

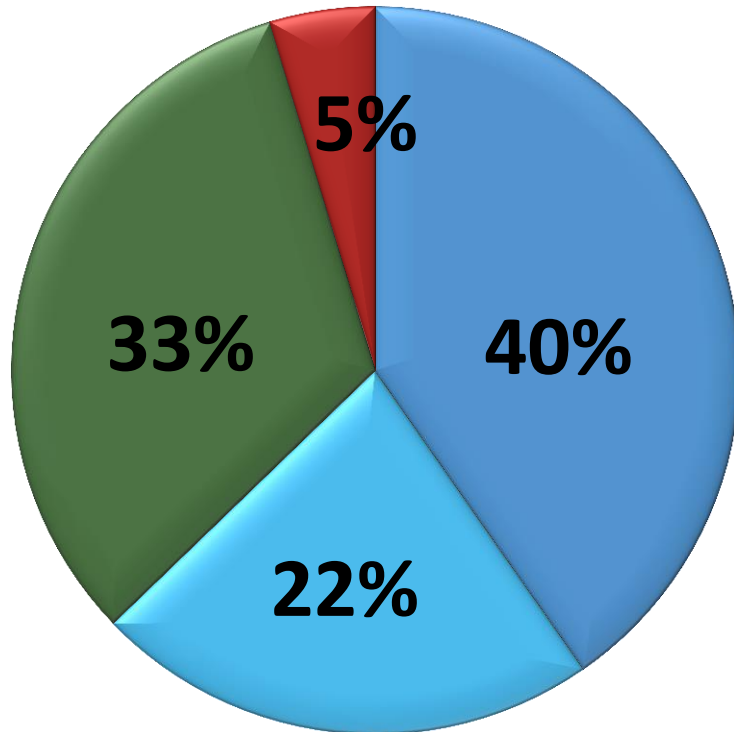
Desarrollo del Shale Gas en USA y sus incidencias en el mercado mundial del Gas Natural

Javier Díaz, Senior Energy Analyst, LNG

20 de Agosto de 2014, CONGRESO INTERNACIONAL CAMISEA 10 AÑOS, Lima, Perú

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Who is Bentek Energy?



- Majors, Producers, Mktrs, Industrials
- Pipelines, Utilities, Midstream
- Financial and Hedge
- Government, Associations, Consultants

Who We Are

- Premier Energy Data and Analytics
- 120 employees
- 400+ Clients
- Based in Denver, Colorado
- Division of Platts (McGraw-Hill Fin'l)

What We Do

- Reports and Consulting Services
- Collect, Analyze, Interpret and Distribute Data, Information and Knowledge to the Energy Industry

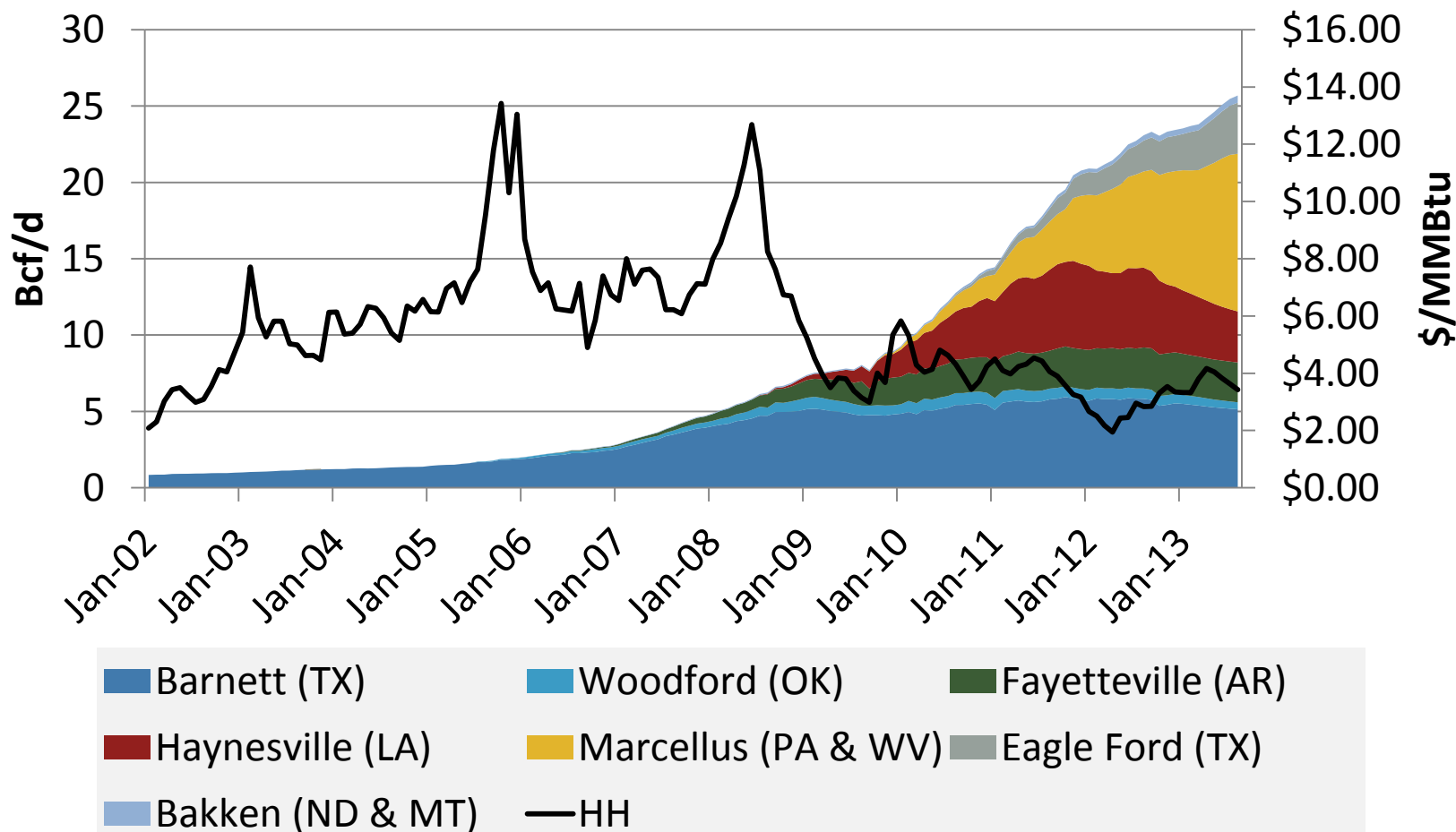
- North American shale gas: how much will be exported?
- Global Demand Outlook: Global demand for North American Shale gas
- Effect of LNG exports on Henry Hub
- Are NA LNG exports competitive?
- Pricing outlook - Oil linkage vs. Henry Hub pricing
- Shipping: Required Shipping Capacity for NA LNG Exports

Shale Gas Exports: Why, when and how much?



Shale Gas Development Has Outpaced Demand Growth and Caused Drop in Prices

Shale Gas Production by Play/Region vs. Henry Hub



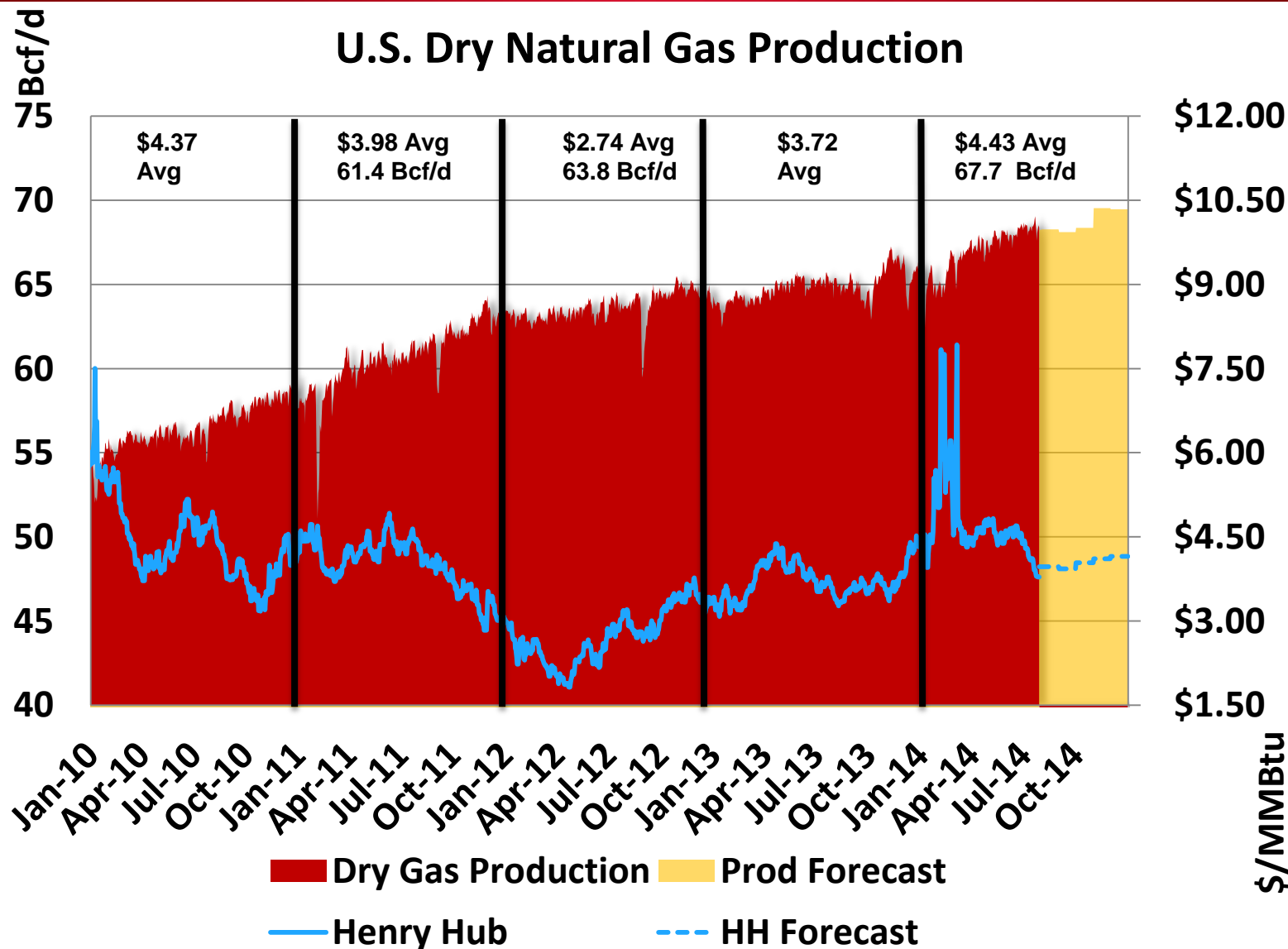
Source: Bentek

Dry Gas Growth Up 1.1 Bcf/d in 2013,
Expected to Climb 2.6 Bcf/d in 2014



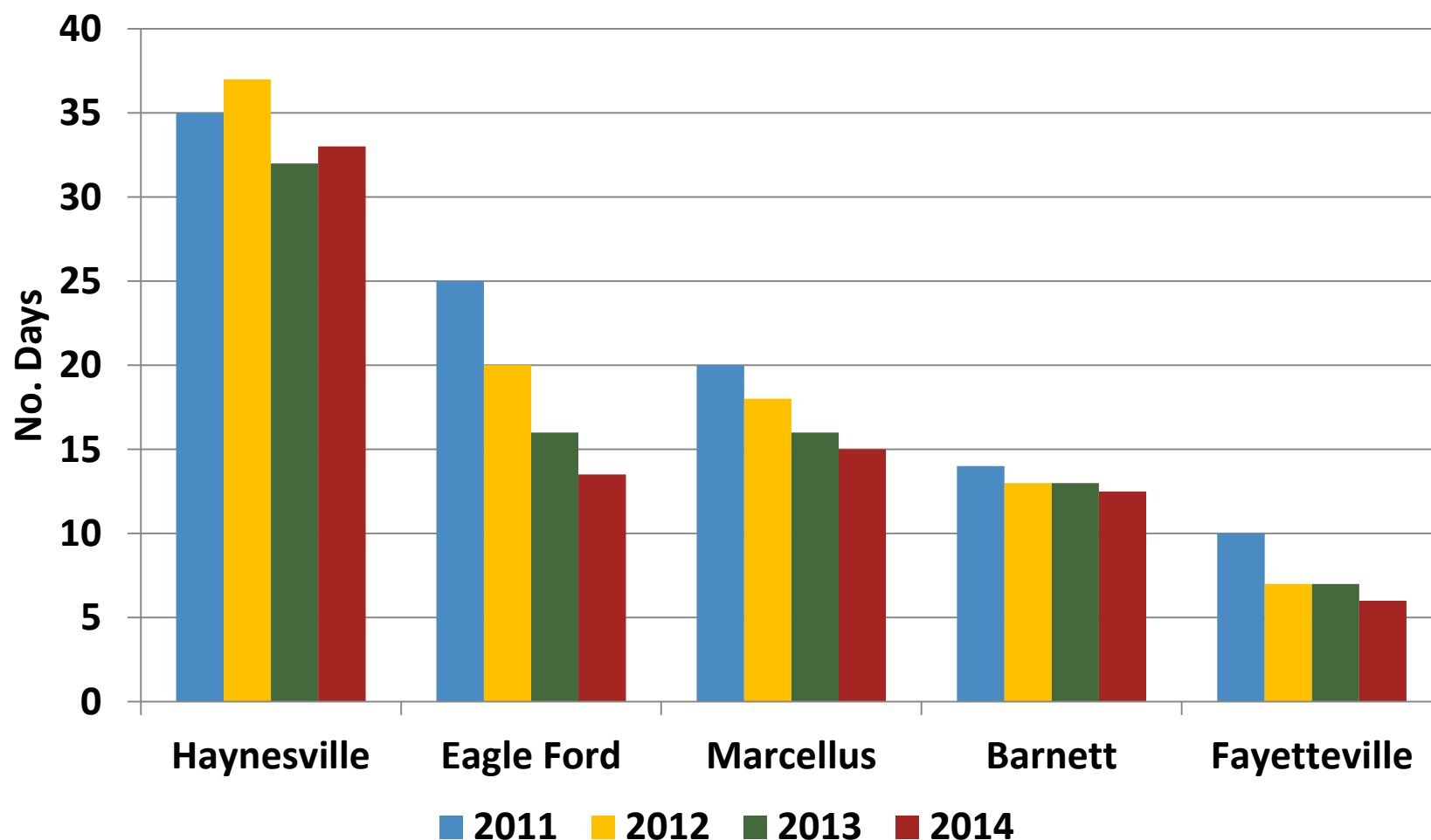
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Source: BENTEK Supply and Demand Report

