

JOINT TRANSPORTATION RESEARCH PROGRAM

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Electric Vehicles: Public Perceptions, Expectations, and Willingness-to-Pay

Introduction

Indiana will receive approximately 100 million dollars from the federal government to build electric vehicle (EVs) charging stations by 2026. This investment is anticipated to accelerate EV adoption in the state, but the public perceptions of EVs for both EV users and non-EV users was unknown. The objective of this project aims was to inform INDOT on the following topics.

1. The adoption, incentives, and barriers to EV use in Indiana.
2. Public charging preferences among different groups and their willingness-to-pay (WTP) for different charging types.
3. Trip information for EV users and future EV demand predictions.

To achieve these goals, an online stated preference survey of Indiana adult residents was conducted, and a total of 1,217 valid responses were collected.

Findings

- Indiana EV users are predominantly male, middle age, high income, live and work in urban areas, and identify as Democrats. Generally, the EV is the most used car in their household, and EV users have a positive feeling about their vehicles. Tesla is the most common EV brand in Indiana, followed by Chevrolet, Kia, and Nissan. Most of the EV users own their vehicle instead of leasing it.
- Non-EV users are more likely to adopt an EV in the long term than in the short term. Their likelihood to

purchase an EV increases over time, while the likelihood to lease one remains constant.

- Most survey respondents prefer used EVs due to their lower cost and are apprehensive about investing in a technology they are not familiar with. However, participants who prefer a new EV attribute it to the better performance of new EVs and their general inclination to buy new vehicles independent of the engine type.
- Incentives related to the purchase of EVs are more recognizable than the ones related to charging. Almost half of the sample agree that EV incentives would make them more willing to adopt an EV.
- The main barriers pointed out by non-EV users to not having an EV is the purchase price, access to home charging, and the inconvenience of charging.
- Non-EV users are less aware of charging technologies, prefer shorter driving distances to charge, and are less inclined to use public charging stations.
- Home charging is a vital component for EV users. Conversely, non-EV users appear to have more range anxiety, which greatly affects their willingness to use EVs for trips.
- EV users are more likely to choose direct current fast charging (DCFC), followed by DWPT and Level 2 charging. Non-EV users prefer Level 2, DCFC, and DWPT, in this order.
- EV users are willing to pay around \$9.44 (median) and \$2.93 (mean) per hour to reduce

waiting times at Level 2 charging stations, while non-EV users are willing to pay approximately \$86.97 (median) and \$20.72 (mean) per hour to reduce it. For reducing charging time at DCFC stations, EV users' WTP is estimated at \$21.73 (median) and \$6.73 (mean) per hour, while non-EV users are willing to pay \$30.04 (median) and \$7.16 (mean) per hour. Finally, non-EV users expressed a WTP of an extra \$4.10 (median) and \$0.98 (mean) for amenities, such as restrooms, at DCFC stations.

- EV trips are predominantly concentrated in urban areas or along highways. Of these trips, 50% were short distance and related to retail and catering.
- The generated synthetic dataset aligned with real-world data, predicting future EV demand for the next 8 years. In optimistic scenarios, the number of EVs increases by 18 times the 2023 levels, while in pessimistic scenarios, it doubled.

Implementation

This project prepares INDOT and other stakeholders for the increased EV adoption that will follow the deployment of charging stations across the state. The EV demand prediction provides several future scenarios of EV adoption in Indiana. To foster EV adoption, promotion of EV incentives, particularly those related to charging, are strongly recommended. Additionally, test drive and EV ride programs can address some barriers to EV adoption, such as lack of familiarity with the technology. Workforce programs focused on used EVs may become necessary due to the expected increase in

demand for these vehicles in the future.

Charging stations should not be restricted to deployment; they should also focus on increasing the number of charger ports. This strategy has the potential to reduce range anxiety and queueing time. Furthermore, amenities at public charging stations can make them more appealing to drivers and their passengers. Segmented education about the different charging technologies is also recommended, especially if DWPT options emerge. Lastly, the synthetic dataset provides impact simulations of various policy adjustments or incentives on EV adoption rates. By understanding how changes in policies (such as increased subsidies, tax incentives, or expanded charging infrastructure) influence user behavior, INDOT, policymakers and EV stakeholders can make data-driven decisions to optimize the impact of these investments across Indiana.

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