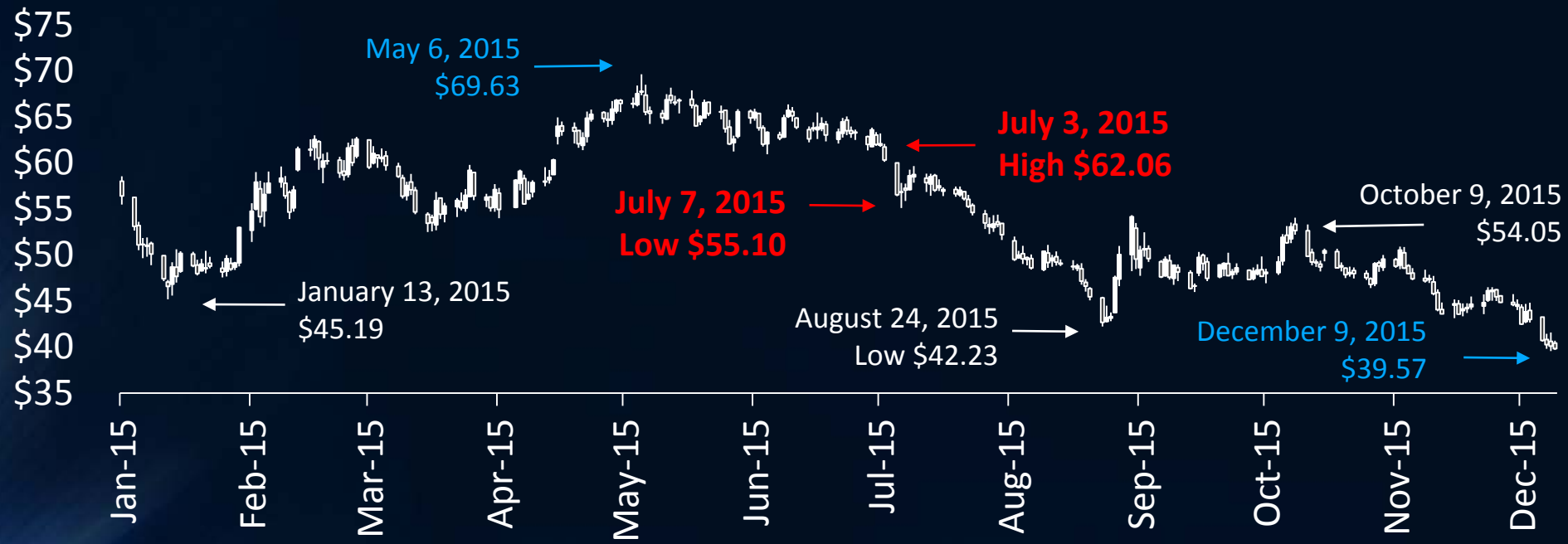


Source: CGA, EIA, Blacklight

The July 6 break in crude prices was a first signal of new damage in fundamentals.

ICE Brent Crude Oil Price

rolling continuous prompt, $/bbl

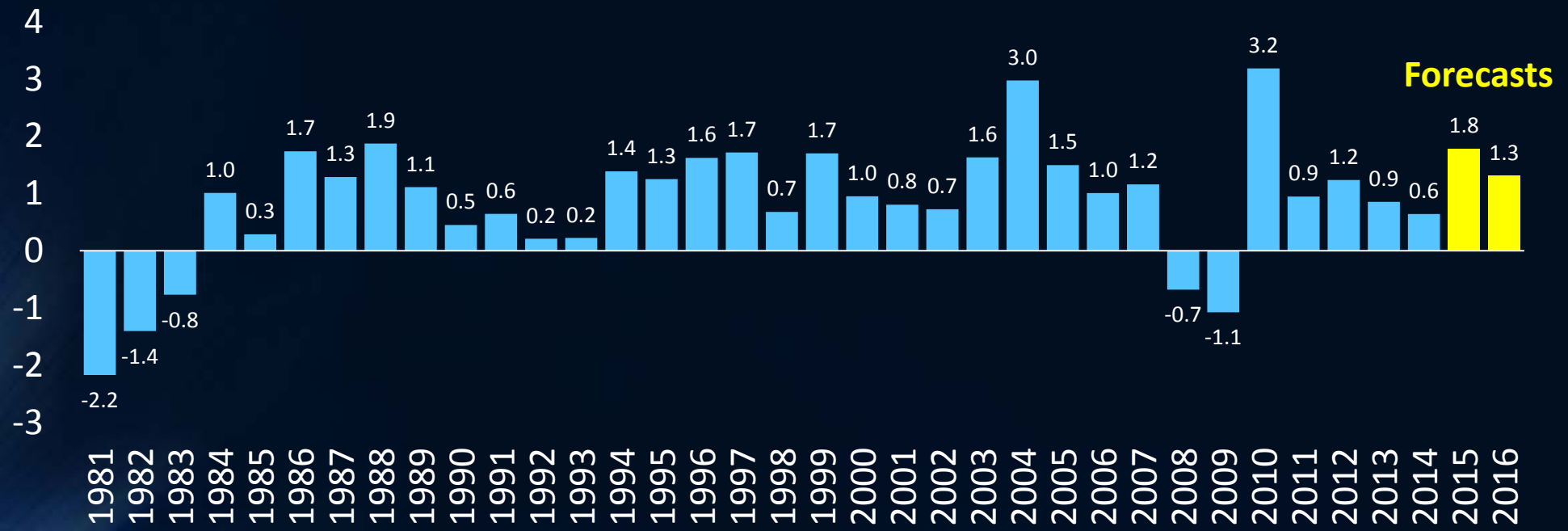


Source: ICE, Blacklight

Global oil demand growth in 2015 is the strongest in this business cycle.

Annual change in global petroleum consumption

million barrels per day yoy

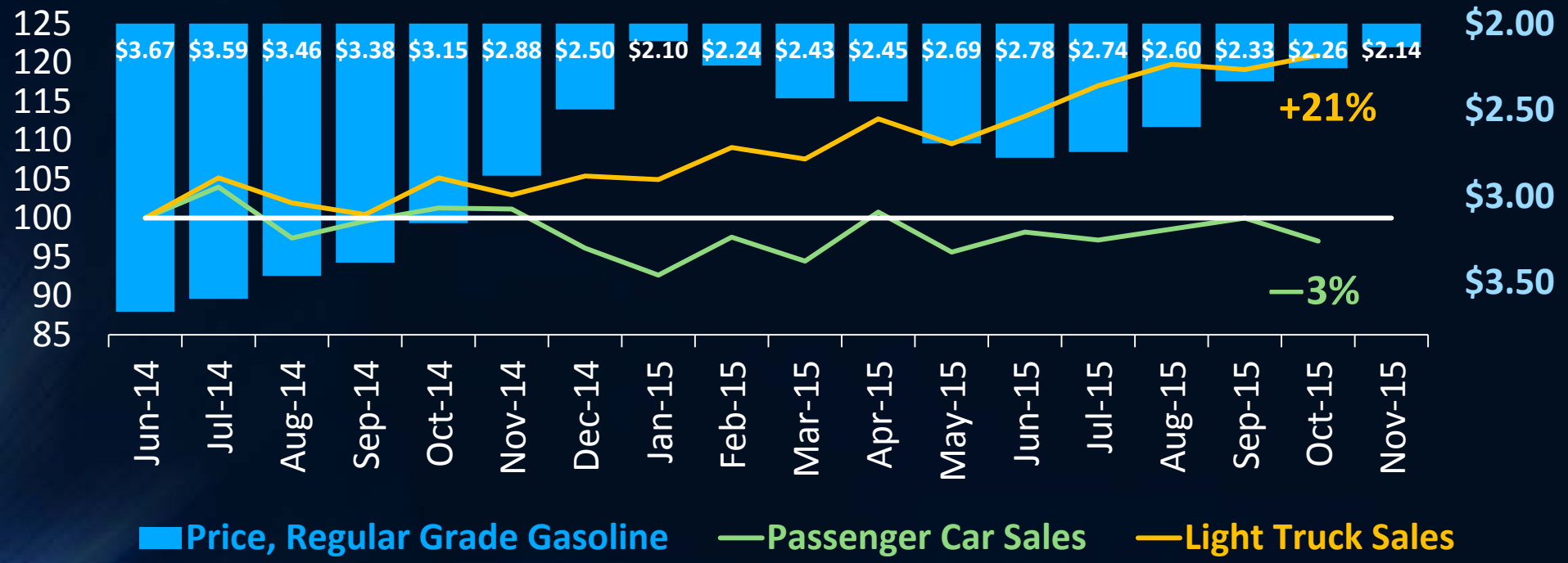


Source: EIA, IEA, Blacklight Research LLC

Cheaper gasoline has lifted retail sales, but even in vehicle sales the effect is strongly mixed.

Cheaper gasoline prompts strong lift in US sales of gas guzzlers

Vehicle sales, Index 100 = June 2014; gasoline price inverted, $/gal



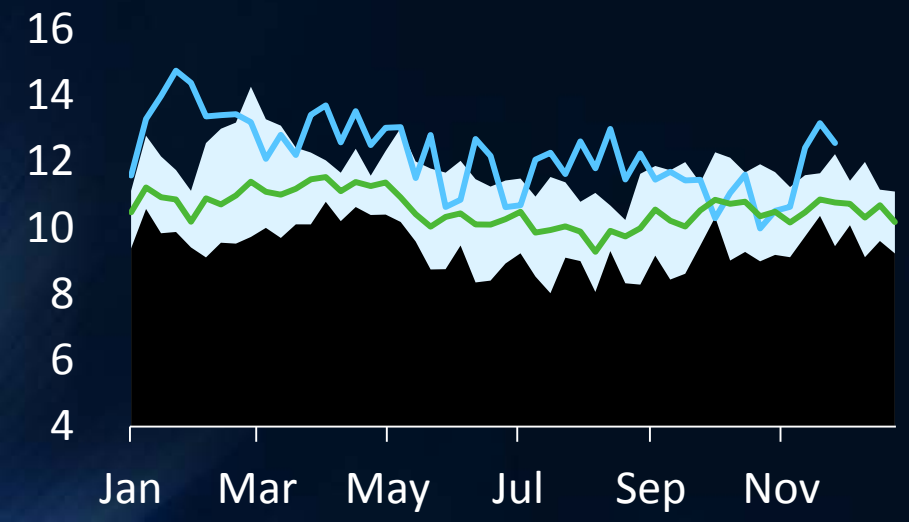
Source: AAA, Ward's, Blacklight

	GDP RANK	GDP 2014 (MIL US$)	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15
UNITED STATES	1	17418925	55.7	56.4	58.1	56.1	57.9	57.6	55.1	53.5	52.9	51.5	51.5	52.8	53.5	52.7	51.1	50.2	50.1	48.6
CHINA	2		50.7	51.7	50.2	50.2	50.4	50.0	49.6	49.7	50.7	49.6	48.9	49.2	49.4	47.8	47.3	47.2	48.3	48.6
JAPAN	3		51.5	50.5	52.2	51.7	52.4	52.0	52.0	52.2	51.6	50.3	49.9	50.9	50.1	51.2	51.7	51.0	52.4	52.6
GERMANY	4		52.0	52.4	51.4	49.9	51.4	49.5	51.2	50.9	51.1	52.8	52.1	51.1	51.9	51.8	53.3	52.3	52.1	52.9
UNITED KINGDOM	5		56.9	54.9	53.3	51.8	53.0	53.5	52.6	52.9	53.8	53.8	51.7	51.9	51.5	52.0	51.8	51.7	55.2	52.7
FRANCE	6		48.2	47.8	46.9	48.8	48.5	48.4	47.5	49.2	47.6	48.8	48.0	49.4	50.7	49.6	48.3	50.6	50.6	50.6
BRAZIL	7		48.7	49.1	50.2	49.3	49.1	48.7	50.2	50.7	49.6	46.2	46.0	45.9	46.5	47.2	45.8	47.0	44.1	43.8
ITALY	8		53.9	52.8	49.8	48.8	50.8	51.8	49.4	51.2	50.0	51.6	53.1	52.5	53.4	52.0	54.6	53.3	53.4	53.4
INDIA	9		51.5	53.0	52.4	51.0	51.6	53.3	54.5	52.9	51.2	52.1	51.3	52.6	51.3	52.7	52.3	51.2	50.7	50.3
RUSSIA	10		49.1	51.0	51.0	50.4	50.3	51.7	48.9	47.6	49.7	48.1	48.9	47.6	48.7	48.3	47.9	49.1	50.2	50.1
CANADA	11		53.5	54.3	54.8	53.5	55.3	55.3	53.9	51.0	48.7	48.9	49.0	49.8	51.3	50.8	49.4	48.6	48.0	48.6
AUSTRALIA	12		46.2	47.3	48.7	47.9	38.5	43.3	40.9	45.1	49.0	38.8	39.5	43.0	36.4	49.5	43.9	46.7	53.7	46.7
SOUTH KOREA	13		48.4	49.3	50.3	48.8	48.7	49.0	49.9	51.1	51.1	49.2	48.8	47.8	46.1	47.6	47.9	49.2	49.1	49.1
SPAIN	14		54.6	53.9	52.8	52.6	52.6	54.7	53.8	54.7	54.2	54.3	54.2	55.8	54.5	53.6	53.2	51.7	51.3	53.1
MEXICO	15		51.8	51.5	52.1	52.6	53.3	54.3	55.3	56.6	54.4	53.8	53.8	53.3	52.0	52.9	52.4	52.1	53.0	53.0
INDONESIA	16		52.7	52.7	49.5	50.7	49.2	48.0	47.6	48.5	47.5	46.4	46.7	47.1	47.8	47.3	48.4	47.4	47.8	46.9
NETHERLANDS	17		52.3	53.5	51.7	52.2	53.0	54.6	53.5	54.1	52.2	52.5	54.0	55.5	56.2	56.0	53.9	53.0	53.7	53.5
TURKEY	18		48.8	48.5	50.3	50.4	51.5	52.2	51.4	49.8	49.6	48.0	48.5	50.2	49.0	50.1	49.3	48.8	49.5	50.9
SAUDI ARABIA	19		59.2	60.1	60.7	61.8	59.1	57.6	57.9	57.8	58.5	60.1	58.3	57.0	56.1	57.7	58.7	56.5	55.7	56.3
SWITZERLAND	20		54.5	53.6	53.8	51.5	54.3	52.5	53.6	48.2	47.3	47.9	47.9	49.4	50.0	48.7	52.2	49.5	50.7	49.7
SWEDEN	22		54.8	55.1	51.0	53.4	52.1	52.7	55.4	55.2	53.3	54.1	55.7	54.8	52.8	55.2	53.2	53.3	53.4	54.9
POLAND	23		50.3	49.4	49.0	49.5	51.2	53.2	52.8	55.2	55.1	54.8	54.0	52.4	54.3	54.5	51.1	50.9	52.2	52.1
TAIWAN	26		54.0	55.8	56.1	53.3	52.0	51.4	50.0	51.7	52.1	51.0	49.2	49.3	46.3	47.1	46.1	46.9	47.8	49.5
NORWAY	27		49.6	50.8	51.8	49.5	50.8	51.4	49.8	51.9	50.9	48.6	50.2	46.5	44.2	45.4	43.7	47.5	48.3	47.6
AUSTRIA	28		50.4	50.9	50.9	47.9	46.9	47.4	49.2	48.5	48.7	47.7	50.1	50.3	51.2	52.4	50.5	52.5	53.0	51.4
UAE	30		58.2	58.0	58.4	57.6	61.2	58.3	58.4	59.3	58.1	56.3	56.8	56.4	54.7	55.8	57.1	56.0	54.0	54.5
SOUTH AFRICA	33		49.5	46.4	51.1	52.6	52.7	50.5	50.2	49.8	50.0	51.6	51.5	50.1	49.2	48.9	49.3	47.9	47.5	49.6
MALAYSIA	35		50.6	50.0	49.4	51.0	51.5	51.3	51.0	49.1	51.1	50.5	48.8	49.5	47.6	47.7	47.2	48.3	48.1	47.0
SINGAPORE	36		55.6	53.8	53.6	52.1	51.6	53.6	52.9	53.4	52.9	51.2	49.9	49.5	51.1	51.3	50.8	51.4	50.2	52.2
ISRAEL	37		48.9	46.8	42.6	49.9	48.3	48.7	45.8	53.3	48.7	50.2	49.2	47.6	51.0	47.2	48.1	47.5	51.4	
EGYPT	38		51.5	49.0	51.6	52.4	51.0	50.7	51.4	49.3	46.8	49.6	49.8	49.9	50.2	49.2	51.2	50.2	47.2	45.0
IRELAND	43		55.3	55.4	57.3	55.7	56.6	56.2	56.9	55.1	57.5	56.8	55.8	57.1	54.6	56.7	53.6	53.8	53.6	53.3
GREECE	44		49.4	48.7	50.1	48.4	48.8	49.1	49.4	48.3	48.4	48.9	46.5	48.0	46.9	30.2	39.1	43.3	47.3	48.1
CZECH REPUBLIC	51		54.7	56.5	54.3	55.6	54.4	55.6	53.3	56.1	55.6	56.1	54.7	55.5	56.9	57.5	56.6	55.5	54.0	54.2
VIETNAM	55		52.3	51.7	50.3	51.7	51.0	52.1	52.7	51.5	51.7	50.7	53.5	54.8	52.2	52.6	51.3	49.5	50.1	49.4
HUNGARY	58		51.7	56.6	51.0	52.7	55.0	55.0	50.9	54.3	55.0	55.4	51.2	55.2	54.9	49.9	51.0	55.8	55.4	56.2
KENYA	74		54.9	54.7	55.9	55.8	57.2	57.1	57.7	53.2	54.8	53.8	56.2	55.1	55.3	54.1	55.0	51.9	51.7	53.7
HONG KONG	(37A)		50.1	50.4	49.6	49.8	47.7	48.8	50.3	49.4	50.7	49.6	48.6	47.6	49.2	48.2	44.4	45.7	46.6	46.6
DEVELOPED MARKETS			54.0	53.2	53.8	53.4	53.2	52.6	52.3	52.3	52.6	53.0	52.1	52.4	52.2	52.5	52.4	52.2	52.9	52.6
EMERGING MARKETS			50.8	51.4	50.9	50.7	50.8	50.9	50.6	50.9	51.1	50.1	49.6	49.7	49.5	49.0	48.6	48.5	49.0	49.2
GLOBAL PMI			52.6	52.4	52.5	52.2	52.2	51.8	51.5	51.7	51.9	51.7	51.0	51.3	51.0	51.1	50.7	50.7	51.3	51.2

A counter-seasonal turn in oil product inventories was real-time evidence of demand softness.