Days Required to Drill One Well

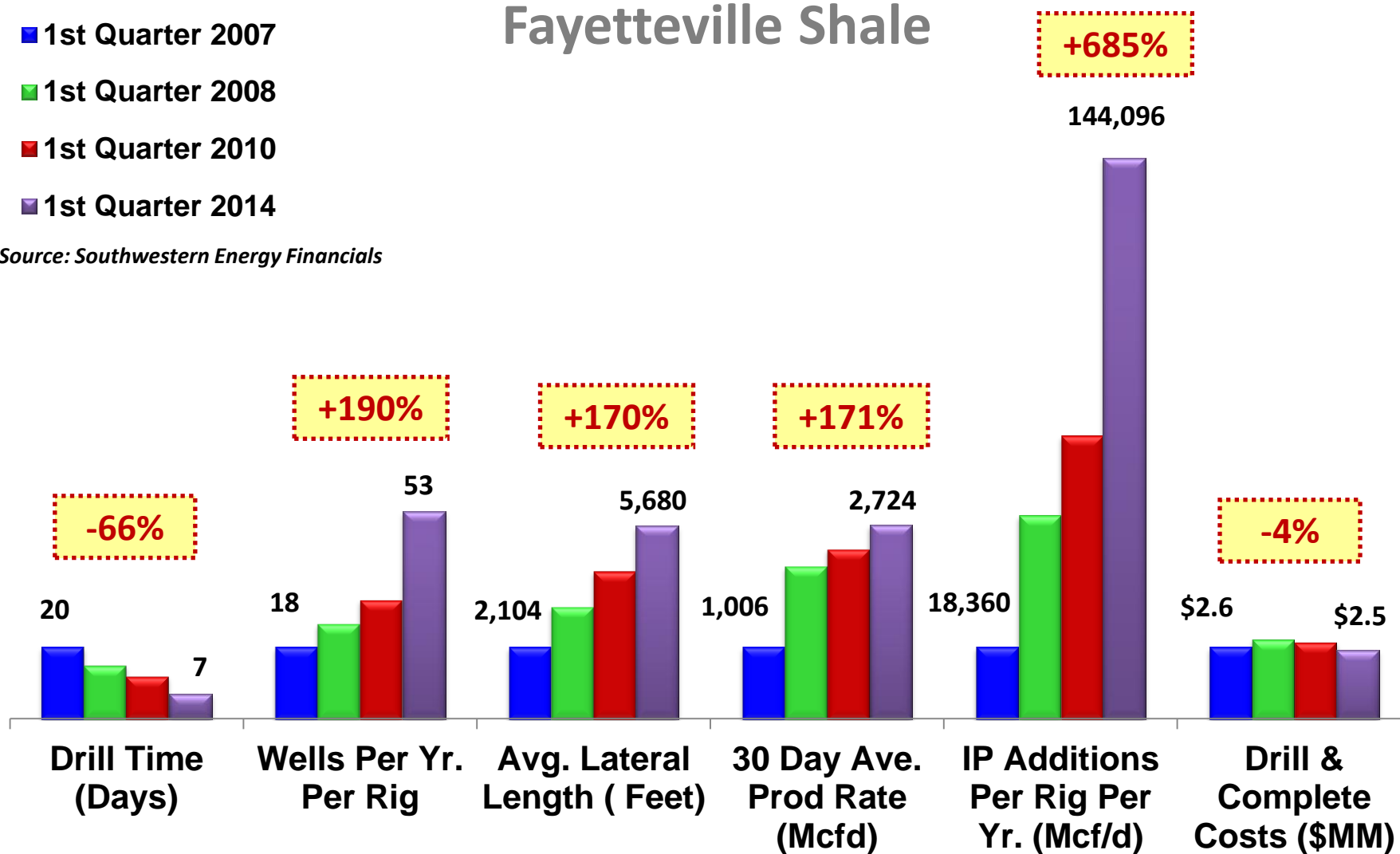


Southwestern Energy's Rig Productivity Gains

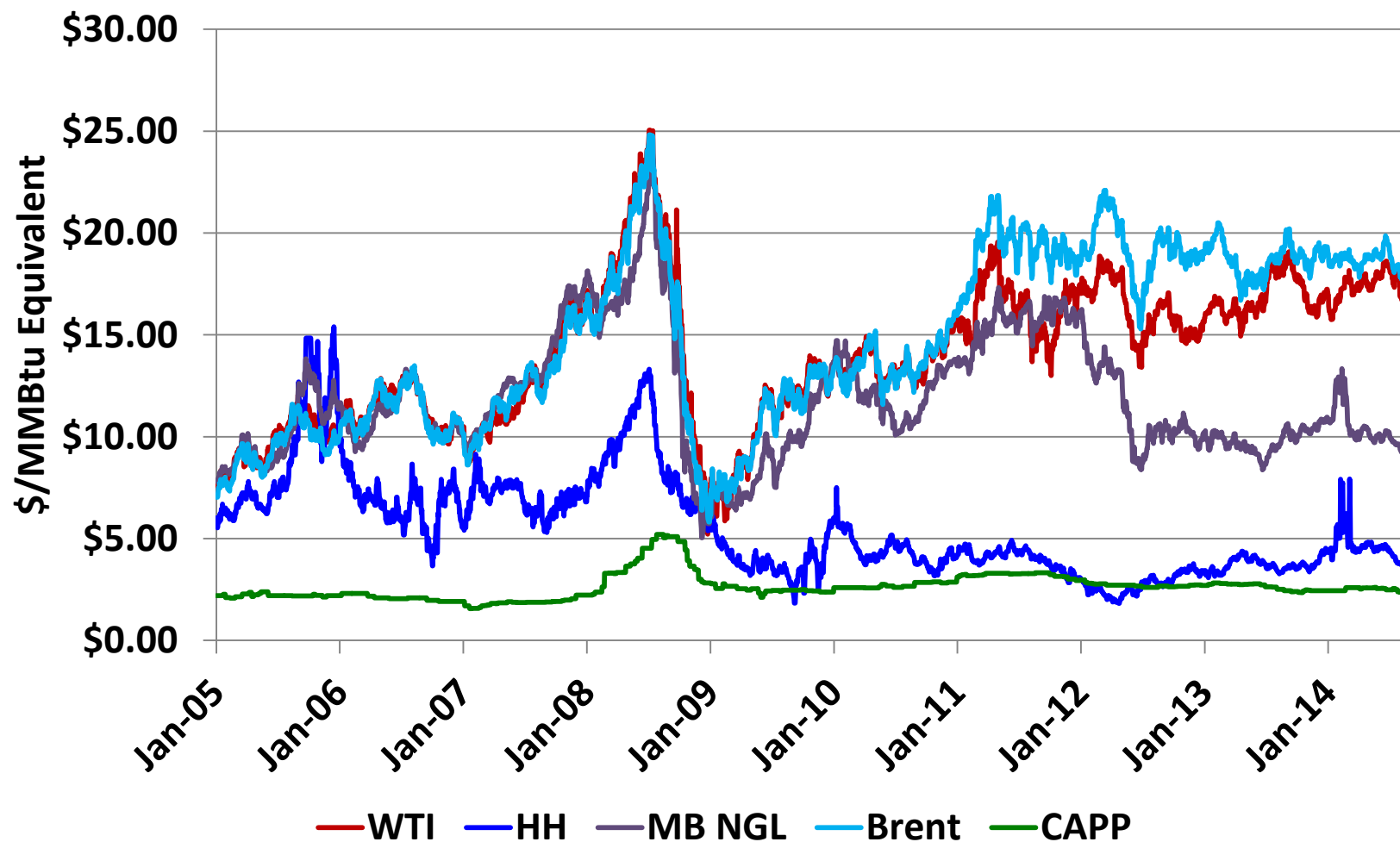
Fayetteville Shale

- 1st Quarter 2007
- 1st Quarter 2008
- 1st Quarter 2010
- 1st Quarter 2014

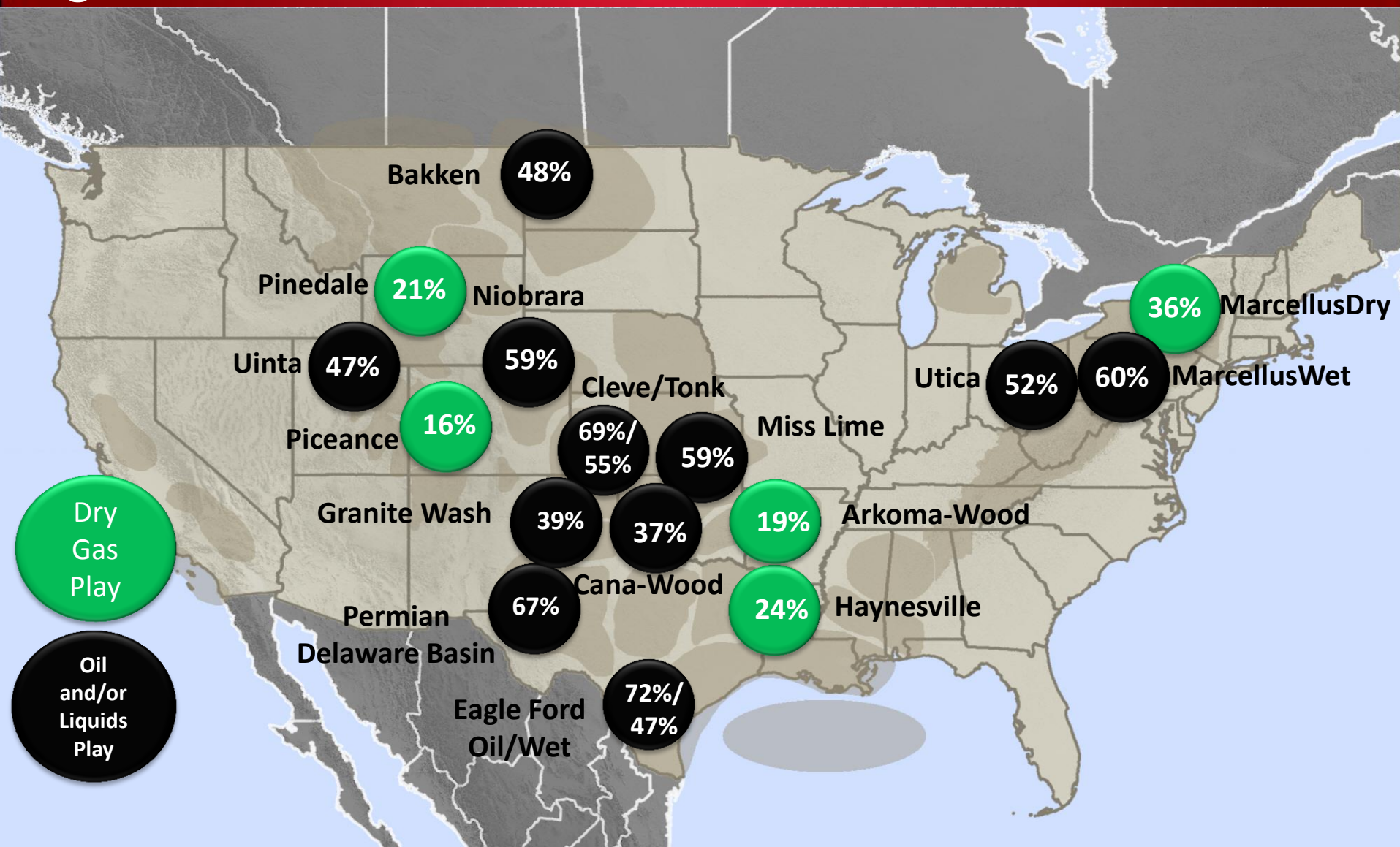
Source: Southwestern Energy Financials



Gas, Oil and NGL Price Comparison: MMBTU Equivalent

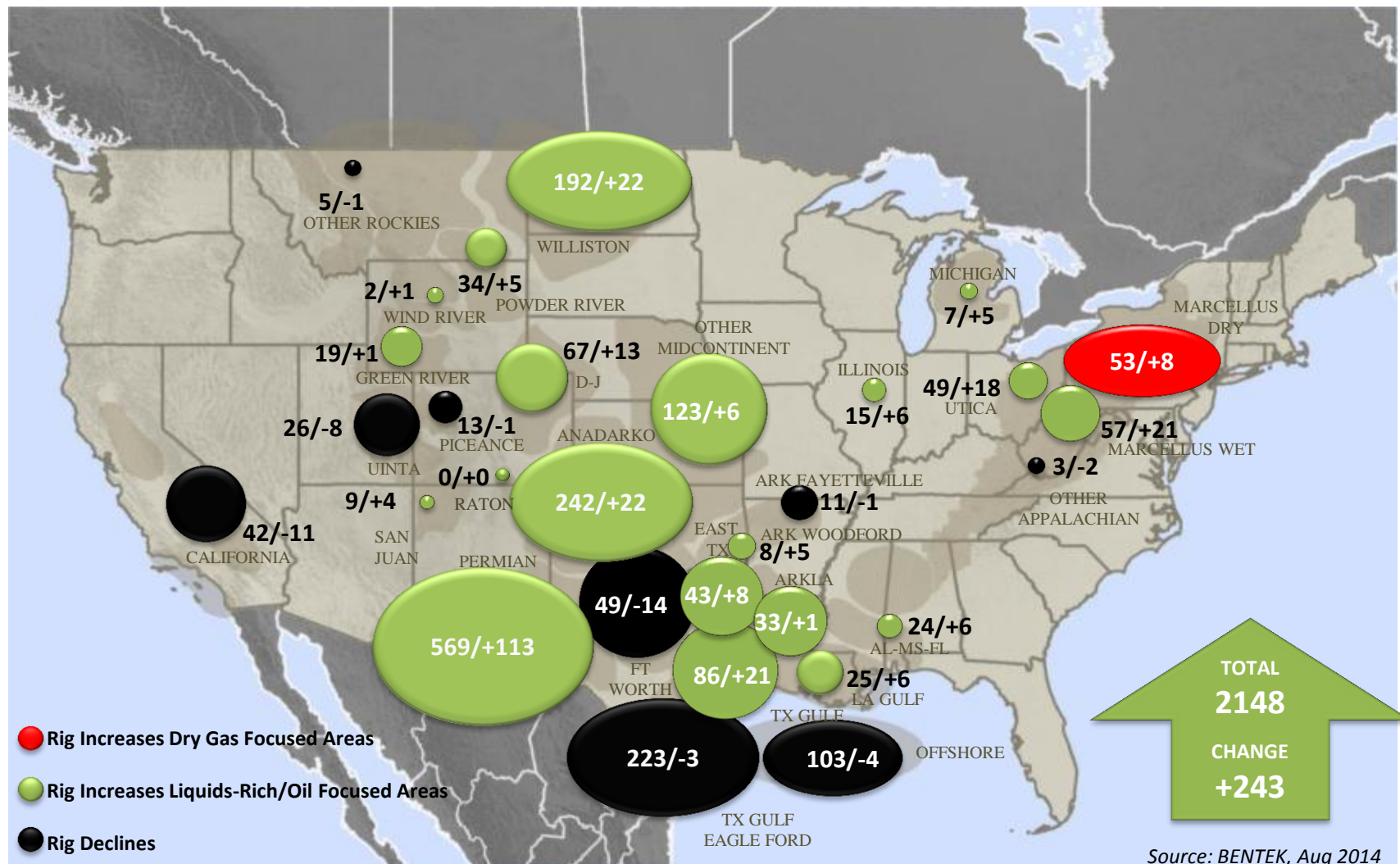


Oil and NGL Plays Earning the Highest Returns



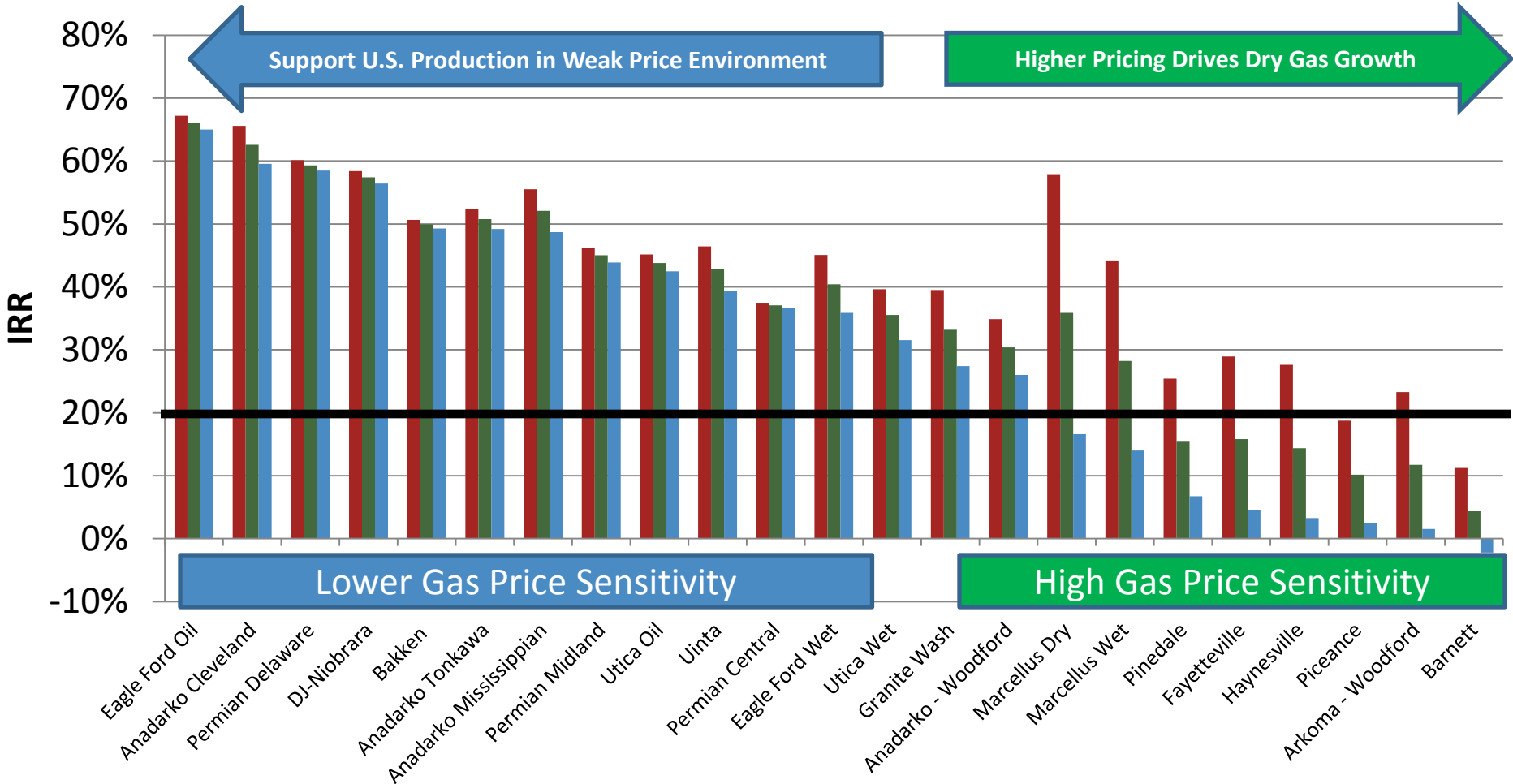
May 2014 Price Assumptions: Gas = 12 month forward average curve for each regional pricing point (range \$3.99- \$4.77/Mcf)
 Oil = 12 month forward average WTI +/- differential (range \$89-\$98/barrel)
 NGLs = weighted average \$/barrel, 12-mo forward average Mt. Belvieu prices (range \$27.14 - \$45.45 barrel)

Plays With High Returns Attract Drilling Rigs



Active rig count: Aug 1, 2014 / Change in rig count from Aug 2, 2013

Return of Dry Plays Expected with \$4 Gas



Source: Bentek

■ \$5 ■ \$4 ■ \$3

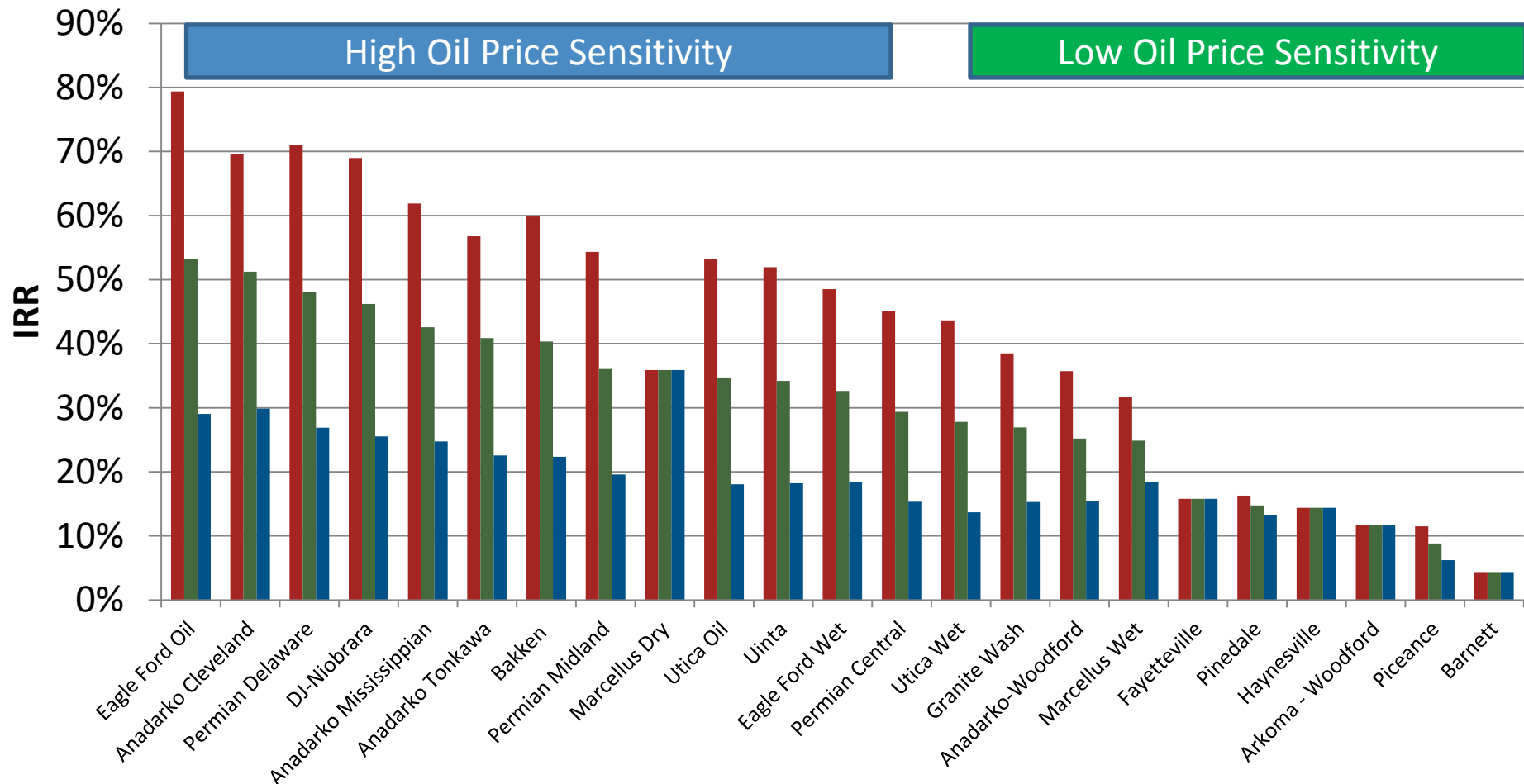
Note: Oil \$90
NGL 30% of Crude

Oil plays highly sensitive to changes in Oil price



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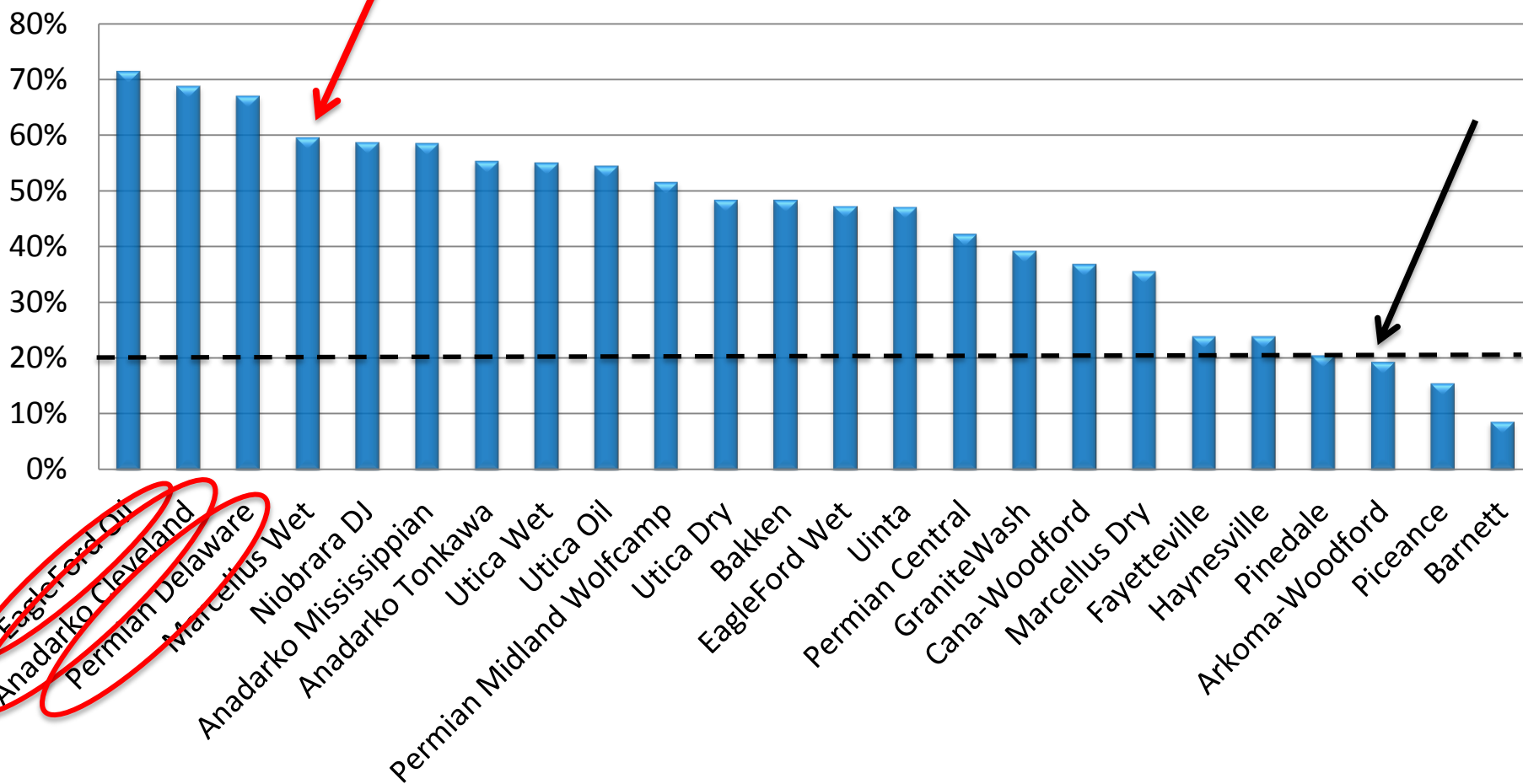
Source: Bentek

