MANAGEMENT AND PRODUCTION ENGINEERING

MUR DM 118 - Life Cycle Assessment of Batteries for Electric Mobility

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Dipartimento di Ingegneria Gestionale e della Produzione [P.iva/CF:00518460019]
Supervisor	SETTINERI LUCA - luca.settineri@polito.it
Contact	CATALANO ANGIOLETTA RITA - angioletta.catalano@polito.it PRIARONE PAOLO CLAUDIO - paoloclaudio.priarone@polito.it SIMEONE ALESSANDRO - alessandro.simeone@polito.it SETTINERI LUCA - luca.settineri@polito.it
Context of the research activity	This research aims to conduct a comprehensive life cycle assessment (LCA) of batteries used in electric mobility, evaluating their environmental impacts from raw material extraction to disposal, using a cradle-to-grave approach, considering battery manufacturing and demanufacturing, and end-of-life scenarios. In particular, with the use of LCE softwares, lithium-ion batteries will be analyzed. National differences in electricity generation and recycling practices will also be considered. Progetto finanziato nell'ambito del PNRR – DM 118/2023 - CUP E14D23001750006
	Objective: This research aims to conduct a comprehensive life cycle assessment (LCA) of batteries used in electric mobility, evaluating their environmental impacts from raw material extraction to disposal. In particular, the research activity will be focused on the recovery of strategic metals. Methodology: The study will employ a cradle-to-grave approach, considering battery production, usage, and end-of-life scenarios. Data on material inputs, energy consumption, greenhouse gas emissions, and other relevant indicators will be collected. Liithium-ion battery chemistry will be analyzed and regional differences in electricity generation and recycling practices will also be considered. LCA software tools will be utilized to quantify environmental impacts, including carbon footprint, resource depletion, air and water pollution, and

Objectives	including carbon footprint, resource depletion, air and water pollution, and potential human toxicity. A specific focus will be dedicated to the batteries manufacturing and de-manufacturing process. Outcomes: The research will identify hotspots in the battery life cycle, highlighting opportunities for improvement. Findings can inform policy decisions, guide technological advancements, and promote sustainable practices in electric mobility. Significance: This study will contribute to the knowledge base on battery environmental performance, aiding stakeholders in making informed decisions regarding battery selection, design, production and end-of-life management. It will support the transition to more sustainable and environmentally friendly electric mobility systems.

Skills and competencies for the development of the activity	Degree in Engineering. General knowledge on Manufacturing Processes