



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

Robert A. Ritz

Energy Policy Research Group (EPRG)
Cambridge Judge Business School

r.ritz@jbs.cam.ac.uk

MIT CEEPR-EPRG-EnBW European Conference

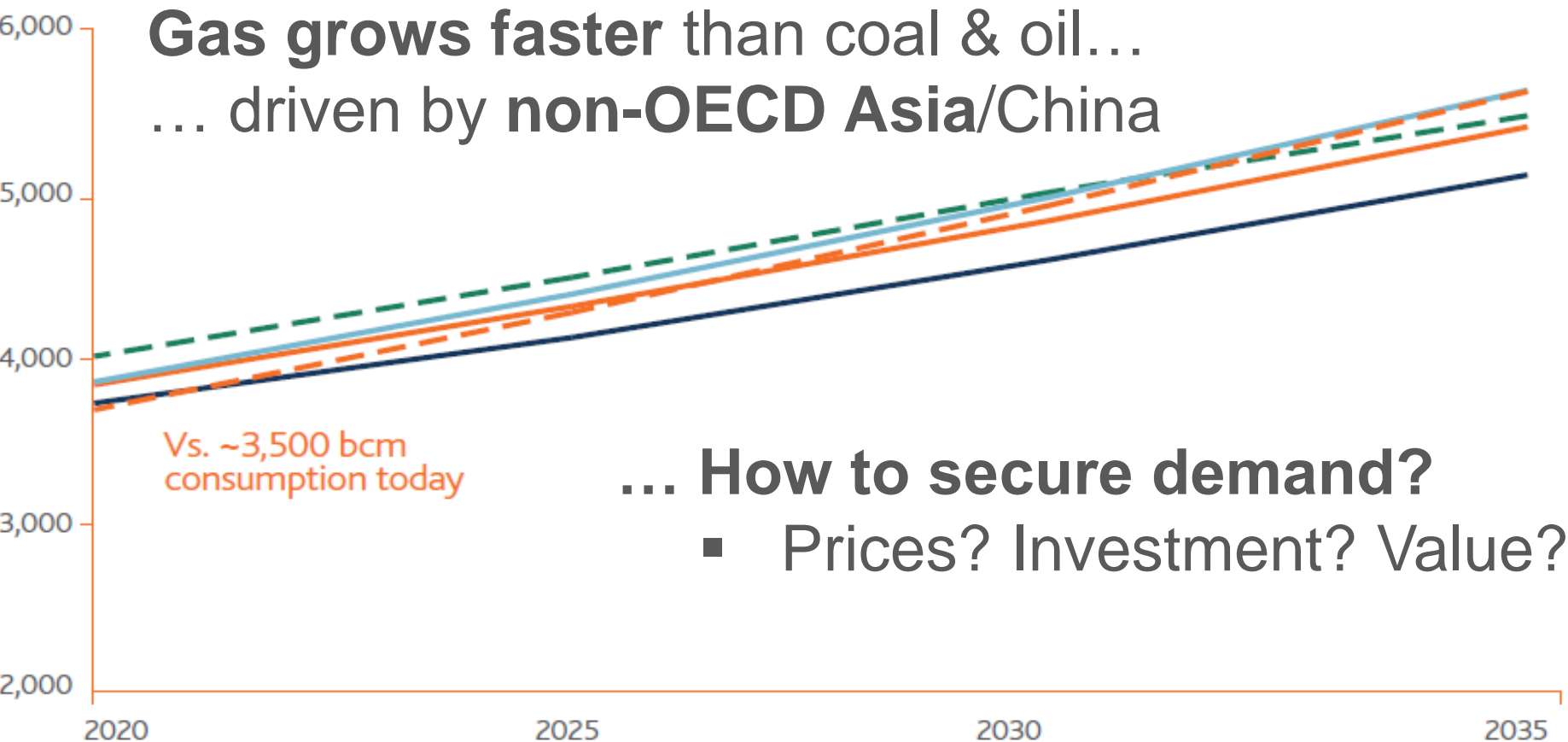
Berlin, 3 July 2018

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**

Forecasts too bullish given challenges for gas?

