LIFE CYCLE ASSESSMENT(LCA) REPORT FOR eCANTER vs DIESEL CANTER

Reviewed by TÜV Rheinland Energy GmbH

ABSTRACT

In this project, we assessed Product Carbon Footprint of battery electric and diesel Canter trucks through their whole lifetime (raw material extraction, production, use and end-of-life). eCanter shows significant advantages not only in terms of absolute kg CO2eq. but also in terms of reduction potential, especially when electricity grid mix is going through an energy transition towards more renewable & green resources.

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EXECUTIVE SUMMARY

The reference year for the evaluation is 2024.

This study assessed GHG emissions produced by two different technologies for Canter truck: battery electric vehicle (BEV) vs. diesel internal combustion engine (diesel ICE). Both trucks are used for cargo distribution (Light-Duty Trucks - LDT).

Both the new eCanter and the diesel Canter MY24 are highly customizable Light Duty Trucks (LDT). To make comparison between the trucks possible, the selection of the truck models was done carefully making sure the technical specifications were kept as similar as possible.

This study covers the entire life cycle from cradle-to-grave of both the new eCanter & diesel Canter MY24 for **Japan market**. This begins with raw material extraction followed by processing and ends with the end-of-life of the trucks. The functional unit is one truck over the entire life cycle, which is calculated based on a 10-year life cycle and an average distance travelled of 30 thousand km (tkm) per year for a total of 300 tkm.

The investigation results show that BEV powertrain – the new eCanter and its energy supply during use phase are most likely to provide significant GHG emission reductions. eCanter bought today corresponds to GHG emission savings of **8.3% or more** over their life cycle compared to diesel one. However, in future scenarios[1] (2030), we can see significant GHG savings of **38% or more** due to the advancements in electricity generation.

Although the GHG emissions generated through value chain of HV-Battery production are intensive, operating the new eCanter gets repaid (break-even) by the **sixth year of operation** after **162 tkm mileage** in current scenario and **second year of operation** after **59 tkm mileage** in future (2030) scenario.

The saving emissions benefit is due to **JP electricity grid mix** which has a **lower carbon intensity** than combination of diesel production & diesel combustion. It must be noted that the CO_2 intensity of electricity has a large effect on the level of savings that the new eCanter can obtain.

Not only performing better in category of climate change impact, the new eCanter shows **advantages as well as** in **Eutrophication Potential.** If the new eCanter will be charged **by green energy grid mix,** then the **Acidification Potential** will be better than the diesel-driven Canter.

