V2G Potential Across Mobility Archetypes: A Strategy-Differentiated Optimisation for Residential and Workplace Charging

Project description

This project develops an empirical framework to evaluate the economic viability of vehicle-to-grid (V2G) technology across distinct electric vehicle owner archetypes. Using a large-scale household travel diary dataset, mobility archetypes are identified. Each archetype is assigned a contextually appropriate V2G charging strategy (residential charging or workplace charging) based on the observed daily travel patterns.

Our approach to this problem is to apply a stochastic dynamic programming and mixed-integer linear programming dispatch framework to compute net V2G revenue for each strategy after optimisation, accounting for battery degradation costs, state-of-charge constraints before the next day (or travel), and an adherence parameter that can represent realistic user behaviour. The results identify the potential for profitability of V2G across different travel patterns.

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