

Perspectives on US Energy Outlook, Cocktail Party Issues and Impacts on E&C Players

October 4, 2011

Wood Mackenzie
downstream consulting



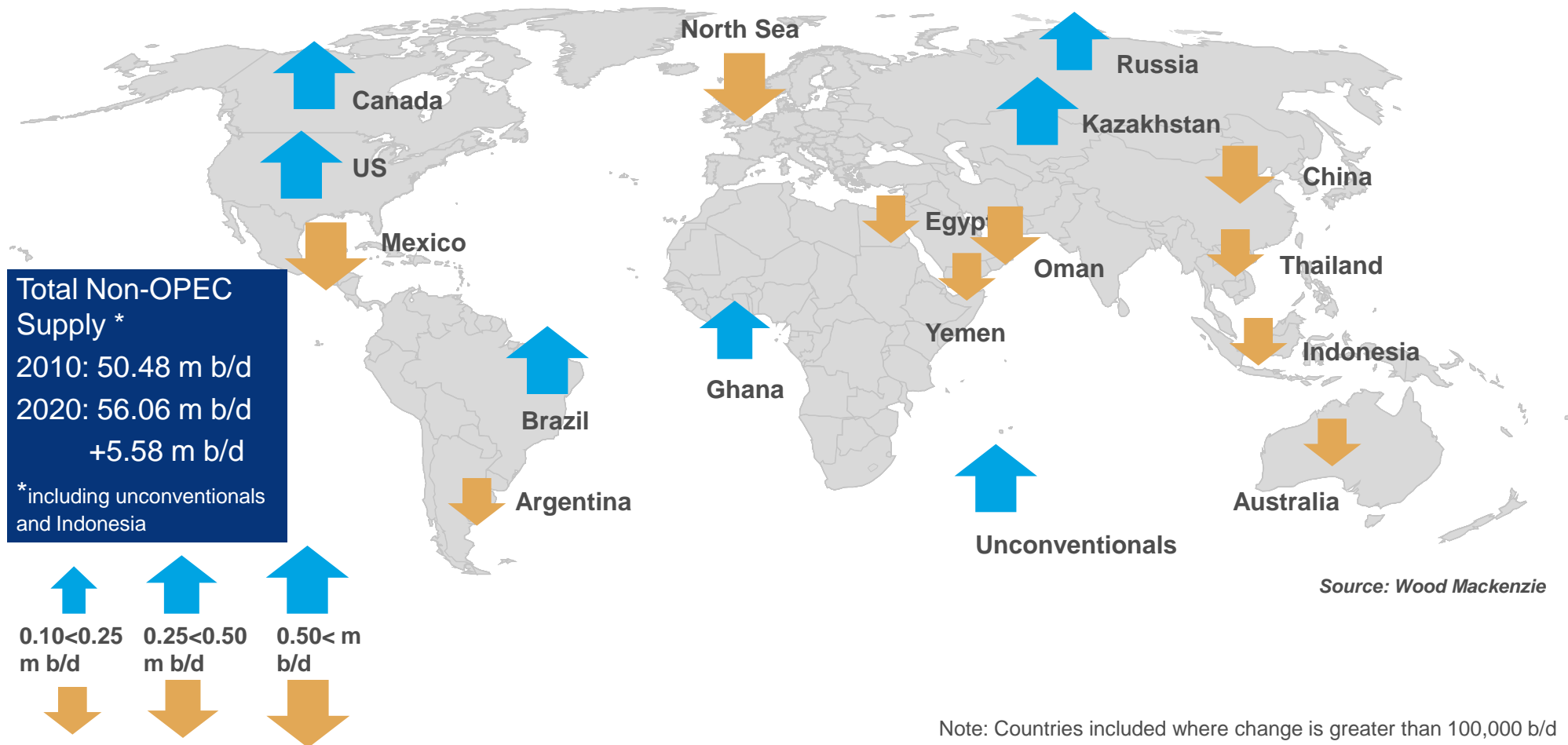
1 World Oil Outlook

2 US Refining and Gasoline Outlook

3 US Natural Gas Outlook

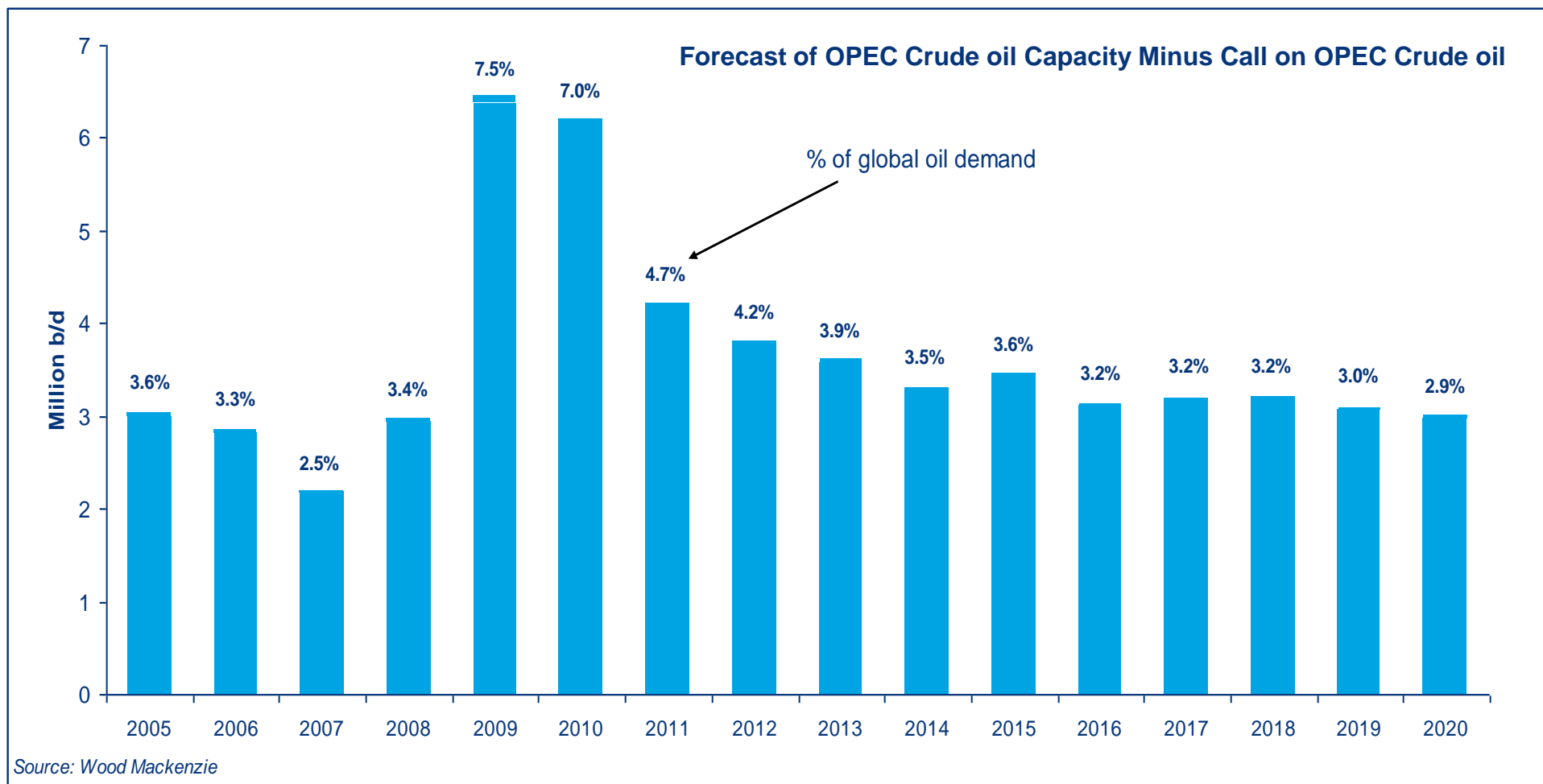
4 US NGL Outlook

Oil supply, outside OPEC increases markedly



Note: Countries included where change is greater than 100,000 b/d

OPEC spare crude oil capacity ensures demand can be met

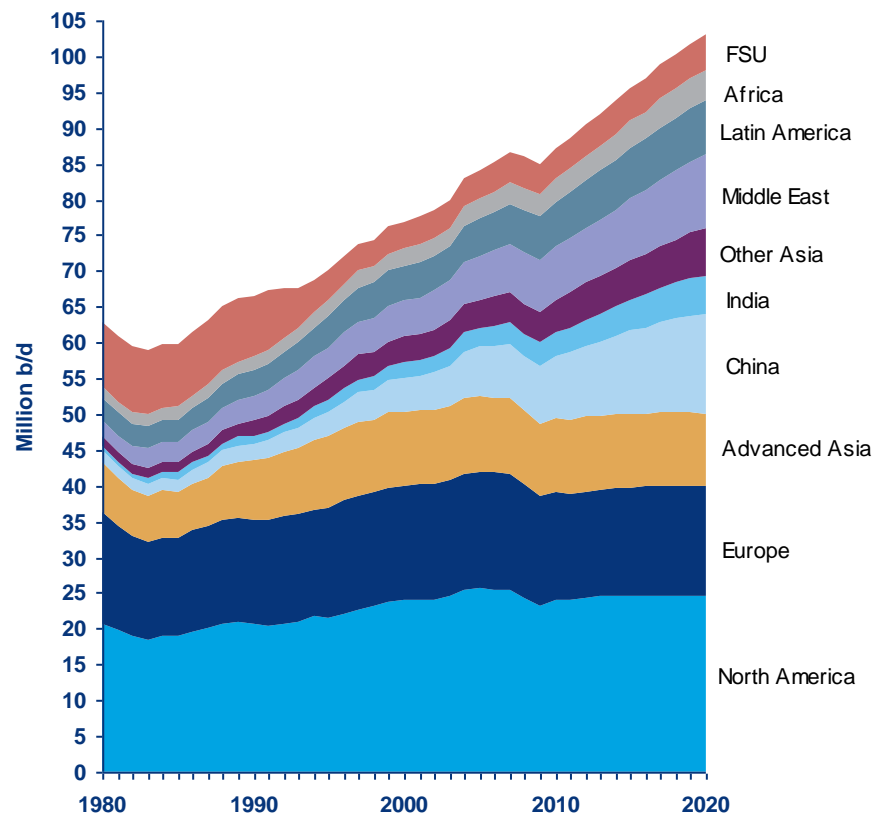


*Call on OPEC crude oil is world oil demand forecast compared with our forecasts for non-OPEC production, OPEC and non-OPEC natural gas liquids, world refining processing gains, and our definition of unconvensionals (consisting of biofuels, CTL, GTL, and shale oil).

Source: Wood Mackenzie

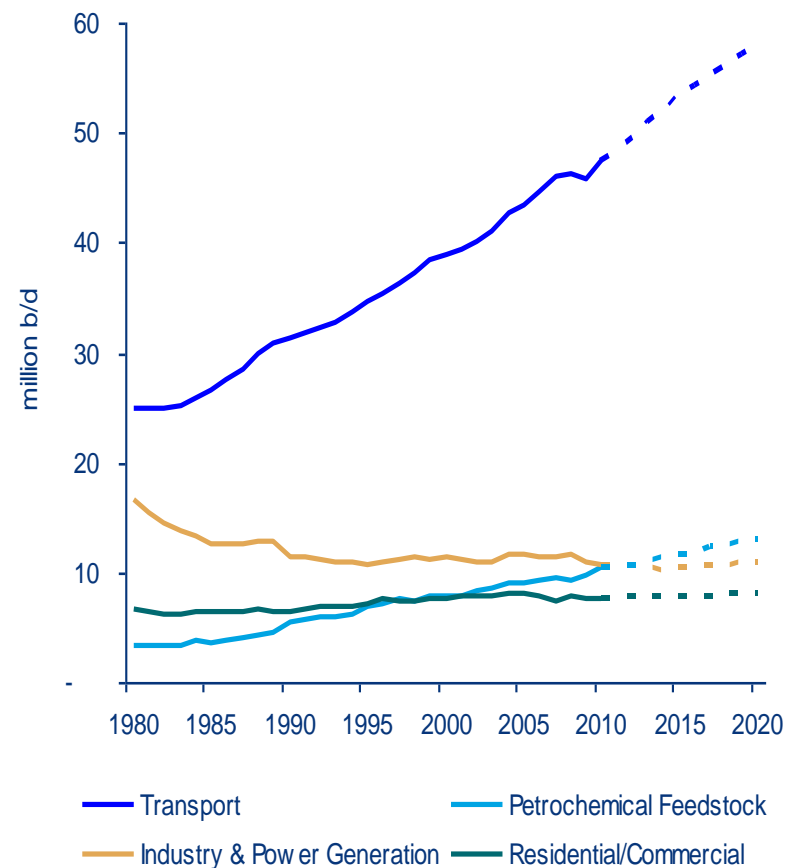
World oil demand forecast shows strong growth