■ \$100.00 ■ \$80.00 ■ \$60.00

Note: Gas \$4.00
NGL 30% of Crude

Oil Plays are at the Top of the IRR Stack

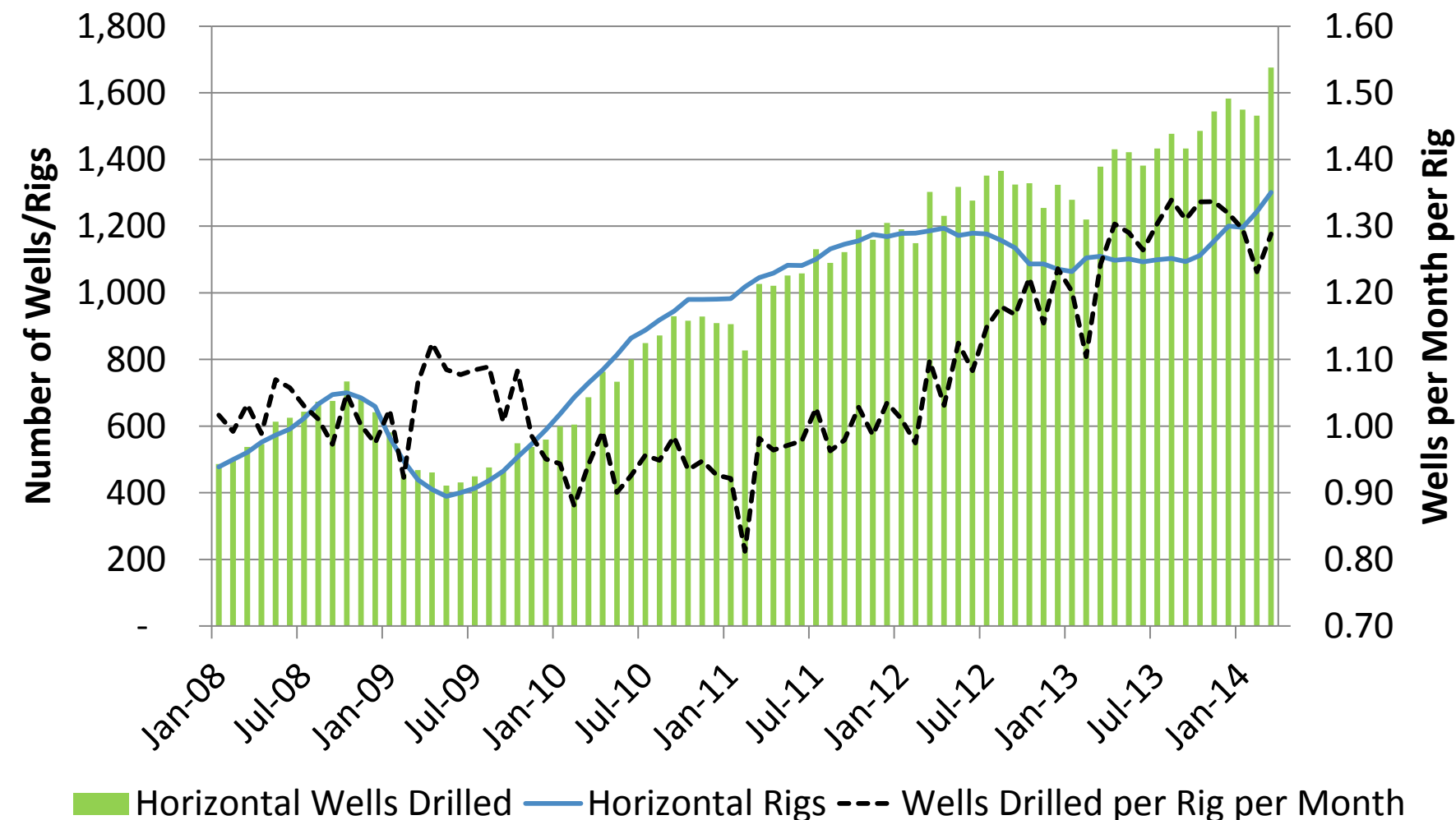
Internal Rate of Return (IRR)



May 2014 Price Assumptions: Gas = 12 month forward average curve for each regional pricing point (range \$3.99- \$4.77/Mcf)
Oil = 12 month forward average WTI +/- differential (range \$89-\$98/barrel)
NGLs = weighted average \$/barrel, 12-mo forward average Mt. Belvieu prices (range \$27.14 - \$45.45 barrel)

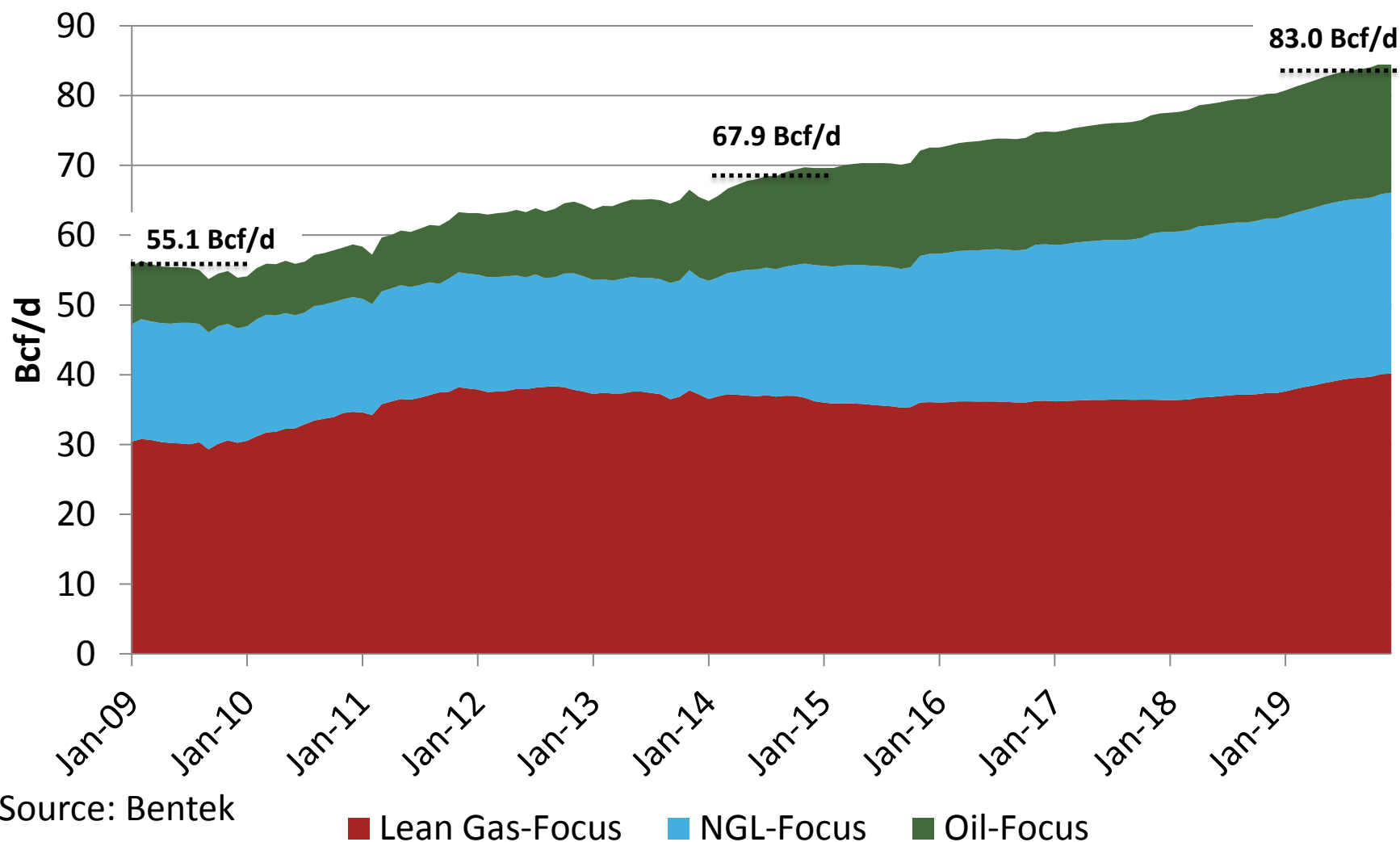
U.S. Horizontal Wells Climb Despite Rig Drop

U.S. Horizontal Drilling Dynamics



Source: Bentek

US Dry Gas Production by Basin Focus



U.S. LNG Exports



US LNG Export Criteria

US LNG Export Forecast Criteria						
	Terminal	Pre-existing Infrastructure	MOUs (% of cap.)	FERC Pre-filing	DOE Precedence	Regional Necessity
United States Base Case	Sabine Pass	X	91%	Approved	Approved	-
	Freeport	X	100%	12/23/2010	Approved	-
	Lake Charles	X	100%	3/30/2012	Approved	-
	Cove Point	X	92%	6/1/2012	Approved	X
	Cameron	X	97%	Approved	Approved	-
	Elba Island	X	100%	12/6/2012	6th	-
United States Best of the Rest	Golden Pass	X	Qatar/Exxon	5/16/2013	9th	-
	Excelerate	-	0%	11/21/2012	3th	-
	Jordan Cove	-	0%	2/29/2012	Approved	X
	Magnolia LNG	-	100%	4/30/2014	19th	-
	Corpus Christi	-	22.6%	12/14/2011	2th	-
	Gulf LNG	X	0%	5/21/2104	7	-

U.S. LNG Exports: Base Case Forecast

- DOE has received **43** applications for **38.97 Bcf/d** of capacity
- **83.3 mtpa (11.1 Bcf/d)** of MOUs have been signed on 130.5 mtpa (17.4 Bcf/d) of proposed capacity.
- **BENTEK expects 69.92 mtpa (9.3 Bcf/d) of these contracts to reach execution in its Base Case forecast.**

Gulf Coast Export Terminals:
Freeport LNG – 1.4 Bcf/d (13.2 mtpa)
Lake Charles – 2 Bcf/d (15 mtpa)
Sabine Pass – 2.2 Bcf/d (18 mtpa)
Cameron – 1.7 Bcf/d (12 mtpa)



Lake Charles



Cameron LNG



Sabine Pass



Freeport LNG

North East Exports:
Cove Point – 0.75 Bcf/d (5.6 mtpa)

▲ Cove Point



▲ Elba Island



South East Exports:
Elba Island FLNG – 0.5 Bcf/d (4 mtpa)

Source: Bentek

Benposium 2014

Canadian LNG Export Forecast Criteria						
	Terminal	Backers	Pre-existing Infrastructure	MOUs (% of cap.)	NEB Export Approval	Regional Necessity
Canada Base	<i>Bc LNG Cooperative</i>	<i>LNG Partners of Houston (50%), Haisla First Nation (50%)</i>	-	-	Approved	X
	<i>Pacific Northwest LNG</i>	<i>Petronas (62%), Sinopec (15%), Japex (10%), Petroleum Brunei (3%), Indian Oil Corp (10%)</i>	-	38%	Approved	X
	<i>Prince Rupert LNG</i>	<i>BG Group</i>	-	-	Approved	X
Other Canadian Projects	<i>Kitimat LNG</i>	<i>Apache (50%), Chevron (50%)</i>	-	-	Approved	X
	<i>LNG Canada</i>	<i>Shell (50%), KOGAS (15%), Mitsubishi (15%), PetroChina (20%)</i>	-	-	Approved	X
	<i>Jordan Cove</i>	<i>Veresen, Inc</i>			Approved	X
	<i>Triton LNG</i>	<i>AltaGas Ltd (50%), Idemitsu (50%)</i>	-	-	Approved	X
	<i>WCC LNG</i>	<i>Imperial Oil (50%), ExxonMobil Canada (50%)</i>	-		Approved	X
	<i>Woodfibre LNG</i>	<i>Pacific Energy Corp</i>	-		Approved	X
	<i>Goldsboro LNG</i>	<i>Pieridae Energy Canada</i>	-	50%	Pending	X
	<i>Aurora</i>	<i>Partnership: Nexen/CNOOC, INPEX Corp, JGC Corp.</i>			Approved	X
	<i>Oregon LNG</i>	<i>Oregon LNG Marketing Company, LLC</i>			Approved	X

Canada LNG Exports Base Case Forecast

- NEB has approved **11 projects** for **130.6 mtpa (17.41 Bcf/d)** of capacity
- 3 Projects under NEB review for additional **60 mtpa (8 Bcf/d)**
- No significant amount of MOUs have been announced



Prince Rupert

Douglas Channel

Pacific Northwest



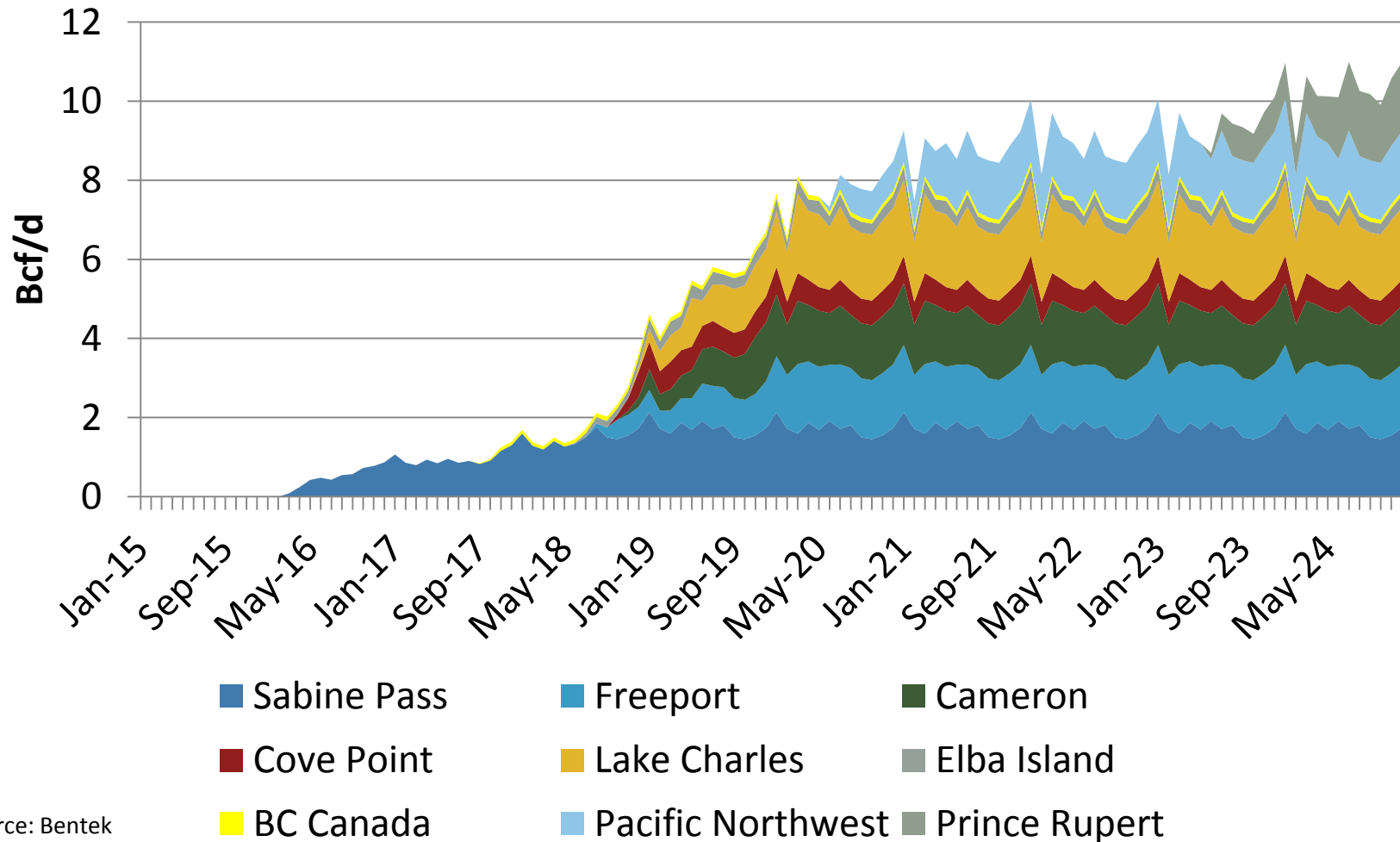
Canadian Exports:

BC LNG – 0.25 Bcf/d (1.8 mtpa)

Pacific Northwest (two trains)– 1.6 Bcf/d (12 mtpa)

Prince Rupert LNG (two trains) – 1.86 Bcf/d (14 mtpa)

