

Editorial

Towards a sustainable future: The decarbonization of transport

Akii A. O. Ibadode¹ & Collins E. Etin-Osa²

Affiliation

^{1, 2}Department of Production Engineering, University of Benin, Benin City, Nigeria.

***For correspondence: email:** ibhadode@uniben.edu¹, etinosa.eruogun@uniben.edu²

Abstract

This themed edition of the Proceedings of the Nigerian Academy of Science delves into the pivotal topic of transport decarbonization, a critical component in the global strategy to combat climate change and promote environmental sustainability. It amalgamates a rich tapestry of research, case studies, and policy analyses focused on the multifaceted challenges and opportunities inherent in transitioning to a low-carbon transport system. Key areas of discussion include the complexities of electric vehicle (EV) adoption, the potential for invigorating local manufacturing sector through EV and e-bike production, the transformative impact of removing fuel subsidies on the uptake of solar power, and the intricate policy landscapes that underpin transport decarbonization efforts. By spotlighting Nigeria's unique context, from its policy strides to innovative local initiatives, this edition not only contributes to the academic discourse on sustainable transport but also aims to inspire actionable insights and collaborative efforts towards achieving a decarbonized transport future. This compilation seeks to foster a deeper understanding of the interplay between technological innovation, policy frameworks, and community engagement in driving the shift towards sustainable mobility solutions, with the hope of catalyzing further research and implementation of sustainable transport systems globally.

Keywords: *Decarbonization, electric vehicles (EVs), sustainable mobility, policy and innovation.*

Introduction

The decarbonization of transport refers to the global shift towards reducing and eventually eliminating carbon dioxide (CO₂) emissions and other greenhouse gases (GHGs) produced by vehicles and infrastructure involved in the movement of people and goods. This monumental shift not only encompasses the transition to electric vehicles (EVs) but also involves innovations in public transport systems, non-motorized transport, and the integration of sustainable practices in logistics and urban planning.

The imperative for decarbonization

Transportation is a major contributor to global CO₂ emissions, accounting for about a quarter of all GHG emissions [European Commission, 2020]. The urgency to decarbonize transport is underscored by the escalating climate crisis, evidenced by rising global temperatures, extreme weather events, and diminishing biodiversity [UNFCCC, 2015]. Decarbonizing transport is not merely an environmental imperative but a societal and economic one. It promises cleaner air,

reduced noise pollution, enhanced energy security, and an overall improvement in the quality of life.

Global and regional efforts in decarbonization

The global perspective

From the Paris Agreement's ambitious climate goals to countries laying down national strategies for slashing transport emissions, the global momentum is undeniable. The International Energy Agency (IEA) maps a path to a net-zero emission transport sector by 2050, spotlighting electrification, alternative fuels, and innovative mobility solutions as the way forward [IEA, 2020].

Regional responses

Europe leads with rigorous emissions standards and investments in greener transport alternatives, targeting a dramatic 90% cut in transport emissions by 2050 [European Commission, 2020]. Meanwhile, the challenges faced by developing regions, including infrastructure deficits and economic constraints, are being met with initiatives like Africa's Sustainable Transport Forum, which fosters sustainable mobility and regional collaboration [WHO, 2021].

Nigeria's strides toward greener transport

Amidst its unique challenges, Nigeria is taking significant steps towards a sustainable transport future.

- **National Policies:** Nigeria's commitment to the Paris Agreement, aiming for a substantial reduction in GHG emissions by 2030, is shaping its transport sector's transformation. The development of an Electric Mobility Policy marks a proactive move towards embracing EVs, showcasing a commitment to reducing fossil fuel dependence [Nigeria's National Determined Contributions, (2022)].
- **Regional Cooperation:** Engaging in regional dialogues and partnerships, Nigeria is part of broader African efforts to adopt eco-friendly transport solutions [Dioha *et al.*, 2022].
- **Innovative Local Initiatives:** From Lagos's Bus Rapid Transit (BRT) system, which has already made a dent in the city's carbon footprint, to pioneering solar-powered electric bikes, local projects underscore the potential for scalable, sustainable transport solutions [Osoja *et al.*, 2023].

Zooming in: Actions and innovations

- **Policy and Legislative Frameworks:** The impact of governmental policies, as seen in Norway's EV incentives and California's gasoline car sales ban, underscores the power of regulatory support in driving change [IEA, 2023].
- **Technological Breakthroughs:** The path to decarbonization is paved with innovation. Advances in battery technology, hydrogen fuel cells, and digital traffic solutions are making sustainable transport both viable and economical [Dioha *et al.*, 2022].
- **Community Engagement:** Changing transportation habits starts with awareness. Public campaigns encouraging carpooling, public transit use, and biking are essential in fostering a culture of sustainability [NESG, 2023].

Challenges and opportunities

Globally, despite significant progress, challenges remain. These include the high upfront cost of EVs, the need for extensive charging infrastructure, and the environmental impact of battery production. A peculiar challenge for most developing countries such as Nigeria is the poor

availability of grid electric power; EVs will put a increased pressure on electric power demand for such countries requiring greater investment on power infrastructure including off-grid systems. Yet, these challenges beckon opportunities for creativity, investment, and global cooperation, particularly for developing countries. By navigating their specific hurdles, from infrastructural gaps to fostering public buy-in, these countries can carve paths that advance green transport.

Conclusion

The decarbonization of transport is a complex but achievable goal. It requires a multifaceted approach, combining policy, technology, and behavioral change. As we advance, it is crucial to ensure that the transition is inclusive, addressing the needs of all sectors of society. The journey towards a decarbonized transport system is not just about reducing emissions; it is about creating a more sustainable, healthy, and equitable world.

This themed edition of the Proceedings of the Nigerian Academy of Science, Decarbonization of Transport, is an addition to the body of knowledge on this journey to attaining the decarbonization of transport. It presents discussions on EV adoption challenges, and opportunities for local manufacturing, conversion of conventional bike to e-bike, impact of fuel subsidy removal on solar power adoption, and policy issues on transport decarbonization. It is hoped that this edition of the Proceedings will engender more work in achieving sustainable transport solutions.

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