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GREEN WHEELS, GREENER WALLETS: ECONOMIC VIABILITY OF LAST-MILE DELIVERY FLEET ELECTRIFICATION IN CASE OF LATVIA

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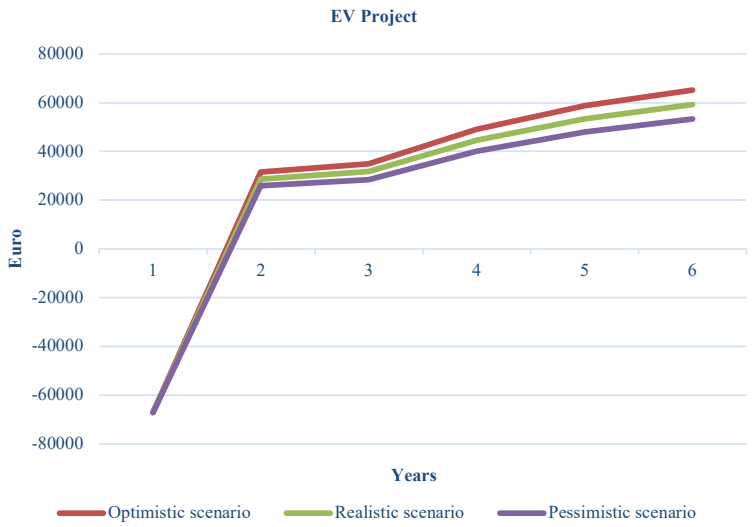
Abstract – The analysis of internal combustion engine vehicle (ICEV) usage habits in *DPD Latvija* and the study of the specifics of its last-mile delivery transport business will allow to understand whether electromobility solutions can make the company more efficient. The question addressed in the research is whether the electrification of the delivery vehicle fleet can reduce transport expenses for the company and under what conditions. For estimation of direct and indirect costs of transport acquisition and usage, Total Cost of Ownership (TCO) is used. The company's daily operation parameters and technical data of the used vehicles VW e-Crafter and VW Crafter 35 Kasten/long base are considered in the study. Net Present Value (NPV) and Internal Rate of Return (IRR) calculation methods are used for analyzing the investment project. The expense of the creation of electrical vehicle charging infrastructure is not considered because the company's daily routine allows to cover all charging processes overnight by using domestic sockets together with Mode 2 chargers. All technical data and calculations were made for deliveries in a city cycle. In financial terms of owning delivery transport, the company is using a 5-year operational lease with 0 % first payment. The obtained results in terms of TCO comparison showed a slight advantage by using EV after 5 years of last-mile delivery service per 1 vehicle – 706.98 euro at 31 200 km a year or 100 km in the working day of 6-day working week (156 000 km in 5 years is under 160 000 warranty condition). The calculation is performed for *DPD Latvija* 213 ICE vans of a total 240-vehicle fleet.



Three different scenarios were considered in the study.

Results of NPV, NPVI, and IRR with a comparison rate of 10.6 % for EV case clearly show a sufficiently good return. The Net Present Value of the solution is 89271.92 euro and the internal rate of return is 48.05 %. The study proves that the electrification of the last-mile delivery company's fleet is economically justified within 5 years. In the process of electrification, the company will reduce its expenses by 1.45 %, which increases the net annual profit by 0.13 %. The main conclusion is that the company will not incur losses by switching to an environmentally friendly vehicle, the capital investment in a realistic scenario pays off already from the 3rd year. Nevertheless, the authors of the study recommend evaluating delivery vehicles with higher driving range parameters, because during peak delivery times and cold seasons, the company may experience unplanned downtime and expenses due to the need for additional charging time at public charging networks on the road, which could lead to financial losses and need for TCO calculation corrections.

Keywords – DPD; E-mobility; fleet electrification; last-mile delivery; total cost of ownership (TCO)