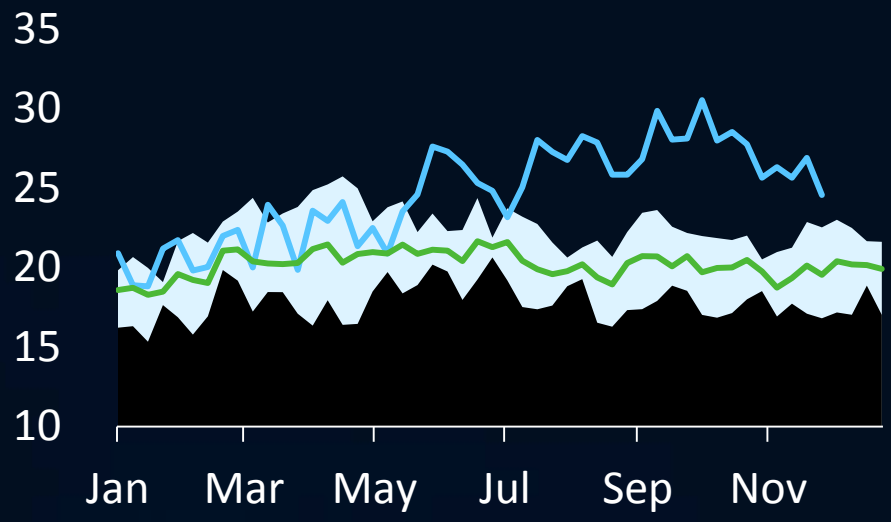
FIRST WEEK OF JULY, NAPHTHA STOCKPATH SUDDENLY INVERTED

Light distillate stocks in Singapore
million barrels



FUEL OIL STOCKS HAD ALREADY BEEN BUILDING SINCE MAY

Residual fuel oil stocks in Singapore
million barrels

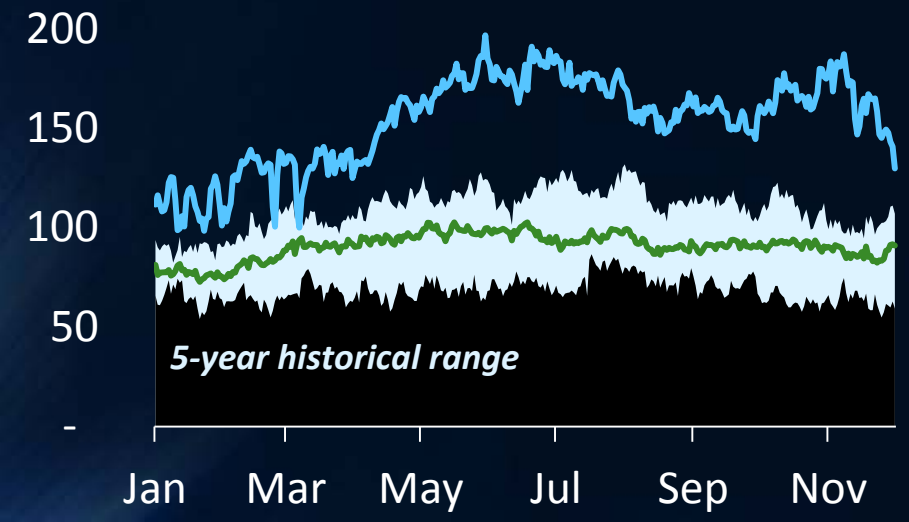


Source: International Enterprise, Blacklight

The petroleum surplus is mostly upstream. Thus, price effects for balance are focused on crude.

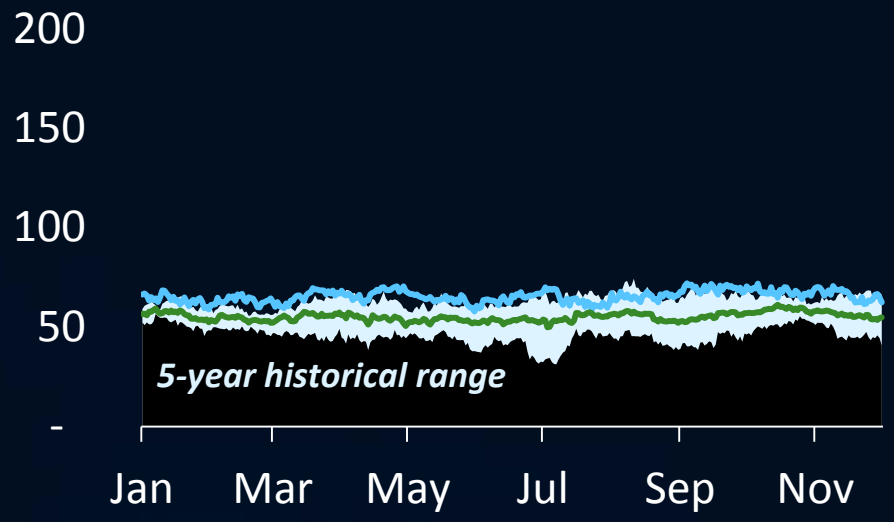
RAPID IMPROVEMENT BUT STILL 44MB (50%) ABOVE NORMAL

Global crude oil stocks on the water
million barrels



PRODUCT STOCKS ARE HIGH BUT WITHIN THE NORMAL RANGE

Global product stocks on the water
million barrels

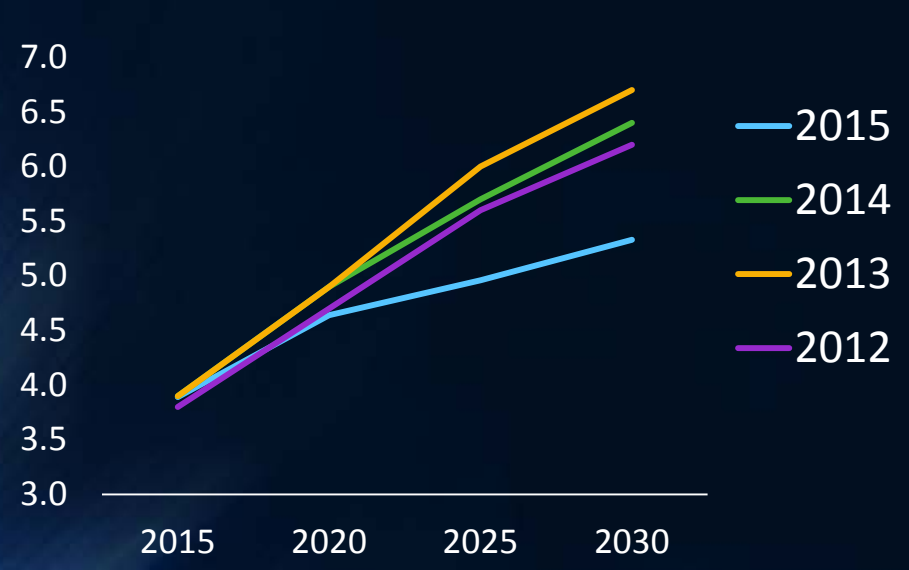


Source: BEF, Chartering reports, Blacklight

US producers are aware of enormous supply adjustments in Canada, Brazil, and Norway.

EXPECTED CANADIAN OIL SUPPLY GROWTH BENDS SHARPLY LOWER

Projected Canadian oil production



WHAT THIS SHIFT IN EXPECTATIONS IS WORTH:

- In June 2015, CAPP reduced its projection for Canadian oil production in 2030 to 5.3 mbd from 6.4 mbd.
- The new forecast cuts cumulative expected supply by 3 billion barrels.
- At an average price of US$45 per bbl, that foregone supply is worth US$135 billion.
- The cumulative lost barrels since 2013 projections are 3.88 Bn bbls – worth US$175 Bn at $45/b and $291Bn at $75/b.

Source: CAPP, Blacklight

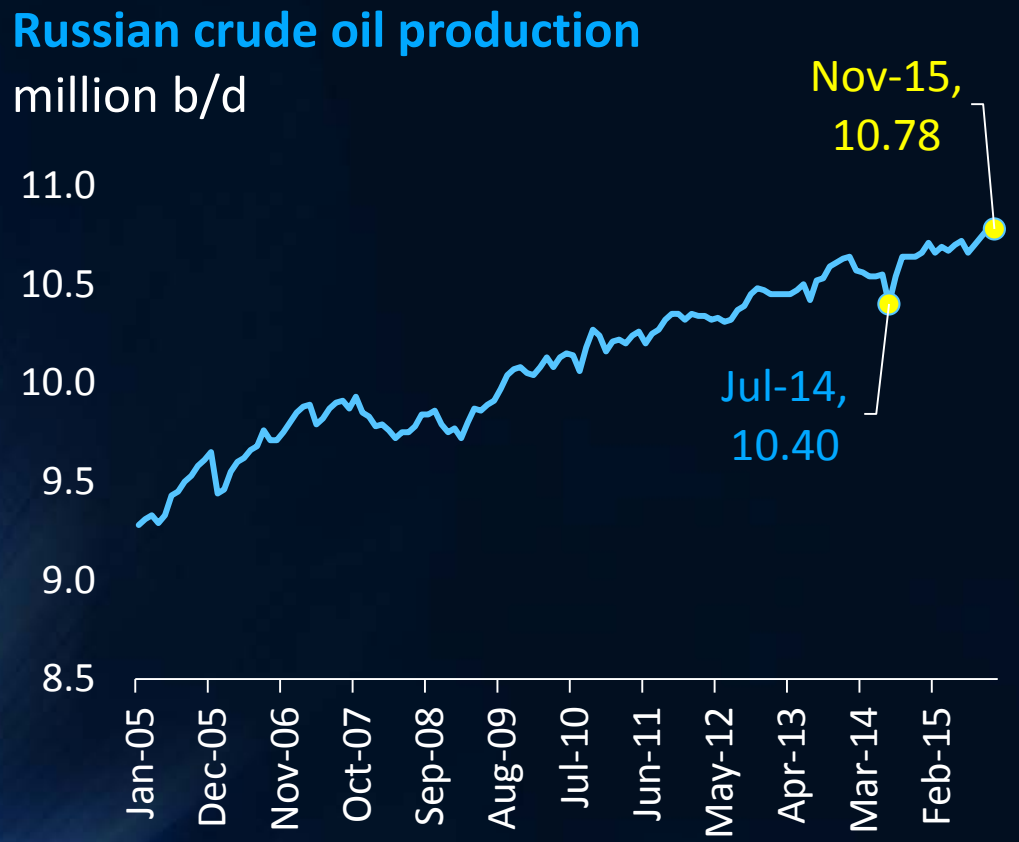
Geopolitics are marching toward the edge of Flashpoint.

JAN 22: "3 MINUTES TO MIDNIGHT"

2015 HAS BROUGHT:

- End of Nunn-Lugar; new Russian ICBMs
- Minsk 2 Agreement Fails
- Egypt bombs Libya
- Saudi bombs Yemen
- Russia bombs Syria / in Turkey's airspace
- US / France / Australia bomb ISIS

Russian crude production has taken the share made available by restricted US crude exports.

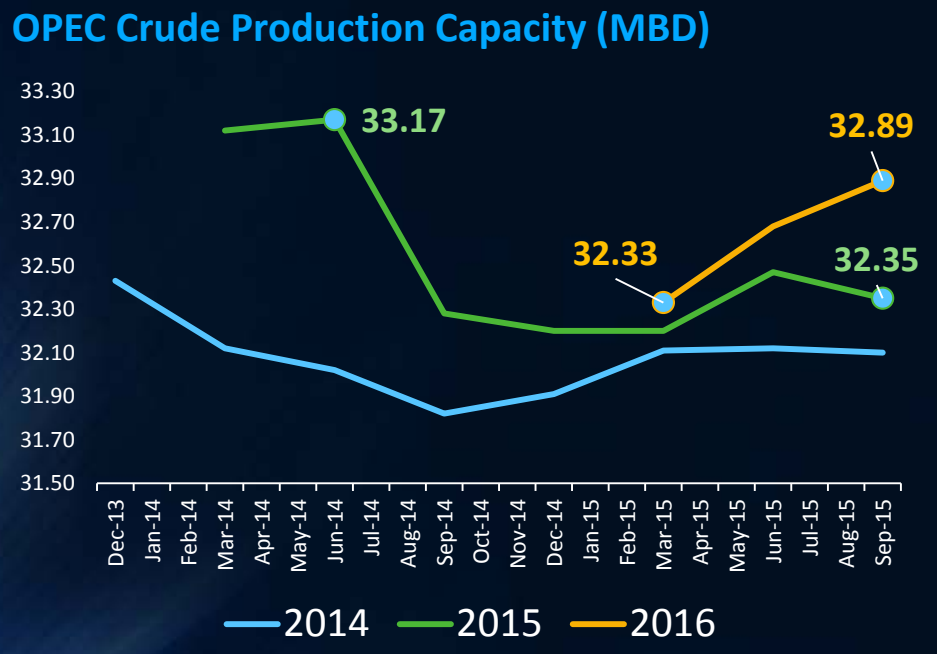


- The 380 kbd increase in Russian crude output is worth $6.9 Bn per year at an average price of $50 per bbl.
- A Lukoil spokesman said, early in 2015, that a sustained price of $40 per bbl for Russian crude would likely force an 800 kbd cut to output.
- This assessment is high, but 200 to 500 kbd is realistic in our view, unless US export ban continues.

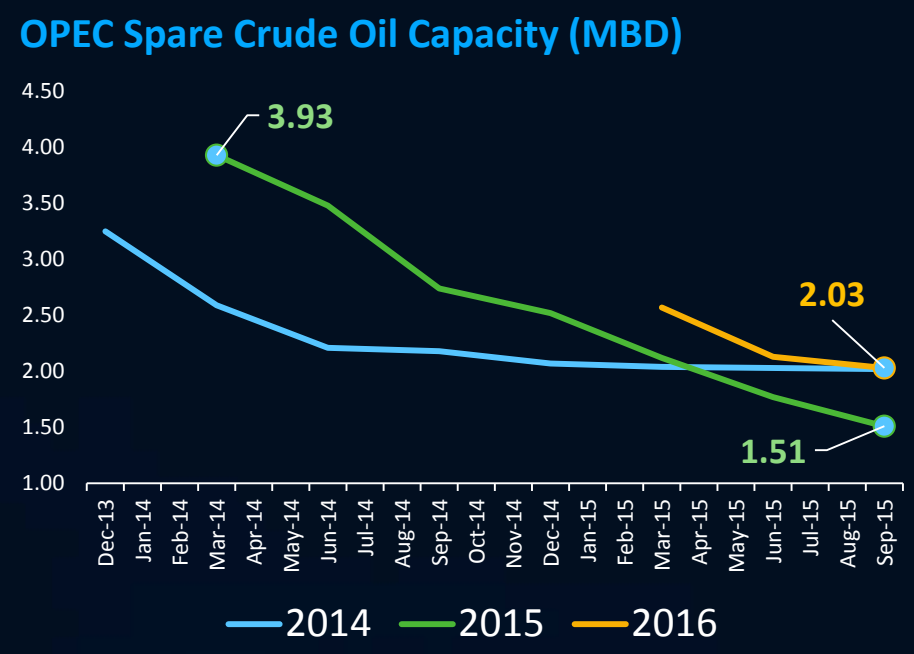
Source: CDU-TEK, Blacklight Research LLC

OPEC's crude production capacity is 820 kbd *lower* than projected when prices peaked in June 2014.

