



Impact of the evolving global gas market on the Eurasian gas market and the implications of COP21

Eurasian Natural Gas Infrastructure Conference

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Dr. Wolfgang Peters, MBA

Managing Director, The Gas Value Chain Company GmbH, Germany

Former CEO, RWE Supply & Trading CZ, a.s., Czech Republic

- ▶ **Emergence of global gas market: ‘LNG revolution’**
 - Share of waterborne trade increasing
 - Price ‘spreads’ instead of separated ‘price regions’
- ▶ **Eurasian market capable of sending price signals?**
- ▶ **Flexible supplies to respond to price signals?**
- ▶ **Europe able to absorb flexible LNG?**
- ▶ **Security of supply transformed towards function of price signals**
- ▶ **COP21 implications?**
 - No ‘sudden death’
 - But a different world to which the gas industry must adapt

IEA WEO 2016: The unfolding LNG “revolution”

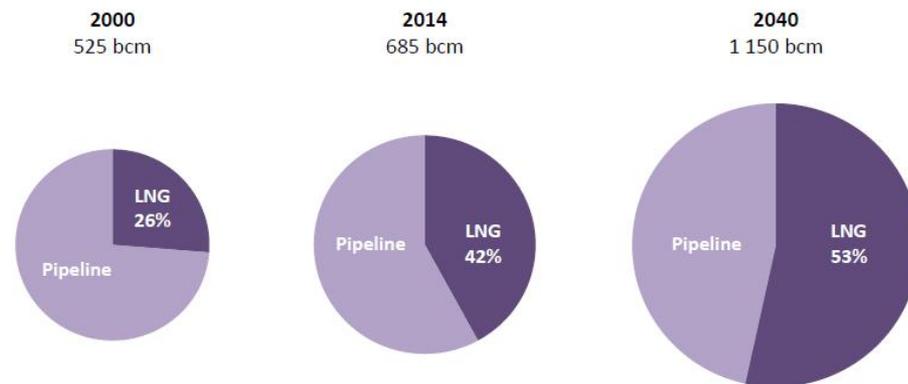
LNG about to overtake piped gas in global trade

> 50% waterborne trade

New LNG has no destination restrictions



Share of LNG in global long-distance gas trade



Contractual terms and pricing arrangements are all being tested as new LNG from Australia, the US & others collides into an already well-supplied market

