

**Interesting Times:**

# **Navigating the Uncertainties in the North American Gas Market**

**Ed Kelly**

**Vice President North American Gas and Power**

**Wood Mackenzie**

consulting  
business environment



## Risks and Uncertainties – On the Supply Side

### The Resource Base is Vast, but Production Levels and Cost Remain Uncertain

- › **1) Environmental resistance – *especially* hydraulic fracturing regulations.**
  - Environmental resistance, and political attention, continue to build
  - Regulatory costs and permitting delays could slow development considerably
  - And increase the ultimate cost, and gas price, *substantially*
  
- › **2) Ultimate shale/unconventional production performance**
  - By 2013-2014, we will know much more about how shale wells perform longer term, and will have a much better idea of ultimate recoveries and production potential for a given well
  
- › **3) Competition with oil for upstream dollars and services**
  - Companies moving toward oil are moving away from dry gas - gas shale plays must compete for horizontal rigs and crews
  - A booming opportunity in oil could raise target IRRs on gas plays as producers seek the best margins

## Risks and Uncertainties – On the Demand Side

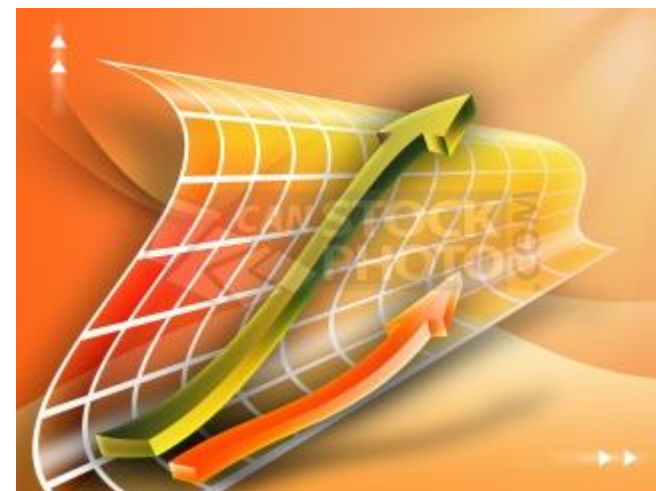
### Demand Opportunities Require Major Capital Commitment or Policy Help, while Risks are Few

- › **1) Carbon and environmental policy – coal retirements are the lever**
  - Wide range of possibilities w. carbon depending on the targets, timing, price and investment focus
  - EPA regulation and pressure on older coal units—how many retire?
- › **2) A weak economy – 1 year of recession takes 2-3 years of demand growth off the table**
- › **3) New (or renewed) markets for gas**
  - Gas-intensive industries represent an opportunity, but depend on liquids and global dynamics
  - NGVs? Difficult competition from plug-in hybrids for passenger cars and energy density issues for long haul heavy duty vehicles

## So How is it Looking?

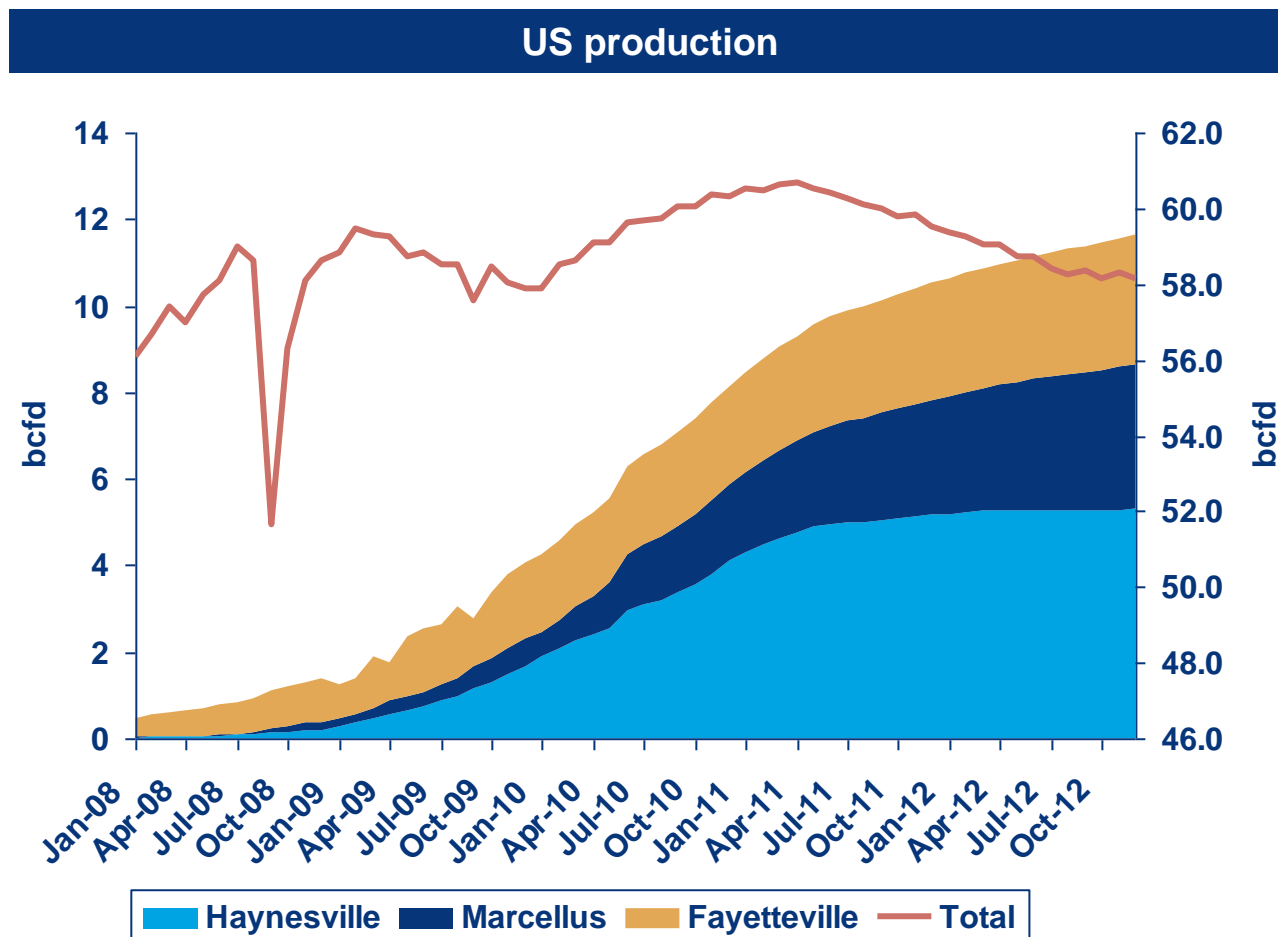
### For Supply – Stronger Potential, but...

- Haynesville, Marcellus, Fayetteville, Eagle Ford, and Canadian shales all look stronger
- How much capital is reallocated toward oil drilling, and how much new capital enters?
- How threatened is hydro-fracking? What will be the results of the ongoing EPA study, and what conditions will the Interior Department place on drilling on federal lands?