THE P5+1 DEAL LIKELY ALLOWS IRAN TO RESTORE 500+ KBD OF CAPACITY BACK TO OPEC IN 2016

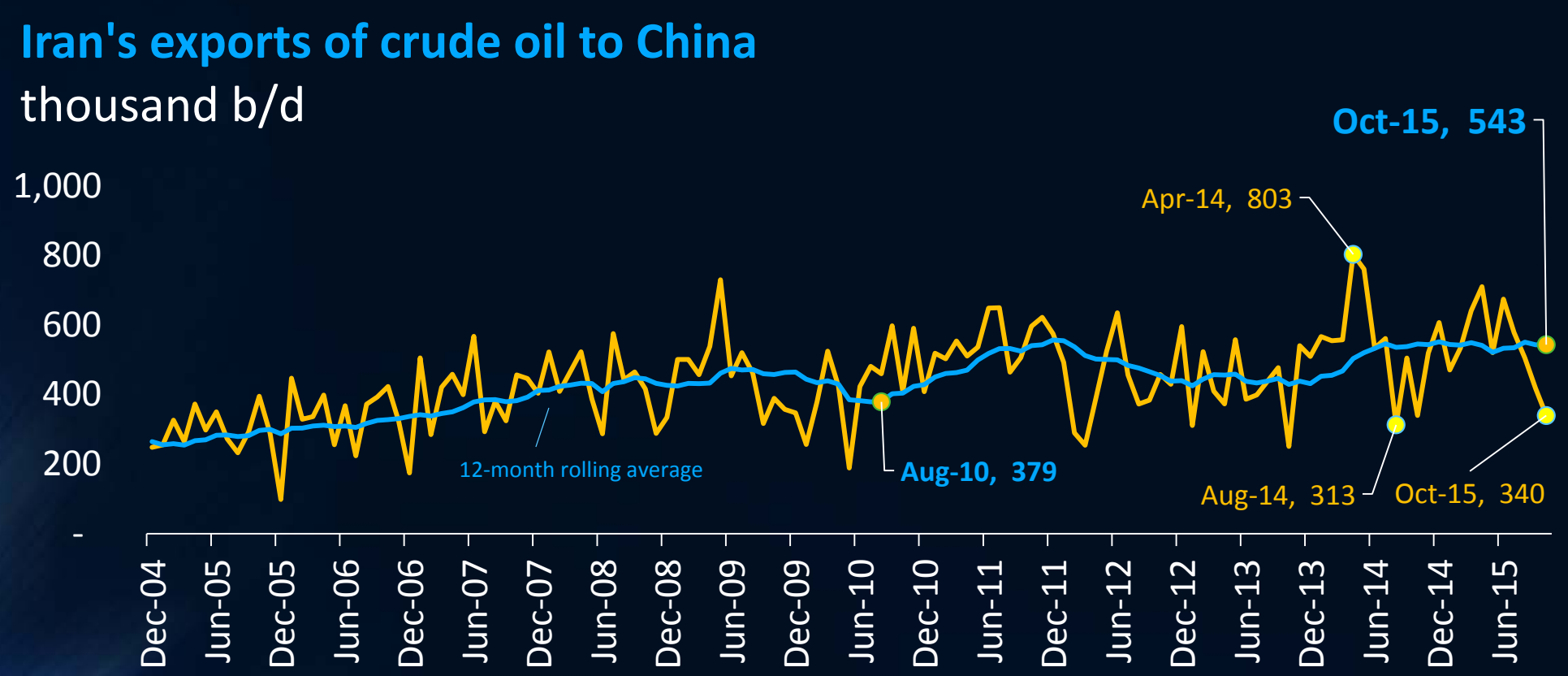


BUT OPEC'S STRATEGY FOR MARKET SHARE HAS REDUCED SPARE CAPACITY BY 2.42 MBD



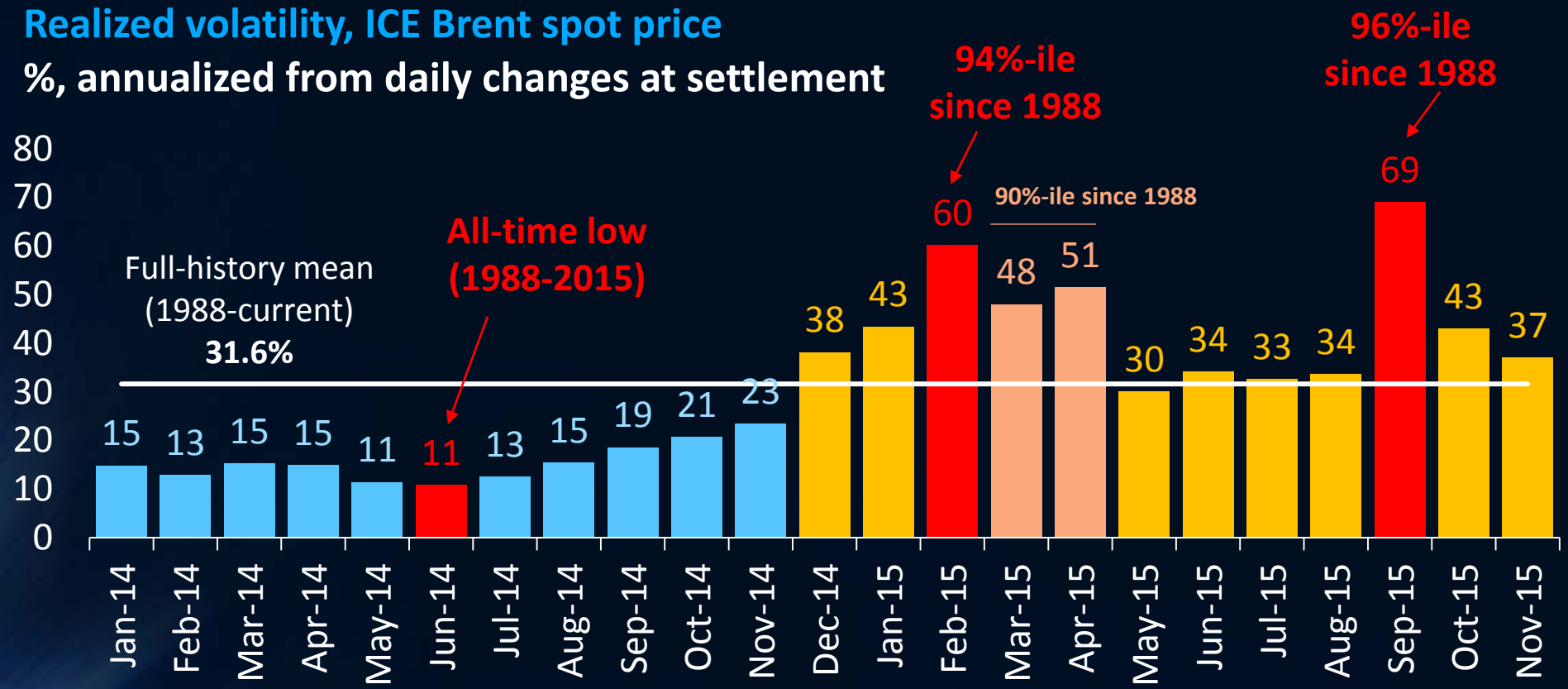
Source: EIA, OPEC, Blacklight

OPEC v. OPEC: Contain a resurgent Iran.



Source: CGA, Oil Ministries, OPEC, Blacklight

‘Lower for longer’ is not quite right; the concept of ‘Ascent of Risk’ is more apt.

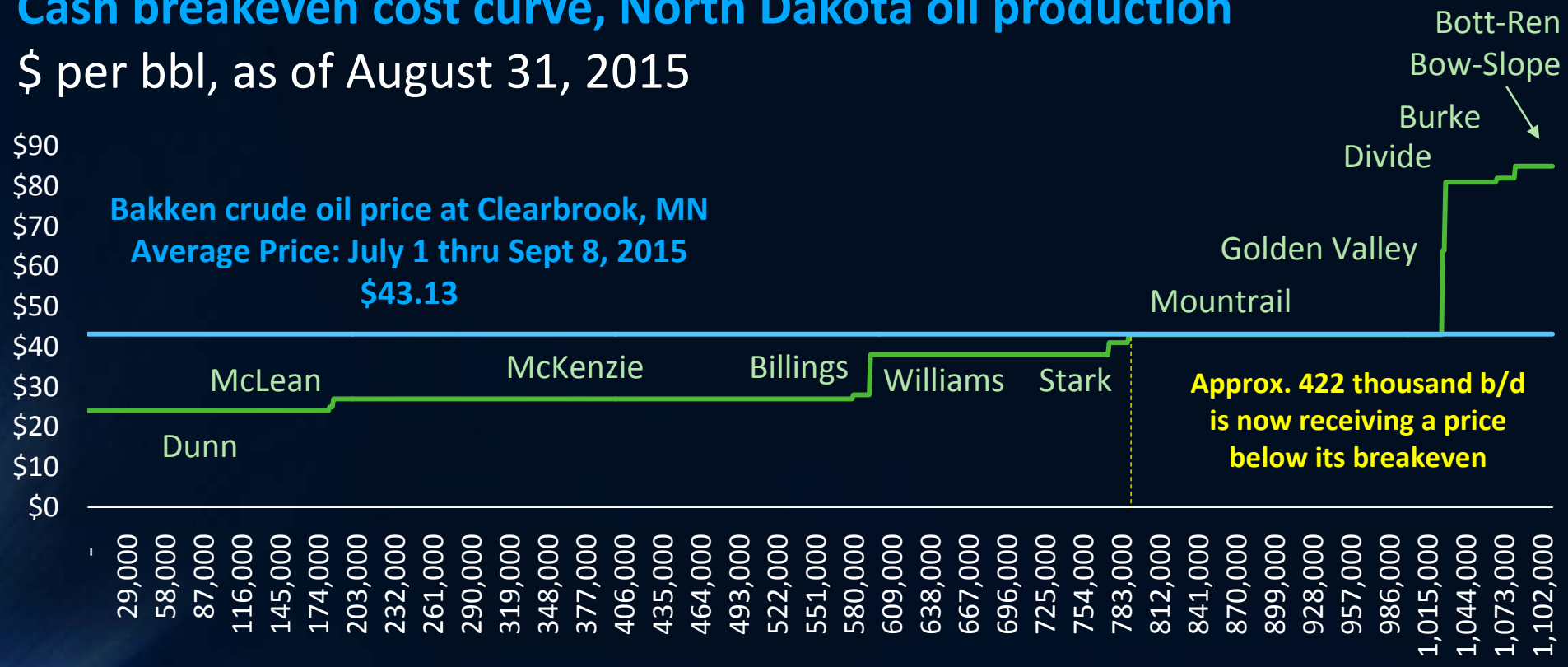


Source: ICE, Blacklight

Lack of demand redirects balancing mechanism back to removal of highest cost supply.

Cash breakeven cost curve, North Dakota oil production

$ per bbl, as of August 31, 2015



Source: Bloomberg, Company Reports, ND-DNR, Blacklight

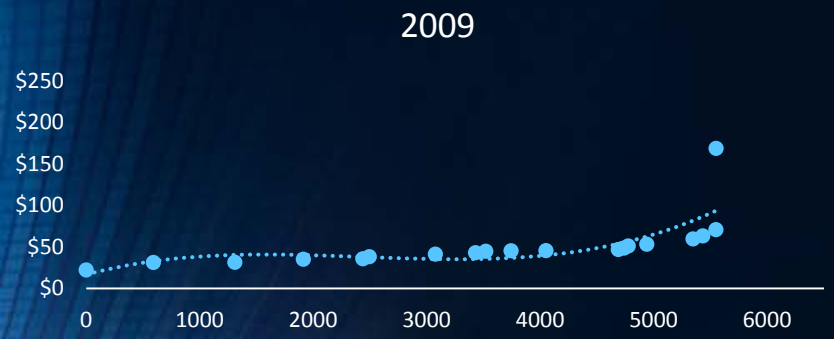
Estimated cash breakeven prices for North Dakota oil production by county through time.

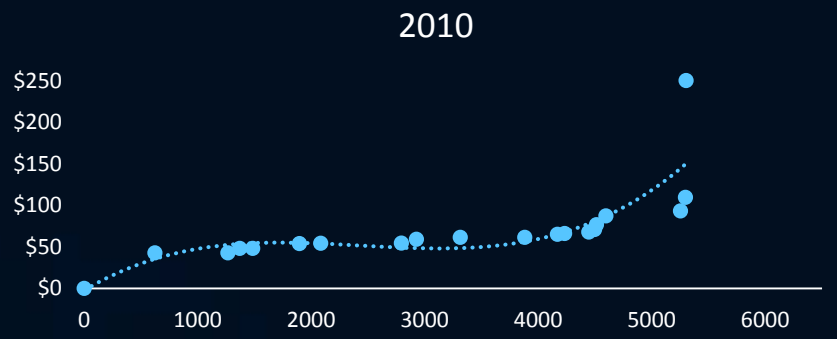
	OIL RIG COUNT					BREAKEVEN PRICE ($/BBL)				
	Nov-14	Dec-14	Jan-15	Jul-15	Aug-15	Nov-14	Dec-14	Jan-15	Jul-15	Aug-15
Billings	3	2	1	0	0	56	44	31	29	28
Bottineau-Renville	5	5	0	0	2	61	52	52	70	85
Bowman-Slope	1	2	3	1	2	75	75	75	75	85
Burke	2	3	1	0	0	87	62	61	75	82
Divide	6	4	5	3	3	104	73	63	62	81
Dunn	27	28	23	10	11	29	29	28	24	24
Golden Valley	0	0	1	0	0	87	52	49	39	64
McKenzie	72	64	58	27	26	30	30	29	26	27
McLean	0	1	0	0	0	73	77	77	25	25
Mountrail	31	33	28	13	13	45	41	39	41	43
Stark	2	0	1	1	1	38	37	35	38	41
Williams	39	40	32	13	16	39	36	34	34	38
NORTH DAKOTA	**188**	**182**	**153**	**68**	**74**	**40**	**37**	**35**	**34**	**36**

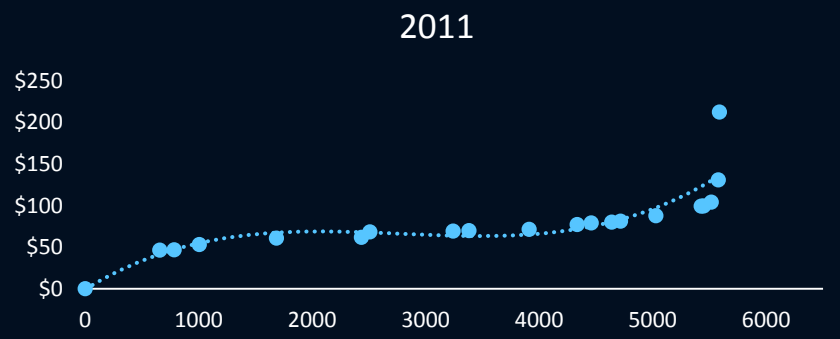
Source: Company Reports, ND-DNR, Blacklight

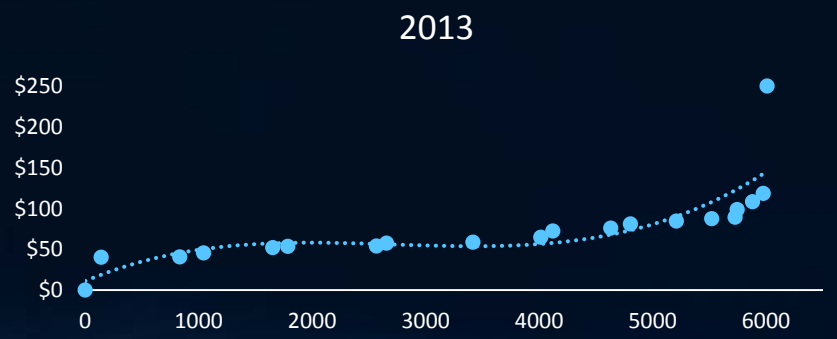
Estimated full-cycle cost curves for sampled LTO producers* by year ($/boe vs. thousand boed)