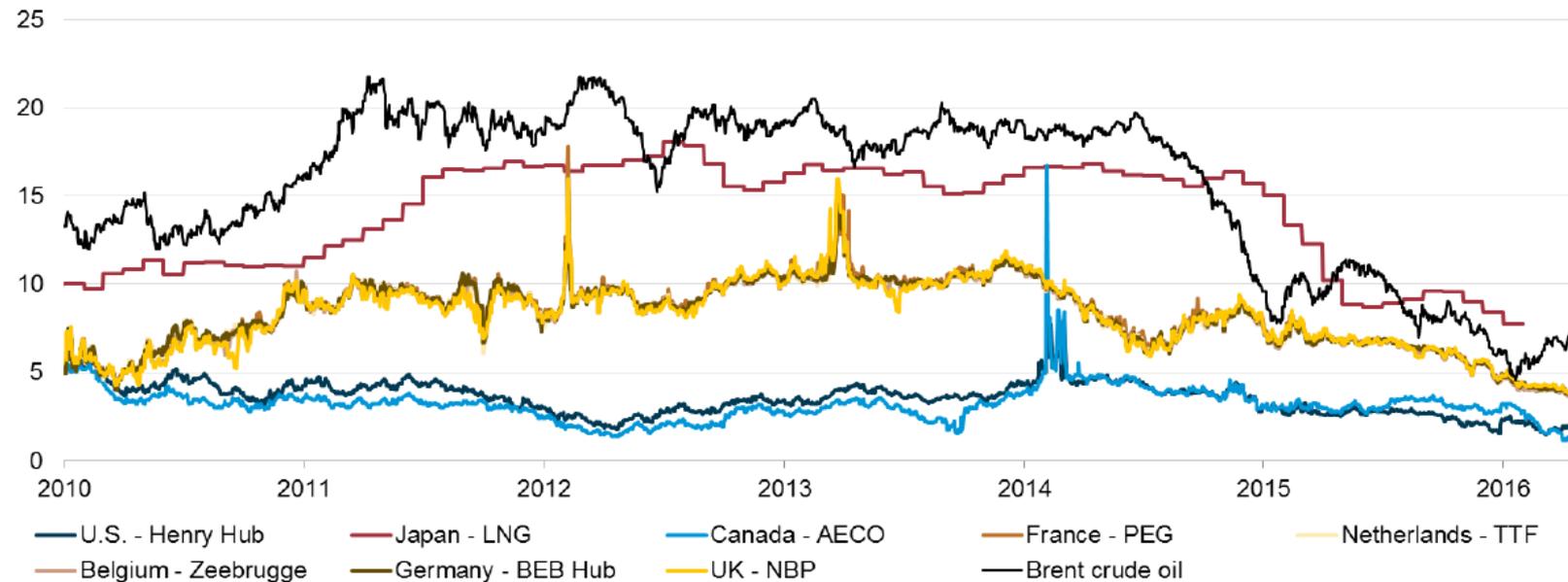
Source: IEA WEO 2016

Spread arbitrage causes price convergence of once isolated regional markets, e.g. EIA states:

North American natural gas prices are low compared to prices in the rest of the world, although spreads have narrowed recently

select global natural gas and crude oil prices with average monthly LNG prices in Japan

U.S. dollars per million British thermal unit



Source: EIA, Bloomberg L.P.

Source: EIA 2016

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Eurasian Henry Hub?

Multitude of national hubs; prices strongly correlated

Ukraine more advanced than Turkey

Market clearly capable of sending price signals

Map 1: European gas regions, markets and hubs⁶⁶



Source:P. Heather

Price Formation NWE 2005 – 2015:

Hubs clearly price setter (varying by region)