World Gas Demand (bcm)



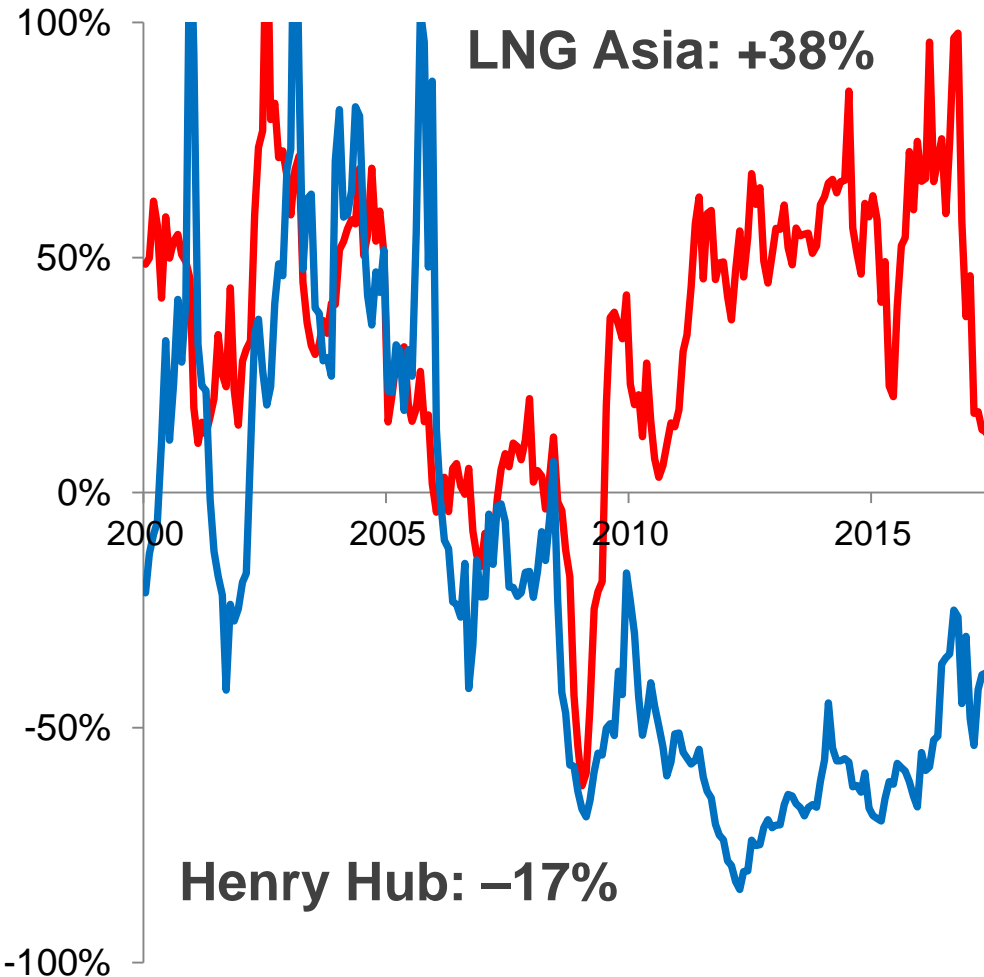
Source: SNAM 2017 Global Gas Report

Projections and growth CAGRs

— EIA Intl Energy Outlook 2016 (2.2%) — Shell LNG Outlook 2017 (2.0%) — BP Statistical Review 2016 (1.8%)
— IEA Golden Age of Gas scenario - 2011 (1.8%)¹ — IEA - NPS 2016 (1.6%)²

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

Competition in global LNG: A changing market

Balance of power: Shift to gas buyers post-2014

- Global price decline (comparable to 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 GIIGNL data