Demand by Region

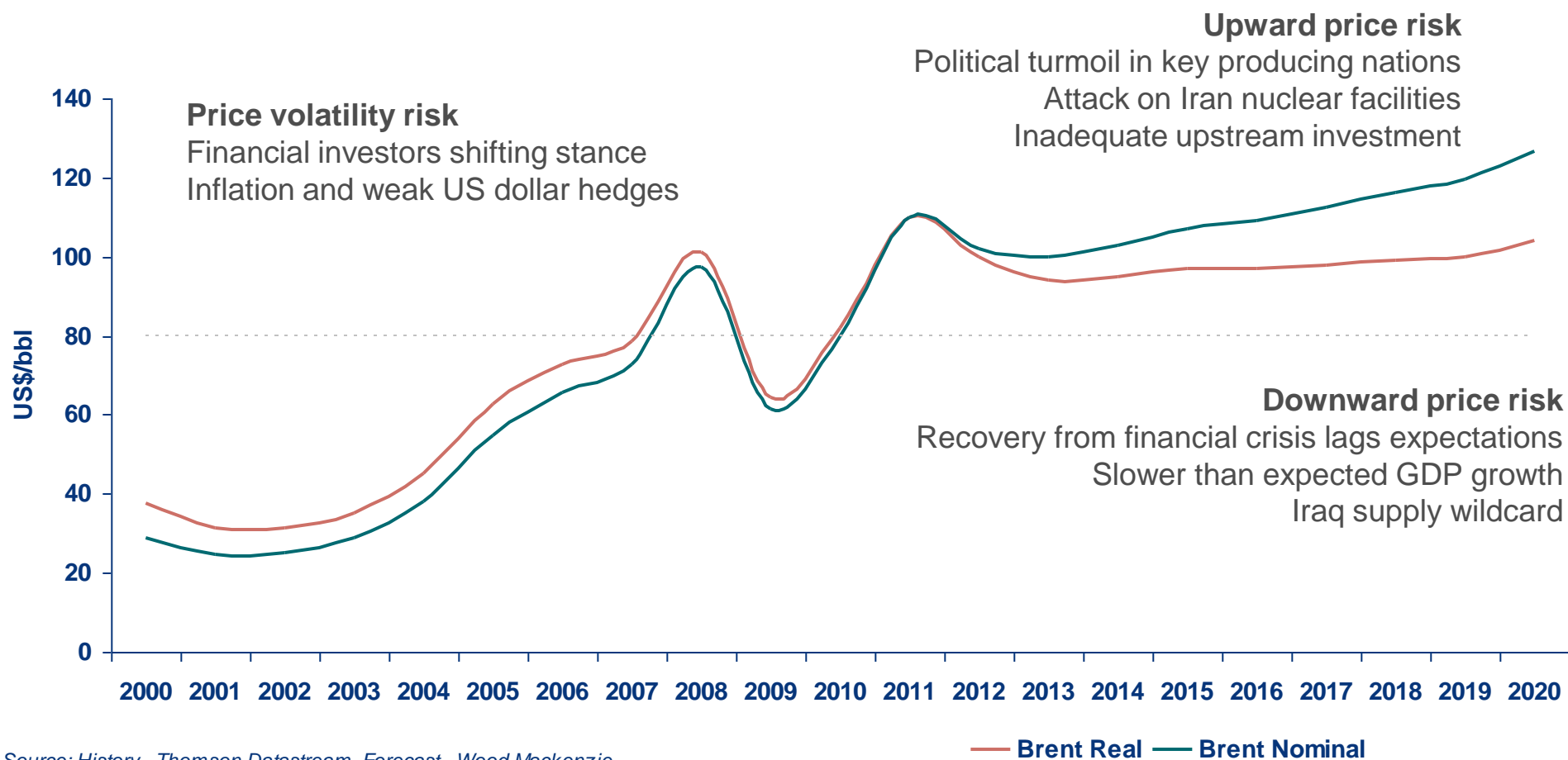


Source: History-IEA, EIA; Forecast-Wood Mackenzie

Demand by Major Sectors



Brent price forecast to 2020 shows increase from about \$100



Source: History - Thomson Datastream, Forecast - Wood Mackenzie

COCKTAIL PARTY ISSUE #1: What's up with WTI?

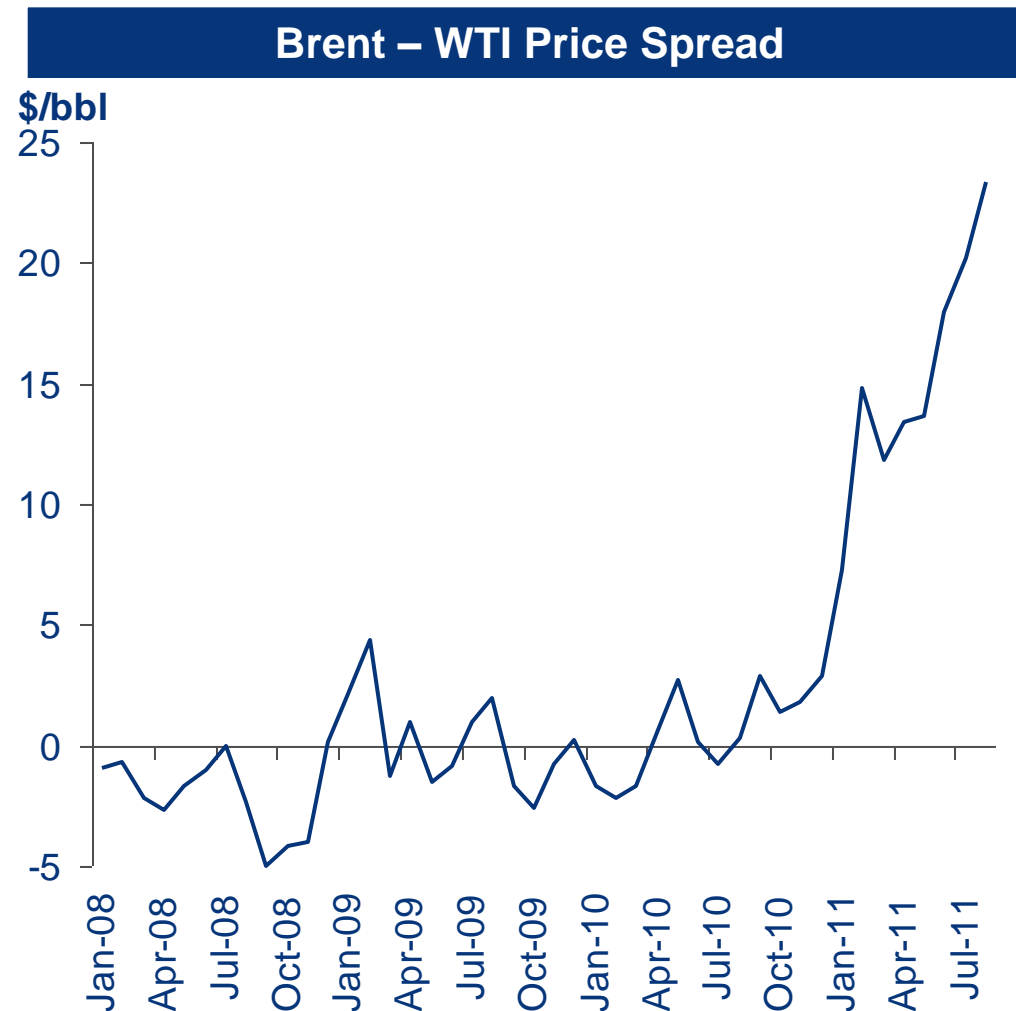
Cushing constraints dislocate WTI from global oil markets

› Brent – WTI spread has multiple drivers

- Rising North America light crude production (WTI ↓)
- US refineries re-positioning (WTI ↓)
- Strong Asian oil demand growth (Brent ↑)
- Libya production off-line (Brent ↑)

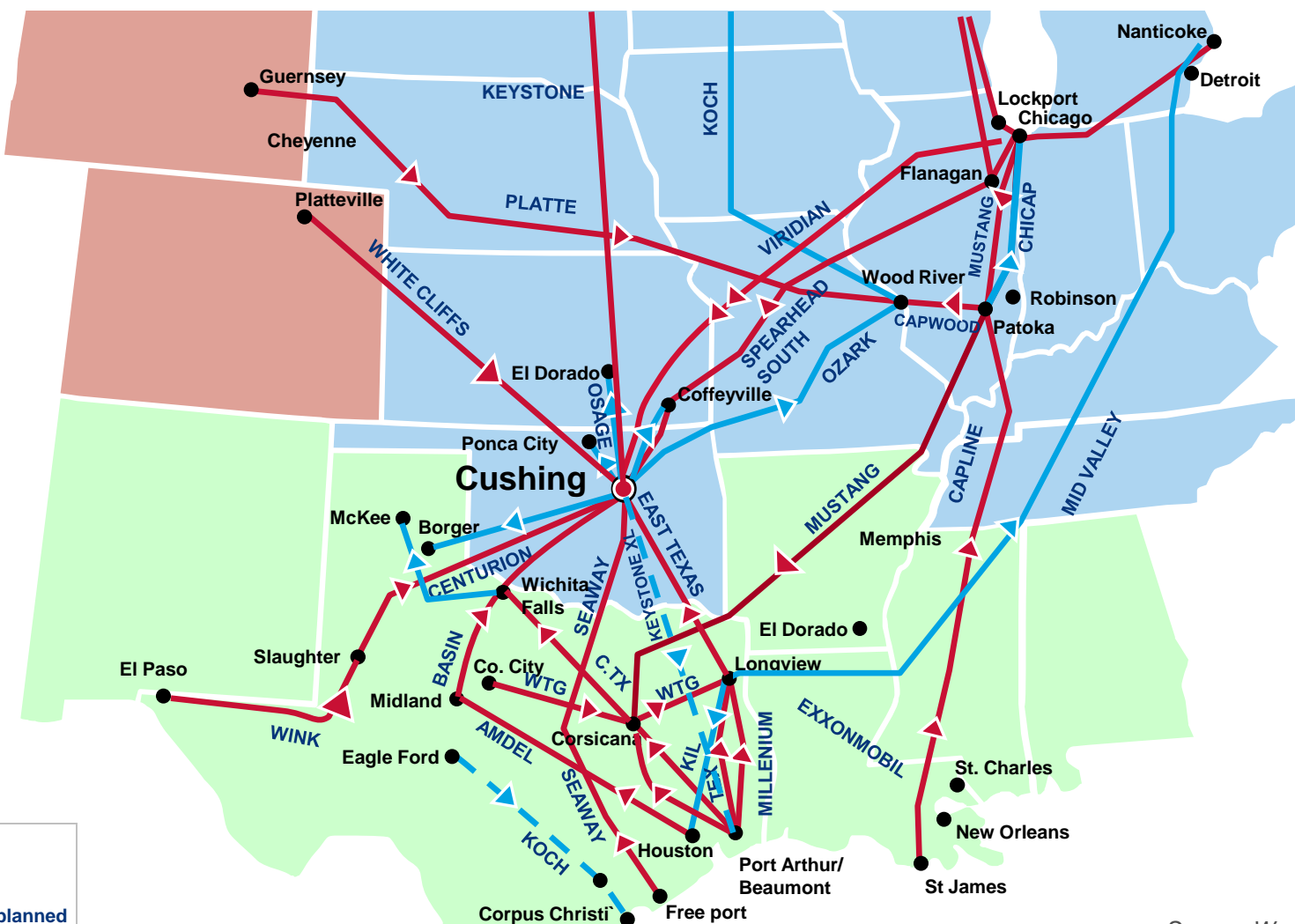
› Widening spread helps inland refiners

- Buy crude on a WTI basis
- Product import competition (from USGC) indexed off Brent



Source: Platts, Wood Mackenzie

USGC connectivity is primarily inbound to Cushing impacting the WTI - Brent differential