Oil indexation almost vanished in NWE: 92% GOG, 8% OPE

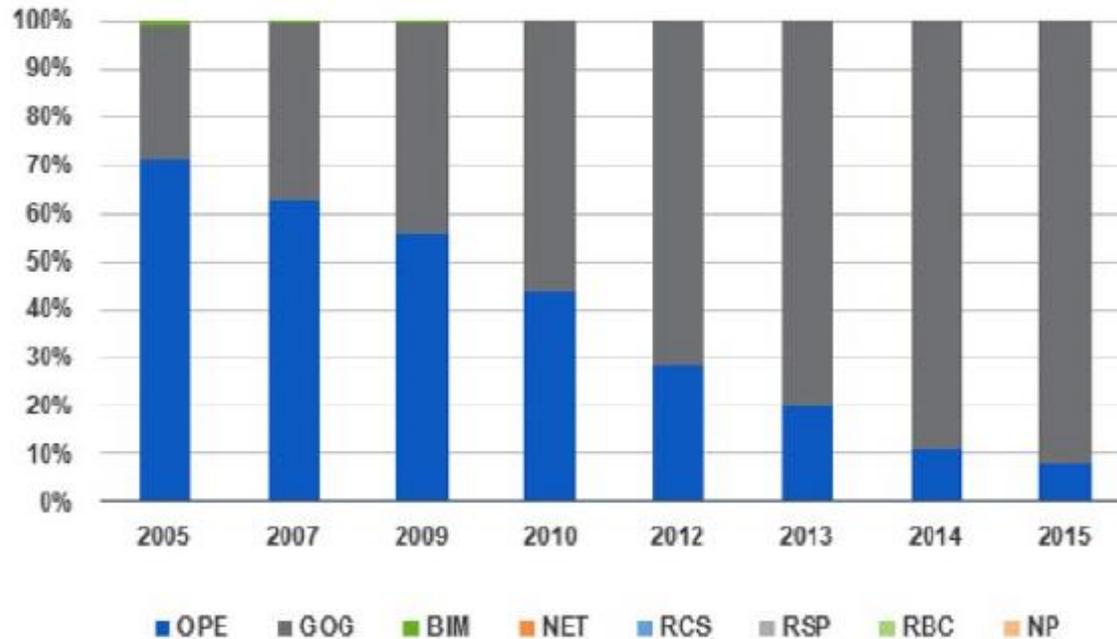


Figure 5.5: Northwest Europe Price Formation 2005 to 2015

Source: IGU Wholesale Price Survey 2016

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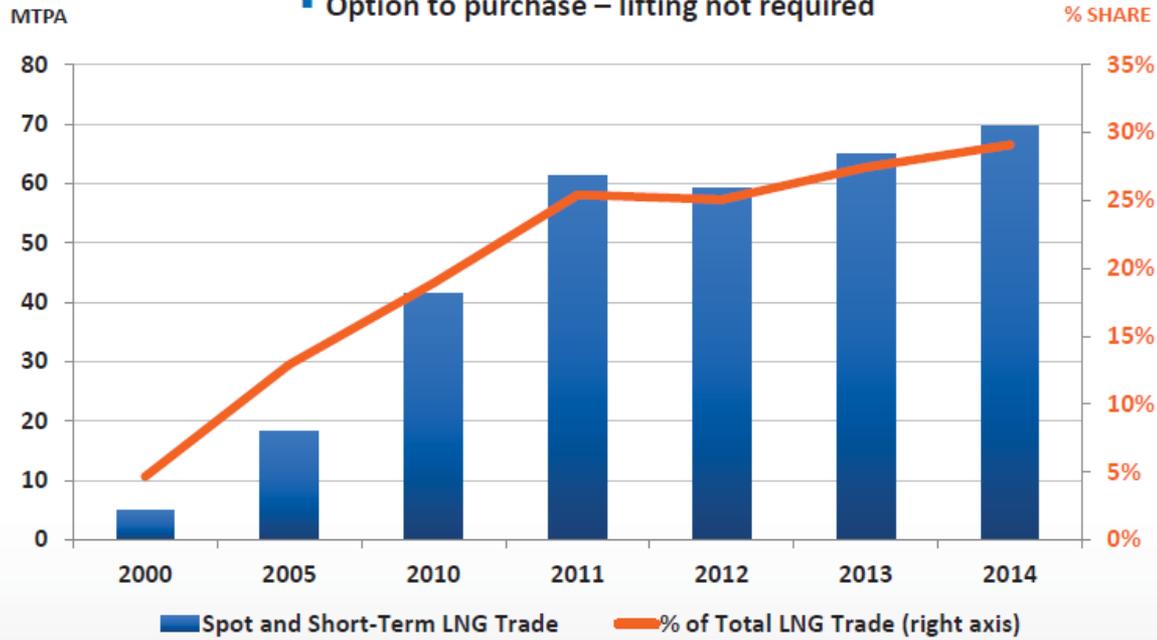
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Flexible LNG responding to price signals?

U.S. LNG (Cheniere & others) offer LNG at non-traditional terms:
 Importantly: FOB instead of DES
 Moreover: no ToP but only liquefaction as “toll or pay”

U.S. Supplies to Create More Market Liquidity

- Flexible destination clauses
- New pricing index – Henry Hub
- Option to purchase – lifting not required