Plan for this talk

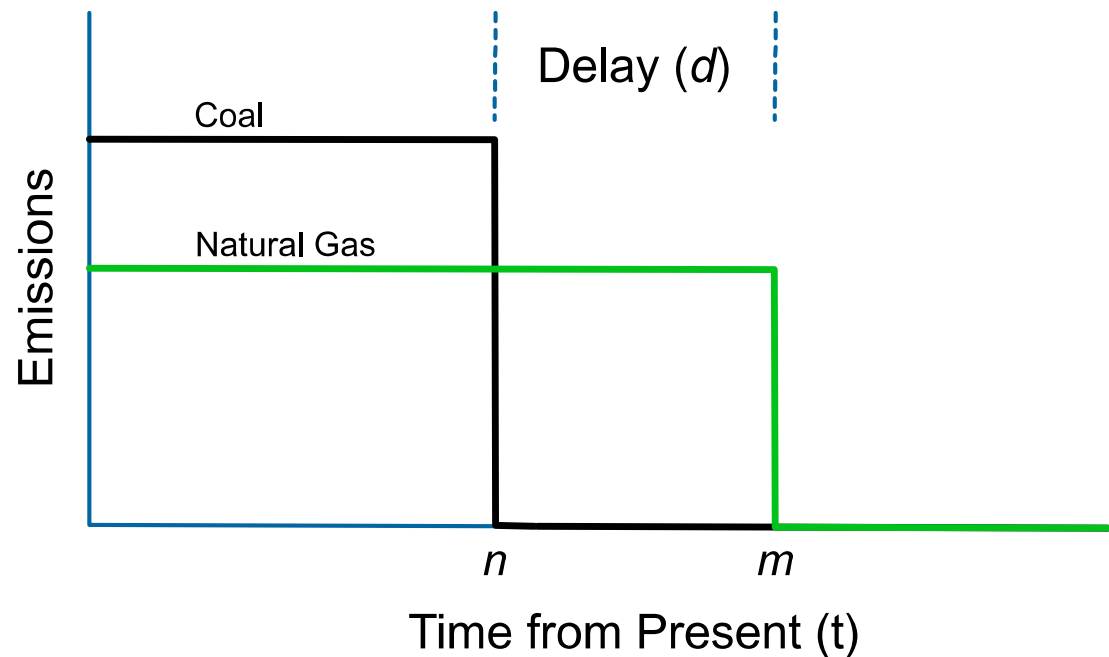
- ① **Gas demand, prices and competition**
- ② **Coal-to-gas switching in power generation**
- ③ **Political economy & carbon pricing**
- ④ **Strategic positioning**

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, Kazakhstan

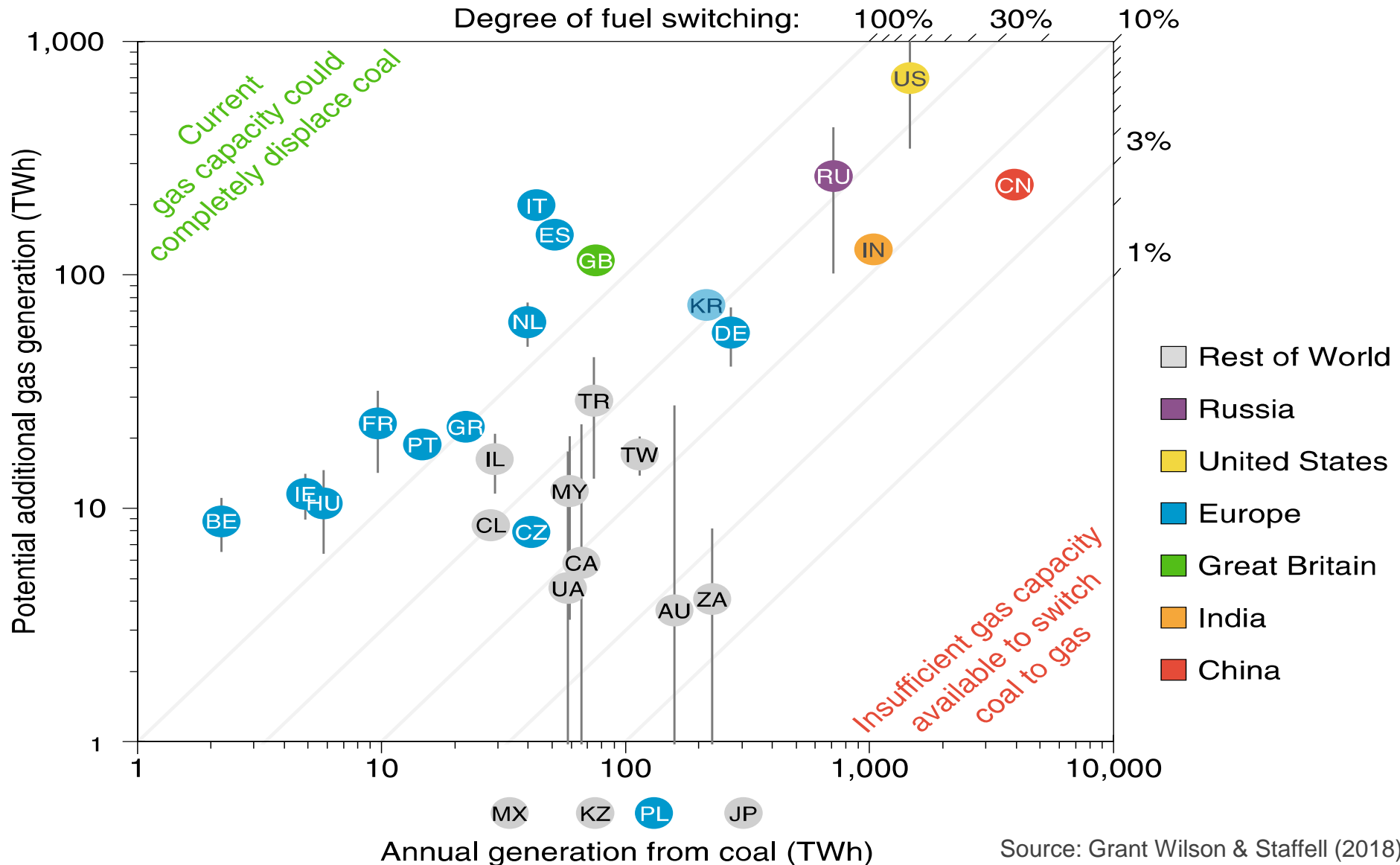
A: Global switching potential ~20% with existing assets

