GLOBAL MULTIDISCIPLINARY PERSPECTIVES JOURNAL

Reducing U.S. Oil Dependency Through Electric Vehicle Adoption

Joseph R Pitt [1*], Ramteen Sioshansi [2], Shanzida Kabir [3], Mike Mills [4]
[1] Centre for Atmospheric Science, The University of Manchester, Manchester, M13 9PL, UK
[2] Department of Agricultural, Environmental, and Development Economics, The Ohio State University, Columbus, OH 43210, USA
[3] Department of Economics & Business, East West University, Dhaka, Bangladesh
[4] University of California, Irvine, Irvine, California 92697, USA

* Corresponding Author: **Joseph R Pitt**

Article Info

ISSN (online): 3107-3972
Impact Factor (RSIF): 8.08
Volume: 03
Issue: 01
Received: 29-12-2025
Accepted: 01-01-2026
Published: 02-02-2026
Page No: 84-88

Abstract
Electric vehicle adoption presents a strategic opportunity for the United States to reduce oil dependency and enhance national security. Although domestic petroleum production has increased, the transportation sector remains highly exposed to global oil price volatility, supply disruptions, and geopolitical risks. By shifting transportation energy demand from petroleum to domestically generated electricity, electric vehicles improve energy diversification and resilience. This article examines the roles of charging infrastructure development, grid integration, and technological advancement in accelerating EV adoption, while also addressing emerging challenges such as critical mineral supply chains, cybersecurity vulnerabilities, and equity considerations. The findings highlight electric mobility as not only an environmental initiative but a critical component of long-term U.S. energy security and strategic autonomy.

DOI: https://doi.org/10.54660/GMPJ.2026.3.1.84-88

Keywords: EV Adoption Reducing US Petroleum Import Dependency National Security

1. Introduction

For decades, the United States has grappled with the strategic implications of oil dependency. Despite becoming a net petroleum exporter in recent years, the nation remains vulnerable to global oil price volatility, supply chain disruptions, and geopolitical tensions in oil-producing regions. The transportation sector accounts for approximately 68% of total U.S. petroleum consumption, with light-duty vehicles representing the largest share (U.S. Energy Information Administration, 2024) [12]. This concentration of petroleum use in transportation creates economic vulnerabilities and constrains foreign policy options when addressing conflicts in oil-rich regions.

Electric vehicles present a transformative solution to this challenge. By shifting transportation energy demand from petroleum to electricity—which can be domestically generated from diverse sources including natural gas, renewables, and nuclear power—EVs fundamentally alter the national security calculus. This transition represents more than technological innovation; it embodies a strategic reorientation toward energy autonomy and resilience.

Recent research has illuminated critical factors influencing EV adoption and infrastructure development. Understanding customer expectations and purchase intentions provides essential insights into market dynamics (Adil Shah, Tarannum, Mahmood, & Kabir, 2026) [5], while infrastructure deployment directly impacts adoption rates and market stability (Shah, Bhowmik, & Kabir, 2026) [7]. Furthermore, the development of ultra-fast charging networks contributes to U.S. competitiveness in global electric mobility markets (Adil Shah, Mahmood, & Kabir, 2025) [1].

This article explores how accelerating EV adoption strengthens national security by reducing oil dependency, examining the technological, infrastructural, economic, and policy dimensions of this transformation.

2. Oil Dependency and National Security Vulnerabilities

2.1. Historical Context

American oil dependency has shaped foreign policy and military strategy since the mid-20th century. The 1973 oil embargo demonstrated how petroleum supply disruptions could inflict severe economic damage, triggering recession and exposing vulnerabilities in energy supply chains. Subsequent decades witnessed military engagements partly motivated by securing access to petroleum resources, illustrating how oil dependency influences strategic decision-making and constrains policy options.

2.2. Contemporary Security Implications

Despite increased domestic production, the United States remains exposed to several security risks stemming from oil dependency:

Economic Vulnerability: Oil price volatility transmits shocks throughout the economy, affecting consumer spending, inflation, and economic growth. Price spikes driven by geopolitical events—such as conflicts in the Middle East or supply disruptions—impose costs on consumers and businesses while constraining monetary policy options.

