



Pacific Rim Impacts of US Shale Boom

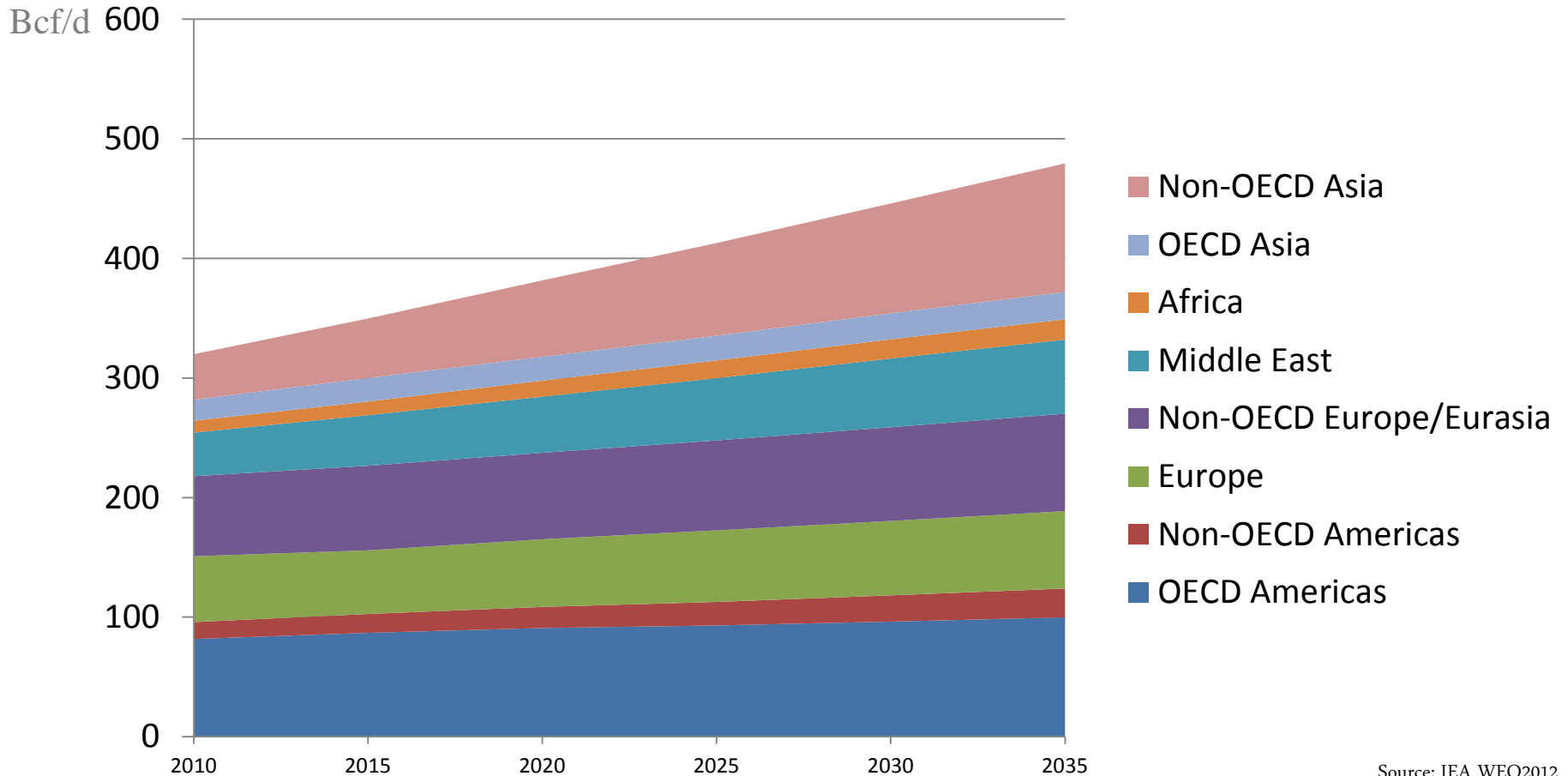
Jason Bordoff

2013 EIA Energy Conference

June 17, 2013



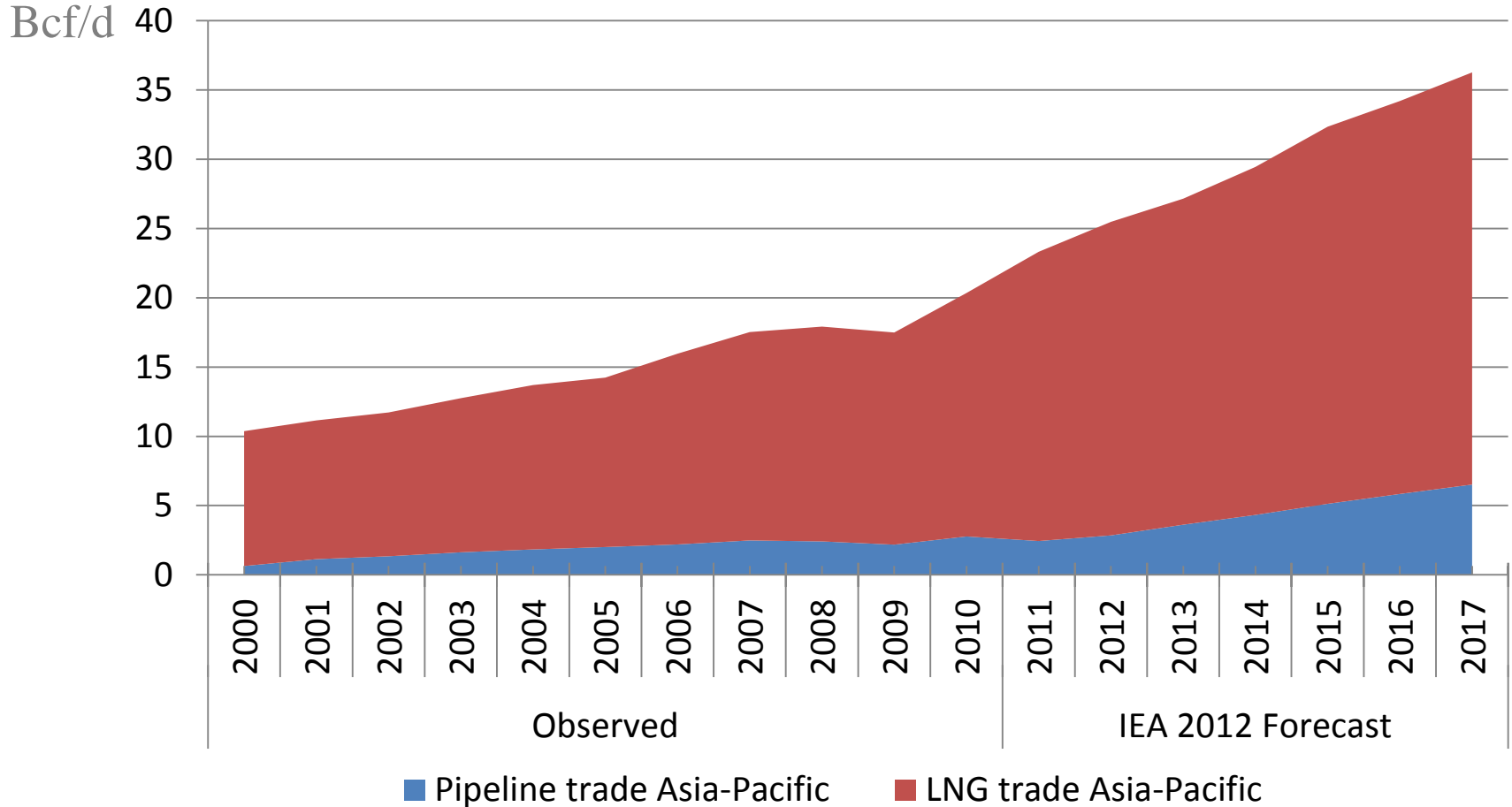
Global Gas Demand Forecast



Source: IEA WEO2012



Asia Pacific Pipeline vs. LNG Demand



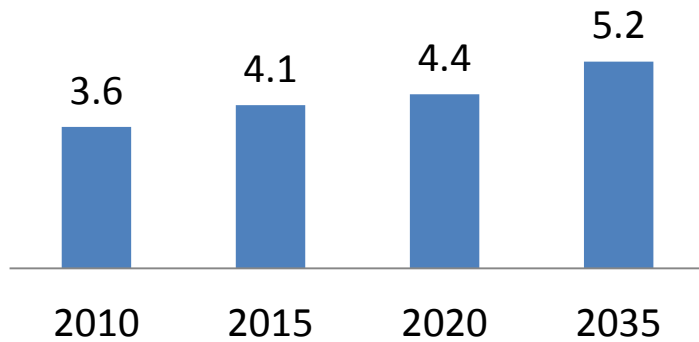
