

Zero-Emission Buses in the US: Understanding and Addressing Market and Policy Challenges

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Leah Foecke Zachary Karson Thomas Tiberghien



Introduction

Zero-emission buses (ZEBs) are a category of buses that produce no tailpipe emissions, contributing to cleaner air and reduced environmental impact. While the last three decades have seen significant transformation of transit bus fleets to cleaner fuels, ZEB technology has proliferated within the last 5-10 years. As the United States accelerates its transition to ZEBs within the public transportation sector, both opportunities and challenges have emerged, requiring careful consideration by policymakers, transit agencies, industry, and other stakeholders. This report provides an updated analysis of the U.S. transit bus market, focusing on the dynamics of the ZEB manufacturing industry and the obstacles hindering widespread adoption of ZEBs.

Study Methods

The research utilized a mixed-methods approach to gather and analyze data. A series of semi-structured interviews and informal conversations were conducted with policymakers, transit agencies, manufacturers, and industry experts to capture a wide range of

perspectives. Additionally, an extensive literature review was undertaken, encompassing industry publications, transit agency ZEB rollout plans, and policy reports. The analysis also included a review of relevant U.S. public transit data from the Federal Transit Administration's National Transit Database and the American Public Transportation Association. This multi-faceted approach allowed the research team to triangulate findings and ensure a robust understanding of the challenges and opportunities in the ZEB transition.

Findings

The study identified several key challenges that transit agencies face in adopting ZEBs. First, the high purchase prices of ZEBs, coupled with uncertain total cost of ownership savings, pose significant financial barriers. The ZEB market is also highly consolidated and unstable, with recent disruptions leading to limited supplier options and long lead times for vehicle delivery. Operational challenges, including the complexity of new technologies and the need for specialized infrastructure, further complicate the

transition. Also, while federal and state policies have been instrumental in driving ZEB adoption, stringent regulations also contribute to market challenges.

The U.S. ZEB market is highly consolidated and unstable, creating significant challenges for transit agencies in procuring reliable and affordable zero-emission buses.

Policy Recommendations

The transition to zero-emission buses is crucial for reducing greenhouse gas emissions and improving air quality, particularly in densely populated urban areas. This shift supports sustainability goals, helping to mitigate climate change and promote public health. The results from this study suggest several solutions for policymakers and transit agency practitioners to support the successful deployment of ZEBs. Policymakers could consider more holistic and innovative funding program designs to encourage volume purchasing, regional collaboration, reduced customization, and optimization of total cost of ownership. The ZEB transition will require strategic action and coordinated efforts across multiple levels of government, and between policymakers, industry, advocates, and other stakeholders. By strengthening these partnerships to address ZEB-specific challenges, the sector will be better positioned to overcome an even broader set of issues affecting the future of public transit in the U.S. that goes beyond just fleet transition. More robust partnerships can help address supply chain challenges, invest in research and development, collect and analyze ZEB performance data, and more thoughtfully allocate key risks associated with transition. Policymakers could also facilitate the availability and use of supporting technologies, data and learnings to smooth the transition for transit agencies, improving operational efficiency and enabling cost-effective maintenance even in remote locations. Finally, policymakers could implement new initiatives to upskill and reskill workers for this next generation of zero-emission mobility, with dedicated programs focused on public transit. The need to accelerate the ZEB transition is urgent, and meaningful market and policy shifts will likely be required to achieve these goals.

About the Authors

Leah Foecke is a Manager at Rebel with a background as an economic consultant and policy advisor and expertise in zero-emission transition and public-private partnerships.

Zachary Karson is a Manager at Rebel with a background in renewable energy and finance and expertise in market analysis, public procurement and transportation policy.

Thomas Tiberghien is a Consultant at Rebel with a background in international development and expertise in quantitative research methods.

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For more details about the study, download the full report at transweb.sjsu.edu/research/2218



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