Geopolitical Constraints: Dependence on global oil markets necessitates maintaining relationships with oil-producing nations, potentially conflicting with other foreign policy objectives. This dependency can limit responses to human rights violations, regional conflicts, or authoritarian governance in strategically important oil-producing countries.

Supply Chain Vulnerabilities: Global petroleum supply chains face risks from terrorism, piracy, natural disasters, and political instability. Critical chokepoints such as the Strait of Hormuz, through which approximately 21% of global petroleum passes, represent single points of failure with potentially catastrophic consequences.

Military Operational Constraints: The U.S. military consumes vast quantities of petroleum, creating logistical vulnerabilities and operational constraints. Fuel supply lines represent targets for adversaries, while petroleum dependence increases the military's exposure to price volatility and supply disruptions.

2.3. Climate Security Nexus

Beyond traditional security concerns, climate change driven partly by fossil fuel combustion represents an emerging threat multiplier. Climate-induced migration, resource scarcity, extreme weather events, and ecosystem collapse create instability that threatens both national and international security. Reducing petroleum consumption through EV adoption addresses both energy security and climate security simultaneously.

3. Electric Vehicles as a Strategic Solution

3.1. Energy Diversification and Domestic Production

Electric vehicles fundamentally transform transportation energy by replacing petroleum with electricity generated from diverse domestic sources. The U.S. electricity grid draws on natural gas (approximately 43%), renewables (21%), nuclear (19%), and coal (16%), with renewable shares steadily increasing. This diversity enhances resilience, as disruptions to any single fuel source have limited system-wide impacts.

Critically, electricity generation occurs predominantly within domestic borders, utilizing domestic fuel sources. This geographical concentration of energy production contrasts sharply with petroleum's global supply chains, reducing exposure to international disruptions and geopolitical tensions.

3.2. Reducing Petroleum Demand

Widespread EV adoption would substantially reduce petroleum consumption. The International Energy Agency projects that achieving net-zero emissions by 2050 would require approximately 300 million EVs globally by 2030, with the United States contributing significantly to this total. At scale, EVs could displace millions of barrels of oil per day from U.S. consumption, fundamentally altering supply-demand dynamics and reducing vulnerability to price shocks. Moreover, reduced petroleum demand decreases revenue flows to potentially adversarial or unstable oil-producing nations, potentially altering geopolitical power dynamics. While this shift creates new dependencies—particularly regarding critical minerals for batteries—these supply chains are more diversifiable and less geographically concentrated than petroleum resources.

3.3. Grid Integration and Resilience

Research demonstrates that integrating EVs with electricity grids can enhance rather than undermine grid stability when properly managed (Shah, Kabir, Razib, & Khan, 2024) [8]. Vehicle-to-grid (V2G) technologies enable EVs to serve as distributed energy storage resources, providing services such as frequency regulation, demand response, and backup power during outages. This bidirectional energy flow transforms EVs from simple loads into grid assets, potentially enhancing resilience against natural disasters, cyber-attacks, or physical attacks on energy infrastructure.

However, realizing these benefits requires sophisticated management systems, appropriate pricing mechanisms, and regulatory frameworks that incentivize grid-supportive charging behavior. Failure to implement these systems could create new vulnerabilities, particularly during extreme weather events when both electricity demand and EV charging needs peak simultaneously.

4. Infrastructure Development and Market Adoption

4.1. Charging Infrastructure as Strategic Investment

Charging infrastructure represents both an enabler of EV adoption and a potential vulnerability requiring strategic consideration. Comprehensive charging networks reduce range anxiety, facilitate long-distance travel, and support diverse use cases from daily commuting to commercial transportation.

Recent research emphasizes the critical relationship between charging infrastructure deployment and EV market stability (Shah, Bhowmik, & Kabir, 2026) [7]. Insufficient infrastructure constrains adoption, creating a circular problem where low EV numbers discourage infrastructure investment, which in turn suppresses EV adoption. Breaking this cycle requires strategic public investment and policy interventions that derisk private infrastructure deployment.

Ultra-fast charging technology particularly enhances U.S. competitiveness in global electric mobility markets (Adil

Shah, Mahmood, & Kabir, 2025) [1]. Charging stations capable of delivering 350 kW or more can replenish EV batteries in minutes rather than hours, approximating the refueling experience of gasoline vehicles. Deploying these technologies positions the United States as a leader in EV infrastructure, potentially creating export opportunities while supporting domestic adoption.