## Led by Key Shales, US Supply Growth Continues: for a Few More Months

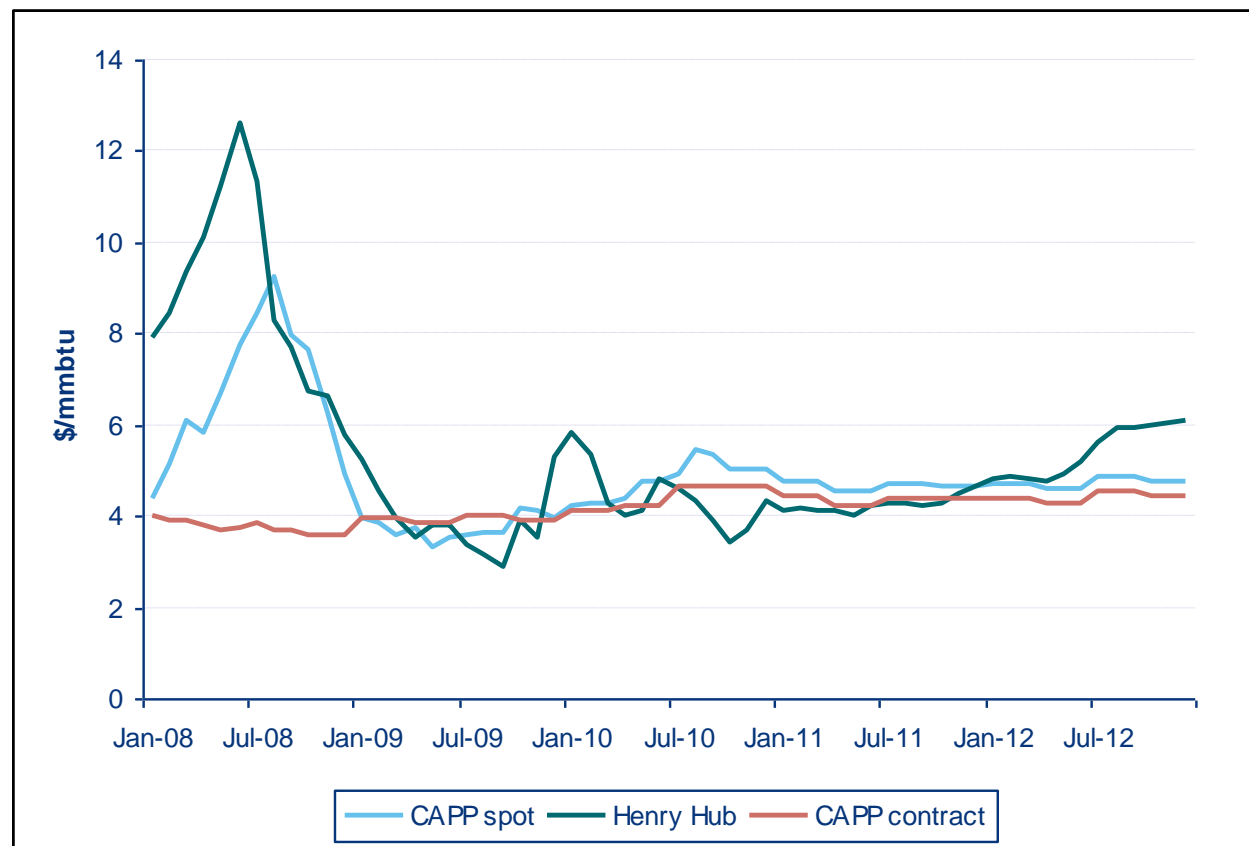
- > Over the last six months, Haynesville, Fayetteville, and Marcellus production climbed by 1.5 bcfd
- > US Production currently (Feb) running an estimated 1.5 Bcfd above year earlier levels
- > Ann Avg production expected to peak this year and next at 60.5 Bcfd dry.



## Setting the stage—The next 18 months; breaking beyond coal competition

- › **Flat supply, firmer global markets, and power demand supports price rebound from current lows**
  - Prices below \$4.00/mmbtu are likely short-lived (end mid 2011)
- › **For 2011, prices recover into the mid \$4.00s (\$4.60 nom) as the market remains well-supplied**
  - Drilling levels are vulnerable late in year
  - Market support develops by winter 2011/2012 (\$5.41 2012 price)
- › **\$6.00 by late 2012**

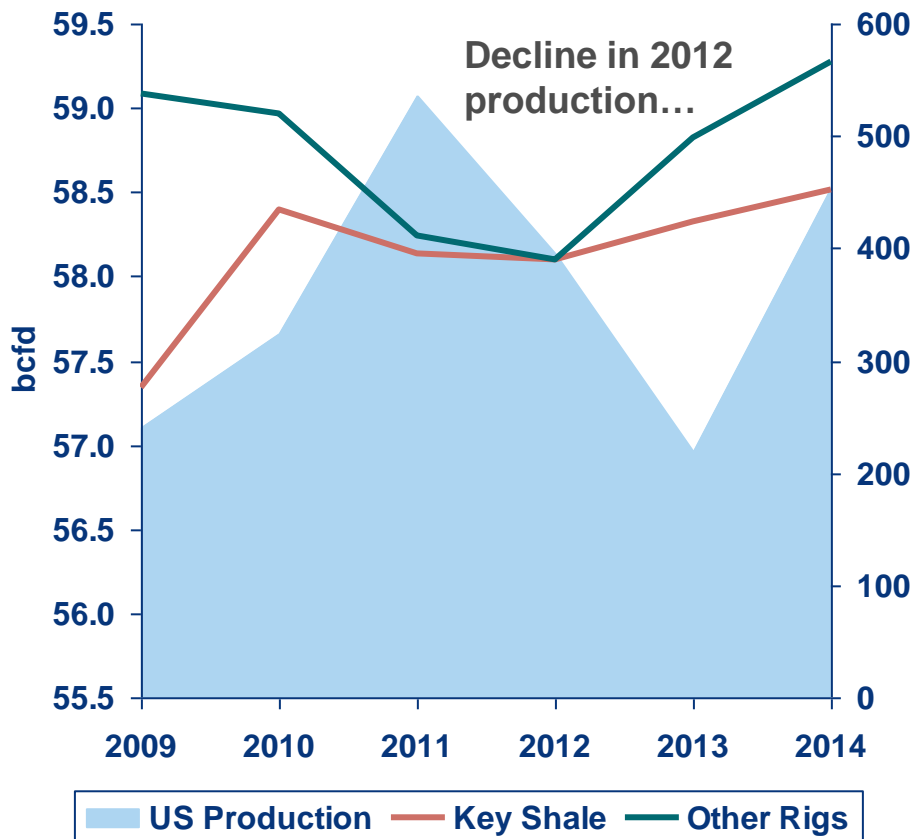
### Short-Term Price Outlook



Source: Wood Mackenzie

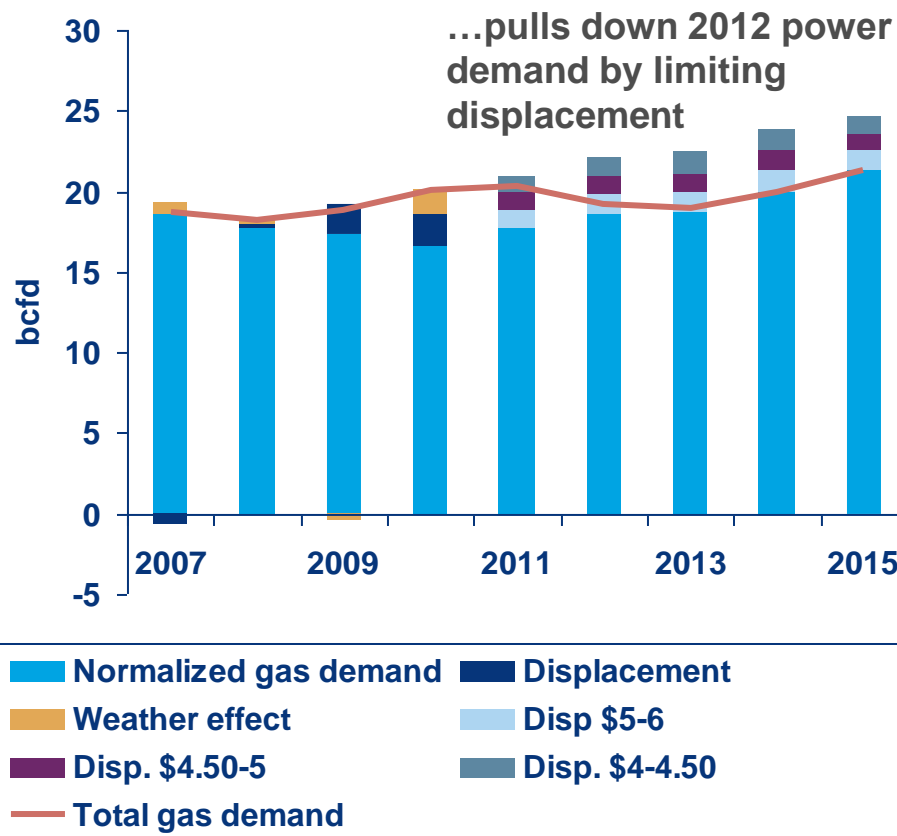
# 2012: Declining rig counts cut into supply and gas demand, and price recovery is hampered by loss of coal displacement demand

## Drilling and supply



Sources: Wood Mackenzie, Smith Bits

## Power sector summary



Source: Wood Mackenzie

## How many rigs does it take to hold production flat?

**About 900, and we're at the Tipping Point. But – it depends on where those rigs are.**

- › With horizontal rigs at record highs and increased rig productivity, rig counts required to maintain production have dropped significantly
- › Rig counts to maintain production at 2010 year-end levels depend strongly on activity levels in key growth shales
  - The rig count to sustain production could be even lower once a majority of shale drilling switches to pad rigs, after acreage constraints ease