Source: IEA



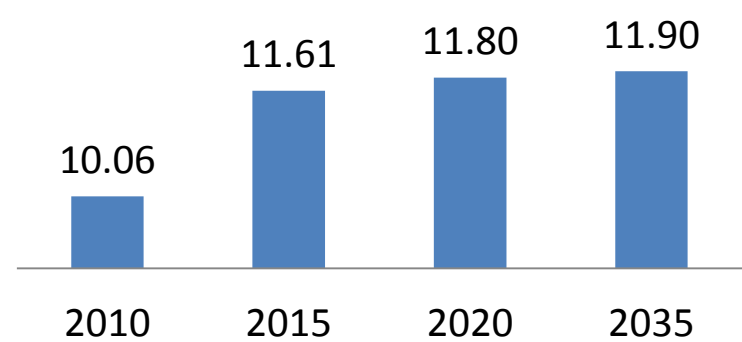
Asia Country Level Forecast

Bcf/d

Korea



Japan

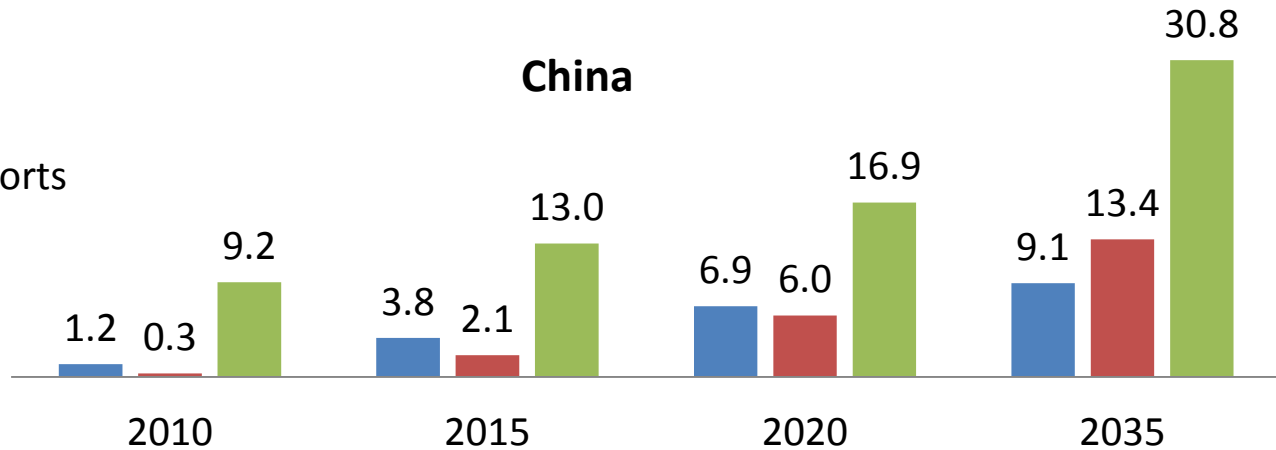


China

■ China LNG Imports

■ China Pipeline Imports

■ China Production

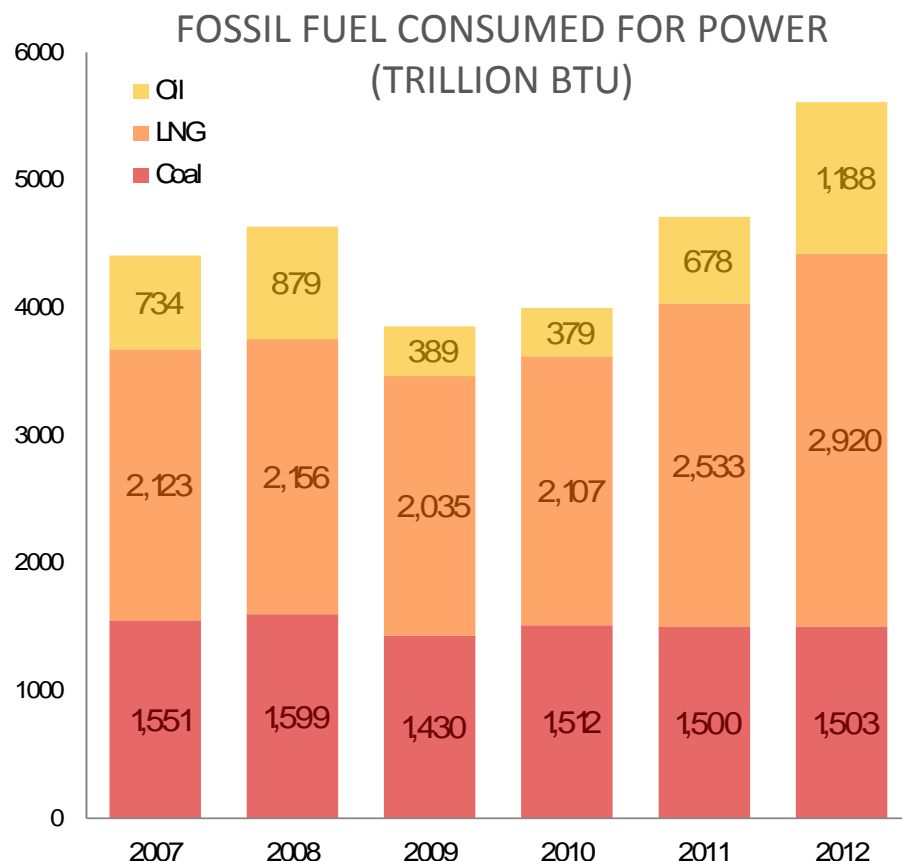
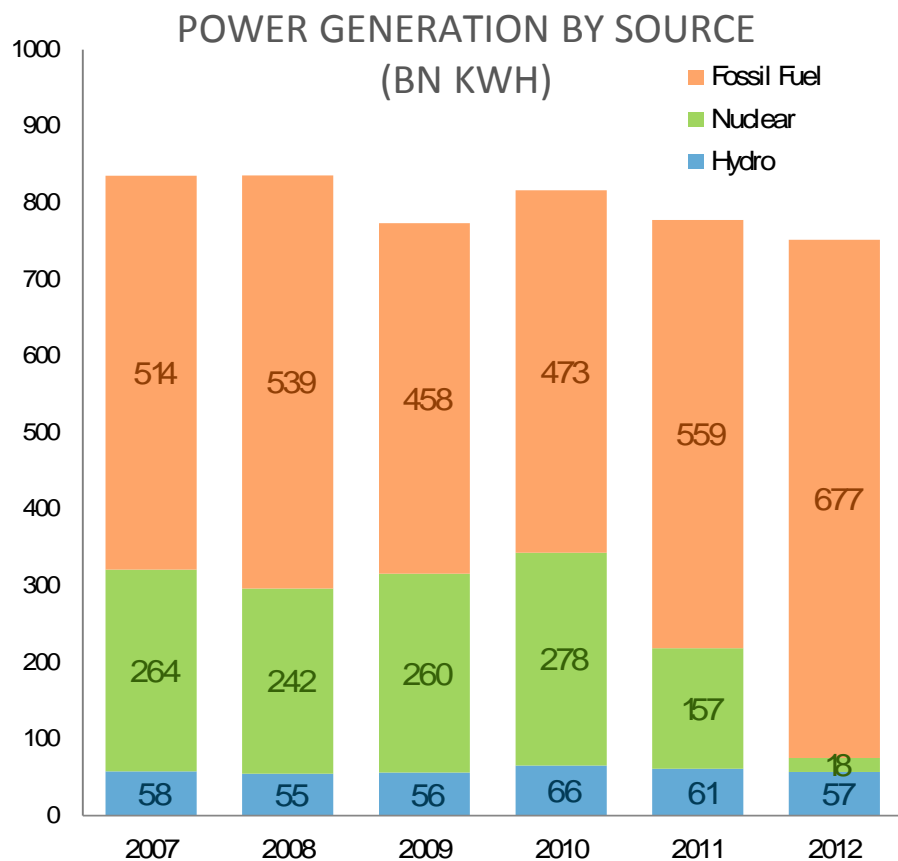


