

Techno economic study of battery degradation and battery 2nd life

Background

Hitachi European R&D (ERD) ¹ has been involved in R&D project to support Hitachi's initiative on EV fleet decarbonization ²³. ERD team is interested in having collaborative research in the scope of Master Thesis to realize a techno economic modelling of battery degradation and battery remaining value (including 2nd life), keeping in mind impacts of various parameters including e.g. battery characteristics, target applications, battery operation conditions etc. Meanwhile, increasing industrial demands on decarbonization would require integrating estimation of asset carbon emission into business decisions.

Target

Techno economic study is often developed for specific target business model and for specific target applications (e.g. Battery Total Cost Ownership modelling). One common element is battery degradation cost modelling. On the other hand, the improvement of battery technology and battery recycling technology, and the dynamics of battery related business would potentially require EV batteries to be used for various applications (e.g. EV leasing, EV car sharing) during its 1st life, and repurposed/recycled for 2nd life applications (e.g. stationary storage).

The target of the project is to develop a techno-economic modelling of battery degradation cost/and battery remaining value (including 2nd life), with the goal to be used for techno-economic studies of different applications/business models.

OPTIONAL: The student is also expected to do a literature review and report of battery LCA (life cycle assessment) methodology and case studies examples.

Needs

- Review and understanding of battery life cycle cost methodology
- Identification of potential common features of battery LCC as well as its potential reusability to different application-specific techno economic studies
- Design battery LCC modelling considering various potential battery degradation patterns including 2nd life
- Prototype (Matlab, Python, or other) of designed modelling tools
- Battery aging test data (preferably) to calculate degradation trends

The student will be supervised Prof. Michael Hiete (Professur Wirtschaftschemie/Professor of Business Chemistry). The project is expected to start on Jan 2022 or earlier with duration of 6 months. The project will be realized with close collaboration with Hitachi European R&D center at (Schwaig-Oberding, Germany), Sophia Antipolis (France) and London (UK). Student may conduct the project by remote work with in – office visit when conditions allow.

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¹ [Hitachi – European Research & Development](#)

² [Intelligent Fleet Decarbonisation | Hitachi](#)

³ [Hitachi affirms its commitment to carbon reduction | Hitachi in Europe](#)