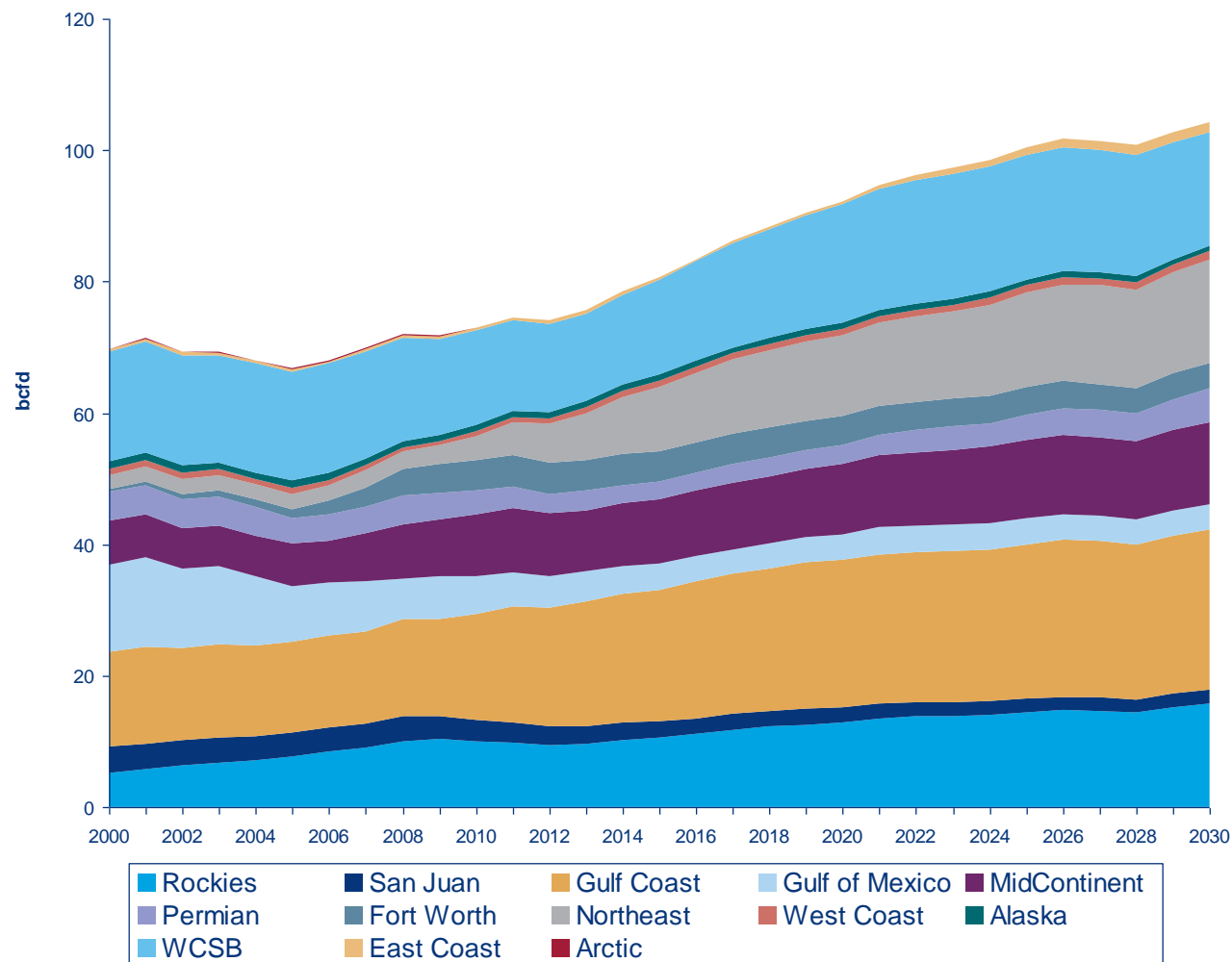
**Rig counts required to maintain production at 2010 year-end levels**

	Total Rigs	Haynesville	Eagle Ford	Fort Worth	Marcellus	Fayetteville & Woodford	Non-shale horizontal
Low emerging shale	1,050	75	70-85	110	90	40	190
Base case	900	100	90-105	90	90	40	160
High emerging shale	780	125	115-135	50	90	40	120
Current	974	172	58	88	90	45	205



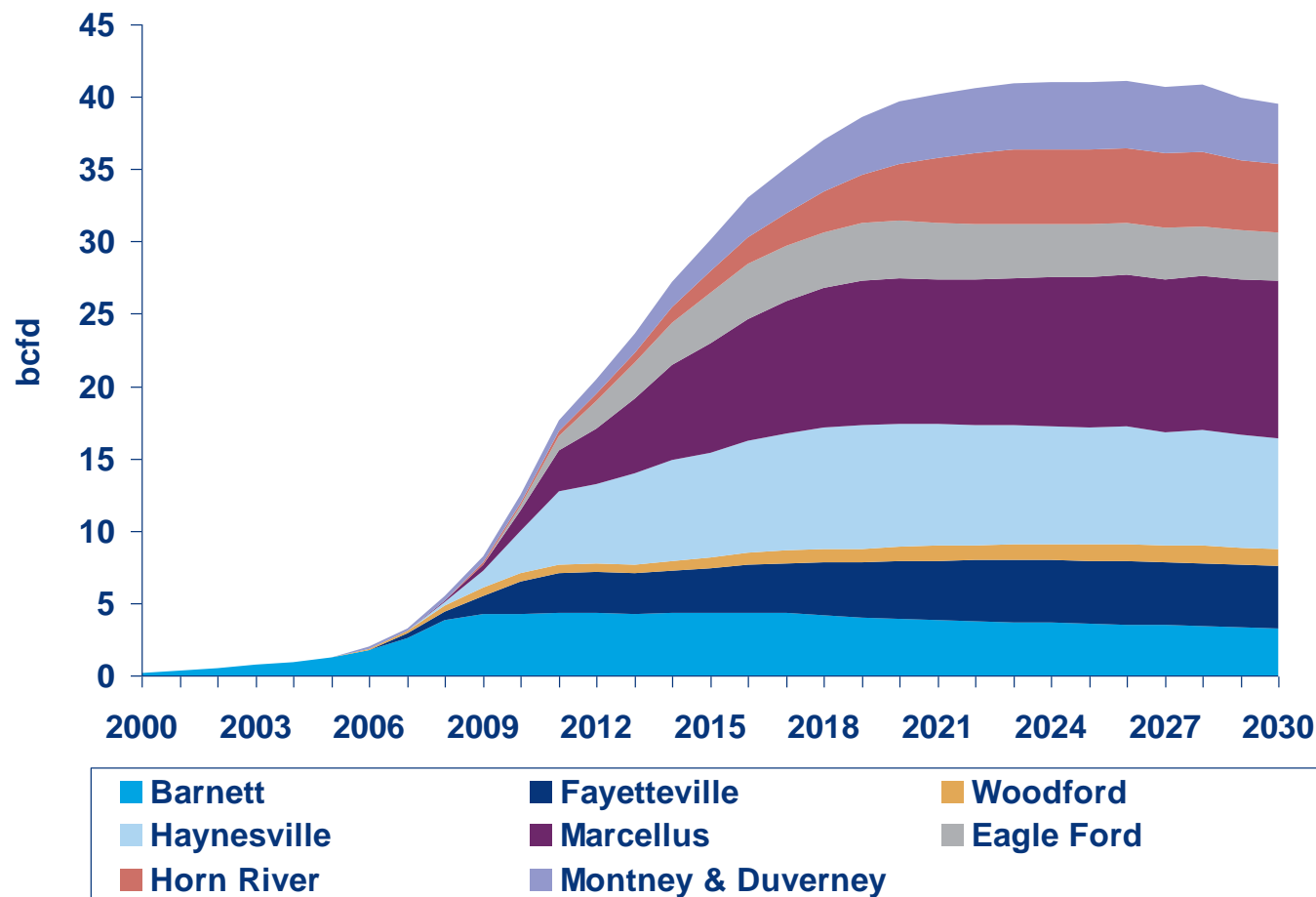
## The Resource Base is There: Supply Analysis by Region Shows the Potential for Broad-based Growth (Bcfd, dry)

- › Supply overall increases by 27 Bcfd in the US 2010-2030.
- › The largest increases are in the Gulf Coast and the Northeast.
- › This represents an increase of 5.1 Bcfd in 2025 in the US from Wood Mackenzie's previous long-term view.
- › Not only do we not need LNG – for the first time *we do not need an AK pipe, either.*



## But – Will we be Allowed to Get to It? The Supply Mix Depends on Shales, and Hydraulic Fracturing

- › Close to 50% of total supply longer term will be affected by regulations on hydraulic fracturing.
- › Still, strong growth potential - 28.5 Bcfd in the known shale plays by 2025!
- › Marcellus – to 10 Bcfd
- › Haynesville – to 8-8.5 Bcfd
- › Horn River – to 5 Bcfd
- › Fayetteville – to 4-4.5 Bcfd



