

Dissertation Proposal

Title: Examining the Impact of Electric Car Production on the
Current Infrastructure of the UK Automotive Sector

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1. Introduction

In the UK the automobile industry is undergoing vast changes due to increased demand and adoption of electric vehicles. There has been a heightened push towards sustainable transportation and regulations advancing electrical technology demonstrating the search for electric vehicle production. In figure 1 the annual new electric car registrations in the UK have been recorded between the years 2015 to 2023. The graph demonstrates the growing number of registrations of electric cars in the UK which was 455300 in 2023. Compared to the number of registrations in 2022, a 23.8% increase is demonstrated in 2023 (Statista, 2025). This indicates that the electric vehicle market and fleet are rapidly expanding with increased demand. As a result, pressure on manufacturing and production facilities or supply chains is also increasing.

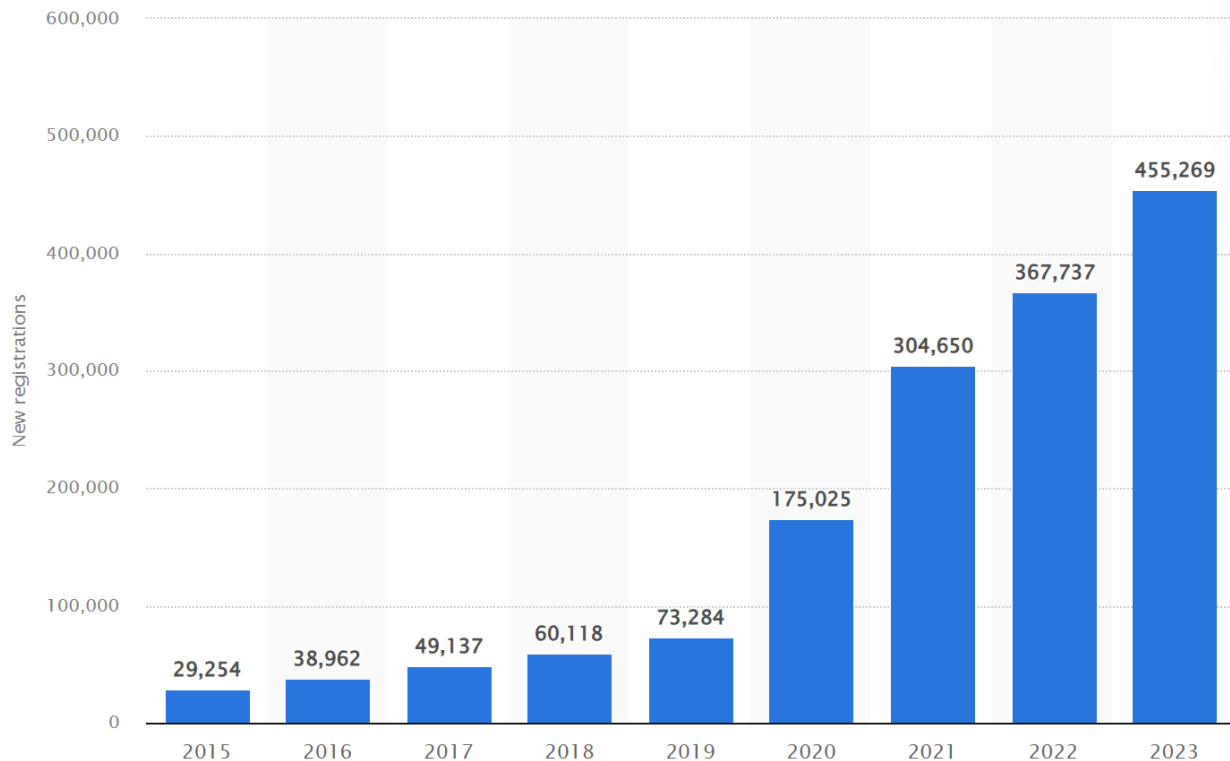


Figure 1: “Annual new electric car registrations in the United Kingdom between 2015 and 2023”