Legend:
 — Inbound
 — Outbound
 - - Outbound planned

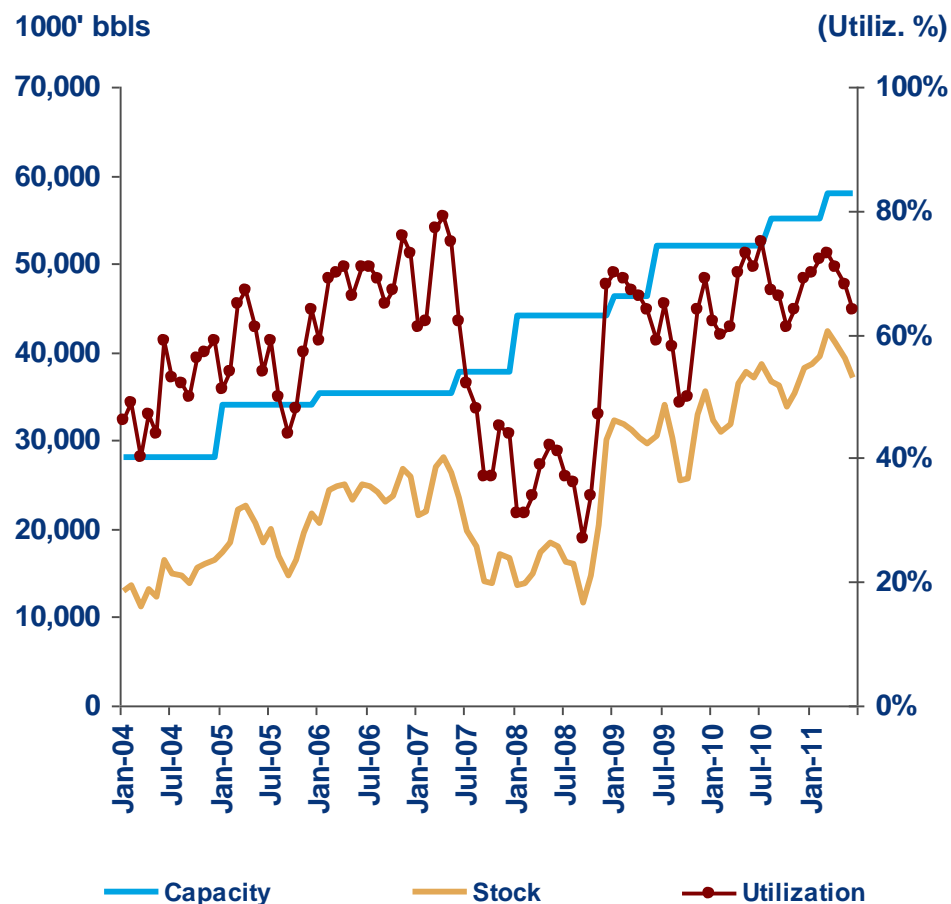
Source: Wood Mackenzie – April 2011

© Wood Mackenzie 8

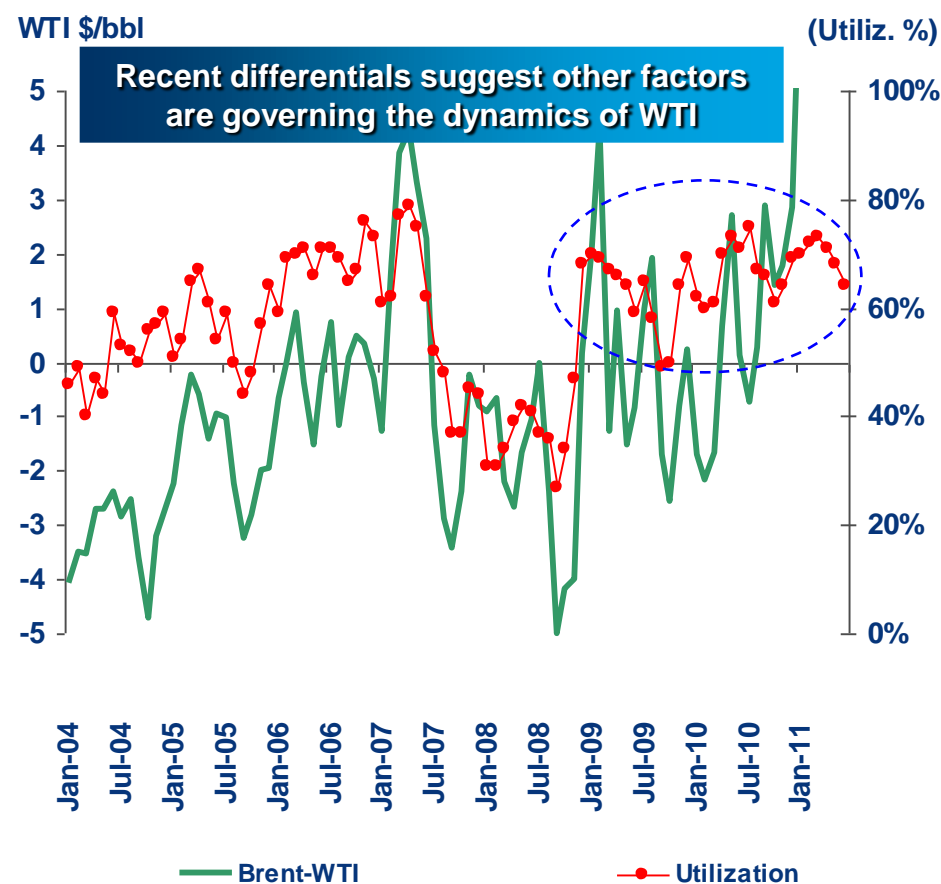
Delivering commercial insight

Cushing storage utilizations influence the price dynamics of Brent – WTI differentials

Cushing – Stock & Shell Capacity (2004-2010)



Brent – WTI diff vs. Storage utilization (2004-2010)



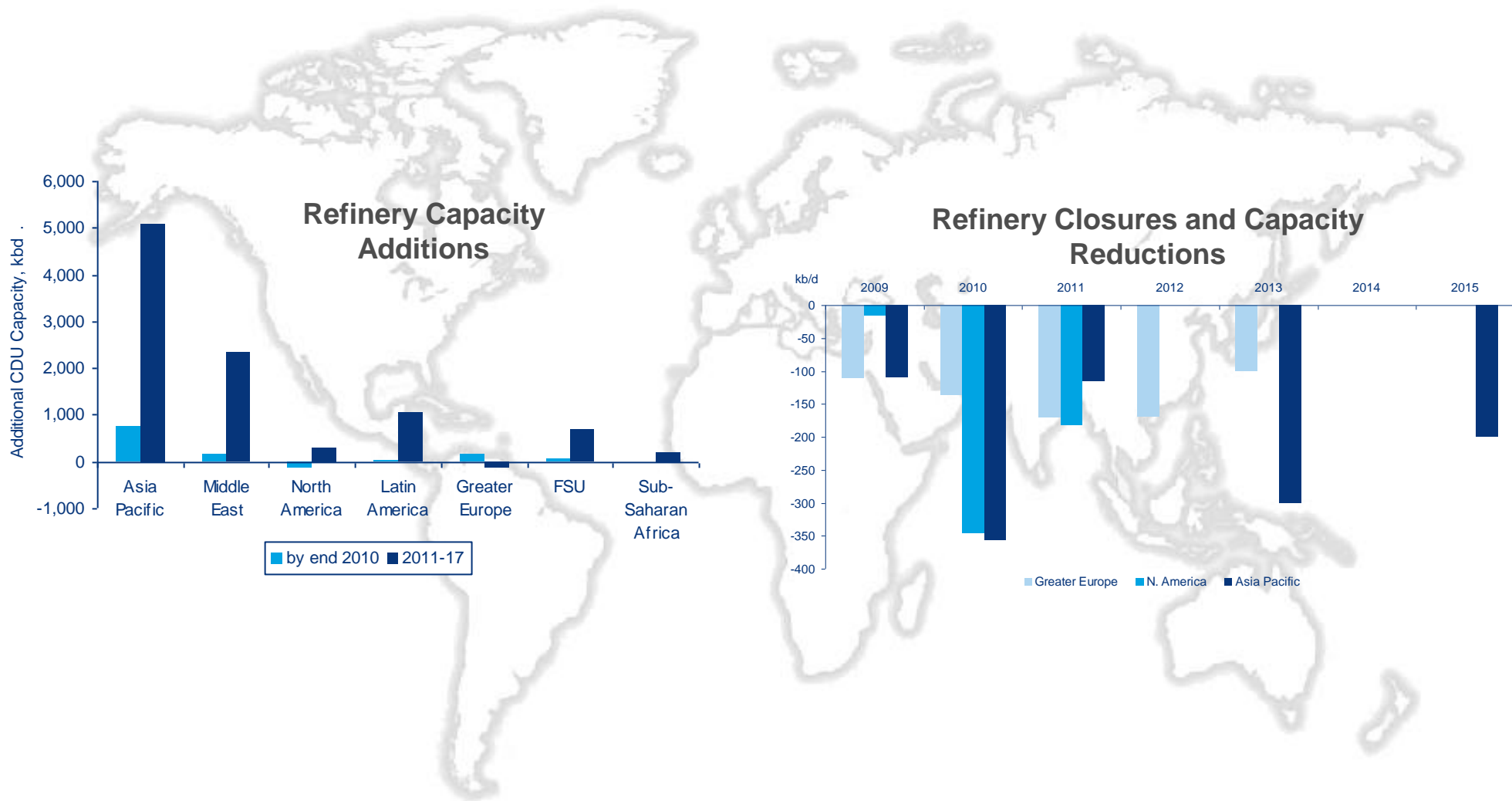
1 World Oil Outlook

2 **US Refining and Gasoline Outlook**

3 US Natural Gas Outlook

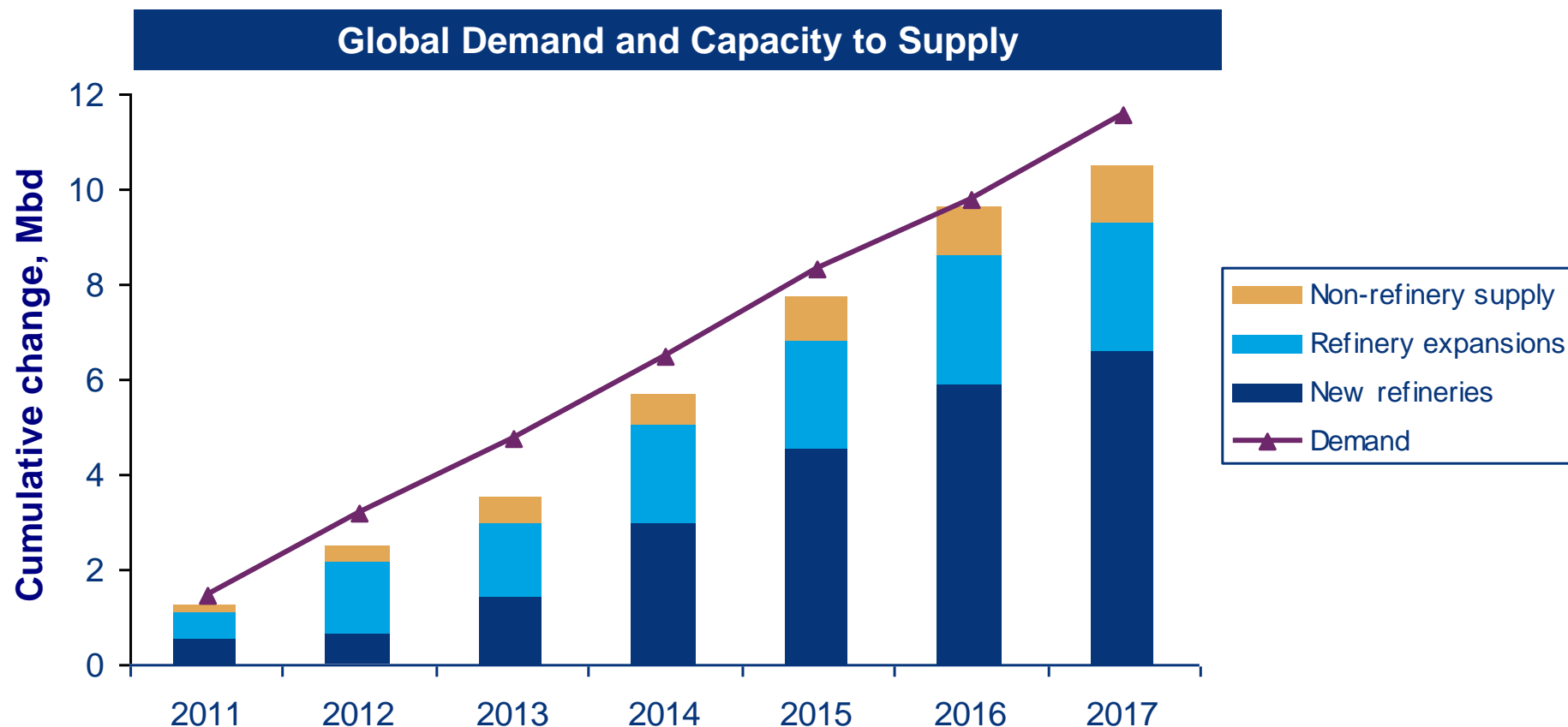
4 US NGL Outlook

Global capacity additions are concentrated in emerging Asia and the Middle East, with closures in the developed world