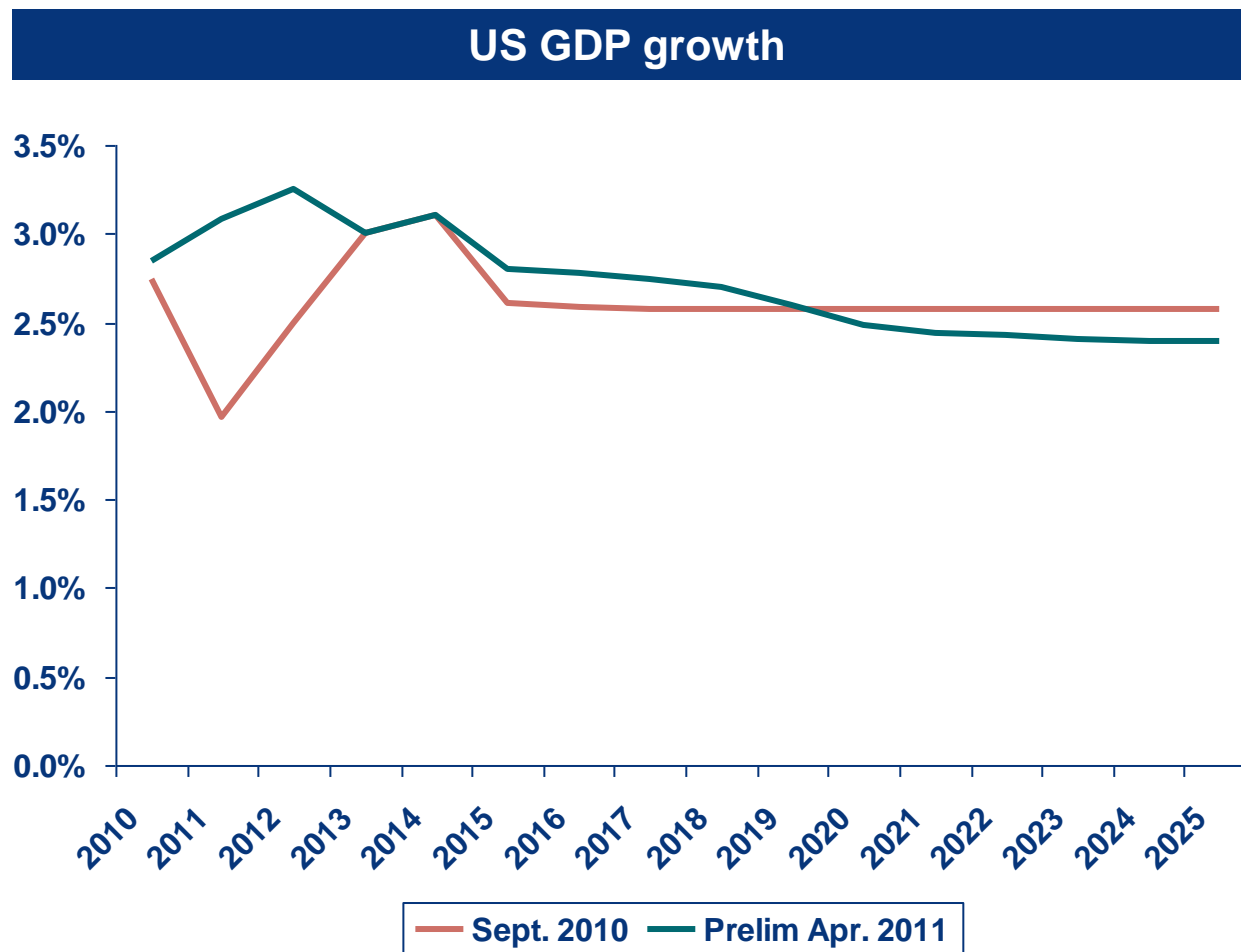
## So How is it Looking?

### › For Demand – Promising Signals

- Several announcements about methanol and ammonia capacity being restarted—new capacity announcements to come?
- Many petchem producers lightening their feedslates
- Several proposed LNG export facilities have signed MOUs, and global gas prices have recovered more quickly than expected
- Coal mining costs look likely to support a higher cost structure—but how fast can retirements come while preserving grid stability?
- Will high oil prices jeopardize fragile economic recovery?

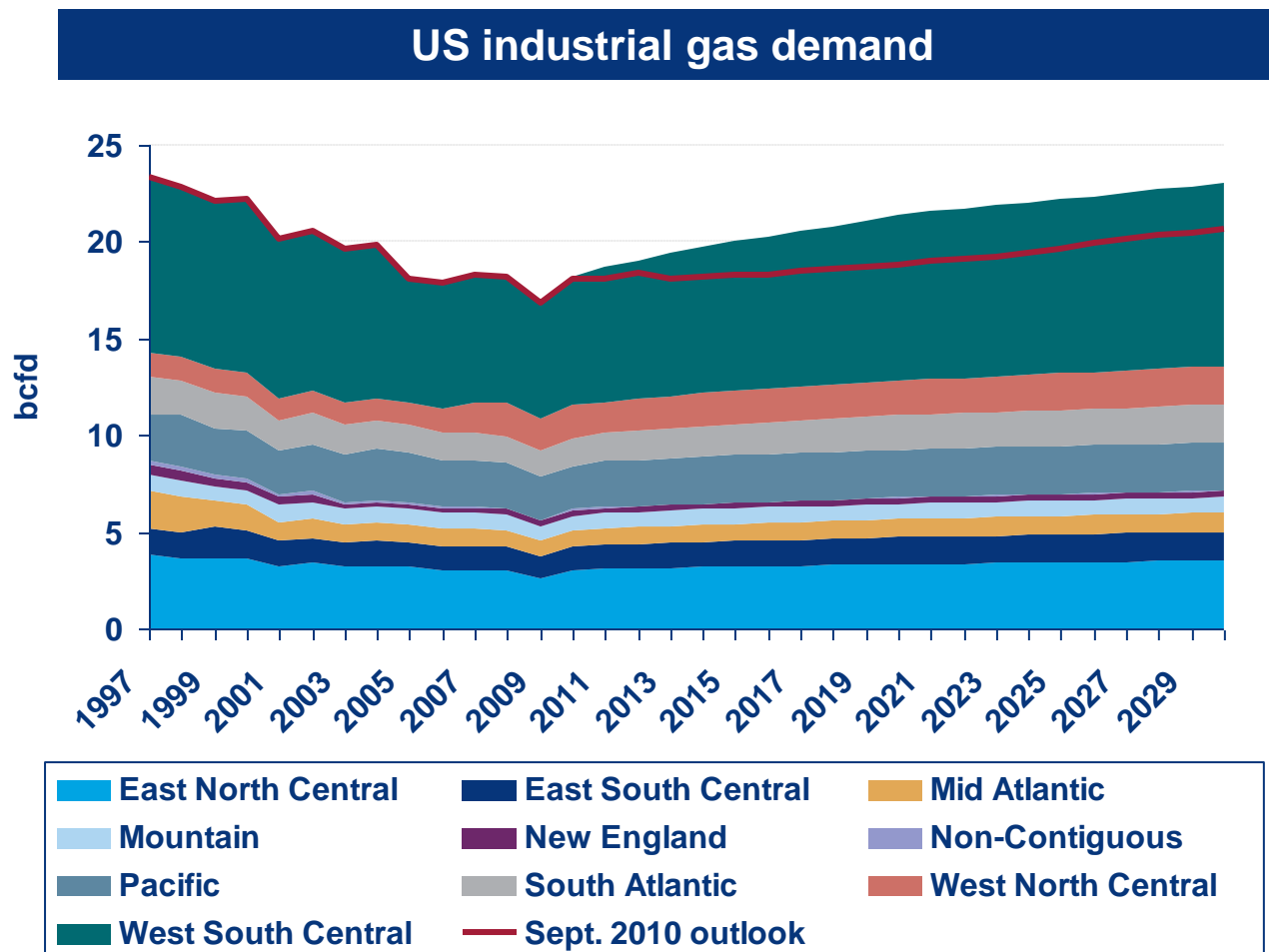
## Short-term economic outlook has improved, but significant risks remain

- › Impact of high oil prices on consumer spending?
- › Long-term GDP growth looks weaker, with slower pace of productivity growth
  - “New normal” unemployment rate at higher levels?



