

WHITE PAPER 1: Methane and CO₂ emissions from the natural gas supply chain

IGU Workshop 20th October 2016

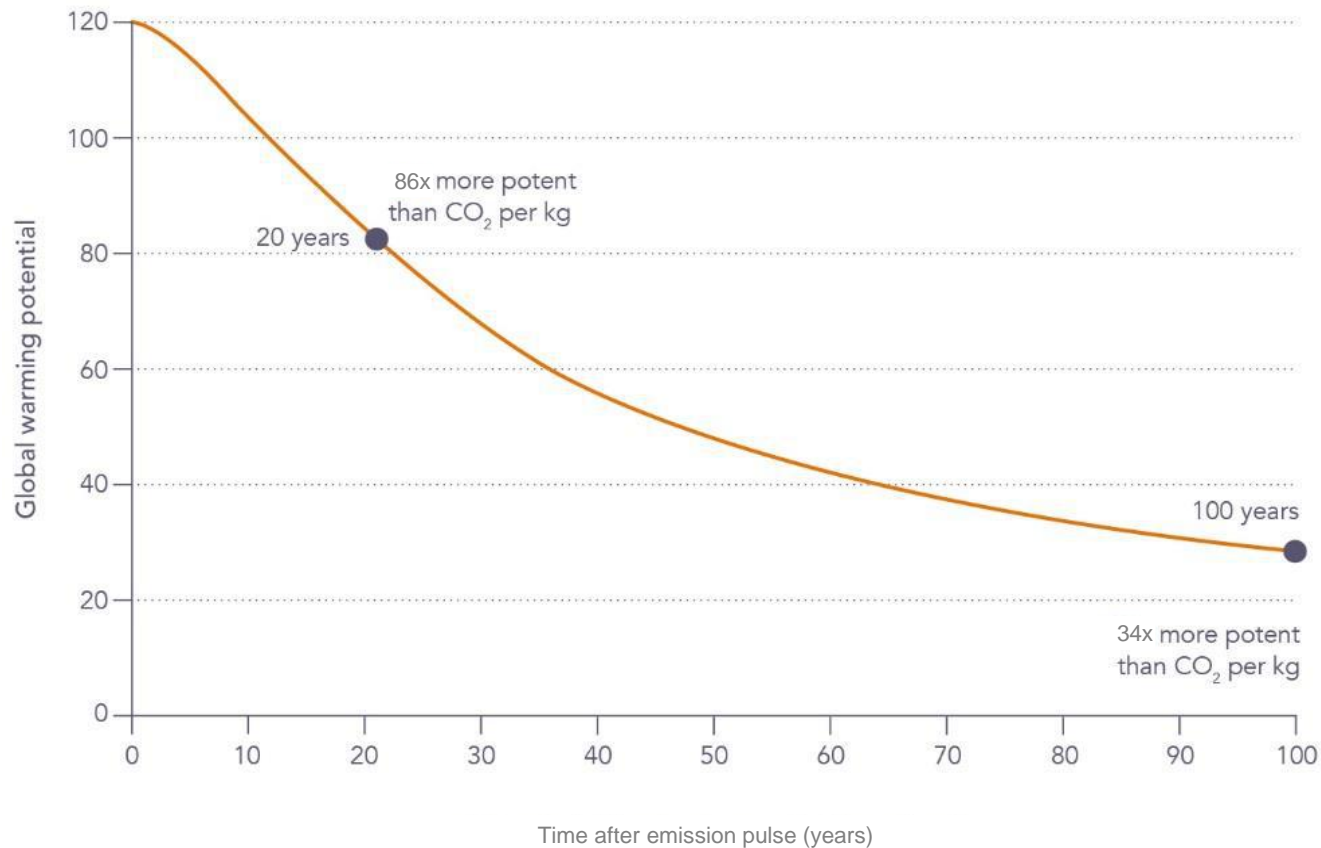
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KEY MESSAGES

