

# SEMS: RESEARCH PROJECT DESCRIPTION

## 1. Project Background and Description

### *What is the role of methane emissions abatement in reaching net-zero climate targets?*

*Methane is the second most important greenhouse gas (GHG), currently causing a quarter of today's man-made warming, but has so far been relatively under-studied compared to CO<sub>2</sub>. It is a very potent GHG, 120 times stronger than CO<sub>2</sub> in climate forcing, but only lasts in the atmosphere for around 10 years, so is relatively short-lived. To compare GHGs we often use the Global Warming Potential (GWP) metric, which suggests that methane is 28-36 times more potent than CO<sub>2</sub> over a 100-year timeframe. But this hides an important temporal variation: which is the correct timeframe or metric to use?*

*This becomes very important when we move towards a 'net-zero' climate target, where the balance of GHG emissions over the course of a year is zero, including positive emissions as well as 'negative emissions' (e.g. removing CO<sub>2</sub> from the atmosphere). But how should methane be included within this target and can we trade-off between GHGs? Should we use a simple GWP metric, a specific time-horizon, or a different methodology altogether?*

*This project will develop a methodology and analysis of how to include methane and other GHGs in net-zero targets. An assessment of climate metrics will be conducted first and their use for different applications. Different climate metrics will be tested for their impact on reaching net-zero by simulating decarbonization pathways using climate models (e.g. MAGICC 6), to determine the impact on the change in global temperatures. The output of the project will be a methodology and set of recommendations on how to include methane and non-CO<sub>2</sub> GHGs in global net-zero targets.*

## 2. Project Scope

### *Three research project objectives*

- *Determine how methane and other non-CO<sub>2</sub> GHGs are currently accounted for in climate targets*
- *Determine the impact of trading off methane and CO<sub>2</sub> under different decarbonization pathways via climate modelling scenarios*
- *Develop a methodology and set of recommendations on how to include methane and non-CO<sub>2</sub> GHGs in net-zero targets*

## 3. Desired Skills from the Student

### *Key skills needed for the PhD project*

- *Environmental assessment and emissions accounting*
- *Climate modelling and atmospheric science*
- *Translation of academic results into policy recommendations*

## 4. Supervisory Team

### *Add supervisory team details*

*Primary: Dr Paul Balcombe, Division of Chemical Engineering and Renewable Energy, SEMS*

*Secondary: Dr Patrick Cullen, Division of Chemical Engineering and Renewable Energy, SEMS*