⇒ Annual global carbon emissions fall by ~1 GtCO₂

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

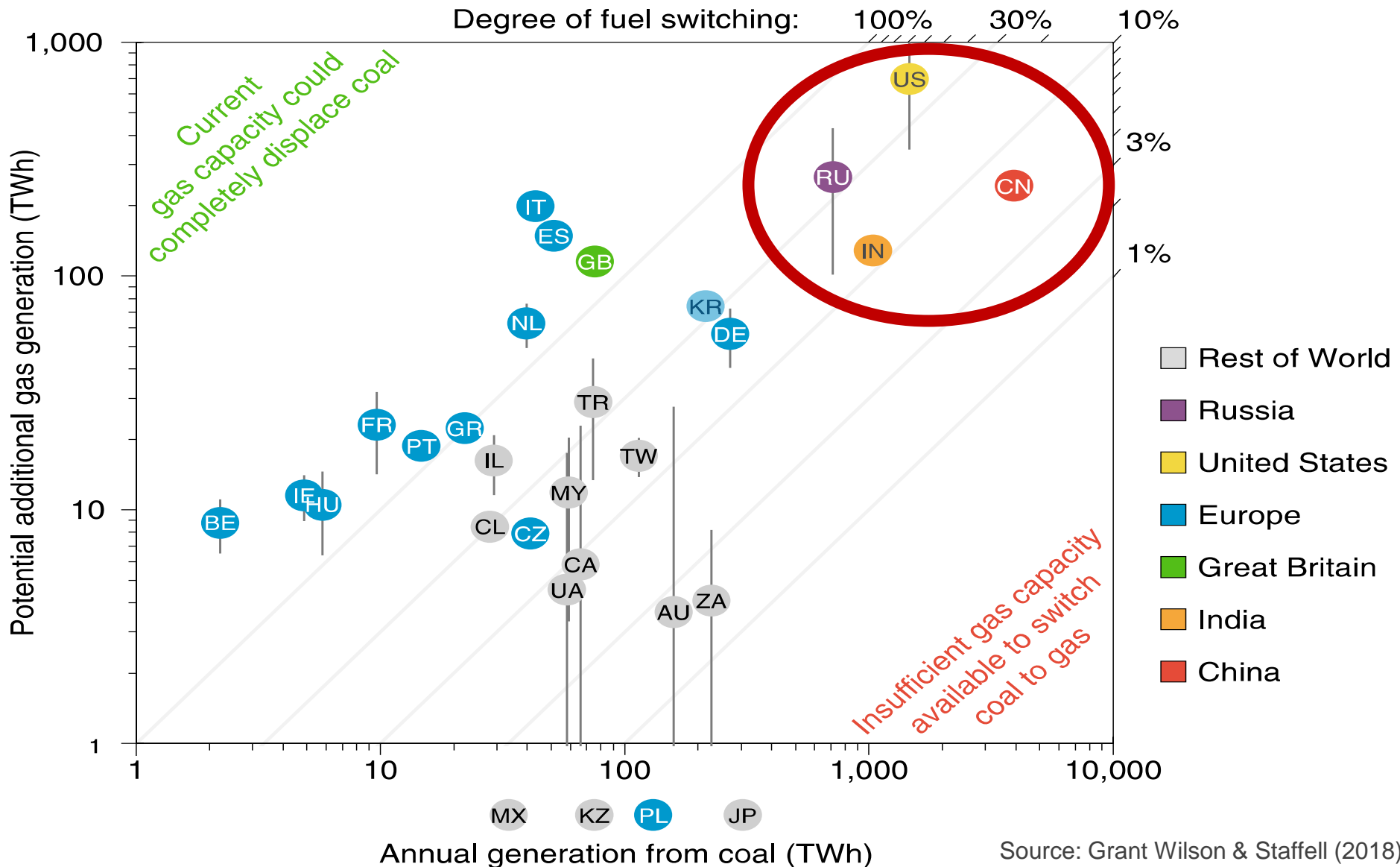
Source: Grant Wilson & Staffell (2018), 2015 data