Source: GIIGNL 2015

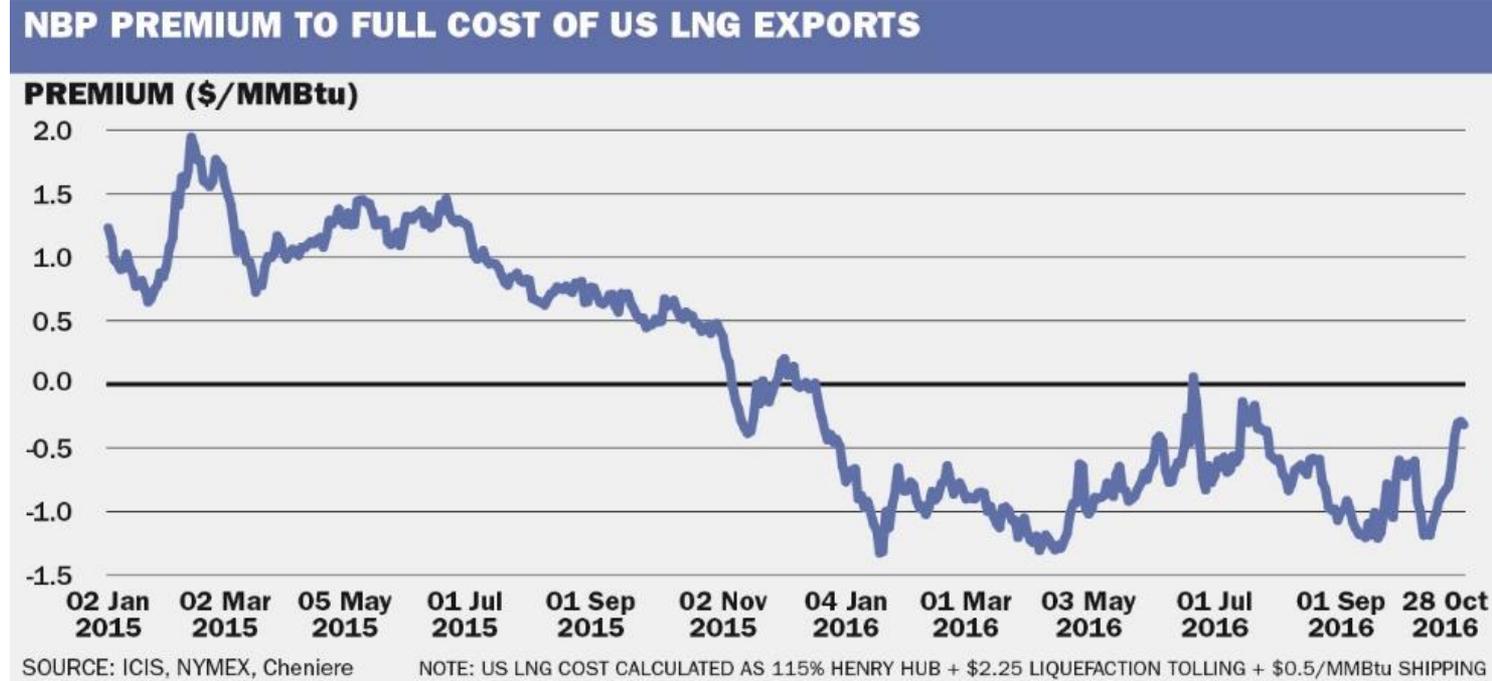
Source: Cheniere 2015

Flexible LNG responding to price signals?

Premium NBP over HH required

Full cost: 15% HH + ~\$2.25 liquefaction + 0.50 shipping + \$ 0.50
regas = ~\$3.70/MMBtu

Marginal cost (liquefaction sunk): ~\$1.45/MMBtu



Source: ICIS Heren

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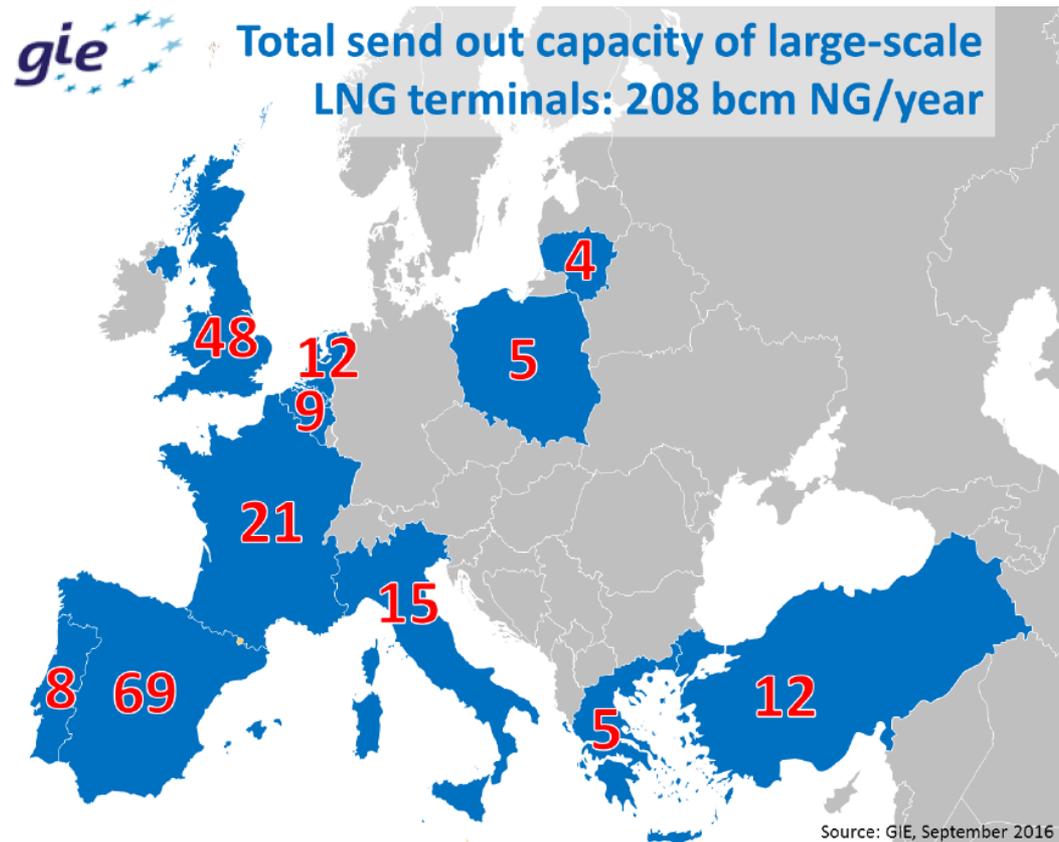
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Europe able to absorb flexible LNG?

