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Global gas markets, carbon pricing and the future of natural gas

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Plan for this talk

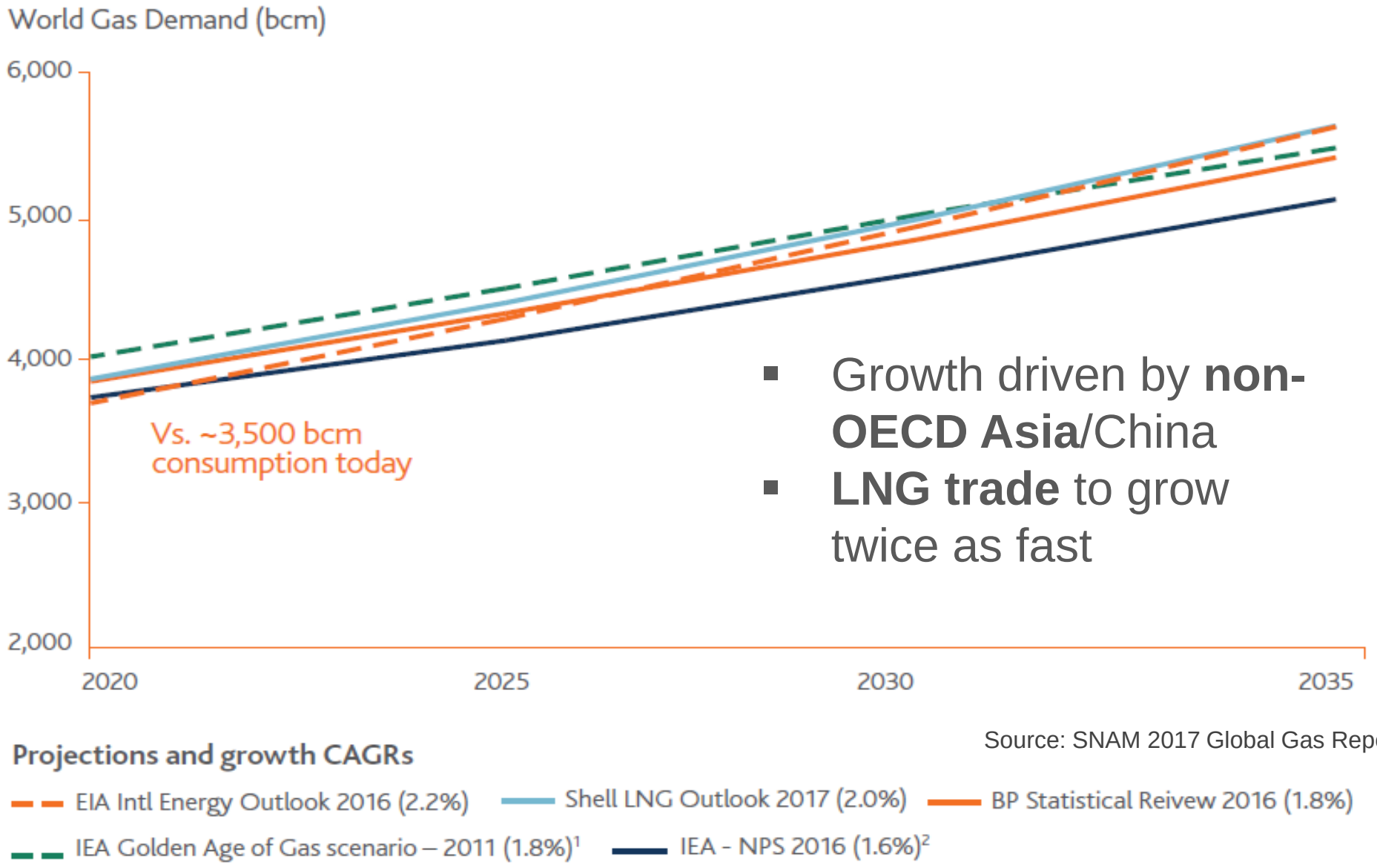
① **Gas demand, prices and competition**

