

Modelling of transport systems in energy system modelling tools

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Background and motivation

This PhD is part of COMETS project, which aims to reach a cost-effective fossil free transport sector in Denmark by 2050. The transport sector is the most complicated sector to undergo changes as it requires both a technological and a behavioural shift.

Objective and challenges

The objective of this PhD project is to extend and to upgrade the existing TIMES-DK economic optimization partial equilibrium model, by developing an advanced representation of the transport sector which includes the behavioral aspect.

In TIMES models the incorporation of modal choice behaviour is an innovative research topic that would allow addressing the transport sector transition integrating technological, behavioural, economical and environmental considerations.

Research questions

- What is the impact of the implementation of modal choice behavior in an energy optimization model?
- What is the best approach for incorporating modal choice behavior in an energy optimization framework?

Method

The transport module of TIMES-DK model will be upgraded within the scope of COMETS. Updated data regarding driving patterns, infrastructure availability and transport demand will be provided by the sectoral transport model LTM. In order to facilitate the data transfer between the two models, a soft-linking interface will be developed. The implementation of modal choice behavior requires the inclusion in TIMES of new attributes, such as modal speed, waiting and transfer time and congestion, which will be taken from the TU survey. Several methodologies for including modal choice behaviour into TIMES-DK will be assessed. Such approaches will be developed into case studies and then compared in order to select the most appropriate one. The possible approaches include the use of the concepts of travel time budget and travel time investment, of stochastic modelling and a new formulation of the TIMES code.

Expected results

This PhD will provide an advanced transportation module in TIMES-DK. The upgraded version of TIMES-DK will be used by Danish Transport Ministry and by Danish Energy Agency as a decision support tool for assessing energy policies to promote the decarbonisation of the Danish energy system by 2050. The inclusion of modal choice behavior will support the relevance of the analyses.



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COMETS PROJECT