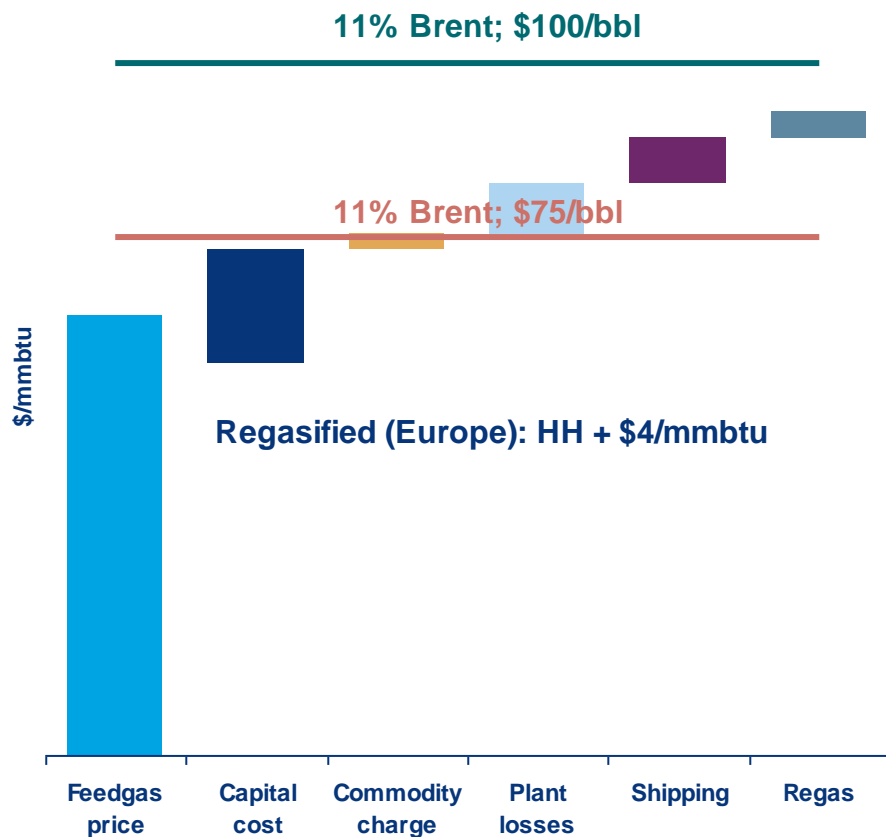
## And ammonia restarts and ethylene capacity conversions suggest a stronger long-term pace of industrial demand growth

- › Medium term growth as capacity is restarted
- › Improved environment for US manufacturing generally, as the dollar depreciates and massive trade imbalances subside

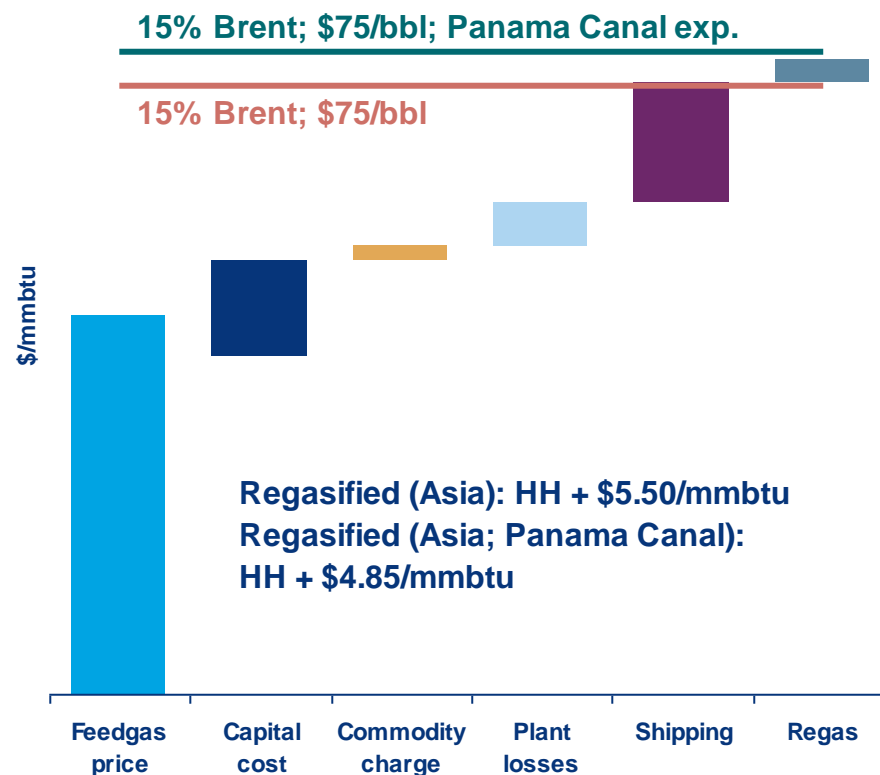


# While robust gas demand in Asia, and cost inflation in Australia, look likely to support at least a couple North American LNG export projects

## LNG exports from Gulf Coast to Europe

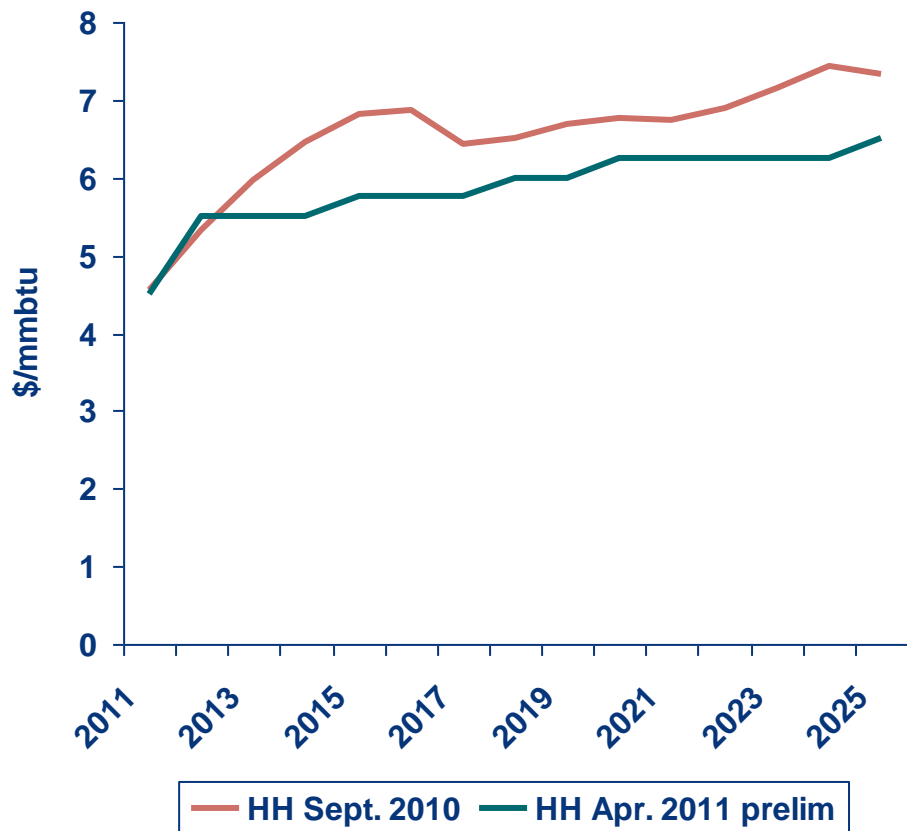


## LNG Exports from Gulf Coast to Asia

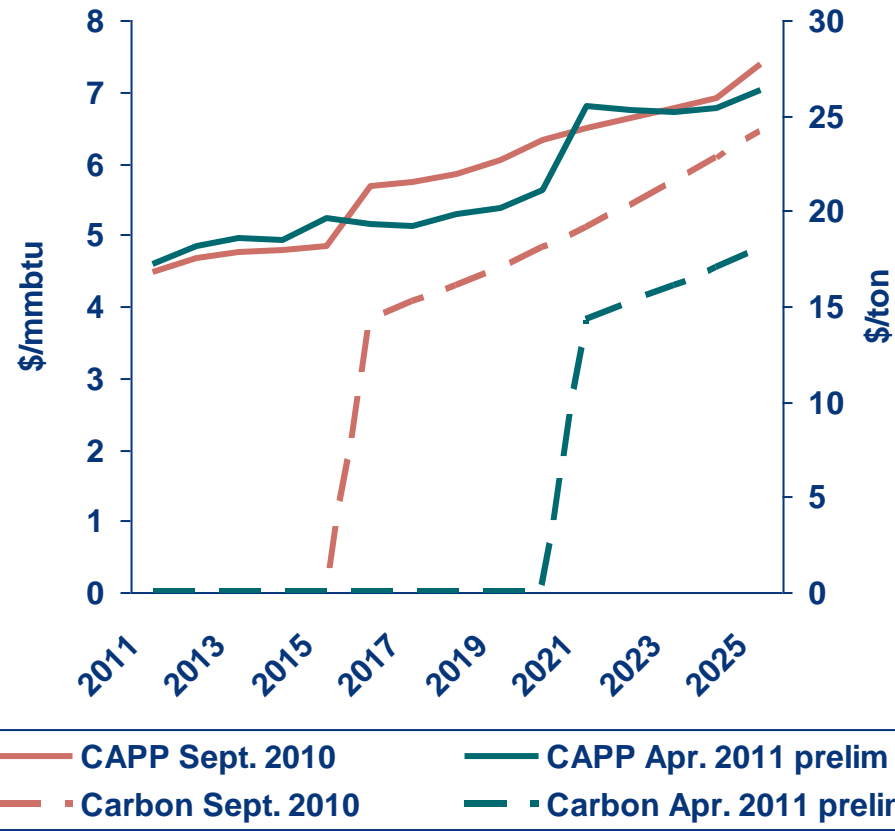


# Gas and coal production costs are moving in opposite direction—although carbon legislation now looks less likely to close this gap

