

U.S. Gas Markets: Coal vs Gas and the Growing Challenge

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David Pruner

Senior Vice President



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North American gas and coal markets: mixed messages

The opportunities...

- › More low-cost resource...
- › CAPP producers are squeezed out...
- › Liquids buoy returns...
- › Plans to capitalize on low-cost gas gain momentum...
- › Global energy and commodity prices remain relatively high...
- › \$5.50/mmbtu gas plays: good assets eventually
- › Not your father's supply area: Gulf Coast price premiums
- › The low-cost resource base offers jobs and an improved trade balance

The challenges...

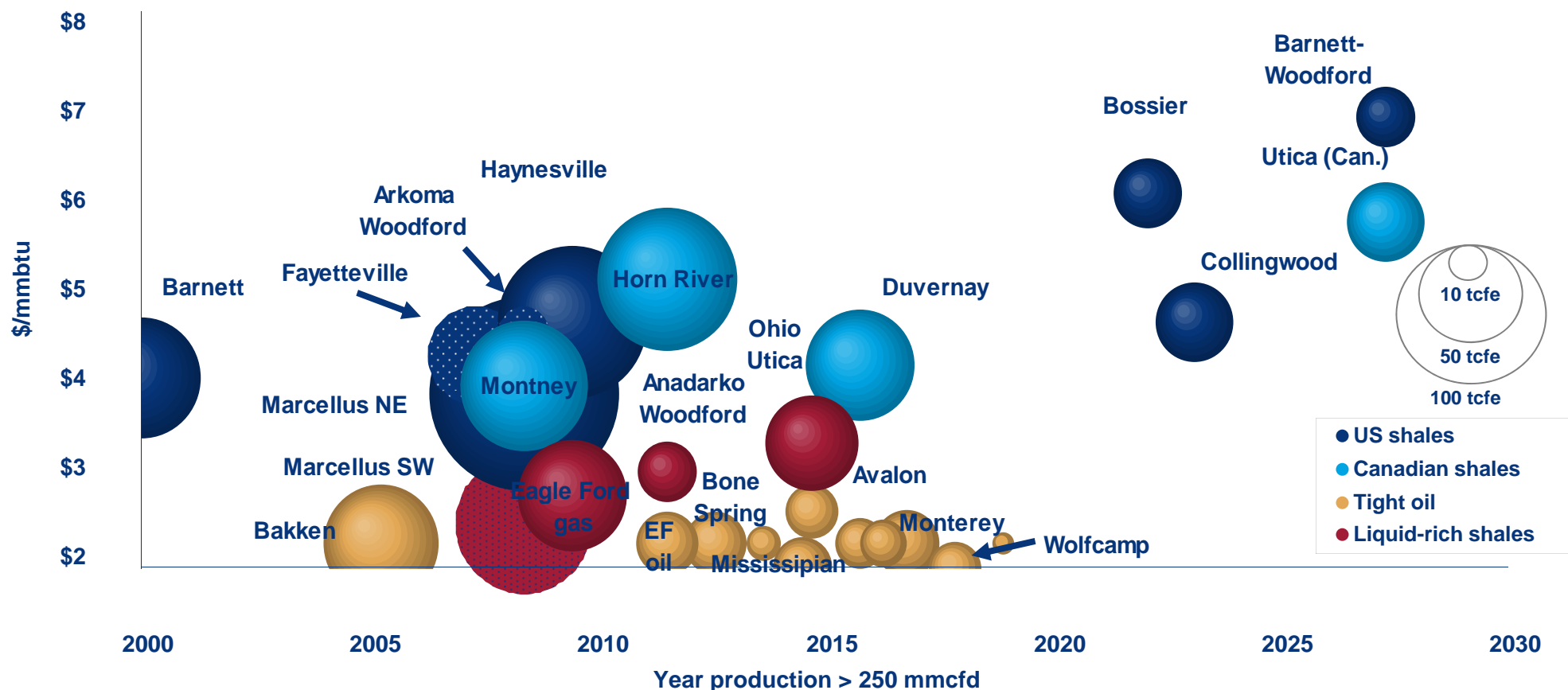
- › ...drives down prices and returns
- › ...but ILB is expanding
- › ...is the ship sinking?
- › ...plans won't translate into demand for years
- › ...how much market for North American exports and China take a pause
- › ...sidelined for now until premium markets develop
- › ...distant supplies feature deep price discounts
- › ...but global headwinds are strengthening

Producers established additional low-cost resource potential

More low-cost resource...

Shale gas and tight oil plays

2012

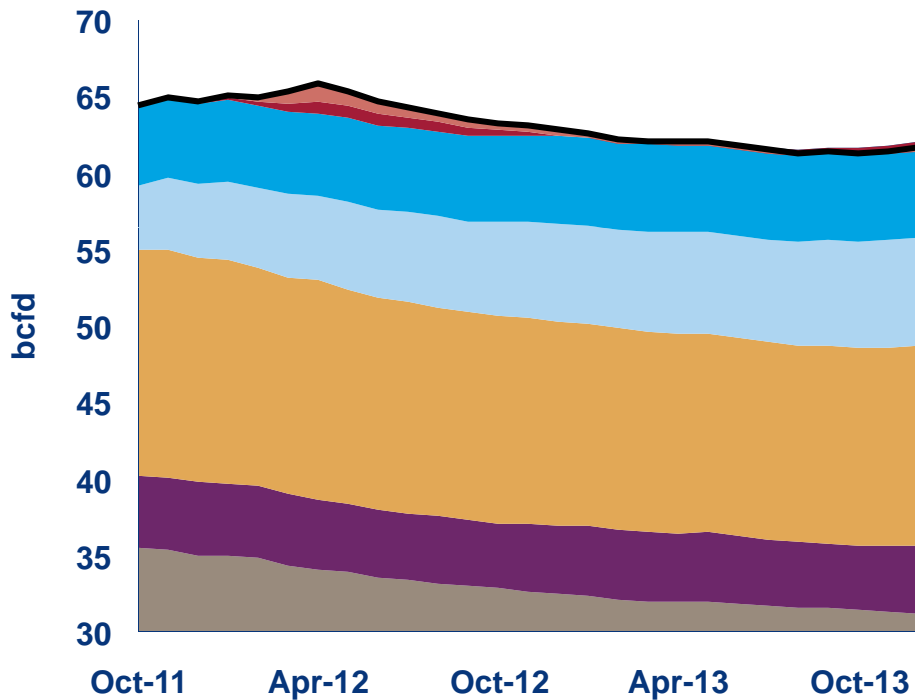


Sources: Wood Mackenzie (North America Gas Service, Unconventional Gas Service)

US drilling declines have been severe but improved drilling efficiency, rising associated gas, and high-grading reduce impact

Chesapeake and Haynesville drilling reductions have been most pronounced

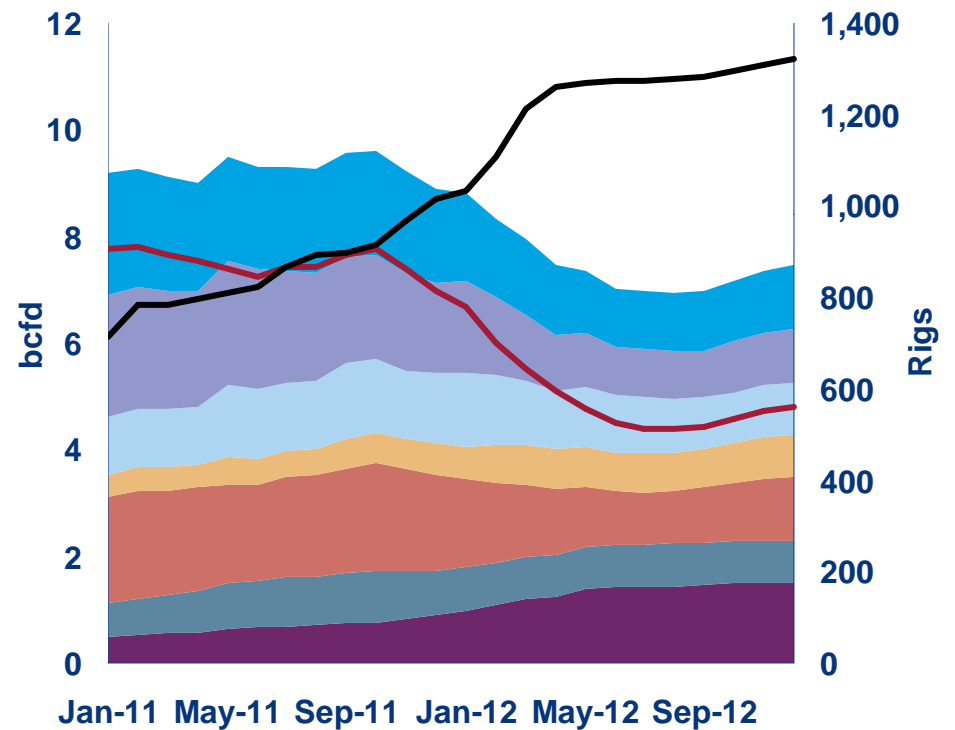
Short-term US Production by type



- Other
- Dry gas shales
- Associated gas
- Shut-ins
- Gulf of Mexico
- Wet gas shales
- Delayed Completions
- Without shut-ins

Source: Wood Mackenzie (North American Gas Service)