1. Supply chain methane and CO₂ emissions are highly variable
 - There are some 'incorrect' estimates using inappropriate data but many high estimates are valid
2. The majority of supply chain facilities/routes exhibit low emissions
 - But there are always a few facilities/equipment with disproportionately high emissions
3. Using BAT will help reduce emissions but this is not everything
 - Progress in the detection of methane emissions is vital

BACKGROUND



Small release of methane = large impact
(at least in the short term)

PREVIOUS STUDIES

Climatic Change
DOI 10.1007/s10584-011-0061-5

LETTER

Methane and the greenhouse-gas footprint of natural gas

Greater focus needed on methane leakage

Characterizing Pivotal re
William J. Chambliss¹ and Steven R. Hamburg²

Measurements of methane emissions at natural gas

POLICYFORUM

ENERGY AND ENVIRONMENT

Methane Leaks from North

Methane emissions from U.S. and Canadian natural gas systems appear larger than official estimates.

Department of Energy & Climate Change

is,⁵ cky,¹³

Potential Greenhouse Gas Emissions Associated with

Natural Gas Industry Methane Emission Factor Improvement Study
Final Report
Cooperative Agreement No. XA-83376101

Prepared by:
Matthew R. Harrison

Motivation:

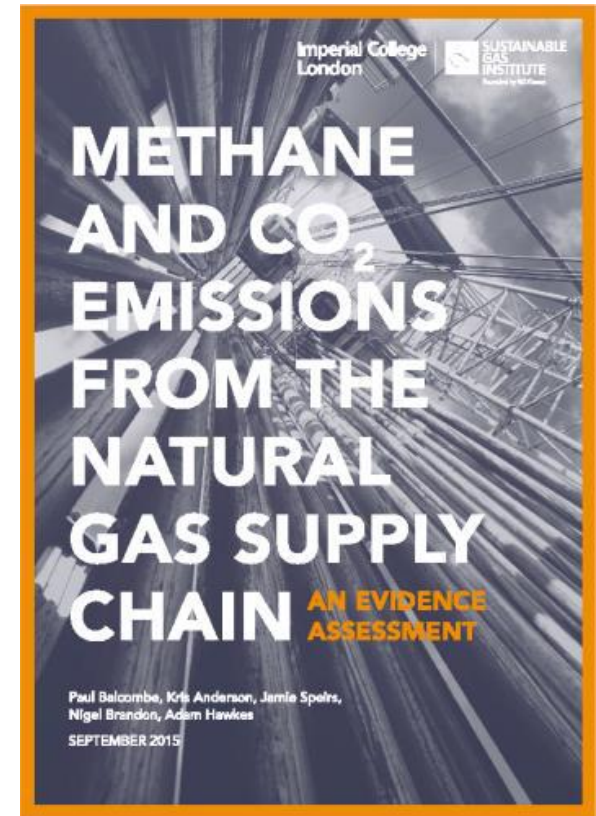
- US shale gas production increase
- In 2011, 1st estimate of greenhouse gas of shale: Natural gas may be worse than coal
- Prompted greater investigation
- Different conclusions and estimation methods
- *We need clarity*

... Plus many more

Conduct a **comprehensive** and **transparent** review of studies on methane and CO₂ emissions across the whole natural gas supply chain