Gas prices



Coal and carbon prices

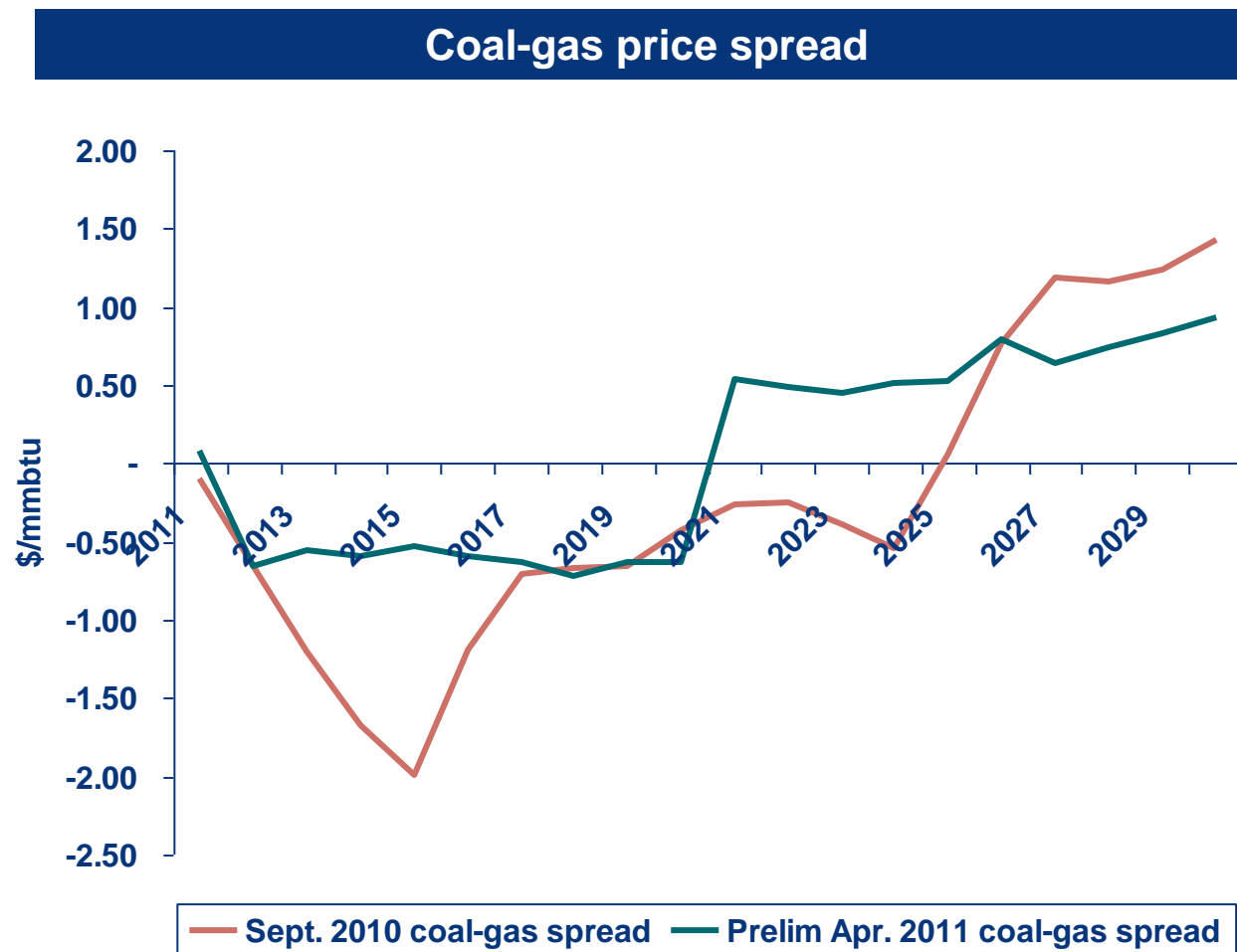


## ...likely supporting more coal plant retirements

### › What is ultimately going to replace CAIR?— Differences between Transport Rule and Carper bill

- State-level caps
- Higher in aggregate, but many regional dislocations

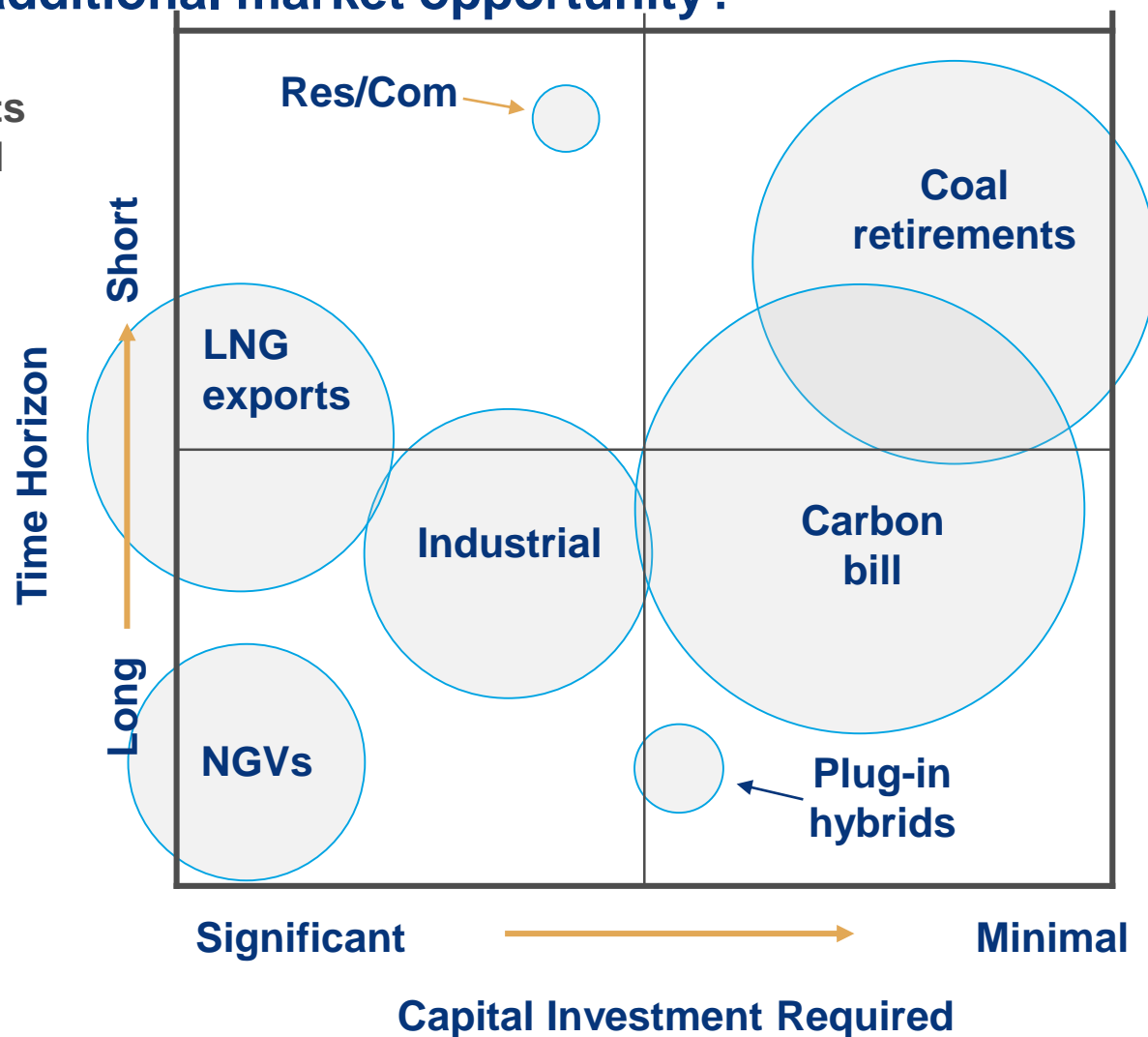
### › How quickly can plants be retired?