US rig fleet gas productivity



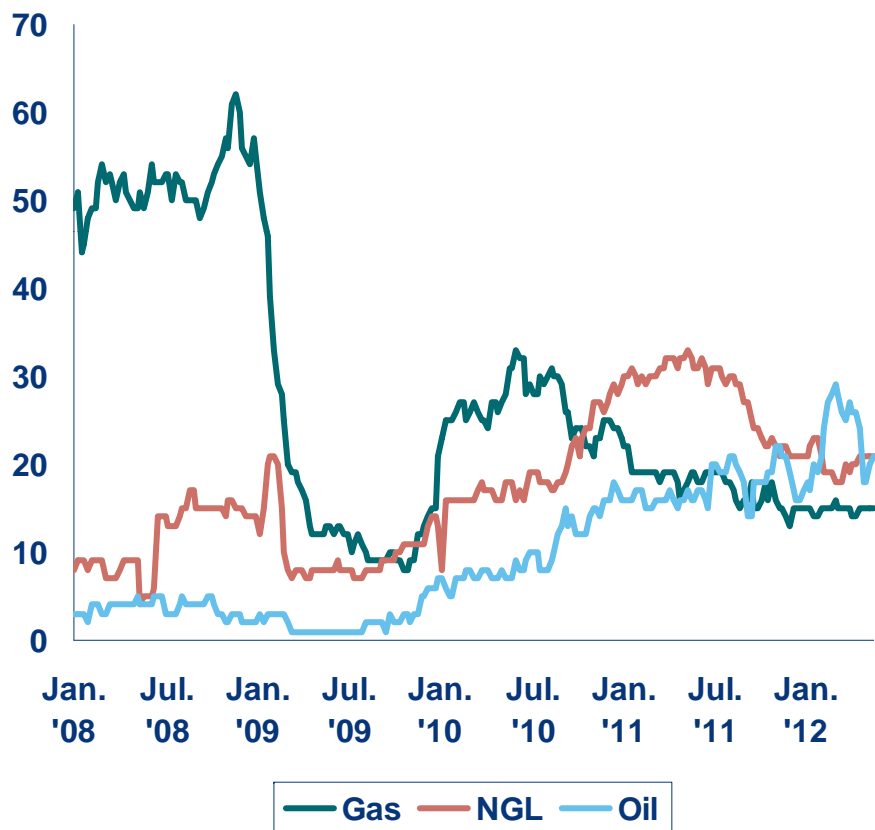
- Associated
- Eagle Ford
- Other rich-gas
- Marcellus SW
- Marcellus NE
- Haynesville
- Other lean-gas
- Gas rigs
- Oil rigs

Source: Wood Mackenzie (North America Gas Service)

And the rush to liquids plays continues...

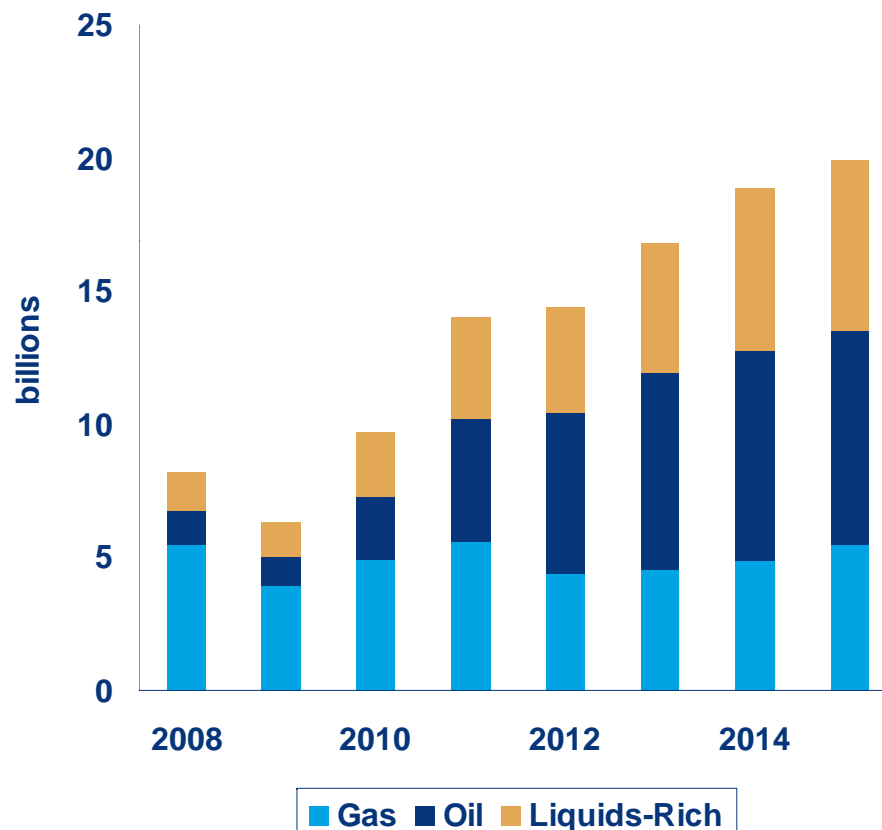
Liquids buoy returns...

Devon rig counts



Source: Wood Mackenzie (North America Gas Service)

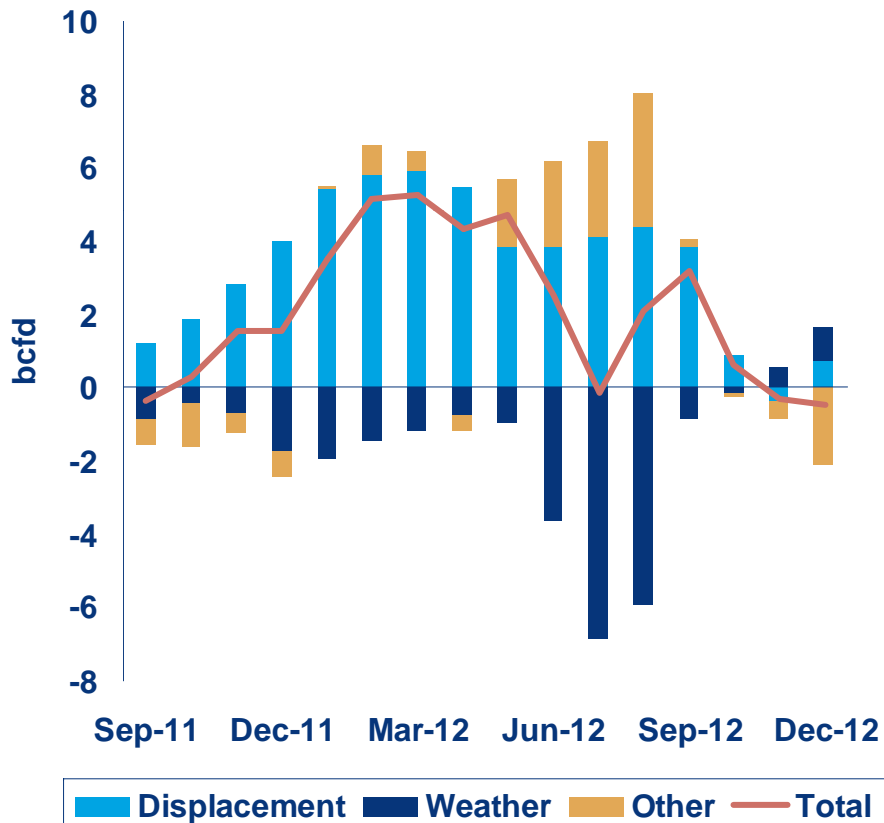
US lower 48 capex outlook for 12 US drillers¹



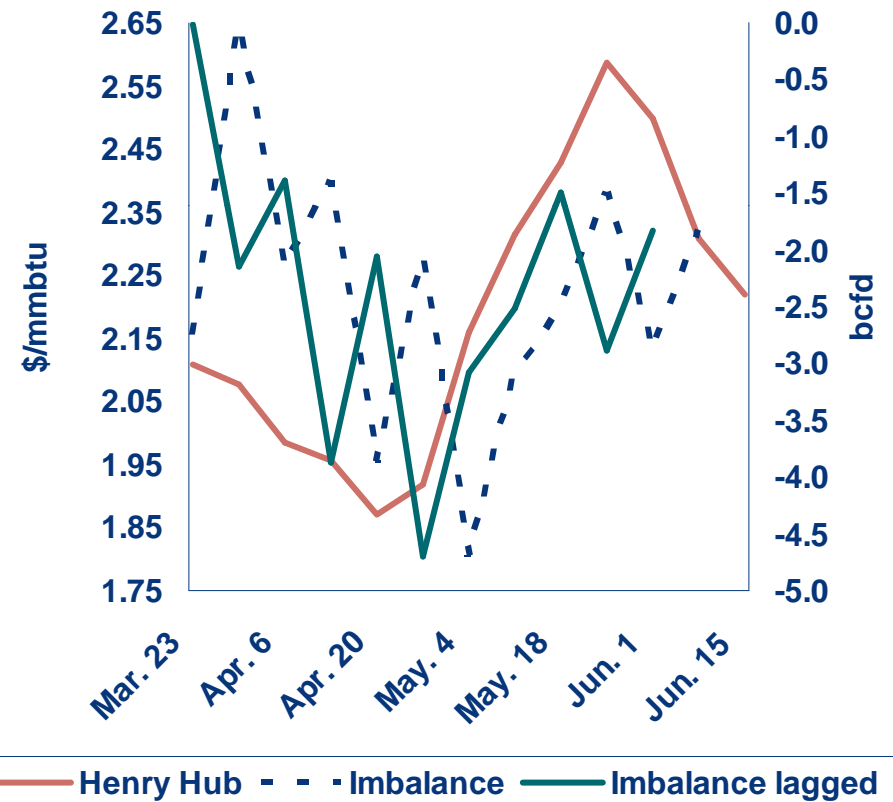
¹ - Companies included in analysis: Anadarko, Apache, BG, BHP, ENI, EXCO, Hess, Newfield, Noble, Range, Samson & Talisman
Source: Wood Mackenzie Upstream Service

