



PhD Position in Techno-economic analysis of e-fuels

Context

The project BEST (Belgian Energy SysTem) studies the contribution of electro- and synthetic energy carriers to the security of supply of Belgium. The development of a holistic model will provide a deep insight in the role of these carriers in the energy system, as well as their energy and economic costs. The key issues of the uncertainties on the current state and the future of the system will be analyzed through a robust optimization approach. The impact of the integration of these carriers on the electricity grid is included in the study as well as several ways to improve the total efficiency of the use of these renewable fuels for different applications.

The project, funded by SPF Economie “Energy Transition Fund”, is a collaboration between five universities: UCLouvain, UGent, ULB, UMons and VUB.

Description of the PhD

The PhD student will quantify, including uncertainties, the production, the transport, and the storage costs of e-fuels, in order to determine their best origins for Belgium. The results of this PhD will be integrated with the research of other members of the consortium. The objective is to pave the way towards helping decision maker with meaningful indicators.

The PhD student will use concepts such as Energy Return On Investment (EROI) but will also adequately integrate with the research effort in energy systems. He/she will establish the link between self-sufficiency ratio, risk of black-out, and cost.

The characterization of uncertainties will be at the core of this research topic, not only as a user but also as a developer of effective methodologies towards uncertainty propagation with a large number of parameters—beating the curse of dimensionality.

Description of Team

This offer will be for a joint PhD between UCLouvain and ULB. The primary contract will be with UCLouvain and the candidate will receive a PhD from both institutions.

The supervisor at UCLouvain is Prof. Francesco Contino. Francesco Contino focuses his research effort on four strands: Energy systems, Computational Fluid Dynamics (CFD) simulations of reactive systems, Real Driving Emissions and Robust Optimisation — optimisation combined with uncertainty quantification. More specifically, about energy systems, he works at micro and macro levels to understand what the key drivers are to help us succeed the energy transition. He also works on making robust design optimisation affordable by working on efficient optimiser and fast uncertainty quantification methods.

The supervisor at ULB is Prof. Alessandro Parente. The research interests of Prof. Parente are in the fields of turbulent/chemistry interaction in turbulent combustion and reduced-order combustion models, non-conventional fuels and pollutant formation in combustion systems, novel combustion technologies (flameless and oxy-fuel), numerical simulation of atmospheric boundary layer flows, and validation and uncertainty quantification in computational fluid dynamics.

Starting date: March 2020

End date: February 2024

Location: UCLouvain and ULB (Belgium)

Salary: 1950€ (approximate net income)

Profile: Candidates should be proficient in English, motivated and well aware of the energy context. Experience in programming (ideally Python), uncertainty quantifications, or techno-economic analysis would improve the ranking.

Application: applications should contain a letter of motivation, a letter of recommendation, a short analysis of the project idea (max one page), and a short video (2 minutes max) explaining why we should hire the candidate. The application package should be sent to francesco.contino@uclouvain.be and alessandro.parente@ulb.be.

More information on the project: www.best-energy.be

More information on working at UCLouvain:

https://jobs.uclouvain.be/content/WorkingatUCL/?locale=en_GB

