Assessment of electric vehicle’s lifecycle emission and fleet optimization

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Background:
Electric mobility is playing every day a more significant role in our lives. It helps keep our cities less polluted and largely reduces emissions. It is possible to furtherly reduce these factors in several ways; for example, by freeing ourselves from the concept of a private vehicle and introducing mobility as a service. Fleets of electric vehicles could easily and economically satisfy mobility demands in our cities, while at the same time greatly reducing traffic and pollution. But how much exactly? Is it possible to estimate and optimize the design of a fleet of electric vehicles for minimal Green House Gasses emissions (GHG)?

Project Description:
The student will investigate Life-Cycle Analysis (LCA) methodologies and exploit them to build a mathematical model assessing \( CO_2 \) and other \( GHG \) emissions for each one of the vehicle life-cycle phases: raw material extraction, material production, vehicle production, vehicle use, recycling, and disposal. Finally, the student will perform a sensitivity analysis on the factors influencing the emissions and assemble a parametric model that can be employed in an optimization framework for a fleet of electric vehicles.

Prerequisites:
Knowledge in optimization, analytical and programming skills, life cycle analysis is a plus but not mandatory, initiative and independence.