(Source: Statista, 2025)

In the past, the automobile factory in the US was highly focused on internal combustion engine vehicles as a result also developed highly established supply chains to support its manufacturing. Additionally, the workforce skills have also been shaped according to the needs in the manufacturing processes for internal combustion engine vehicles which include conventional fuel-powered cars. But lately with the emergence of electric vehicles opportunities as well as challenges have come across which need an extensive modification within the production lines followed by a shift in supplier networks (Engelmann *et al.* 2024). Even the workforce skill sets need updating to meet the new technology demands for the manufacturing of electric vehicles. With increased consumption of electric vehicles, the requirement for wide spread and robust charging infrastructure in the US is turning into a more pressing concern which strains the existing energy grade in the US which must also undergo substantial upgrades for sustainability.

Currently, the Government of UK and US is studying targets for minimising its carbon emissions and heading towards sustainable transport. To achieve these ambitious targets the government is thereby trying to ban sales of new petrol or diesel vehicles by 2030. The policies recruited by the UK Government are accelerating the transition towards electric car production, unfortunately, the current automobile charging infrastructure adequacy to support this transition is questionable (Fabianek and Madlener, 2024). Problems like available stock of raw materials required for battery production supply chain descriptions and the economic viability to support large scale electric vehicle manufacturing in the country needs to be critically observed.

Therefore, the research aims to explore the critical implications of increasing electric vehicle production in the UK and US automobile industry which involves its infrastructure manufacturing facilities workforce skills supply chains and charging networks. By evaluating these factors that build the infrastructure of the electric automobile industry in the UK and US the research will be able to gather insights about the opportunities and challenges that emerge as the traditional automobile industry transforms into electric mobility (Fu and He, 2024). Hence to study will contribute to the achievement of a deeper understanding of the readiness of this industry for this technology transformation.

2. Aims, objectives, and research questions/hypotheses

Research aim: To examine the impact of electric car production on the current infrastructure of the UK and US automotive sector.

Research objectives:

- To assess the preparedness in the current UK and US automotive manufacturing facilities for electric vehicle production at a large scale
- To critically evaluate the implications of electric vehicle production on the supply chain dynamics of the UK and US automobile sector
- To investigate the impact of shifting to electric vehicle production on employment trends and workforce skills in the UK and US automobile industry
- To critically analyse the expansion and development of the charging infrastructure as well as its implications in the UK and US.

Research questions

- How ready are the current UK and US automotive manufacturing facilities for electric vehicle production at a large scale?
- How is electric vehicle production affecting the supply chain dynamics of the UK and US automobile sector?
- What are the implications of shifting to electric vehicle production on employment trends and workforce skills in the UK and US automobile industry?
- How is the expansion and development of the charging infrastructure affecting the UK and US automobile sector?

3. Methodology

The proposed research methodology for the study is a secondary qualitative strategy where the focus is on gathering existing literature industry papers reports as well as government publications. For collecting secondary data, the selection criteria include a group of keywords that resonate with the research topic while procuring existing articles based on electric vehicle production in the UK and US automobile industry. Only publications available in English full text and which have been

published in the last 5 years will be considered relevant in the proposed research for understanding the impact and viability of increasing electric vehicle production. Potentially platforms like ProQuest and Google Scholar will be considered ideal for data collection other than the university library (Fung *et al.* 2025). The articles considered must be peer-reviewed and scholarly to ensure reliability and validity in the findings.

Additionally, to support the data collection framework for the proposed study interpretivism philosophy will be recruited due to its compatibility with secondary qualitative research practices. This will be complemented by the inductive approach to ensure flexibility in the data collection and analysis process recruited in the proposed research. The inductive approach will be useful in framing new theories and concepts that can be useful for industry professionals to improve manufacturing capabilities for supporting the production of electric vehicles in the UK and US. Followed by this the explanatory design is recognised as suitable in the proposed research methodology since it delivers a simple framework for supporting analysis of the data collection results. It is also a simple design that can be easily implemented in academic studies and minimises the scope of error (Gueniat and Maryam, 2024). The principles of Mono method are deemed fit for the study to avoid additional complications that originate when data is collected from multiple sources.