Summer displacement levels will be high, but gas capacity will be sufficient— with coal markets accommodating very high gas burn

Year-over-year gas-fired generation growth



Gas S-D balance and Henry Hub prices



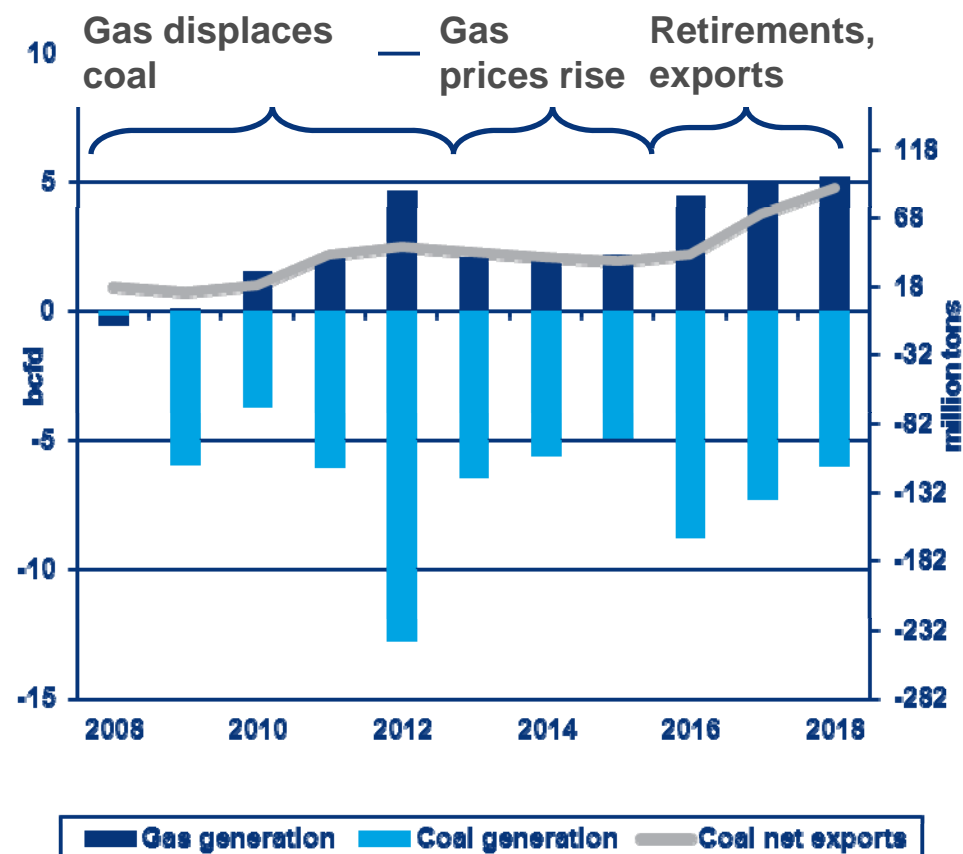
Sources: Wood Mackenzie (North America Power Service, North America Gas Service, Coal Market Service North America)

Coal retirements add a significant increment of gas demand—but rising prices unwind displacement, and load growth is limited

Major coal export capacity expansions

Terminal	Operator	Basin	Cap.	Cost (million \$)	Start Date
IC Rail Marine Expansion	Foresight Energy	ILB	4-8	72	Existing
Houston	KM/Peabody	Col.	2	18	2011
Lambert's Point	Norfolk Southern	CAPP	15		2011/12
IMT Marine	KM/MEE	CAPP	4-6	70	2012
Mobile	WLT/Drummond	SAPP	5	9.5	2012
Burnside	Trafigura	Various	11	128	2012/13
Gateway	Peabody	PRB	27	500	2014/15
Millennium	Arch/Ambre Energy	PRB	6	100	2014/15
Baltimore	CONSOL	NAPP	8		Unspecified
Ram Terminals	Armstrong	ILB	6		Unspecified

US coal exports and gas and coal generation

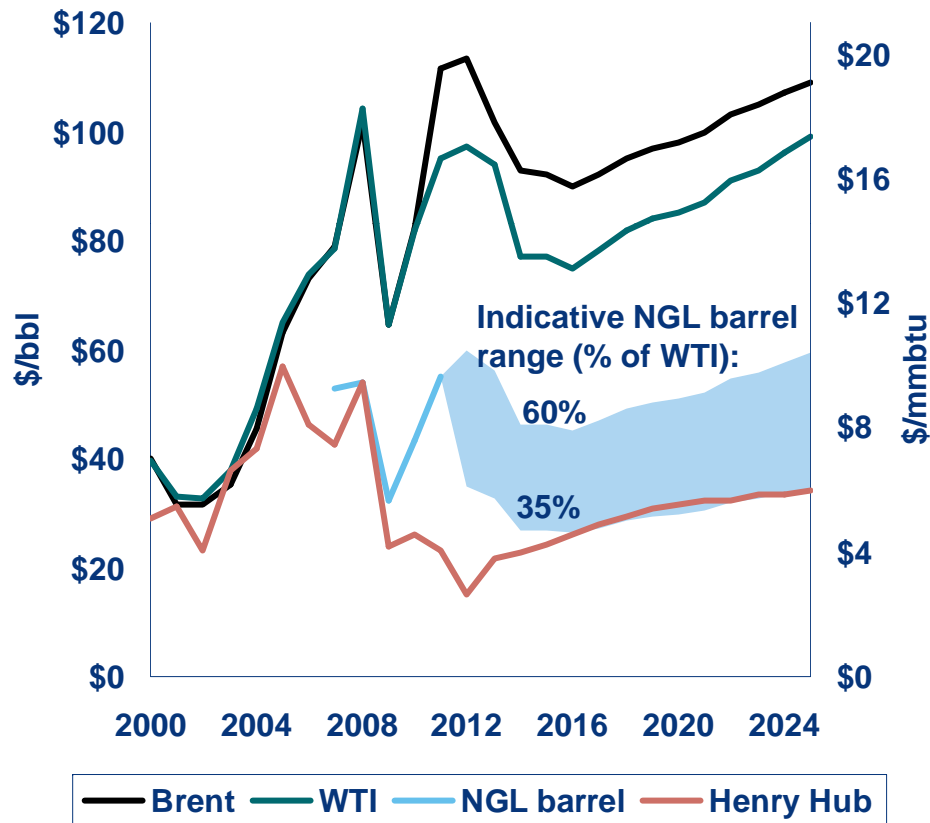


Source: Wood Mackenzie (North America Gas Service, Coal Market Service)

WTI and NGL prices drop and gas drilling recovers as markets develop

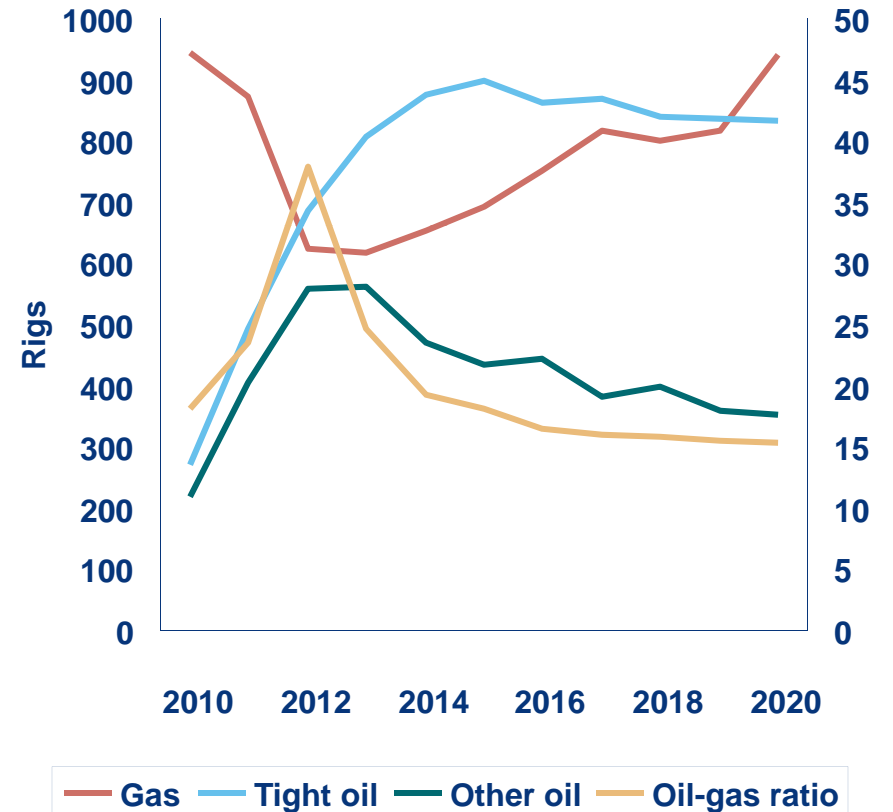
What plays are at most risk to lower liquids values?

