

The potential role of hydrogen in the energy transition of industrial and building sectors

Held by
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Venue:

Hours: 8 (2 events of 4 hours)

Days: May 15th 2025 14:00-18:00

May 22th 2025 14:00-18:00

Abstract:

Global warming and climate change are now recognized as universal problems. To mitigate them, it is essential to limit the production of greenhouse gases produced by fossil fuels and move towards clean and green energy. Europe is a great promoter of the principles of sustainability and through the ambitious objectives of the Green Deal aims to be the first continent in the world to reach zero emissions by 2050 (after an initial phase of reducing greenhouse gases by at least 55% by 2030).

Hydrogen could potentially be of great interest due to its great availability in nature, although not in its pure state, and the possibility of storage. The European Green Deal positions hydrogen centrally in the energy transition. Today's perspective on renewable-sourced hydrogen has significantly evolved. Renewables have established themselves in the electricity market with competitive costs. Hydrogen can serve as a valuable vector to transfer green energy to sectors primarily using thermal energy given the infeasibility of complete electrification. Advances in various technologies make hydrogen a more viable option today than two decades ago.

This course will address the most interesting potential applications of hydrogen in both the industrial and building sectors, considering the different ways of use, i.e. considering it as a fuel, as a chemical reagent and as an energy carrier. Current perspectives and limitations for a systematic use of hydrogen are also discussed, to identify possible realistic future scenarios.

The course is addressed to PhD students, post-doc researchers and anyone interested in exploring new perspective related to the energy transition and the use of new energy sources.

Agenda

Day #1

The potential role of hydrogen in the energy transitions.

Introduction

- The role of hydrogen in the energy transition.
- The uses of hydrogen.

Current limitation on hydrogen uses.

- Limits related to hydrogen production, compression and storage
- Limits related to hydrogen injection in existing natural gas networks.

Blended combustion: a strategy to gradually shift towards a hydrogen-based energy system.

- Thermodynamic analysis of hydrogen as an alternative fuel.
- Interchangeability metrics analysis.

Day #2

Potential hydrogen applications in the industrial and building sectors.

Hydrogen applications in the industrial sectors

- Use for blended combustion.
- Use as a chemical reagent.

Hydrogen applications in the building sectors

- Blended combustion hydrogen-methane.
- Combined heat and power systems.