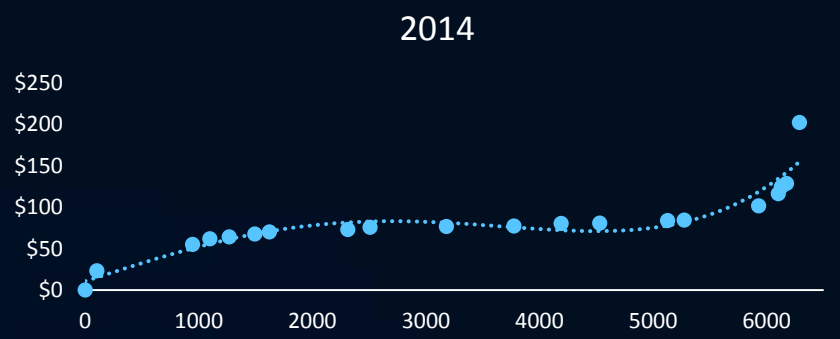
Avg Est Percentile	2014	2013	2012	2011	2010	2009	Average 2010-2014
6%	$ 23.10	$ 40.25	$ 38.81	$ 46.29	$ 42.71	$26.11	$ 38.23
42%	$ 70.00	$ 53.87	$ 69.15	$ 68.35	$ 54.23	$38.00	$ 63.12
64%	**$ 76.56**	**$ 64.84**	**$ 76.29**	**$ 71.38**	**$ 61.27**	**$44.63**	**$ 70.07**
85%	$ 83.70	$ 84.63	$ 88.31	$ 81.16	$ 67.67	$48.41	$ 81.09
99%	$128.43	$118.51	$154.58	$130.79	$109.48	$70.62	$ 128.36
Realized Annual Average Spot WTI Prices							
WTI	$ 92.91	$ 97.98	$ 94.05	$ 94.88	$ 79.48	$61.95	$ 86.88
Brent	$ 99.45	$108.56	$111.63	$111.26	$ 79.61	$61.74	$ 95.38











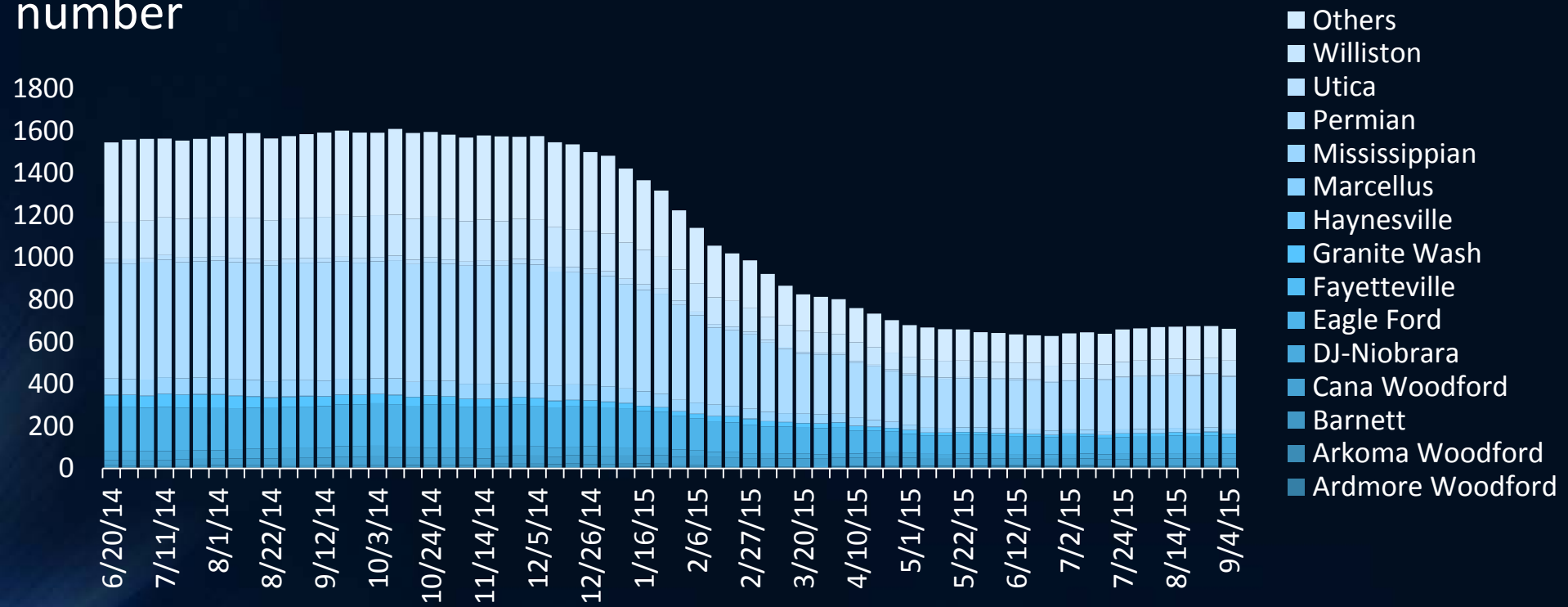
*Universe: APA, APC, CLR, CNQ, DVN, EOG, ERF, HSE, MRO, MUR, NFX, OAS, OXY, PDCE, PXD, QEP, SM, XTO (partial), WLL, WPX.

Source: Company filings, Blacklight Research

US producers have made swift and severe adjustments to capital, labor, and physical stock.

US oil rig count by basin

number

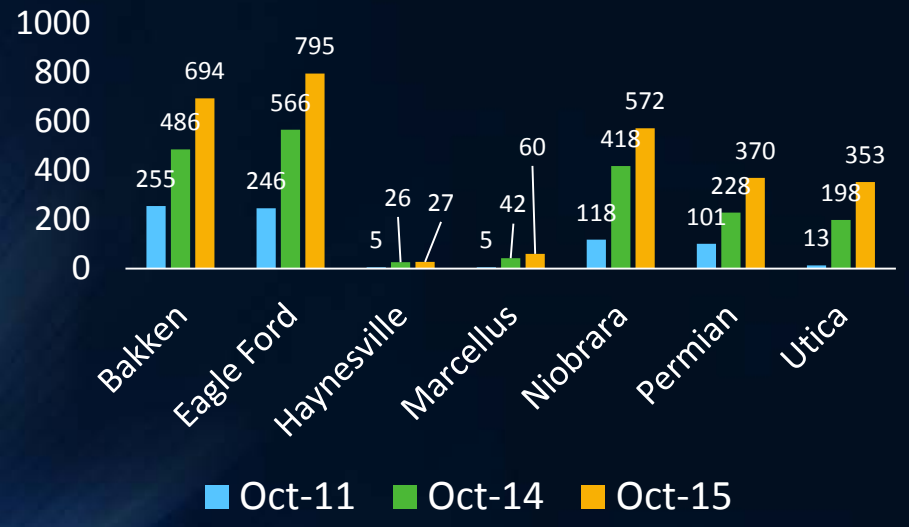


Source: Baker Hughes, Blacklight

LTO productivity gains have been impressive, especially in Permian, but they are not infinite.

NEW WELL PRODUCTIVITY IS UP 62% YOY IN THE PERMIAN

Productivity by light tight oil basin
daily oil production per rig



AN INCREMENTAL PER BASIN NOW AGGREGATES TO +28 KB/M

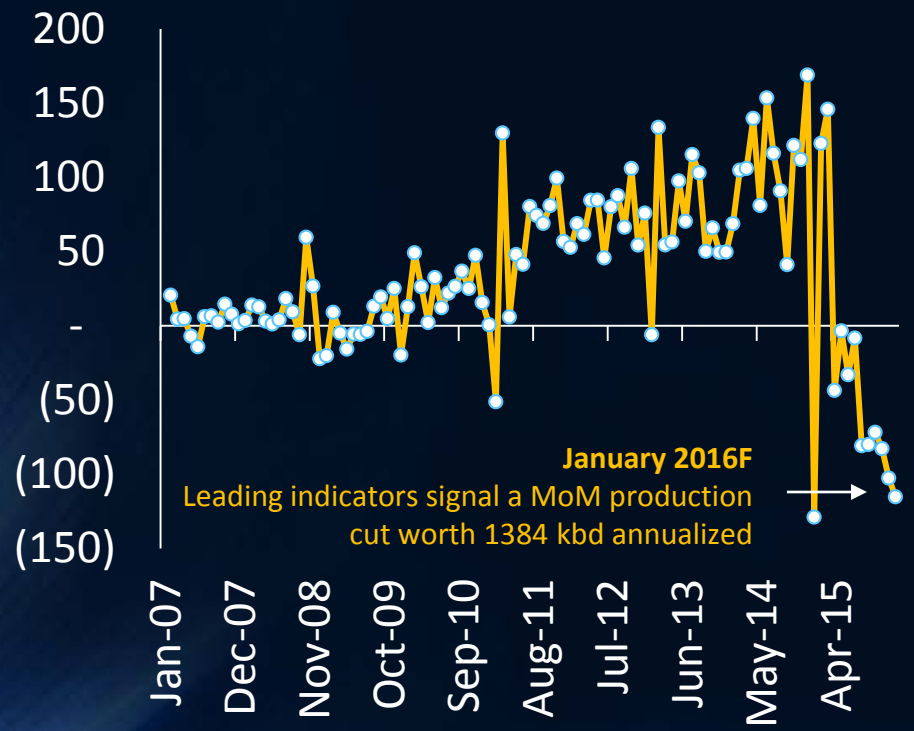
Daily oil production per rig by LTO basin				Productivity Gains	
	Oct-11	Oct-14	Oct-15	4-year	1-year
Bakken	255	486	694	439	208
Eagle Ford	246	566	795	549	229
Haynesville	5	26	27	22	1
Marcellus	5	42	60	55	18
Niobrara	118	418	572	454	154
Permian	101	228	370	269	142
Utica	13	198	353	340	155

Source: EIA, Blacklight

New US LTO output must grow by >340 kbd mom to overcome the legacy decline rate.

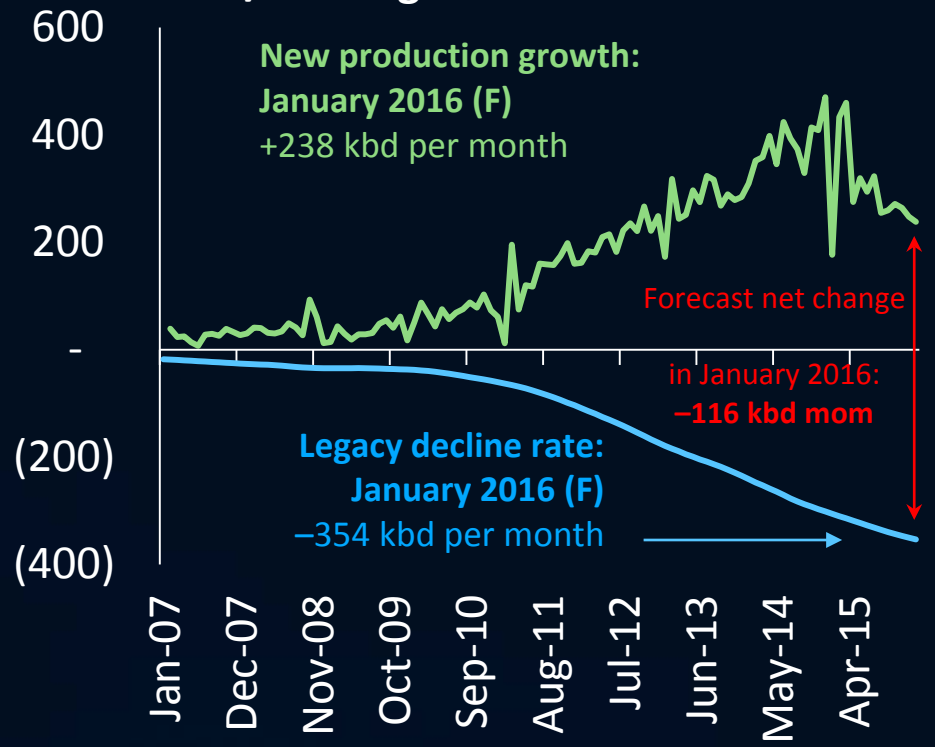
Path of US light tight oil production

thousand b/d change MoM



Legacy decline > new output

thousand b/d change MoM

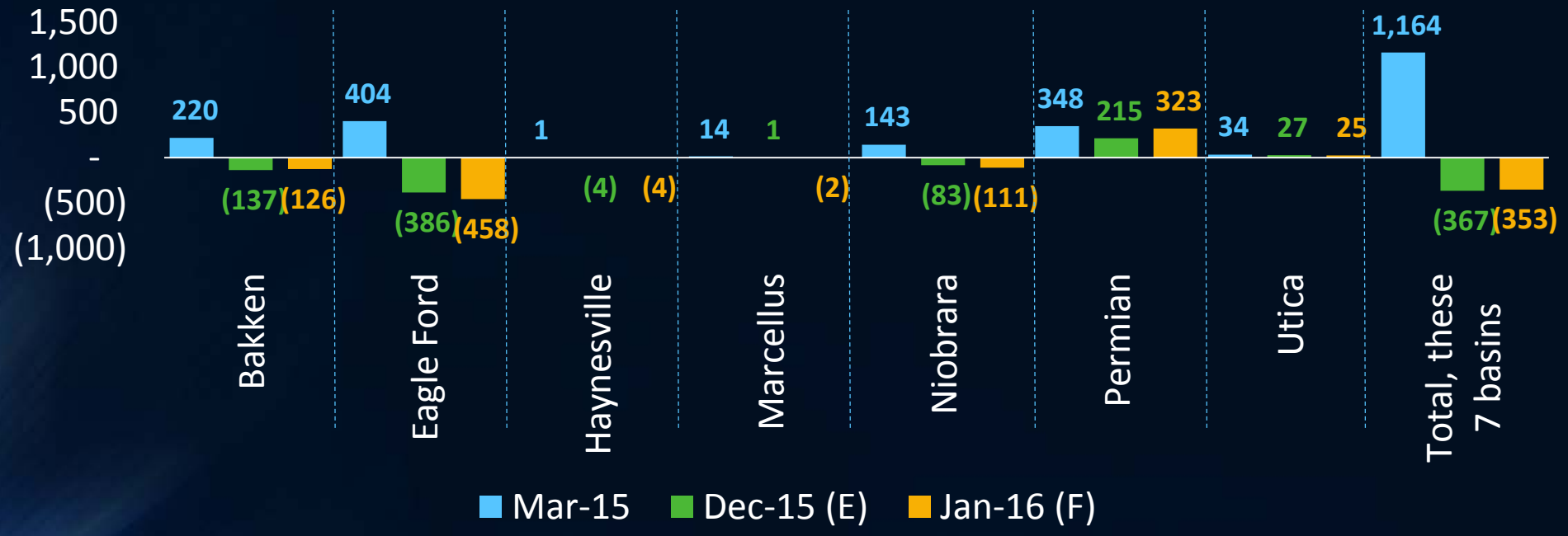


Source: EIA, Blacklight

US LTO production has been slowing MoM. It is now contracting YoY.

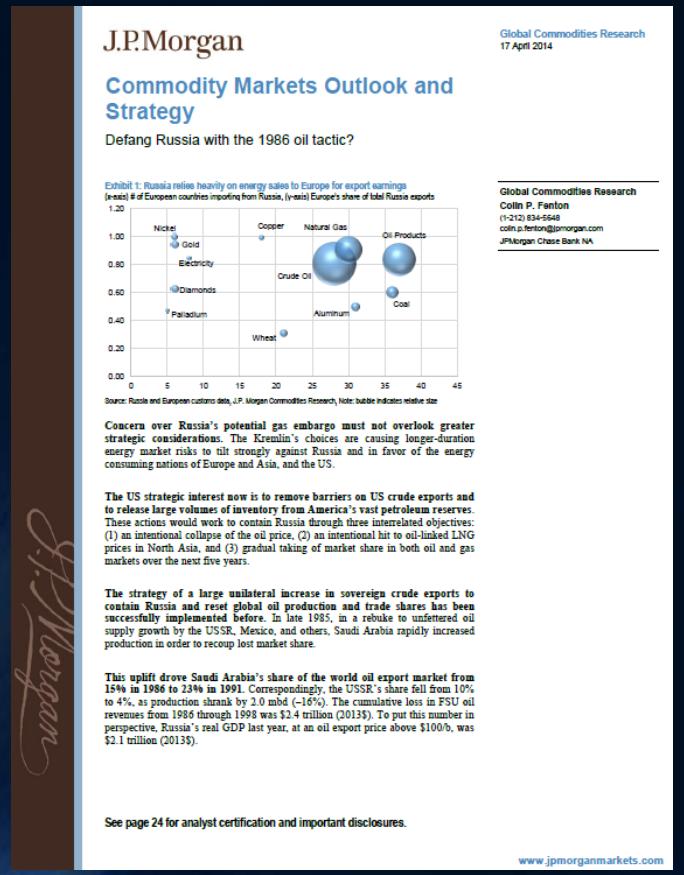
LTO production growth down ~1.5mbd since March

yoy change in oil production by US basin, thousand b/d



Source: EIA, Blacklight

Defang Russia with the 1986 oil tactic?
(JP Morgan Chase, April 17, 2014)



J.P.Morgan

Global Commodities Research
17 April 2014

Commodity Markets Outlook and Strategy

Defang Russia with the 1986 oil tactic?