Gas, Oil, and NGL commodity prices



Source: Wood Mackenzie (North America Gas Service)

Drilling outlook

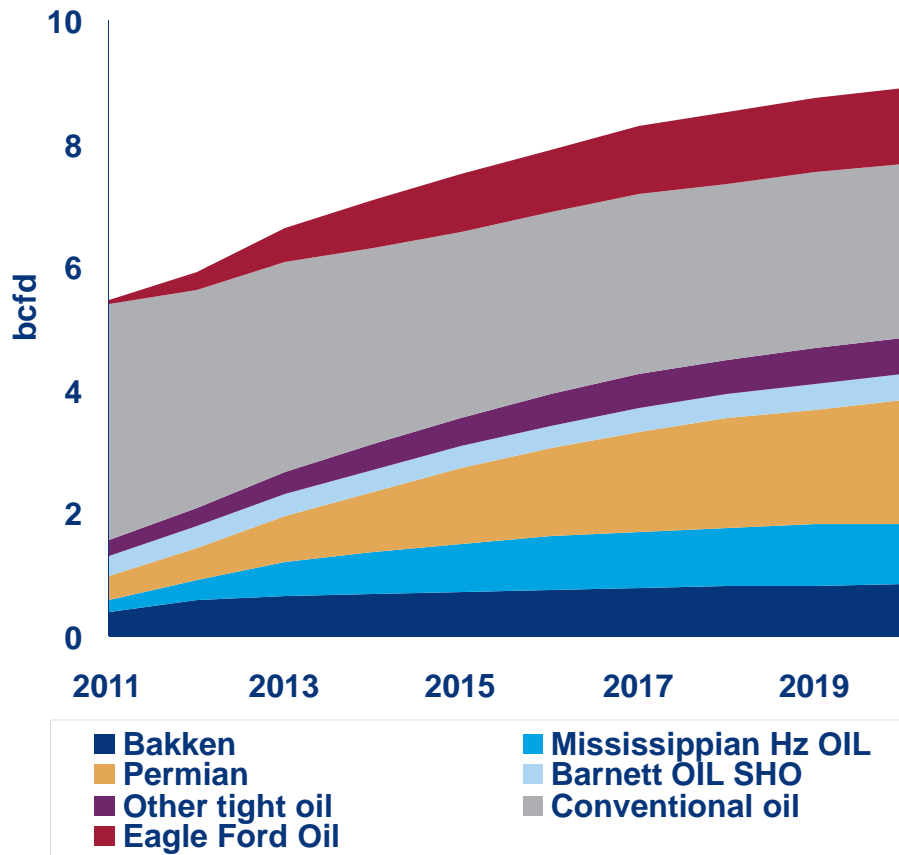


Source: Wood Mackenzie (North America Gas Service)

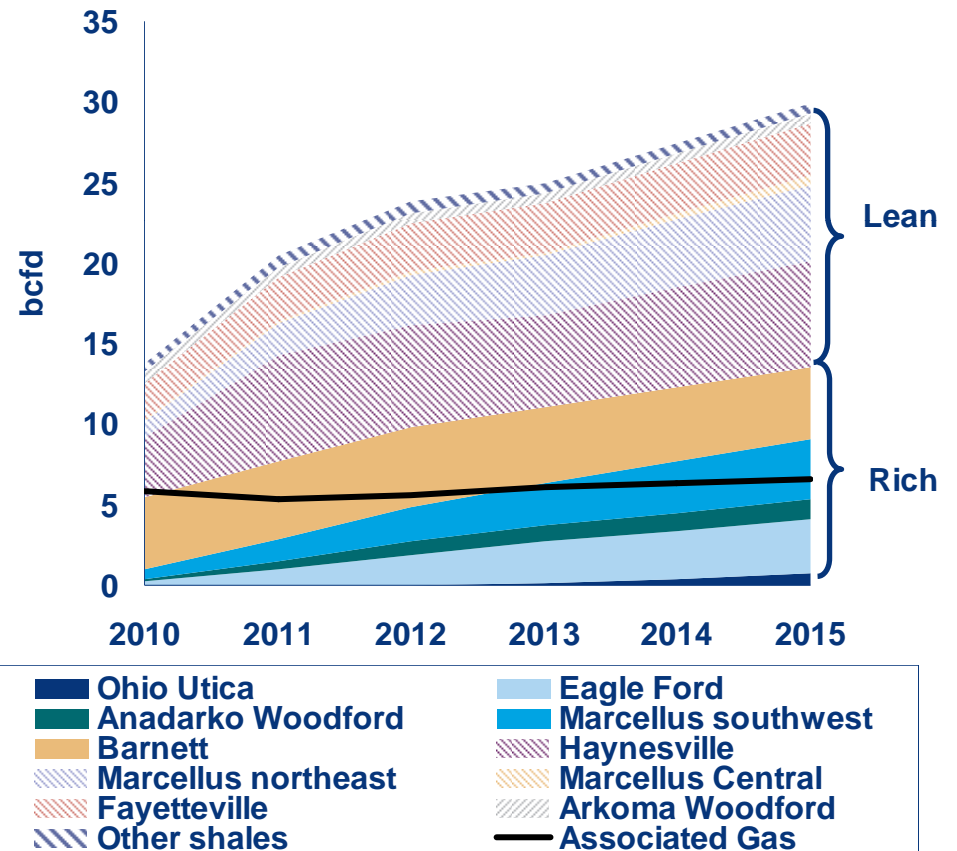
Oil prices and tight oil are supportive of increased gas volumes

But the big driver is rich-gas and NGL support of growing shale gas volumes

US associated gas forecast



US shale production by gas richness



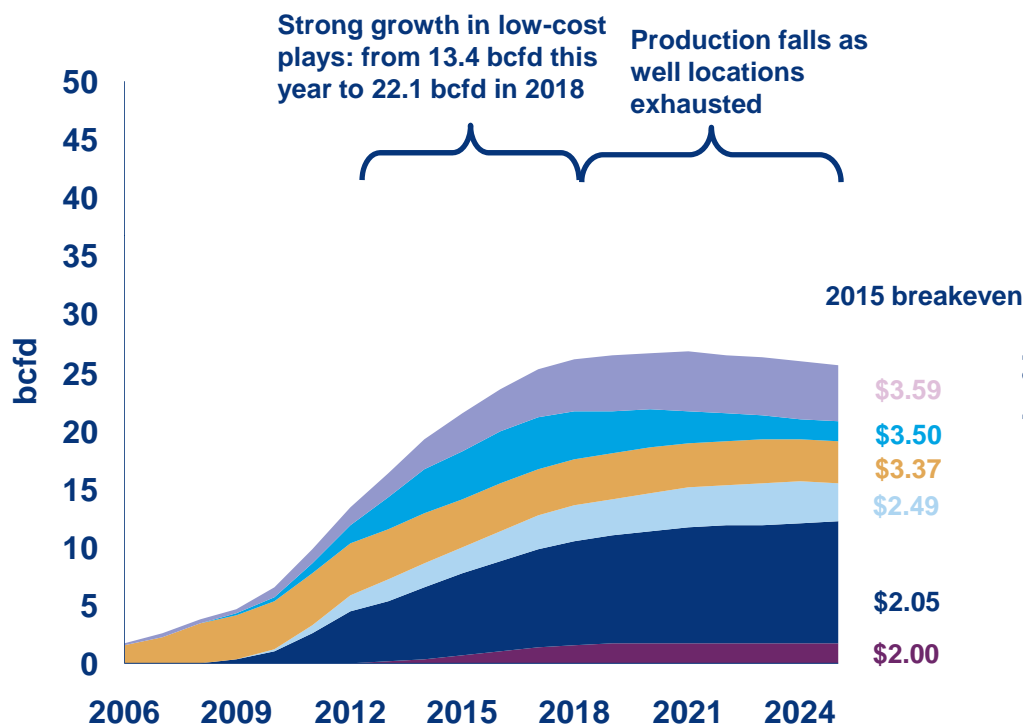
Source: Wood Mackenzie (North America Gas Service)

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Core areas of existing plays are likely to be sufficient to meet demand growth until 2018—returns improve later

Sub-\$4.00/mmbtu gas plays are core gas assets

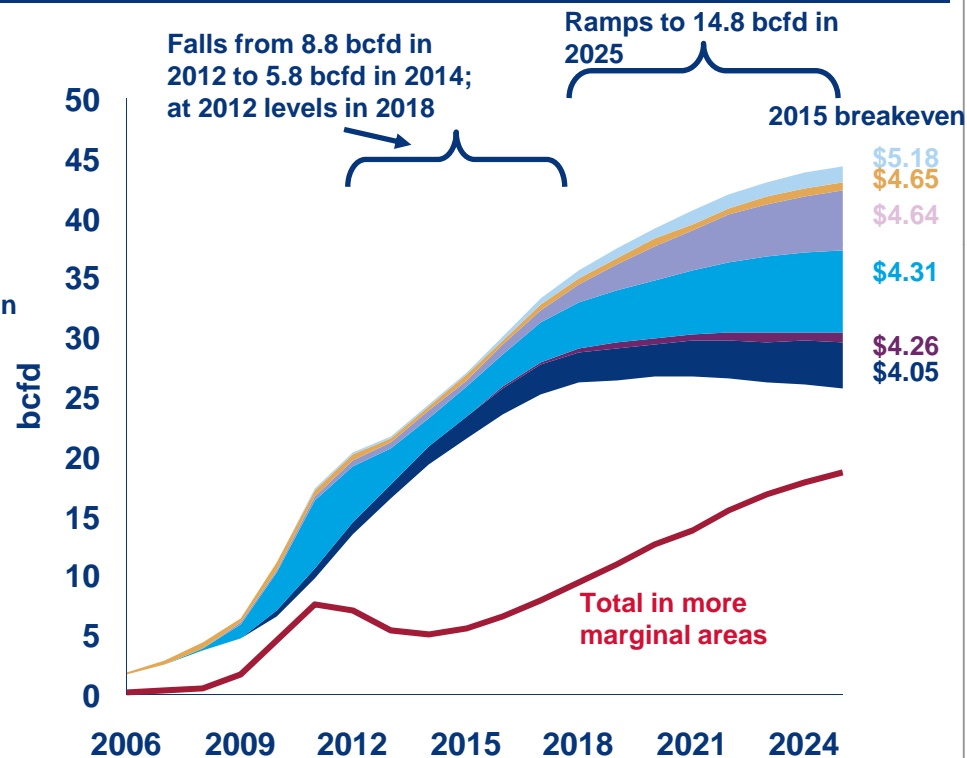
Production from low-cost plays



- Utica wet
- Marcellus core
- Eagle Ford wet
- Barnett core
- H'ville premium
- Montney