Source: IEA WEO2012, EIA, Jim Jensen



Japanese Power Generation

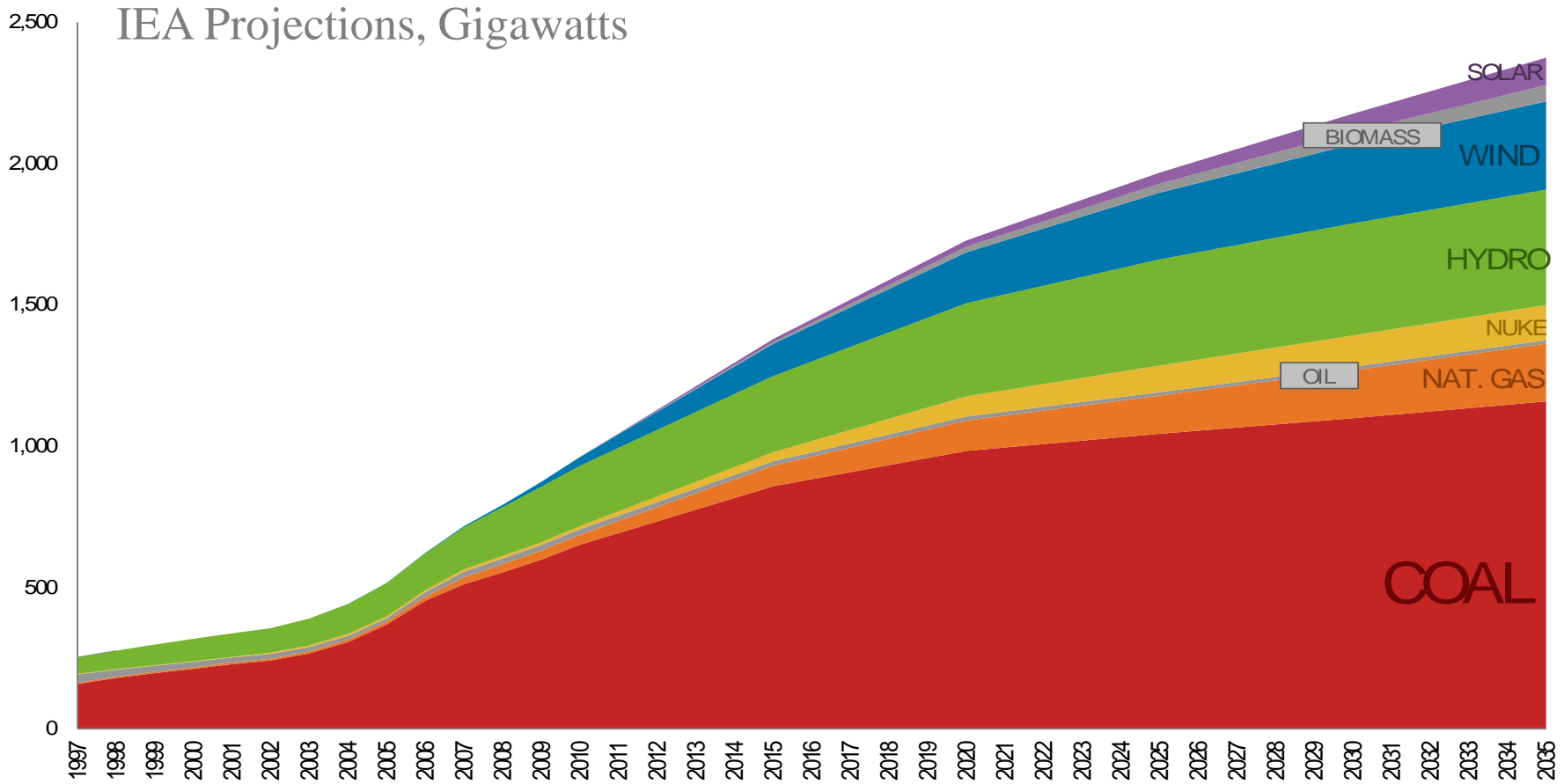
Billion kWh (left) and trillion BTU (right)