✚ North American LNG exports will average 10.31 Bcf (77.33 mtpa) in 2024

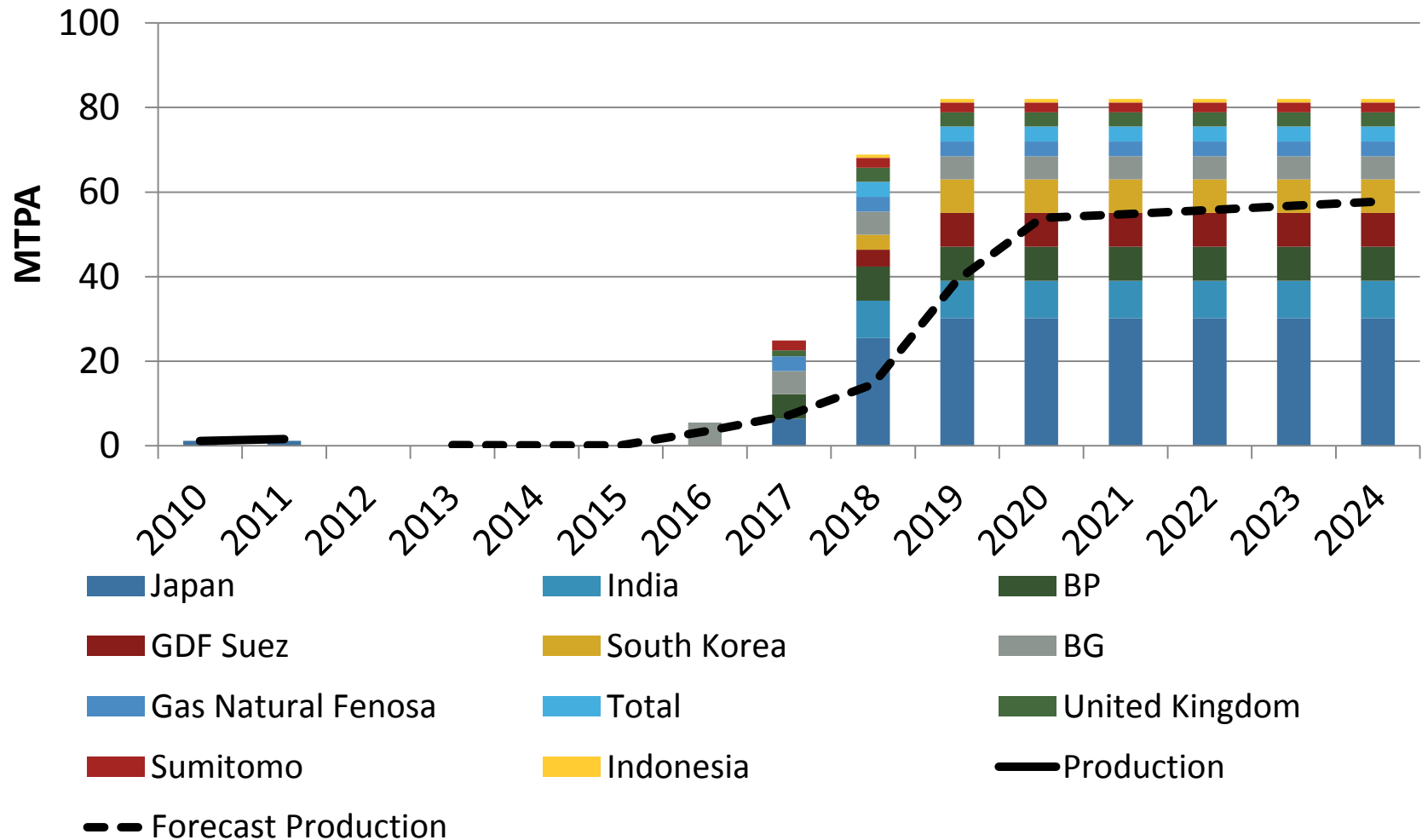


Source: Bentek

Global Demand Outlook



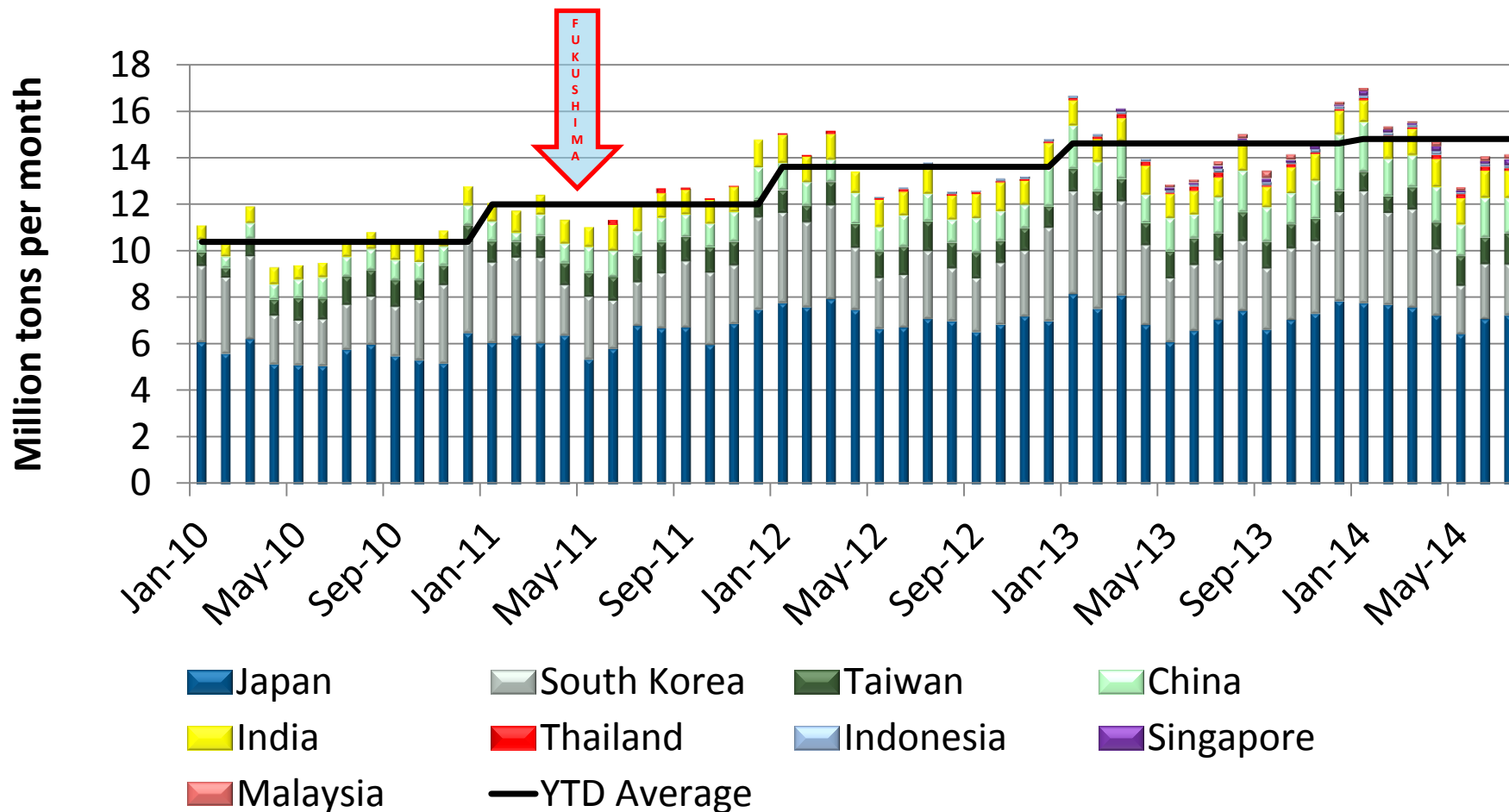
U.S. Production vs Contract Evolution



Source: Bentek

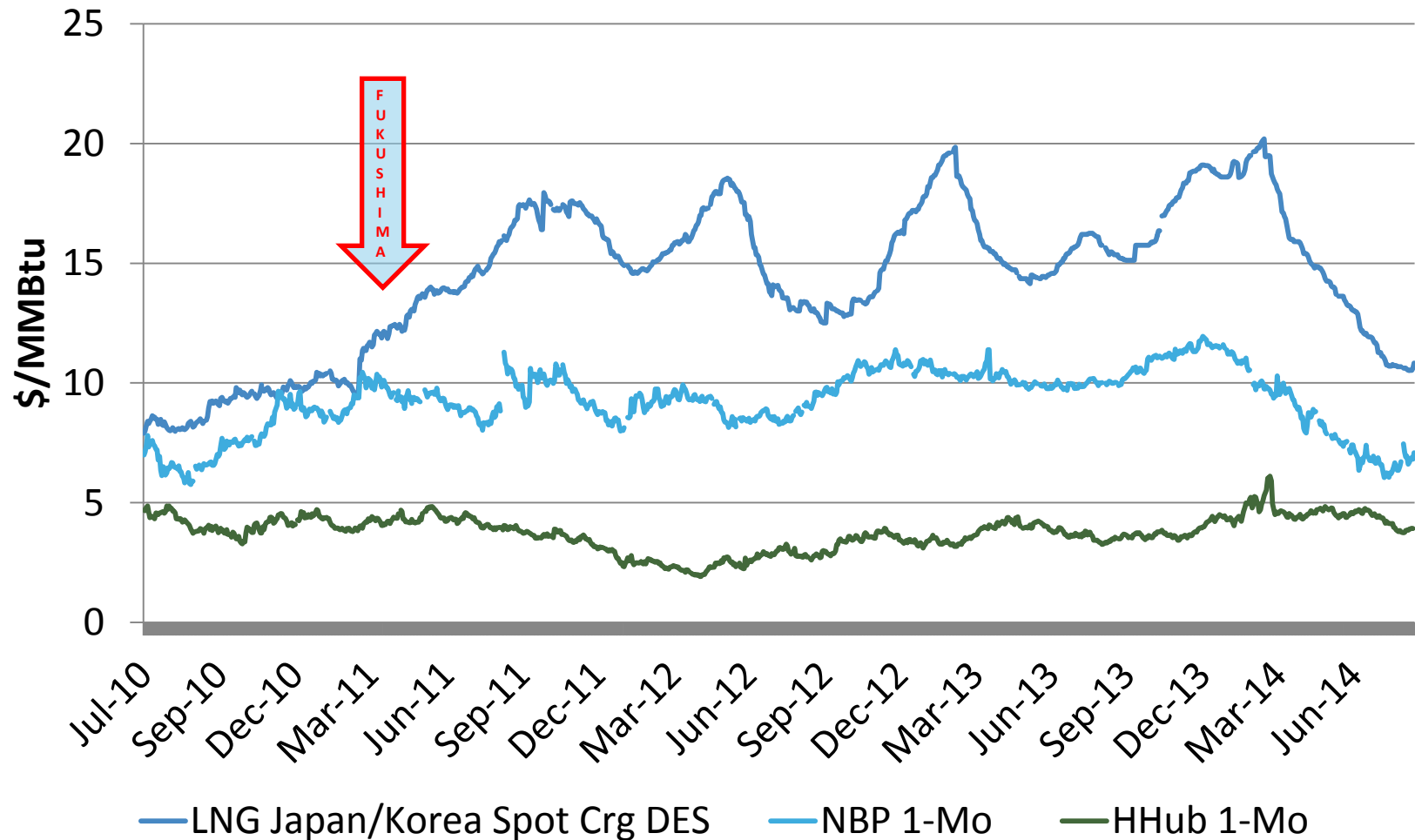
Fukushima Drove Demand Across the Asian Region

Asian LNG Imports



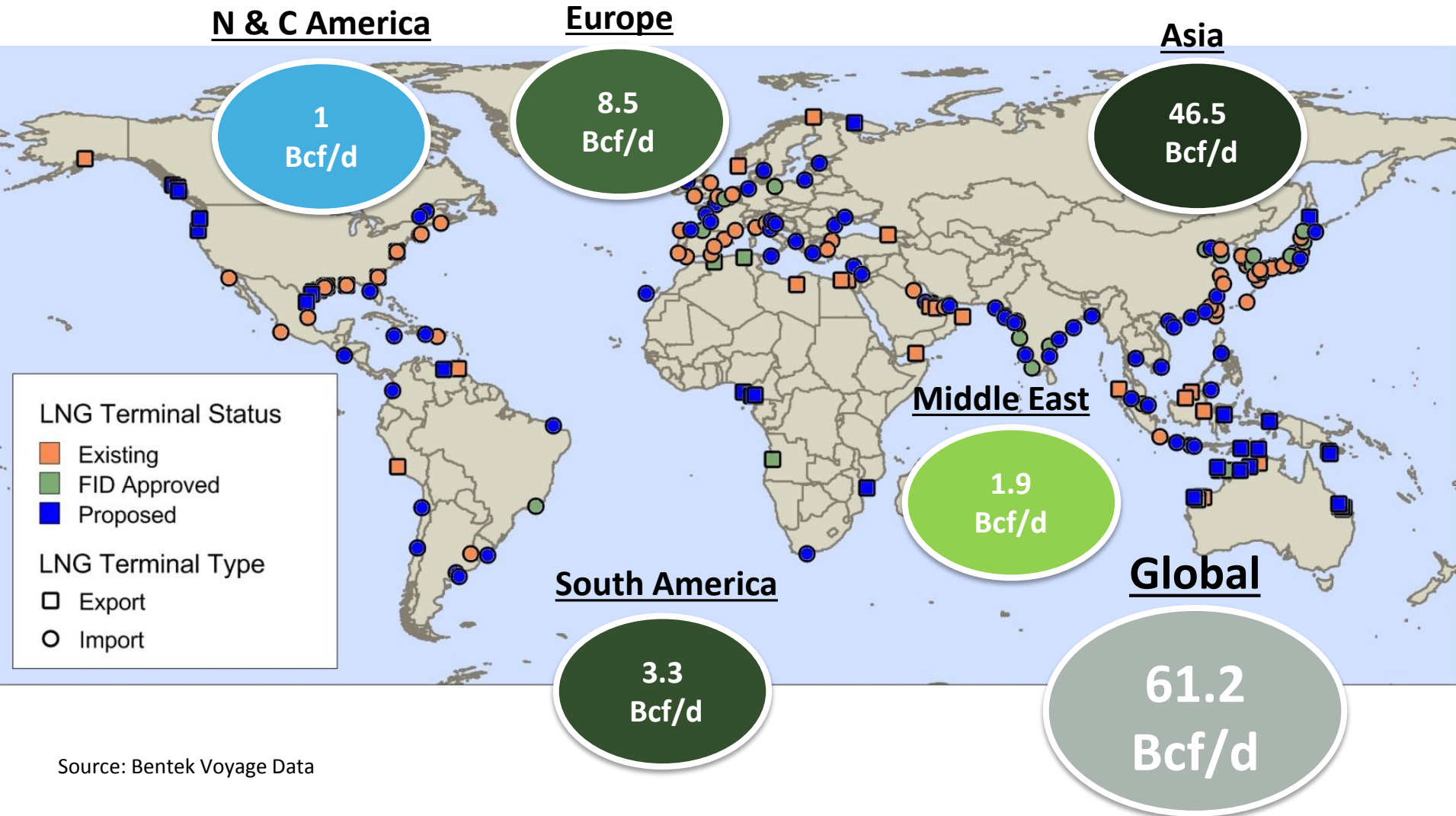
Demand drives prices

JKM vs. NBP vs. HH

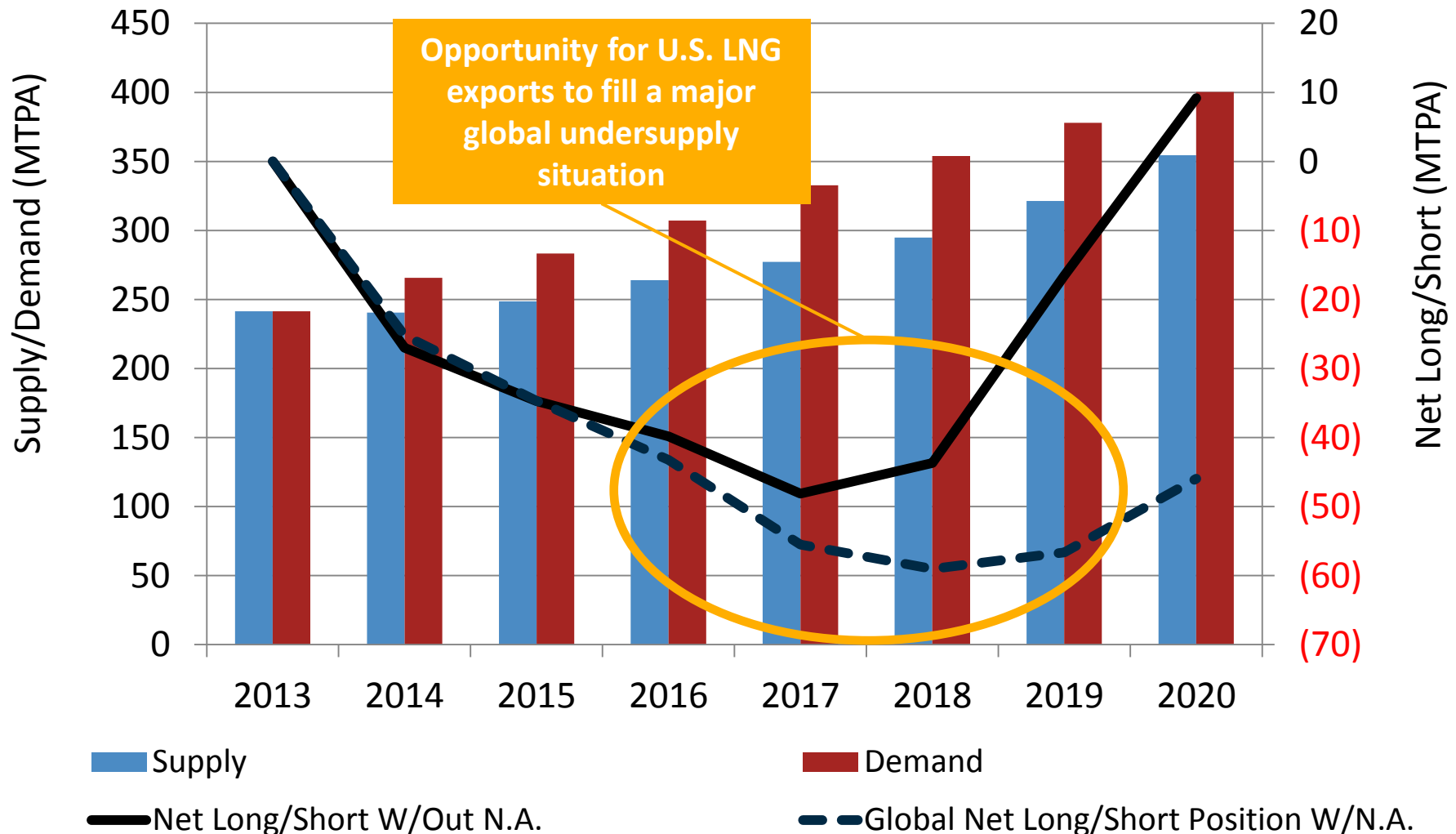


Source: Bentek, Platts

Global Demand 2024: 61.2 Bcf/d

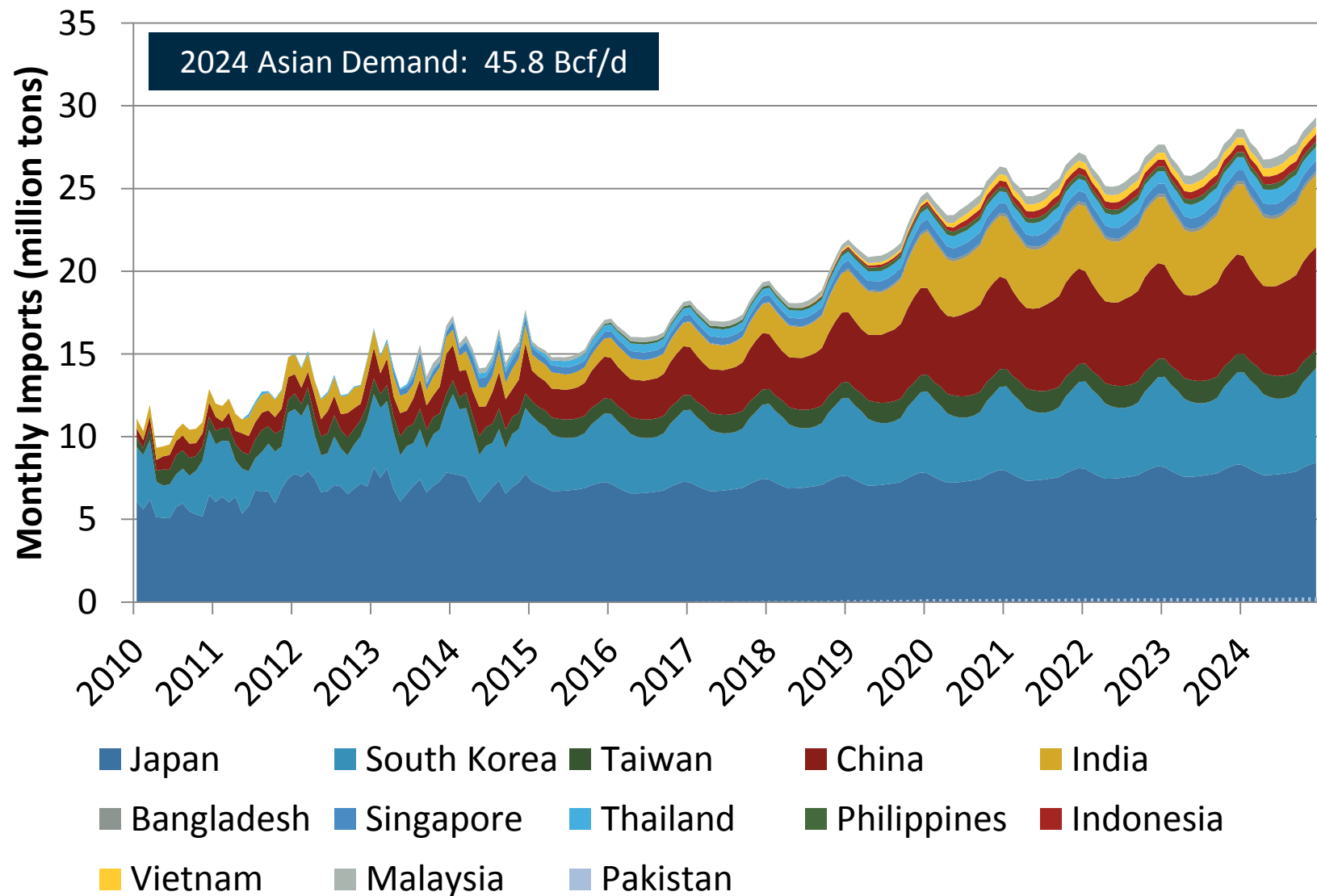


N.A. LNG Exports Help Balance LNG Market By 2020



*Demand theoretical (i.e. without supply constraints)