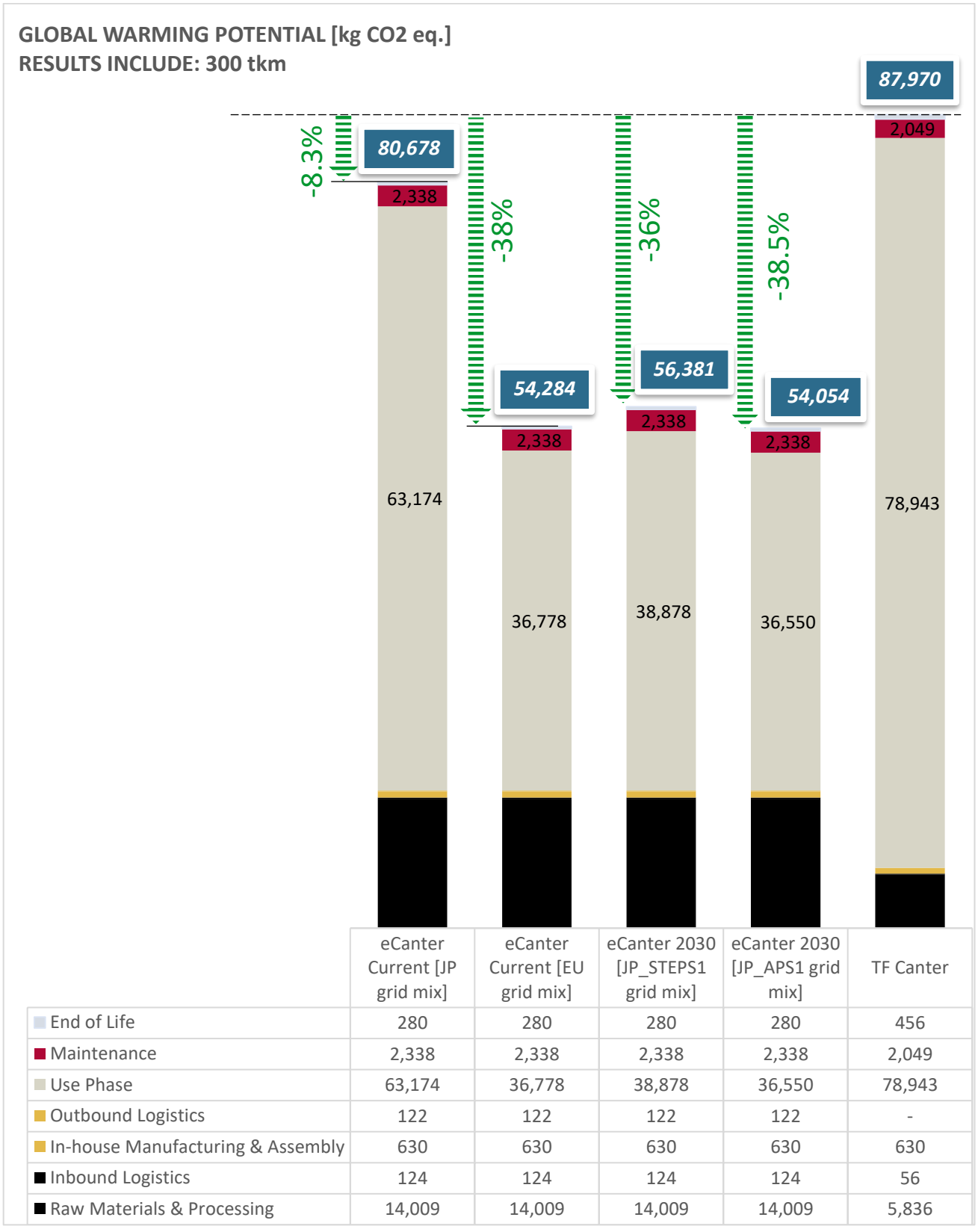
Figure 1 below summarizes the GHG emissions for both trucks throughout their whole lifetime.

This report was prepared in accordance with ISO 14040 and ISO 14044. It provides comprehensive summary for the project documentation, supporting **the verification & critical review, conducted by TÜV Rheinland & Environment GmbH**. This report is written in four main parts:

- Part 1: Goal & Scope
- Part 2: LCA methodology
- Part 3: Daimler Truck LCA model
- Part 4: Results & Interpretation

[1] For future electricity grid mixes, the following scenarios are accounted:
1) "Stated policies STEPS": this scenario represents the outlook based on **just those policies already in place**.
2) "Announced pledges APS": this scenario is derived from the **policies already in place** and those **officially announced**.

Figure 1: GHG emissions (GWP) of the new eCanter & diesel Canter MY24 over their lifetime



	eCanter Current [JP grid mix]	eCanter Current [EU grid mix]	eCanter 2030 [JP_STEPS1 grid mix]	eCanter 2030 [JP_APS1 grid mix]	TF Canter
End of Life	280	280	280	280	456
Maintenance	2,338	2,338	2,338	2,338	2,049
Use Phase	63,174	36,778	38,878	36,550	78,943
Outbound Logistics	122	122	122	122	-
In-house Manufacturing & Assembly	630	630	630	630	630
Inbound Logistics	124	124	124	124	56
Raw Materials & Processing	14,009	14,009	14,009	14,009	5,836