Source: Wood Mackenzie (North America Gas Service)

Production from more marginal areas of these plays

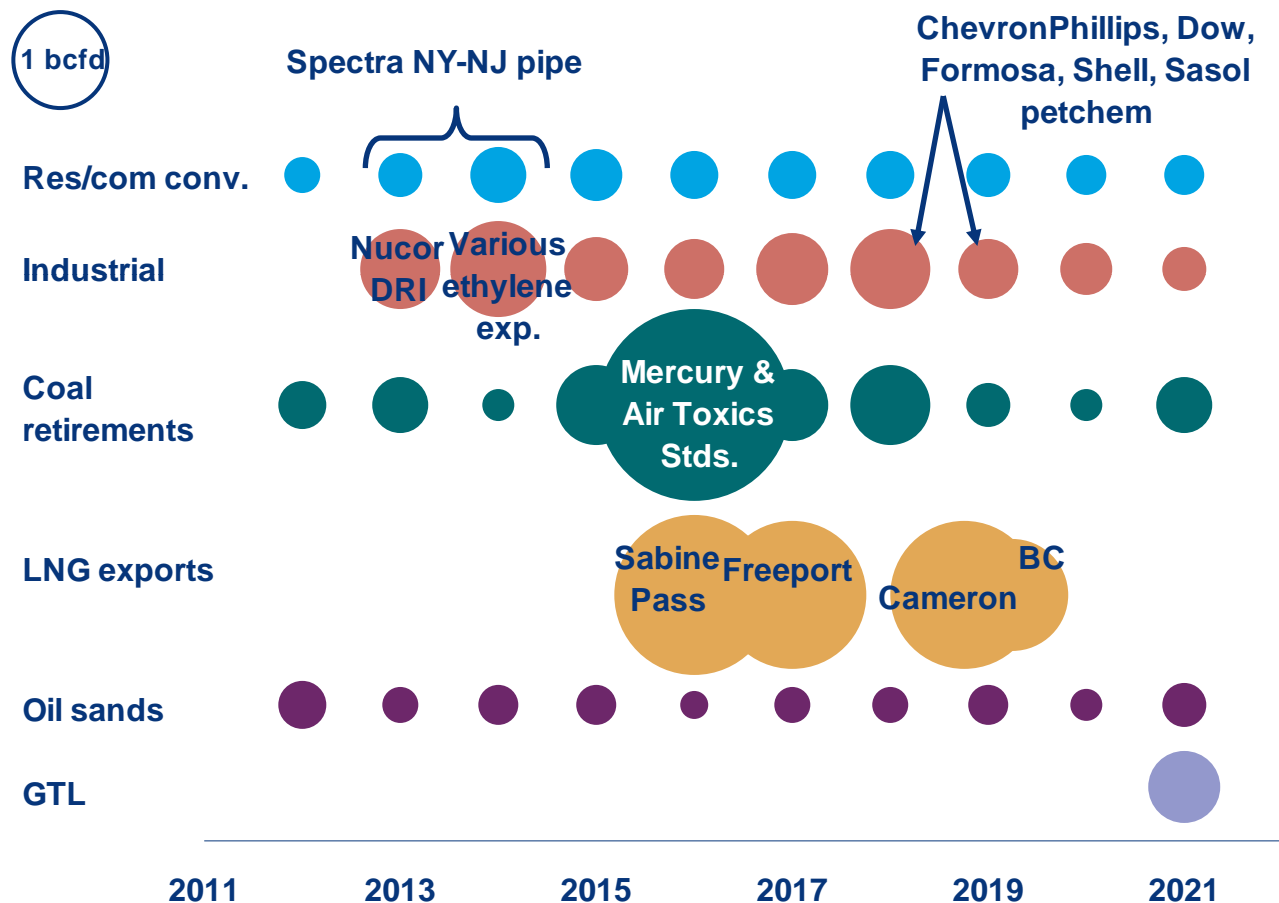


- Marc. non-core
- Utica dry
- H'ville Tier 1
- Horn River
- Barnett non-core
- Eagle Ford dry

Source: Wood Mackenzie (North America Gas Service)

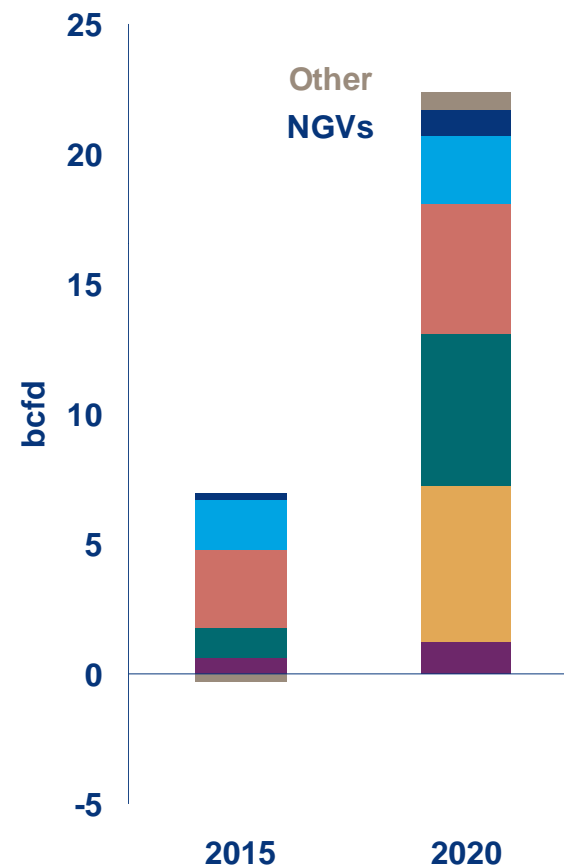
Major demand-side investments are underway—but concentrated in the second half of the decade

Annual gas demand growth (US & Canada)



Source: Wood Mackenzie North America Gas Service

Cumul. demand growth (vs. 2010)

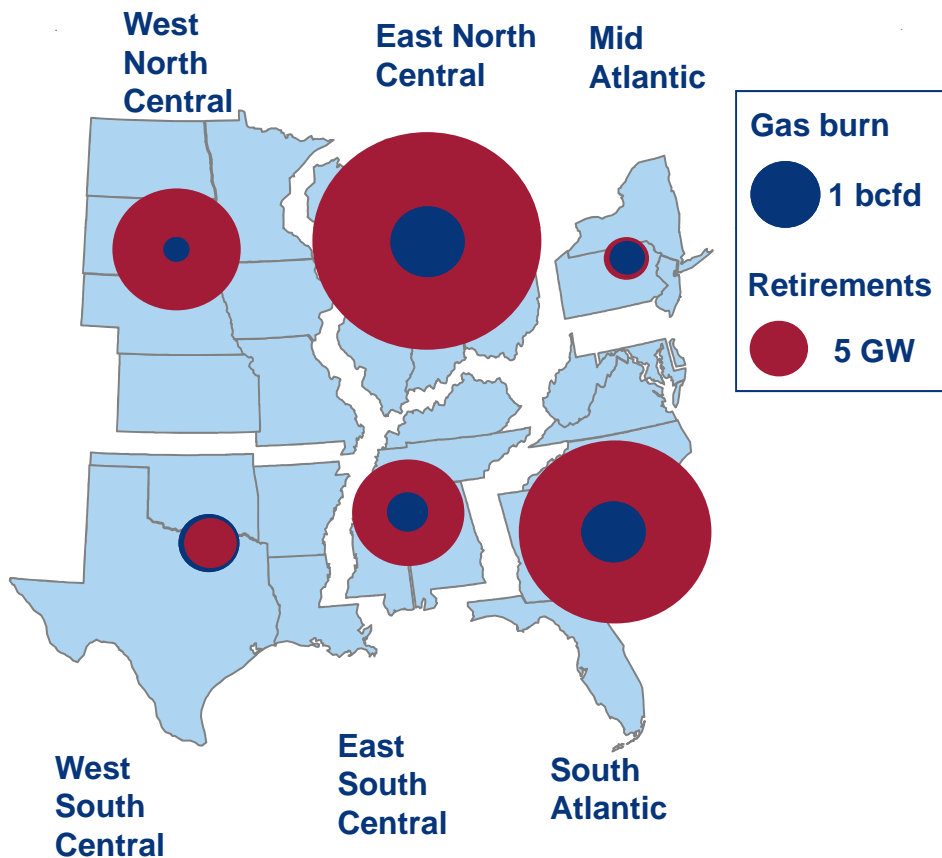


Source: Wood Mackenzie (North America Gas Service)

