Integrated impact assessment of shares, automated and electric mobility

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ABSTRACT

Major transformations in the road transportation sector such as vehicle automation, electrification, and shared mobility, create opportunities to tackle sector challenges. Despite the promising positive impact, little is known about the real potential and the effective sustainability of a combination oh these emerging mobility systems. The proposed doctoral research plan intends to understand and quantify the environmental and energy-related impacts of shared, fully automated, and electric mobility. A fundamental understanding of the upstream and downstream environmental impacts of a product and a system considering SAEVs fleet adjusted to different travel demands will be conducted in a life cycle assessment (LCA) approach. The assessment of potential environmental impact reduction has always been a research hotspot; however, most studies are only focused on operational impact. Moreover, the impact of SAEVs in the road network considering presence, routing, location, access to charging stations and scheduling will be addressed. Hence, automated driving decisions and distinguishing normal from recurring driving patterns are required to develop a framework for generating an automated mobility service. Attention will be given to the application of SAE mobility both at urban and inter-urban scales. The evaluation of the impacts of emerging mobility systems requires a comprehensive set of criteria. Results of the research intend to culminate into a feasibility study combining environmental, economic, and consumer perspective viability of the examined systems. The main research questions of this study are: 1) Which routing strategies should be adopted for energy-efficient driving decision?; 2) What are the impacts of SAEVs systems through a life cycle concept?; 3) What is the potential of SAEVs to manage traffic demand at urban and interurban scales?

KEYWORDS: automated and electric vehicles (AEVs); shared mobility; life cycle assessment

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