② **Coal-to-gas switching in power generation**

③ **Political economy & carbon pricing**

④ **Strategic positioning**

Gas demand is expected to grow steadily

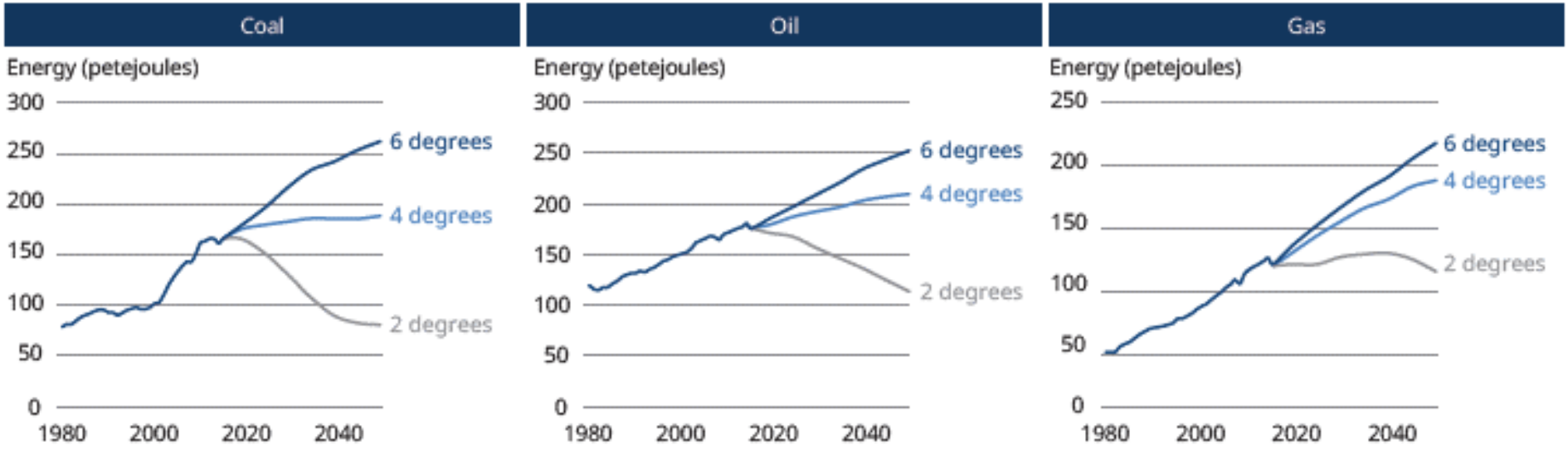


- Growth driven by **non-OECD Asia**/China
- **LNG trade** to grow twice as fast

Source: SNAM 2017 Global Gas Report

Forecasts too bullish given climate challenge?

- Gas demand likely **more robust** than coal or oil



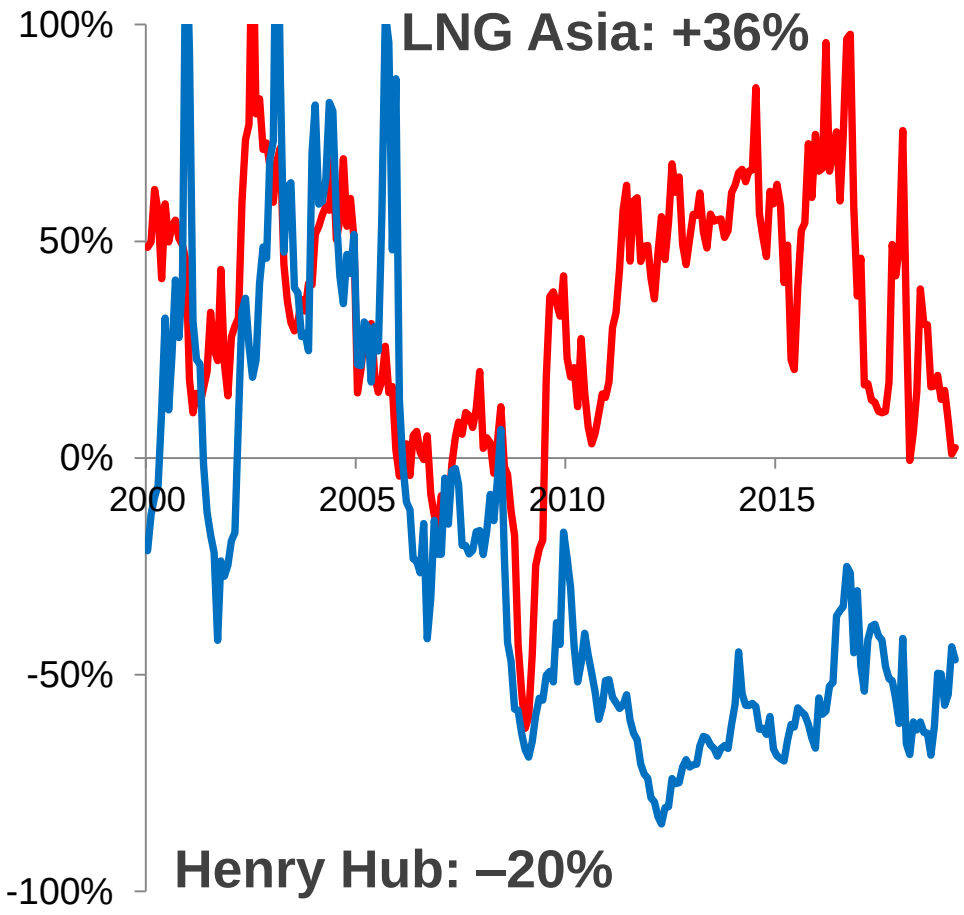
Source: Schroders (2018)

- How to secure **demand**? At which **prices**?

⇒ How much **new investment** in gas/LNG?

Regional price divergence is the historical norm

Price premium relative to EU natural gas



"Asian premium":

- Most of last 20 years
- Imperfect competition + limits to arbitrage

Low & *stable* HH price

→ US LNG exports

→ Security of supply (LNG vs pipeline gas)

⇒ Global convergence to Henry Hub-based pricing?

Source: Calculations based on IMF data from January 2000 to April 2019

Competition in global LNG: A changing market

Balance of power: Shift to gas buyers post-2014

- Global price decline (comparable to crude oil)

LNG market structure:

	2007	2012	2017	2022
Seller HHI (# players)	.102 (14)	.140 (18)	.136 (18)	↑? Further US & AUS
Buyer HHI (# players)	.218 (18)	.180 (27)	.132 (39)	↓? Smaller Asian

⇒ LNG sell-side now *more* concentrated than buy-side

Note: Herfindahl index (HHI) is a measure of market concentration, ranging from 1 (monopoly) to 0 (many small players)
Source: Calculations based on 2018 GIIGNL data

