SERVICE DE METROLOGIE NUCLEAIRE INDUSTRIAL RISK

MASTER THESES

Academic year 2021-2022

The topics listed below correspond more to <u>themes</u> in which master theses can be realized, than to a detailed description of topics. Depending on the interest of the students, more theoretical or instead industry-related topics will be developed. Some of the proposed themes are more convenient for an internship, to be made before the master thesis. The themes proposed are preferably <u>accessible mainly to students in engineering physics and</u> in electromechanical engineering.

12. Safety risks associated with storage and transport through pipelines of CO₂ (in collaboration with Tractebel Engie)

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For master thesis and internship





PROPOSAL FOR MASTER THESIS/INTERNSHIP

- Safety risks associated with storage and transport through pipelines of CO₂ -

Context

In the context of energy transition, CO_2 will be more and more captured and stored or re-purposed. For instance, CO_2 can be combined with hydrogen to produce e-methane. This would decarbonize the activities of industrial sectors which are, for the moment, releasing significant amounts of CO_2 . It would also decarbonize sectors which are not (yet) ready for electrification, e.g. airplanes.

In relation to safety there are no consolidated approach and models regarding the management of risks during the different phases of such projects.

Objective

The objectives of this master thesis are:

- To review the hazards and risks associated with CO₂ (transport, storage);
- To investigate the existing technology for transporting, using and storing CO₂;
- To study accidents or incidents which have occurred with CO₂, their causes and their consequences;
- To search for international standards / guidance / national guidelines regarding the transport, use and storage of CO₂;
- To update the existing technical code for risk assessment of pipelines, to make it applicable to CO₂ pipelines (currently it is applicable for flammable gases)
- To define a methodology for modelling CO₂ pipelines incidents (leaks, etc.): comparison of models, assumptions, sensitivity study to identify the most important parameters, etc. This comprises the comparison related to dispersion of existing empiric computer models (PHAST DNV used by TRACTEBEL) with 3D CFD models.

It is preferred to associate this master thesis with an internship in the Risk & Safety Management team of TRACTEBEL, the engineering company of the ENGIE Group, active in many sectors – energy, urban, water & nuclear. It will be an opportunity to work with experienced colleagues in the field of risk management, have contact with clients developing infrastructure for the future, to get familiarized with industrial software for modelling of accidents, and to discover a rich and stimulating work environment in TRACTEBEL.

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We are a global community of imaginative experts engineering a carbon-neutral future.

Tractebel is a global engineering company delivering game-changing solutions for a carbon-neutral future. Insights gathered during our more than 150 years of experience in energy, urban, nuclear and water projects

than 150 years of experience in energy, urban, nuclear and water projects combined with local expertise allow us to tackle complex future-oriented projects.

By connecting strategy, design, engineering and project management, our community of imaginative experts helps companies and public authorities create positive impact towards a sustainable world, where people, planet and profit collectively thrive.

With offices in Europe, Africa, Asia, the Middle East and Latin America, the company registered a turnover of 581 million Euros in 2020. Tractebel is part of the ENGIE Group, a global reference in low-carbon energy and services.

AREAS OF EXPERTISE

ENERGY

Renewables (Solar, wind, Biomass)
Digital & Decentralized Energy
Thermal Energy
Transmission & Distribution
Natural Cas, LNG, Green Cas & E-fuels
Offshore Energy
Industrial process
Hybrid systems with sector coupling

URBAN

Cities & Territories
Transport Infrastructure
Buildings

NUCLEAR

Advanced Technologies
New Build
Plant Operation Support
Radwaste Management
Decommissioning and Dismantling

WATER

 Water Resources and Climate Change Irrigation
Water Supply and Sanitation
Desalination
Hydropower
Reservoirs and Dams
Flood Protection
Waterways
Coasts and Esturies
Ports and Marine Facilities

KEY FIGURES

Presence in more than 70 countries Projects developed in over 160 countries 5,000 employees

€ 581 million turnover

More than 70 technical publications/year High Safety Standard: Frequency Rate 0.7



PROJECT LIFE CYCLE

Tractebel adds value throughout the complete cycle of a project:

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