Potential for coal-to-gas switching in power

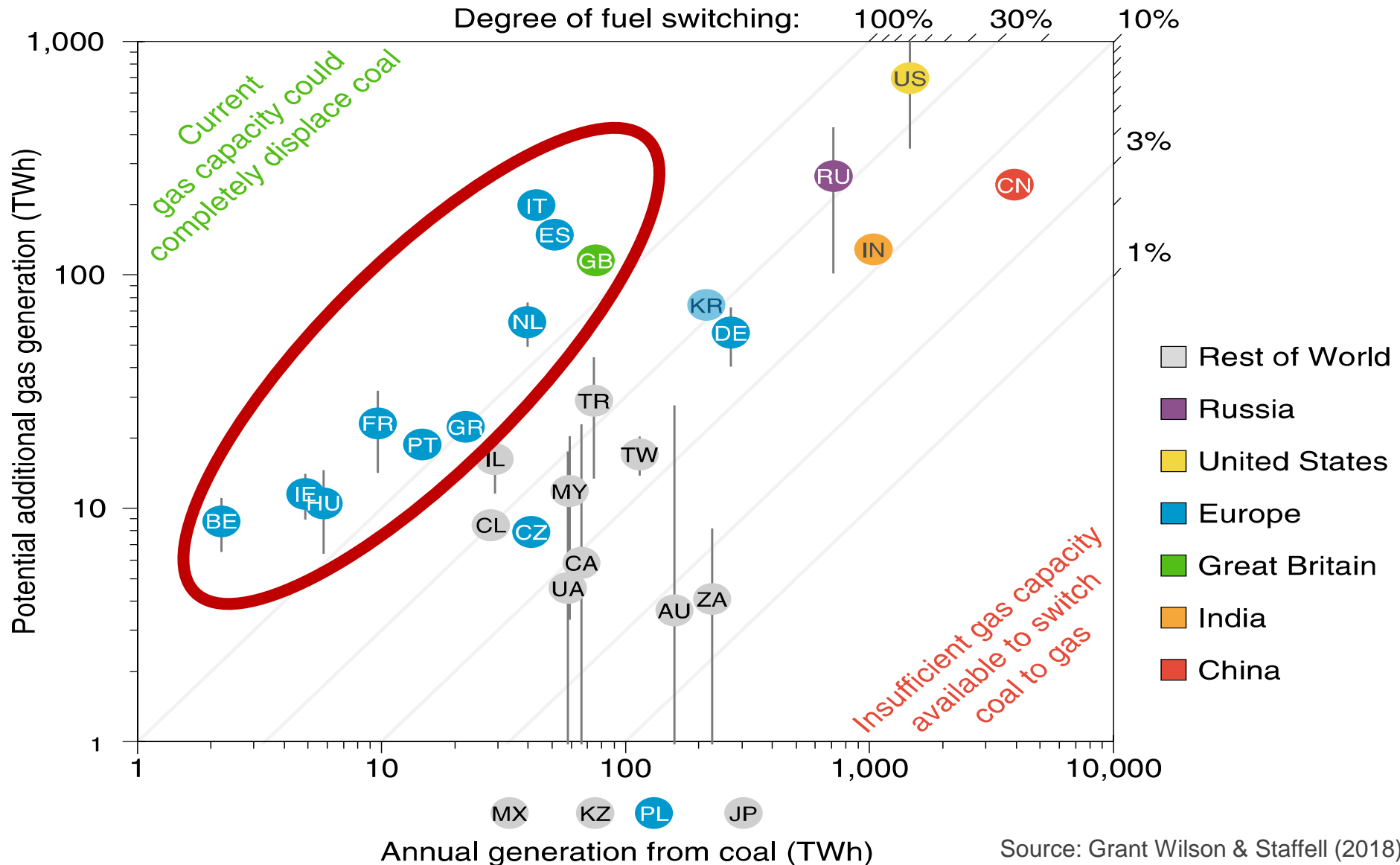


Source: Grant Wilson & Staffell (2018)

Potential for coal-to-gas switching in power