1. What is the **range** of estimated CO₂ 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.

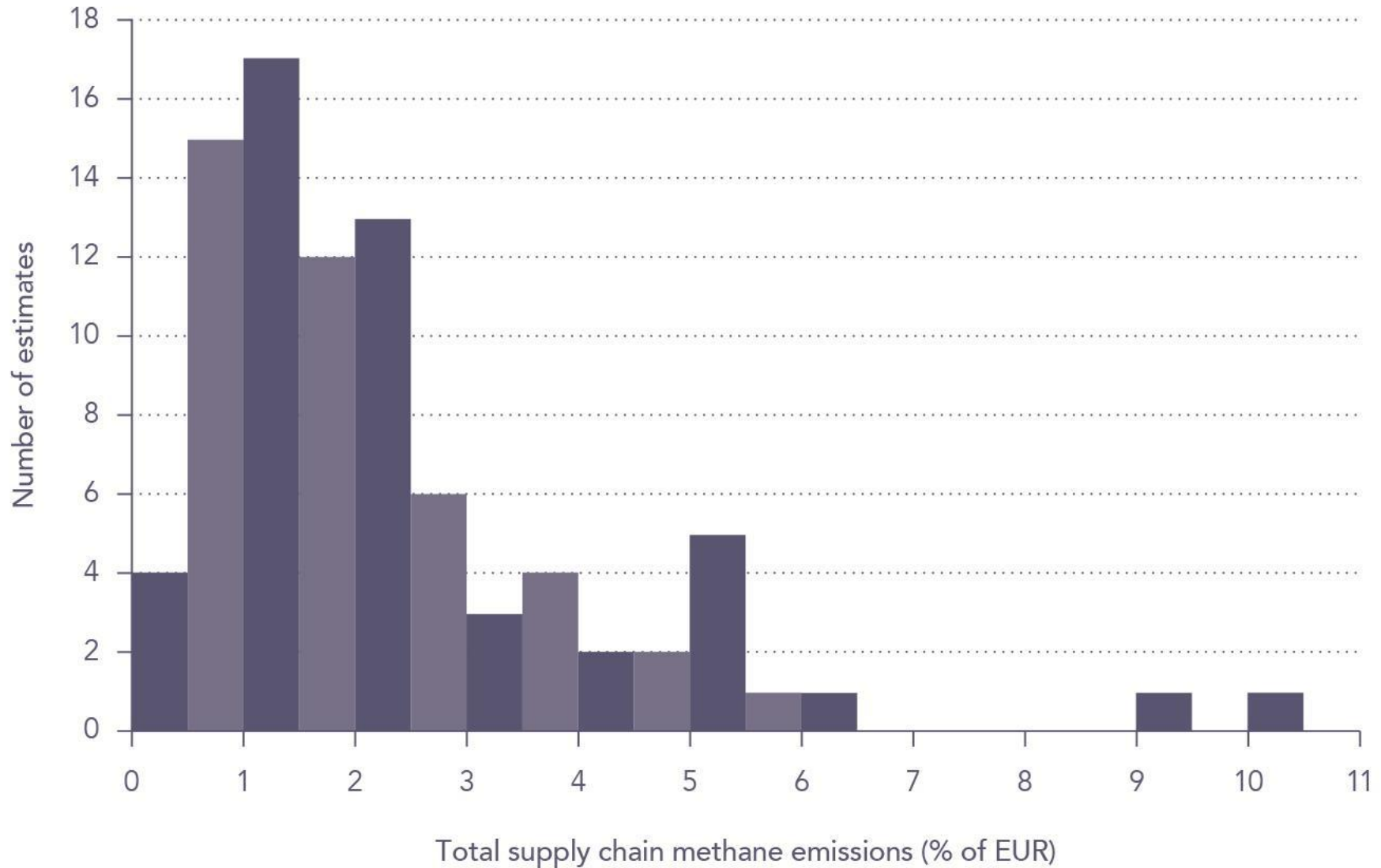
Provides an evidence base for industry and policy makers to help address the issues