Total Asian Demand Forecast



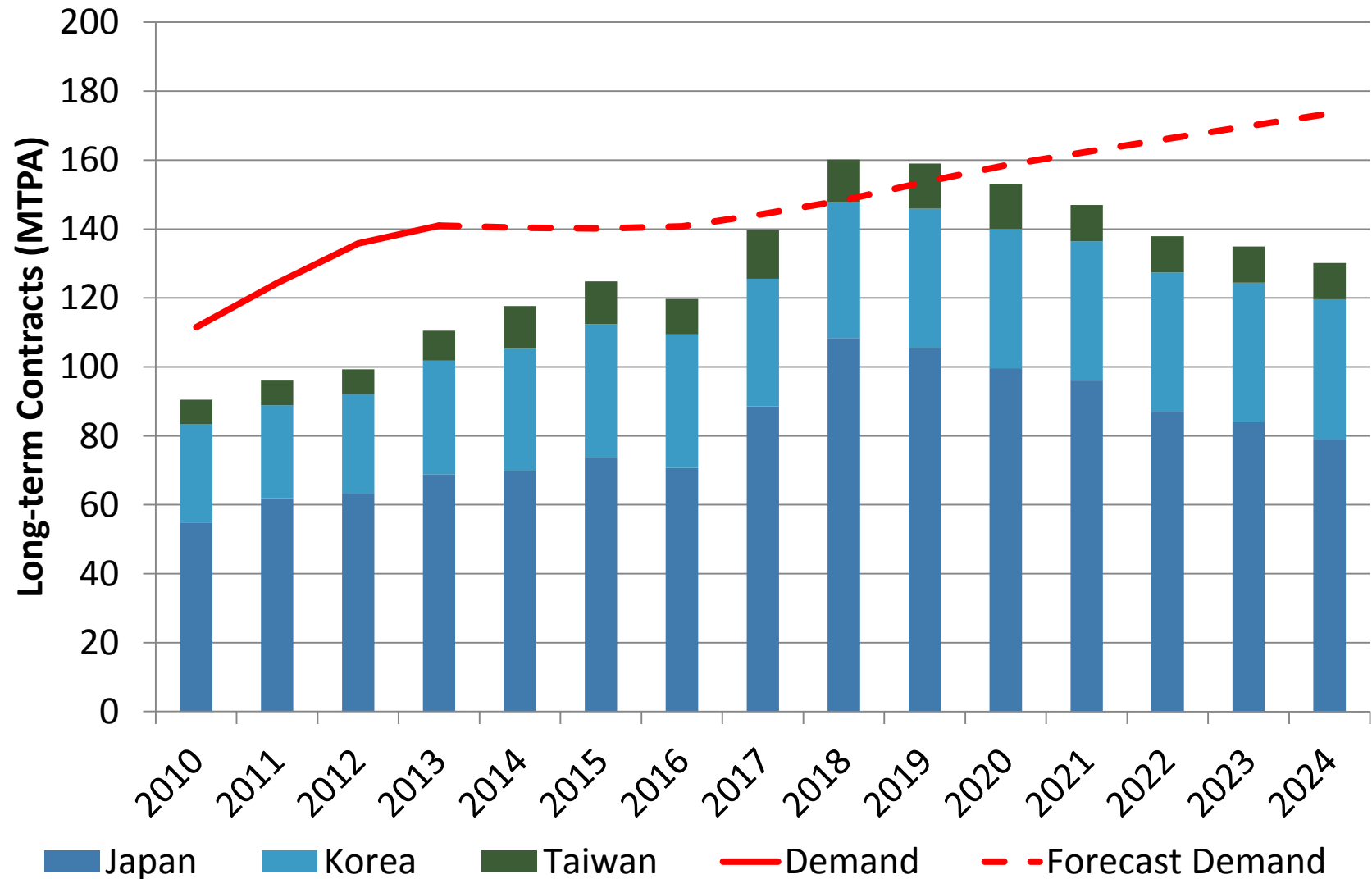
Source: Bentek

Traditional Markets Demand vs Contract Evolution



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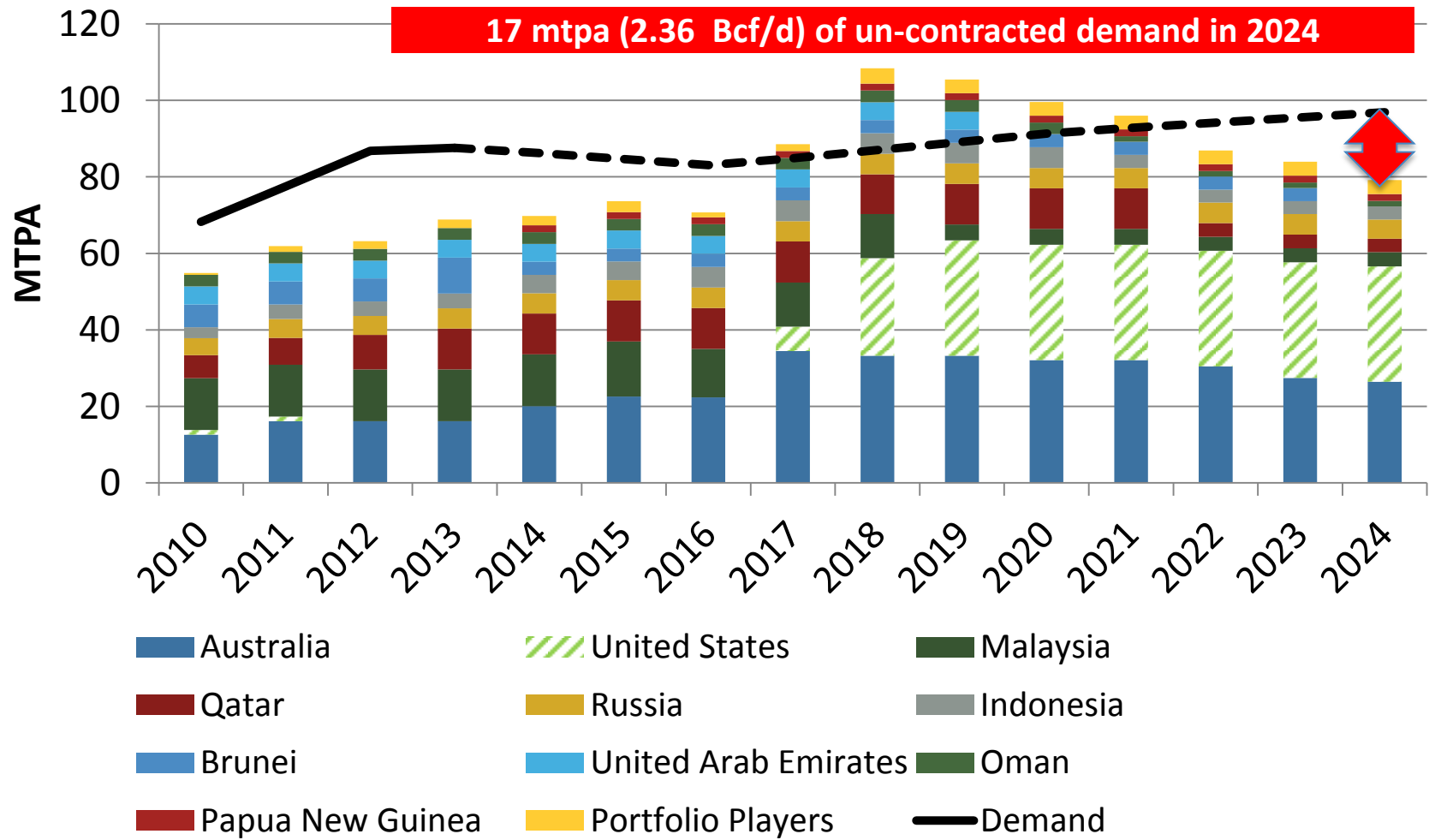
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Source: Bentek

Japan Demand vs Contract Evolution

U.S – Largest LNG Supplier to Japan by 2023



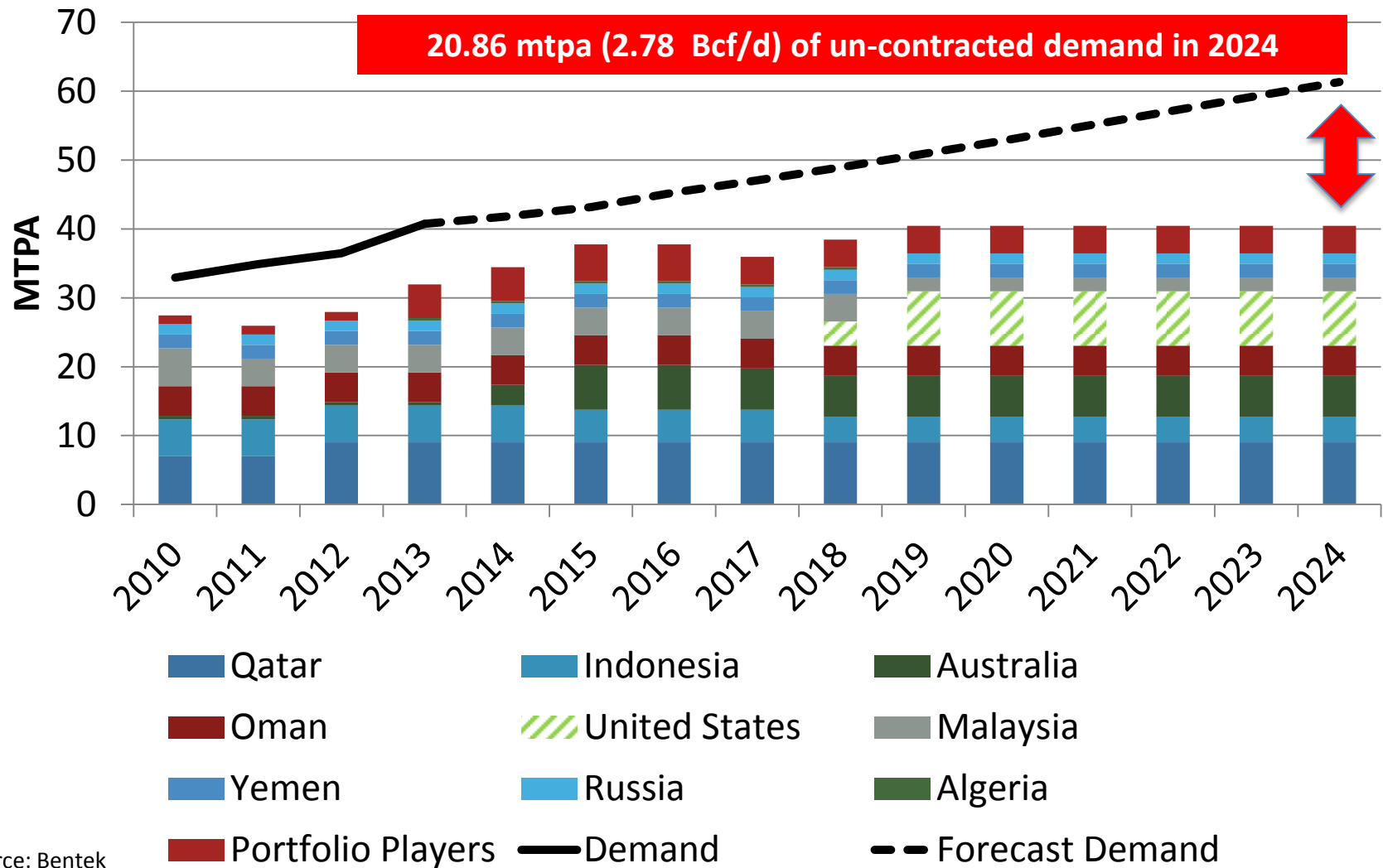
Source: Bentek

South Korea Demand vs Contract Evolution



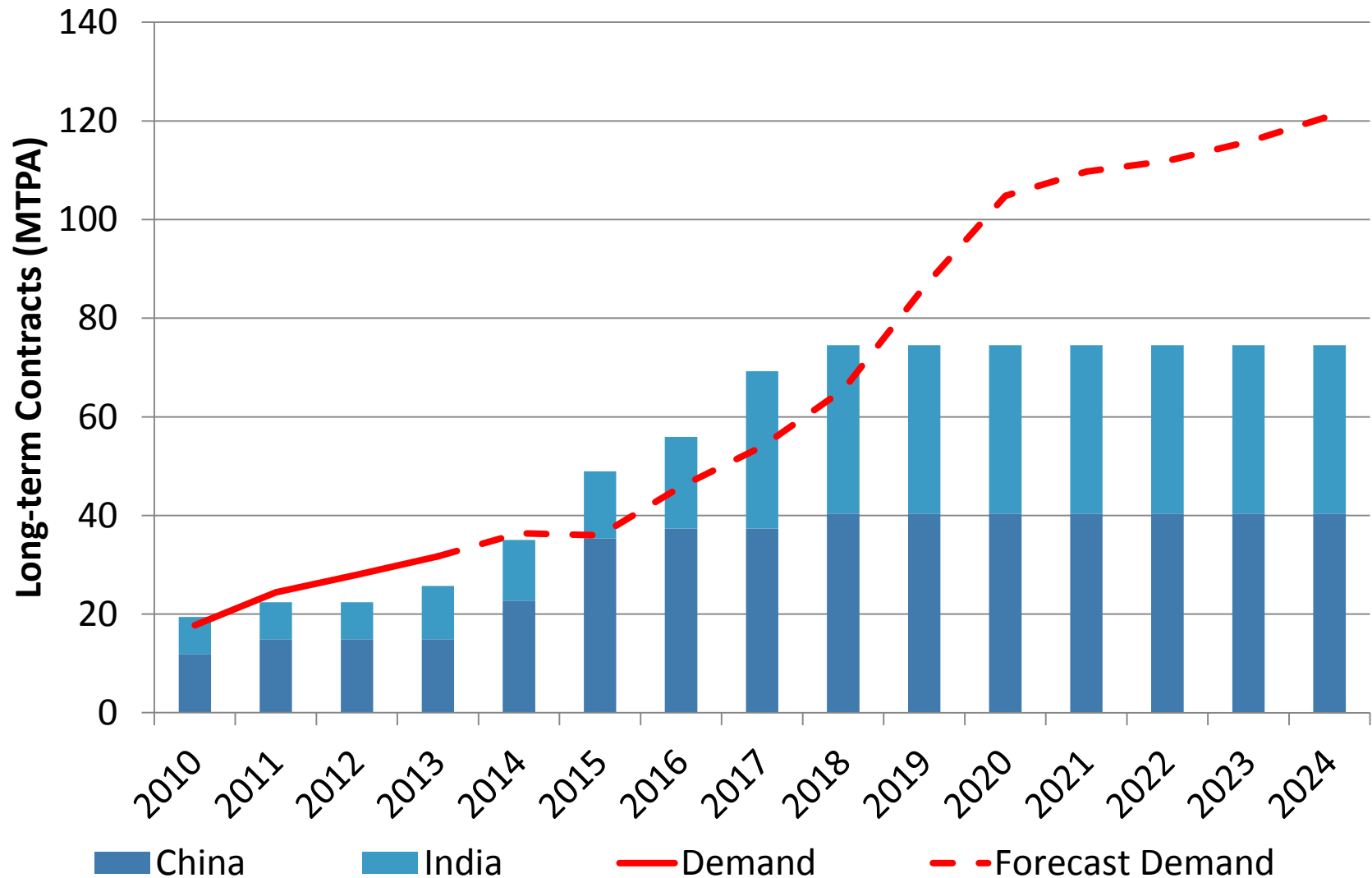
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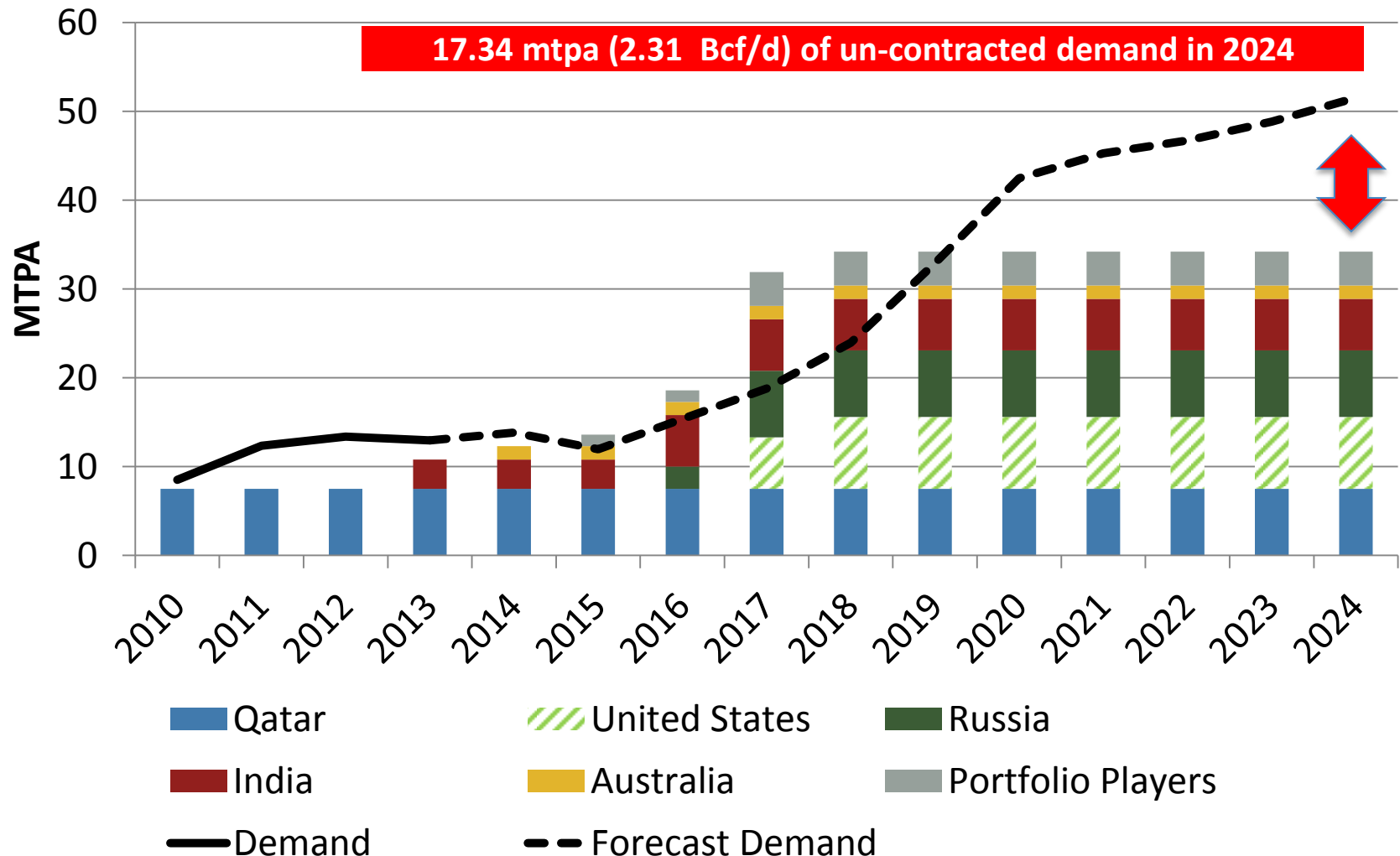
Source: Bentek

