

# Determinants of European Consumers' Purchase Intention Toward Hybrid and Electric Vehicles: A PESTLE Analysis

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**Abstract.** The promotion of hybrid and electric vehicles (HEVs/EVs) has been a key point in the European shift towards sustainable mobility. The industry has been growing fast during the last ten years, but the growth has been heterogeneous at the regional level due to differences in income, infrastructures, and supportive policies. The current study examines the determinants of European consumers' intentions to buy HEVs/EVs. The analysis uses a PESTLE framework to analyse political, economic, social, technological, legal, and environmental conditions informing consumer adoption. The study reveals how EU climate regulations are stringent, national support, and local non-monetary motivations influence market penetration. The study also cites common challenges like high installation costs, severe price sensitivity, limited rural presence in some areas, and social or cultural variations in consumer behaviours. While technological advances and safety and recycling laws offer room for future growth, environmental benefits are contingent upon sustainable electricity supply and raw material handling. Studies identify that adoption forms a multi-sided process driven by affordability, availability, and awareness. To address the issues, the present study recommends the harmonization of the subsidies in the member states, the provision of special financial support for the poorer consumers, the addition of charging points for rural areas, and the communication of total cost of ownership advantages.

**Keywords:** Hybrid and electric vehicles, consumer behaviour, sustainable mobility, european automotive market, policy and incentives.

## 1. Introduction

Over the past 20 years, the European electric and hybrid car market has experienced extraordinary growth. BEV and PHEV registrations increased from minute quantities in the early 2010s to accounting for over 20% new car demand in leadership markets such as Norway by 2018, from below 0.5% in Italy in 2018[1,2]. EV adoption is encouraged by the EU emissions regulations, rapid technology advances, and shifting consumer values for sustainability. Initial market push was given by products such as the Toyota Prius hybrids, but European automobile manufacturers soon expanded the scope for their electrification plans in response to policy ambitions and surging demand [1, 3].

Early mass-market battery electric vehicle (BEV) launches in Europe—such as the Renault Zoe and Nissan Leaf in the 2010s—helped establish consumer awareness and infrastructure foundations [3]. Following the 2015 diesel emissions scandal, Volkswagen Group accelerated its “ID” series strategy, targeting over 50% BEV sales in Europe by 2030. BMW's i3 and i8 (launched in 2013) positioned the brand in the premium EV space, while Mercedes-Benz (EQ series) and Audi (e-tron) pursued luxury electric segments. Volvo and its performance brand Polestar have committed to selling only BEVs from 2030 [1]. Together, these developments illustrate how major European automakers have entered the BEV market, intensifying competition across multiple vehicle segments.

Europe is now the world's second-largest NEV market after China. In 2023, BEVs accounted for roughly 15% of new EU passenger car registrations and plug-in hybrids (PHEVs) for about 8% [2]. Market share is concentrated among Volkswagen Group, Stellantis, BMW Group, Mercedes-Benz, and Tesla. Regional penetration varies widely—Norway's BEV share exceeds 80% of new sales, while Southern European countries remain in earlier adoption phases. These differences largely reflect variations in income levels, government incentive schemes, charging infrastructure, and consumer awareness across regions [1, 4].

European automakers are competitive domestically and active exporters of EV models to North America and Asia. Vehicles such as the Volkswagen ID.4, BMW i4, and Mercedes EQE serve global markets. EU fleet CO<sub>2</sub> targets (95 g/km) have become a benchmark for international climate policy, influencing regulations elsewhere [1, 3].

EV adoption in Europe is closely linked to economic and technical factors: purchase price, range, and charging convenience remain primary purchase decision drivers [1, 3, 4]. Non-financial incentives, such as free parking or reduced tolls, have proven effective in some markets [4].

## **2. PESTLE Analysis**

### **2.1. Political Factors**

At the national policy level, the European Union has set forth new climate and emission regulations, such as a 95g/km average of CO<sub>2</sub> emissions threshold across all car models beginning in 2020. Such measures are compelling motor manufacturers to de-prioritise conventionally-fuelled gasoline vehicles in an effort to prevent financial penalties [1, 3]. Also, variations in policy translate to different consumer incentives. Northern and Western European states, for instance, favour the provision of subsidies, tax breaks, or exemptions from registration fees, while the lack thereof prevails in Southern and Eastern European states [4, 5]. Such differences significantly impact consumer decisions: in strongly incentivized markets where there is real financial support, consumers are prepared to experiment in EV take-up and experience lower economic risk and higher ultimate value. However, in weakly incentivized markets, affordability and convenience are preferred over the environment.