Source: Federation of Electric Power Companies (FEPC) via Bloomberg



Chinese Power Generation by Type

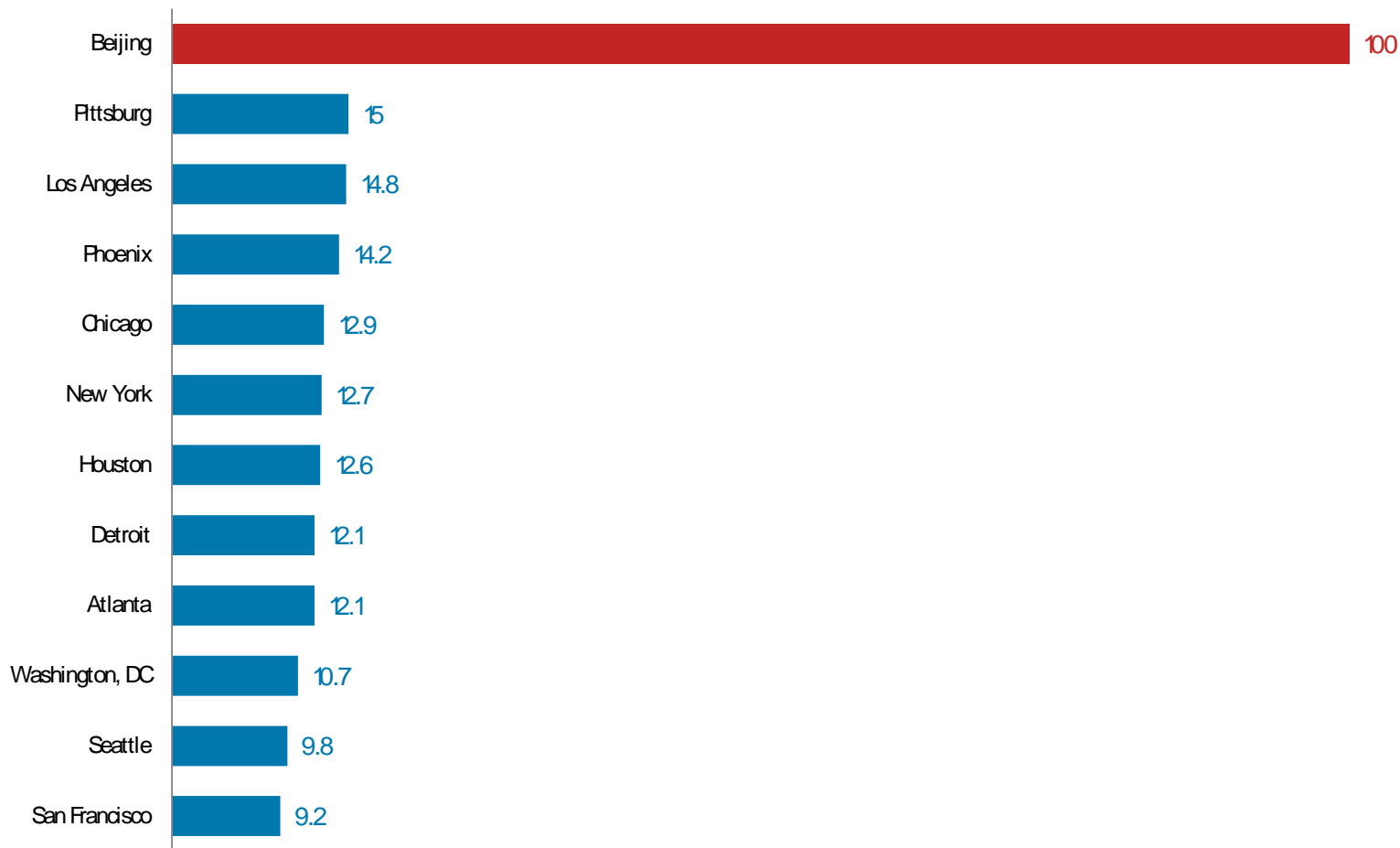


Source: IEA's "New Policies Scenario" from the 2012 World Energy Outlook



China's Acrid Air

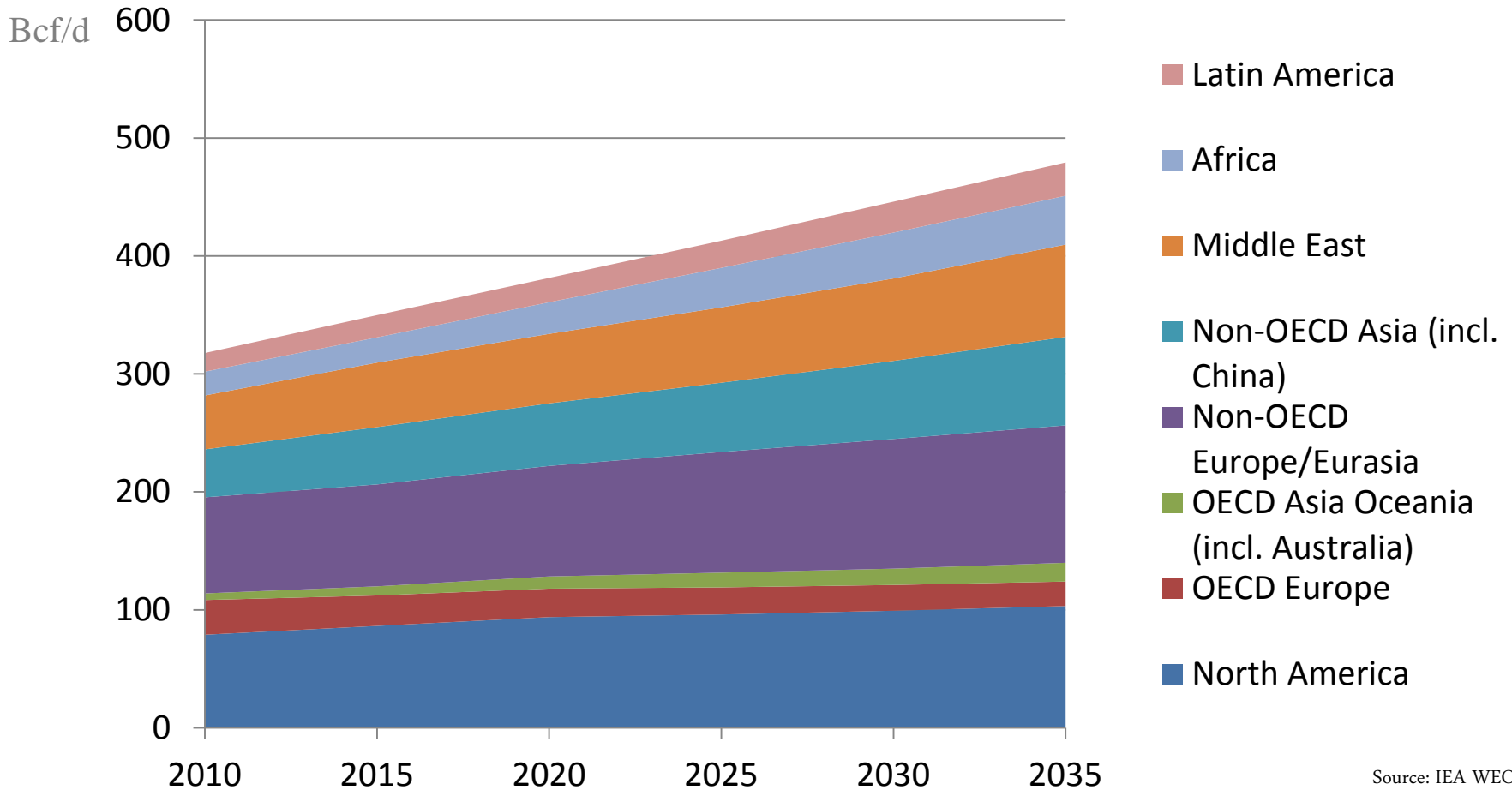
PM 2.5 microns per cubic meter



Source: WHO, Steven Q. Andrews and RHG estimates



Global Gas Supply Forecast



Source: IEA WEO2012



Top 10 countries with technically recoverable shale gas resources

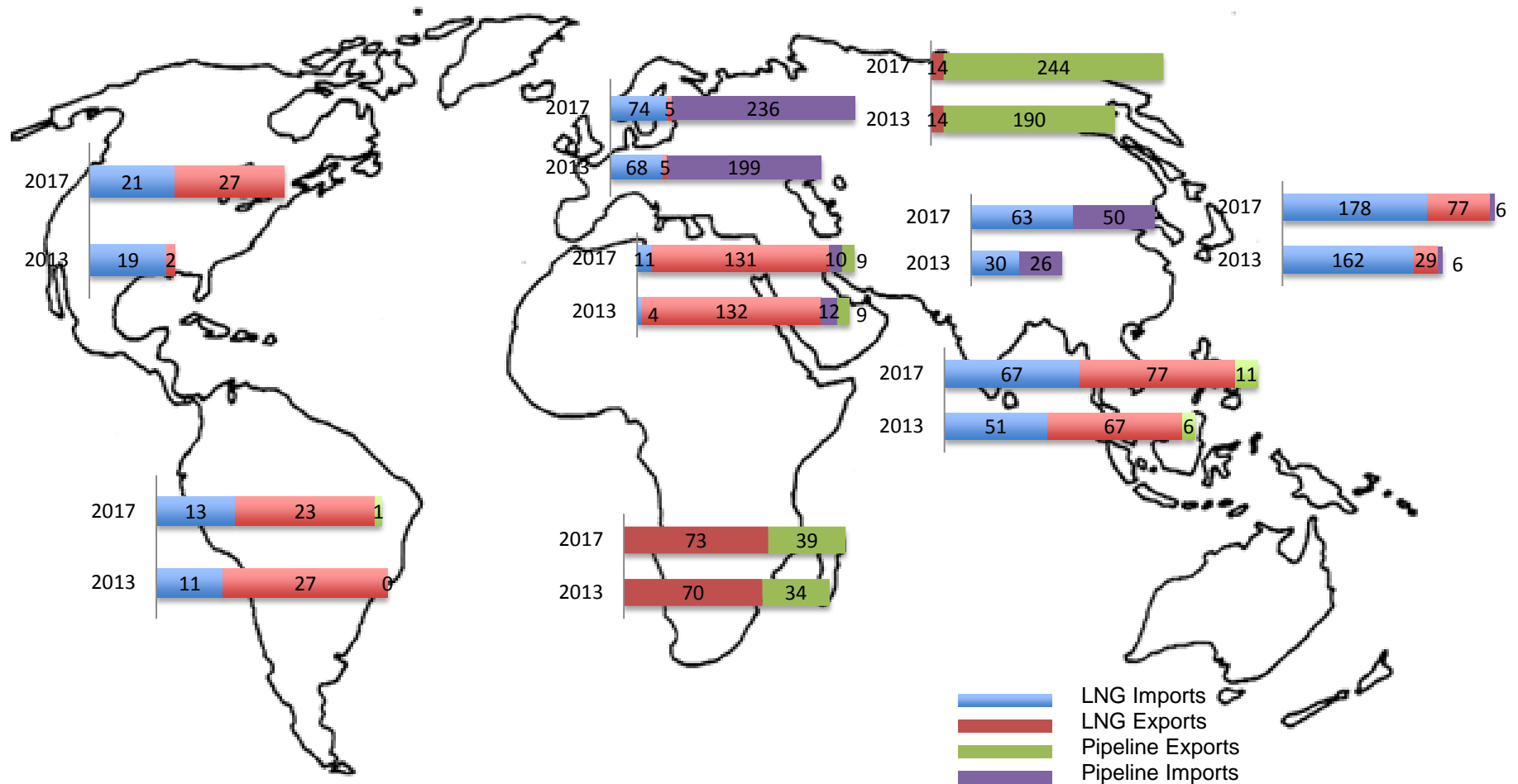
Rank	Country	Shale Gas (tcf)
1	China	1,115
2	Argentina	802
3	Algeria	707
4	U.S. ¹	665 (1,161)
5	Canada	573
6	Mexico	545
7	Australia	437
8	South Africa	390
9	Russia	285
10	Brazil	245
	World Total	7299 (7,795)