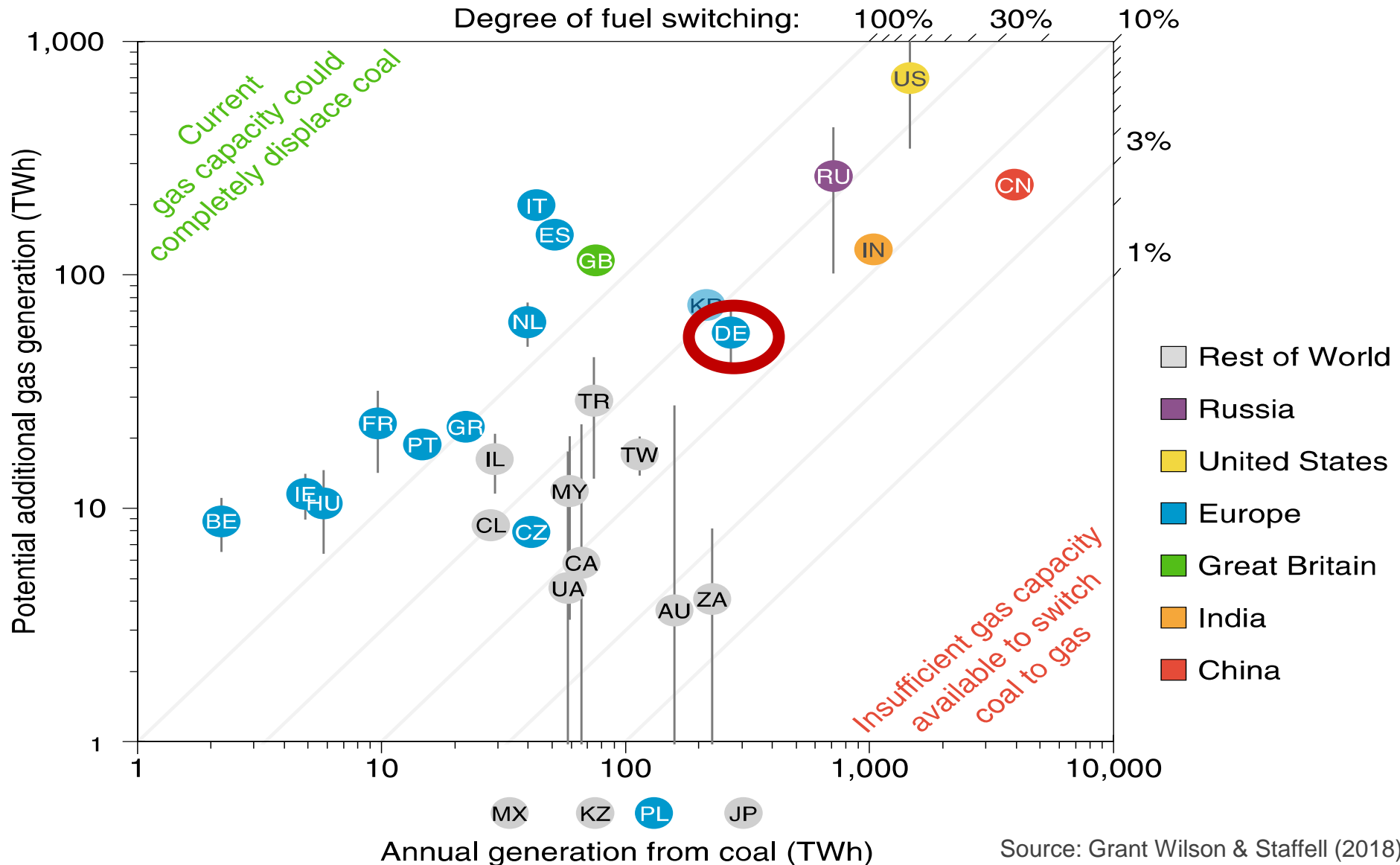


Potential for coal-to-gas switching in power



Source: Grant Wilson & Staffell (2018)

