FINANCIAL ANALYSIS OF ELECTRIC VEHICLE CHARGING STATIONS: A CAPITAL BUDGETING APPROACH

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Overview

The accelerating adoption of electric vehicles (EVs) has created a pressing need for the development of additional charging infrastructure. This study evaluates the financial viability of EV charging stations in the United States using capital budgeting metrics, including net present value (NPV), internal rate of return (IRR), and payback period. While previous studies have explored the economic feasibility of charging stations (see Kim et al., 2022 and Bernal et al., 2024), this research employs a capital budgeting approach to evaluate the economic viability of charging stations. By analyzing case studies from various U.S. regions, the study incorporates factors such as installation costs, charging prices, tax credits, and barriers to entry. The goal is to guide policy and charging station implementation by optimizing pricing strategies, leveraging subsidies, and reducing economic challenges associated with infrastructure deployment.

Methods

The study, which is still in progress, is focused on evaluating the profitability of EV charging stations using an NPV analysis under various scenarios. To support this primary analysis, key financial metrics such as the IRR and payback period are also being incorporated. Adopting a capital budgeting perspective, the study emphasizes critical factors, including the weighted average cost of capital, the methodology for calculating free cash flows, and the identification of capital sources specific to this investment type, along with their associated costs. A sensitivity analysis will further explore the effects of crucial variables—such as electricity prices, utilization rates, discount rates, and government subsidies—on the financial performance and sustainability of EV charging stations. Data is being sourced from case studies, legislative documents, and economic reports to ensure a comprehensive and robust modeling approach.

Results

This study is still underway, and the results are forthcoming, However, preliminary findings suggest that EV charging stations are unlikely to achieve economic sustainability without substantial government involvement or subsidies. This heavy reliance on external financial support highlights the limitations of current business models in the absence of public funding. These insights may prompt a reevaluation of local and federal policies to address structural barriers and promote the long-term viability of EV charging infrastructure. Collaborative models, such as public-private partnerships, show promise in distributing risks and effectively utilizing subsidies. Additionally, strategic tiered pricing schemes and consistent utilization rates are expected to be critical for profitability.

Conclusions

This study illustrates the importance of government policy and strategic pricing in overcoming financial and operational barriers to EV charging infrastructure. Although current subsidies and tax credits provide essential support, long-term viability will depend on innovative solutions to reduce costs and improve utilization rates. Findings from this study will provide valuable insights to policymakers, investors, and industry leaders in devising effective approaches to scale EV charging infrastructure and address the evolving challenges of sustainable transportation.

References

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