>220 bcm/a regas capacity

~81% of regas capacity (~160 bcm/a) idle

~50% of regas volume (~110 bcm) = European storage WGV



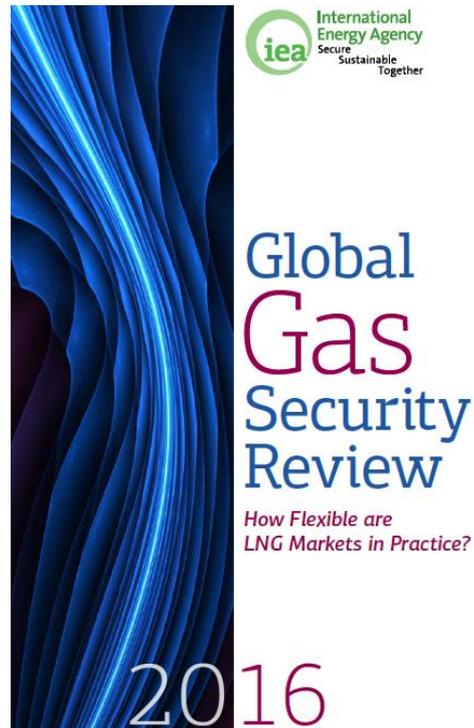
Source: GIE

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IEA: Regional approach to security of gas supply no longer appropriate

“As the role of gas ... evolves, a narrow approach to gas security focussing on gas as a stand-alone fuel in an individual region is no longer appropriate.”



European security of supply commercially transformed

Exposure to political blackmail concern less relevant
SoS has transformed from bi-lateral physical dependency to a functionality of price signals in an integrated traded market



Ukrainian Crisis 2009: Andrej Budajew, “Putin’s recalcitrant bride”

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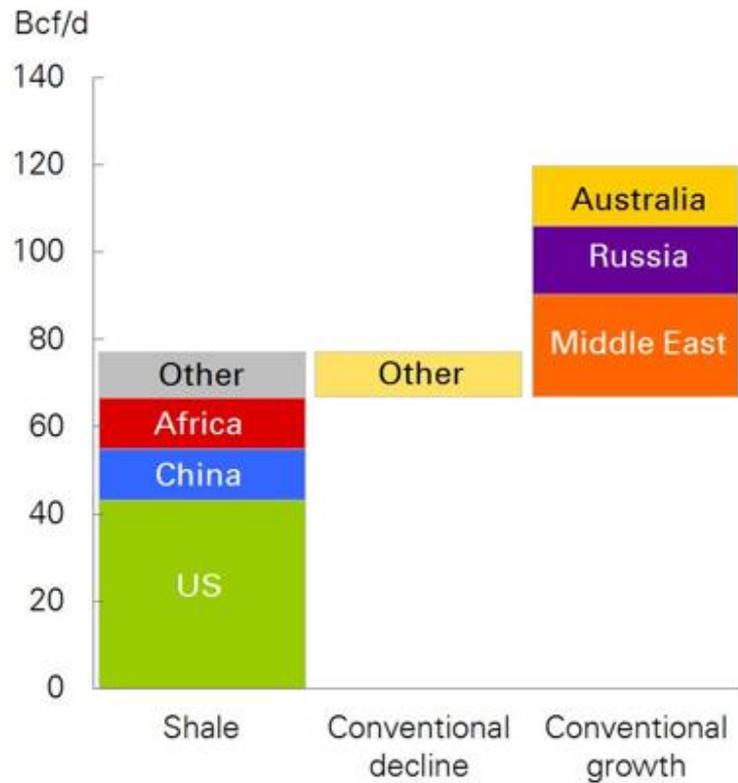
“COP21” (21st Conference of Parties under the United Nations Framework Convention on Climate Change)

