

IMPEE PhD Opportunity

Project title: Understanding emissions from CO2 capture plants in Carbon Capture, Utilization and Storage (CCUS) networks

Supervisor(s): Dr Eva Sanchez Fernandez

Abstract

Reducing CO2 emissions from the industrial and power sector is needed to meet carbon budgets. The industrial sector is more constraint than the power sector in the options to decrease carbon emissions. In this respect Carbon Capture, Utilization and Storage (CCUS) aims at enabling low emission industries via CO2 capture and storage and / or CO2 utilization.

Amine based absorption is a capture technology that can be broadly implemented in power plants and industries and its Technology Readiness Level (TRL) is significantly higher than other technologies ensuring its smooth transition towards commercialisation in the near term. However, there are still technical issues for large deployment. For instance, due to amine volatility, some amine emissions can be released to the environment. This is prevented by including emission control technologies in capture plants. However, amine solvent emission can be influenced by the operating conditions and operation pattern of the capture unit. To date, there is no systematic study on solvent emission control technologies under transient conditions. Given the fact that certain flexibility will be required for capture plants to ensure optimal operation in CCUS networks, it is imperative to investigate the impact of transient operation on amine solvent emission.

The primary aims of the research are to develop amine emission models for conventional and advance amine systems to evaluate volatile amine emissions during transient operations of post-combustion capture plants. The emission models will be used to evaluate the robustness of emission counter-measure systems and will support the design of control strategies that can further reduce emissions for identified scenarios. The successful candidate will liaise with our industrial partners to validate the developed dynamic models at a dedicated post-combustion capture facility in Europe. The candidate is also expected to collaborate with other team members to propose additional control systems for the capture plant that will be further verified in pilot scale trials.

This project is fully funded by the ERA-NET co-found ACT (Accelerating carbon Technologies) (<http://www.act-ccs.eu/about-us>), which recently awarded R&D projects to progress the implementation of CCUS. This is a unique and exciting opportunity for engineers to develop their skills in applied research while having the opportunity to connect to multiple industrial partners in this project. The successful PhD candidate will join the Centre for Innovation in Carbon Capture and Storage (<http://ciccs.hw.ac.uk/>) at the Institute of Mechanical, Process and Energy Engineering directed by Prof Mercedes Maroto-Valer and will be supervised by Dr Eva Sanchez Fernandez. The start date of the project is expected to be the 1st of August 2017.

Requirement

The successful candidate should have, or expect to have, an Honours Degree / 1st class / 2:1 degree or equivalent in Chemical Engineering. Other disciplines such as Mechanical Engineering or Physics will be considered when the candidate has some background in process technology.

Essential background: The candidate must have skills in dynamic modelling of processes. Basic knowledge of modelling software such as Matlab and /or Aspen Plus® is required. The successful candidate will be able to work independently and as part of a team, have good management skills and being able to work closely with industrial partners. Knowledge of two or more of the following research areas is desirable: process engineering, the thermodynamics and kinetics of chemical processes, dynamic modelling and control.

Other info

The funding includes EU fees rate, plus a yearly maintenance allowance for the 3-year project duration (£14,500 in 2017/18). The studentship is open to all nationals, however international students will need to provide the difference in tuition fees.

For additional information contact Dr Eva Sanchez Fernandez:

E.Sanchez_Fernandez@hw.ac.uk

+44 131 451 4737