Source: Wood Mackenzie Product Markets Service

On a cumulative basis demand just outpaces capacity growth



Excludes capacity creep and utilisation rate changes

Source: Wood Mackenzie Product Markets Service

© Wood Mackenzie 12

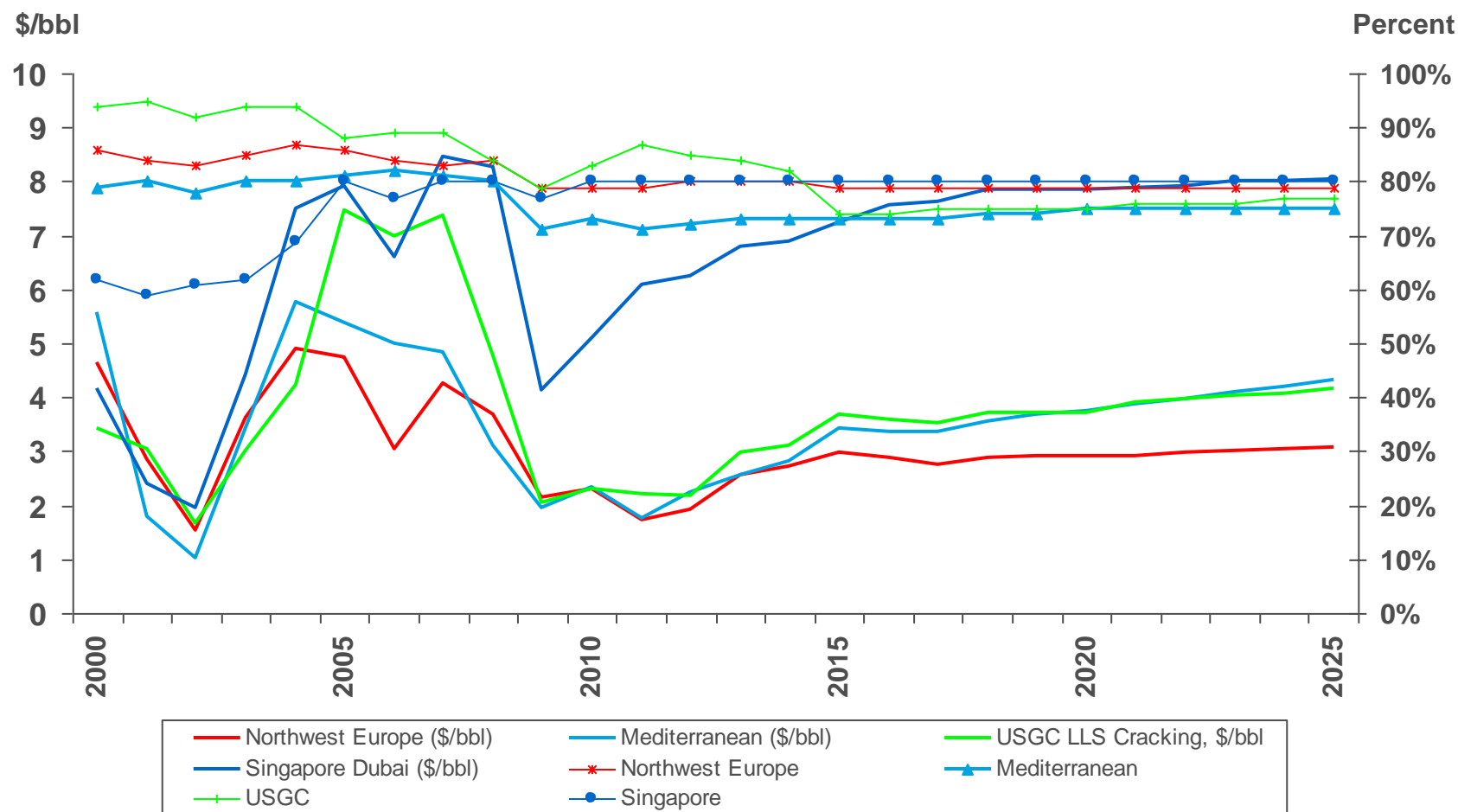
Delivering commercial insight

North American Oil Product Demand shows decreased Gasoline and Naphtha Demand

<i>Million barrels per day</i>	<u>2005</u>	<u>2010</u>	<u>2011</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>2030</u>
United States							
LPG (excl C2)	1.37	1.26	1.25	1.21	1.16	1.16	1.15
<i>Naphtha</i>	<i>0.40</i>	<i>0.27</i>	<i>0.26</i>	<i>0.22</i>	<i>0.19</i>	<i>0.19</i>	<i>0.18</i>
<i>Gasoline</i>	<i>9.16</i>	<i>9.03</i>	<i>9.03</i>	<i>9.11</i>	<i>8.79</i>	<i>8.27</i>	<i>7.75</i>
Jet/Other Kero	1.75	1.44	1.44	1.50	1.56	1.60	1.63
Gas/Diesel Oil	4.12	3.79	3.90	4.16	4.20	4.23	4.22
Fuel Oil	0.92	0.55	0.53	0.39	0.37	0.35	0.33
Other	3.09	2.80	2.92	3.14	3.23	3.23	3.20
US-50 Total	20.80	19.15	19.32	19.73	19.51	19.03	18.46

Sources: EIA & IEA (history), WM (forecast)

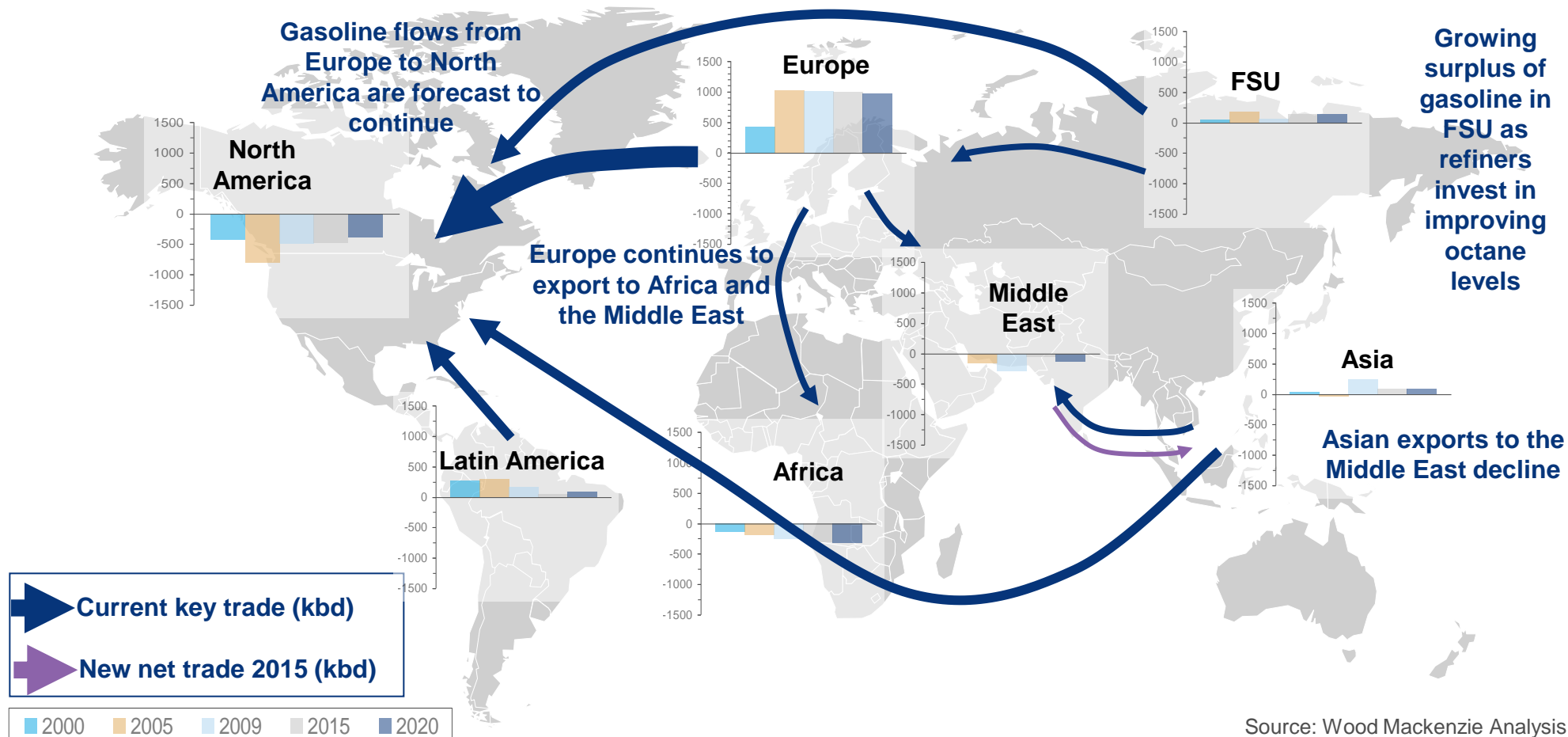
Global capacity utilization equalizes, but margins improve in Asia, where oil demand is growing



CP ISSUE #2: What is happening on USEC refining?

USEC continues to suffer from global competition

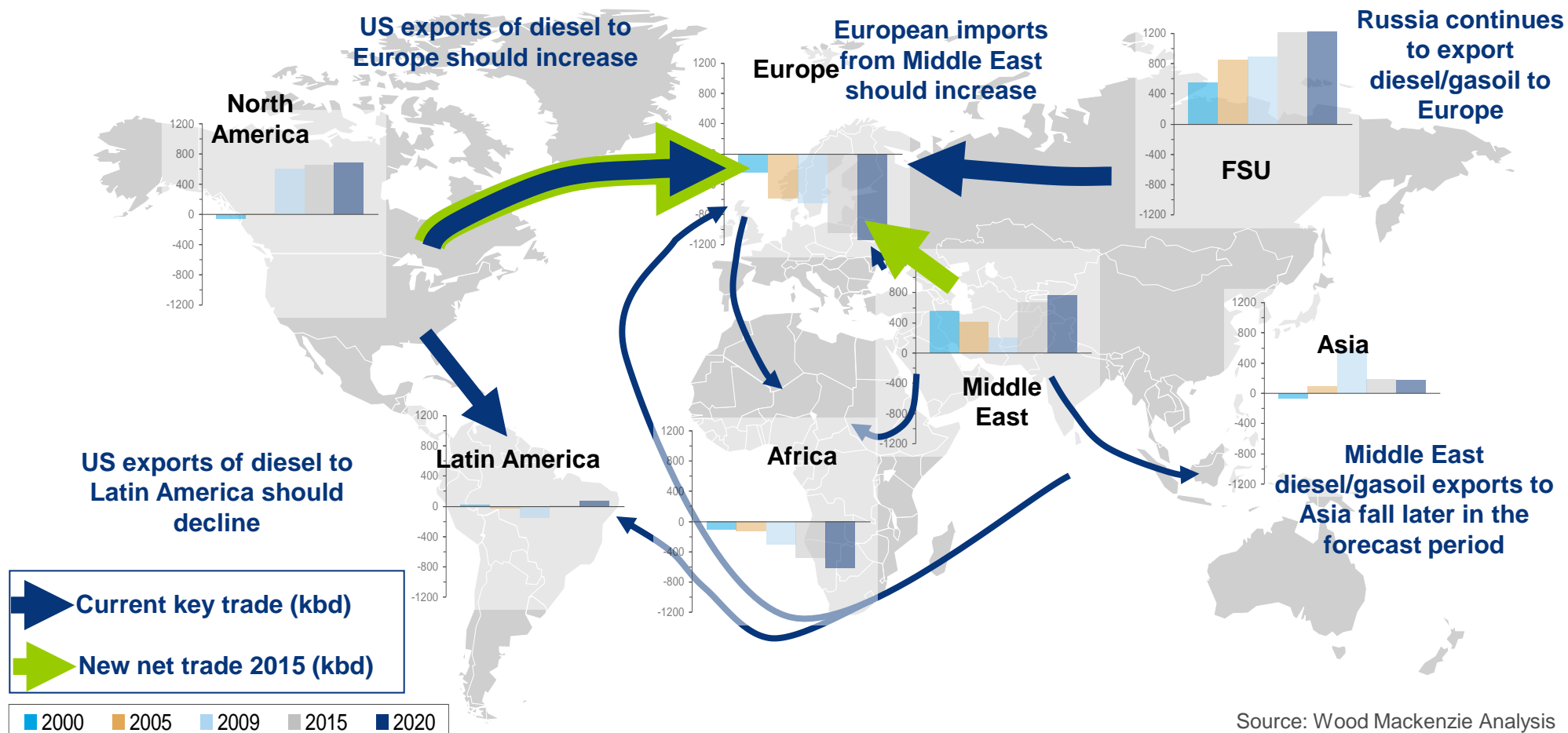
Gasoline Trade



Source: Wood Mackenzie Analysis

Opportunity may be for USEC players to play a larger role in supplying diesel/gasoil to Europe

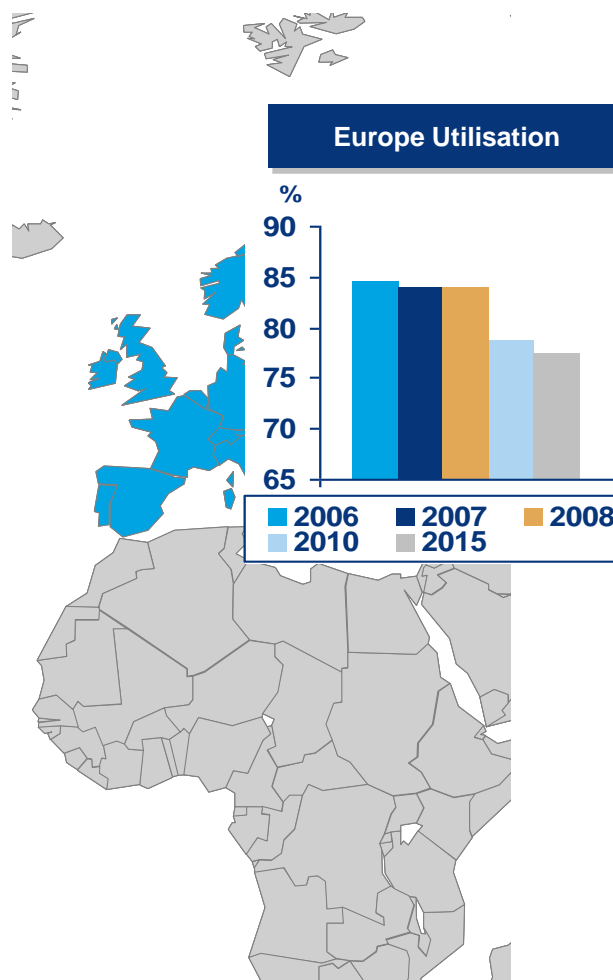
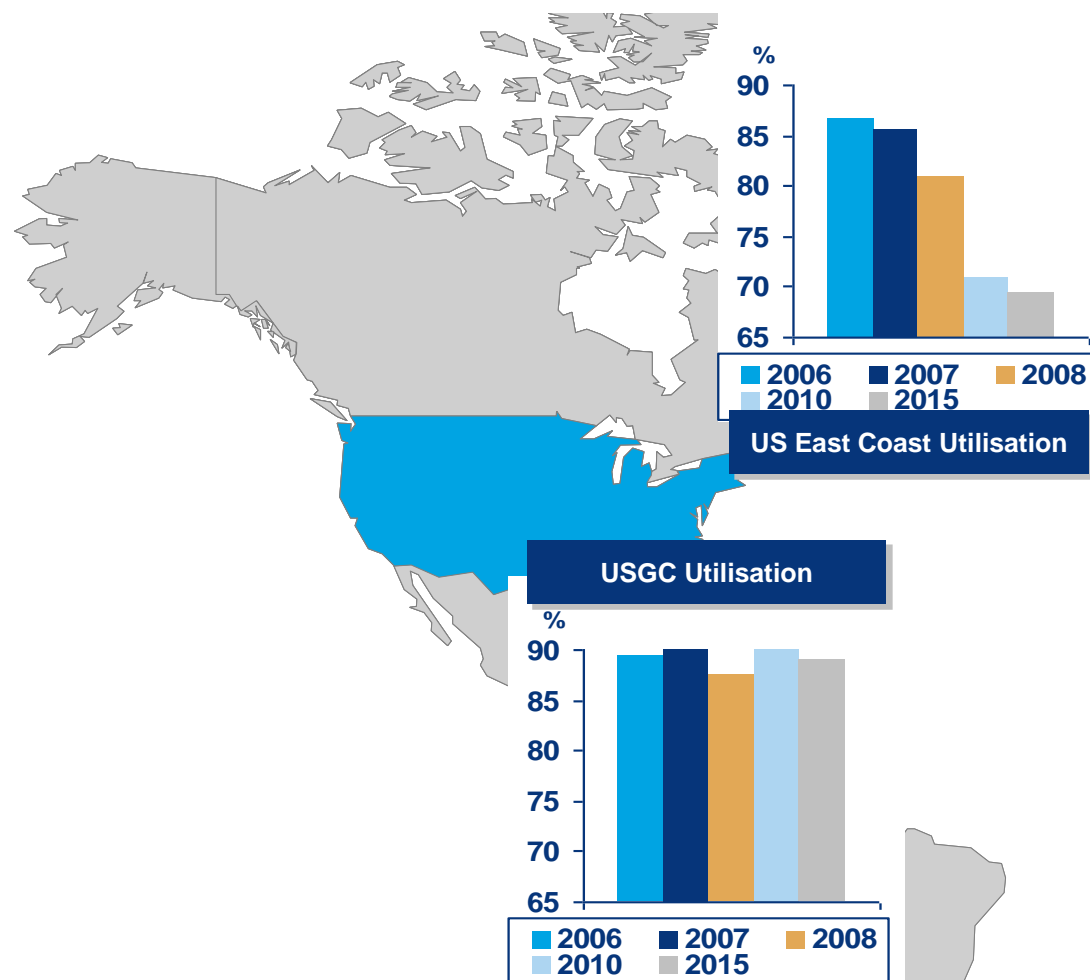
Diesel/Gasoil Trade