Widespread (Mis-) perception: Sudden death

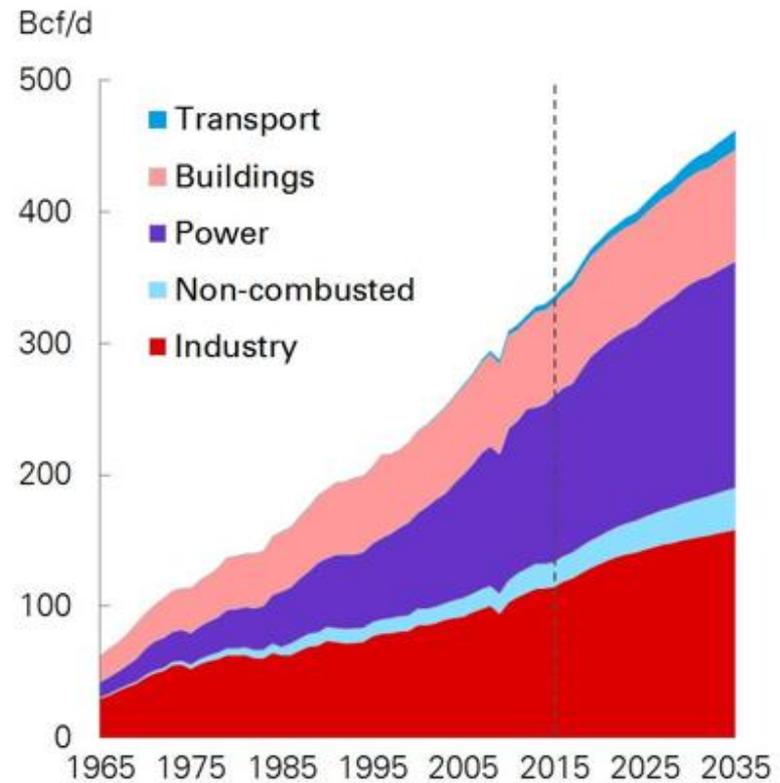


IEA & others bullish on gas growth: Supply growth ~1,200 bcm/a; demand ~5,000 bcm/a

Gas supply growth 2015-2035

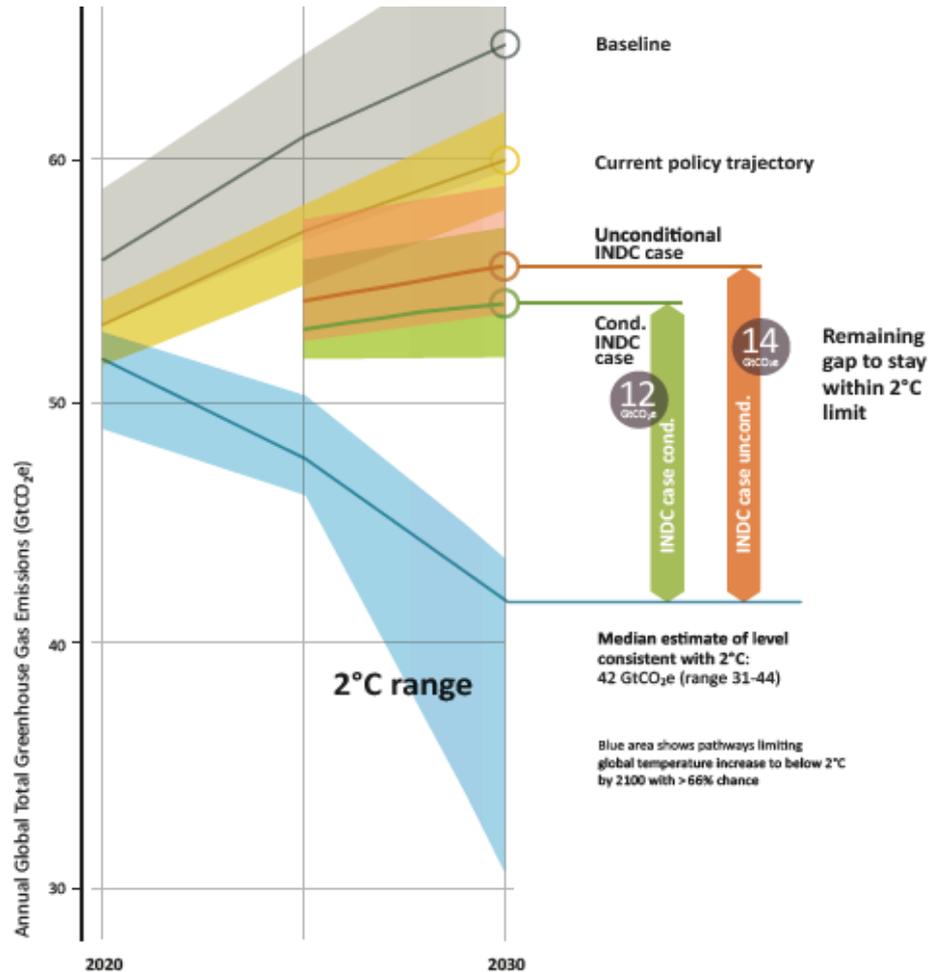


Gas consumption by sector



COP21/22 NDCs insufficient to reach 2 degree C goal

Remaining “carbon budget”: 1,000 GtCO₂ equ.