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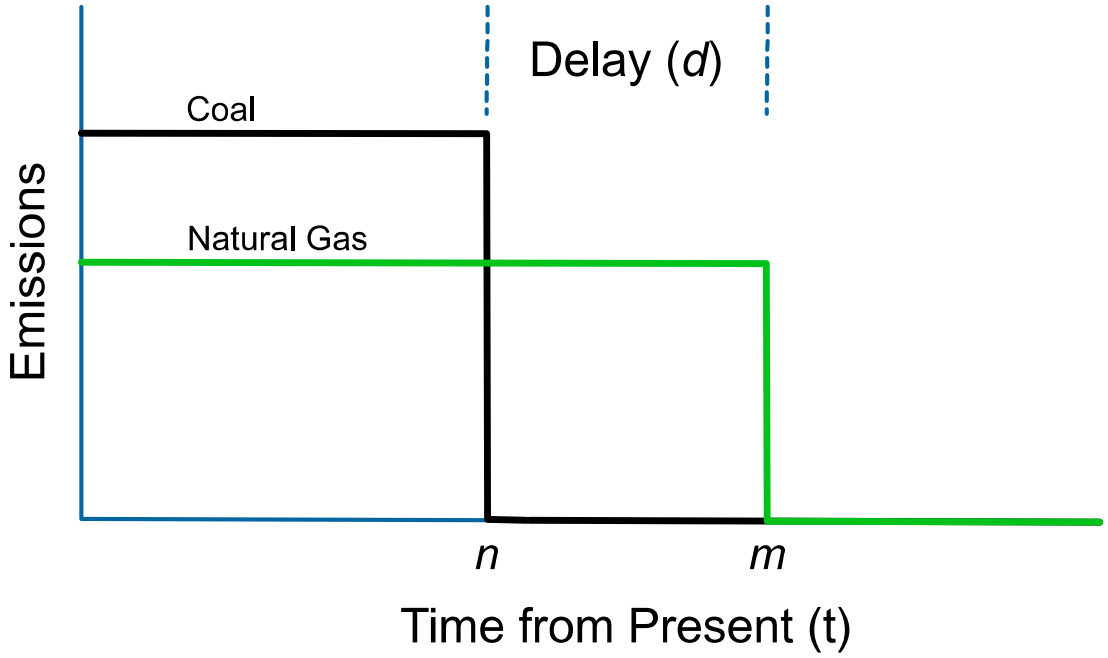
Coal-to-gas switching from a climate perspective

How much delay in adoption of near-zero carbon technologies (NZCT) is achieved by switching to gas?

Parity ratio: Allowable years of gas per year of coal generation avoided

- **Literature: ≈ 2.4 years**
- Coal plant replaced 15 years before otherwise replaced by NZCT
- Gas can operate for ≤ 36 years, helping climate



⇒ "Bridge fuel" buys 1.4 years per year of coal displaced

Source: Adapted from Hausfather (2015)

Thought experiment: Global coal-to-gas switch

Q: How much existing coal-fired power generation can be replaced with existing *unused* gas generation?

Top 5	"Gas potential"
China	6%
US	47%
India	12%
Russia	37%
South Korea	35%

- **European countries**: mostly >100% potential
- **Zero potential**: Japan, Mexico, Poland, Kazachstan

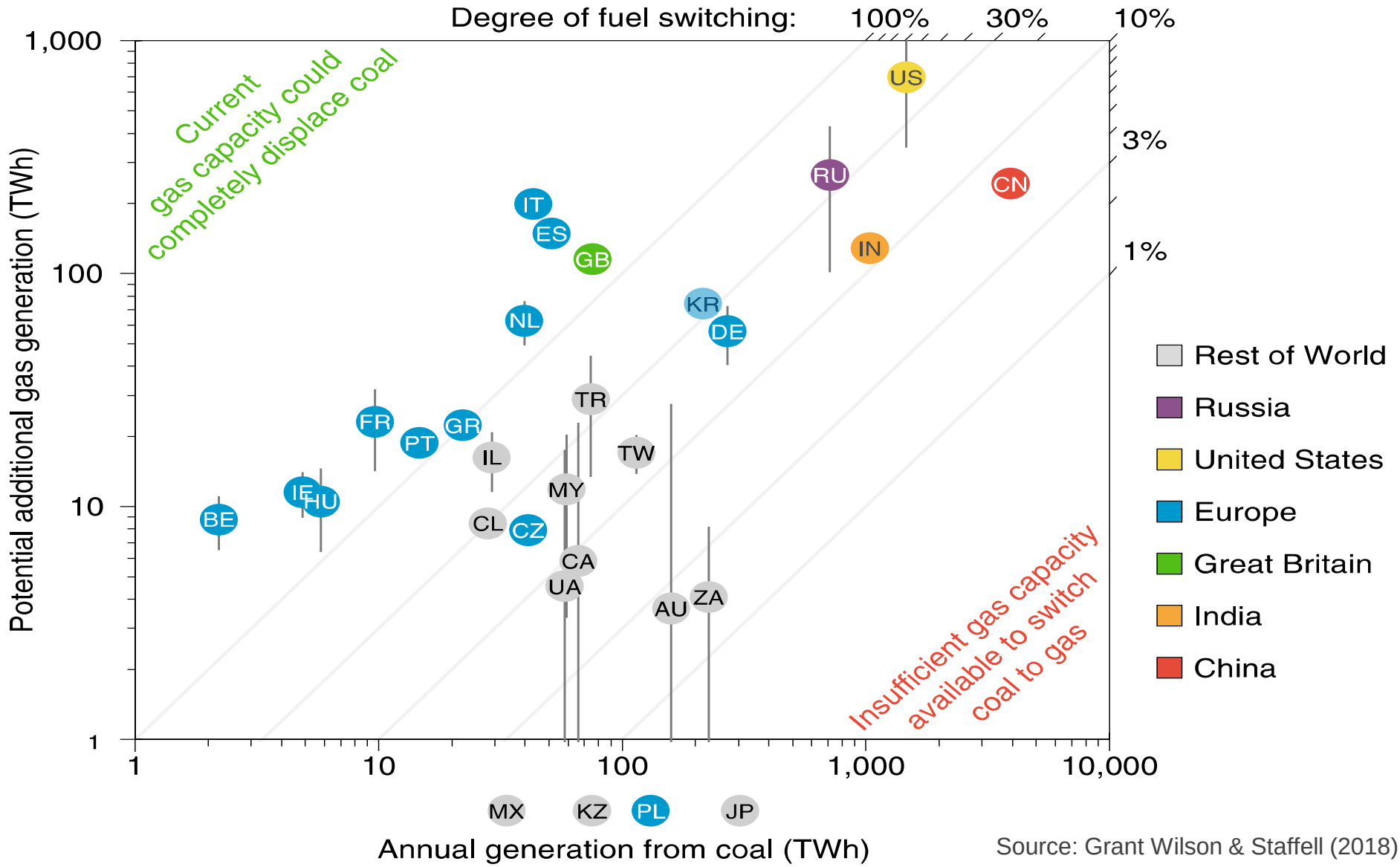
A: Global switching potential ~20% with *existing* assets