Source: Wood Mackenzie Analysis

Run cut losers are in the Atlantic Basin

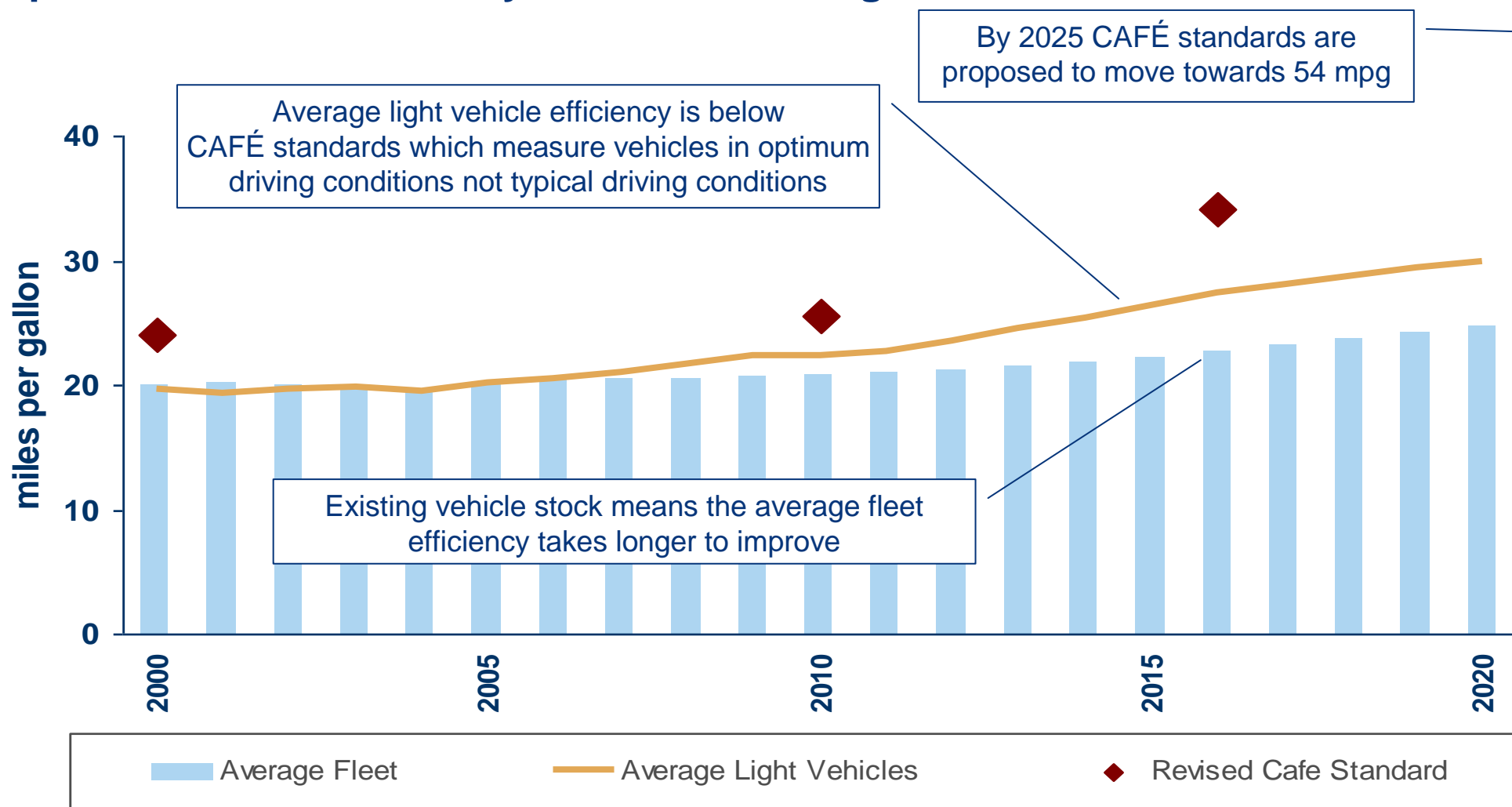
USGC utilisations manage to stay fairly constant



Source: Wood Mackenzie Product Markets Service

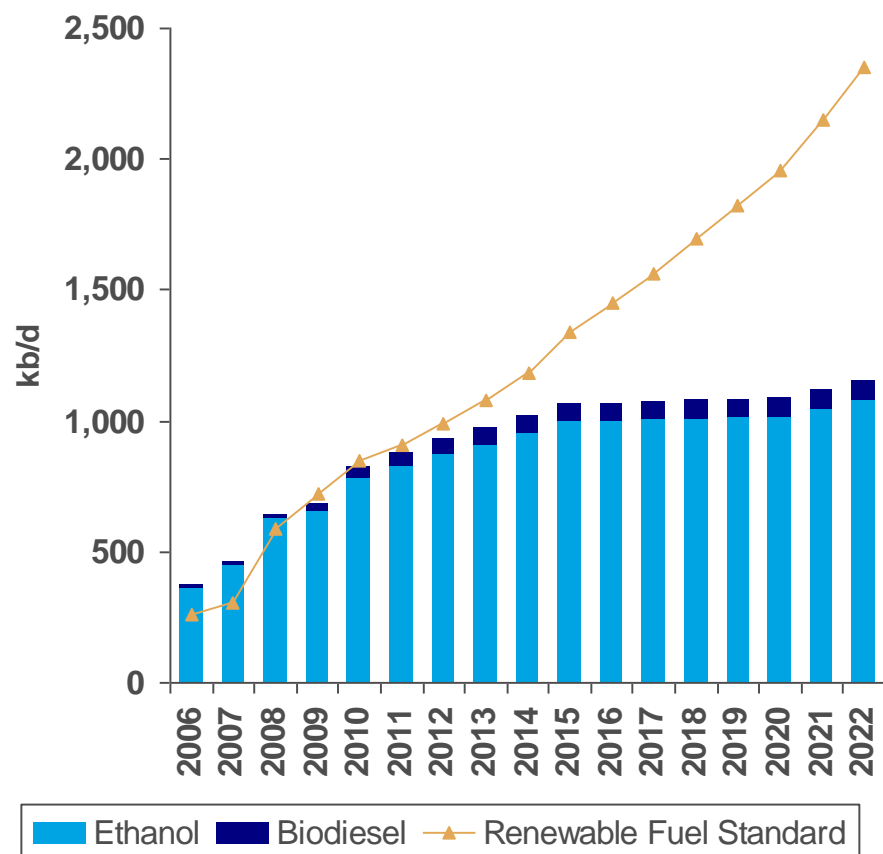
CP ISSUE #3: Why are these utilizations so low?

Improved vehicle efficiency is a restraint on gasoline demand

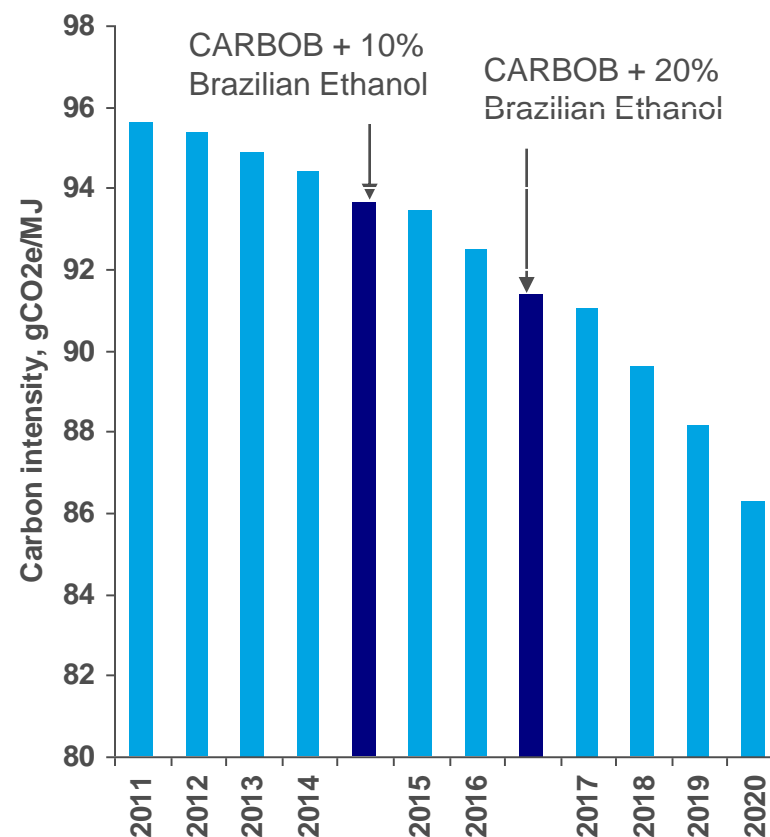


Compliance with RFS and LCFS regulation substitutes with Ethanol

Forecast Compliance With the US RFS



The Californian LCFS Carbon Intensity Requirements vs Two Gasoline Ethanol Blends