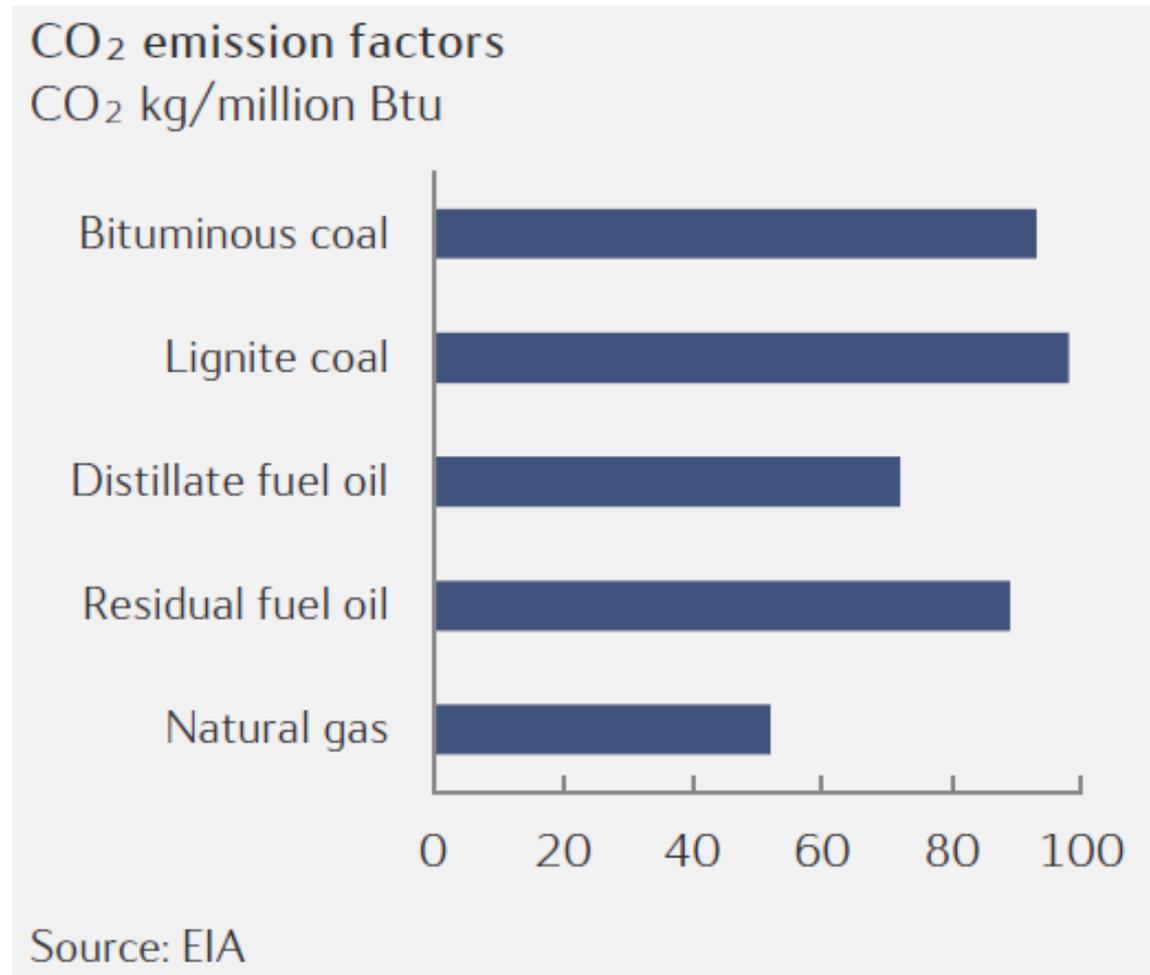
Source: UNEP Emissions Gap Report 2015

Proliferation (and increase) of price on carbon to be expected:

40 countries already imposing or preparing to do so
 40% of global GDP under some form of GHG emissions trading scheme.



Gas has superior qualities regarding climate protection... And will benefit from carbon price in merit order



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Gas industry must adapt: e.g. renewable hydrogen ‘stored’ in gas grids as part of a ‘holistic’ energy system



Most of the hydrogen produced today is not CO₂-free (from gas, oil, coal)



If produced from renewable power via electrolysis, hydrogen is fully renewable and CO₂-free.



