

# LCA Prediction of Lithium-Ion Batteries for Electric Vehicles Based on the Paris Agreement

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CO<sub>2</sub> (Carbon Dioxide) emissions during power generation vary from country to country. In this study, based on the Paris Agreement, conducted a life cycle assessment (LCA) to estimate and predict the reduction of CO<sub>2</sub> emissions from lithium-ion battery (LIB) replacement production and traveling over the lifetime use of electric vehicle (EV) from the past to 2050. Currently, hybrid vehicle (HV) is an equivalent to or more environmentally friendly than EV from a lifetime use perspective, however it is estimated that EV will be more environmentally friendly in the future for new EV.

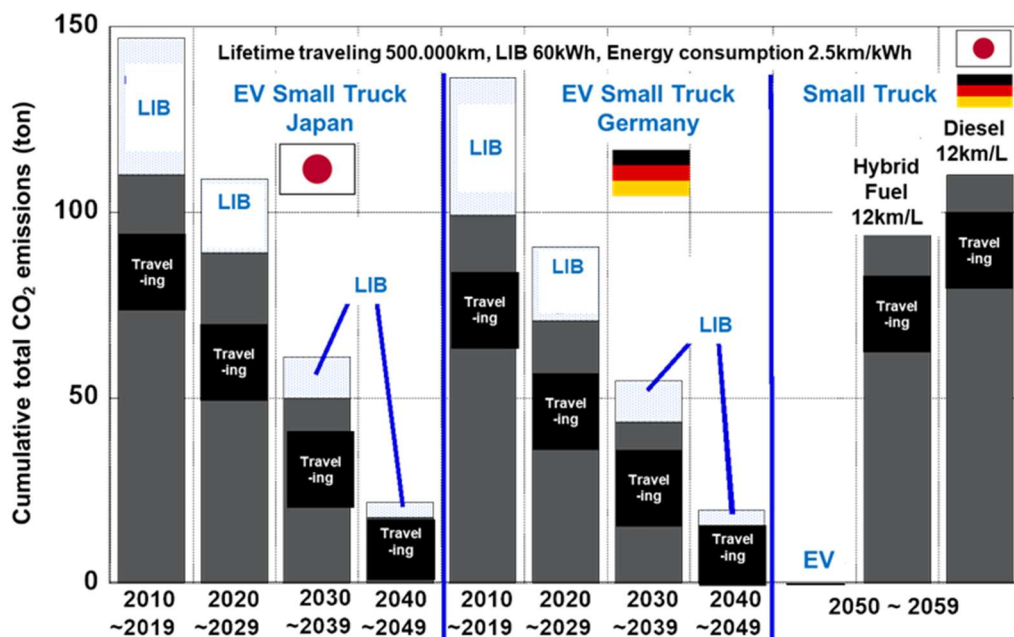


Fig.1 LCA for LIB Replacement and Traveling over Lifetime of Small Truck.

Fig.1 shows LCA projections for LIB replacement and driving time for light-duty trucks in Japan and Germany. It is estimated that in both countries, total CO<sub>2</sub> emissions from LIB and traveling will continuously decrease over the years. Compared to Japan, Germany, with its lower environmental impact during power generation, has a relatively lower lifetime environmental impact (LIB replacement and traveling) for EV small trucks. However, between 2040 and 2049, when zero emissions are nearing completion, the difference in environmental impact between Japan and Germany will almost disappear. After 2050, the environmental impact of LIBs and driving for EV trucks in both countries will be zero. However, for HV and DV trucks, total CO<sub>2</sub> emissions will remain unchanged because they burn fossil fuels in internal combustion engines.