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Titel des Beitrags: Life cycle greenhouse gas analysis for automotive applications – A case study for taxis in Singapore

Abstract: Within a life cycle analysis, we assess greenhouse gas (GHG) emissions and their environmental impact with respect to global warming for four different powertrain technologies. These are vehicles using petrol, diesel and compressed natural gas (CNG) as well as battery electric vehicles (BEVs). First, characteristics are derived for using the vehicles as taxis in Singapore. Then the upstream emissions of fuel and electricity supply are assessed in a well-to-tank (WTT) analysis and combined with the tank-to-wheel (TTW) emissions from fuel combustion in the engine. Electricity is found to cause least emissions per driven kilometre followed by CNG and diesel, whereas petrol ranks worst. The GHG emissions caused by the production of the respective vehicles are also analysed showing that BEVs cause highest emissions mainly due to the necessary battery production. However, after a total life-time mileage of 1.1 million km, the BEV taxi shows lowest emissions followed by the CNG vehicle. A brief sensitivity analysis proves that this result is quite stable and it shows that the vehicle consumption, the emission factor of the electricity generation in Singapore and the cycle stability of the battery have the greatest influence on the overall results.

Stichworte: FTM Smarte Mobilität