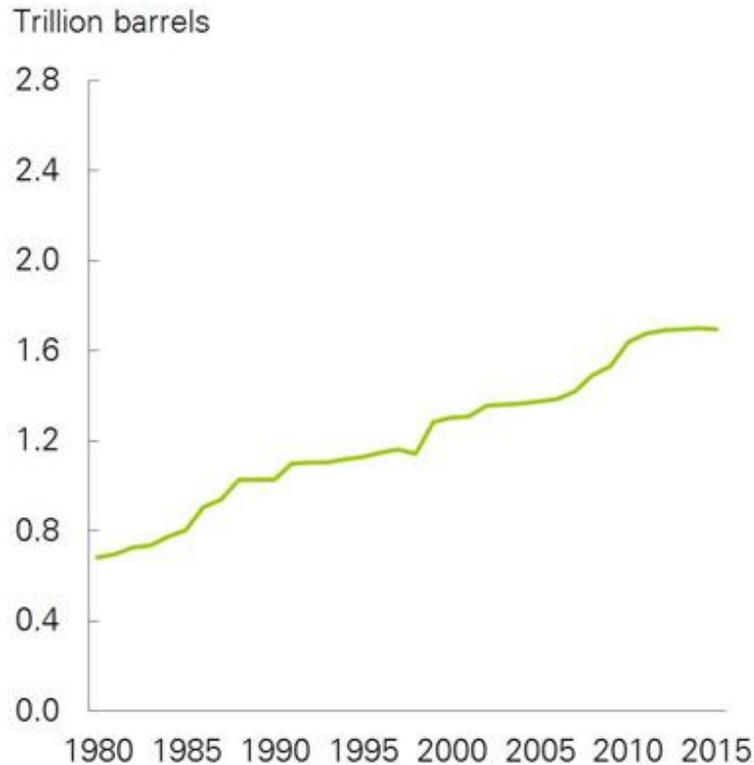
Renewable hydrogen has the potential to decarbonize a large range of applications

Data source: The Hydrogen Economy, M. Ball 2009 & Esprit Associates 2014

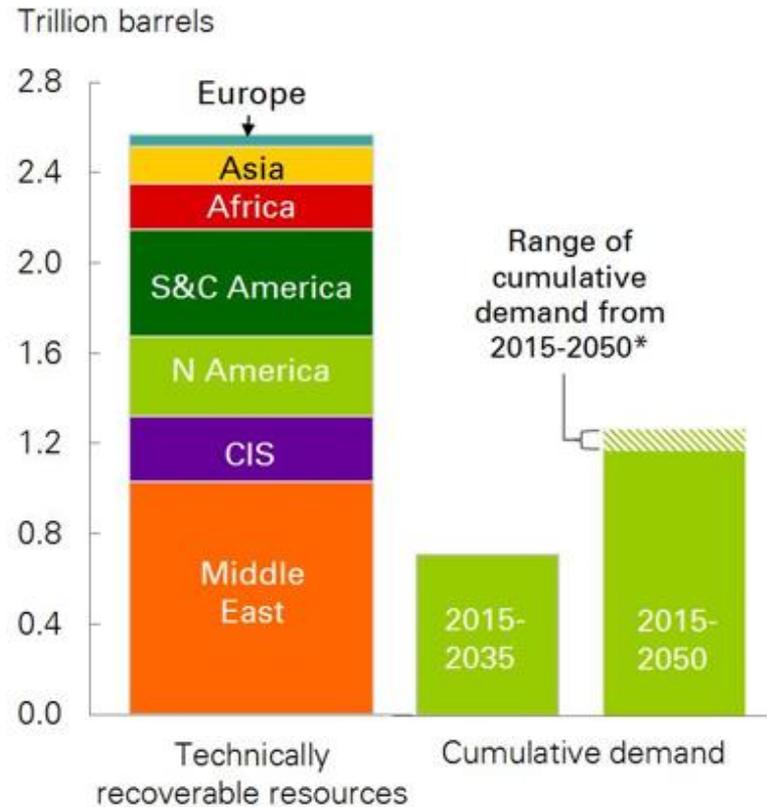
Only ~half the recoverable resources produced by 2050

Recent multiple FIDs: 'end game' mentality?

Global proved oil reserves



Estimates of technically recoverable resources and cumulative oil demand



Article on role of gas post COP21:

THE CASE FOR GAS POST COP21

Natural gas is the „low hanging fruit“ for material and immediate reduction of greenhouse gases

by

Wolfgang Peters



Dr. Wolfgang Peters

Managing Director

Uhlenhorstweg 17

45479 Muelheim, Germany

Mobile: +49-152 5320 4362

Fax: +49-208 8484031

Mail: wolfgang.peters@gasvaluechain.com

Web: www.gasvaluechain.com