ABBY-NET E^3-Systems Research Project Update 2019:
#3b/c: The Future of Gas Markets: Conventional vs Renewable Gases

Sebastian Kolb, PhD student
Friedrich-Alexander University of Erlangen Nürnberg (FAU), Dep. of Engineering
email address: sebastian.kolb@fau.de

Research Team:
Supervisor: Prof. Jürgen Karl, FAU, Department of Engineering
Cosupervisor: Prof. Ralf Ludwig, LMU, Department of Geography
Cosupervisor: Prof. J. Bergerson, University of Calgary, Depart. of Chemical Engineering

Project summary

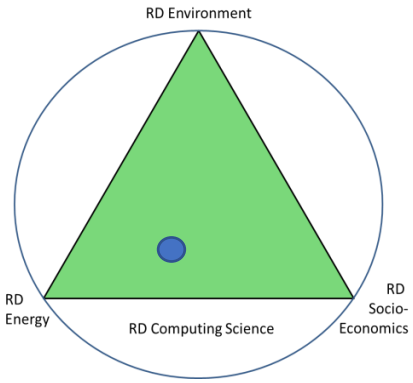
This project addresses the potential future influence of renewable gases on European & German energy/gas markets, the society and the environment based on a system dynamics modelling approach. The main focus lies on a detailed description of the different technological options as well as a realistic mapping of the gas market's behaviour. In doing so, the possible effects of different funding scenarios and quantities on the future gas mix, CO_2 emissions and gas prices can be evaluated. The promising scenarios and process chains are furthermore evaluated regarding their potential social acceptance and their interference with the ecosystems and repercussions for agriculture and land use change. Those results in turn are used in order to readjust scenario parameters in order to find economically, environmentally and socially acceptable pathways.

Progress to date

This project, which has been funded by the German Ministry of Economics, has been successfully completed in 2019. During the last years, there was an intensive cooperation between the German partners from all fields of the E3-system. Furthermore, the project highly benefited from an international/Canadian perspective by means of cooperation in the ABBY-Net framework, for example through student exchanges. For instance, Prof. Joule Bergerson from UofC (Dep. Of Chemical and Petroleum Engineering) co-supervised a Master's thesis undertaken by Katharina Hofmann regarding life cycle emissions of gas production technologies.

Contribution to E3-system and Implications

The project is embedded into a governmentally funded project with partners covering the whole E3-system. It thoroughly addresses each of ABBY-Net's core topics not only by pushing the boundaries of a single discipline like energy system modelling or environmental assessment of certain technologies, but also by evaluating the interference of energy systems, economics, environment and social acceptance. By means of an optimisation algorithm, the project aims to provide a interdisciplinary perspective and find optimal holistic solutions instead of a technological optimum.



Geographic location

The main work was performed in Bavaria. However, as indicated, the methodology, input data, boundary conditions and key findings were discussed with experts from Alberta as well.

Final Outcomes

The project's final report will be published in the upcoming months. The project's results will be published in Sebastian Kolb's PhD thesis. Modelling results were presented at the European Biomass Conference 2019 in Lisboa (DOI: 10.5071/27thEUBCE2019-5BV.3.32). Life Cycle Analysis in collaboration with UofC resulted in a Master's thesis by Katharina Hofmann which can be requested from sebastian.kolb@fau.de