Modelling Transition Towards Sustainable Transportation Sector - DTU Orbit (25/12/2018)

Modelling Transition Towards Sustainable Transportation Sector
In a transition towards 100% renewable energy system, transportation sector is rarely dealt with using the holistic approach and measuring its impact on the whole energy system. Furthermore, solutions for power and heat sectors are clearer, it is a tendency of the researchers to focus on the latter two energy sectors. In order to deal with the raised issue, authors of this paper developed a methodology for calculation of the transition towards sustainable transport sector, focusing on the solutions that are already available. Furthermore, as a part of the model, a detailed mapping of resources needed has been carried out for each of the alternatives. It was shown that the electrification of the transportation sector is a crucial point in transition, while for the transport modes that cannot be electrified, or shifted to different transportation modes, four alternatives were defined: synthetic fuels, biofuels, hydrogen and synthetic fuels utilizing excess intermittent electricity generation. Results showed that the 72.3% of the fossil fuel demand in transportation sector of the European Union (EU) can be replaced by electricity demand, reducing final energy demand in transportation sector for 50.6% or 2,051 TWh. All the alternatives for the non-electrified part of transportation suffer from the low well-to-wheel efficiency, resulting in a significant amount of additional resources needed. Replacing remaining part of the fossil fuels by biofuels led to the increased demand for biomass on EU level equal to 3,069 TWh, which is extremely challenging to meet in the future in a sustainable way. In the case of synthetic fuel production as an alternative, additional electricity demand was calculated to be 2,775 TWh, which is approximately 90% of the total electricity demand of the EU for the year 2013. Hence, authors argued that due to the enormous additional demand for scarce resources for producing alternatives to the fossil fuels, concepts such as car sharing, induction charging on highways, promotion of bicycling and public transportations should be assessed in a more detailed way in order to bring additional energy savings in the sector.

General information
State: Published
Organisations: Department of Energy Conversion and Storage, Aalborg University, University of Zagreb
Contributors: Domíkovic, D. F., Bačeković, I., Mýrdal, J. S. G., Pedersen, A. S., Krajačić, G.
Pages: 154-154
Publication date: 2016

Host publication information
Title of host publication: Book of Abstracts : 11th Conference on Sustainable Development of Energy, Water and Environment Systems
Article number: SDEWES.SEE2016.0083
Research output: Research - peer-review » Conference abstract in proceedings – Annual report year: 2016