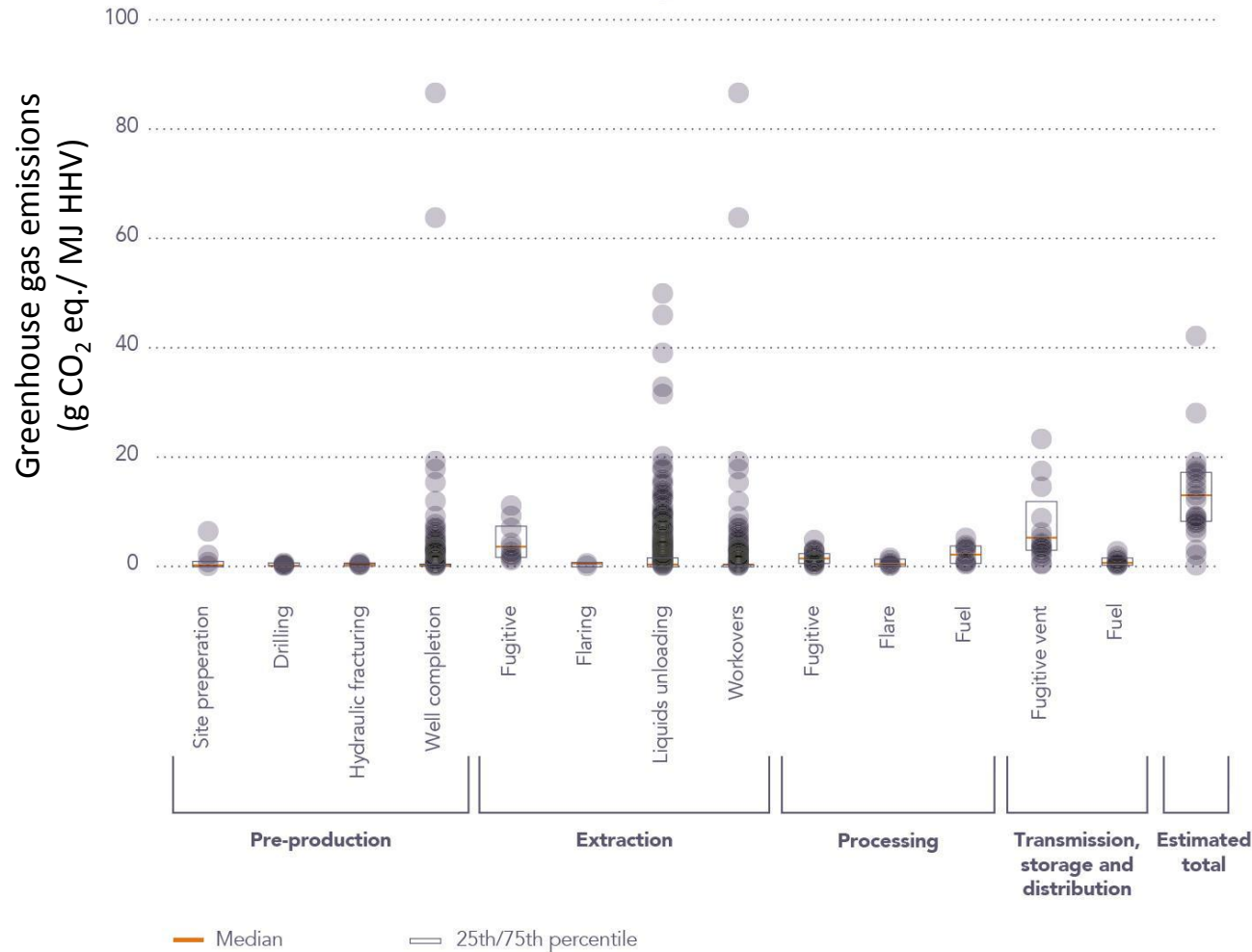
KEY FINDINGS

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

TOTAL METHANE EMISSIONS



