Industry is at the core of developing low-carbon solutions: it is responsible for producing technologies to support decarbonisation of other sectors like power, buildings, and transport. Therefore, it is imperative to reduce emissions from industrial operations while industry continues to supply transformational infrastructure and technologies.

Accelerating the transition to Net Zero Greenhouse gas (GHG) in UK industry is important to satisfy the UK’s ambitious 2050 target. Globally industrial processes, excluding power generation are responsible for one-third of global energy use and 40% of global carbon dioxide emissions (CO2) emissions – eliminating emissions from a hard to abate sector like industry would also go a long way in satisfying the goals of the Paris agreement.

Though the industry sector is large and heterogeneous, the goal of decarbonisation is achievable, and the technologies exist albeit at different readiness levels. However, adoption of these technologies is currently zero. A good approach by the industrial sector is to focus on concepts for decarbonisation instead of single technologies. Industrial decarbonisation concepts enhance the collective value of several technologies. The key concepts for decarbonising industry are advanced energy and material efficiency, switching to alternative fuels and feedstocks, and carbon capture and storage. Implementing these concepts is not a one size fits all making it a non-trivial exercise.

Several barriers hinder accelerated adoption of these strategies, and gaps remain in the UK’s industrial decarbonisation policy and business model framework – such as market pull policy interventions to support full scale commercialisation, and lack of new business models to support clean industrial products. Gaps remain in research, such as lack of robust methods to quantify the impact of various interventions to address barriers to adoption of strategies and synthesise commercialisation pathways. Insights from such frameworks help determine how to shorten the time to widespread adoption of concepts and keep us on track toward achieving the climate goals.

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The overall aim of this project is to develop a framework underpinning physical modelling of industrial processes and associated energy system, techno and socioeconomic modelling, and market simulation. Such a framework supports the system of systems approach to solving problems. The insights gained from applying the decision-support framework to existing interventions can be used to design new policies and business models to support industrial decarbonisation.

The student would have opportunities to work closely with industry in the UK and abroad, and interact with a range of academics from the Grantham Institute, Centre for Environmental Policy and Chemical Engineering. Further information can be obtained directly from me o.oluleye@imperial.ac.uk. Please do not hesitate to get in touch if interested.