

**ANNOUNCEMENT FOR
STUDENT CONTEST PROBLEM COMPETITION
2015**

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 **April the 30th 2015, 24:00 CET**. Solutions can be prepared by individuals or by teams.

The jury will select the best solution, 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).

The Award includes:

- One invitation to attend to the 12th PSE and 25th ESCAPE Joint Event, to be held in Copenhagen, Denmark 31 May - 4 June 2015. <http://www.pse2015escape25.dk/> to get the award.
- A money transfer of **1000 EUR**, after the PSE/ESCAPE event, to cover the travel and accommodation expenses.
- The publication of the selected solution at the EURECHA web site.

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 any 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.

Provision of facilities

A small Sheikdom has escaped modernisation for years, largely because nobody could find oil there. The population is about 8,000 with most men working away from home in richer neighbouring states. Fishing is important and farming very limited because of the low rainfall.

Recently things have changed drastically. Oil has been found, wells have been drilled and an oil refinery built. There is also a mooring facility for tankers to load in deep water. This is all about 10 km away from the old town. The nearest airport is 55 km away and a new road has been constructed linking the airport (on one side of the town) to the refinery (on the other side of town).

The Sheikh has some very interesting ideas for his fiefdom. He does not want it to develop like other places in the gulf. He knows that everything will change but he wants to hold onto the old values rather than be overwhelmed by the new. One of his dreams is to create a small but special University where the best scholars in the world can meet and gather. Another is that the desert might bloom. A third is the provision of medical facilities. Above all, he has in mind the wise old Turk from Voltaire's "Candide" who observed that, "Work banishes the three evils of mankind, poverty, vice and boredom."

This project needs to look at the provision of facilities that need to be integrated.

- Provision of electrical power.
- Provision of potable water including water storage and possible integration with the old system of wells.
- Water recycling – including ballast water from oil tankers.
- Production of fertilisers, obviously ammonium nitrate but also potassium and phosphorus as well.
- Production of insecticides.
- Use/sale of methane, ethane/ethylene and LPG which might otherwise be flared by the refinery.
- Growing salad and vegetable crops will need water, fertiliser and insecticides. With the new university the population is expected to rise to 10,000 - 11,000 over the next ten years. The production of fresh food needs to be increased and that includes sea fishing – so preserving the marine environment has high priority.
- The provision of broadband and telecoms can be assumed.
- Existing houses were built/designed to maximise shade and ventilation; this policy is to be continued even though everyone will have air-conditioning.

The project should look at some aspects:

1. Water supply, storage and distribution
2. Water re-cycling and re-use – including ballast water from tankers
3. Power generation – reliability and continuity will be big issues since the only opportunity for a grid-link is with the power station on the oil refinery.
4. Use of methane/ethane/LPG and other gases for power generation. This is likely to involve some gas storage provision.
5. Fertiliser production
6. Insecticide production
7. Other re-cycling – everything that gets brought in will need to be re-cycled in due course.
8. Food – import, production and distribution
9. Sustainability and analysis of overall carbon footprint
10. Provision of emergency services
11. Port facilities and transport infrastructure