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Publishable Executive Summary

The goal of this LCA study is to evaluate the environmental impact of the electric drive (synchronous machine plus inverter) for Renault Zoe and to determine the influence on the environment of the main components of the traction machine. Withal, some recommendations related to electric machine optimization and suggestions for taking into account the idea of circular economy will be exposed in order to reduce the environmental impact as defined in WP1 [PANDA Koroma 2019].

To carry out this study, the necessary technical data of the studied electric machine were collected from Groupe Renault. For this analysis, the SimaPro v9.1 software was used, as it is one of the most used programs for product's LCA study. The Ecoinvent database, one of the largest databases, was applied in order to complete this study. This database includes data processes for thousands of products, which offers clear information about the impact of each on the environment. The Ecoinvent database is built and based on the International Organization for Standardization (ISO) LCA method (ISO 2006a; ISO 2006b). As the main objective of the Ecoinvent database is to be a transparent and a trustworthy source of Life Cycle Inventory, all data is collected through collaboration with external partners around the globe who have the local, sectorial and methodological expertise, such as research institutes, academia, consultancies or industry associations. After all, data quality is maintained by an accurate validation and review system. Thus, these consistent LCA datasets help to perform LCA analysis and to give credibility to the results [Wernet, 2016].

As impact method for the Life Cycle Impact Assessment phase, the ReCiPe 2016 Hierarchist method was considered, focusing on environmental issues of three categories: human health, ecosystem and resources.

When it comes of production and assembly of electric traction machine, the components with the highest environmental impact are windings, housing, stator and the other parts. The windings have the highest score on each impact category (77.7 % on human health, 87.2 % over ecosystems depletion, respectively 47.1% on resources). The second is the housing with 11.4%, 7.33% and 37.6%.

The LCA indicators can be introduced in the optimization process of the electrical machine and several strategies for circular economy are available to be implemented by the electrical motor producer.

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Table 1. Project Partners

#	Type	Partner	Partner Full Name
1	UNIV	ULille	Université de Lille
2	IND	SISW	Siemens Industry Software SRL
3	UNIV	VUB	Vrije Universiteit Brussels
4	IND	VEEM	VALEO Equipement Electriques Moteur SAS
5	UNIV	UTCN	Universitatea Tehnica Cluj Napoca
6	SME	TY	Tajfun HIL (Typhoon HIL)
7	-	-	-
8	UNIV	UBFC	Université Bourgogne Franche-Comté
9	SME	UNR	Uniresearch BV
10	IND	RTR	Renault Technologie Roumanie
11	SME	Bluways	BlueWays International bva
12	IND	TUV-BT	TüV SÜD Battery Testing GmbH