## Will Gas Find Other Markets? Could the long-term price outlook—and the gap with oil—fuel additional market opportunity?

Circle size reflects demand potential

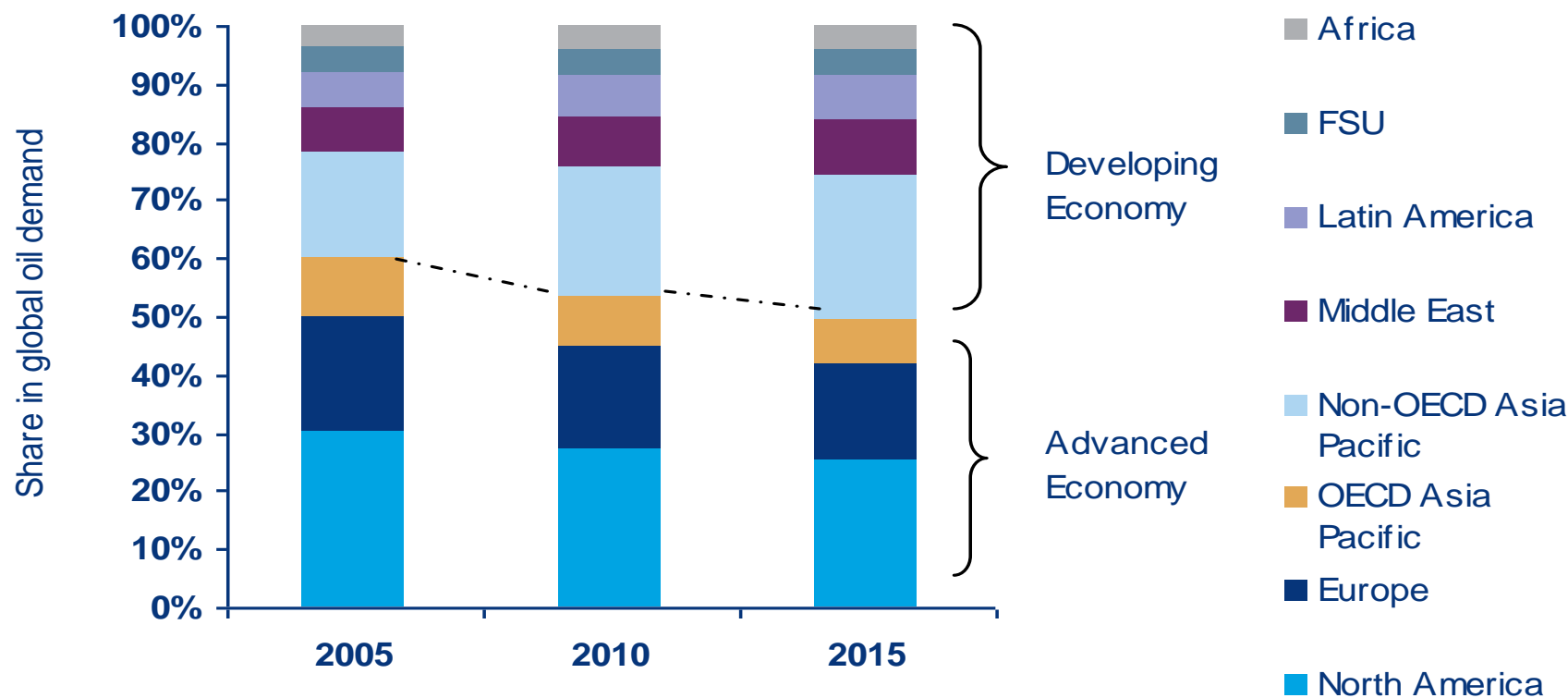


Source: Wood Mackenzie

## (Other) Risks to the Outlook

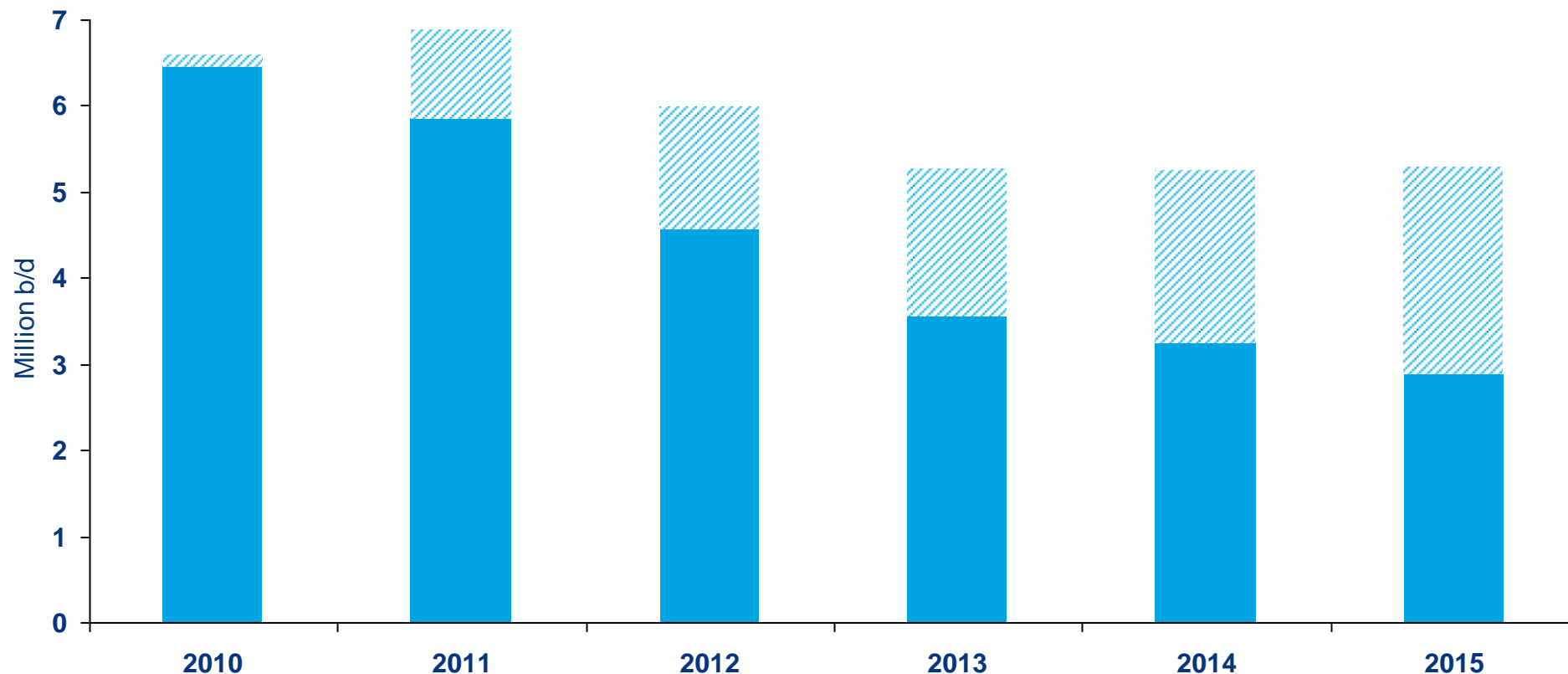


## Speaking of Which, On the Oil Side - Developing Economies (demand pull) will exert greater influence on global oil demand



