# ABBY-NET E³-Systems Research Project Update 2019: #13a: The Impact of Electric Vehicles on the Energy System of Alberta

**Fabian Hahn, Master student**

Friedrich-Alexander-University Erlangen-Nürnberg, Department of Computer Science, Professorship for Energy Informatics

**Research Team:**

Prof. Dr.-Ing. Marco Pruckner[1], Dr. Joule Bergerson[2], Dr. Ganesh Doluweera[3]

[1]Friedrich-Alexander-University Erlangen-Nürnberg, Department of Computer Science, Professorship for Energy Informatics

[2]University of Calgary, Department of Chemical and Petroleum Engineering

[3]Canadian Energy Research Institute (CERI)

**Project summary**

To assess the impact of EVs on Alberta a study on provincial electricity system level is required that takes into account the changing conditions in the electricity sector and in the transport sector. While EVs reduce the CO2 emissions in the transport sector they are causing additional emissions in the energy sector because of the higher electricity demand. In this way, an evaluation of the overall development of CO2 emissions in Alberta is needed. In order to evaluate the impact of EVs on the energy sector and the transport sector in regards to the environmental impact and the electrical energy consumption, we conducted a simulation study of the Albertan electrical energy system. Thereby, we used an already existing simulation framework which is calibrated to the electrical energy system of Alberta and enhanced by a newly developed EV electricity demand module. Results show interactions between the electricity and transport sector in regards to CO2 emissions and energy balances.
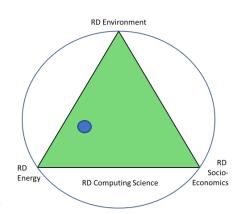
**Progress to date**

This project was completed in May 2018. The main findings of this impact study can be found in the Master Thesis of Fabian Hahn. Currently our research team is working on a journal publication where we want to present the methodological background as well as simulation results of investigated scenarios.

**Contribution to E3-system and Implications**

In this very interdisciplinary research project we are working on the interface of RD Environment and RD Energy by using methods from RD Computing Science. Because of climate change and CO2 reduction policies, the usage of electric vehicles become more and more important. Electric vehicles help reducing CO2 emissions in the transport sector and can reduce the local emissions in big cities drastically. On the other hand, the higher demand of electricity has to be considered in the energy sector. Under the usage of simulation models, we conducted a comprehensive study.



**Geographic location**

In this project, researchers from the Friedrich-Alexander-University Erlangen-Nürnberg, the University of Calgary and the CERI have been working together. Fabian was a master student at Erlangen-Nürnberg, but undertook two research stays at the University of Calgary and CERI.

**Final Outcomes**

[1] Fabian Hahn: A Study on the Impact of a Rapidly Growing Fleet of Electric Vehicles on the Electric Power System in Alberta, Canada; Master Thesis; Friedrich-Alexander-University Erlangen-Nürnberg, 2018.

[2] Fabian Hahn, Ganesh Doluweera, Joule Bergerson, Marco Pruckner: The Impact of Electric Vehicles on the Energy System of Alberta, Transportation Research Part D, 2019 (to be submitted).