Exhibit 1: Russia relies heavily on energy sales to Europe for export earnings
(x-axis) # of European countries importing from Russia, (y-axis) Europe's share of total Russia exports

Source: Russia and European customs data, J.P. Morgan Commodities Research, Note: bubble indicates relative size

Concern over Russia's potential gas embargo must not overlook greater strategic considerations. The Kremlin's choices are causing longer-duration energy market risks to tilt strongly against Russia and in favor of the energy consuming nations of Europe and Asia, and the US.

The US strategic interest now is to remove barriers on US crude exports and to release large volumes of inventory from America's vast petroleum reserves. These actions would work to contain Russia through three interrelated objectives: (1) an intentional collapse of the oil price, (2) an intentional hit to oil-linked LNG prices in North Asia, and (3) gradual taking of market share in both oil and gas markets over the next five years.

The strategy of a large unilateral increase in sovereign crude exports to contain Russia and reset global oil production and trade shares has been successfully implemented before. In late 1985, in a rebuke to unfettered oil supply growth by the USSR, Mexico, and others, Saudi Arabia rapidly increased production in order to recoup lost market share.

This uplift drove Saudi Arabia's share of the world oil export market from 15% in 1986 to 23% in 1991. Correspondingly, the USSR's share fell from 10% to 4%, as production shrank by 2.0 mbd (–16%). The cumulative loss in FSU oil revenues from 1986 through 1998 was $2.4 trillion (2013$). To put this number in perspective, Russia's real GDP last year, at an oil export price above $100/b, was $2.1 trillion (2013$).

See page 24 for analyst certification and important disclosures.

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JPMorgan Chase Bank NA

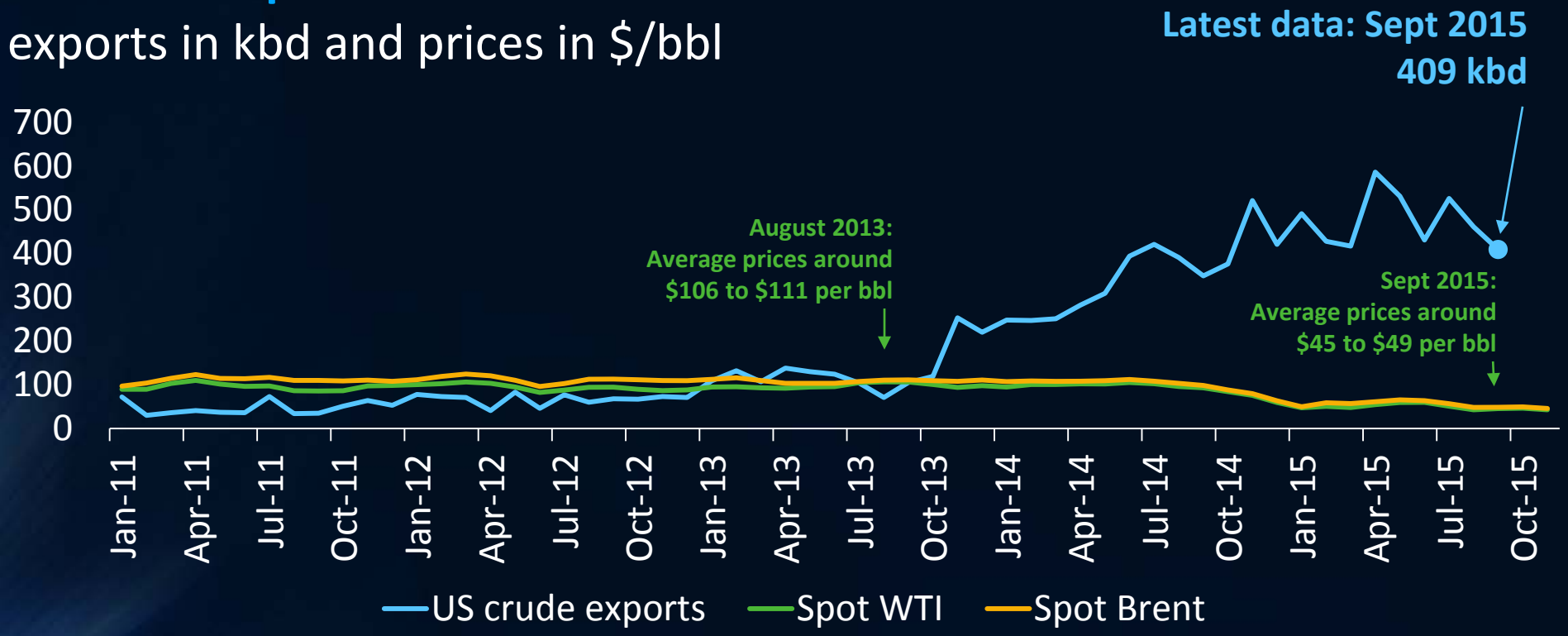
It is not hard to understand why Russian production was ultimately so badly bruised by the Saudi trade strategy. The immediate impact on oil prices in 1986 was large and jarring, especially for the Russians. In October 1985, Arab Light had averaged $27.15/b, or a little less than $59/b in 2013$. By December, that average price had slid to $22.49/b (–17%). Within weeks, it was about half of its October level and by July 1986, the average price was $10.76/b, for a decline of more than 60% in less than 9 months. A comparable price drop today would bring WTI to about $40/b by year end. Once the Saudi competitive strategy was in place, there was little the Russians could do to prevent the economic losses that followed.

Scenario analysis can **foresee** possible futures. No one can **foretell** the future.

US crude exports helped drive the price decline. Ironically, the stall is preventing price recovery.

US crude exports had decisive effect

exports in kbd and prices in $/bbl

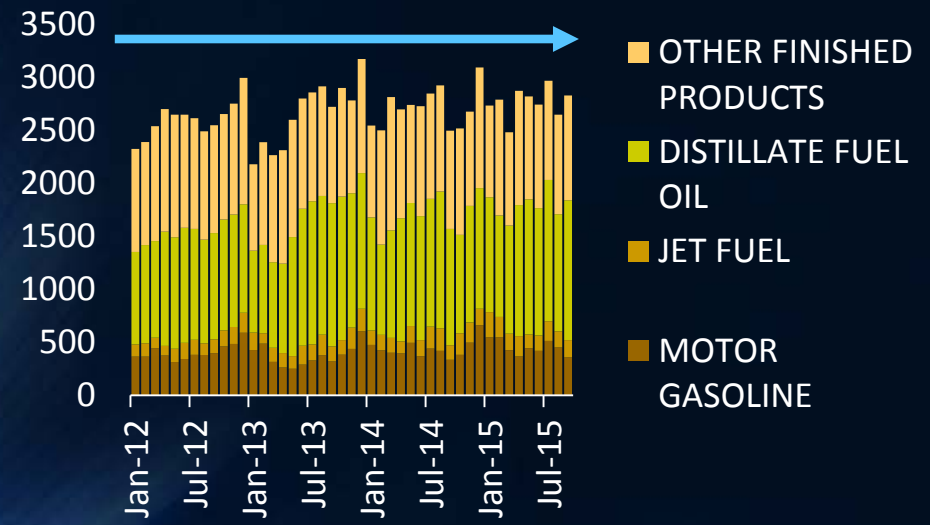


Source: EIA, Blacklight

The first adjustment from LTO boom was through max product exports, *then* upstream exports.

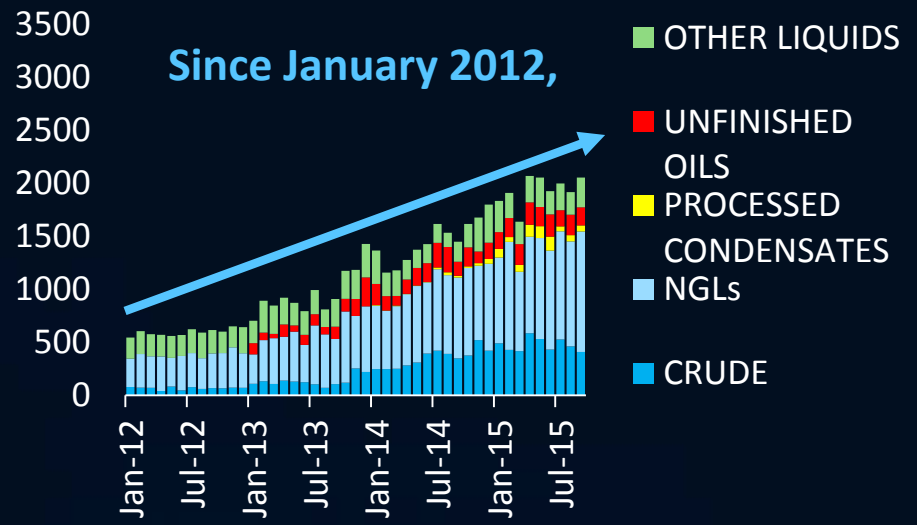
WORKING AT FULL BORE, DOWN-STREAM HAS NO MORE FLEX

US finished oil product exports
thousand b/d



THE ADJUSTMENTS TODAY ARE HAPPENING IN THE UPSTREAM

US unfinished oil exports
thousand b/d

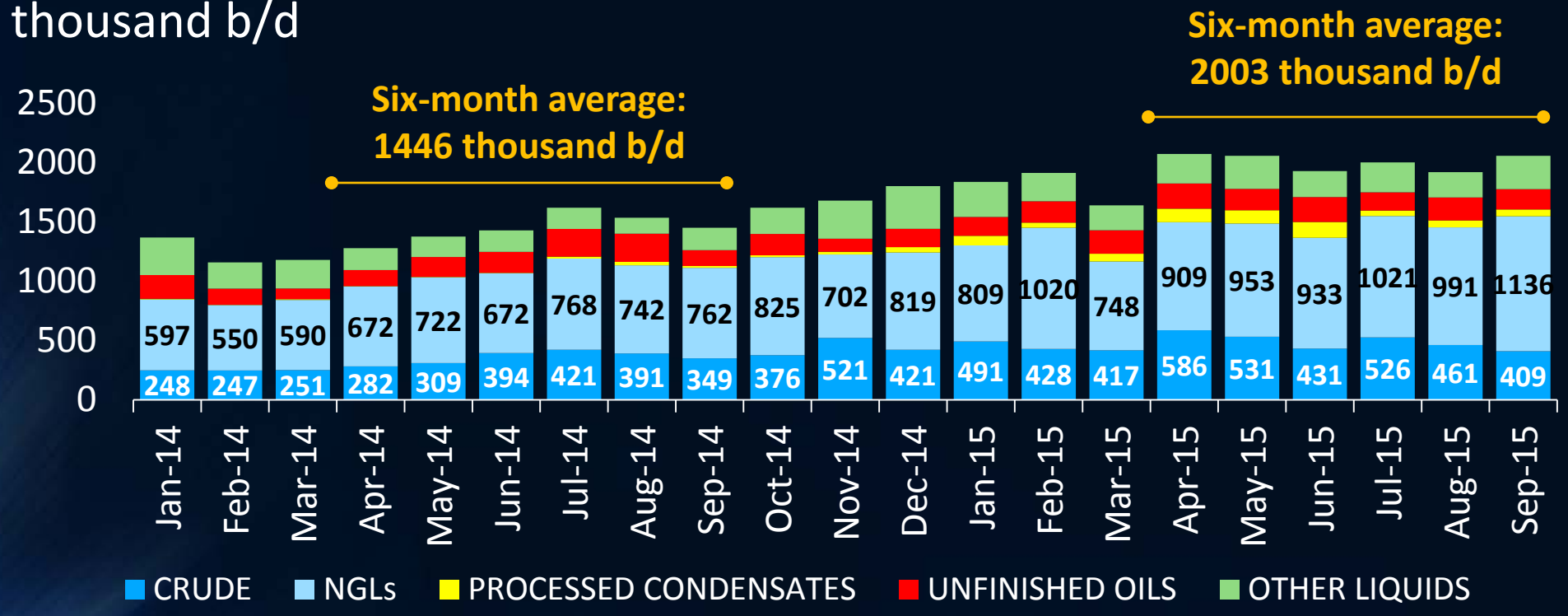


Source: EIA, Blacklight

Exports of these oils increased by 557 kbd (39%) in the most recent six months versus a year ago.

US exports from the upstream

thousand b/d

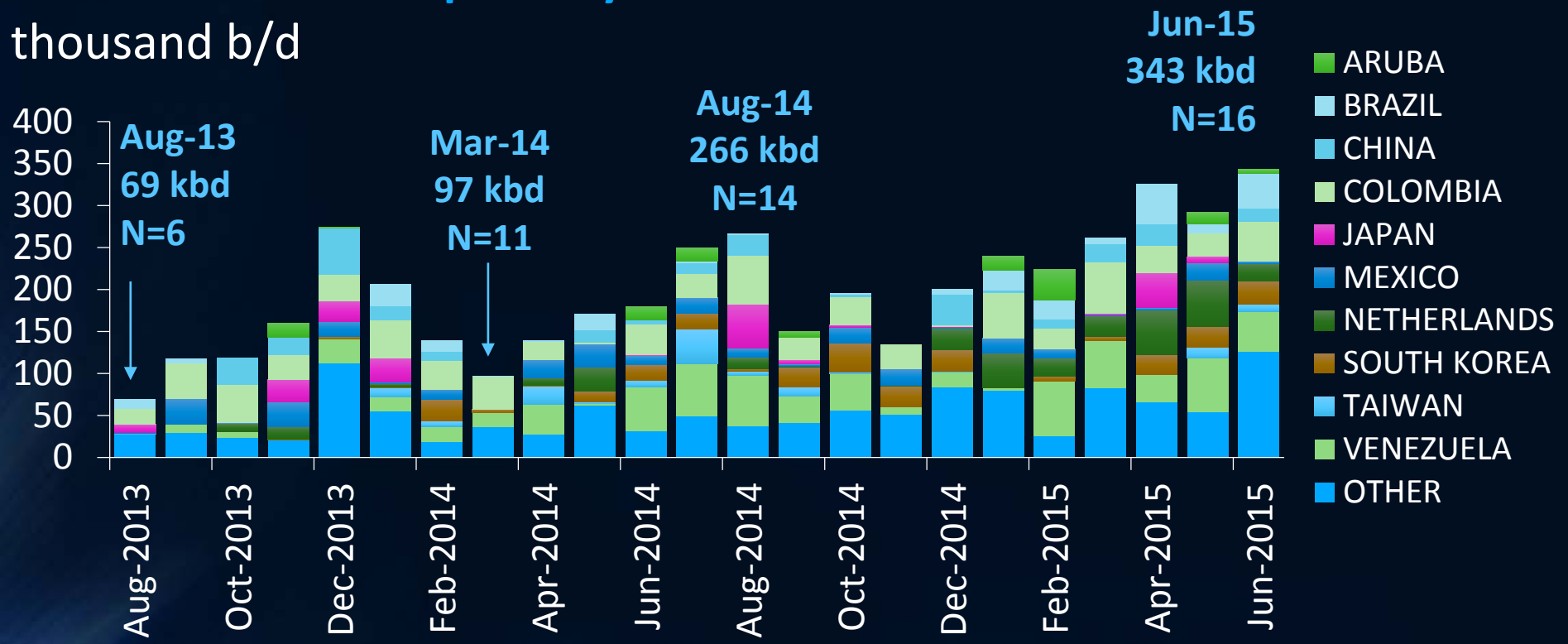


Source: EIA, Blacklight

A critical point: More barrels + more destinations = **more uncertainty**.

