This contest problem is open to Bachelor/Master/PhD level students.

The participants have approximately three months to prepare and submit solutions to the problem (see below) no later than **December the 31st 2016, 23:59 CET**. Solutions can be prepared by individuals or by teams.

The Jury, composed by members of the EURECHA committee, will select the best solutions, based on technical excellence (i.e. cost effectiveness, energy efficiency, environmental impact, social impact, operability, flexibility, etc.), quality of the report and originality. The Jury will take also into account the size of the team and its academic level (Bachelor/Master/PhD).

1st Prize Award includes:

- One invitation to attend ESCAPE-27/WCCE10, to be held in Barcelona, Spain, 1st – 5th October 2017 to get the award.
- A money transfer of 1000 EUR, after the ESCAPE event, to cover the travel and accommodation expenses.
- The publication of the selected solution at the EURECHA web site.

2nd Prize Award includes:

- One invitation to attend the 2017 edition of the CAPE-FORUM.
- A money transfer of 1000 EUR, after the CAPE-FORUM event, to cover the travel and accommodation expenses.
- The publication of the selected solution at the EURECHA web site.

The Jury has the right to not select a winner for one or both prizes, as well as to award honor mentions if was deemed necessary. The Jury has the right to decide on any question not covered by these rules. All Jury decisions are final.

Submission procedure:

The written report should consist on a **pdf** file written in **English** and not exceeding **15 pages** (including figures).

This **written report**, any **other support file** (Annexes, Spread Sheets, Simulation Input files, etc.), and a support letter from an academic supervisor at your home university, should be packed (zip format) and sent, before the established deadline, as e-mail attachment to eurecha.secretariat@gmail.com.

In the body of this e-mail you **must** include the following information:

- Complete name (for all authors).
- Level (Degree/Master/PhD) and current year of your studies (**for all authors**). If available, please provide a link to a web page at your home institution related to one of the courses you are currently enrolled.
- Complete name and address of your home institution (School/Department/Research Center, etc.). Please provide a link to the web page of your home institution and an official contact to eventually confirm your affiliation/enrolment.

Carbon Capture and Utilization

In spite of the recent international initiatives to control the Global Warming effect, this effect is currently reaching alarming rates. Its principal cause are Carbon Dioxide (CO_2) emissions from our use of fossil fuels. In the recent years, removing CO_2 from industrial and energy-related sources before it enters the atmosphere has been presented as a promising approach to reduce these emissions. Then, the captured CO_2 may be stored in places like sub-seabed geological formations or underground in geological reservoirs (CO_2 capture and storage – CCS).

An attractive alternative to CO_2 storage is the use of captured carbon as a reagent for producing useful chemicals either through biological, chemical or electrochemical methods (CO_2 capture and utilization – CCU).

So the proposed task is to design a specific process for CO_2 utilization that demonstrates its effectiveness and feasibility at industrial scale.

The process has to be able to lead with an optimum balance between economic, environmental and energetic efficiency and exhibit the flexibility required to operate under different circumstances (variable CO_2 supply and quality).

The proposed alternative should be fully described; the report should at least include:

- A preliminary long-term feasibility study for, at least, 3 clearly different technological alternatives, plus the "reference situation" (i.e.: "not to utilize" → CCS), in order to justify the selection of one of these 3 alternatives to be further detailed.
- A complete quantitative description of the selected alternative: most appropriate technologies, equipment and skills needed, and the main characteristics of the different units to be installed in the "utilization" part of the CCU system (sizes, efficiencies, operating conditions,…)
- Optimum mass and energy balances for the selected alternative at steady state, in a wide range of processing circumstances/scenarios (e.g.: different CO2 availability and/or purity). A flow diagram/superstructure is suggested to represent the optimum performance of the proposed solution along some representative situations from the wide range of circumstances studied, with special emphasis on the identification of the different flow-path(s), if any.
- The technical and cost analysis of the selected alternative, including any aspect you consider relevant to allow a fair comparison among proposals (environmental effects, social performance, controllability, safety,…). For comparison purposes, you should consider some performance indicators like, Net CO_2 emissions, Energetic/Economic/Environmental… costs associated to the kg of CO_2 utilized, etc. This analysis **must include** both short-term and the long-term perspectives,