

# Supergen



## Topic Group 3 – Energy Vectors

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We work with academia, industry, government and societal stakeholders to develop sustainable bioenergy systems that support the UK's transition to an affordable, resilient, low-carbon energy future.

Supergen Bioenergy Hub



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Overall effect on net GHG emissions =

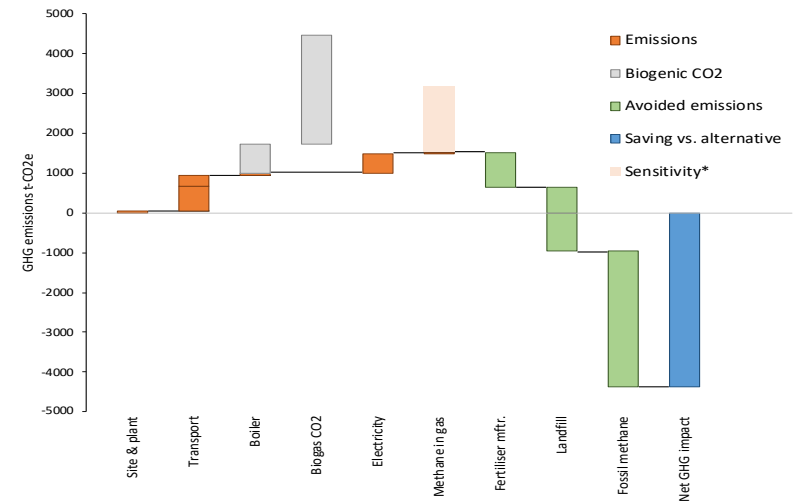
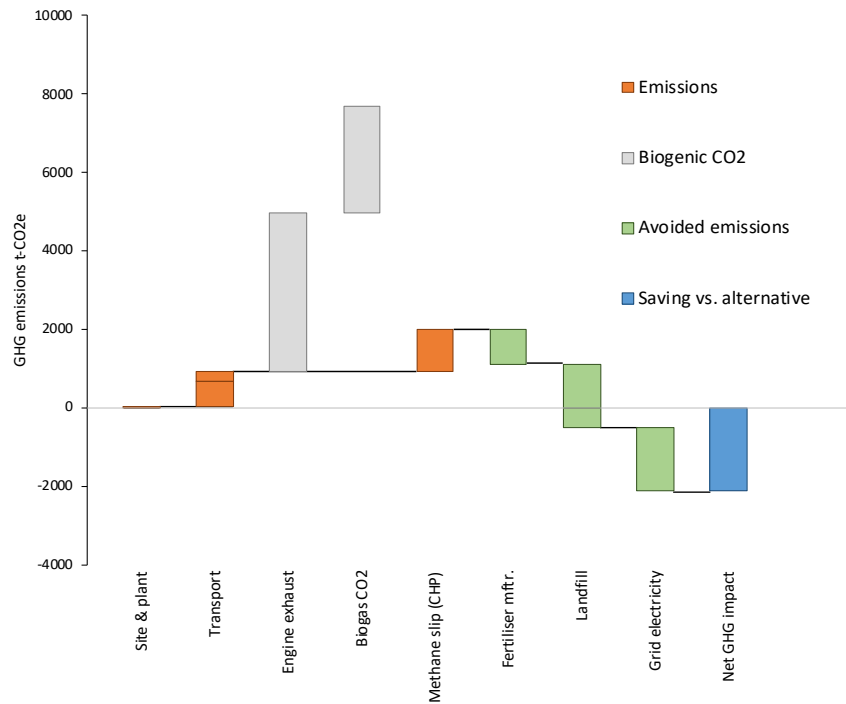


What is the benefit of displacing counterfactual energy vectors?

Varies with time and location.