CARB - California Reformulated Gasoline Blendstock for Oxygenate Blending

1 World Oil Outlook

2 US Refining and Gasoline Outlook

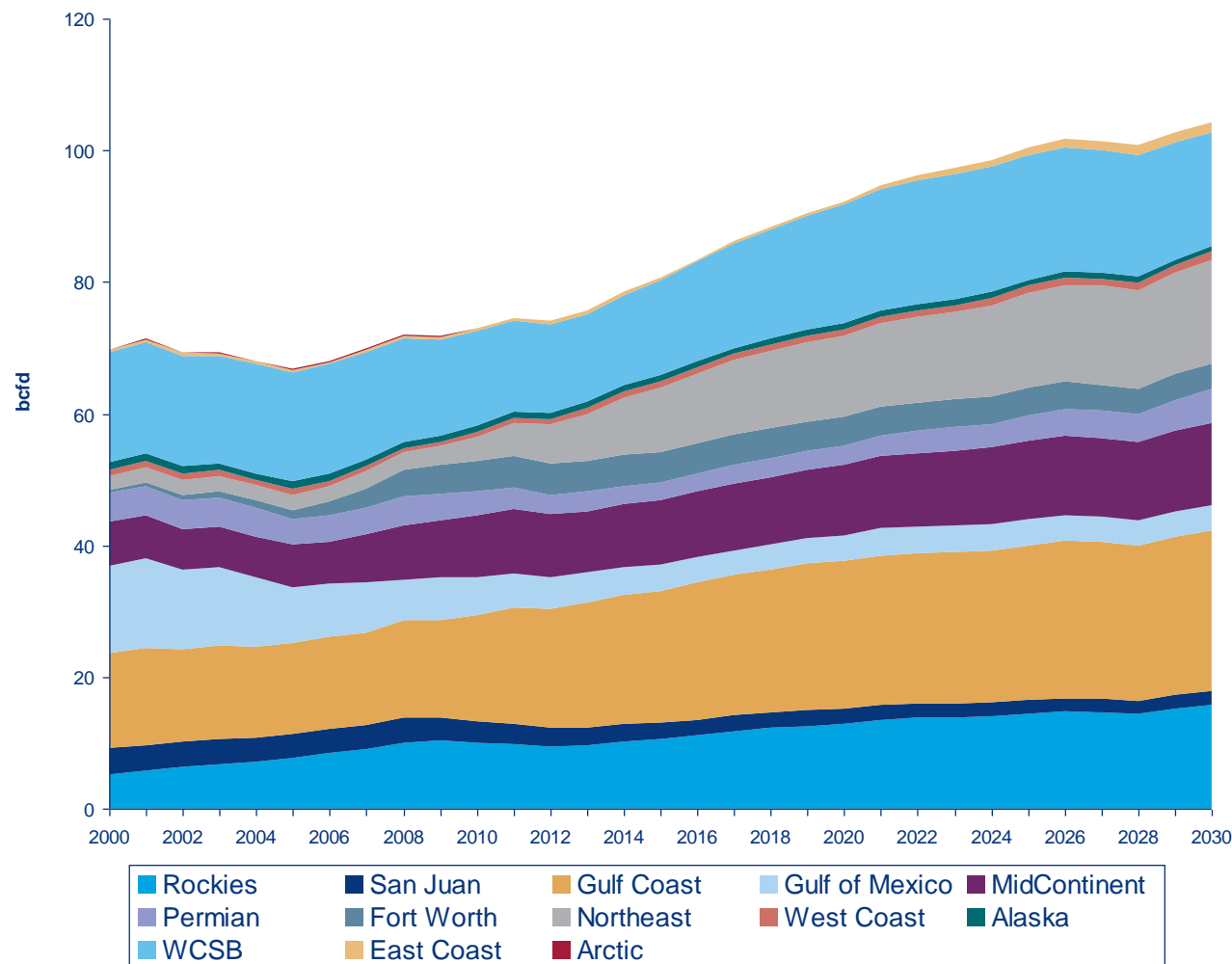
3 **US Natural Gas Outlook**

4 US NGL Outlook

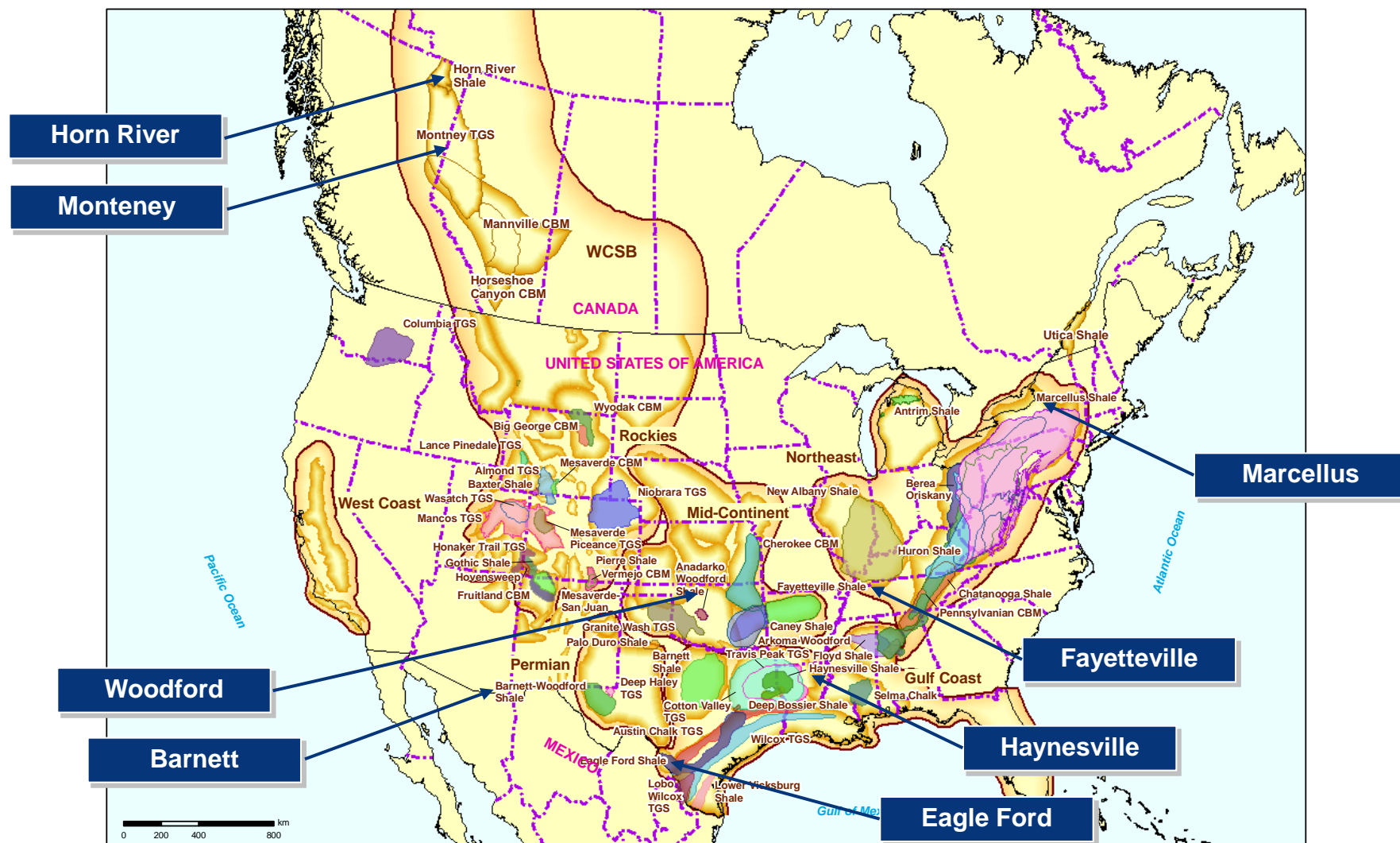
Natural gas supply anticipated to grow

(Bcfd, dry)

- › Supply overall increases by 27 Bcfd in the US 2010-2030.
- › The largest increases are in the Gulf Coast and the Northeast.



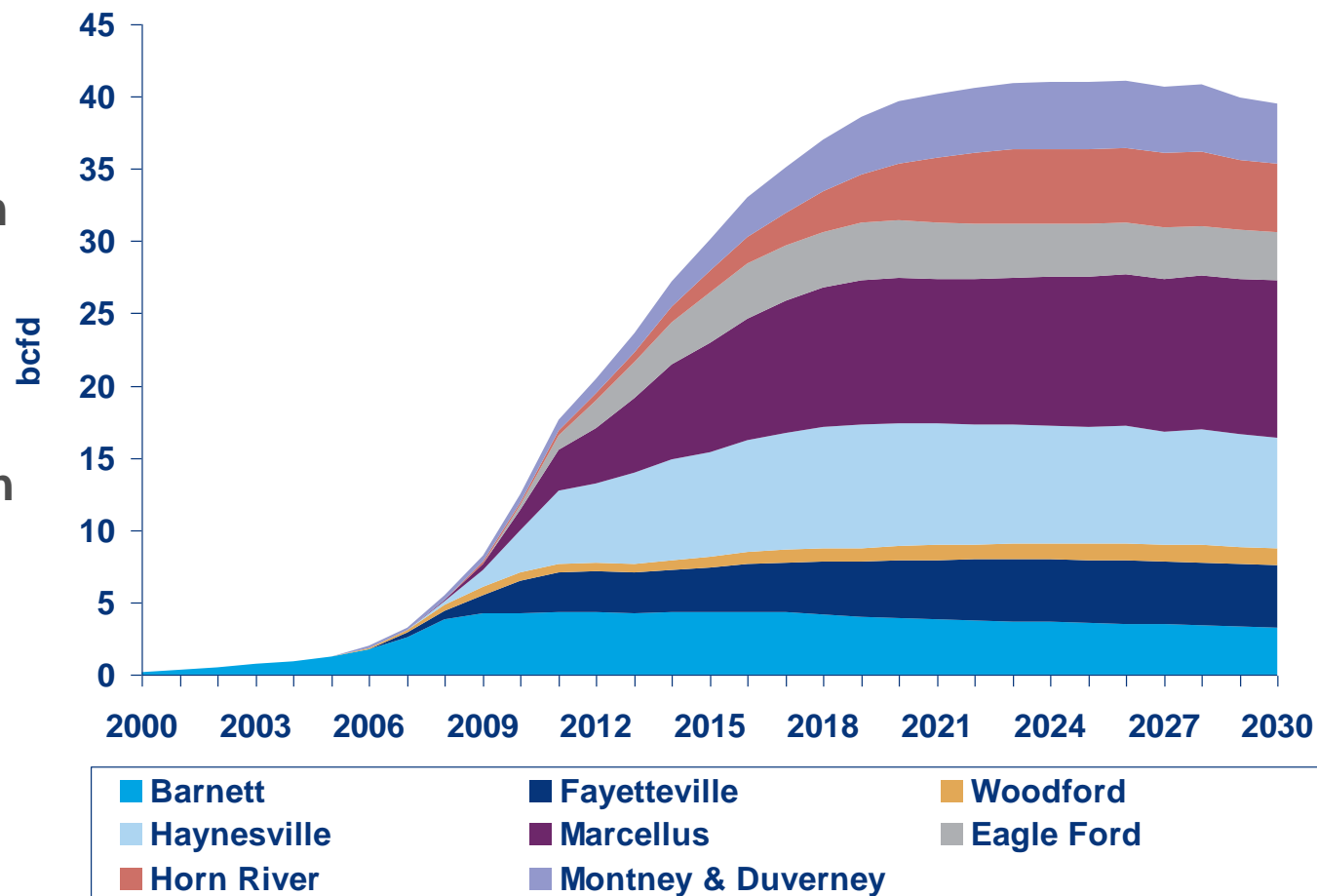
Shale gas reserves are key to growth



CP ISSUE #4: Will we be allowed to get to it?

The supply mix depends on shales, and hydraulic fracturing

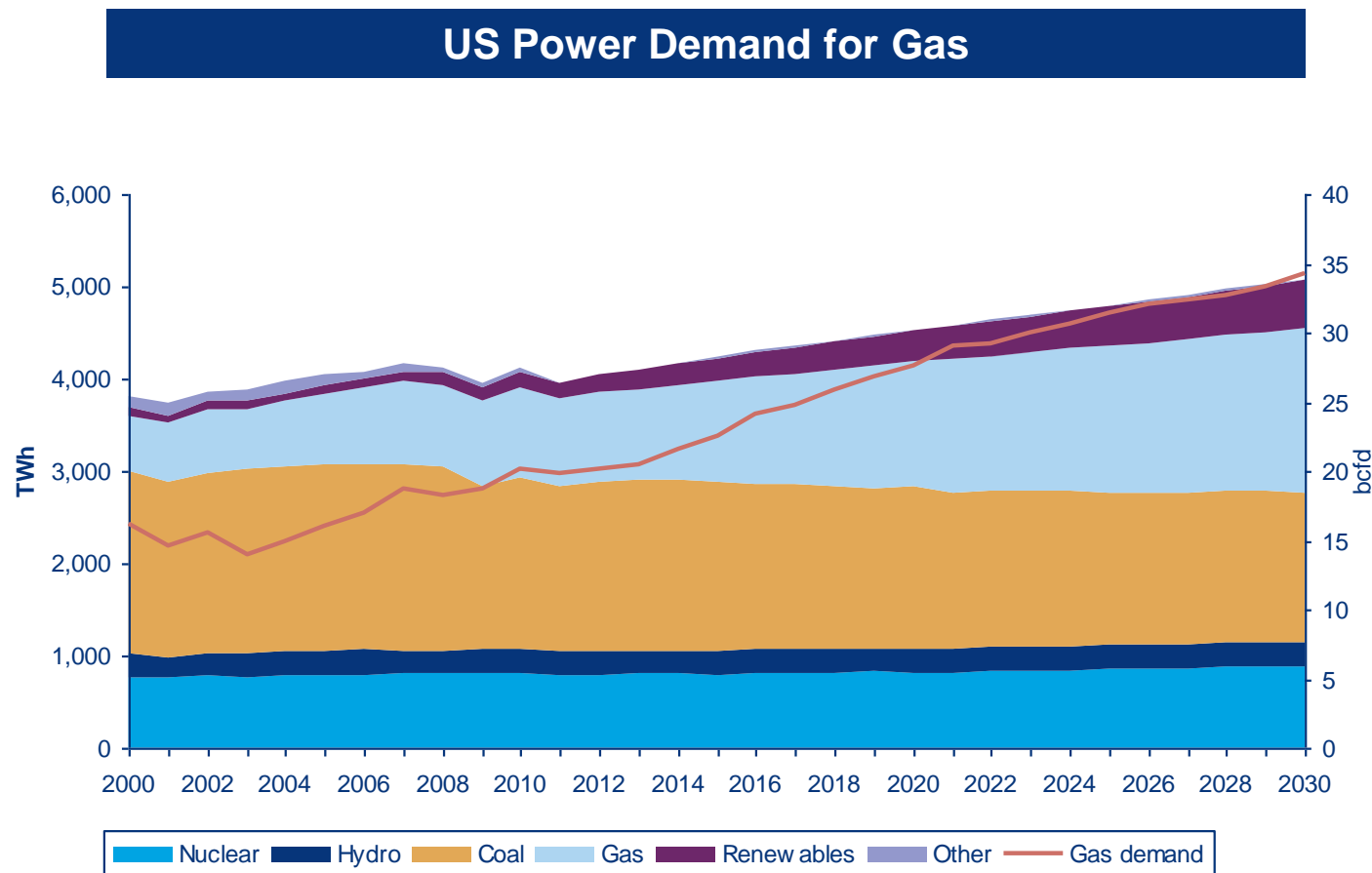
- › Close to 50% of supply longer term will be affected by regulations on hydraulic fracturing.
- › Still, strong growth potential - 28.5 Bcfd in the known shale plays by 2025!