$\Rightarrow$ Annual global carbon emissions fall by ~1 $GtCO_2$

- **Social value**: ~$50+ billion per year

Source: Grant Wilson & Staffell (2018), 2015 data

Potential for coal-to-gas switching in power



Source: Grant Wilson & Staffell (2018)

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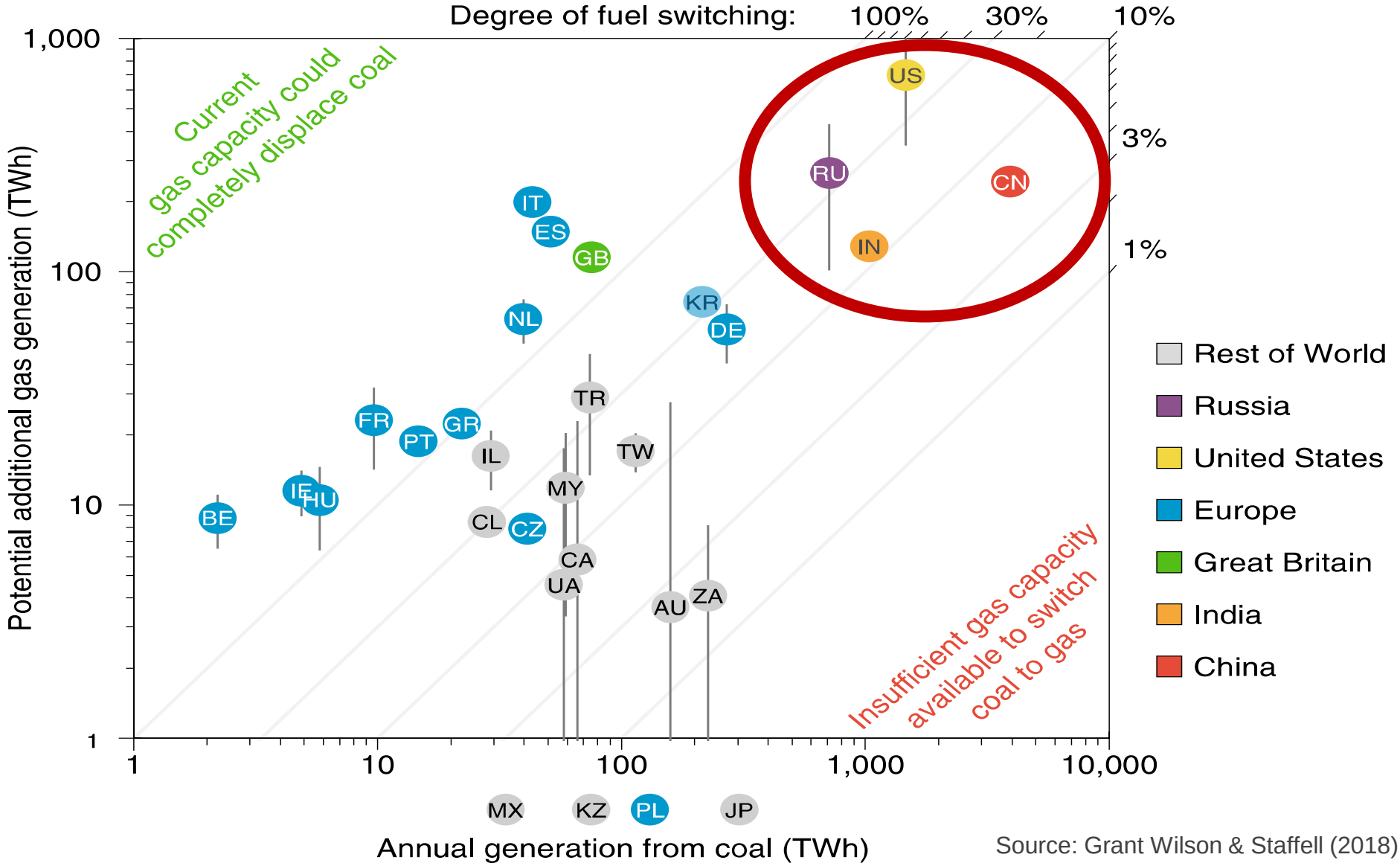