4.2. Consumer Adoption Patterns

Understanding customer expectations and purchase intentions proves essential for accelerating EV deployment (Adil Shah, Tarannum, Mahmood, & Kabir, 2026) [5]. Research indicates that consumer preferences are shifting toward EVs driven by factors including environmental concerns, fuel cost savings, technological appeal, and improving vehicle performance. However, barriers persist, including higher upfront costs, range anxiety, charging availability concerns, and limited model availability in certain vehicle segments.

Addressing these barriers requires multi-pronged strategies encompassing financial incentives, infrastructure deployment, consumer education, and regulatory mandates. Purchase subsidies, tax credits, and rebates reduce cost barriers, while emissions standards and zero-emission vehicle mandates create regulatory certainty that encourages manufacturer investment in EV development.

4.3. Safety and Technology Integration

Advanced safety technologies, increasingly enabled by artificial intelligence, enhance EV appeal and broader transportation safety (Shah, Razib, & Kabir, 2026) [10]. Autonomous emergency braking, lane-keeping assistance, adaptive cruise control, and other driver assistance systems reduce accident rates and improve public safety. These technologies integrate naturally with EVs' electronic architectures, creating synergies between electrification and vehicle automation.

From a national security perspective, safer transportation systems reduce societal costs, enhance economic productivity, and free resources for other priorities. Moreover, the data infrastructure supporting connected and autonomous vehicles creates opportunities for improved traffic management, emergency response, and infrastructure planning, though it also introduces cybersecurity vulnerabilities requiring careful management.

5. Challenges and Considerations

5.1. Critical Mineral Dependencies

While EVs reduce petroleum dependency, they create new dependencies on critical minerals including lithium, cobalt, nickel, and rare earth elements. These materials concentrate in specific geographic regions, with China dominating processing and refining capacity across multiple supply chains. This concentration represents a potential vulnerability, as supply disruptions or geopolitical tensions could constrain EV production.

Addressing this challenge requires diversifying supply sources, developing domestic processing capacity, investing in recycling technologies, and researching alternative battery chemistries that reduce or eliminate dependence on scarce or geographically concentrated materials. Strategic stockpiling, international partnerships with allied nations possessing mineral resources, and trade agreements that secure supply access represent complementary approaches.

5.2. Grid Capacity and Generation Mix

Large-scale EV adoption increases electricity demand, potentially straining grid capacity and requiring substantial infrastructure investment. Meeting this demand sustainably necessitates expanding renewable generation capacity, modernizing transmission and distribution infrastructure, and implementing smart grid technologies that optimize energy flows.

If additional electricity demand is met primarily through fossil fuel generation, EVs' climate benefits diminish, though energy security advantages persist due to fuel diversification and domestic sourcing. Maximizing both climate and security benefits requires pairing electrification with decarbonization of electricity generation.

5.3. Equity and Just Transition

EV adoption patterns currently skew toward higher-income households with access to home charging, raising equity concerns. Low-income communities, renters, and residents of multi-unit dwellings face barriers to EV ownership and charging access. Ensuring equitable access to EVs' benefits—including reduced fuel costs and improved air quality—requires targeted policies such as income-based incentives, public charging in underserved communities, and programs supporting used EV markets.

Moreover, transitioning from petroleum to electricity affects workers and communities dependent on fossil fuel industries. A just transition requires supporting affected workers through retraining programs, economic diversification initiatives, and social safety nets that cushion employment disruptions.

5.4. Cybersecurity Vulnerabilities

Connected and electric vehicles introduce cybersecurity risks absent in conventional vehicles. EVs' integration with charging infrastructure, grid systems, and communication networks creates potential attack vectors for malicious actors seeking to disrupt transportation systems, steal data, or compromise grid stability. Recent applications of AI in clinical and safety contexts demonstrate both opportunities and risks associated with interconnected systems (Khan, Shah, & Arman, 2024; Shah, Razib, & Kabir, 2023) [11, 9].

