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Publication Date

2025-11-11

Peer reviewed



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Published in *Elgar Encyclopedia of Transport
and Society*,
Chapter 67, Pages 136-137
<https://doi.org/10.4337/9781035330522-00072>

Preprint
November 2025



UNIVERSITY OF CALIFORNIA *Berkeley*
Transportation Sustainability
RESEARCH CENTER



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Pre-print

**Published in Elgar Encyclopedia
of Transport and Society**

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The transition toward electric vehicles (EVs) represents a pivotal shift in transportation technology, promising significant environmental benefits through reduced greenhouse gas emissions and decreased dependence on fossil fuels. However, the integration of EVs presents unique challenges and opportunities within the context of social equity. EVs have emerged as a key technology in the evolution of transportation, with their history tracing back to the late nineteenth century. Despite early developments, the dominance of internal combustion engine vehicles throughout the twentieth century limited EV technological development and widespread adoption. In recent years, however, advancements in battery technology, policy incentives, and growing environmental awareness have positioned EVs as a central component of sustainable transportation strategies. Concurrently, social equity in transportation has gained prominence, with an increasing recognition of the disparities in access, affordability, and environmental impact of transportation systems. The integration of EVs into the transportation network thus occurs at a critical juncture, where technological innovation meets a growing imperative for social justice.

One of the paramount barriers to equitable EV adoption is the accessibility of charging infrastructure (including reliability and charging costs), which tends to be disproportionately distributed, favouring urban and economically affluent areas over underserved communities (Hardman et al., 2021). This disparity undermines the feasibility of EVs as a transportation option for individuals in underserved regions, perpetuating existing mobility inequities. Moreover, EV costs, despite decreasing battery costs, remain elevated compared to conventional vehicles, rendering economic incentives such as tax rebates and grants less effective for lower-income individuals who cannot surmount the initial price barrier (Guo & Kontou, 2021). Consequently, the economic and environmental benefits of EV ownership—including reduced fuel and maintenance expenses—are not equitably accessible. Environmental justice further confounds the narrative, with underserved communities disproportionately bearing the brunt of transportation-related pollution, leading to higher rates of respiratory

diseases and other health issues as a consequence (Bullard, 2003). EVs offer a potential remedy to this injustice by reducing vehicle tailpipe emissions, but the full realisation of these benefits requires equitable adoption of EV technology, ensuring that clean transportation options are available to those who have been most affected by transportation pollution (Sheller, 2023).

Policies and initiatives at various government levels have begun to address this nexus between EV adoption and social equity (Haddadian et al., 2015). Beyond promoting personal EV ownership through targeted subsidies for low-income buyers, these efforts extend to the electrification of shared mobility options, incentivizing the shift toward EVs in transportation network companies (also known as ride-hailing and ride-sourcing), taxis, and car-sharing services. Investments in charging infrastructure in underserved areas and programmes designed to increase awareness and EV accessibility among these communities are complemented by support for electric last-mile delivery vehicles and community-based EV car-sharing programmes. These multifaceted initiatives aim to reduce emissions and enhance mobility for those with limited personal vehicle access. While these efforts mark significant progress, the pace and scale of initiatives vary widely, with many regions lagging behind in creating inclusive EV adoption strategies. This underscores the importance of diversifying strategies to encompass a broader spectrum of transportation needs, ensuring that the benefits of electrification reach all segments of society. Navigating the pathway to equitable EV integration entails addressing technical, economic, and social barriers (Egbue & Long, 2012). The establishment of an extensive, reliable, and affordable charging network, for instance, poses significant logistical and financial challenges. Economic considerations encompass the allocation of investments and the equitable distribution of benefits and costs, whereas social and cultural resistance to technological transitions can impede widespread acceptance. Addressing these challenges necessitates a multidimensional approach that combines

technological innovation with proactive social policy.

The future trajectory of EV integration within a social equity framework (e.g., Spatial—Temporal—Economic—Physiological—Social (STEPS) framework for equity, Shaheen et al., 2017) is contingent upon the adoption of innovative policies that prioritise inclusivity (e.g., purchase incentives, access to charging infrastructure, etc.). Refined financial incentives are crucial to making EVs accessible to a broader demographic, especially those with more limited financial resources. Equally important is the expansion of charging infrastructure with an emphasis on accessibility for all communities (reliable and affordable), particularly those underserved by existing transportation options. Furthermore, community engagement and education are pivotal in fostering acceptance and understanding of EV benefits, thereby facilitating adoption across diverse societal segments. Looking ahead, the integration of EVs within a social equity framework requires ongoing research to identify best practices and innovative transportation strategies. Emerging technologies, such as battery improvements and automated vehicles, offer new opportunities for enhancing accessibility and affordability (Shaheen et al., 2018). At the policy level, a more cohesive and coordinated approach among stakeholders—ranging from governmental agencies to EV manufacturers and community-based organisations—is essential for addressing the complex challenges at the intersection of EV technology and social equity.

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