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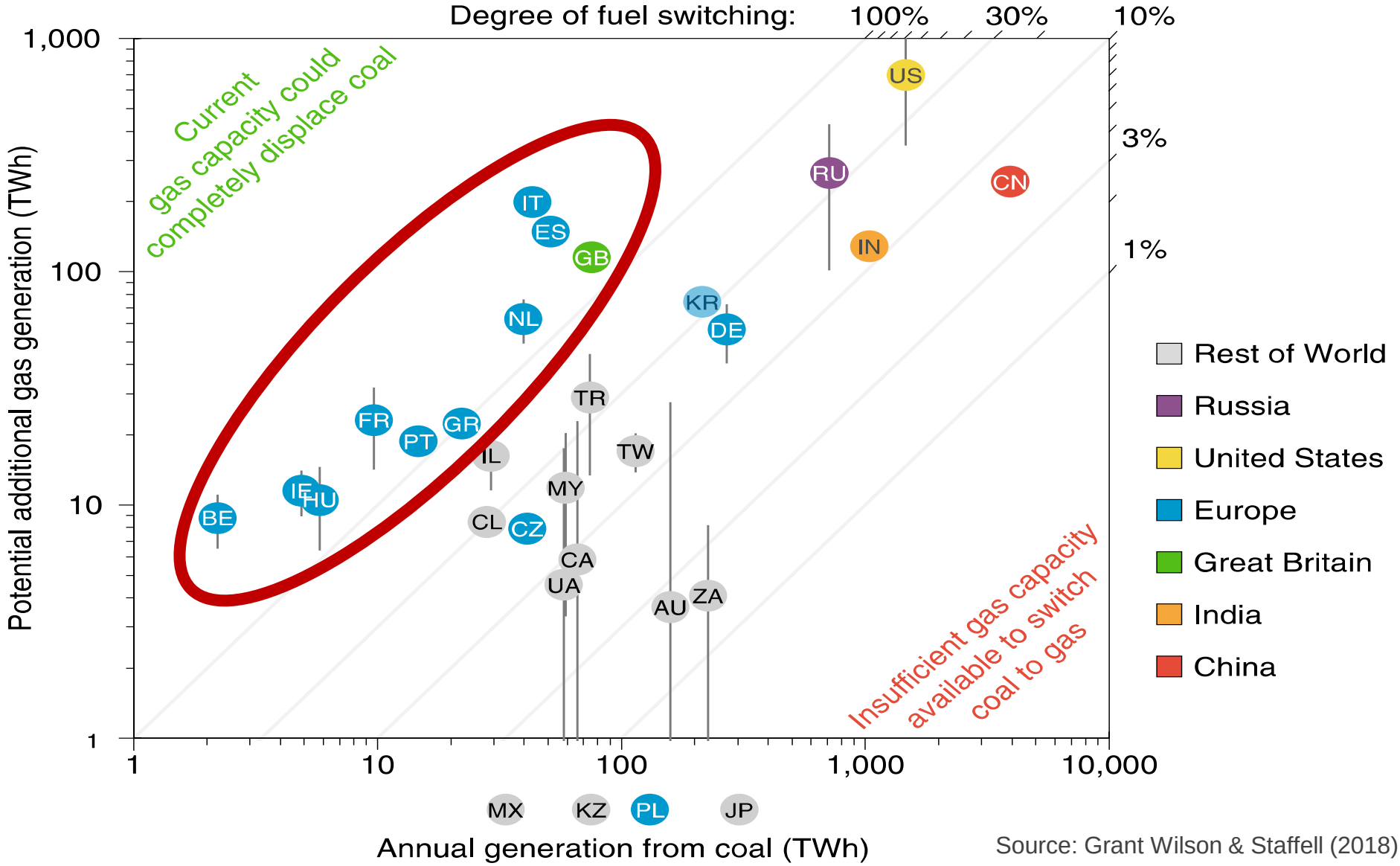

Source: Grant Wilson & Staffell (2018)

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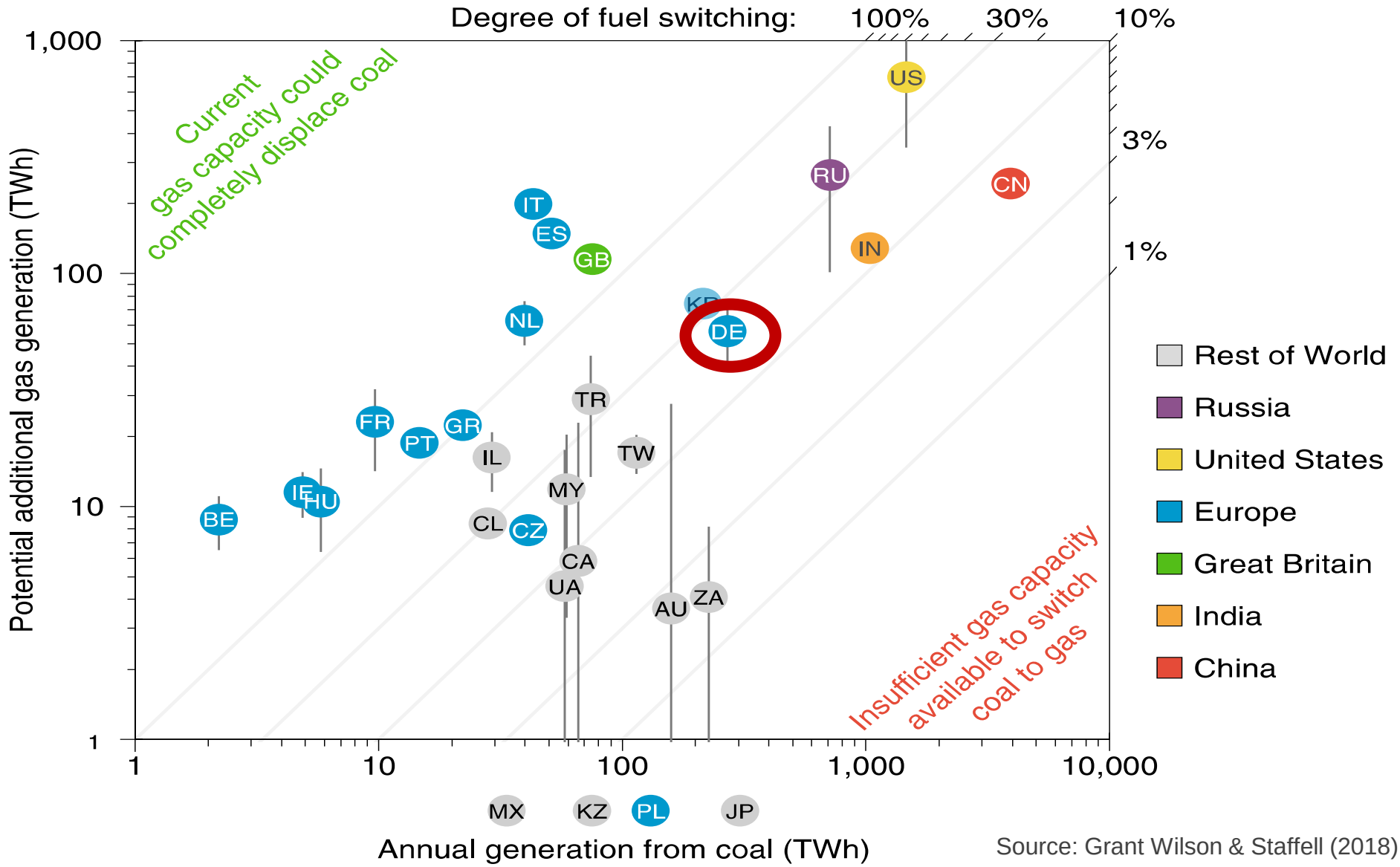

