Rational use of energy

Component
INSTITUT NATIONAL DES SCIENCES APPLIQUEES TOULOUSE

Number of hours
75h

Presentation

Description

Program (detailed contents):

This training will introduce the general concept of « rational use of energy ». Scientific approaches (LCA, energetic balance, exergetic balance) able to answer the requirements for an efficient use of energy will be revised and applied to energy production/consumption systems and to industrial plants. New concepts such as Pinch analysis and numerical optimization, will be developed for completing the global approach for energy-use assessment and optimization.

Organisation:

Lectures, tutorials, projects. During projects, the students will apply the different methods for energy-use assessment to energy-production and consumption systems. Dysfunctions must be identified and optimal solutions will be proposed. Students will so understand the advantages and the drawbacks of these different assessment methods.

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

*How to establish a life cycle analysis on energy production processes and different energy use scenarios; to use a software (Umberto) and the appropriate databases. Use of results for process eco-design.

* Pinch analysis for improving energy use in a process.

*Other optimization methods (numerical methods) depending on the case study for process ecodesign.

*Establish energy and exergy balances on energy production or energy consumption scenarios. Critical analysis of the obtained results.

*Identify dysfunctions in a system and to propose optimal solutions. To propose new scenarios considering energy aspects.

The student will be able to:

*Mobilise knowledges in chemical engineering in order to solve complex problems in the field of matter and energy processing.

*Conception, design, modelling, conducting and optimizing (for technical and economical criteria) installations in the field of chemical engineering

* Considering safety, energy efficiency and management of environmental impacts in the early step of process design and in functioning of unit processes and processes.

*Conception of new unit processes and processes in different industrial fields like Ecoindustry, Energy, Environment, in order to reduce the climate change threat and contribute to energy transition.

Pre-requisites

Energetic thermodynamics

Process simulation and assessment

Processes and energy

Heat transfer : unit operations and simultaneous heat and mass transfer

Useful info

Place

Toulouse