OVERALL GHG EMISSIONS

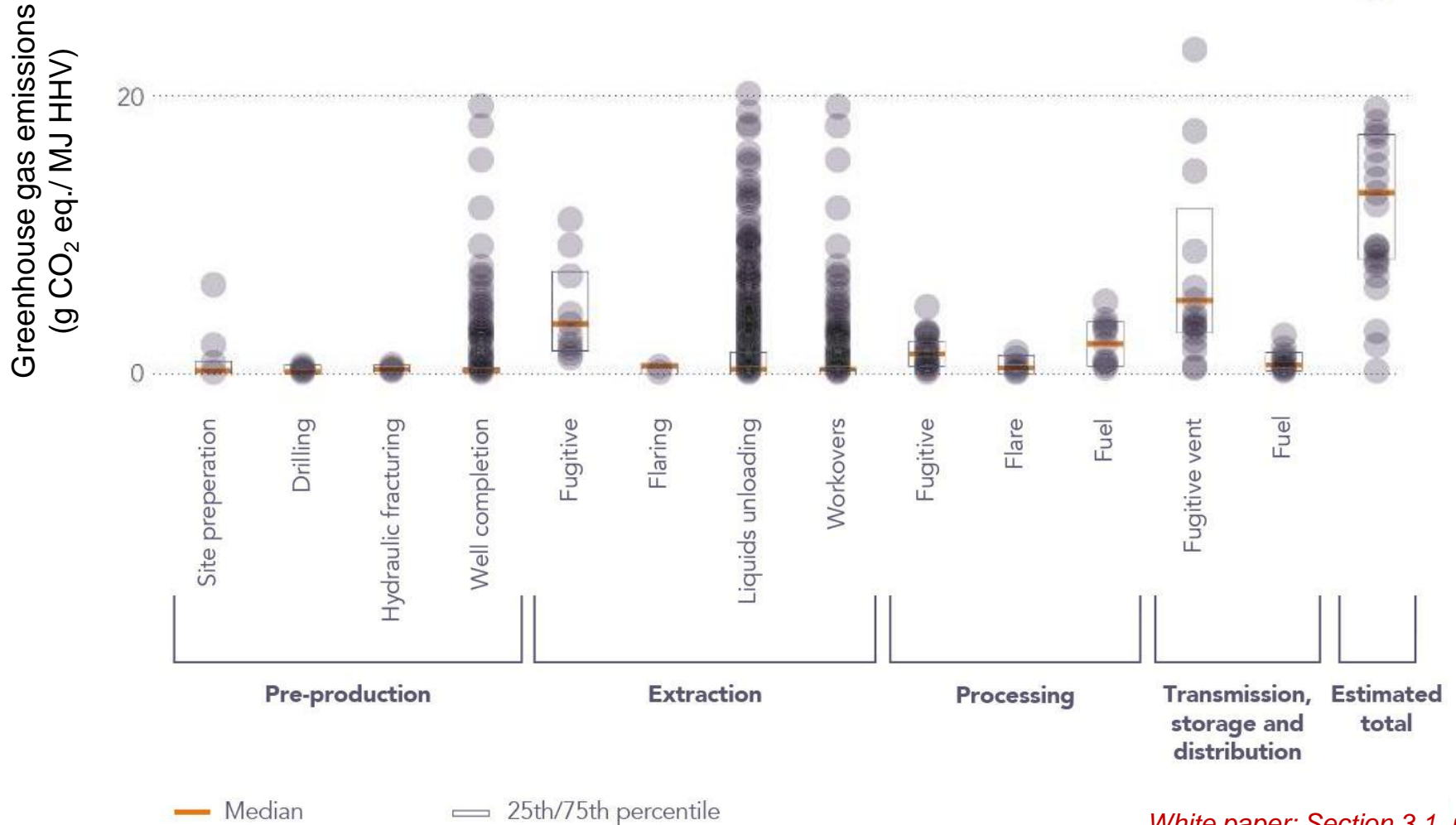


Greenhouse gas emissions: g CO₂ eq./MJ

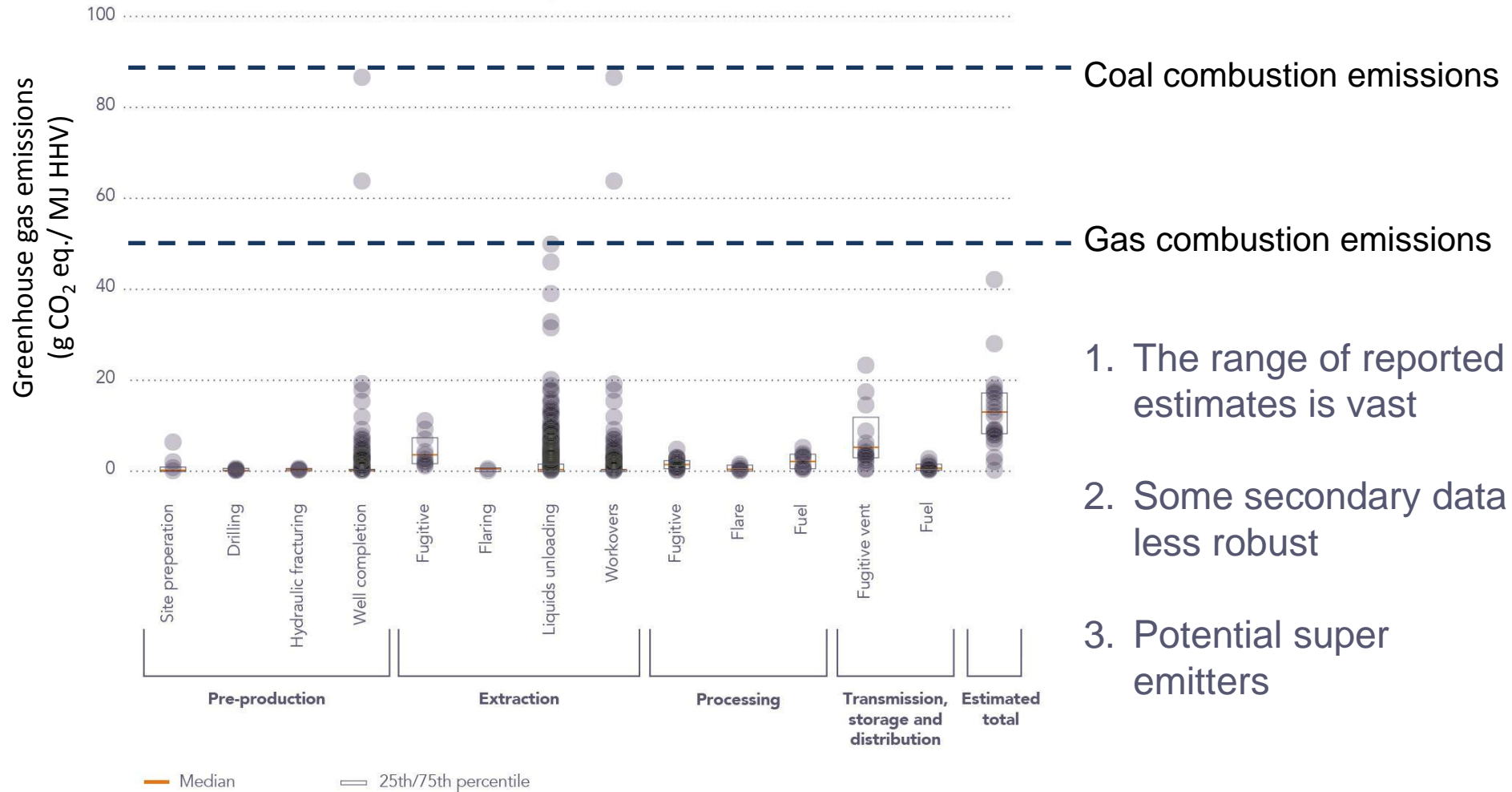
- **g CO₂ eq.** Carbon dioxide plus methane (methane = 34 x CO₂)
- **/ MJ** Energy content of the gas delivered to consumer

