

CASE STUDY—KLIMOVA DARIA

Through BRISK2 I visited the Department of Energy technology at KTH Royal Institute of Technology in April 2018.

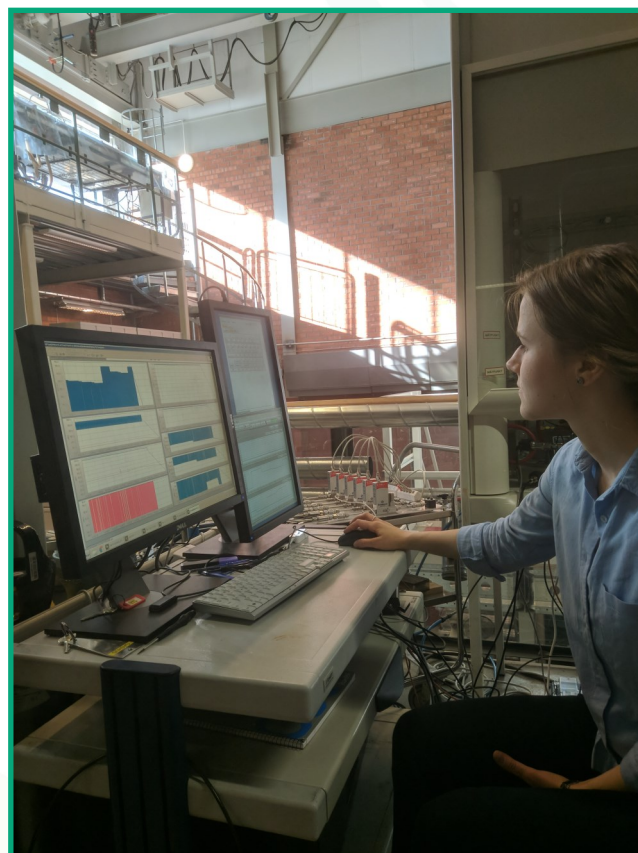
The main purpose of the research visit was to conduct an experimental investigation to confirm a previously proposed theoretical concept—a new method of quality measurement of biogas and upgraded biogases.

The concept of the method is based on the use of low cost sensors available for implementation on the market. The following equipment was used to conduct an experiment:

- Gas-mixing station, which allows preparation of gas mixtures equal to biogas and upgraded biogas.
- NDIR and TCD sensor array. Two sensor types were used as measurement equipment: NDIR for the hydrocarbons and CO₂ concentrations, and TCD for direct measurement of thermal conductivity of the gas mixture.
- Gas chromatograph Varian CP4900 for validation of measured experimental data.

My work during these two weeks was divided in three steps. The first step was “engineering”. This step consisted of equipment adjustment: sensors and chromatograph calibration, chromatograph working temperature and pressure selection, detailed calibration of propane channel of gas-mixing station.

The second step was “experimental”. Gas matrixes were prepared for binary and trinary mixtures with minimal step of 0.5% in order to eliminate the influence of gas-mixing station mixing error. Measurements were held in accordance with gas matrixes. For binary mixtures, chromatograph readings were taken in parallel for validation of gas mixtures received.



Conducting experiments: checking reading of sensor array on new gas mixture

The third step was “analytical”. This step included finding statistical patterns between calorific value and measured data; comparison of values measured by sensors array and gas chromatograph.

The result of the work is successful implementation in experimental investigation and data collected for further processing. After preliminary results analysis, it was found out that NDIR sensors did well with measurements on CO₂ and CH₄ selective channels. The direct mixture thermal conductivity measurement sensor has also shown good results.

Klimova Daria

klimovadr@gmail.com

**Gubkin Russian State
University of Oil and
Gas**