The research will also be cross-sectional to ensure a deeper understanding of the research problem by focusing on it in the present context in the UK and US automobile industry rather than considering variables from a long span (Gutiérrez-Negrín, 2024). For analysing the data quality thematic analysis is proposed where a minimum of 4 themes will be constructed that reflect the research objectives. These teams will demonstrate data patterns and trends from the current UK automobile industry supporting the examination of the preparedness of this industry to evolve into a dominantly electronics transport landscape.

4. Literature review

The expansion of electric vehicle production

According to Kazançoğlu *et al.* (2024), the British government is trying to achieve zero carbon emissions by 2050 where the transportation landscape in the country is a key focus area. Kriukelyte *et al.* (2024), said that the registrations for electric vehicles in the UK have steadily expanded

which has been possible due to incentives like grants for purchasing electric vehicles and exemptions from congestion charges. Unfortunately, the pace at which electric vehicle production is growing presents itself as a challenge to manufacturers trying to adapt the existing infrastructure in the UK and US to meet new demands.

Challenges in the manufacturing infrastructure and supply chains

Rifelly and Susanto (2024), indicated that the transition from traditional will or diesel power engines to electric vehicle manufacturing necessity and expenses change procedure within the manufacturing instructor of the mode automobile industry. Kovalevskaya *et al.* (2024), stated that the traditional supply chains which have been designed for diesel and petrol vehicles now need to be reconfigured to accommodate electric drive trains and battery production. Several manufacturers in the automobile industry like Nissan and Jaguar Land Rover have announced their significant investments to rebuild Electric vehicle manufacturing facilities. However, concerns related to the readiness amongst smaller manufacturers in the UK persist. Another critical issue is related to supply chain disruptions as the production of Electric vehicles needs very specific raw materials like Cobalt, Nickel and lithium which are minerals globally sourced.

Lichtman (2024), opined that these are minerals which portray problems like limited available resources. Additionally, geopolitical uncertainties escalate the problem by adding to supply chain bottlenecks. Therefore, there is a need for adopting localized supply chain strategies in the production of electric vehicles as highlighted by existing academic studies. Twigg *et al.* (2024), proposed that this can be a useful measure for mitigating the problems related to material shortages.

Employment trends and workforce skill set in the automobile industry

Workforce trends and requirements are being rapidly altered with increasing inclination towards electric vehicles. Uygun *et al.* (2024), propounded that the mechanical components involved in the production of electric vehicles are much less as compared to the production of traditional combustion engine vehicles. With such changes in the manufacturing landscape for automobiles and the significant changes have been reflected in skill demands and job roles in this industry. On one hand, some traditional job roles in the automobile industry have become obsolete. New roles are emerging in this industry like software engineering, battery technology and electric vehicle maintenance. Following these adaptations in the automobile industry, several British universities

as well as training institutions have updated their teaching programs by introducing specialised programs that cater to the skill set requirement for meeting the demand of increased electric vehicle production.

Moreover, government initiatives have been introduced that focus on supporting workforce upskilling and retraining like the automotive sector deal. However, it must also be noted that such transitions are likely to result in temporary disruptions within employment trends and the job market especially in areas that highly depend upon traditional automobile manufacturing.

The charging infrastructure and energy grid changes

Aligning the increased consumption of electric vehicles with the expansion of charging infrastructure in the UK and US is a significant challenge for this industry. Currently, in the UK and US there are thousands of public charging stations however this current network of charging stations is insufficient to meet the demand in the future. Yeganehdoust *et al.* (2025), denoted that this insufficient charging network acts as a failure to support the potential growth of the electric vehicle industry and usage in the UK and US. Consumers which include existing as well as potential consumers of electricity are highly anxious about the range of fast charging stations indicating the need for widespread deployment of starting stations across the UK and US to alleviate these concerns. In addition to this, the integration of electric vehicles into the existing energy grade also acts as a challenge due to the surge in electricity demand.