¹ EIA estimates used for ranking order. Advanced Resources International estimates in parentheses

Source: EIA



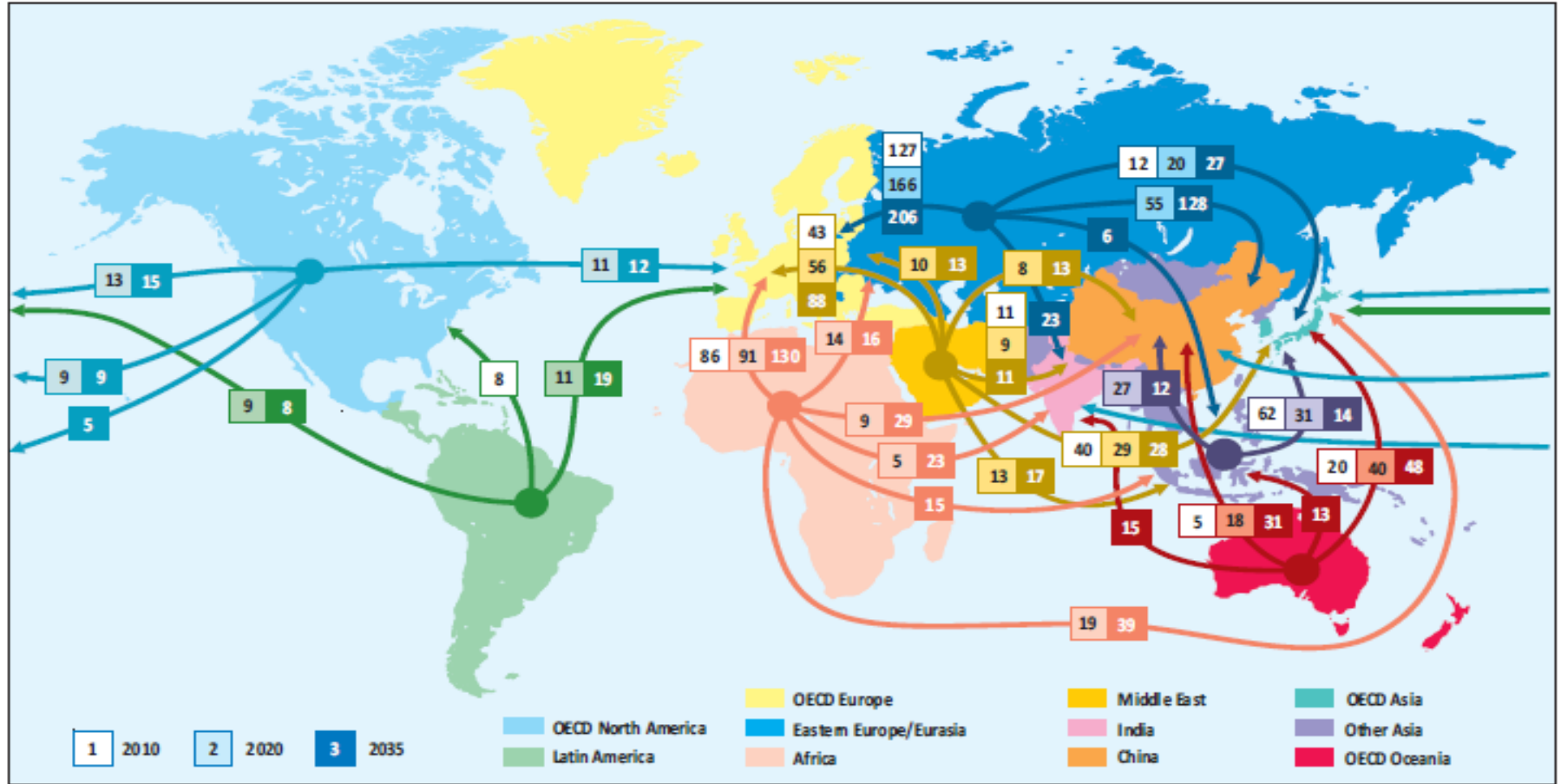
Global Gas Trade 2013-2017



Source: IEA Medium Term Gas Report 2012



Global Gas Supply Forecast



Source: IEA Medium Term Gas Report 2012



Impact of US Shale Boom

Economic

- LNG Exports
- Coal Exports
- Displaced LNG Imports

Geostrategic

- Russia
- Qatar
- Australia
- Other

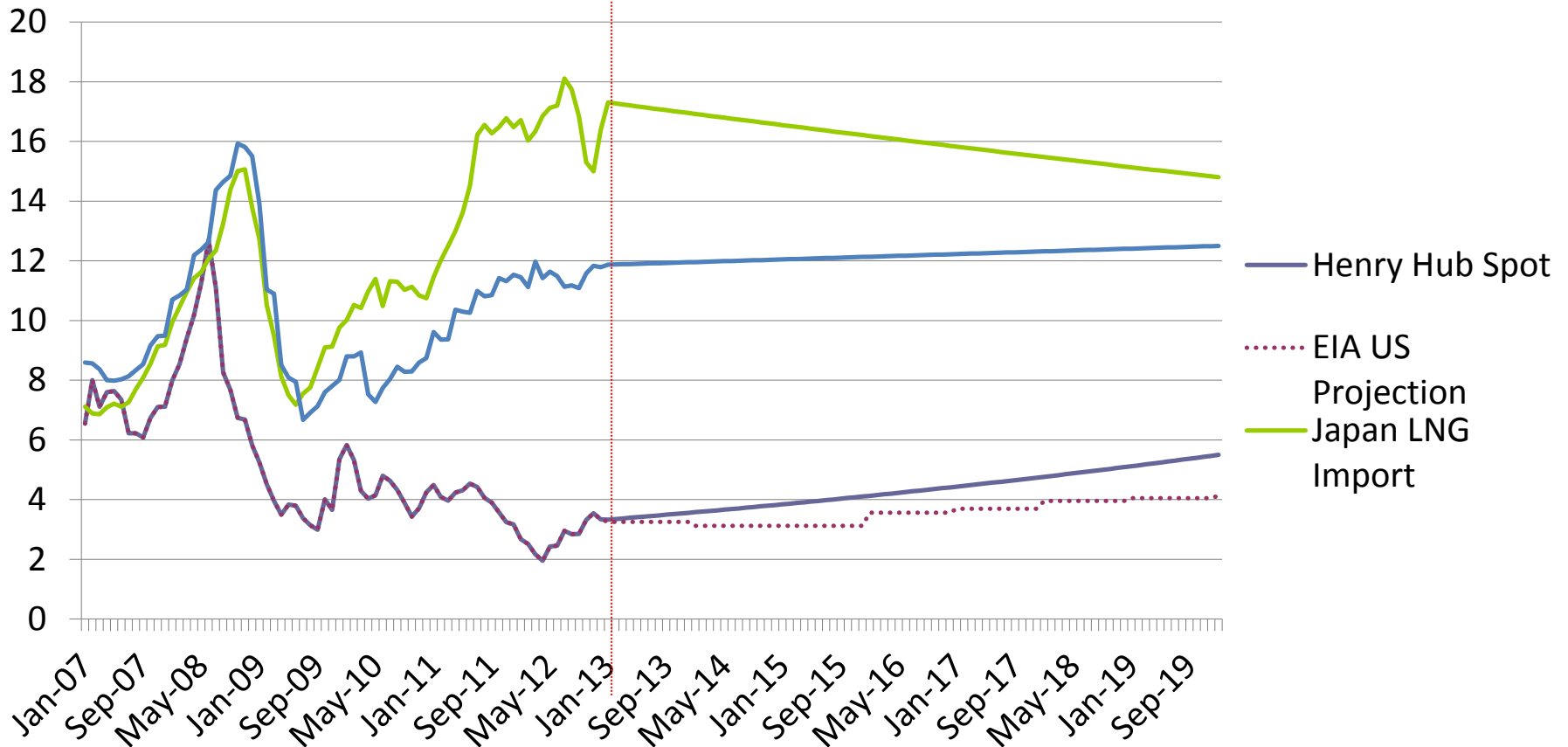
Environmental

- Substitution of gas for coal?
- Substitution of gas for renewables and nuclear?
- Impact of lower gas prices on consumption?



Regional Gas Price Forecast

\$/MMBTU



Source: IEA WEO2012



Summary of Projected US LNG Exports

Study (year)	Volume