Protecting against these threats requires robust cybersecurity standards for vehicles and infrastructure, ongoing monitoring and threat detection systems, secure software development practices, and incident response capabilities. Regulatory frameworks must evolve to address emerging cyber threats while fostering innovation.

6. Policy Recommendations

6.1. Federal Investment and Standards

The federal government should substantially increase investment in EV charging infrastructure, particularly in rural and underserved areas where private investment lags. Establishing national interoperability standards ensures seamless charging access across networks, reducing consumer barriers and enhancing grid integration.

Implementing progressively stringent emissions standards for light-duty vehicles provides regulatory certainty that encourages manufacturer investment in EV technology while driving market transformation. Complementary standards for medium- and heavy-duty vehicles extend electrification benefits to commercial transportation, freight, and public transit.

6.2. Critical Mineral Security

Developing comprehensive strategies for critical mineral security represents an urgent priority. This includes supporting domestic mining where environmentally appropriate, investing in processing and refining capacity, funding battery recycling research and deployment, and establishing international partnerships that diversify supply sources.

Research funding should prioritize alternative battery technologies that reduce dependence on scarce or geographically concentrated materials, including sodium-ion, solid-state, and other emerging chemistries. Strategic reserves of critical minerals can buffer against short-term supply disruptions while longer-term diversification strategies mature.

6.3. Grid Modernization and Renewable Integration

Pairing transportation electrification with grid modernization and renewable energy deployment maximizes security and climate benefits. Federal and state policies should incentivize renewable generation, energy storage deployment, transmission expansion, and smart grid technologies that enable efficient integration of variable renewable resources and flexible EV charging loads.

Time-of-use electricity pricing, managed charging programs, and V2G incentives encourage charging behavior that supports grid stability and maximizes renewable energy utilization. Regulatory reforms may be necessary to enable innovative rate structures and remove barriers to V2G deployment.

6.4. Equity and Access Programs

Ensuring equitable EV access requires targeted interventions including enhanced incentives for low-income purchasers, investments in public charging in underserved communities, support for used EV markets, and programs addressing barriers faced by renters and multi-unit dwelling residents.

Workforce development programs should prepare workers for EV manufacturing, charging infrastructure installation and maintenance, and related sectors, with particular attention to workers and communities affected by fossil fuel industry transitions.

6.5. Cybersecurity Standards and Preparedness

Establishing mandatory cybersecurity standards for EVs and charging infrastructure protects against emerging threats. These standards should address vehicle software security, charging network protection, data privacy, and grid integration security. Regular security audits, vulnerability disclosure programs, and incident response planning enhance resilience against cyber threats.

7. Conclusion

Electric vehicle adoption represents a strategic opportunity to enhance U.S. national security by reducing oil dependency, diversifying energy sources, and strengthening economic resilience. While petroleum has shaped American foreign policy and military strategy for generations, electrification offers a pathway toward greater energy autonomy and reduced vulnerability to global oil market volatility and geopolitical tensions.

Realizing these benefits requires coordinated action across technology development, infrastructure deployment, policy implementation, and market transformation. Recent research demonstrates progress in understanding consumer adoption dynamics (Adil Shah, Tarannum, Mahmood, & Kabir, 2026) [5], infrastructure requirements (Shah, Bhowmik, & Kabir, 2026; Adil Shah, Mahmood, & Kabir, 2025) [7, 1], and grid integration challenges (Shah, Kabir, Razib, & Khan, 2024) [8]. Building on these insights, policymakers, industry stakeholders, and researchers must collaborate to accelerate the transition.

Challenges remain, including critical mineral dependencies, grid capacity constraints, equity considerations, and cybersecurity vulnerabilities. However, these challenges are manageable through strategic planning, sustained investment, and adaptive policymaking. The alternative—continued petroleum dependency—perpetuates established vulnerabilities while foreclosing opportunities for enhanced energy security and climate leadership.

The transition to electric mobility constitutes not merely an environmental initiative but a national security imperative. By reducing oil dependency, diversifying energy sources, and strengthening domestic energy production, widespread EV adoption enhances American strategic autonomy, economic resilience, and global competitiveness. The time to accelerate this transition is now, leveraging technological advances, policy tools, and market forces to build a more secure and sustainable transportation future.