Power is still the largest and a growing use of natural gas in the US

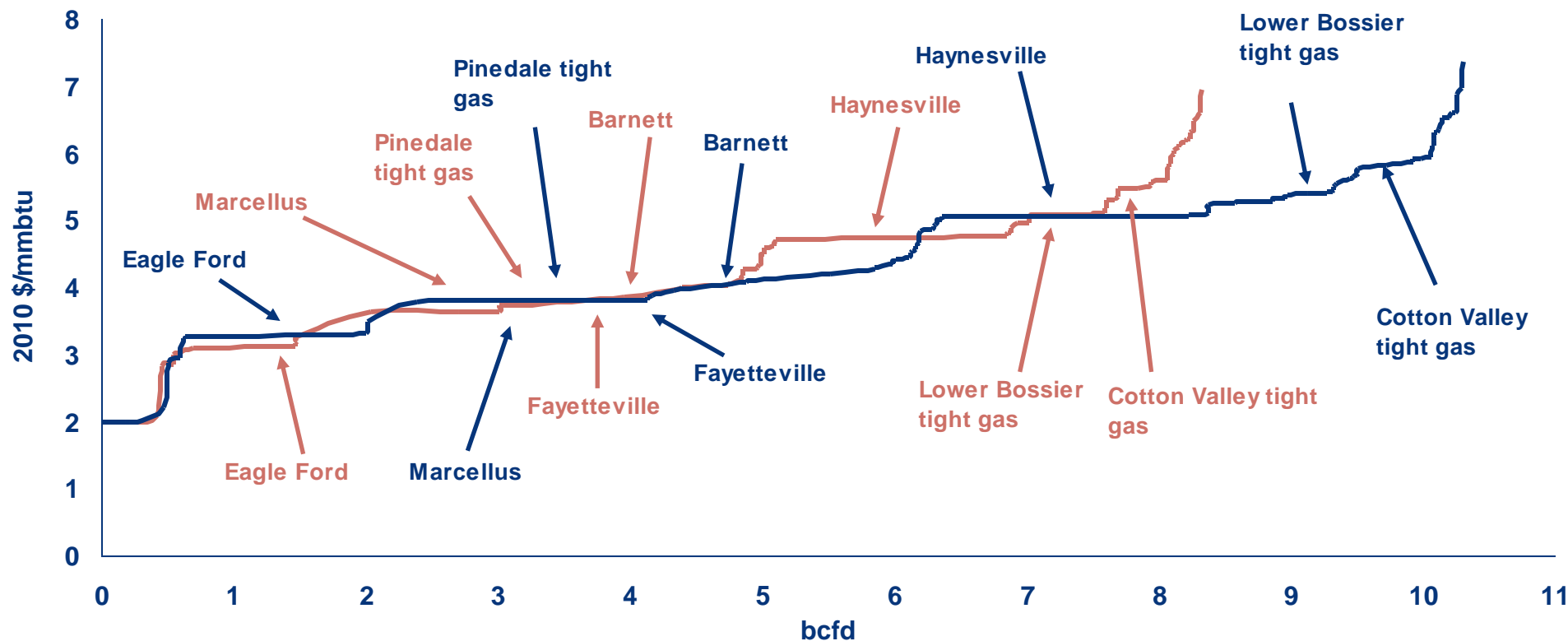
Initially, rapid growth, but a longer term slowing

- › Coal retirements, a resumption of economic growth drive 1.5 Bcfd growth annually through 2020
- › Post 2020, efficiencies and renewables reduce growth to < 1 Bcfd yearly.



New-drill cost curves indicate higher long-term Henry Hub price requirement, but well below recent years

US new drill gas supply stack*



*Assumes development breakeven economics (not including land lease costs) at a 10% real IRR adjusted to a Henry Hub- equivalent price

— 2011 — 2020

Source: Wood Mackenzie (North America Gas Service)

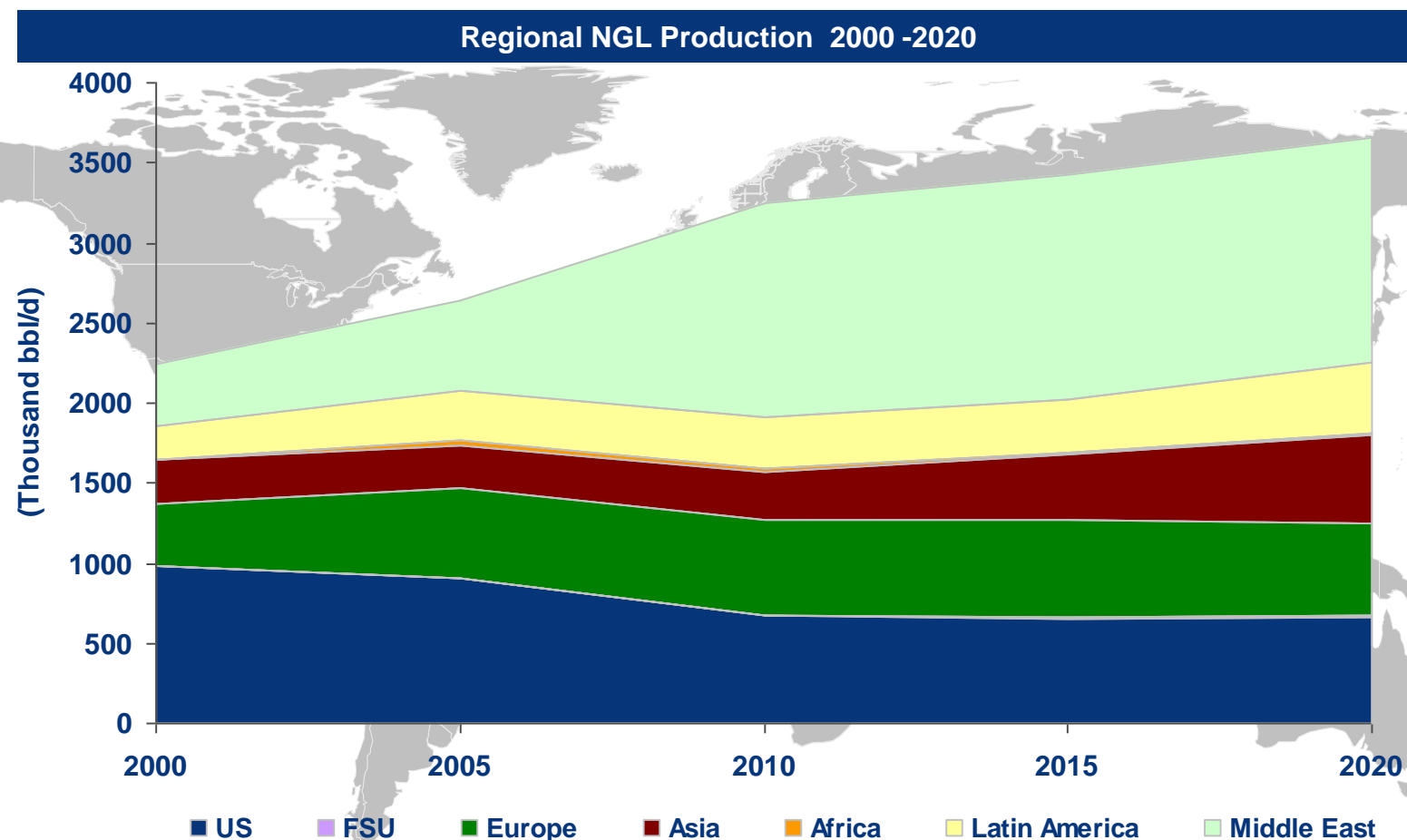
1 World Oil Outlook

2 US Refining and Gasoline Outlook

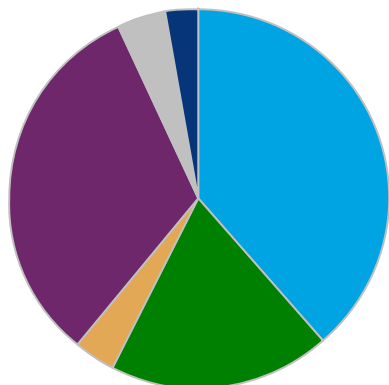
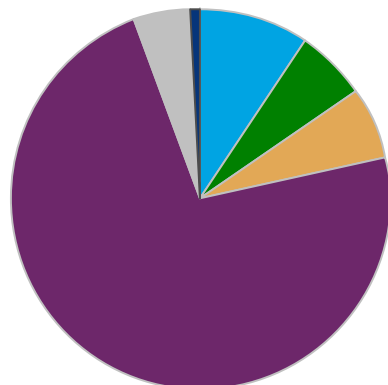
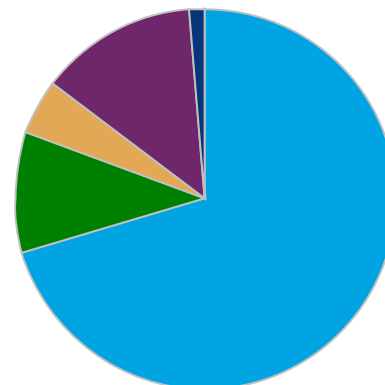
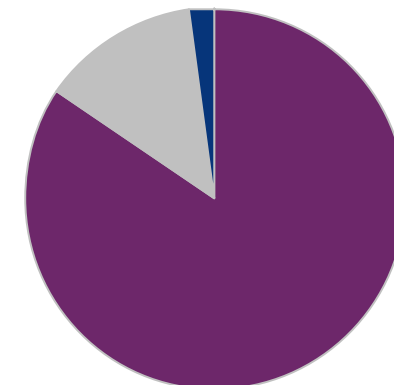
3 US Natural Gas Outlook

4 **US NGL Outlook**

Middle East continues to dominate the LPG production – while the US supply remains steady

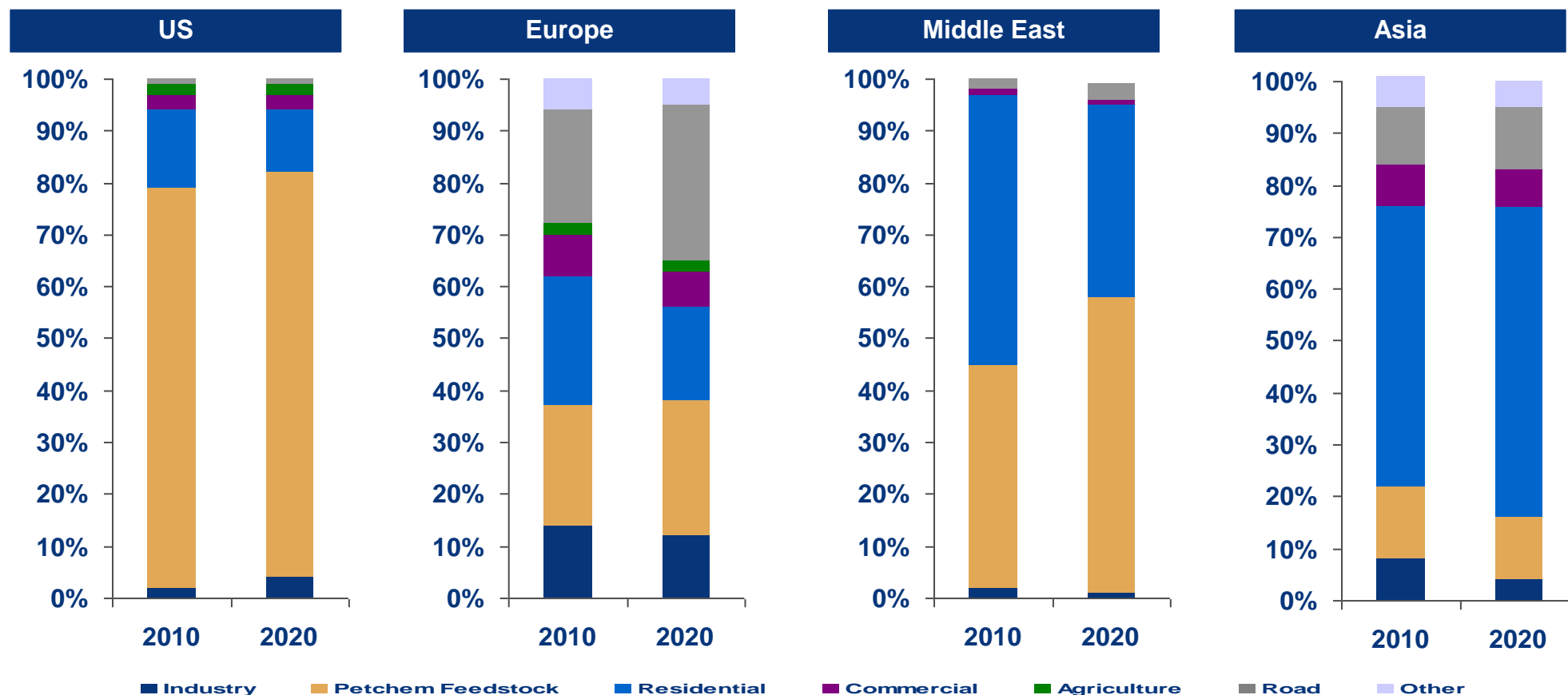


Given the infrastructure of regional demand, the USGC is the hub for Propane and Butane for Chemical use

US**North West Europe****Middle East****Asia**

■ Ethane ■ Propane ■ Butane ■ Naphtha ■ Gasoil ■ Other

LPG petchem demand expected to increase in the Middle East while other regions' demand profile remains nearly unchanged