CRA (2013)	20 bcf/day*
ICF (2013)	8 bcf/day**
Moody's (2013)	6 bcf/day
Navigant (2012)	5-6 bcf/day
Ken Medlock (2012)	No more than 1.2 bcf/day
NERA (2012)	0 bcf/day***

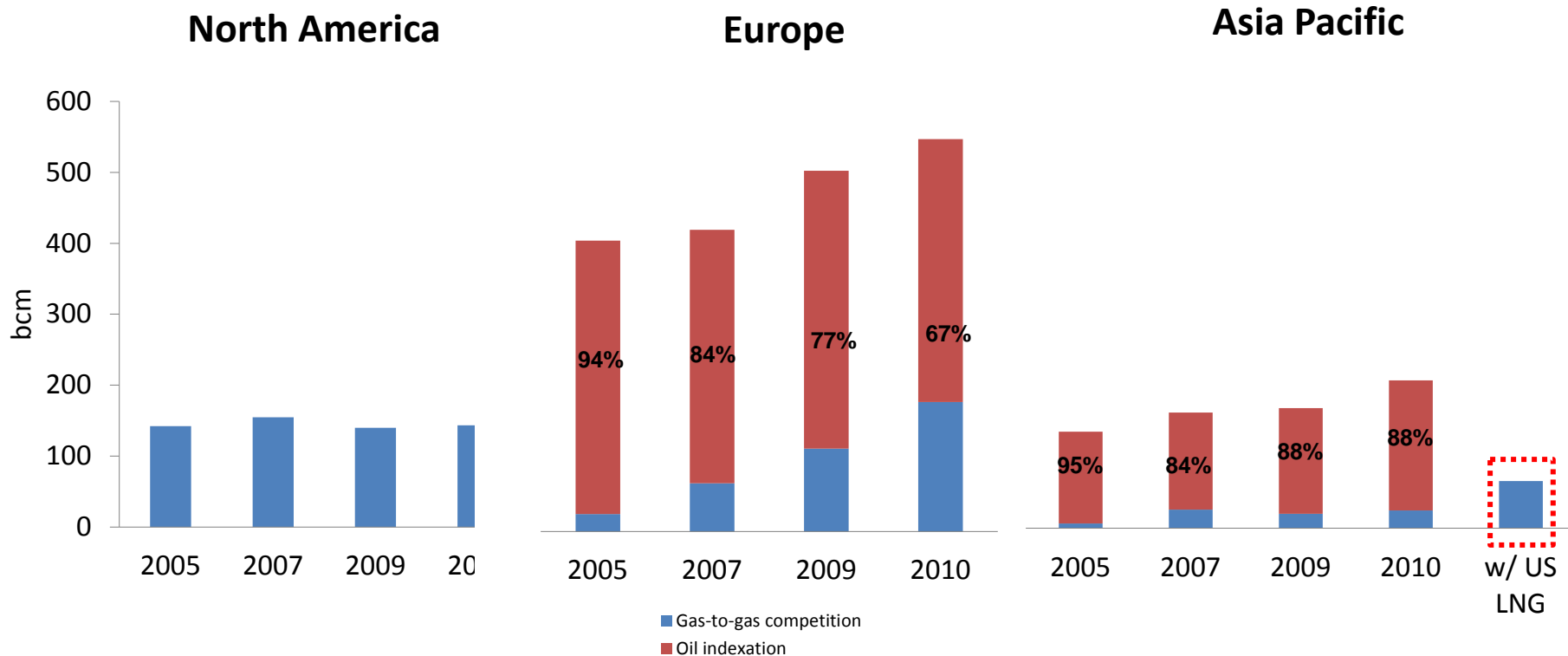
* Likely case. High case = 35 bcf/day.

** Middle case. Low case = 4 bcf/day. High case = 16 bcf/day.

*** In its analysis of global markets, NERA found that the U.S. would only be able to market LNG successfully with higher global demand or lower U.S. costs of production than in the Reference cases.



Market-based Pricing in Gas Trade by Region



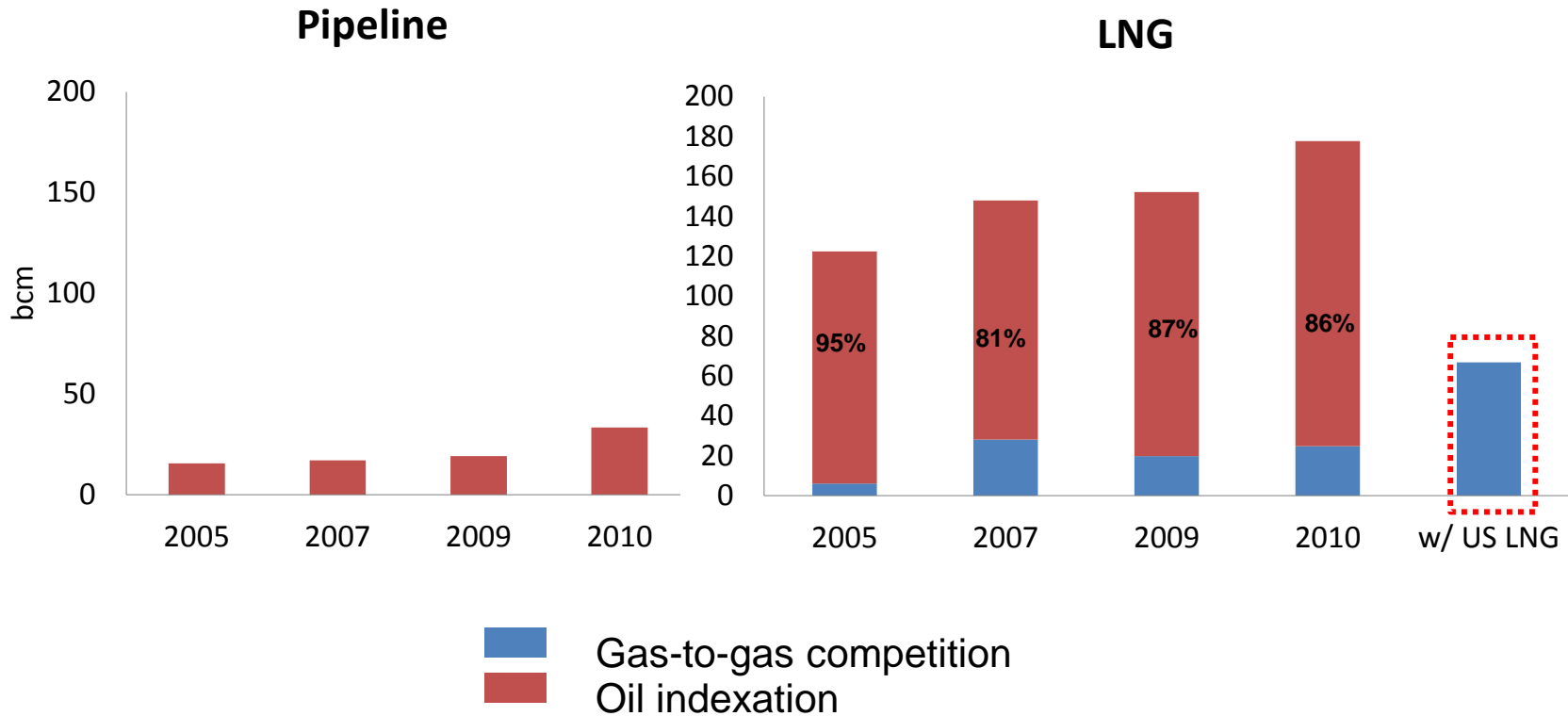
Additional 42 bcm/year or 4 bcf/day of North American LNG exports into Asia Pacific could increase volume of gas traded on gas-to-gas basis from 12% to 27%