References

1. Adil Shah, Abdullah Al Mahmood, Shanzida Kabir. Accelerating the transition: ultra-fast charging infrastructure and U.S. global competitiveness in electric mobility. J Bus Manag Stud. 2025;7(10):51-61. doi:10.32996/jbms.2025.7.10.6
2. Baymard Institute. Cart abandonment rate statistics and benchmarks. Baymard Research; 2023. Available from: https://baymard.com/lists/cart-abandonment-rate
3. Davenport TH, Ronanki R. Artificial intelligence for the real world. Harv Bus Rev. 2018;96(1):108-116.
4. Huang MH, Rust RT. Artificial intelligence in service. J Serv Res. 2018;21(2):155-172. doi:10.1177/1094670517752459
5. Adil Shah, Tasfia Tarannum, Abdullah Al Mahmood, Shanzida Kabir. Customer expectations on electric vehicles in the USA market: a comprehensive analysis of shifting preferences and purchase intentions. J Bus Manag Stud. 2026;8(1):20-27. doi:10.32996/jbms.2026.8.1.2
6. Grewal D, Roggeveen AL, Nordfält J. The future of retailing. J Retail. 2017;93(1):1-6. doi:10.1016/j.jretai.2016.12.008
7. Shah A, Bhowmik J, Kabir S. Bridging the reality gap: quantifying the impact of charging station infrastructure on U.S. EV adoption and market stability. J Manag World. 2026;(1):1-6. doi:10.53935/jomw.v2024i4.1249
8. Shah A, Kabir S, Razib MNH, Khan SA. Grid-integrated EV charging systems: impacts on U.S. power grid stability and resilience. Int J Artif Intell Eng Transform. 2024;5(1):40-45. doi:10.54660/IJAIET.2024.5.1.40-45
9. Shah A, Razib MNH, Kabir S. Machine learning–driven clinical decision support systems for improving patient outcomes in US healthcare. Int J Med Allied Body Health Res. 2023;4(4):75-79. doi:10.54660/IJMBHR.2024.4.4.75-79
10. Shah A, Razib MNH, Kabir S. Quantifying the impact of AI-enabled safety technologies on accident prevention

and public risk mitigation. Int J Artif Intell Eng Transform. 2026;7(1):24-31. doi:10.54660/IJAIET.2026.7.1.24-31
11. Shah A, Razib MNH, Kabir S, Tarannum T. Blockchain applications in pharmaceutical supply chain transparency and drug traceability: a comprehensive analysis. Int J Med Allied Body Health Res. 2023;4(4):80-83. doi:10.54660/IJMBHR.2024.4.4.80-83
12. U.S. Energy Information Administration. Petroleum and other liquids. 2024. Available from: https://www.eia.gov/petroleum/
13. Deigh C. Integrated reservoir characterization of deepwater turbidite systems: A systematic review of seismic attribute analysis, well log integration, and dynamic data validation, with a focus on the Niger Delta Fold Belt. Int J Multidiscip Res Growth Eval. 2024;5(6):1798-1814. doi:10.54660/IJMRGE.2024.5.6.1798-1814.
14. Pappas IO, Kourouthanassis PE, Giannakos MN, Chrissikopoulos V. Explaining online shopping behavior with the theory of planned behavior. Int J Inf Manage. 2016;36(3):346-357. doi:10.1016/j.ijinfomgt.2016.01.001
15. Verhagen T, van Dolen W. The influence of online store beliefs on consumer online impulse buying. Inf Manage. 2011;48(8):320-327. doi:10.1016/j.im.2011.08.001
16. Xu A, Liu Z, Guo Y, Sinha V, Akkiraju R. A new chatbot for customer service on social media. In: Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems; 2017. p. 3506-3510. doi:10.1145/3025453.3025496
17. Zhang T, Lu C, Torres E, Chen PJ. Engaging customers in value co-creation or co-destruction through mobile apps. Int J Contemp Hosp Manag. 2018;30(1):254-273. doi:10.1108/IJCHM-01-2017-0025

How to Cite This Article

Pitt JR, Sioshansi R, Kabir S, Mills M. Electric vehicles and national security: reducing oil dependency in the United States. Glob Multidiscip Perspect J. 2026;3(1):84-88. doi:10.54660/GMPJ.2026.3.1.84-88.