

Mallika Sharma

Research Statement

Research Overview:

My research is situated at the intersection energy economics and transportation policy, with a focus on electric vehicle (EV) behaviour and charging infrastructure. The EV landscape is consistently evolving and my research revolves around understanding complex electricity market dynamics, public policy instruments, and infrastructural investments influencing the transition to a low-carbon transportation sector. My ongoing research agenda has two main objectives. First, to examine drivers of EV adoption among middle and low-income households, and regions where private charging is not feasible. Two, to explore the drivers of interaction between charging infrastructure and EVs other than the adoption externality.

Beyond my core research, my extensive contributions as a research assistant with major Canadian utilities and economists from University of Calgary and University of Alberta include power analyses, econometric analyses and engagement messaging for large-scale randomized controlled trials on demand-side management and load control. Across all projects, at both professional and academic fronts, I work with high-frequency, high-dimensional datasets to uncover causal relationships that inform the design and evaluation of public policies aimed at accelerating EV adoption and optimizing infrastructure use.

Ongoing research:

- My job market paper, *Network Effects Between Electric Vehicles and Charging Infrastructure*, quantifies how the expansion of public charging networks influences both the extensive and intensive margins of EV charging and driving behaviour. Using detailed vehicle-level charging and driving data from Optiwatt and using IV and FE estimation, combined with spatial data on station density, the paper provides empirical evidence of the effect of charging network expansion on vehicle utilization and public charging frequency. These findings shed light on the behavioural responses to infrastructure growth and offer insights into how network effects shape utilization patterns, with implications for planning and investment in EV infrastructure.
- Another research, *Are the Electric Vehicle Charging Equipment Incentives Worth It?*, evaluates the effectiveness of home and commercial charger rebate programs in driving EV adoption. By combining program data with adoption trends and staggered DID technique, this research identifies the magnitude and heterogeneity of policy impacts, contributing to the broader debate on the cost-effectiveness of commercial and public charging infrastructural subsidies, especially in high population density regions where apartment dwelling is more prevalent.
- The above two studies focus on causal analysis of the efficacy of incentives and EV user behaviour. Another project focused on a statistical analysis, *How Do People Drive and*

Charge Their Electric Vehicles (with Dr. David Brown, Ali Niazi and Dr. Blake Shaffer), explores the behavioural foundations of EV usage, analyzing driving and charging decisions of EVs, which can lay the groundwork for future models of dynamic energy management and grid integration.

- Finally, a policy report *The Value of Timely and Detailed Electricity Data for Energy and Economic Policy Research*, with Dr. Blake Shaffer and Dr. Megan Bailey, emphasizes the importance and governance of granular, accessible energy data as a critical public good for credible policy evaluation.

Future plans

My research aims to bridge empirical economic analysis with actionable policy for a sustainable energy transition. I employ reduced-form econometrics, quasi-experimental methods, and large-scale data to study the intersection of clean transportation and electricity markets. Building on my current work, I plan to extend my research on EV charging mechanisms towards pricing strategies at public charging stations to incorporate, one, incentives for charging at off-peak periods at public stations, and two, incentivize managed charging at peak demand periods. A central objective is also to identify policy reforms to encourage EV adoption among middle-income households and in dense urban regions where private charging is not feasible.

I plan to deepen my work on how pricing and investment frameworks can align charging behaviour with cleaner grid generation. This includes evaluating network expansion strategies, tariff design, and incentive structures that support equitable and efficient electrification. Beyond EVs, my future will explore the integration of renewables into electricity markets—specifically, how storage, flexible demand, and grid coordination can enhance the value of intermittent generation. By connecting insights across EV adoption, demand-side management and integrating EV load with renewable variability, my long-term goal is to advance empirically grounded strategies that support grid-aligned EV adoption, efficient renewable deployment, and resilient energy systems.