Source: Grant Wilson & Staffell (2018)

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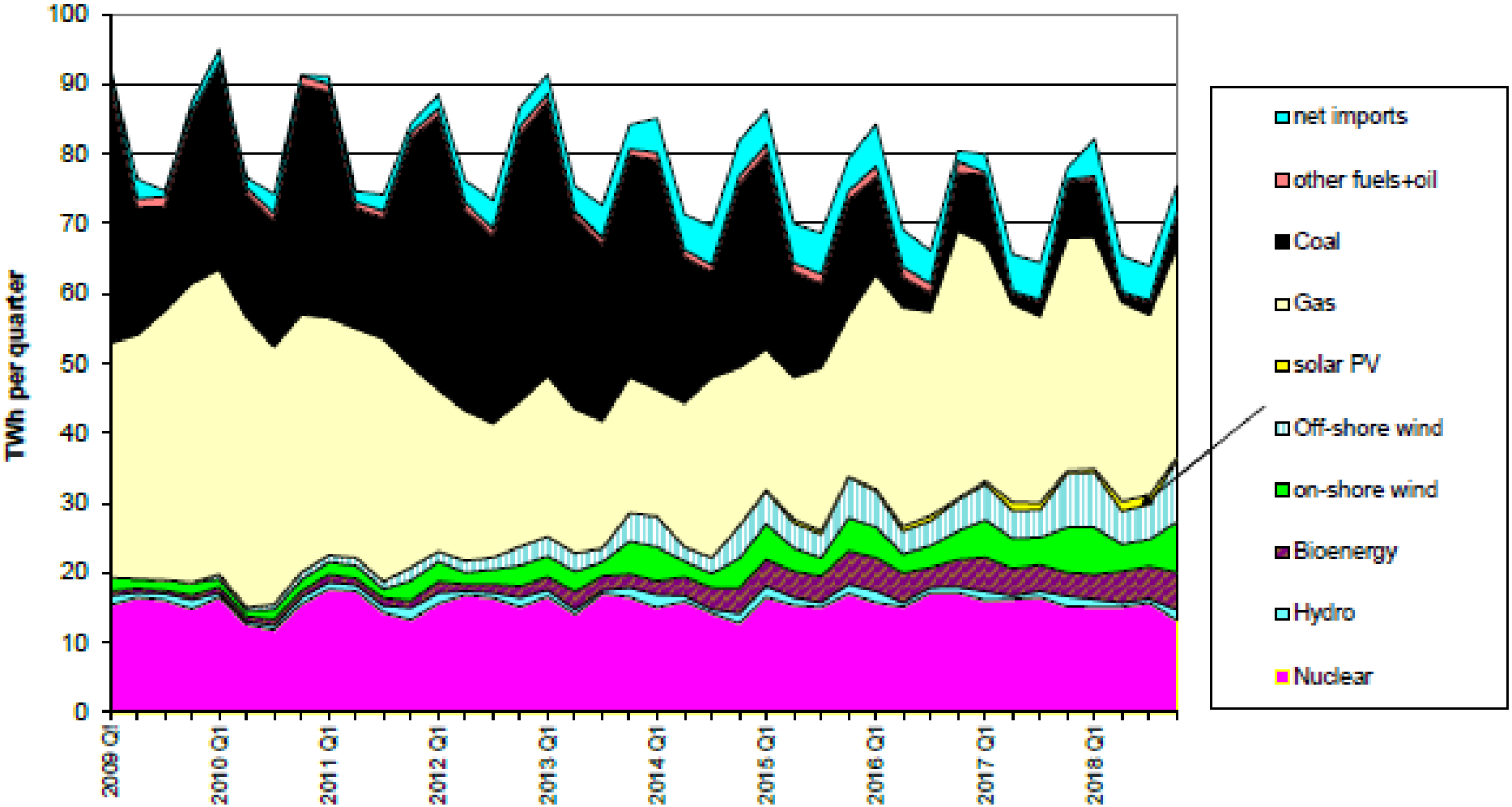
UK: Decline of coal-fired generation



- **Coal share** from 41% (2013) to 6% (2018)

⇒ **Policy**: Coal phase-out by 2025

Source: Chyong, Guo & Newbery (2019)

UK: Carbon price floor supports gas switch

Carbon Price Support (CPS)

