AN ELECTRIFYING PLAN: ENVISIONING A VEHICLE CHARGING NETWORK

Yassir Alhazmi & Magdy Salama

There's no question: electric vehicles are a greener choice than their gas-powered counterparts, producing less air pollution and greenhouse gases. But a major barrier to their adoption is limited battery range. If drivers want to use electric vehicles for anything more than short commutes or errands around town, they need a network of fast-charging stations.

So how do we go about building an effective one? Over the past few years, WISE researchers Yassir Alhazmi and Magdy Salama examined that question from many angles.

They started by estimating future sales of plug-in electric vehicles (PEVs) in order to predict how demand for charging stations will grow. The duo developed a forecasting model based on variables including gas prices, electricity rates, and government incentives to buy electric vehicles, current charging infrastructure and more.

Step two was developing formulas to determine the optimal locations for charging stations, ensuring drivers are always within battery range of one.

Next, they evaluated the combined impact of fast-charging stations and home charging stations on the grid, making sure the extra load wouldn't create voltage violations, power losses or line loading.

Finally, they turned their attention to economics, developing a phase-in plan to ensure each new station will attract enough drivers to make it economically viable.

The result is a comprehensive model for creating PEV charging infrastructure: one that best serves drivers, creates returns for investors and doesn't overwhelm the electric grid. In other words, a road map to greener transportation.

Researchers: *Yassir Alhazmi and Magdy Salama*

READ FULL PAPER