US unfinished oil exports by destination

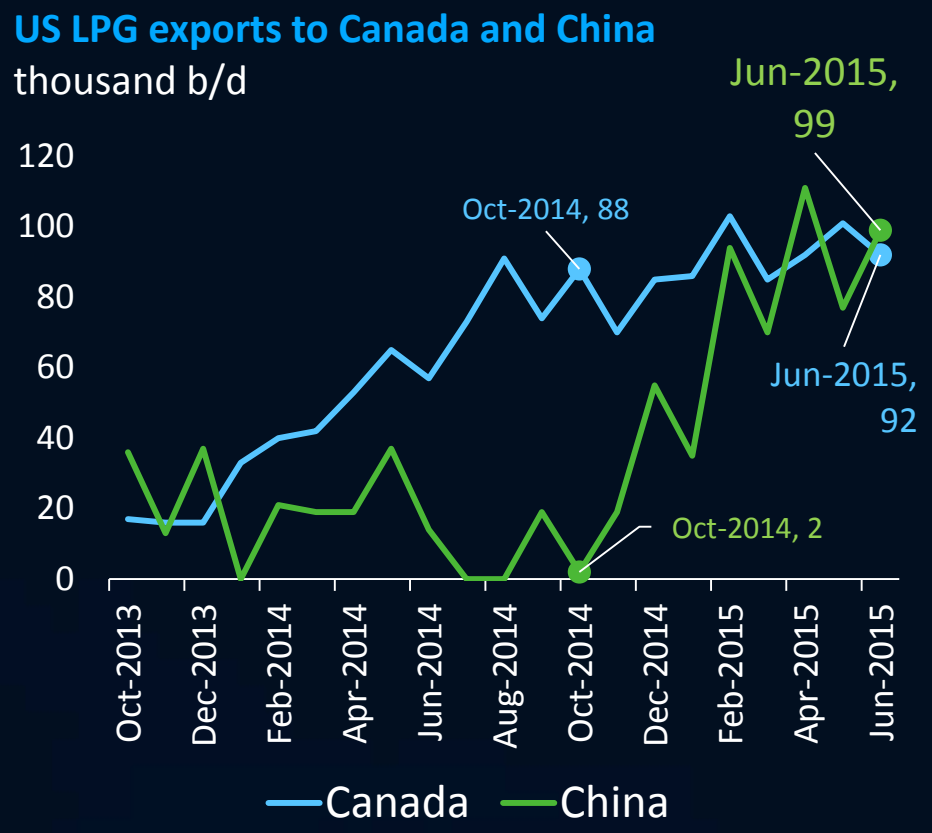
thousand b/d



Source: EIA, Blacklight

Stranded propane needed to find new homes…and so a new export market was born.

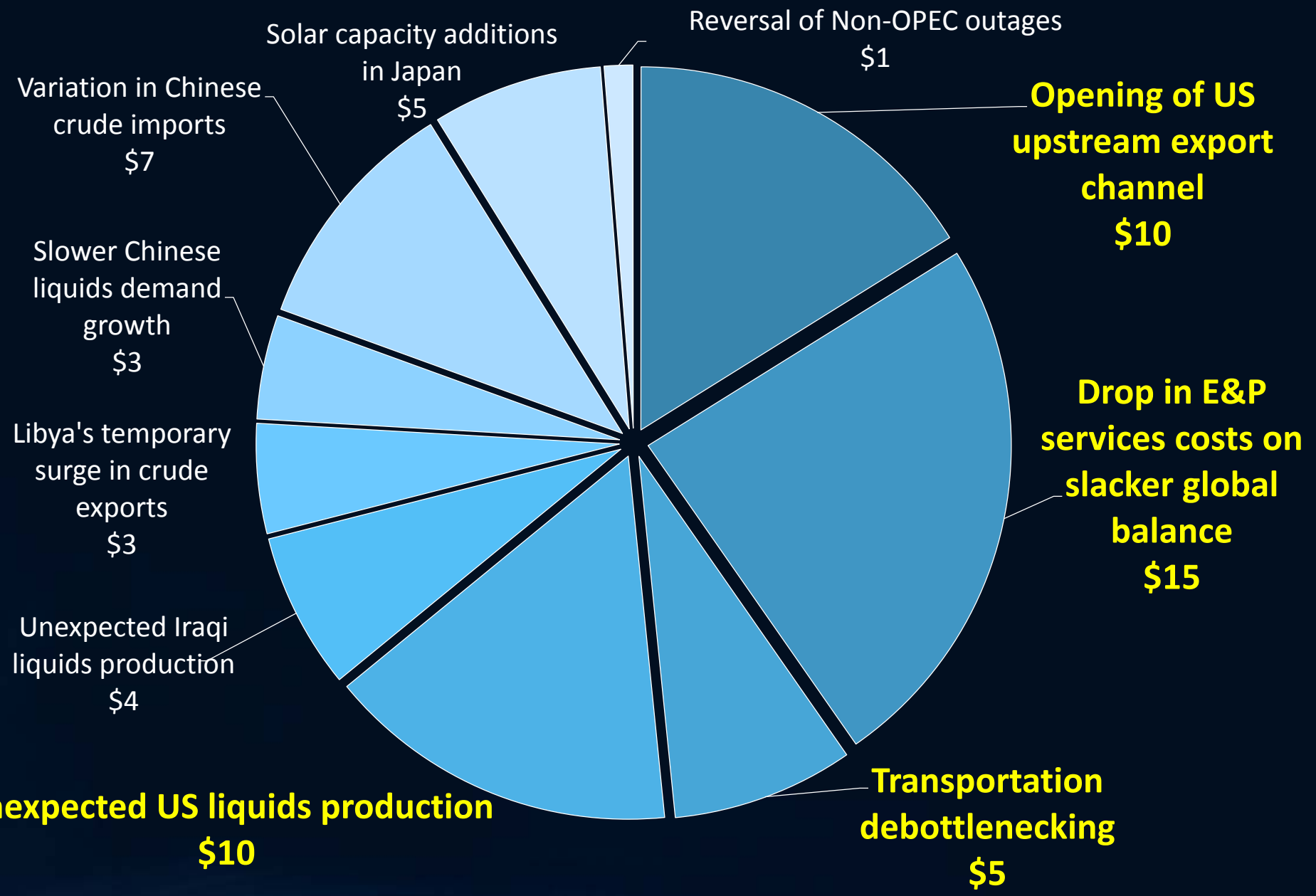
- US propane inventories now cover more than 62 days of US use on a seasonally adjusted basis.
- This market has been one of the largest sources of new export flows.



Source: EIA, Blacklight

Factor attribution in the $60/b drop in the Brent spot price:

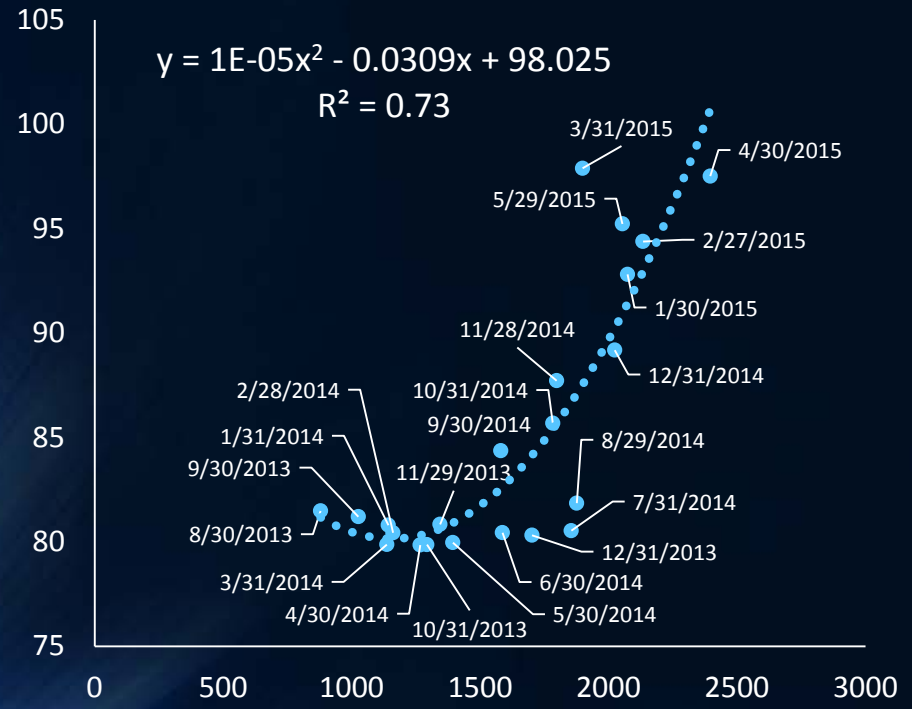
June 2014 – January 2015



Source: Blacklight

More upstream oil exports adds positively to the trade balance, GDP, and the value of the USD.

DXY vs US exports of upstream oils
(y) US$ index, (x) thousand b/d



- Each 10% increase in US upstream oil exports has recently been associated with a 5.5% increase in the value of the USD, as represented by DXY.
- Legislative removal of the US ban on crude oil exports could result in more than 1 million b/d of new export flow, across all upstream oils, within 1 year.

Source: EIA, ICE, Blacklight

Growing pains: Tesla is learning that consumer demand for valuable free things is infinite.

Elon Musk, Chairman and CEO: For the Superchargers, as we've said in the initial press release, the **Superchargers are free. It's basically free long distance for life, forever**. So, free long distance forever is what the Superchargers are providing. **There are few people who are like quite aggressively using it for local Supercharging and we also send them just a reminder note that it's cool to do this occasionally but it's meant to be a long distance thing.** But it is free long distance forever and it's basically built into the cost of the car. And based on what we're seeing in terms of the economics, it looks quite supportable. And of course, **we've gone super fast with the super chargers, so most of the Superchargers do not yet have solar and a battery backup** but over time we're going to put solar over every Supercharger where it's possible to do so or if it's not possible to do, make sure that we're purchasing power that is generated in the renewable manner so that the entire Supercharger network is powered by sunlight.

— 2015 Annual Shareholders Meeting (June 9, 2015)

Source: Transcript by Seeking Alpha

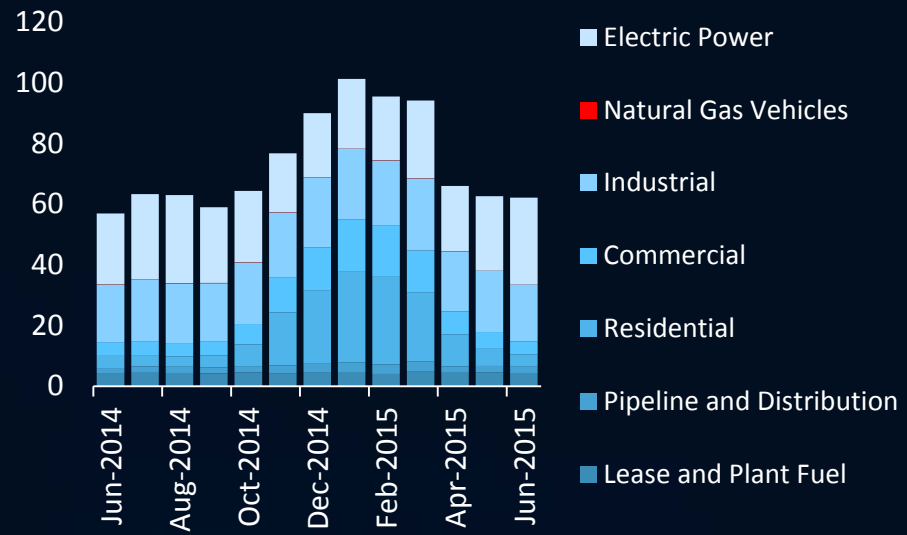
Tesla balances vision and ambition with principles, learning, and pragmatism.

STILL NUMBER ONE PRODUCT: ENGINEERING AND STYLE

Source: Tesla, Consumer Reports

PLENTY OF SPACE TO ADDRESS MODEL, ADD NGV, ADJUST

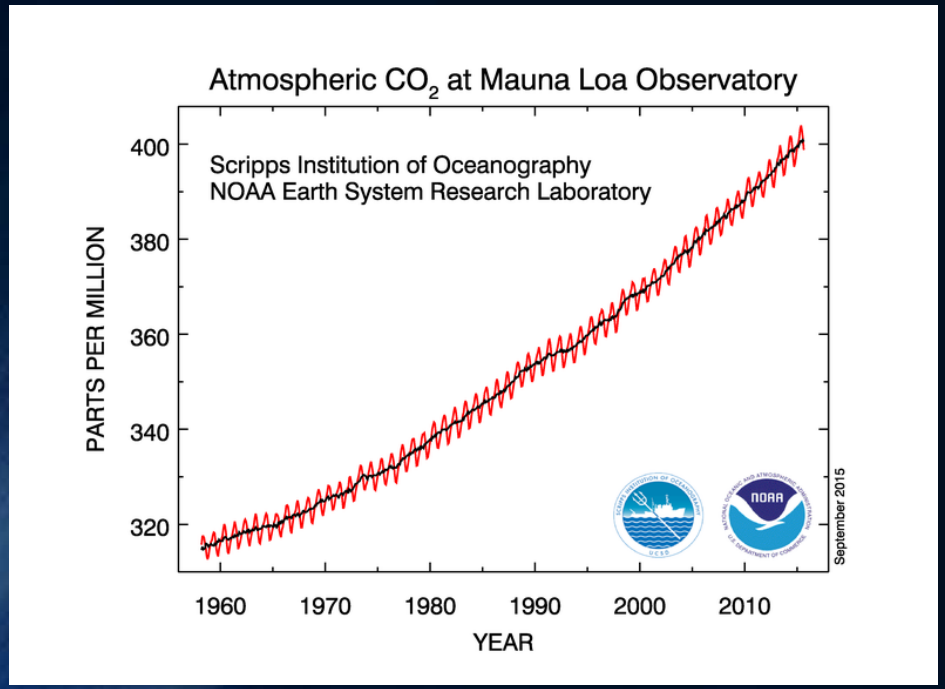
US natural gas consumption by segment
billion cubic feet per day



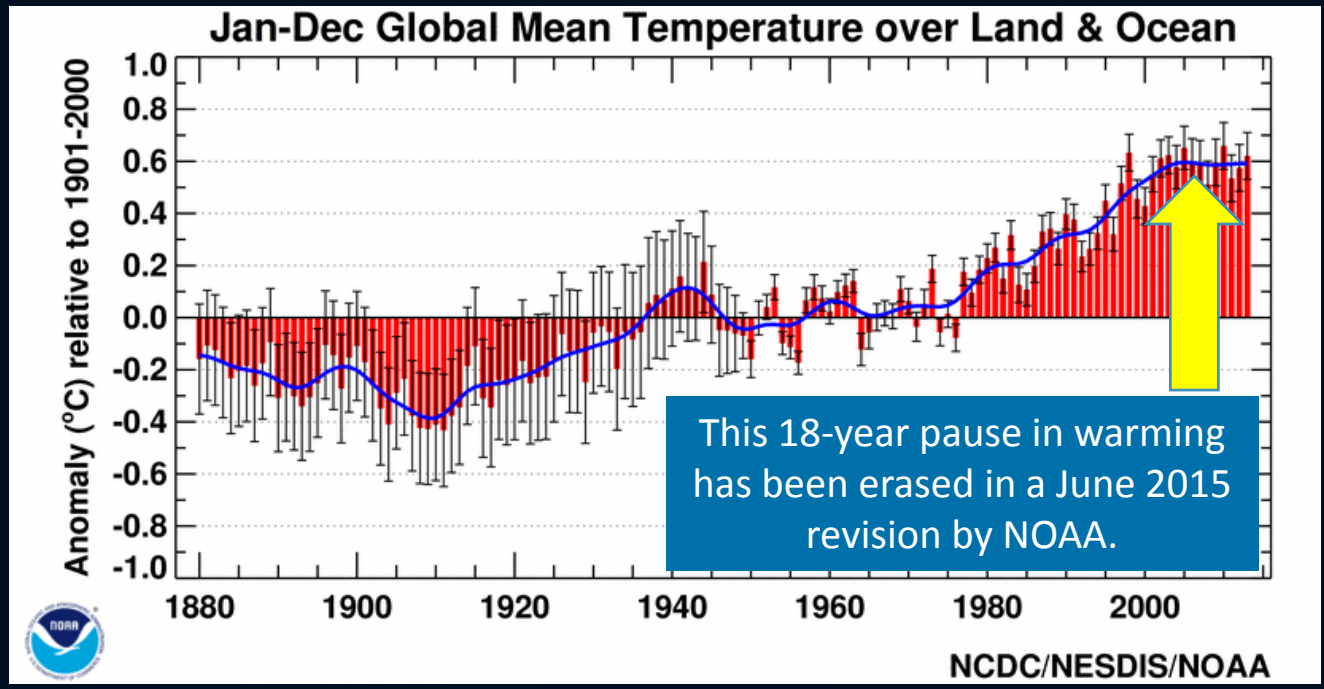
Source: EIA, Blacklight Research LLC

The climate policy framework hinges on two numbers: atmospheric CO_2 and global mean surface temperature.