Potential for coal-to-gas switching in power

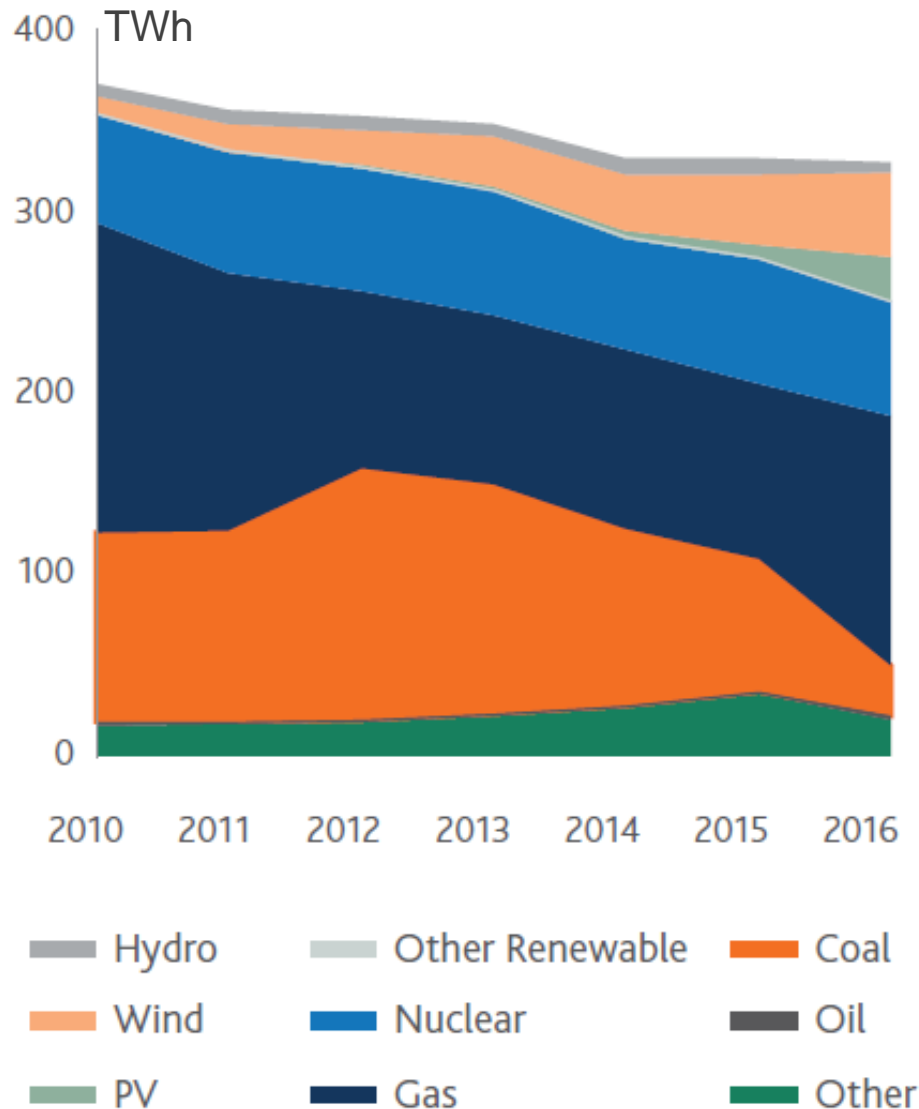


Source: Grant Wilson & Staffell (2018)

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**

UK: Carbon price floor supports gas switch



Coal phase-out now policy objective (for 2023)

Carbon price floor

- EU ETS + £18/tCO₂
- Emissions performance standard

⇒ **Coal share** from 41% (2013) to 8% (2017)