Growth Markets Demand vs Contract Evolution



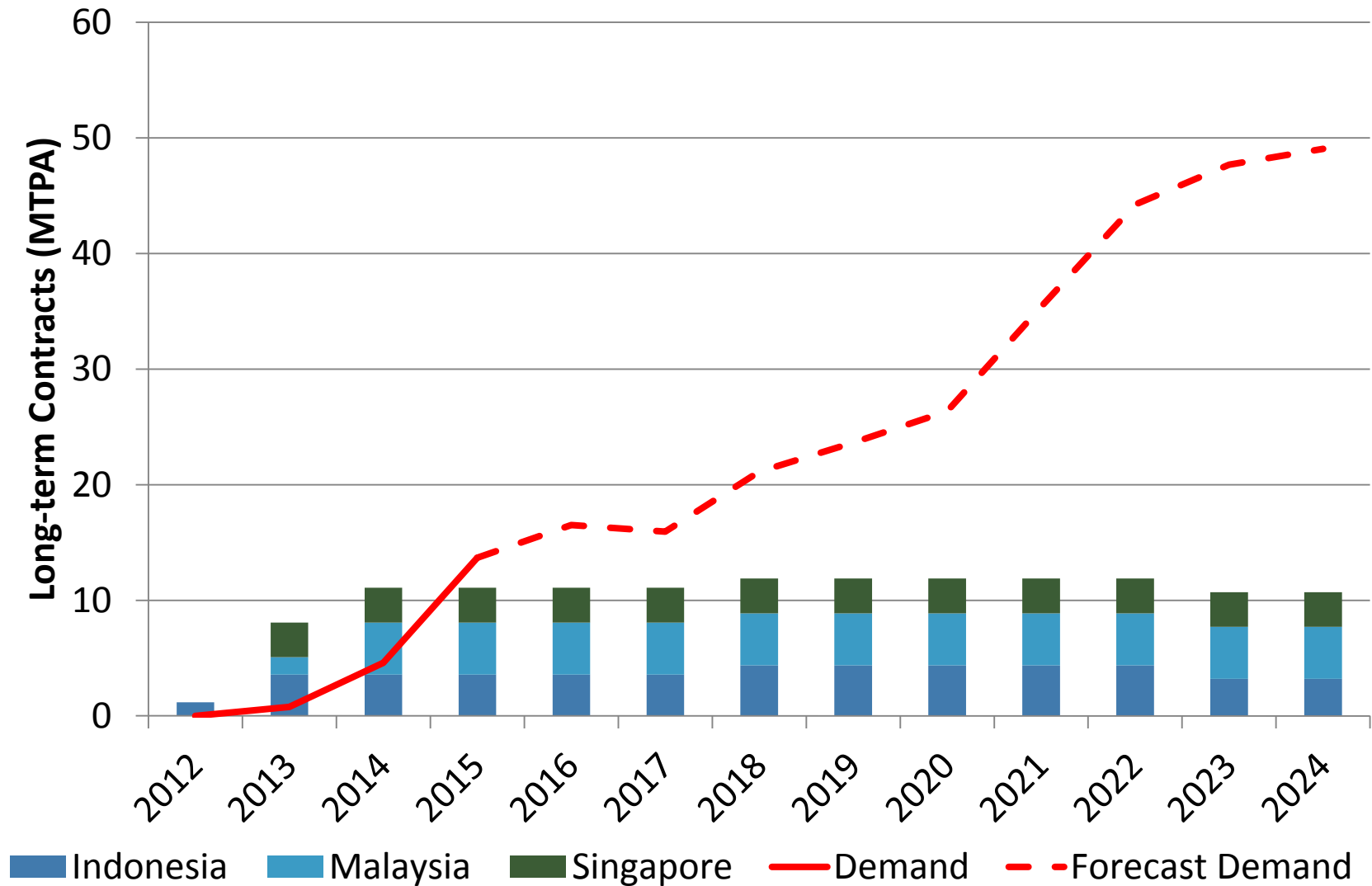
Source: Bentek

India Demand vs Contract Evolution



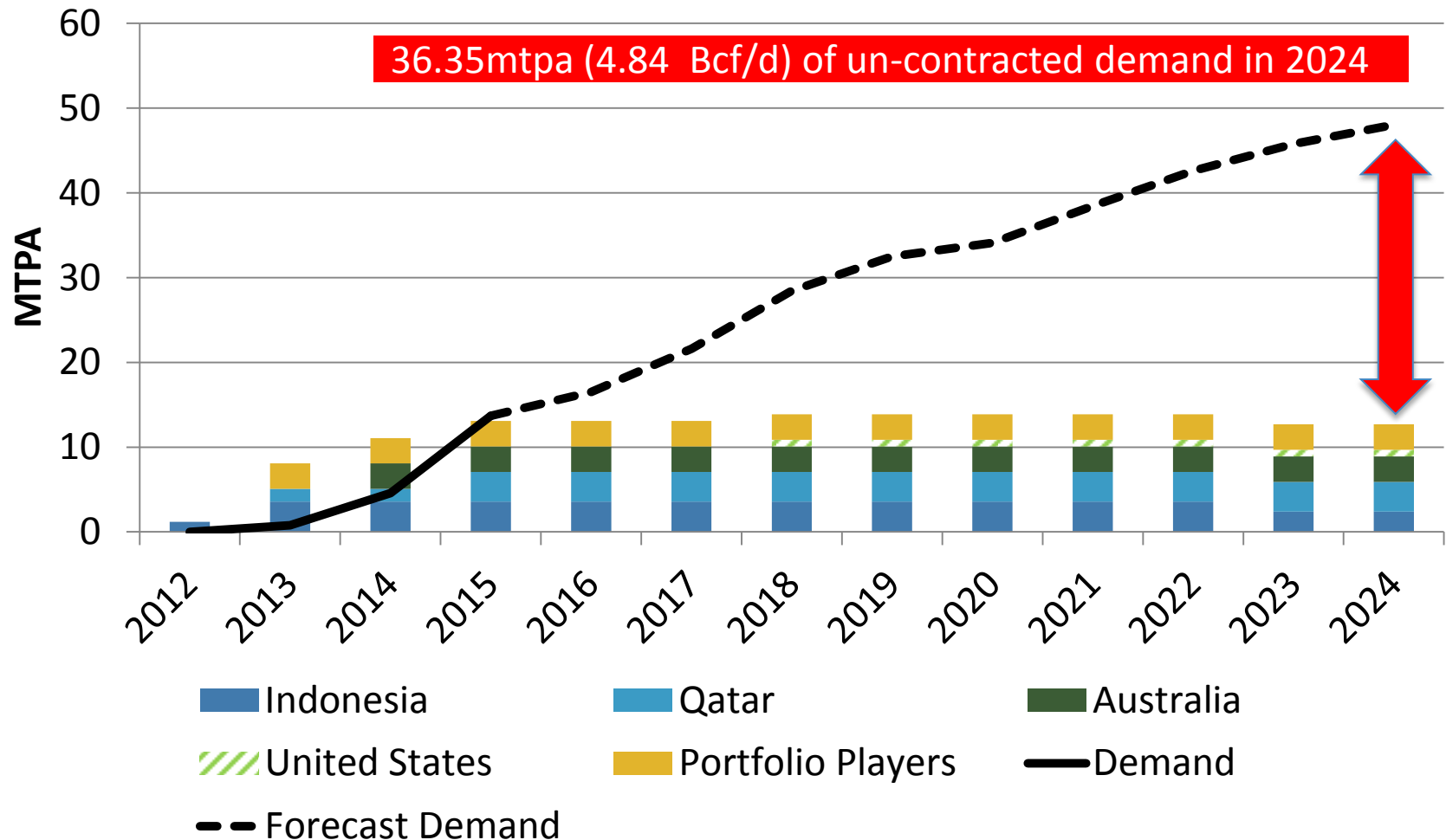
Source: Bentek

Emerging Markets Demand vs Contract Evolution



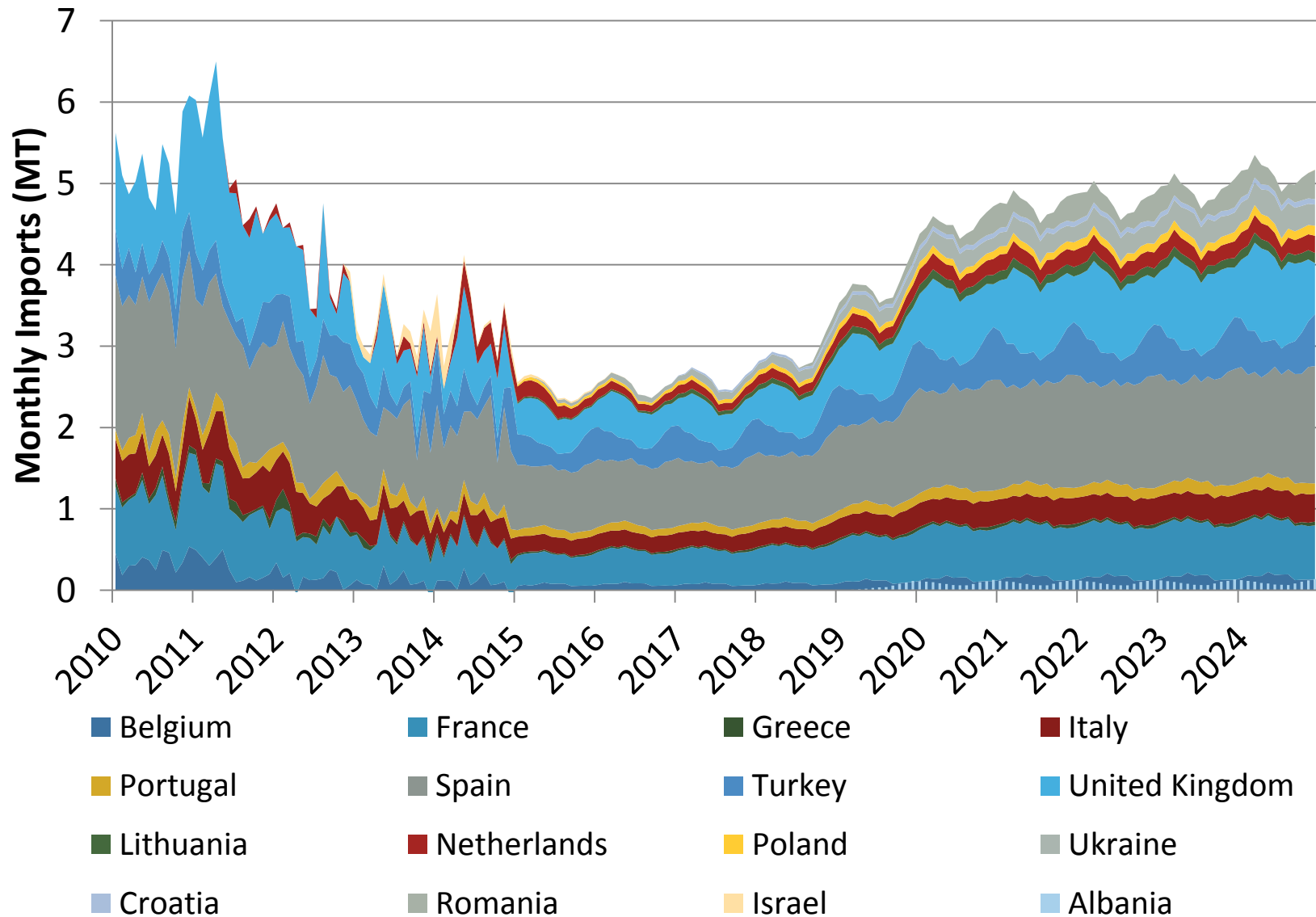
Source: Bentek

Asian Emerging Markets Demand vs Contract Evolution



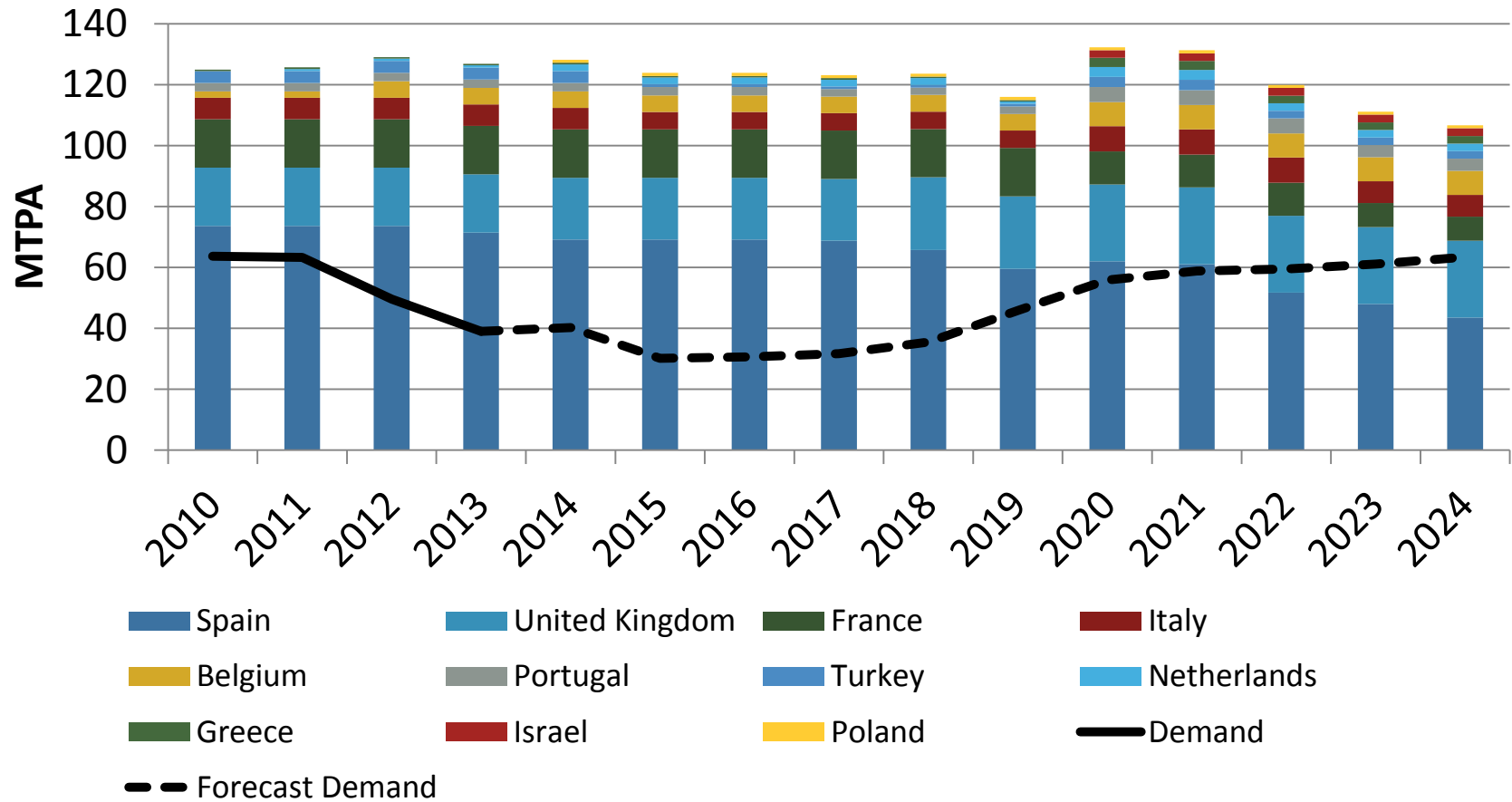
Source: Bentek

European Demand Forecast



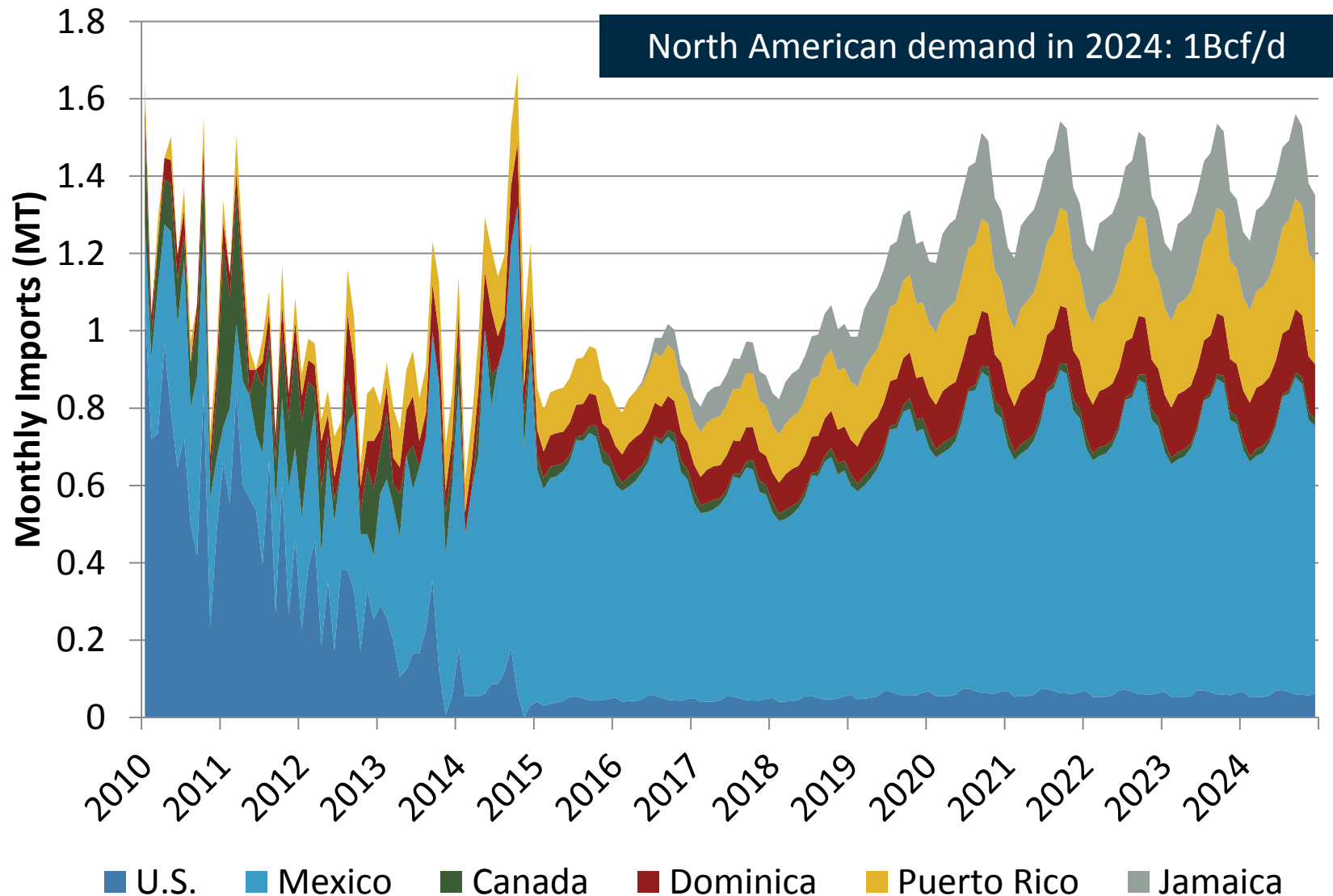
Source: BENTEK

European Contract Evolution vs. Imports



Source: Bentek