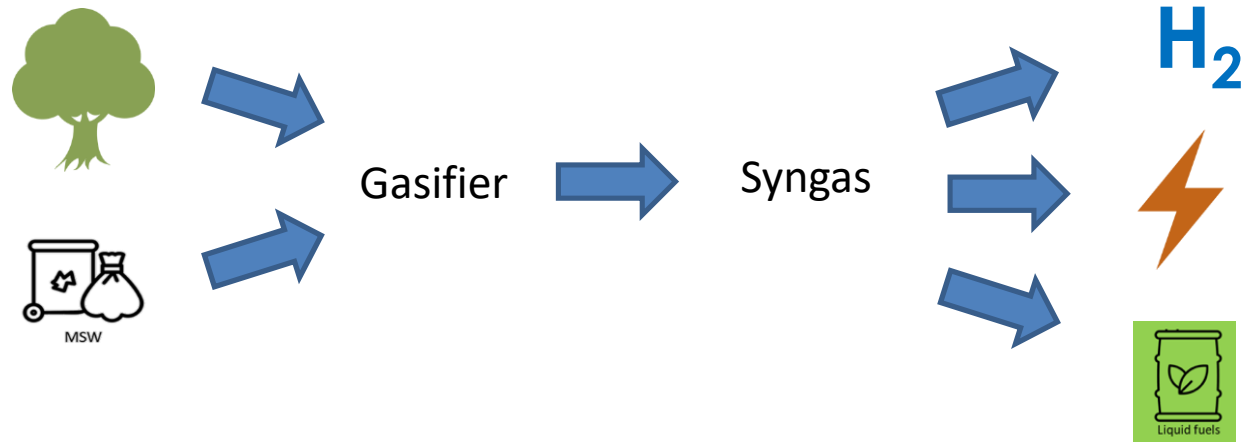
# Example 1: Anaerobic digestion – electricity vs biomethane.

- Grid GHG intensity
- Efficiency
- Synergy with carbon capture



\* sensitivity relates to impact of not removing methane from scrubbed CO2 / water solution

## Example 2: Biomass gasification – electricity or hydrogen?

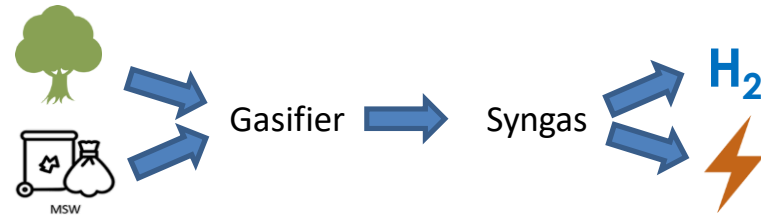


## Example 2: Biomass gasification – electricity or hydrogen?

### Intensity of energy output

Hydrogen: -385 gCO<sub>2</sub>e/kWh<sub>LHV</sub>

Electricity: -693 gCO<sub>2</sub>e/kWh



### Intensity of bioenergy input

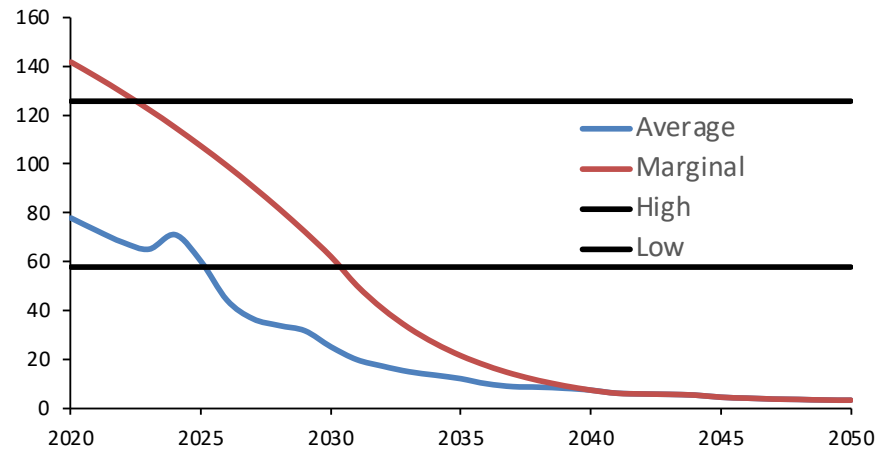
Hydrogen: -255 gCO<sub>2</sub>e/kWh

Electricity: -243 gCO<sub>2</sub>e/kWh

### What does it replace?

Blue hydrogen: 58 to 126 gCO<sub>2</sub>e/kWh<sub>LHV</sub>

Electricity: see graph



Energy, Element. 2021. Low Carbon Hydrogen Well- to-Tank Pathways Study - Full Report A Report for Zemo Partnership Prepared by Element Energy.

García-Freites, Samira, Clair Gough, and Mirjam Röder. 2021. "The Greenhouse Gas Removal Potential of Bioenergy with Carbon Capture and Storage (BECCS) to Support the UK's Net-Zero Emission Target." Biomass and Bioenergy

# Conclusions

- Overall GHG effects depend on what the energy vector will be used for
- This effect might vary going into the future
- Key factors:
  - Efficiency
  - GHG intensity of counterfactual
  - Synergies with carbon capture

Any questions?

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