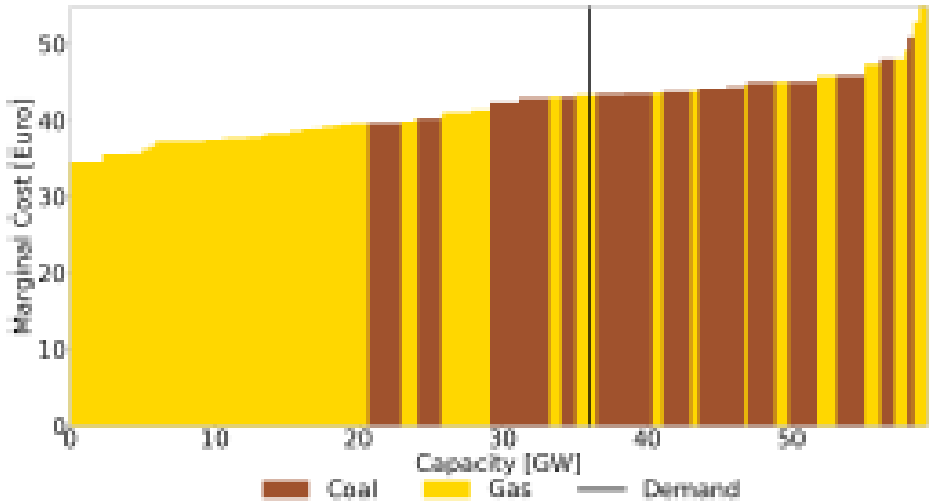
- EU ETS price + £18/tCO_2
- Tax revenue = ~€1bn per year

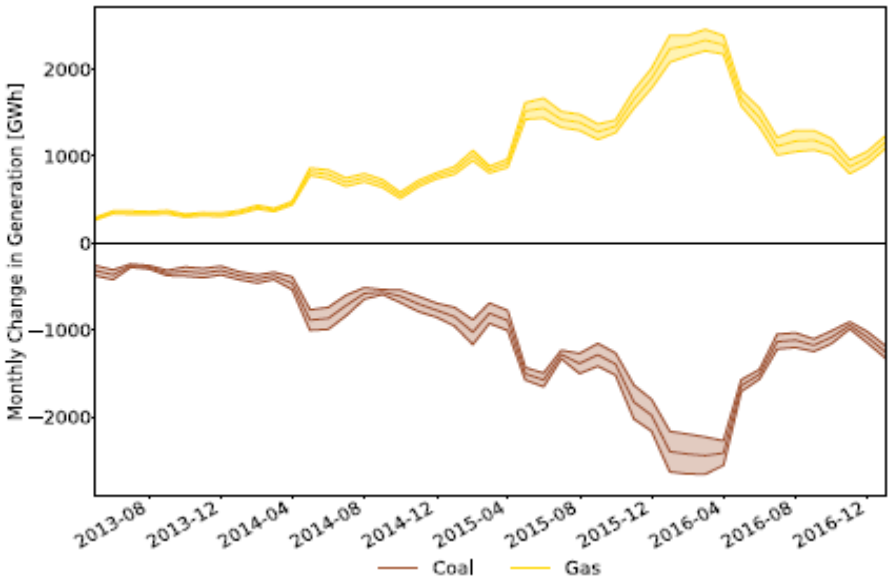
Direct policy impacts

- Efficient CCGTs run baseload
- 15% point shift from coal to gas
- Emissions reduction: 26.1m tCO_2 over 2013-2016 (-6.2%)
- Abatement cost: ~€18-30/tCO_2

Cross-border effects

- More imports into GB
- Higher power prices in FR & NL
- Impact on *global* emissions?

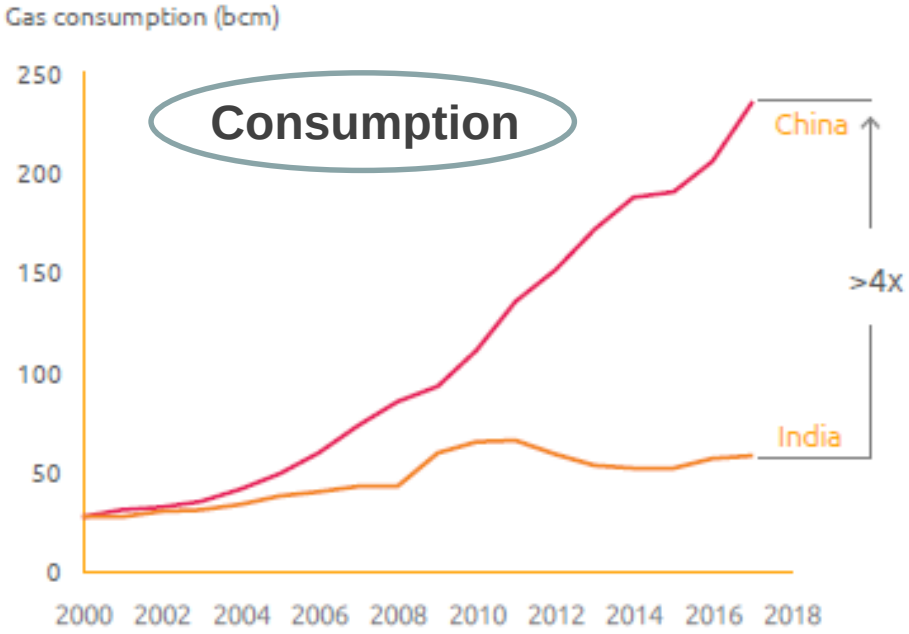




Source: Abrell, Kosch & Rausch (2019)