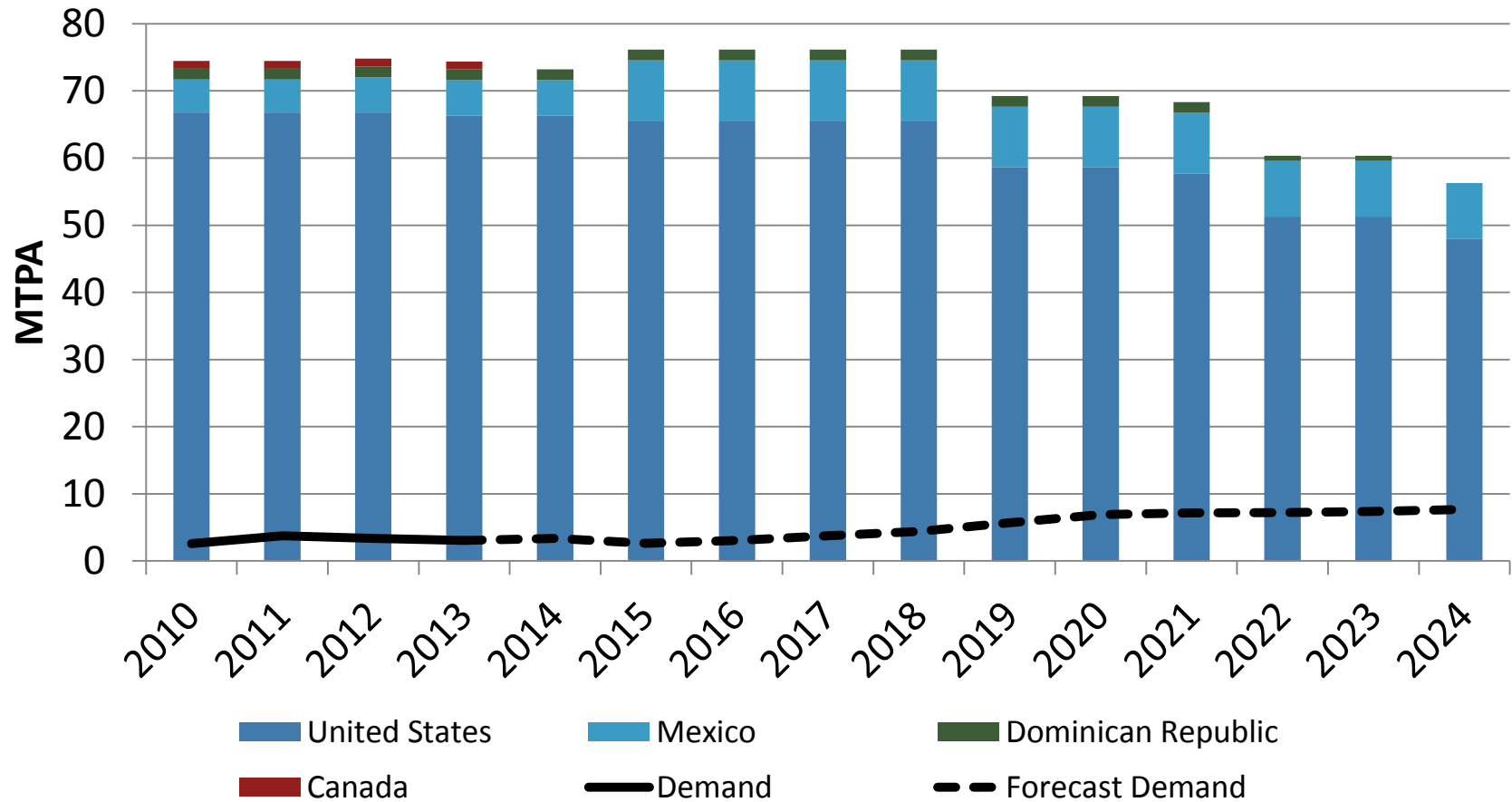
North American Demand Forecast



Source: BENTEK

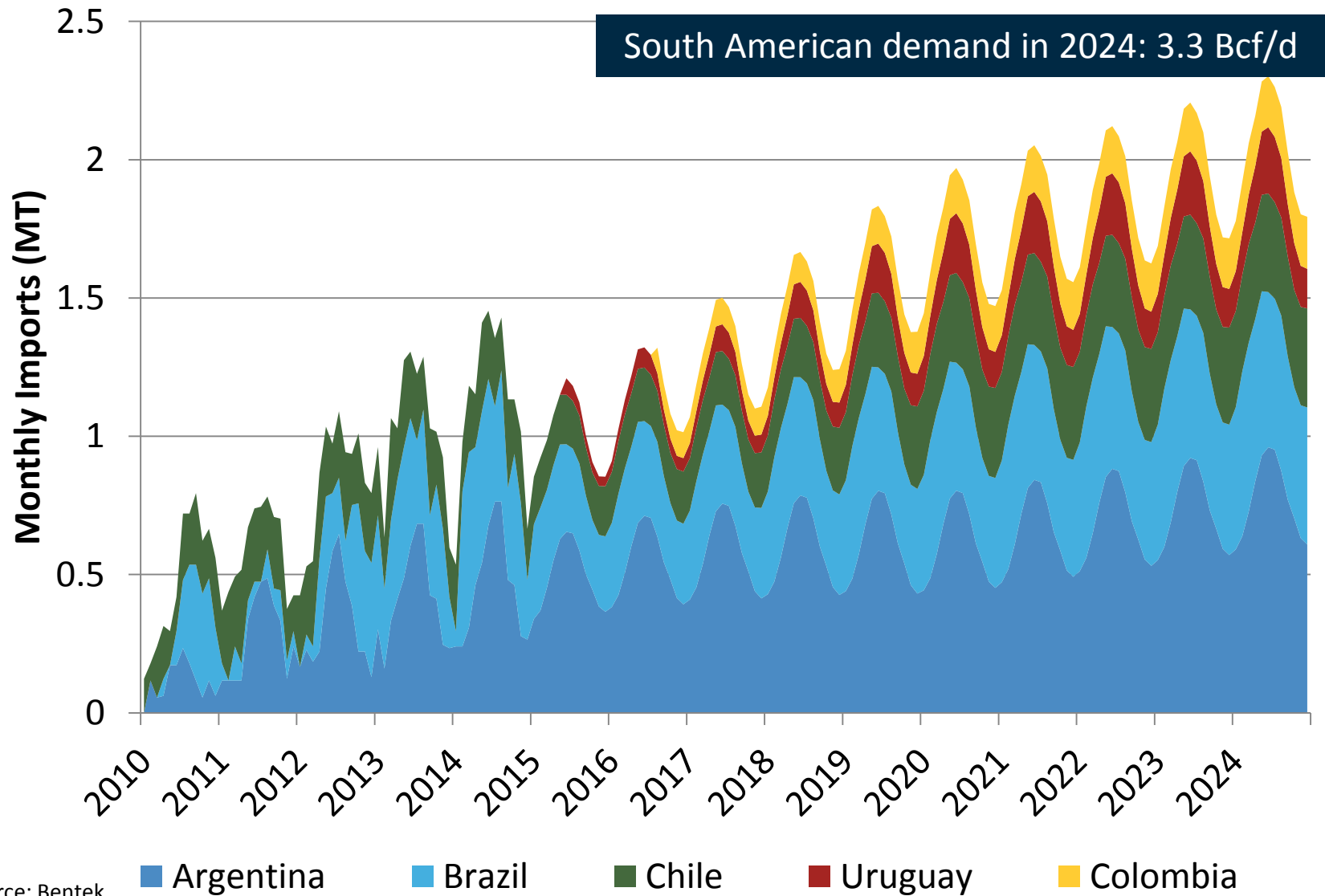
North American Demand vs. Contract Evolution

North America Contract Evolution vs. Imports



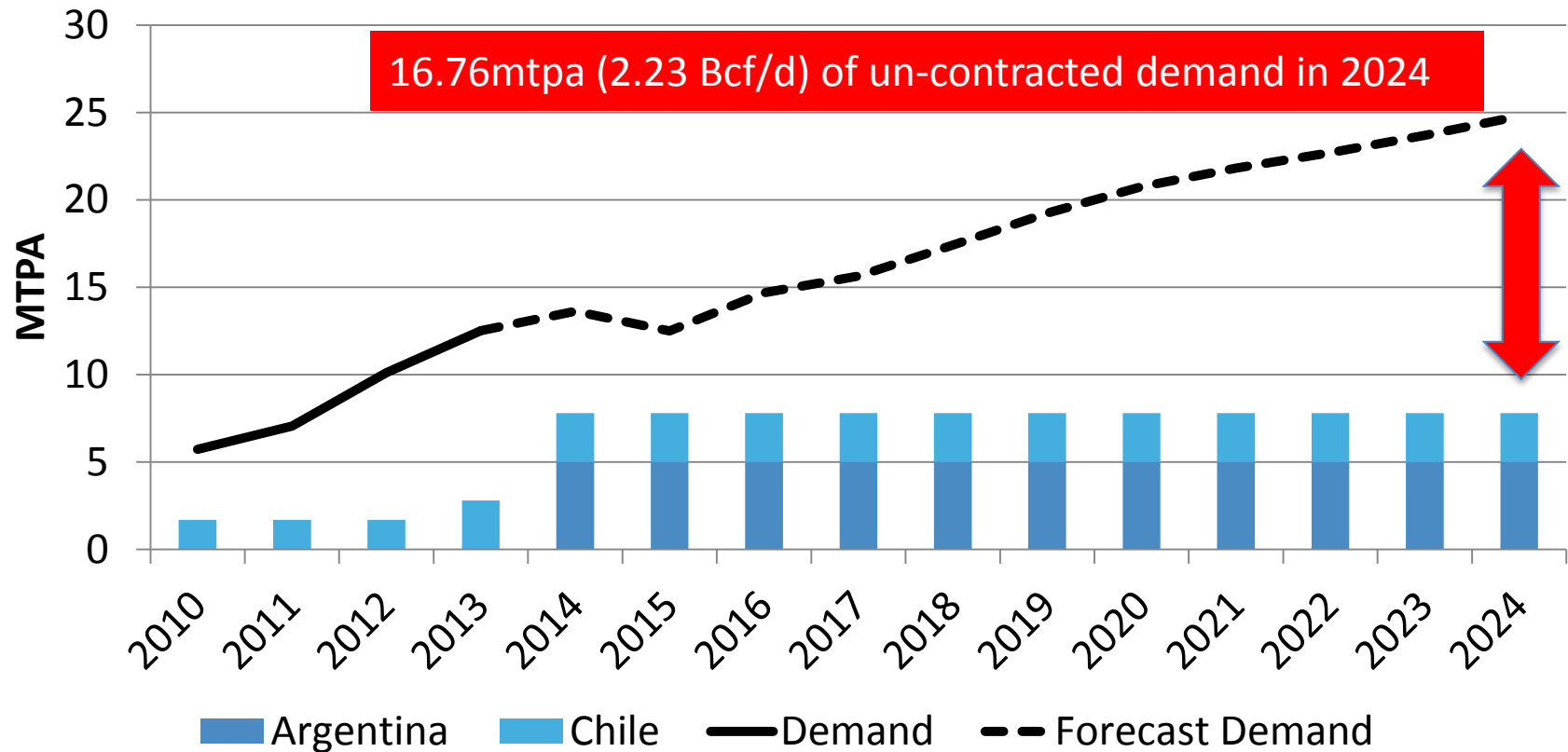
Source: Bentek

South American Demand Forecast



Source: Bentek

South American Demand vs Contract Evolution



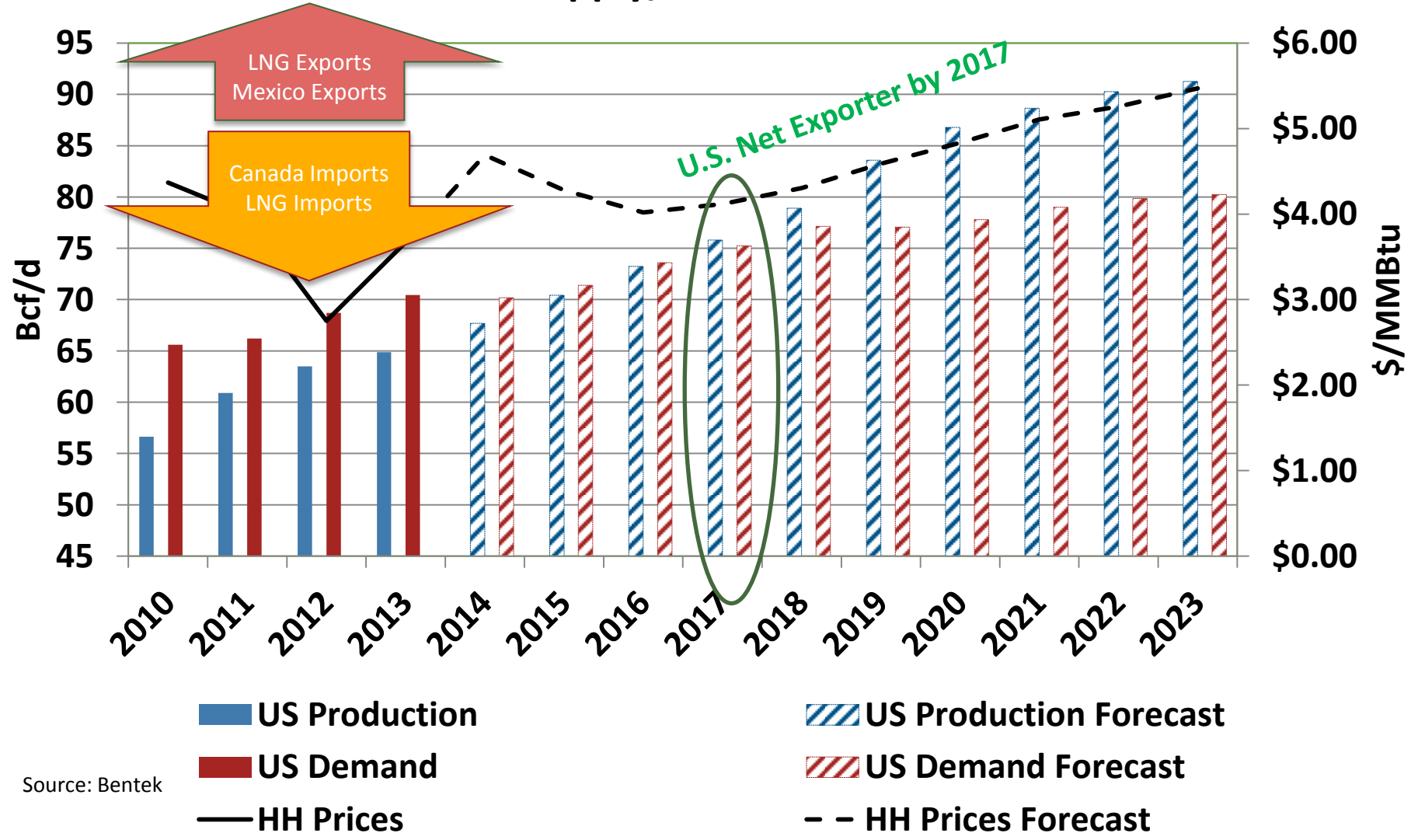
Source: Bentek

Price Evolution and Competitiveness



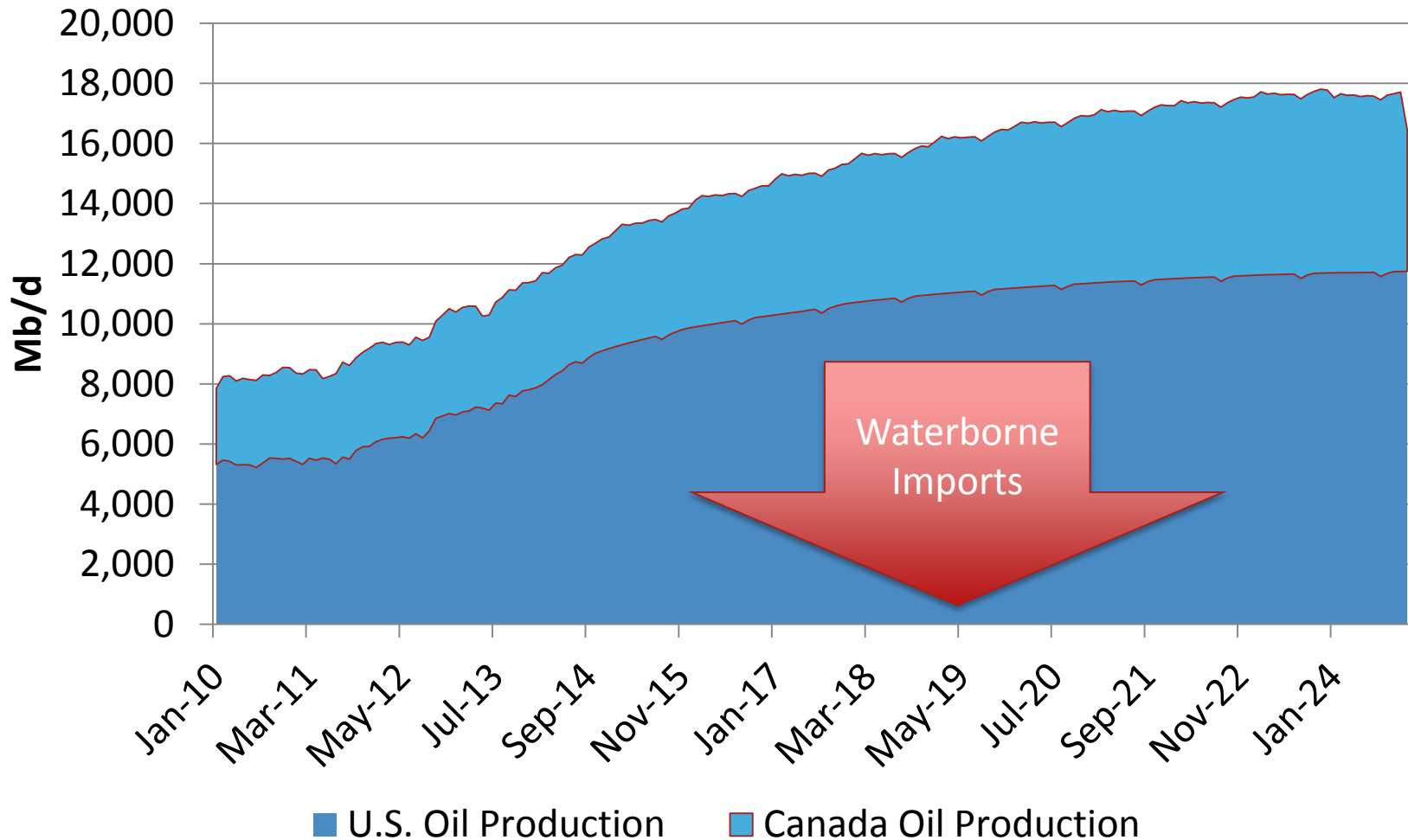
U.S Market Continues to Lengthen HH to stay competitive against Asian prices