With rising electricity demand due to increased consumption and charging of electric vehicles, strain on the electricity grade is also increasing which requires Investments within renewable energy resources as well as smart grid technology to maintain effective supply chains and power supply. Coordinated policies across energy sectors and the automobile industry to support this sustainable transition.

Role of government, policies and regulatory frameworks

The role of the government is to legislate policies and develop regulatory frameworks that can support the sustainable transition of the automobile industry from traditional combustion engines to electric vehicles. Therefore, it can be stated that government policies play a vital part in driving the adoption of electric vehicles in ensuring the development of the charging infrastructure to

support consumption and adoption of electric vehicles in the future. Therefore, introduced multiple initiatives which included a range of incentives that provide grants to purchasers of electric vehicles along with offering them tax benefits and funding for research and development on batteries for electric vehicles (Yeganehdoust *et al.* 2025). Moreover, the regulatory Framework is also responsible for accelerating the adoption of electric vehicles by setting quotas for producers and manufacturers. Initiatives like the zero-emission vehicle mandate can do so.

However, there are significant challenges in this context as demonstrated by a few industry reports like the requirement for additional subsidies as well as compliance costs which affect widespread consumer adoption of electric vehicles.

5. Limitations

- One of the primary concerns in the study is related to data availability as the proposed research is intended to apply secondary qualitative methods. In this methodology, limitations are present in the level of depth that can be achieved in the analysis as it depends upon the quality and availability of existing literature. As compared to primary research control over data availability in secondary research practices is limited.
- There are also Industry-specific challenges since confidential or proprietary information about automobile companies in the UK may not be accessible publicly. This will hinder data accessibility thereby affecting the quality of the results and insights obtained from the research practices (Fung *et al.* 2025).
- Additionally, the UK automobile landscape is rapidly changing which makes it difficult to ensure the latest and most recent trends are captured with the secondary approach. Due to the Rapid evolution of the electric vehicle sector in the UK, the possibility of coming across articles and findings which are outdated is higher. This will affect the accuracy of the research findings as the changes occurring in the industry cannot be captured in real-time.

6. Ethical considerations

The current research will adopt secondary data collection practices which eliminate the need to involve human participants. Therefore, the study will not involve any direct ethical concerns concerning the inclusion of human participants. Instead, the ethical concerns are attributed towards

the originality of the research paper and the maintenance of authenticity through the use of references and citations of sources that have been used in the data collection process. Academic integrity standards will be maintained in the research practices by following the ethical guidelines provided by the University. Moreover, while analysing data personal assumptions, interpretations and biases of the researcher will be kept aside to exhibit the true nature of the finding which can be generalized in a broader research context in the future.

7. Timeframe

Chapters and stages of research	Months						
	1	2	3	4	5	6	7
<i>Introduction</i>							
<i>Literature review</i>							
<i>Research methodology and Data collection</i>							
<i>Thematic analysis</i>							
<i>Compilation of research findings and drafting of research document</i>							
<i>Reviewing drafts, making revisions</i>							

<i>and final submissi on</i>							
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Table 1: Proposed Research Timetable

8. Conclusion

The proposed study will offer valuable insights into the existing UK and US automobile industry and its infrastructure to accommodate all the critical requirements for boosting the production of electric vehicles. This is important due to targets said by the government of minimising their carbon emissions as well as to meet the increasing demand for sustainability in the market. From the determination of opportunities in challenges associated with the transition of the current UK and US automobile industry to electric vehicles, the proposed research will be able to contribute to insights and discussions that will be useful to industrial leaders in policymakers for facilitating a smoother transition.