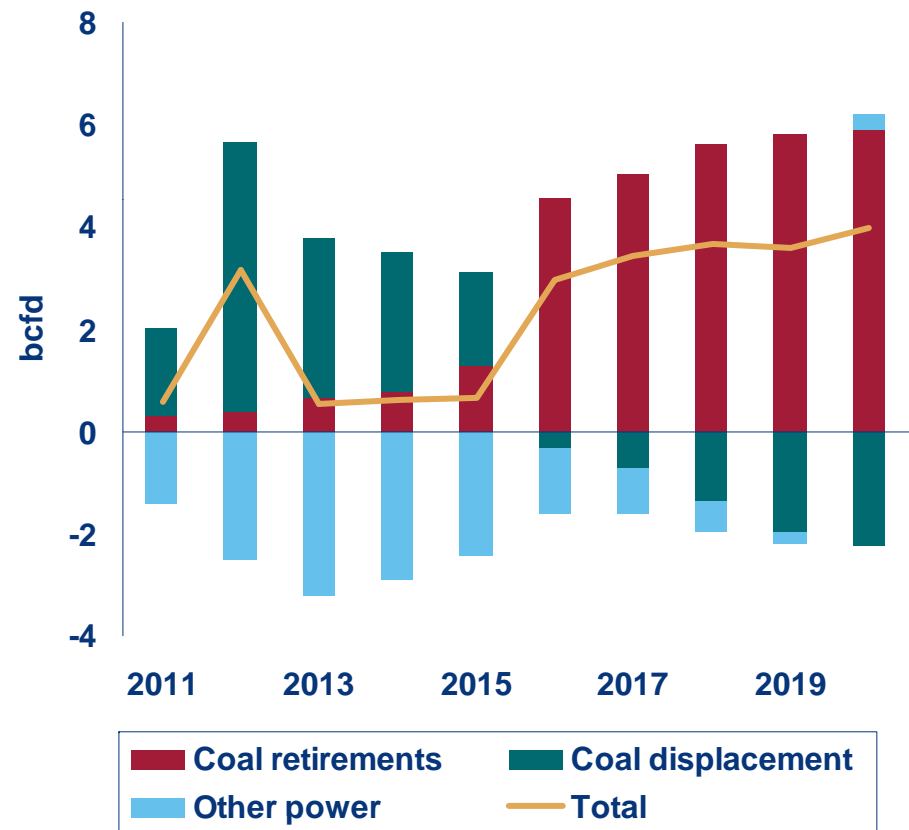
Coal retirements add a significant increment of gas demand—but rising prices unwind displacement, and load growth is limited

Plans to capitalize on gas gain momentum, but plans don't translate into demand for years...

Coal retirements and gas impact

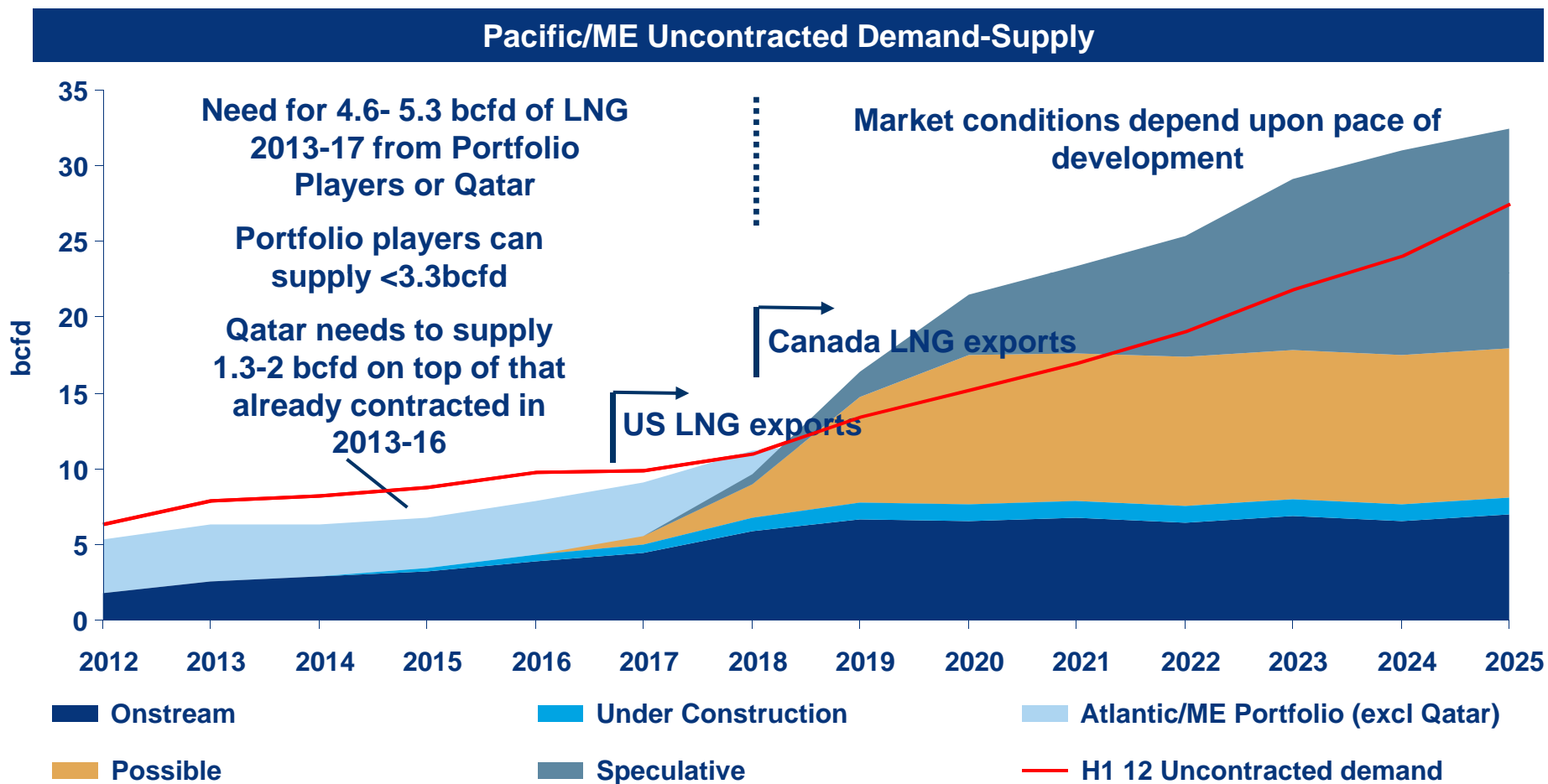


Power sector demand growth



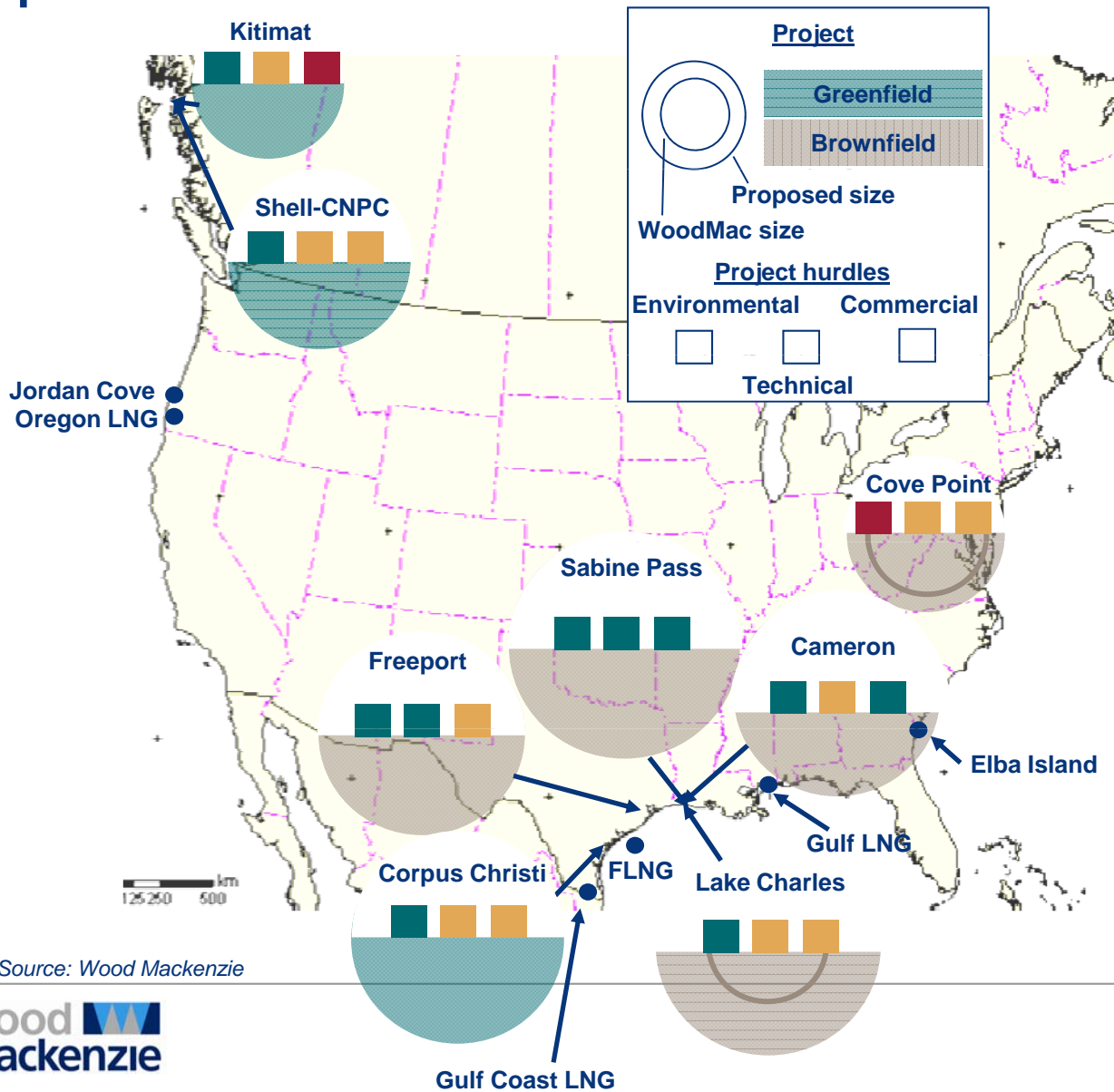
Sources: Wood Mackenzie (Coal Market Service, North America Power Service)

The market for North American LNG within the Pacific is limited and projects that can get to market quickly are advantaged

