

Will gas become the new coal?

# **Greenhouse gases, infrastructure** and the role of CCS

#### Adam Hawkes

Co-Director Sustainable Gas Institute, Imperial College London

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www.sustainablegasinstitute.org/ sgi@imperial.ac.uk @SGI\_London



## SGI Research

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#### White Paper Series



#### **Energy Systems Modelling**

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## Three challenges?

 Supply chain greenhouse gas emissions, especially methane Imperial College

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- Stranded infrastructure?
- Global CO<sub>2-eq</sub> budgets

#### Greenhouse gases

A **comprehensive** and **transparent** review of studies on methane and CO<sub>2</sub> emissions across the whole natural gas supply chain

- 1. What is the **range** of estimated CO<sub>2</sub> and methane emissions?
- 2. What are the reasons for the different estimates?
  - a) Different estimation methods
  - b) Lack of data, or difference in assumptions made
  - c) Different natural gas extraction points, processes, transport and storage steps etc.



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Paul Balcombe et al.

#### **Overall GHG Emissions**



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#### White paper: Section 3.1, page 19

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## **GHG** main conclusions

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- 1. The reported range of greenhouse gas emissions is vast
- 2. Evidence of super emitters all across the supply chain
- 3. Key emission **sources**
- 4. Revised **estimate of emissions** for supply chains using modern equipment and effective operation and maintenance procedures
- 5. Significant methodological differences
- 6. Lack of data
- 7. Further research needs



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### Infrastructure



#### Jamie Speirs et al.



- Valuable asset
- System benefit: flexibility
- The higher pressure network will likely remain
- The low pressure local distribution network may not



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#### Costs: Hydrogen and Biomethane production



gas price in 2015 1.6 p/kWh

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electricity price in 2015 3.3 p/kWh

Cost of hydrogen production (p/kWh)

## GHG emissions: hydrogen

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The future of fossil fuels? The AR5 range



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> Range from literature: 10,000 to 33,000 GtCO<sub>2</sub>

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#### Will gas become the new coal?

Methane emissions means that gas sometimes already is the new coal in terms of  $CO_{2-eq}$  footprint.

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...BAT and effective monitoring largely mitigate this.

A significant future role for tail end gas infrastructure can only realistically be enabled by decarbonised gas.

...but decarbonised gas may face economic and emissions challenges relative to electricity-led solutions.

Top end infrastructure fairs better. CCS is important in the long term.

...capture rate is crucial, and competition with coal determines market share in high capture rate scenarios.