1. The range of reported estimates is vast

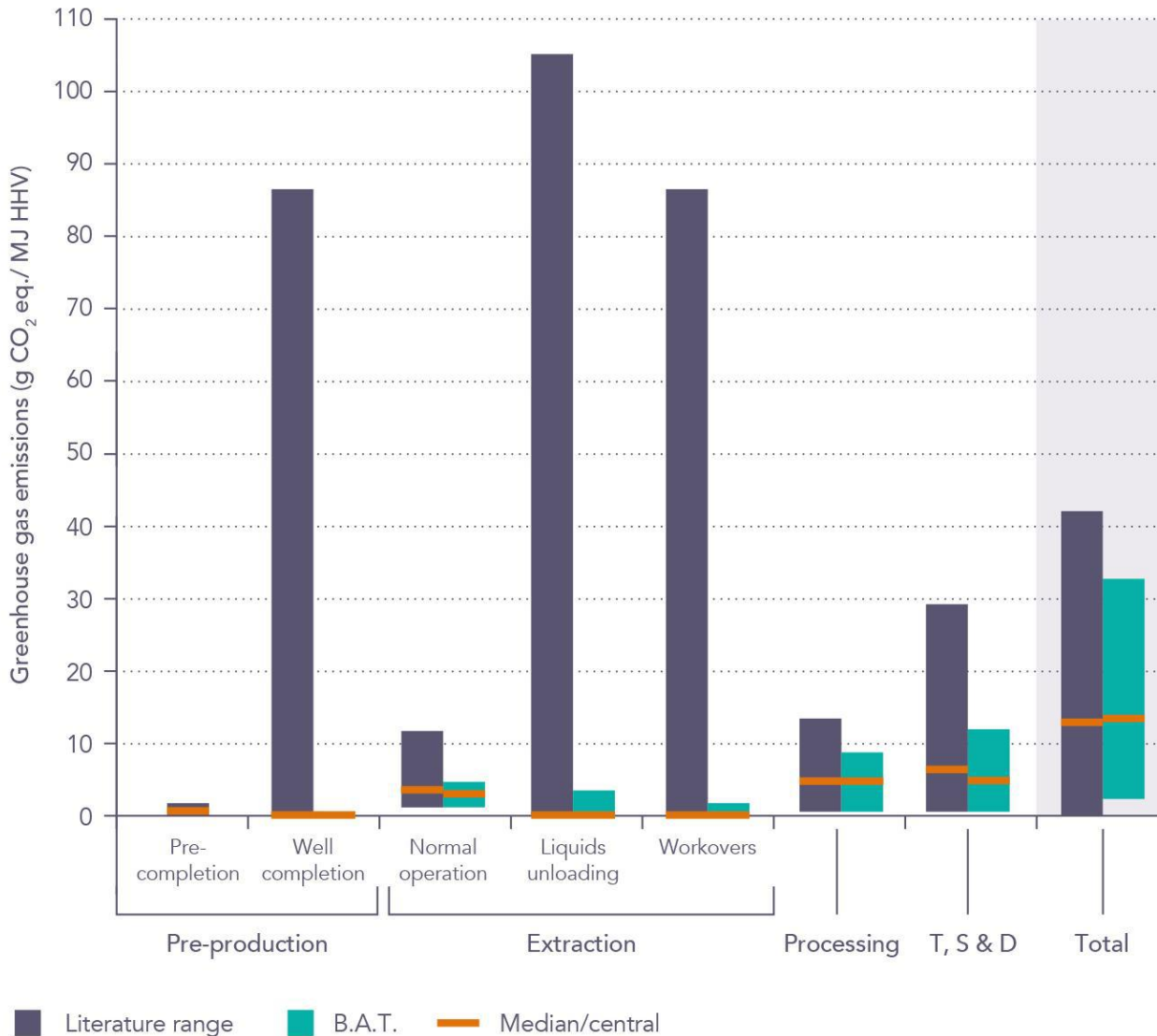
OVERALL GHG EMISSIONS



OVERALL GHG EMISSIONS



REVISED EMISSIONS ESTIMATE



- Ranges are reduced significantly
- Research need: identify further reductions, how much can emissions be reduced to?

CONCLUSIONS

1. Using 'average' emission values is tricky with such high variation
 - There is a big difference between emissions from a typical facility and average mean emissions.
2. The majority of supply chain facilities/routes exhibit low emissions
 - But there are always a few facilities/equipment with disproportionately high emissions
3. Using BAT will help reduce emissions but this is not everything
 - Progress in the detection of methane emissions is vital