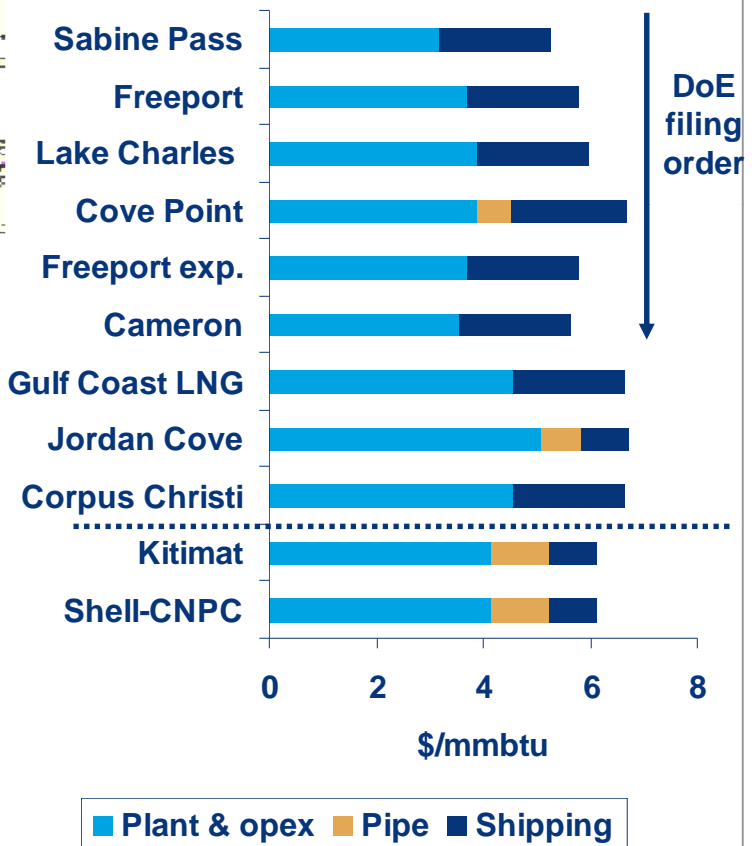


Source: Wood Mackenzie Global Gas Service H1 12, LNG Tool

Not all North American LNG projects—even brownfield ones—are created equal



Export economics

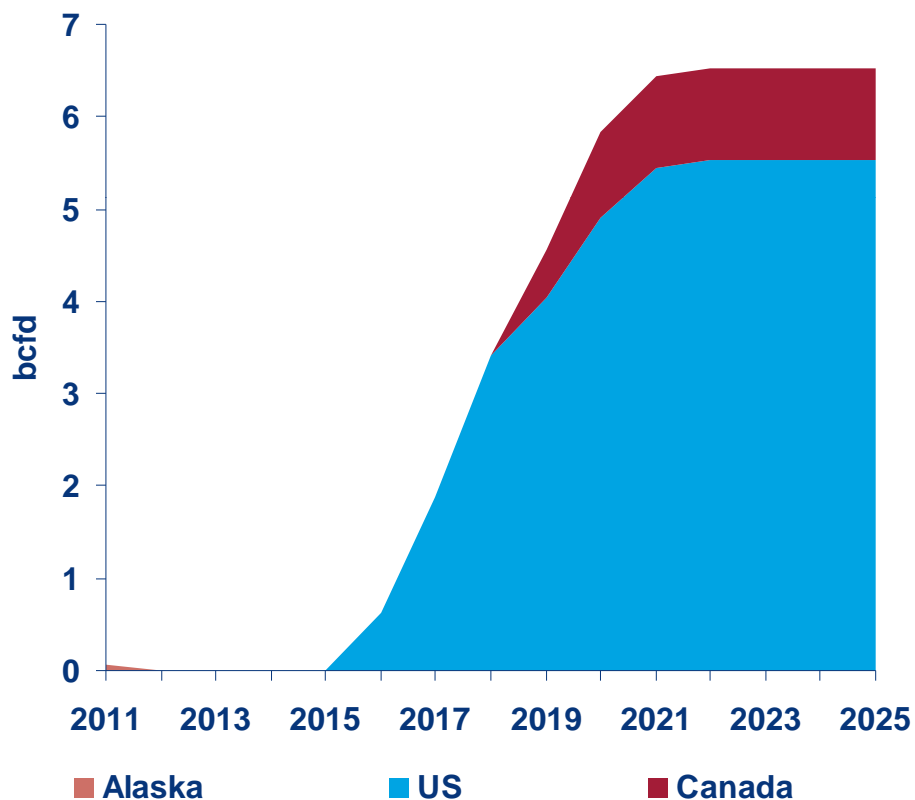


Source: Wood Mackenzie

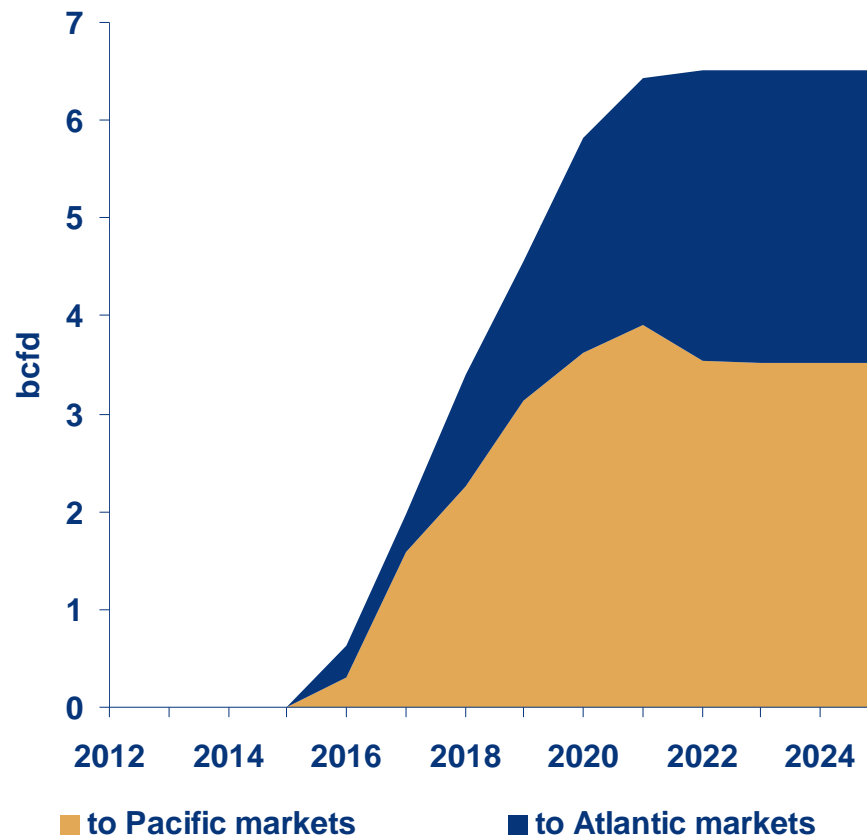
Note: AECO discount included in Plant & opex figures

A significant portion of North American LNG will likely be routed to Atlantic markets, primarily Europe