ATMOSPHERIC CO_2 , MAUNA LOA 1958-CURRENT



GLOBAL MEAN TEMPERATURE 1880-2013



Source: NOAA

Swarthmore protest exemplifies a problem. How it resolved is also very instructive.

SWARTHMORE COLLEGE STUDENTS SEIZE PRESIDENT'S OFFICE, DEMAND DIVESTMENT.

Source: *The Guardian* (March 24, 2015)

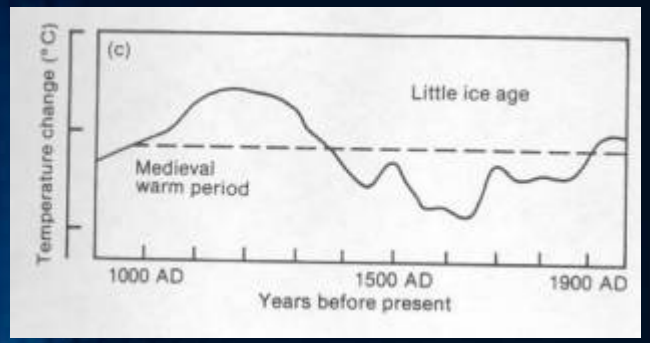
DIVESTMENT CALL SPAWNS GLOBAL DECARBONIZATION MOVEMENT

Source: *The Guardian* (March 19, 2015)

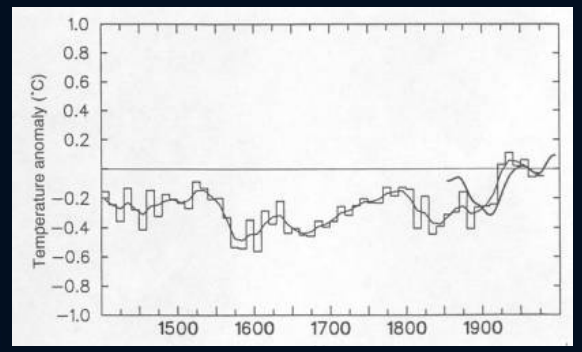
$3.4Bn endowment (2015) of which $139MM in fossil fuel holdings (4.1%)

The evolution of the ‘hockey stick’ chart

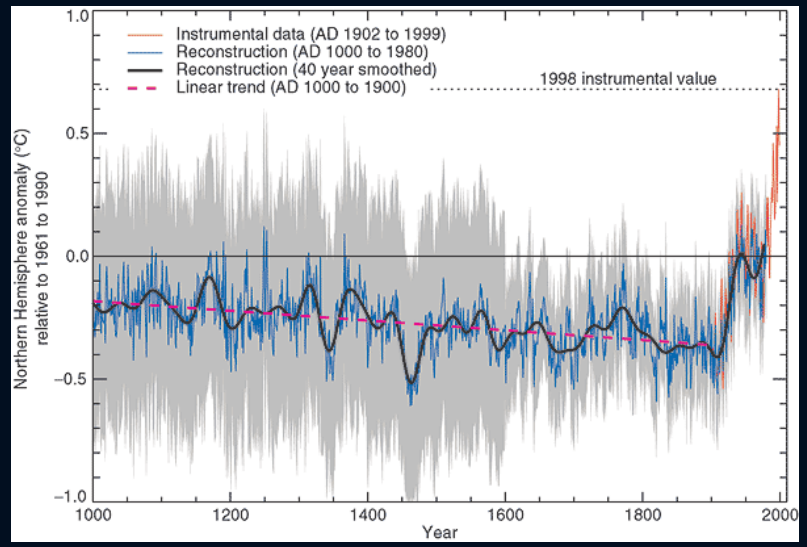
1ST Assessment Report, 1990
Page 202 of the IPCC FAR-1



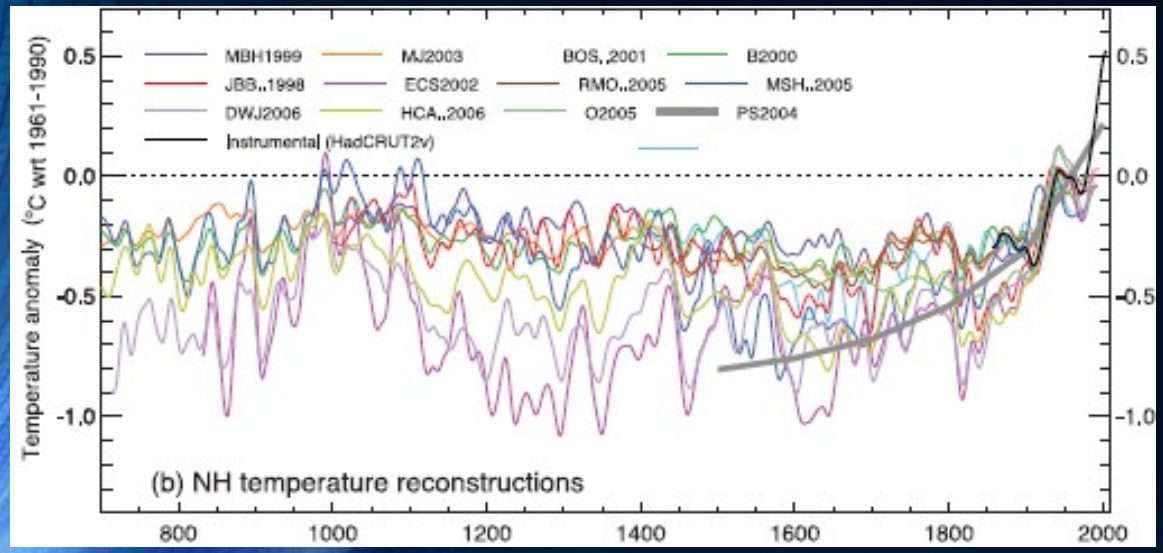
2ND Assessment Report, 1995
Page 174 (note shift in start year excludes Medieval Warm Period)



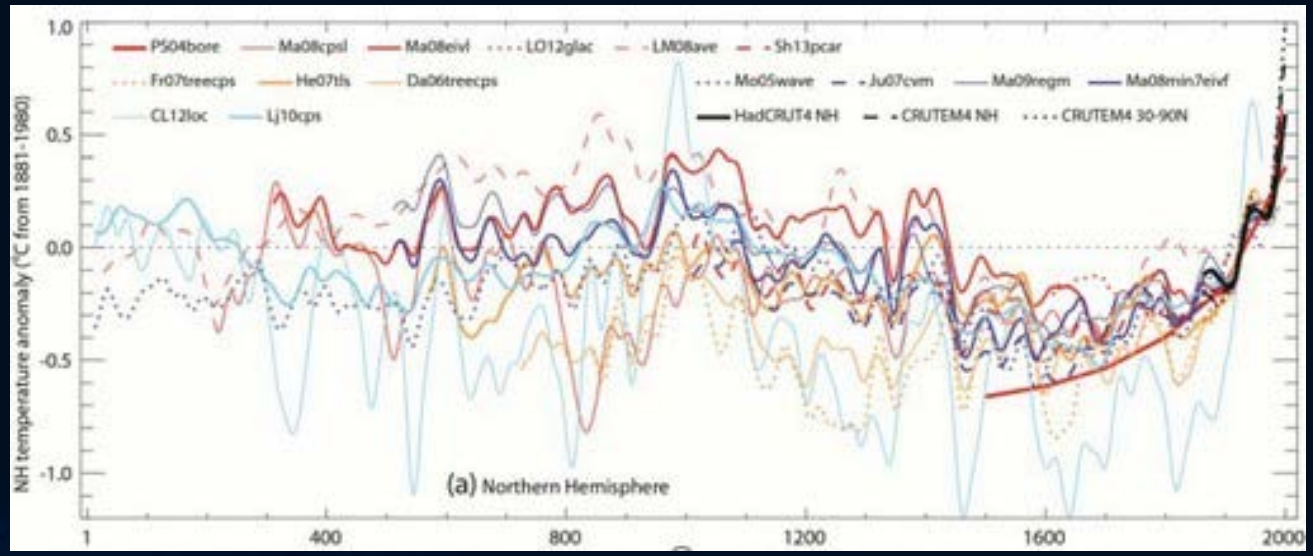
3RD Assessment Report, 2001
Figure 2.20. Two standard error limits (grey shaded)



4TH Assessment Report, 2007
Page 467

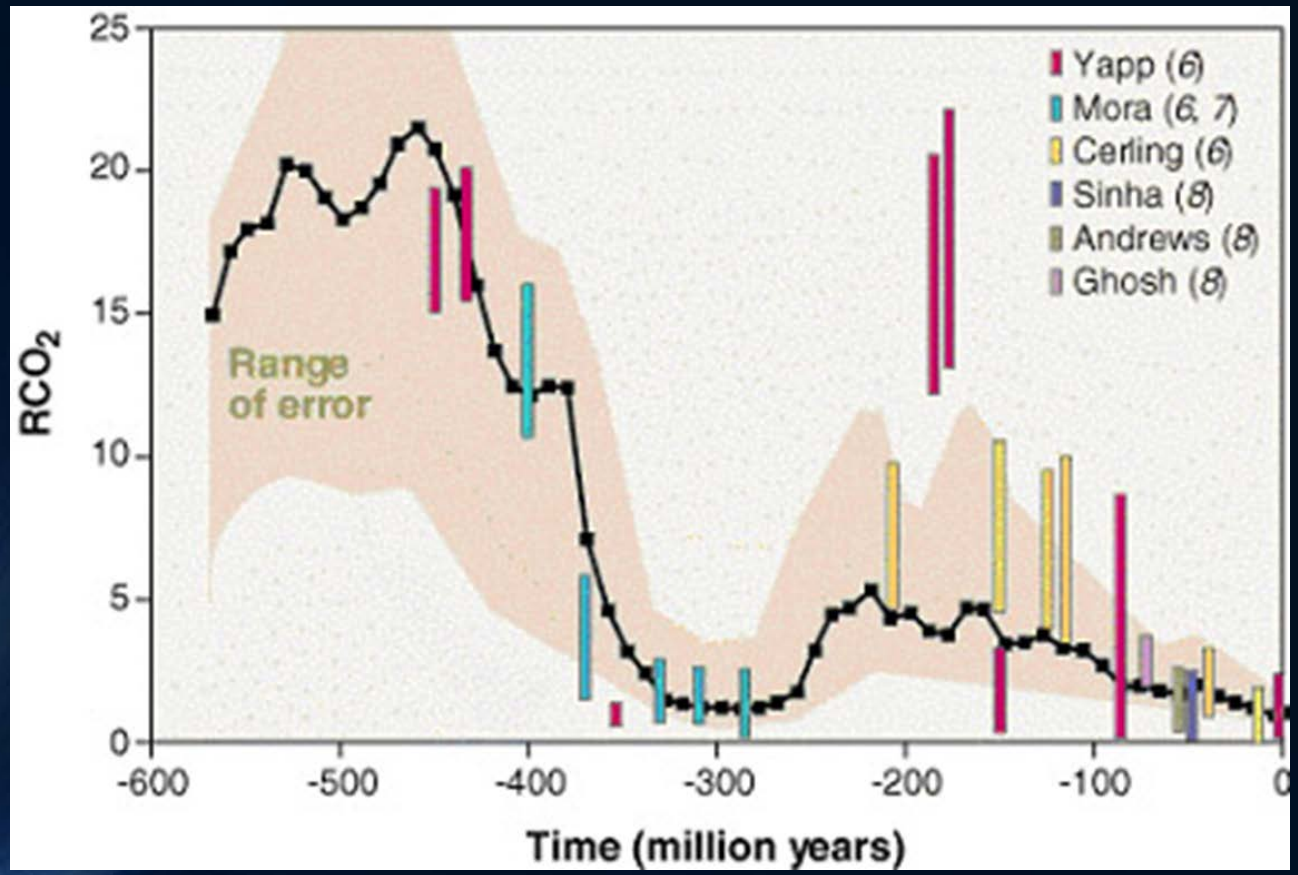


5TH Assessment Report, 2013
Figure 5.7 in IPCC FAR-5 (Note that MBH1999 has been dropped from the sample.)



Source: Michael Kruger. Translated, condensed, edited by Pierre Gosselin (October 17, 2013).

Atmospheric CO_2 records have been reconstructed into the ancient past.



History of Atmospheric CO_2 through geological time (past 550 million years: from Berner, *Science*, 1997).

"The parameter RCO2 is defined as the ratio of the mass of CO2 in the atmosphere at some time in the past to that at present (with a pre-industrial value of 300 parts per million). The heavier line joining small squares represents the best estimate of past atmospheric CO2 levels based on geochemical modeling and updated to have the effect of land plants on weathering introduced 380 to 350 million years ago. The shaded area encloses the approximate range of error of the modeling based on sensitivity analysis. Vertical bars represent independent estimates of CO2 level based on the study of ancient soils."—UCSD

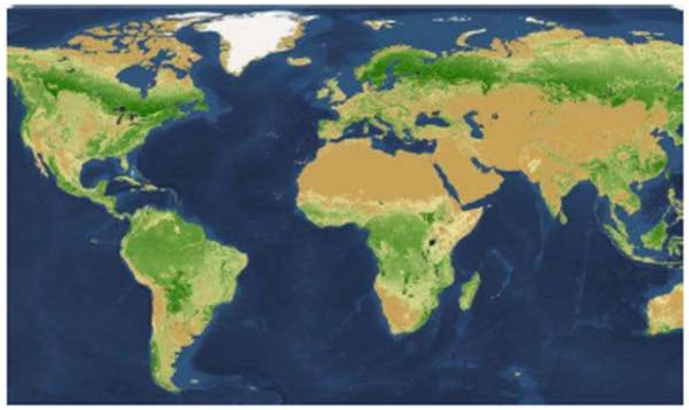
Source: UC San Diego, downloaded October 1, 2015 by Blacklight Research, LLC

In between Elmau and Paris, Science discovered 2.6 trillion trees. Forest contribution to CO_2 is larger than previously thought.

