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Abstract:
The world is in need for more environmentally friendly forms of transportation as a contribution to calm global warming. With urbanization being one of the most dominant megatrends, this evolution primarily has to happen in cities, where the heavy usage of cars is responsible for a large share of transport-related CO2 emissions and other negative effects on the environment and human health. Battery electric vehicles (BEVs) are locally emission-free and thus have the potential to contribute to sustainable individual mobility and increase the quality of life in cities by reducing air pollution and noise. However, electric vehicles still show low market penetration, one reason being the higher costs compared to conventional cars. This thesis provides an approach for the city-specific derivation and evaluation of BEV concepts tailored to the local mobility needs of urban residents. With that, a potential oversizing of technical components, in particular of the costly battery, is avoided in order to achieve lowest-possible vehicle costs. The local environmental and economic footprints of these optimized BEV concepts are then evaluated in comparison to conventional cars and hybrids. The presented methodology is applied to derive and evaluate BEV concepts for 24 world cities. The results, inter alia being quantified in the Electromobility Potential Index (EMPI), shall be of help for decision makers in the automotive
industry during the very early stage of the product development process and for local policy makers as an advise if and how to introduce electromobility in their municipalities.