Reference list

- Engelmann, L., Arning, K. and Ziefle, M., (2024). One step closer: Laypeople's perception of production steps for manufacturing CO₂-based jet fuel. *Energy, Sustainability and Society*, 14(1), pp. 9. <https://doi.org/10.1186/s13705-024-00441-8>
- Fabianek, P. and Madlener, R., (2024). Assessing Zero-Emission Vehicles from the Customer's Perspective by Using a Multi-Criteria Framework. *Sustainability*, 16(24), pp. 11149. <https://doi.org/10.3390/su162411149>
- Fu, E. and He, W., (2024). The development and utilization of shale oil and gas resources in China and economic analysis of energy security under the background of global energy crisis. *Journal of Petroleum Exploration and Production Technology*, 14(8-9), pp. 2315-2341. <https://doi.org/10.1007/s13202-024-01818-3>
- Fung, P.L., Al-Jaghbeer, O., Chen, J., Ville-Veikko Paunu, Vosough, S., Roncoli, C. and Järvi, L., (2025). A geospatial approach for dynamic on-road emission through open-access floating car data. *Environmental Research Letters*, 20(1), pp. 014033. <https://doi.org/10.1088/1748-9326/ad984d>
- Gueniat, F. and Maryam, S., (2024). A comprehensive and policy-oriented model of the hydrogen vehicle fleet composition, applied to the UK market. *Environment Systems & Decisions*, 44(1), pp. 85-99. <https://doi.org/10.1007/s10669-023-09911-4>
- Gutiérrez-Negrín, L.C.A., (2024). Evolution of worldwide geothermal power 2020–2023. *Geothermal Energy*, 12(1), pp. 14. <https://doi.org/10.1186/s40517-024-00290-w>
- Kazançoğlu, Y., Gozacan, N., Luthra, S. and Kumar, A., (2024). Are we really addressing the roadblocks to adoption of renewable and sustainable energy technologies? Total interpretive structural modeling approach. *Environmental Science and Pollution Research*, 31(11), pp. 16846-16864. <https://doi.org/10.1007/s11356-024-32096-5>
- Kovalevskaya, D., Pedersen, A., Holmen, E., Kaloudis, A. and Ringen, G., (2024). Triads in Lean Management: Analyzing Buyer–Supplier–Supplier and Buyer–Supplier–Supplier's Supplier Relationships for Zero-Defect Manufacturing. *Journal of the Knowledge Economy*, 15(1), pp. 616-660. <https://doi.org/10.1007/s13132-022-01094-8>

- Kriukelyte, E., Sochor, J. and Kramers, A., (2024). Actualizing sustainable transport: the interplay between public policy instruments and shared mobility providers' business models. *European Transport Research Review*, 16(1), pp. 11. <https://doi.org/10.1186/s12544-024-00634-4>
- Lichtman, R., (2024). Managing a low urban emissions world. *Climate Action*, 3(1), pp. 44. <https://doi.org/10.1038/s44168-024-00117-1>
- Rifelly, D.A. and Susanto, A.A., (2024). Challenges of electric vehicle adoption in Indonesia: Revealing the hidden factors affecting purchase intention. *Jurnal Siasat Bisnis*, 28(2), pp. 149-171 <https://doi.org/10.20885/jsb.vol28.iss2.art2>
- Statista.com, (2025), *Annual new electric car registrations in the United Kingdom between 2015 and 2023*, Available at: <https://www.statista.com/statistics/1411261/uk-annual-electric-vehicle-sales/> [Accessed on 13/03/2025]
- Twigg, G., Fedenko, J., Hurst, G., Stanley, M.S. and Hughes, A.D., (2024). A review of the current potential of European brown seaweed for the production of biofuels. *Energy, Sustainability and Society*, 14(1), pp. 21. <https://doi.org/10.1186/s13705-024-00452-5>
- Uygun, Y., Mohammadian, N. and Nisa, M.U., (2024). Implications of changing the base raw material – the case of license plate manufacturing. *Production & Manufacturing Research*, 12(1),. <https://doi.org/10.1080/21693277.2024.2381076>
- Yeganehdoust, F., Anil Kumar Madikere, R.R. and Zaghib, K., (2025). Cell Architecture Design for Fast-Charging Lithium-Ion Batteries in Electric Vehicles. *Batteries*, 11(1), pp. 20. <https://doi.org/10.3390/batteries11010020>