PHYS.ORG

Three trillion trees: Study finds there are 7.5 times more trees than previously believed

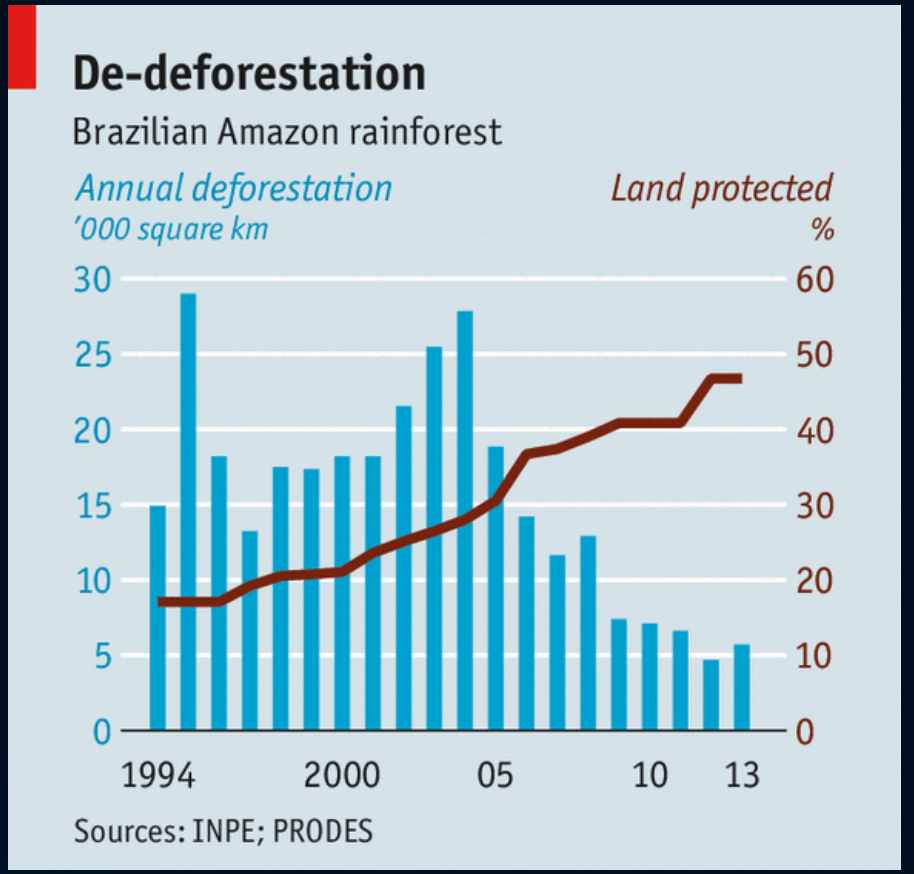
2 September 2015



The global map of tree density at the square-kilometer pixel scale. Credit: Crowther, et al

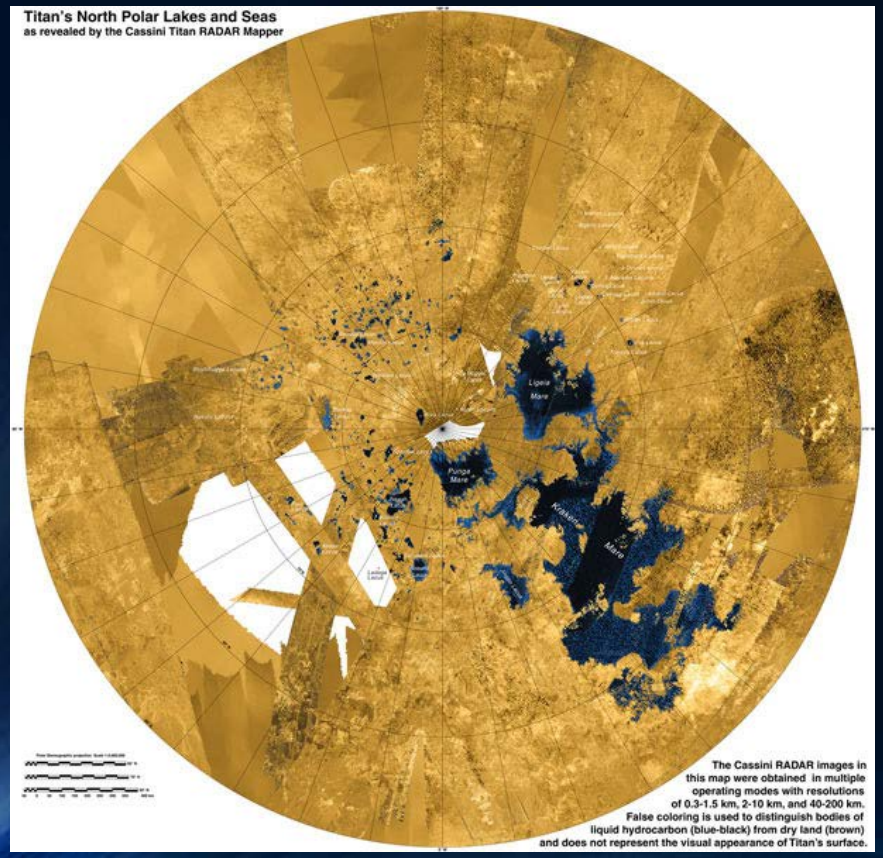
organisms on Earth, yet we are only recently beginning to comprehend their global extent and distribution," said Thomas Crowther, a postdoctoral fellow at the Yale School of Forestry & Environmental Studies (F&ES) and lead author of the study.

"They store huge amounts of carbon, are essential for the cycling of nutrients, for water and air quality, and for countless human services," he added. "Yet you ask people to estimate, within an order of magnitude, how many trees there are and they don't know where to begin. I don't know what I would have guessed, but I was certainly surprised to find that we were talking about trillions."



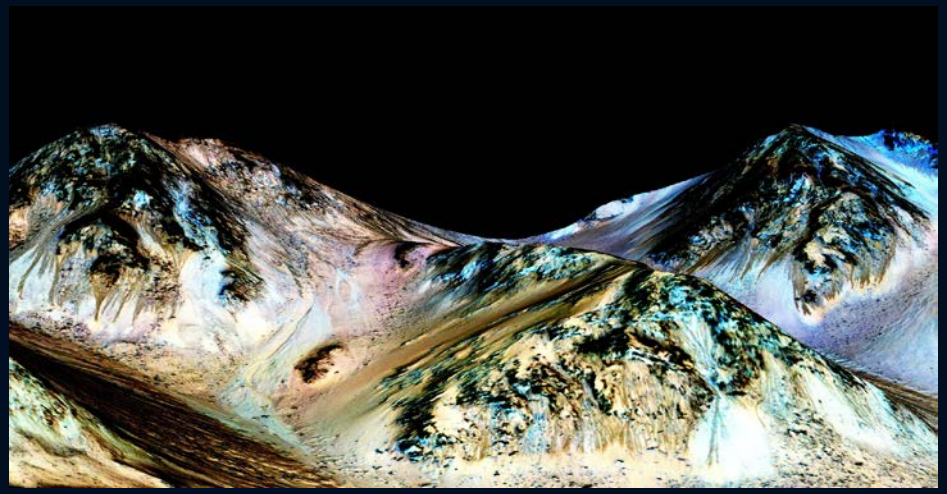
‘Fossil fuels’? Abiogenic hydrocarbons and H_2O are plentiful in our solar system.

TITAN (2005): LIQUID METHANE



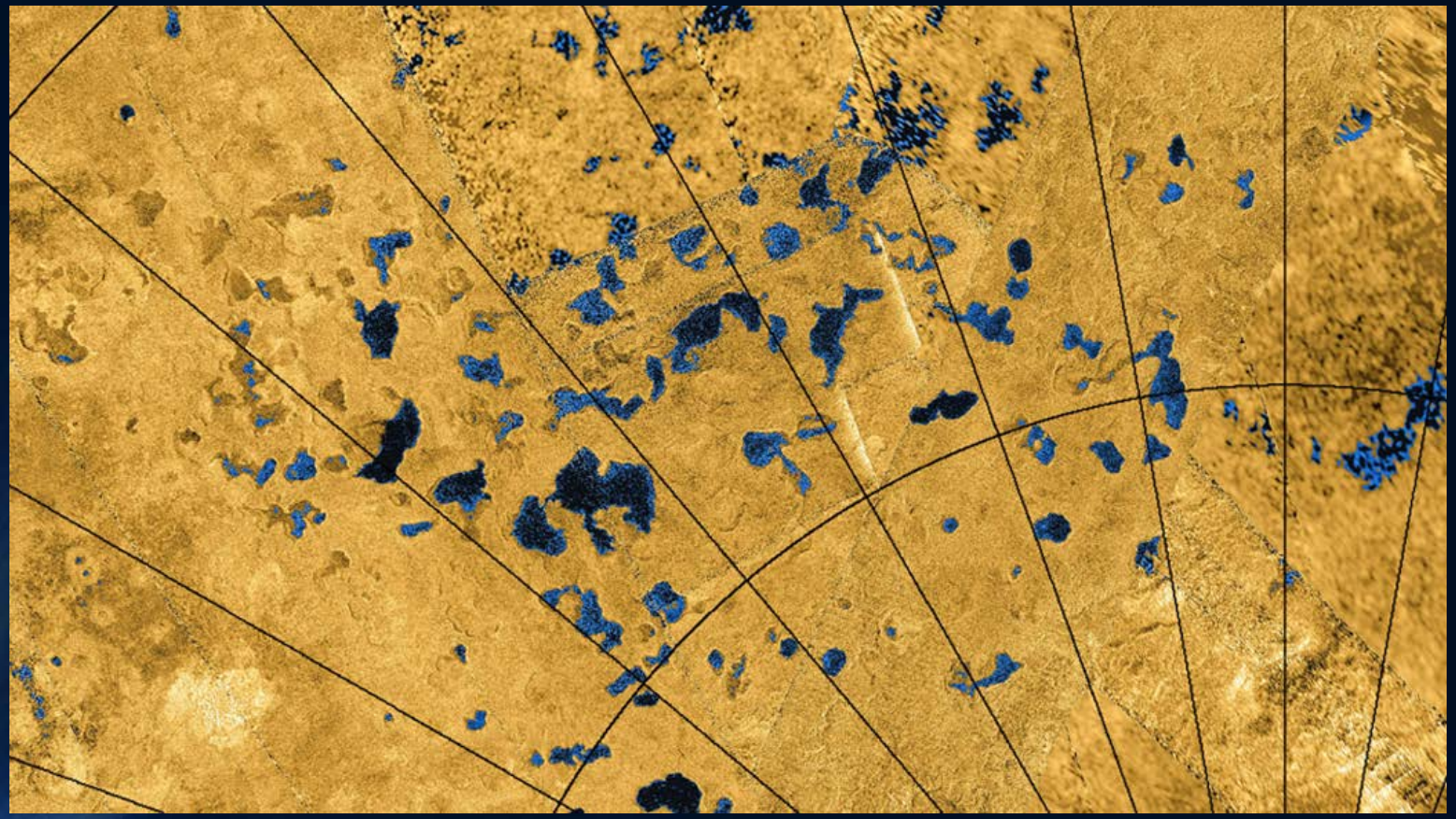
Source: NASA/JPL-Caltech/ASI/USGS

MARS (2015): LIQUID WATER



Source: Mars Reconnaissance orbiter/University of Arizona/JPL/NAS

NASA reports that lakes filled with LNG dot the surface of Titan around its north pole.



Source: NASA/JPL-Caltech/ASI/USGS

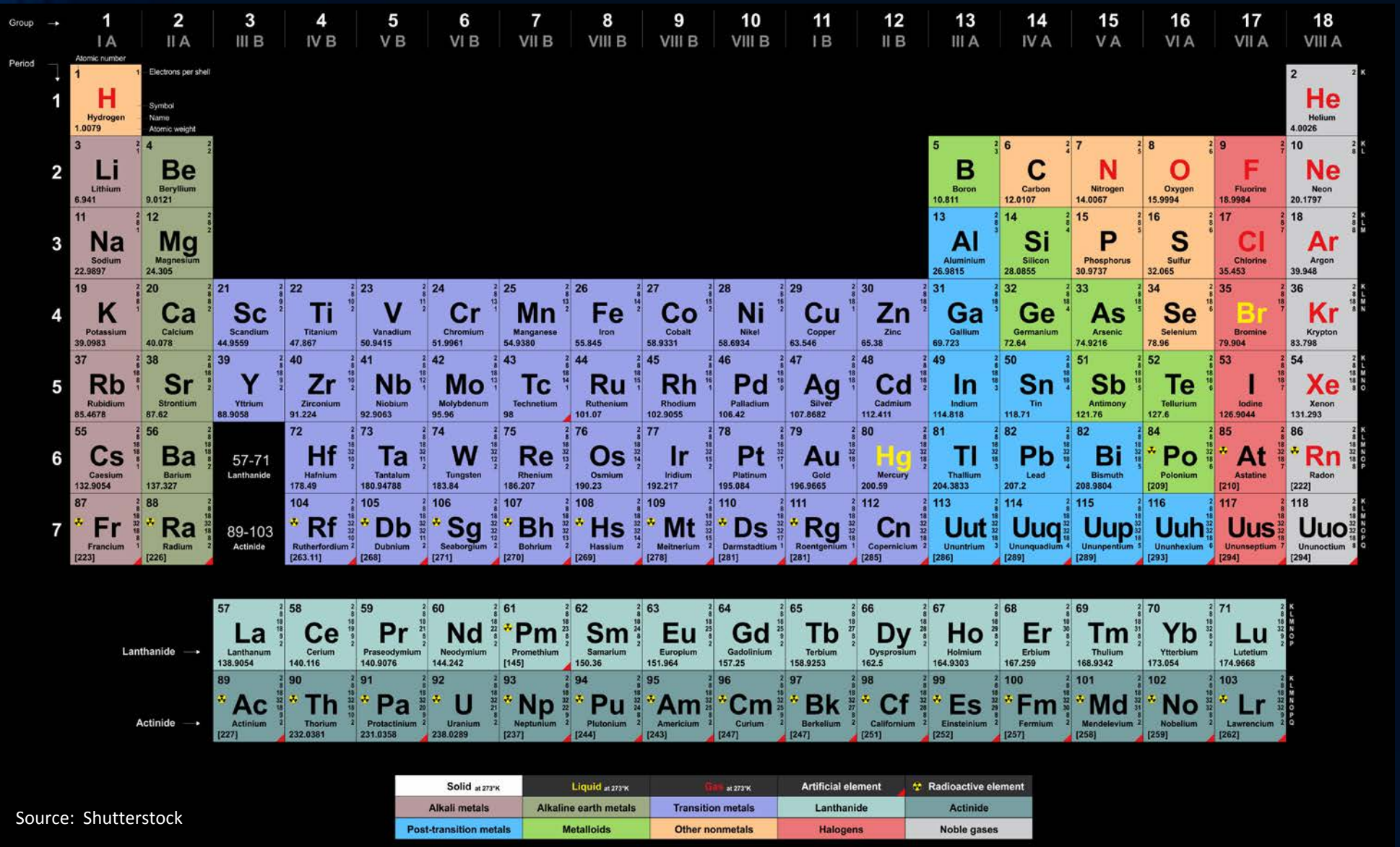
"Apart from Earth, Titan is the only body in the solar system known to possess surface lakes and seas, which have been observed by the Cassini spacecraft. **But at Titan's frigid surface temperatures -- roughly minus 292 degrees Fahrenheit (minus 180 degrees Celsius) -- liquid methane and ethane, rather than water, dominate Titan's hydrocarbon equivalent of Earth's water.**

Cassini has identified two forms of methane- and ethane-filled depressions that create distinctive features near Titan's poles. **There are vast seas several hundred miles (or kilometers) across and up to several hundred feet (or meters) deep, fed by branching, river-like channels. There also are numerous smaller, shallower lakes, with rounded edges and steep walls that are generally found in flat areas.** Cassini also has observed many empty depressions.

The lakes are generally not associated with rivers, and are thought to fill up by rainfall and **liquids feeding them from underground**. Some of the lakes fill and dry out again during the 30-year seasonal cycle on Saturn and Titan. But exactly how the depressions hosting the lakes came about in the first place is poorly understood." – JPL/Caltech website as of October 5, 2015. Downloaded by BLR.

Only in 1869 did humanity start piecing together this chemistry.

Our understanding is primitive. Be prepared for New Chemistry.



Source: Shutterstock

Composition of the Universe's Energy
(2015 Earth Knowledge)

Dark energy = 72%
Dark matter = 23%

Baryonic matter = 4.6%
(i.e., the ordinary matter of protons, neutrons, and electrons that make stars, planets, and living beings)

Composition of baryonic matter:

Hydrogen = 74%
Helium = 24%
All other elements = 2%

Oxygen is 3rd in abundance rank but 8th on the table.

NYM WTI Crude Oil ($ per bbl)

		Price	*p10*	*p25*	*p75*	*p90*
1Q2015	Actual	48.57				
2Q2015	Actual	57.95				
3Q2015	Actual	46.50				
4Q2015	*Forecast*	**37.45**	**32.49**	**34.90**	**40.91**	**43.96**
1Q2016	*Forecast*	**40.91**	**29.48**	**33.90**	**46.29**	**53.30**
2Q2016	*Forecast*	**43.48**	**27.35**	**33.11**	**50.64**	**61.32**
3Q2016	*Forecast*	**45.50**	**26.31**	**32.73**	**53.19**	**66.18**
4Q2016	*Forecast*	**47.68**	**26.03**	**32.89**	**55.27**	**69.80**
2014	Actual	92.91				
2015	*Estimated*	**46.48**	**32.49**	**34.90**	**40.91**	**43.96**
2016	*Forecast*	**44.39**	**27.29**	**33.16**	**51.35**	**62.65**
2017	*Forecast*	**52.56**	**26.06**	**33.57**	**58.96**	**75.98**

Forecasts as of: Thursday, December 10, 2015

NYM Natural Gas ($ per MMBtu)

		Price	*p10*	*p25*	*p75*	*p90*
1Q2015	Actual	2.81				
2Q2015	Actual	2.74				
3Q2015	Actual	2.73				
4Q2015	*Forecast*	**2.07**	**1.71**	**1.87**	**2.29**	**2.50**
1Q2016	*Forecast*	**2.34**	**1.57**	**1.81**	**2.51**	**2.91**
2Q2016	*Forecast*	**2.22**	**1.59**	**1.88**	**2.73**	**3.23**
3Q2016	*Forecast*	**2.43**	**1.56**	**1.89**	**2.87**	**3.46**
4Q2016	*Forecast*	**2.80**	**1.61**	**1.99**	**3.19**	**3.95**
2014	Actual	4.26				
2015	*Estimated*	**2.59**				
2016	*Forecast*	**2.45**	**1.58**	**1.89**	**2.82**	**3.39**
2017	*Forecast*	**3.18**	**1.65**	**2.05**	**3.30**	**4.09**

Forecasts as of: Thursday, December 10, 2015

Disclosures

Last Updated: June 2, 2015

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