Source: BP Statistical Review, IEA



Asia Pacific Pricing Mechanism

LNG Trade versus Pipeline

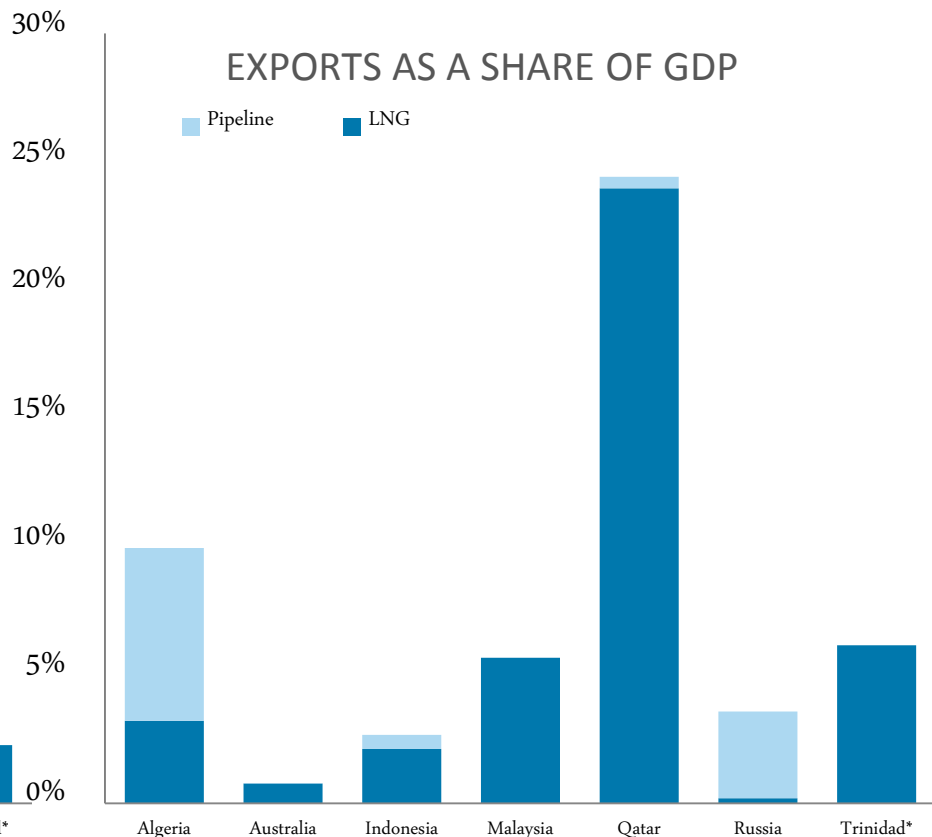
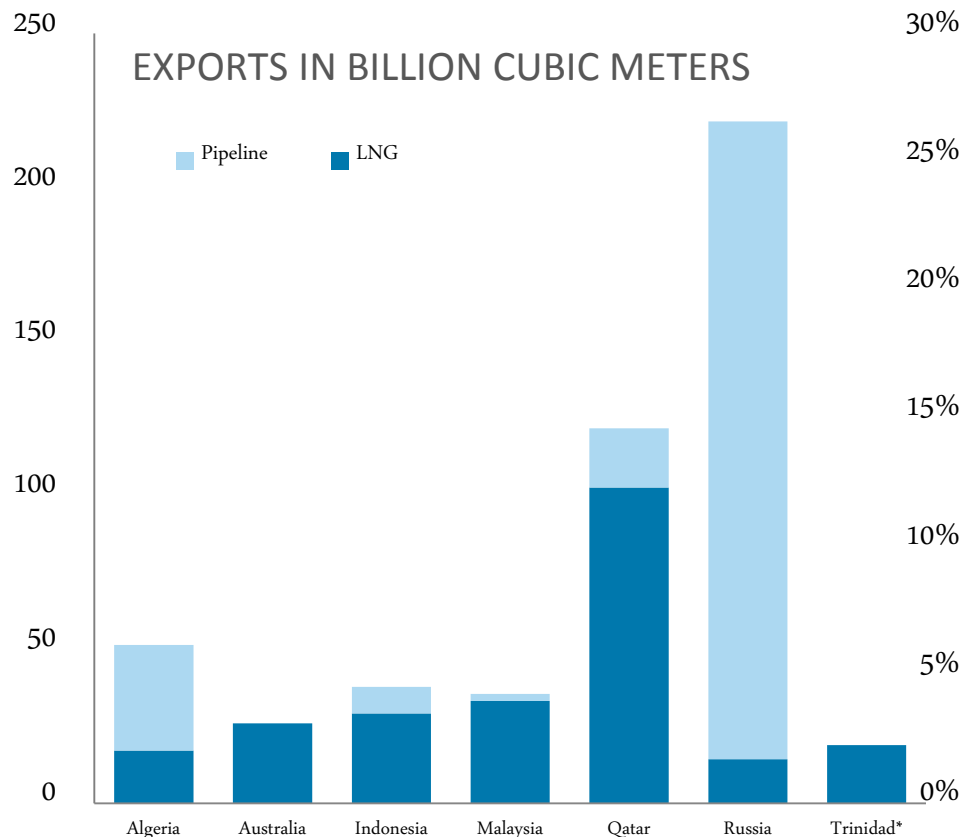