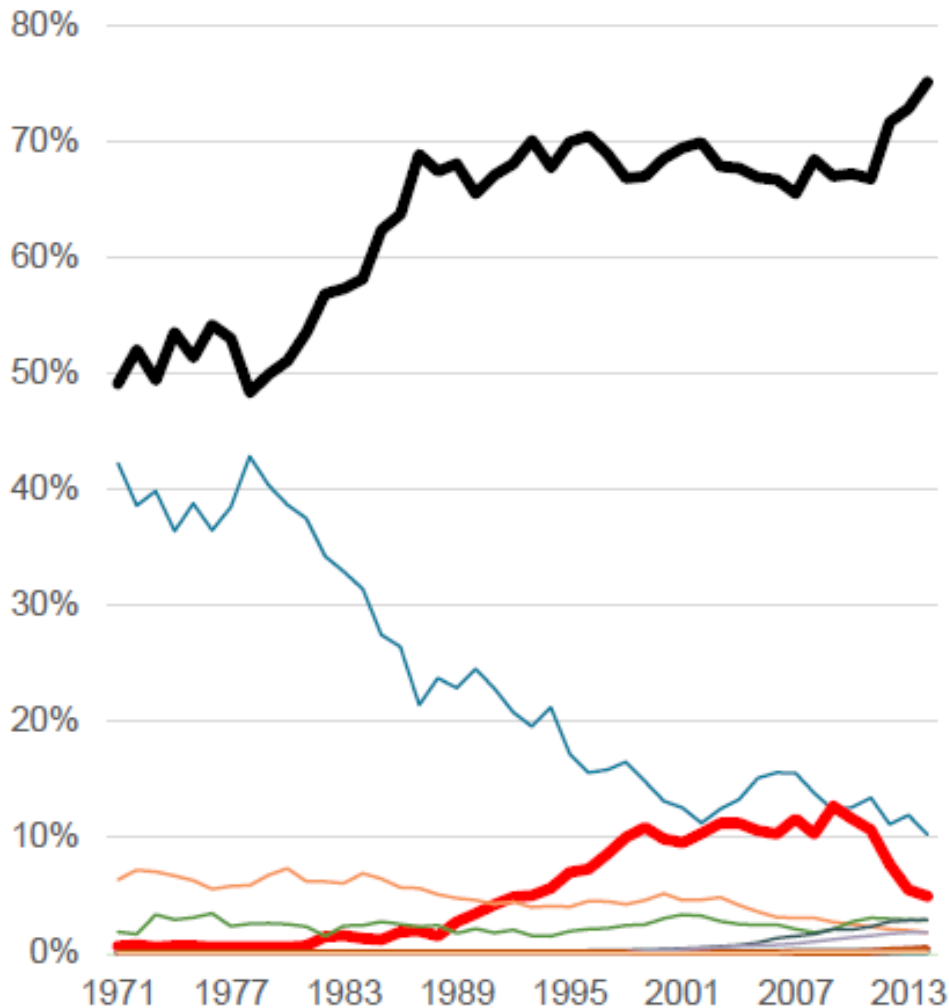
Case for CO₂ price floor on power generation

- Regional or EU level

Source: SNAM 2017 Global Gas Report

India: Gas currently squeezed by coal & solar

Electricity Generation by Fuel



No clear role for gas/LNG

- Not cost-competitive against 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

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 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**
- ② **Global gas price convergence**: not any time soon
- ③ 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

References

Grant Wilson, I.A. and Iain Staffell (2018). Rapid fuel switching from coal to natural gas through effective carbon pricing. *Nature Energy* 3, 365-372

Hausfather, Zeke (2015). Bounding the climate viability of natural gas as a bridge fuel to displace coal. *Energy Policy* 86, 286-294

Newbery, David, David Reiner & Robert Ritz (2018). When is a carbon price floor desirable? EPRG Working Paper 1816
<https://www.eprg.group.cam.ac.uk/eprg-working-paper-1816/>

Ritz, Robert (2014). Price discrimination and limits to arbitrage in global LNG markets. *Energy Economics* 45, 324-332
http://www.econ.cam.ac.uk/people-files/affil/rar36/pubs/RobertRitz_LNG_July2014.pdf

Ritz, Robert (2018). A strategic perspective on competition between pipeline gas and LNG. Working Paper, January 2018
http://www.econ.cam.ac.uk/people-files/affil/rar36/pubs/RobertRitz_SPGC_Jan2018-final.pdf