U.S. Supply/Demand Balance



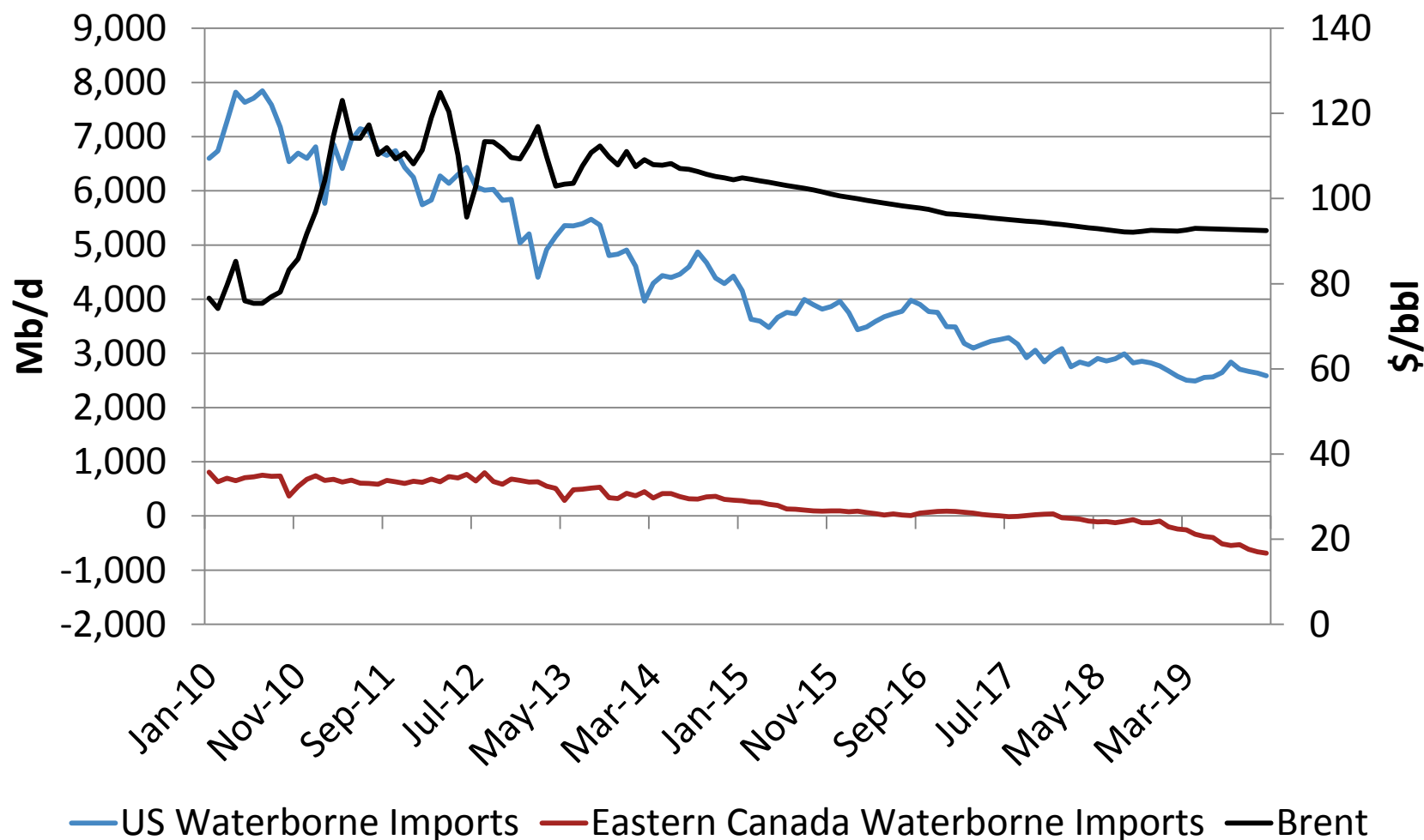
Source: Bentek

Shale Oil: N.A. Oil Production



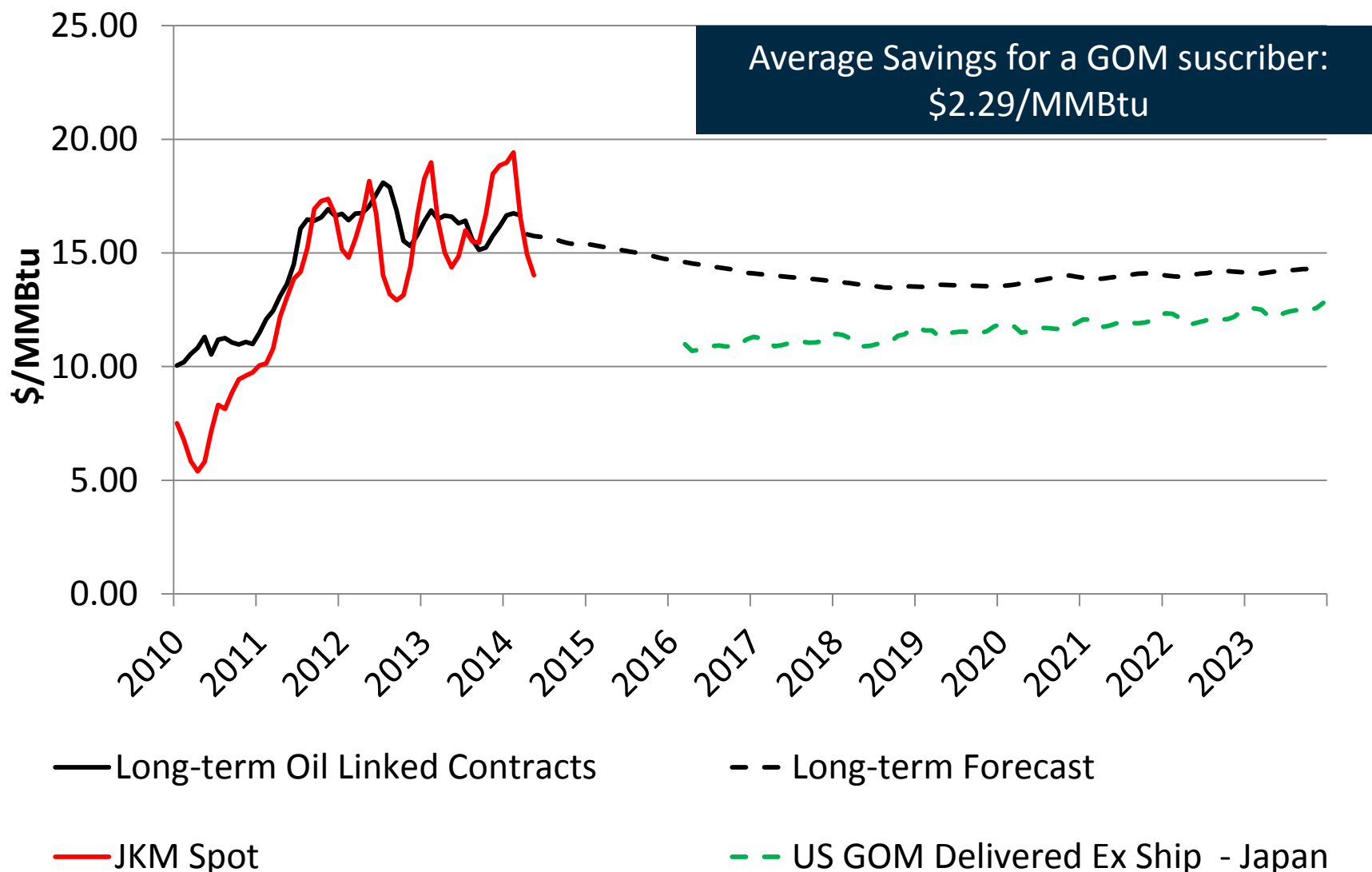
Source: Platts, Bentek

Shale Oil: Waterborne Imports vs. Oil Prices



Source: Platts, Bentek

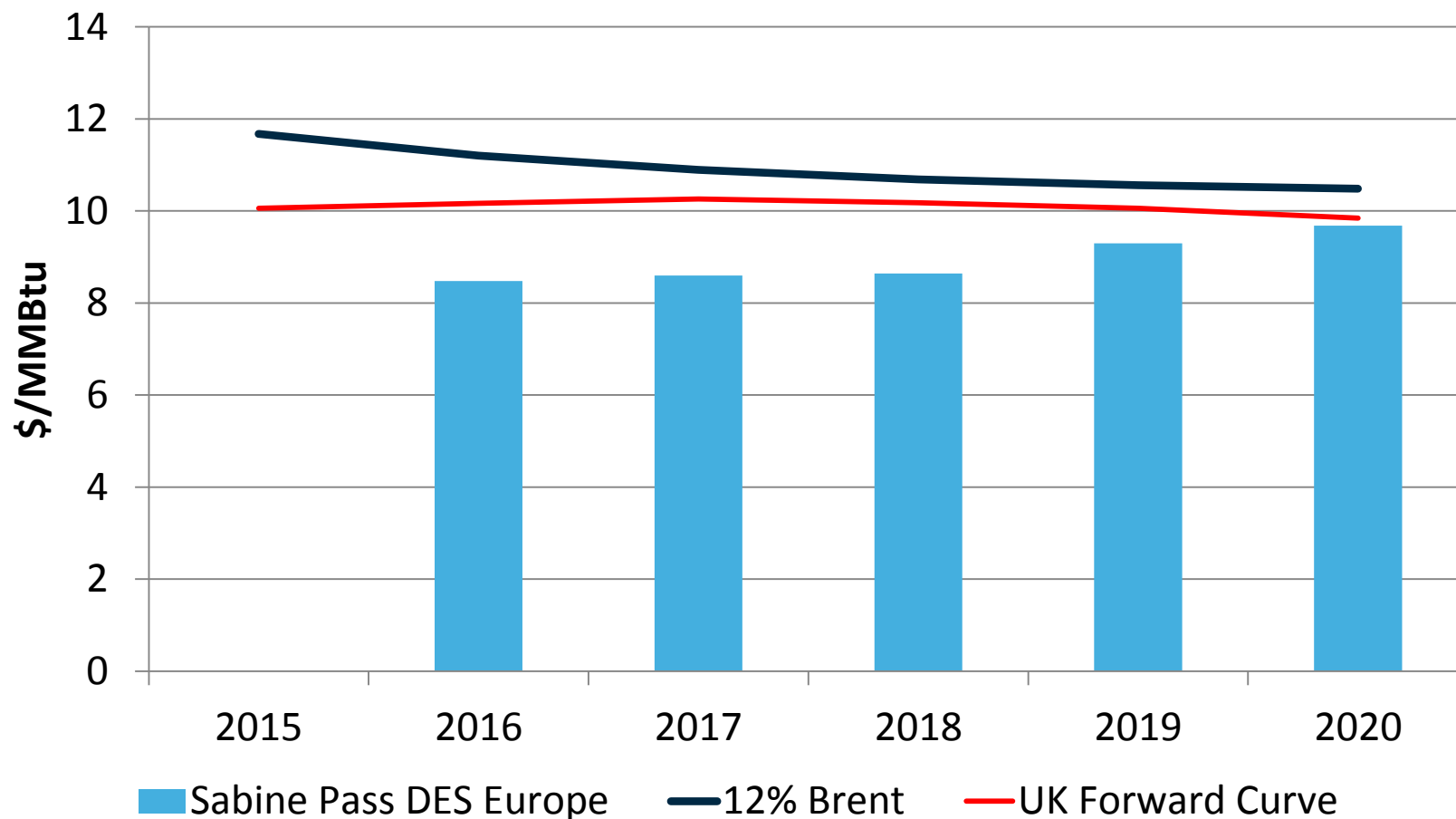
JKM Spot Price Forecast vs. LT Oil Index vs. U.S. Gulf of Mexico DES - Japan



Source: Bentek, Platts

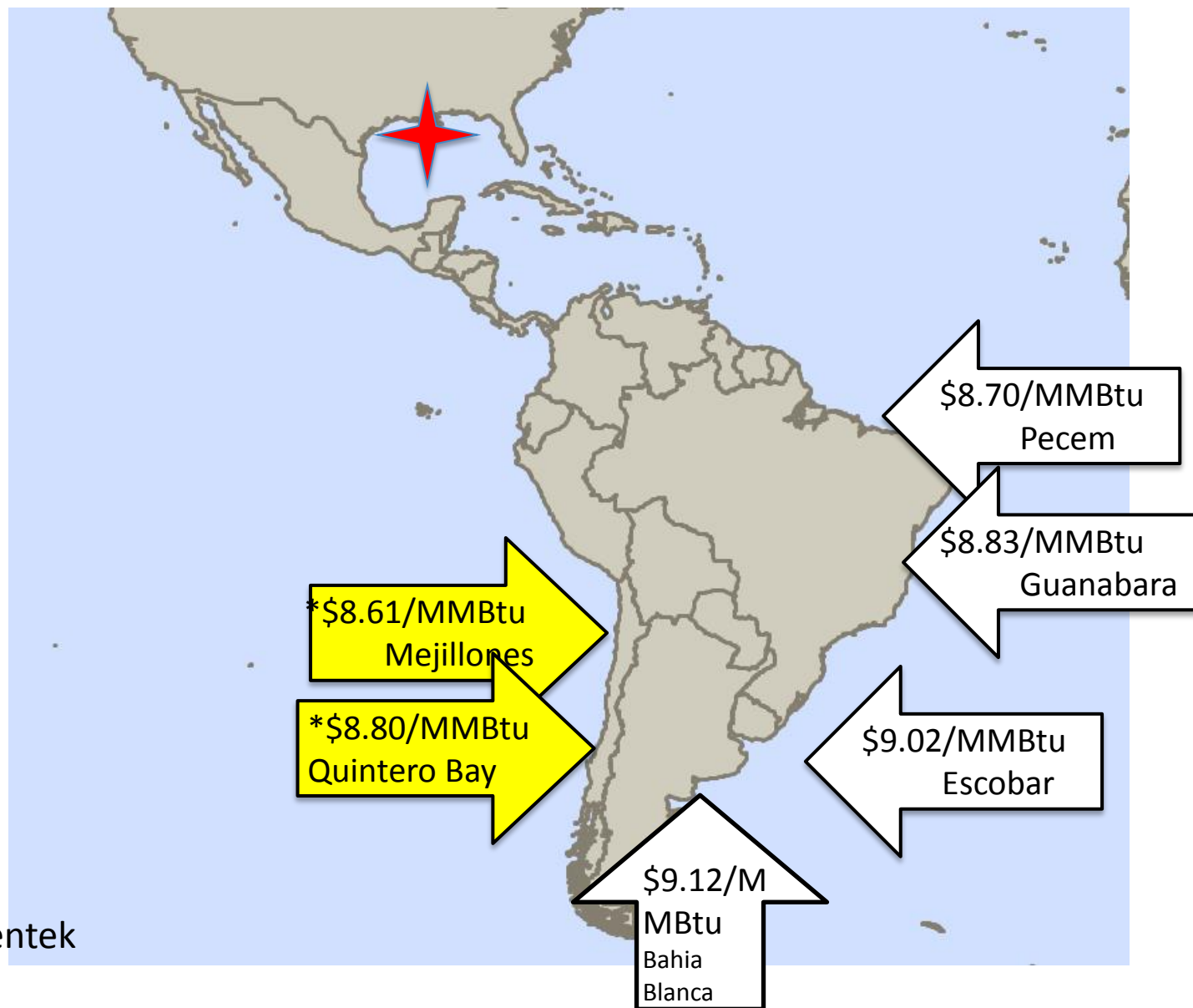
U.S. Exports Will Be Competitive Into Europe

- U.S. LNG exports will be competitive in the U.K. market, also with oil-linked Russian imports into the European Market.



Source: Platts, Bentek, ICE

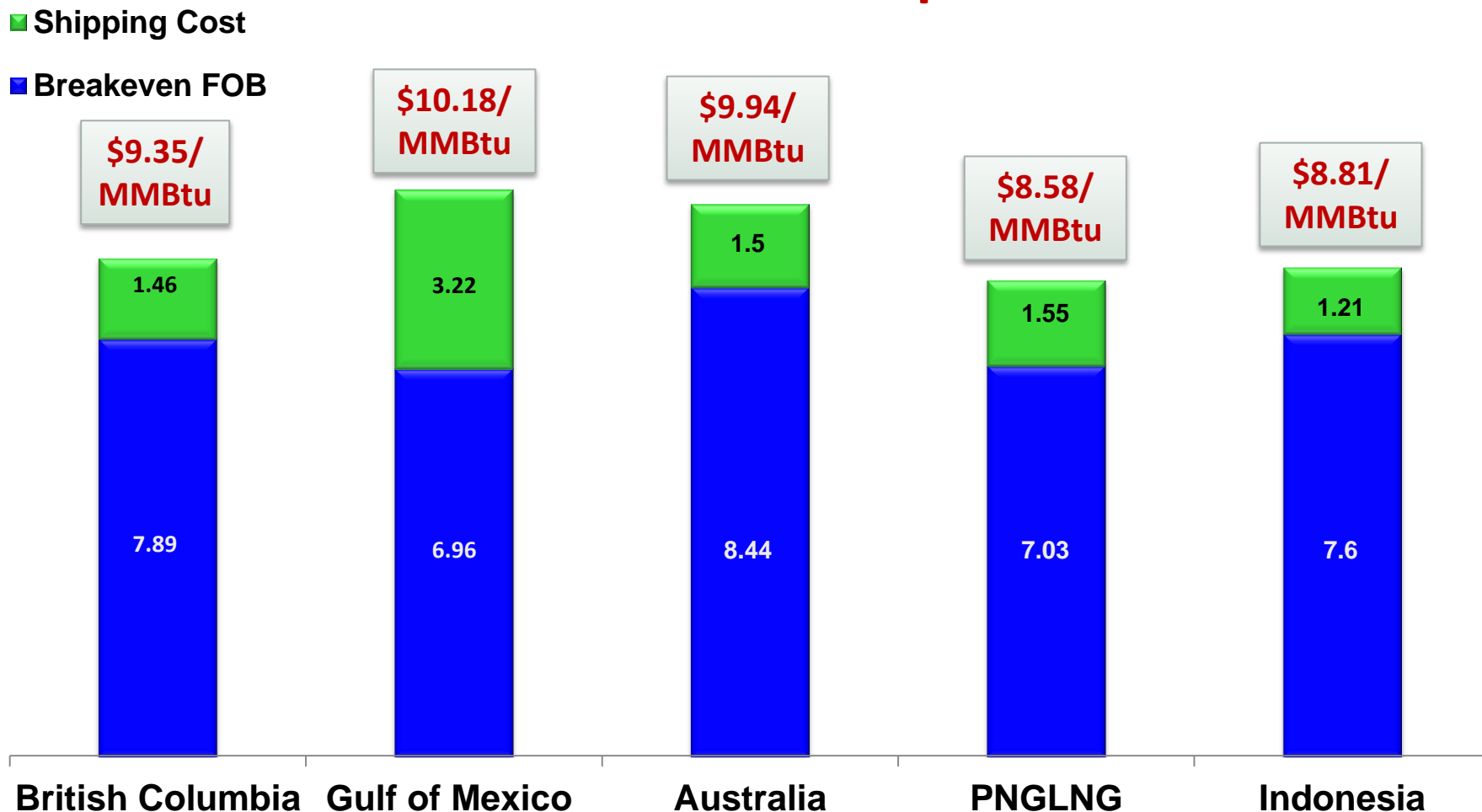
U.S. Gulf LNG Exports to South America DES Breakeven Cost 2018



Source: Bentek

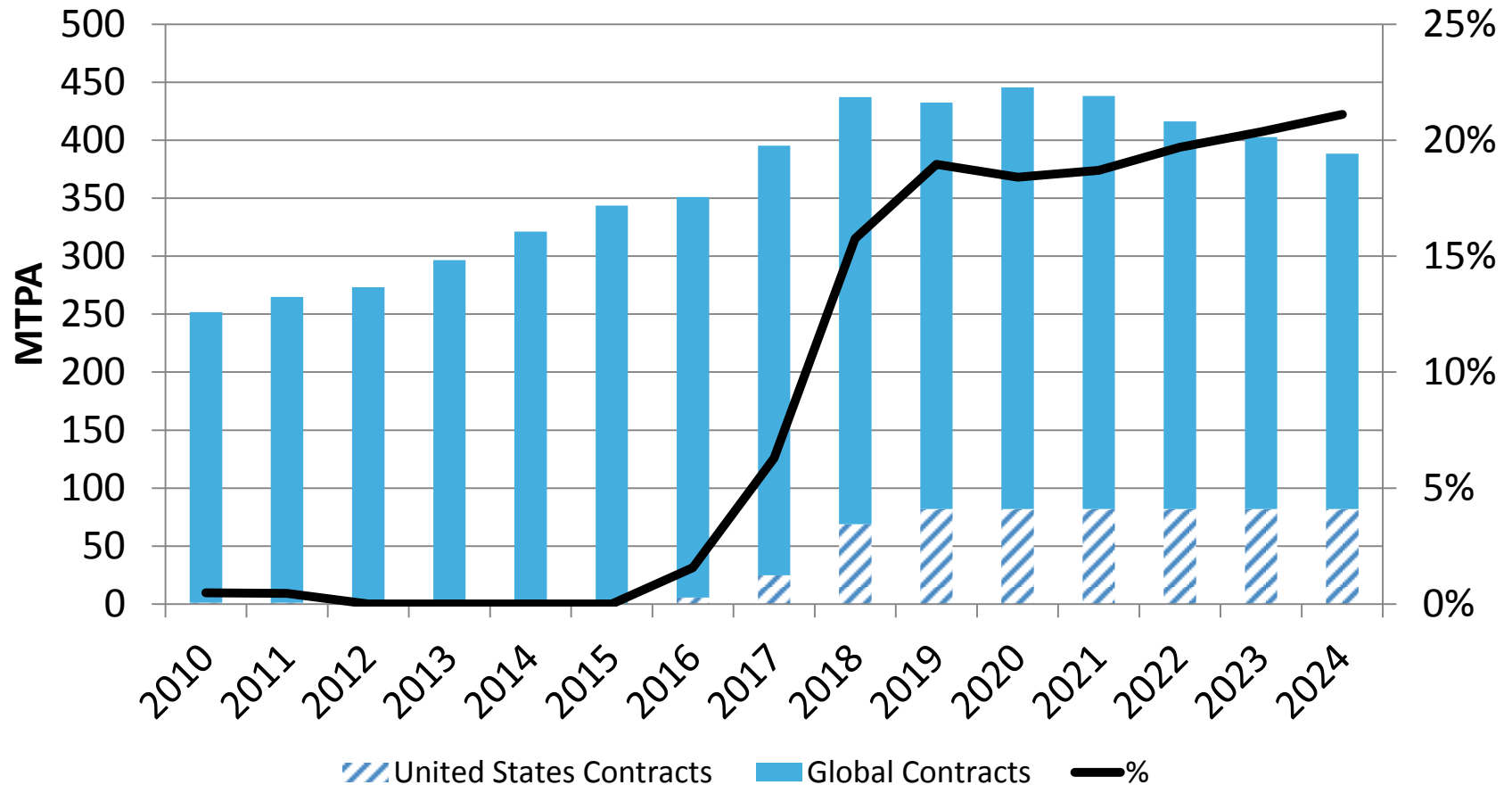
Export Competitive Analysis Case Study: Japanese Market - 2018

Breakeven DES – Japan 2018



Source: Bentek

Global Contract Evolution



Source: Bentek

How much shipping capacity will be needed for upcoming North American LNG exports to Asia?

Required Shipping Capacity for NA LNG Exports : 156 vessels

North American Shipping Requirements

TERMINAL	ASIA			MIDDLE EAST / INDIA			EUROPE			SOUTH AMERICA			TOTAL SHIPS REQUIRED
	Volume (mtpa)	Distance (days)	Ships Required	Volume (mtpa)	Distance (days)	Ships Required	Volume (mtpa)	Distance (days)	Ships Required	Volume (mtpa)	Distance (days)	Ships Required	
Sabine Pass	11.0	50.0	19.1	3.5	48.5	5.9	2.2	25.0	1.9	1.3	31.0	1.4	28.4
Elba Island	2.0	50.0	3.5							2.0	31.0	2.2	5.6
Cove Point	2.3	50.0	4.0	2.3	67.5	5.4	0.7	25.0	0.6				10.0
Freeport	13.2	50.0	23.0										23.0
Cameron	8.0	50.0	13.9							5.5	31.0	5.9	19.8
Lake Charles	5.0	50.0	8.7	5.0	67.5	11.7				5.0	31.0	5.4	25.8
BC LNG	1.8	22.5	1.4										1.4
Pacific Northwest	15.7	22.5	12.3	4.0	50.0	7.0							19.2
Prince Rupert	16.0	22.5	12.5	5.6	50.0	9.7							22.3
SHIPS REQUIRED	98.4			39.7			2.5			14.9			155.5
CAPACITY (m3)	15,911,226			6,427,386			400,833			2,406,683			25,146,128

Assumptions	
Vessel Speed (mi/day)	400
Ship Capacity (m3)	161,700
Ship Capacity (Mt)	0.07875

Source: Bentek

- U.S. gas production growth based on shale gas development has outpaced demand growth and caused drop in prices, generating opportunities for North American Exports
- North American LNG exports will average 10.3 Bcf in 2024
- Windows of opportunity closing for Canadian LNG Exports
- U.S. to become net gas exporter by 2017, N.A. LNG exports will lead to \$5.10/MMBtu Henry Hub Price in 2021
- Global demand 61 Bcf/d by 2024 driven by Asia (75% of the market)
- Global demand growth will outstrip supply through mid-decade; North American exports are needed for market balance.
- Market tightness will continue for the rest of the decade, supporting JKM
- Shale oil will displace waterborne oil imports from the U.S., affecting global oil prices...and oil linked LNG contracts
- Average savings for Japanese subscribers of GOM liquefaction projects: \$2.29/MMBtu (2016-2024)
- U.S. LNG exports into Europe and South America also competitive
- 21% of global contract HH indexed by 2024
- ~ 156 Vessels required for North American exports

Muchas gracias por su atención

BENTEK is an energy market analytics company focused on the natural gas, oil, and liquids markets and related energy sectors.



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