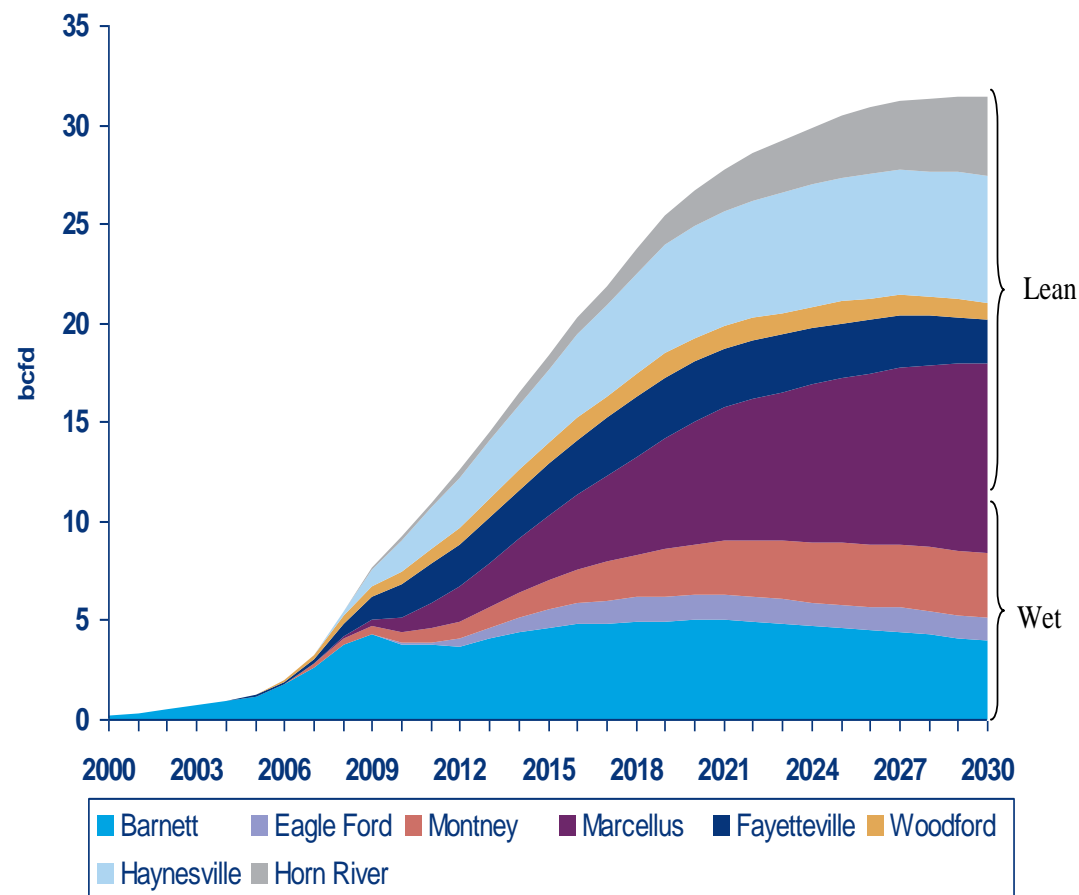
CP ISSUE #5: Why is everybody's talking about Ethane?

With all these shales NGL content ("richness") is a key driver

› High oil-gas price differential has increased the attractiveness of liquids-rich shale gas plays...

- Increased focus on "wetter" shale plays in 2010/11
- Shifting upstream strategies and capital allocation across independents

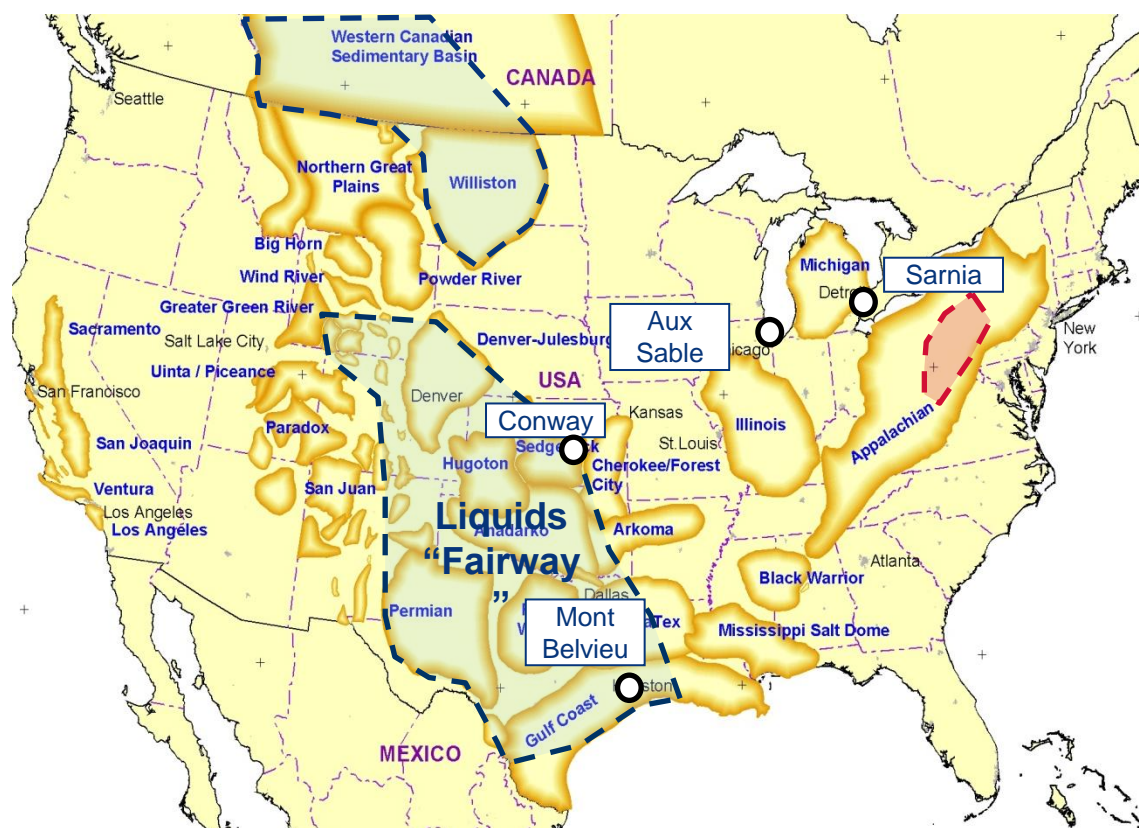
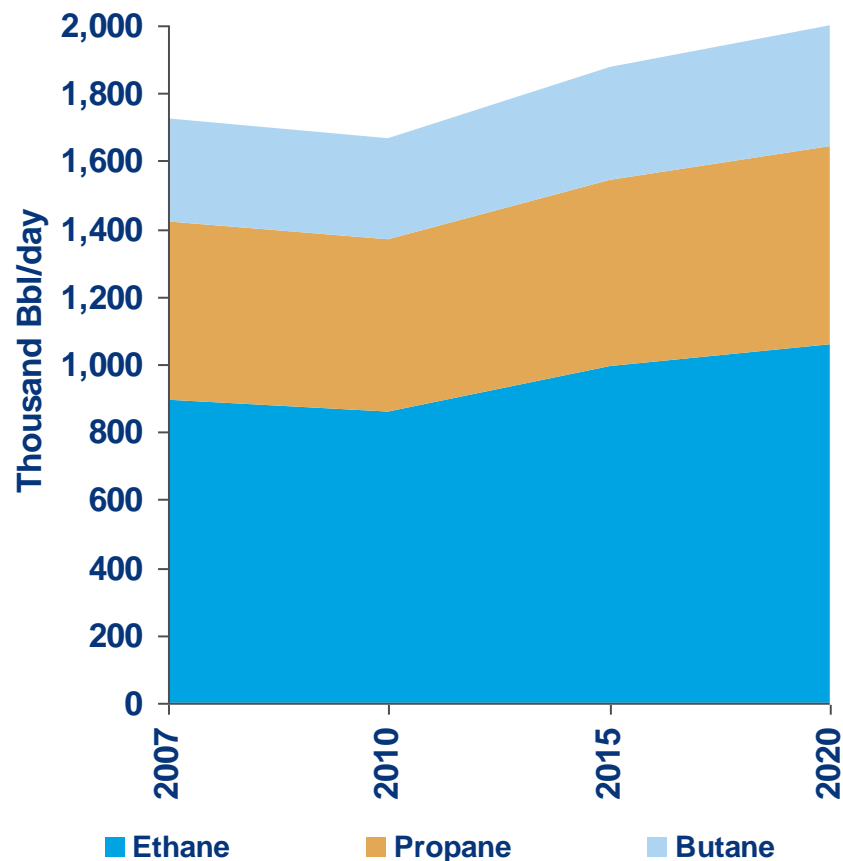
US Shale Gas Production by Play



Source: Wood Mackenzie Unconventional Gas Service

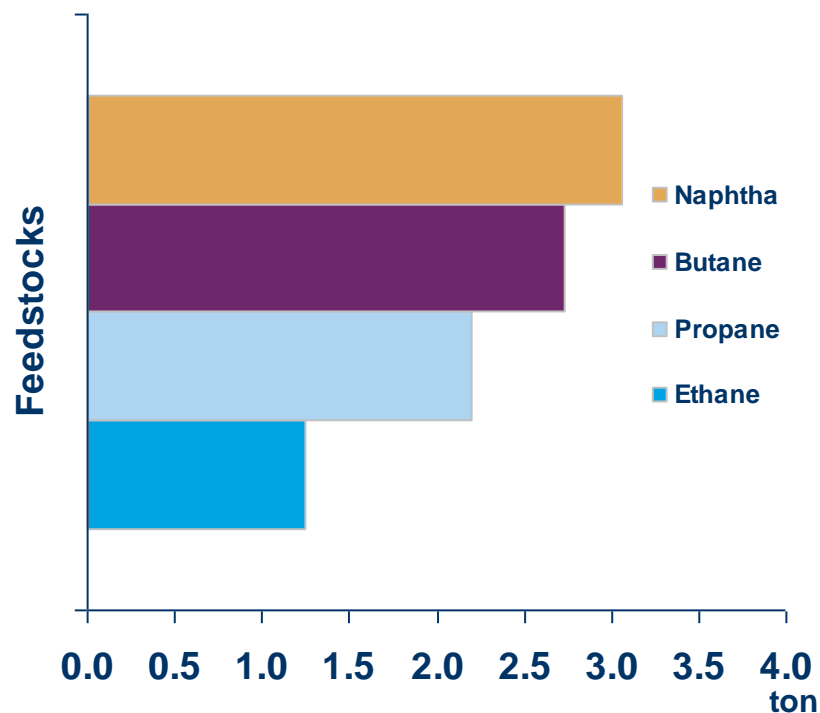
North America's "Liquids Fairway" unveils an "ethane supply" story

US NGL Production (2007-2020)

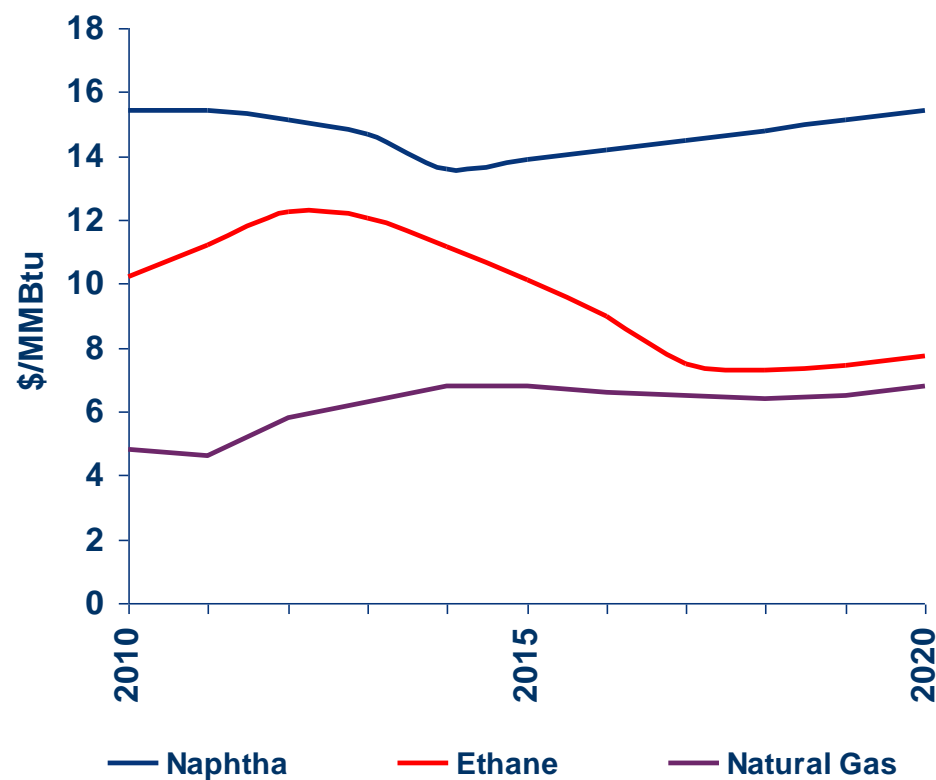


USGC petchems may focus on maximizing Ethane feedstock

Feedstock demand to produce 1 ton of Ethylene



Ethane Price Projection (\$/MMBtu) 2010-2025



In summary, how do the broader trends in the energy industry impact the E&C business?

Macro-Fundamentals

- › Oil supply is stable and more from non-OPEC sources
- › Gasoline demand declining
 - Overall demand
 - CAFÉ
 - RFS/LCFS
- › Natural gas volumes increased with (wet) shale plays
- › NGL supply stable, but ethane will grow significantly

E&C Impact

- › Mega projects in the upstream remain in the mix (Brazil deepwater and Canada)
- › Infrastructure plays become the more important in future
- › Refining projects to be smaller more geared to regulatory compliance vs. profitability
- › Gas fired power plants win the day
- › Ethylene units may already have too many announced

THANKS

Any Questions?

Wood Mackenzie

Kintore House
74-77 Queen Street
Edinburgh EH2 4NS

Global Offices

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

Global Contact Details

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



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**