Source: BP Statistical Review, IEA



Global LNG Majors

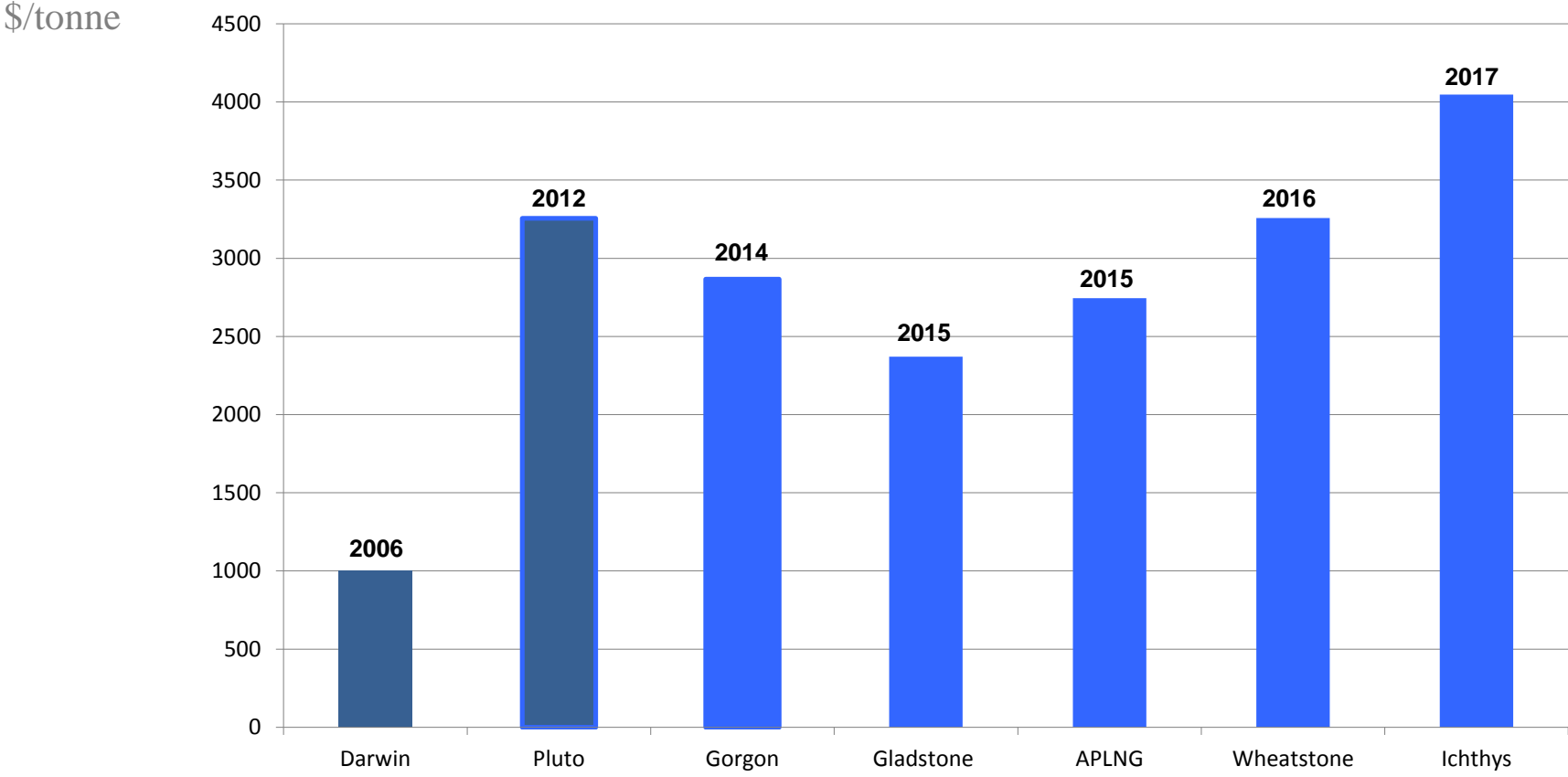
Export quantity and revenue as a share of GDP in 2011



Source: IMF, WITS, BP, Rhodium Group estimates



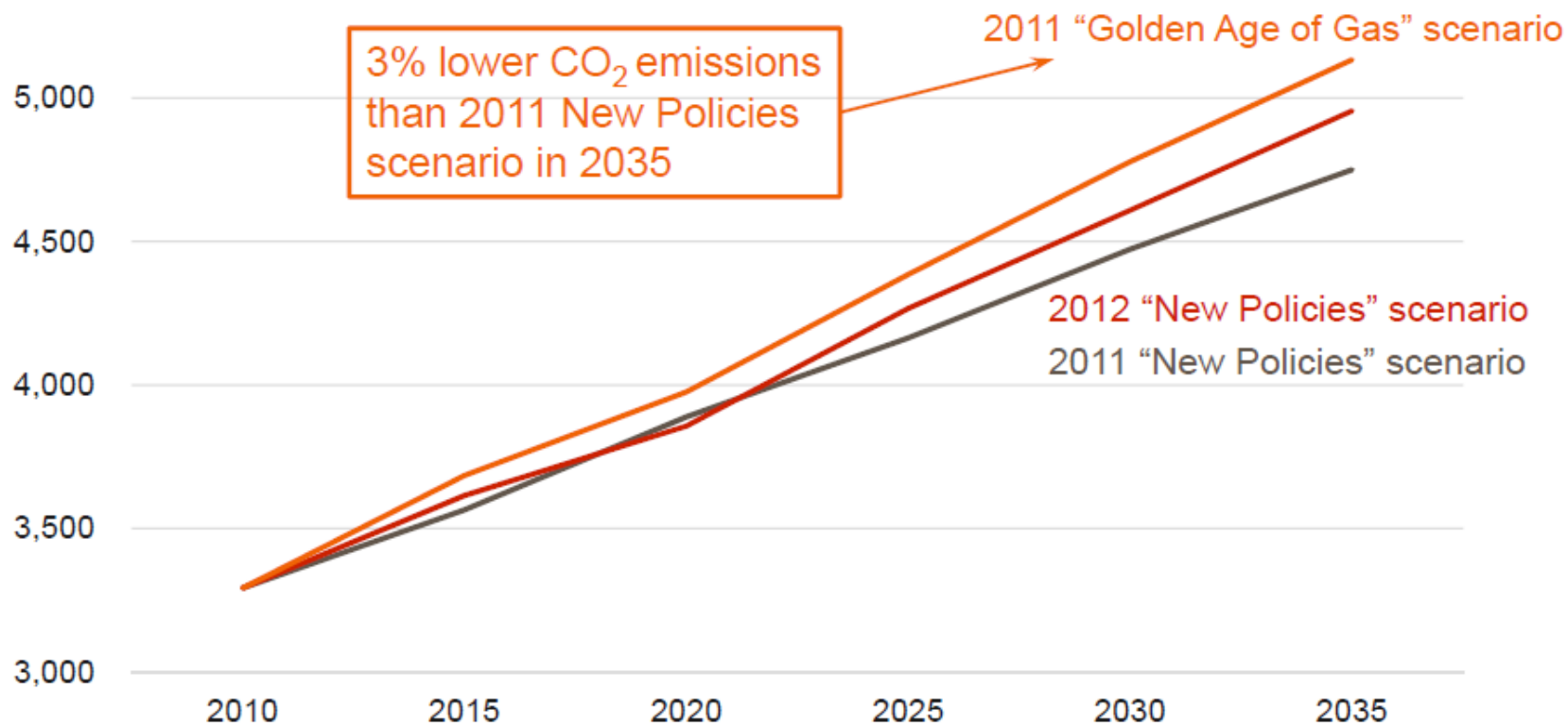
Rising Australia LNG Construction Costs



Source: Press reports



Gas Substitution Effect on Emissions



Source: IEA 2011, WEO 2012, "Golden Age of Gas Report"



Concluding Thoughts

Economic

- LNG exports can lower costs in Pacific and boost competition, but transportation costs mean regional price differential will persist.
- Oil linkage to remain, although with more flexible indexation clauses, but entering a period of more gas-on-gas competition in latter half of decade

Geostrategic

- Ramp up in LNG export capacity to continue pressuring Russia gas terms
- Huge Qatari surplus capacity has been absorbed; question is how they respond to surge in new export capacity.
- Keep an eye on Australian LNG project costs.

Environmental

- Low-cost natural gas tends to lower GHG emissions, but not a lot
- Still need climate policy; gas makes policy cheaper, doesn't solve climate
- Need better information about lifecycle emissions (fugitive methane)



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Thank you

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Appendix



U.S. LNG Export and Price Impact Forecast

Study	Average Price without Exports (\$/MMBtu)	Average Price with Exports (\$/MMBtu)	Average Price Increase (%)
EIA*	\$5.28	\$5.78	9%
Deloitte	\$7.09	\$7.21	2%
Navigant (2010)** (2 bcf/day of exports)	\$4.75	\$5.10	7%
Navigant (2012)***	\$5.67	\$6.01	6%
ICF International***	\$5.81	\$6.45	11%

* Price impact figure for EIA study reflects the reference case, low-slow export scenario.

** The Navigant study did not analyze exports of 6 bcf/day.

*** Navigant (2010 and 2012) and ICF International studies are based on Henry Hub price.

Source: EIA, Deloitte, Navigant, ICF International