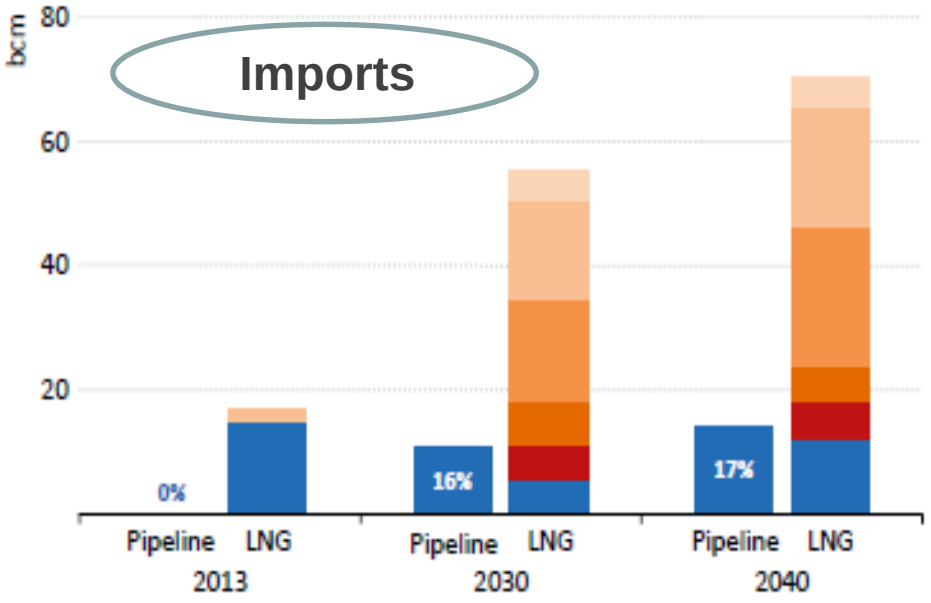
India: Gas catch-up & optimistic forecasts

- Gas has had **take-off in China**, so is India next?



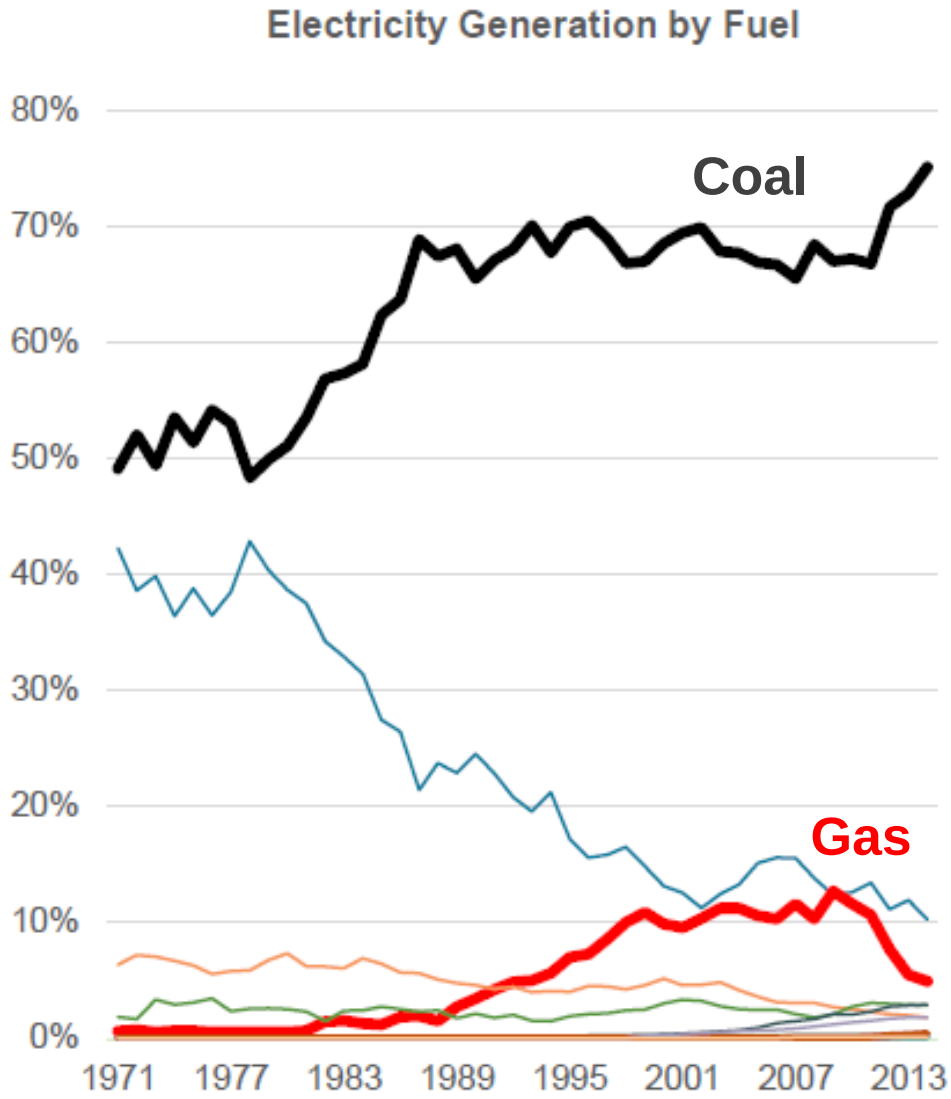
Source: SNAM 2018 Global Gas Report

- **LNG import** forecasts have been bullish…



Source: IEA 2015 India Energy Outlook

India: Gas squeezed by coal & solar



No clear role for gas/LNG

- Not cost-competitive vs domestic coal
- Limited policy support
  - No carbon pricing
- Infrastructure constraints

Skipping gas? Coal to RE

- Ambitious 175 GW target for 2022 (esp. solar)
- Large cost reductions & low auction prices

Source: International Institute for Strategic Studies (IISS) & Vivid Economics

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Gas industry *itself* is in the midst of a transition

Strategic repositioning around natural gas:

① **Energy majors**: oil → gas/LNG & power/RE

② **Electricity companies**: coal/gas → RE

③ **Commodity traders**: oil → LNG

④ **Private equity**: → "legacy" coal/gas assets

⑤ **New players**: → LNG export, gas E&P

⇒ Trend to ***large integrated*** *or* ***niche specialist***?

Conclusions

① Significant downside risk in **gas demand forecasts** due to climate-related uncertainties

② **Global gas prices:** regional price convergence unlikely to be permanent

③ Still huge **global potential for coal-to-gas switching** in power generation

④ Local **political economy** for gas/LNG in non-OECD (Asia) very different from OECD (Europe)

⑤ Ongoing **strategic repositioning** reflects companies' different visions of the future

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