

## **EuroTeQ Collider 2023**

### **Theme:**

**Alternative smart concepts to replace gas pressure stations and to reduce emissions**

### **Introduction**

Driven by the challenge of the EU Green Deal, to develop the European Union till 2050 to a climate neutral Union and zero all Green House Gas Emissions, domestic homes, transport systems and industries are aiming to cut their GHG footprint in their business processes and products. Key in this challenge is the search for and application of new technologies, development of new operational processes or other ways of reducing GHG emissions in business processes.

### **Who is behind this initiative?**

GasNet is the operator of the largest gas distribution network in the Czech Republic, providing reliable and secure energy from natural gas supplies for more than 2.3 million customers. With its 65.000 kilometers of gas distribution pipelines, does GasNet cover around 80% of the natural gas distribution in the Czech Republic.

The company's focus is to deliver energy reliably and safely to 2.3 million customers and to support the Czech Republic's decarbonization goals. GasNet targets at carbon neutrality by 2040, this mainly by replacing natural gas by hydrogen and biomethane. To successfully manage this unprecedented transformation process, GasNet will intensely invest not only into the renewal and retrofit of its network, but also into new advanced technologies and apply new work approaches.

### **What is the challenge?**

GasNet operates along its 65.000 kilometers of gas distribution pipelines more than 3.000 pressure reduction stations. These reduction stations make sure, that the natural gas from high- or medium-pressure pipelines is reduced to appropriate lower pressure for local distribution in cities to homes and industries.

Although the pressure reduction is assured today primarily via valves, today's design of regulation stations is rather complex, which includes a wide range of sensors and valves to monitor and regulate its operation, boiler technologies and other technical IT, telco and electric components.

Considering the Joules-Thomson-Effect, natural gas is cooling down when expanded and hence, to avoid damage on equipment and pipelines due to too low temperatures or freezing, the gas needs to be preheated prior pressure reduction.

To improve the design and process of our reduction stations to a next ecological and economical, but less complex level, we look for possibilities of a new process design for regulation stations, which

- solves the intrinsic pressure reduction process in a less complex, less expensive (CAPEX, OPEX) way,
- lowers or even neutralizes the need of pre-heating of the gas.
- considers the fluctuation of the gas flow during the year and over the day

**Interested student teams are asked to engage in the above area by**

- Providing a description of the proposal, as memo and presentation, especially in terms of the technologies and process applied.
- Provide calculations on input/ loss/ output of energy in form of gas and heat and the efficiency of the process.
- Provide calculations on the emission savings due to the alternative process design.
- Provide an assessment, which compares the current process solution with the proposed in matters of technological and economical potential/ risks.

**Relevant considerations for the challenge / theme:**

Challenge the status quo and be open minded.

Provide a clear and profound storyline and assessment to the technological and economic feasibility of the proposed solution design and concept.