JUNIA Grande école d'ingénieurs
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L2EP
Laboratoire d'électrotechnique et d'électronique de puissance de Lille

Master project, 2024-2025

— Modeling the Ecological and Economic Costs of Energy Equipment —

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Context

This internship is part of a multidisciplinary research project aimed at creating a design and supervision tool for an energy system that includes an electric vehicle charging infrastructure and hydrogen storage. This tool must consider several constraints to offer the best trade-off in terms of cost and CO_2 emissions during the design phase of the installation. Therefore, it is crucial to assess the ecological and economic costs (carbon footprint) of supervision (installation, use, and end-of-life).

Objective

The general objective of this internship is to integrate Life Cycle Assessment (LCA) and Life Cycle Costing (LCC) approaches when designing an energy system, from system conception to the management of electrical flows (during the production phase). To achieve these objectives, all the equipment components of the system must be differentiated when considering economic and environmental costs: production and storage means, and Information and Communication Technologies (ICT) equipment needed for energy management (sensors, servers, etc.). Databases such as Ecoinvent and ELCD can serve as starting points for this study. The use of Simapro software may also be considered.

Work steps

The main stages of this internship are as follows:

- Scope: Definition of system flows and boundaries (considered equipment)

- Inventory: Research of economic and environmental data of the system's elements

- Conducting the LCA of the equipment and the overall system

- Research and analysis of the relationship between equipment rate and management capabilities/performances to allow for the integration of financial and economic costs into the final management of the system.

- Finally, a formulation of economic and environmental factors as functions for each piece of equipment will need to be done.

Key word

LCA and LCC modeling