2010-01-0832

# A Study of Fuel Converter Requirements for an Extended-Range Electric Vehicle

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**ABSTRACT**

Current focus on techniques to reduce the tailpipe carbon dioxide ($CO_2$) emissions of road vehicles is increasing the interest in hybrid and electric vehicle technologies. Pure electric vehicles require bulky, heavy, and expensive battery packs to enable an acceptable driveable range to be achieved. Extended-range electric vehicles (E-REVs) partly overcome the limitations of current battery technology by having an onboard fuel converter that converts a liquid fuel, such as gasoline, into electrical energy whilst the vehicle is driving. Thus enabling the traction battery storage capacity to be reduced, whilst still maintaining an acceptable vehicle range.

This paper presents results from a drive style analysis toolset that enable US and EU fleet vehicle drive data to be categorised and compared. Key metrics, such as idle frequency, idle duration, vehicle speed, and vehicle acceleration are analysed. Vehicle usage patterns in the US and EU have been compared against each other and to relevant legislative drive cycles.

Based on results from examination of the fleet data, a drive-cycle is selected and used as the basis for analysis of the fuel converter requirements for a hypothetical E-REV based on a typical European C-class vehicle. The influence of drive-cycle and battery pack size on the fuel converter requirement is discussed. Finally, the influence of the fuel converter efficiency upon the new European Drive Cycle (NEDC) fuel consumption of the E-REV is assessed.