North America LNG Capacity



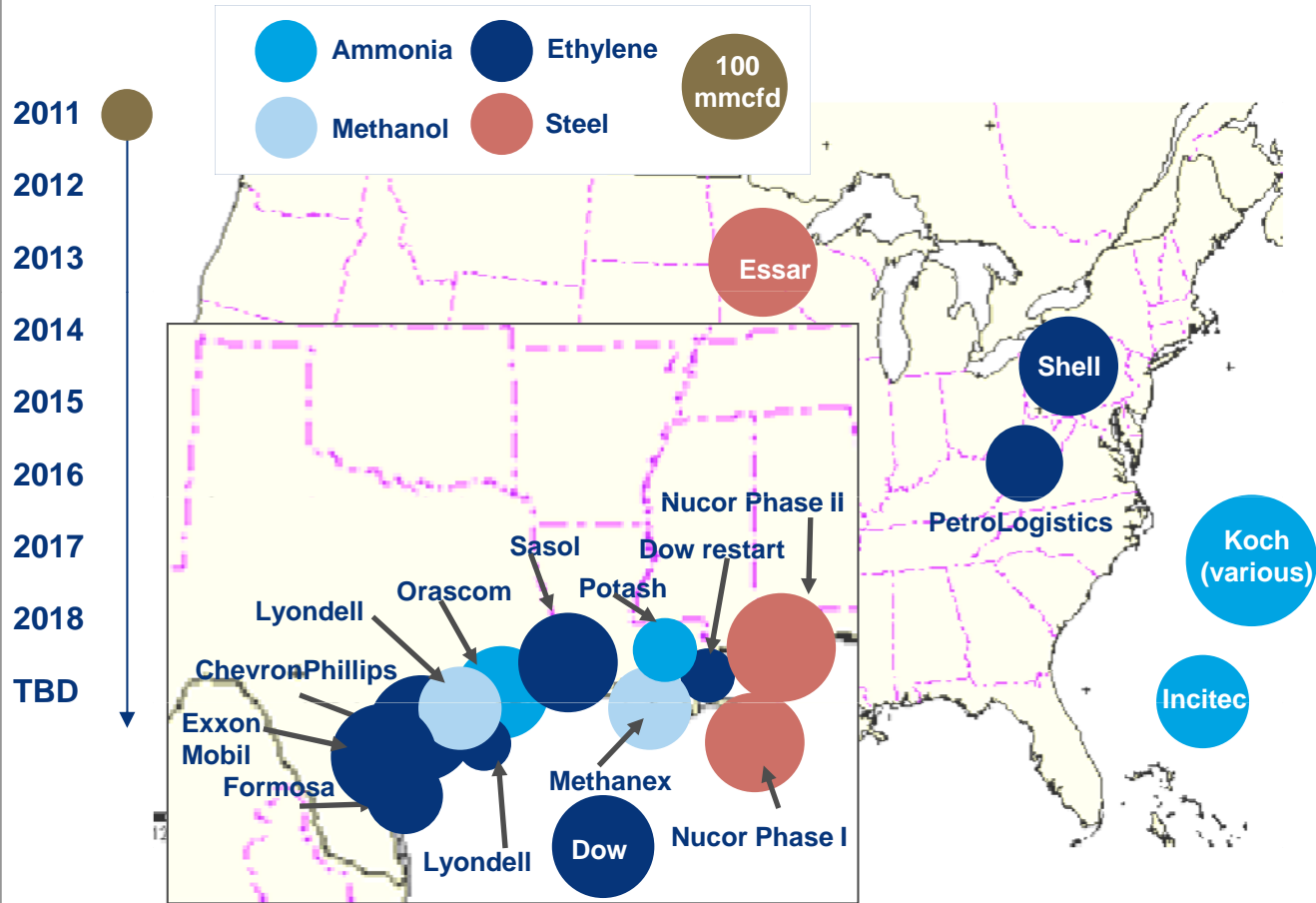
North America LNG Flows



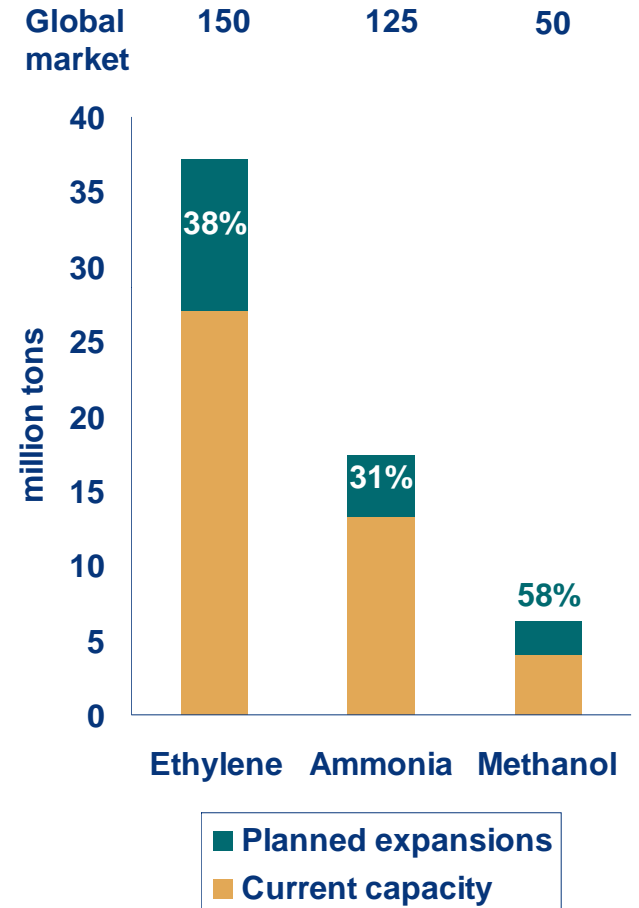
Source: Wood Mackenzie Global Gas Service H1 '12

Industrial announcements accelerate

Industrial capacity expansions



Industrial capacity

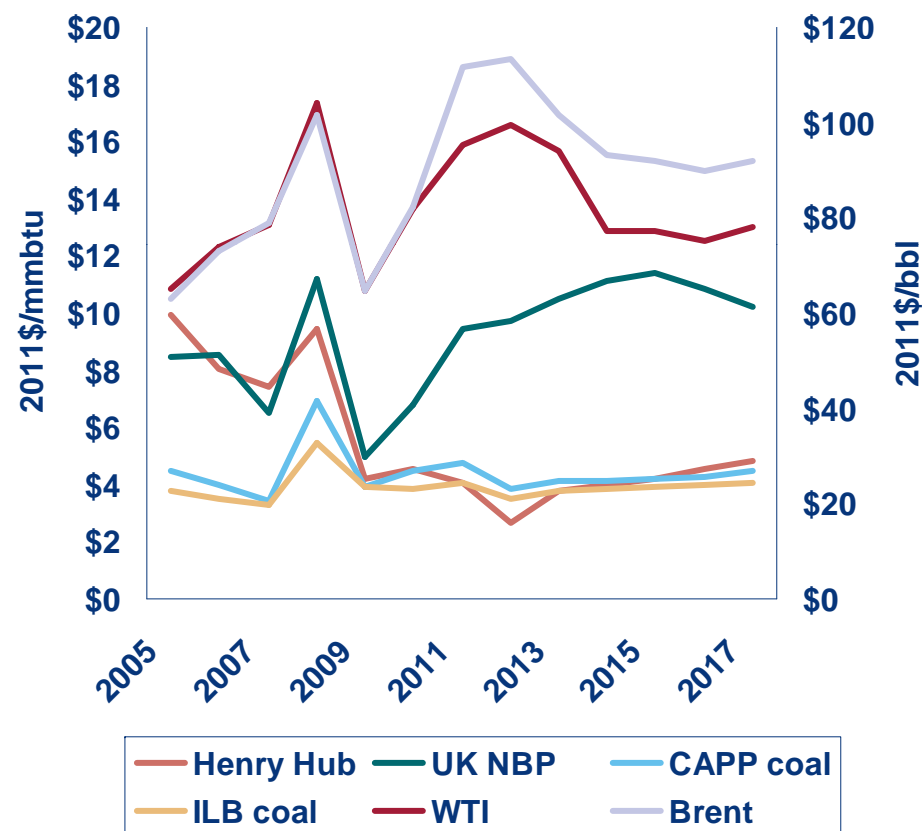


Source: Wood Mackenzie North America Gas Service

After the 2013 rebound, limited upside in gas demand or pricing

- › Low-cost resource creates opportunity, but with questions
- › Limited market growth holds down gas and capex through 2015
- › Drilling, price and returns step starting in 2016
 - Capital projects are completed and increase markets
 - Well locations in productive Haynesville and Marcellus cores are limited
- › Watch for:
 - Sensitivity to oil prices—could liquids drilling step back and support dry gas capex?
 - Productivity improvements, higher EUR
 - Leverage to global economy
 - Can the resource-rich US bolster global growth?

Price outlook

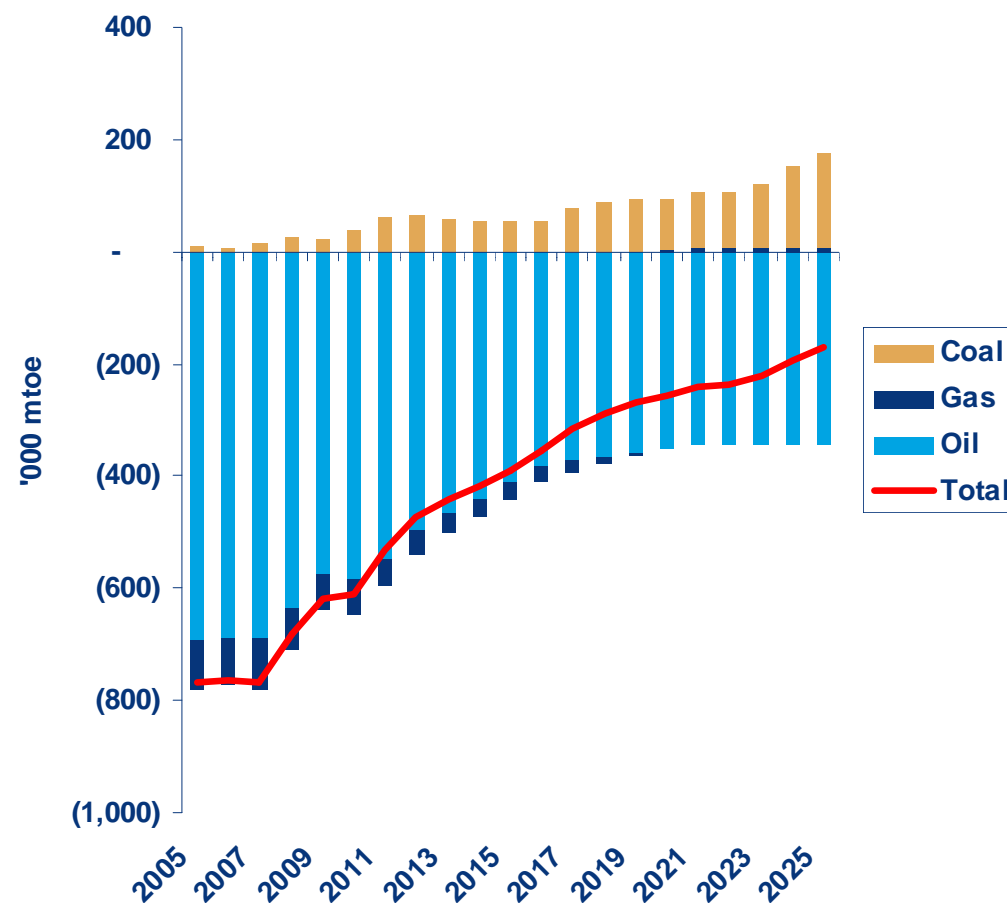


Source: Wood Mackenzie (North America Gas Service, Coal Market Service North America, Global Gas Service)

Key Takeaways

- › Low-cost resource creates opportunity, but with questions
- › Limited market growth holds down gas and capex through 2015
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US energy balance



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Global Contact Details

Europe +44 (0)131 243 4400
Americas +1 713 470 1600
Asia Pacific +65 6518 0800
Email energy@woodmac.com
Website www.woodmac.com

Global Offices

Australia	Japan	United Arab Emirates
Brazil	Malaysia	United Kingdom
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