Source: History - IEA; Forecast - Wood Mackenzie

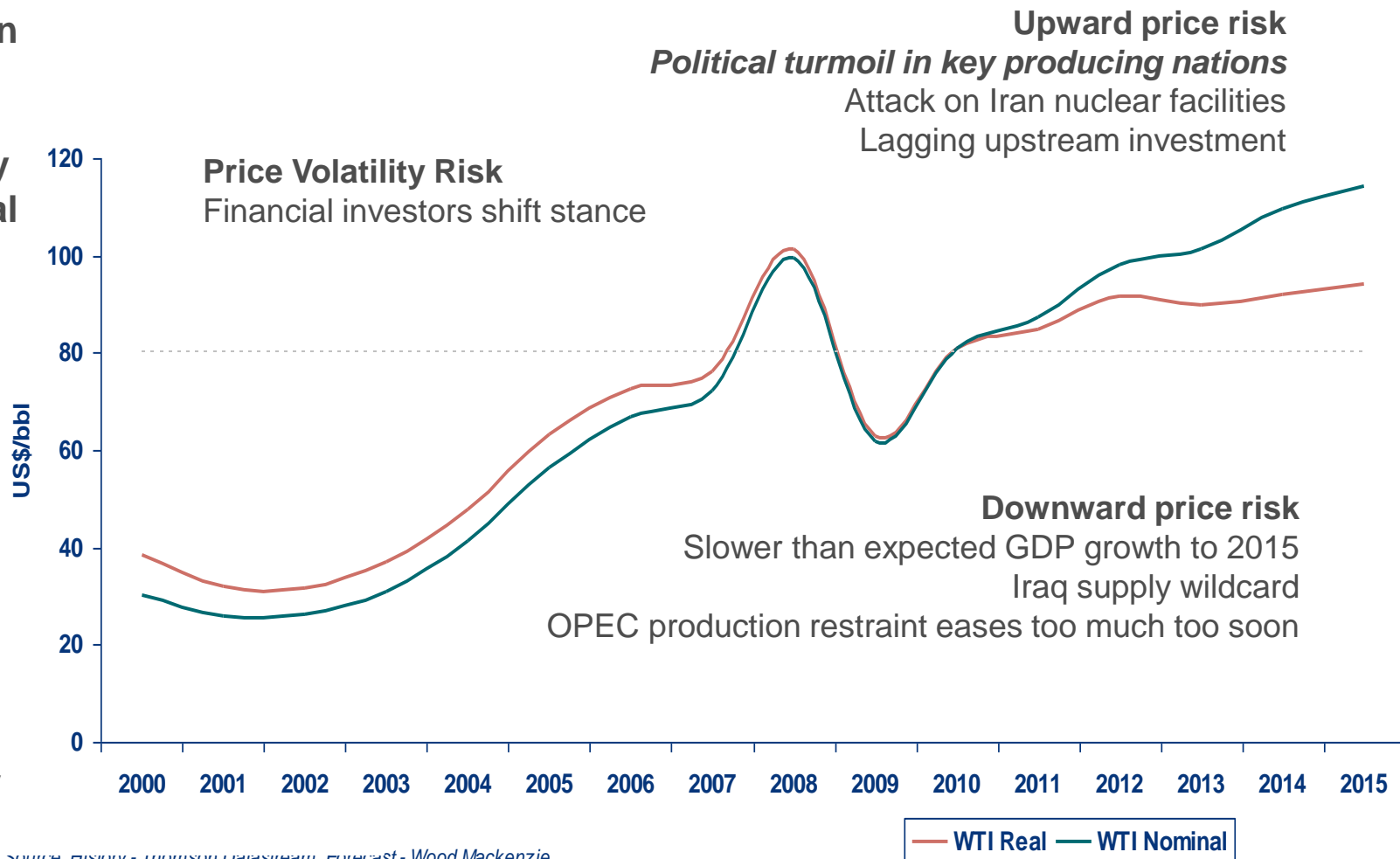
**As a Result: OPEC Spare Capacity Reduced Through 2015 : Our base case view shown with the impact of lower than expected oil demand in the same period – *and this reduction is pre-crisis***



Source: Wood Mackenzie

## The Result: WTI Crude Oil Price Forecast to 2015 (Real and Nominal) and Risk Factors

- > Oil prices return to \$100 (nominal) on annual basis by 2013; \$92 in real terms.
- > \$95 real, \$116 nominal by 2015.
- > Oil demand growth averages near 1.5 millions Bbls/day annually, reaches 100 MMBbls/day by 2020.



source: history - Thomson Datastream, forecast - Wood Mackenzie

Source: History – Thomson Datastream; Forecast - Wood Mackenzie

## Despite Increasing Prices, Gas Remains Cheap—Oil and Gas Remain Apart

### > Average price WTI:

- 2010-15: \$89.46
- 2016-20: \$92.21

### > 2021-30: \$105.26

> *Plentiful exploration risk, and reservoir performance risk in this oil outlook, in contrast to US gas.*

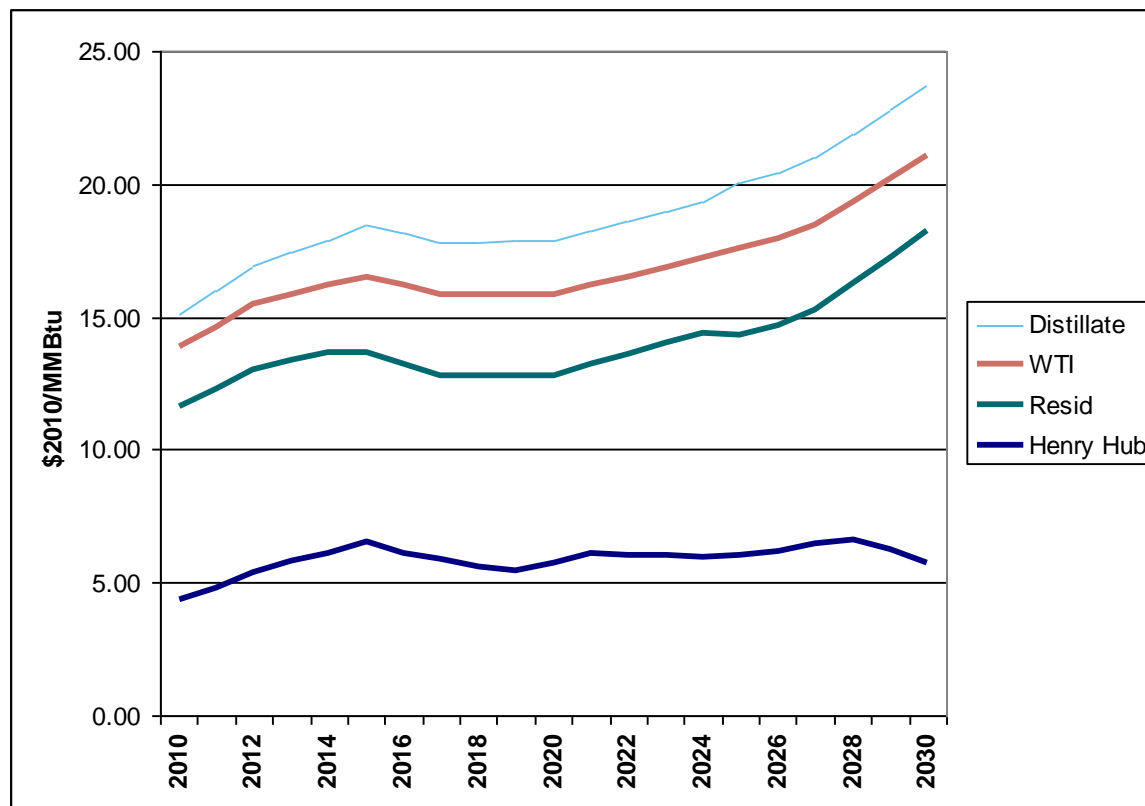
### > Preliminary Avg Henry Hub (real):

- 2011: \$4.60
- 2011-15: \$5.71
- 2016-20: \$5.75
- 2021-30: \$6.12

### Average WTI to Henry Hub Differential

	\$2010/mmbtu
2000-2008	2.83
2009	6.88
2010-2020	10.03
2021-2030	12.02

### Oil and Gas Commodity Price Forecasts



## The New Big Picture: Gas is Available in Any Feasible Quantity, but Not at \$4.00 ----- and That's *IF* the Industry is Allowed to Get To IT

### › Through 2012...Sluggishness and Gas as a Coal-derived Fuel

- With sluggish economic recovery and supply strength; coal displacement continues to influence the gas market

### › Late 2012 – 2016...Growth Potential

- With an increasing call on production as demand growth resumes, there is potential for growing pains as the market transitions from retrenchment to expansion; prices rise to the \$5.75 - \$7 range.

### › 2016 and Beyond – a Collision Course?

- Demand pressure appears likely, with the pace of growth shaped by coal retirements, potential carbon legislation and a discount to oil.
- If the upstream is allowed to invest at pace, pricing remains moderate: \$6.50 - \$7.00
- BUT – if not, we could be needing that LNG, and that Alaska Pipeline after all!

### Wood Mackenzie

Kintore House  
74-77 Queen Street  
Edinburgh EH2 4NS

### Global Contact Details

Europe	+44 (0)131 243 4400
Americas	+1 713 470 1600
Asia Pacific	+65 6518 0800
Email	<a href="mailto:energy@woodmac.com">energy@woodmac.com</a>

### Global Offices

Australia - Canada - China - Japan - Malaysia - Russia - Singapore - South Africa - United Arab Emirates - United Kingdom - United States



THE QUEEN'S AWARDS  
FOR ENTERPRISE:  
INTERNATIONAL TRADE  
2007



INVESTOR IN PEOPLE

Wood Mackenzie has been providing its unique range of research products and consulting services to the Energy industry for over 30 years. Wood Mackenzie provides forward-looking commercial insight that enables clients to make better business decisions. **For more information visit: [www.woodmac.com](http://www.woodmac.com)**