Besides national-level policies, local administrations have also introduced a variety of non-fiscal instruments to support electric vehicle uptake. London, Paris, and Madrid provide electric vehicle drivers with discounted or free car parking, special access to limited areas, and congestion-charge exemptions [4]. Such instruments have been successful in practice due to their ability to lower the daily costs and inconvenience of car ownership, thus making EVs a preferable choice for consumers over their conventionally fuelled counterparts. By directly enhancing the feasibility and affordability of EV usage in the urban area, such local measures have been found to increase adoption levels appreciably and bolster consumers' willingness to make the transition.

### **2.2. Economic Factors**

Economic factors are one of the most important driving forces for the adoption of hybrid and electric vehicles (HEV/EV) in Europe. One of the biggest deterrents could well be the relatively high initial price for electric vehicles compared to their internal combustion counterparts. Despite incentives, the initial price tag for electric vehicles is beyond the reach of numerous consumers, particularly lower-income consumers [6]. This imbalance has been responsible for sporadic adoption of electric vehicles in Europe.

Another significant variable is consumers' willingness to pay (WTP) and price sensitivity to specific electric car characteristics. Research illustrates that consumers are prepared to pay a premium to enjoy larger range, increased charging speed, and lower emissions, yet such preferences are held within tight budget constraints [4, 5]. Crucially, willingness to pay does not exist in equal measure for all consumers. It differs to a great extent by income group, in that higher-income consumers display higher capacity to make the investment in superior EV features, while lower-income consumers are extremely price-sensitive. Likewise, demographic variables such as age and education determine WTP levels: younger, technology-savvy drivers are less averse to paying for new-fangled characteristics, while older consumers value affordability and quality above other considerations. Such distinctions point to the reality that while technology enhancements can increase EV appeal, their success relies on fitting the design and price strategies to the economic realities for heterogeneous consumer sets. [4, 5]. Practically, such feasibility translates into the fact that although

various technological innovations can make electric cars more attractive, they can do so only on a competitive pricing basis.

### **2.3. Social Factors**

According to market surveys, younger UK consumers are more likely to associate EV ownership with modernity and sustainability, reflecting broader social trends identified in recent consumer reports [7]. An increasing number of today's consumers are inspired by climate change concerns and pollution. Though cost is always a major influence, environmental considerations are playing a significant part in purchase motivation [5, 6]. This trend is a response to wider social demands for sustainable living, where owning an EV can be an environmentally responsible choice. In particular, social image and identity are important drivers of EV adoption, providing social standing and prestige. Studies demonstrate consumers who are not early market players assess whether electric vehicles are compatible with their peer pressure-driven self-image [8, 9].

Nonetheless, there are different consumer perceptions due to cultural and regional variations in Europe. Whereas in Northern Europe, where there is high environmental concern and government encouragement, the electric car has become a mainstream and rational option. However, in Southern Europe, adoption of the electric car has been low, because of low consumer concern with the environment and distrust of emerging technologies [1, 2].

### **2.4. Technological Factors**

Technological innovation has played a key role in driving the adoption of hybrid and electric vehicles (HEV/EV) in Europe. Key among these is battery technology, which has steadily improved driving range and shortened charging times. While early hybrid and electric vehicles were limited to less than 200 kilometers (192 miles), continuous technological advancements have enabled many batteries electric vehicles (BEVs) to exceed 400 kilometers per charge, addressing one of the biggest obstacles: range anxiety [10, 11]. Faster charging capabilities have also improved convenience, making electric vehicles more suitable for everyday use.

Equally important is the widespread availability of charging infrastructure, a key factor in driving widespread adoption of electric vehicles. The deployment of fast-charging stations, such as Ionity and Tesla Superchargers, has significantly reduced charging times and boosted consumer confidence in the availability of electric vehicles. For instance, studies show that consumers are willing to pay around €258 for every one-minute reduction in charging time, highlighting the importance of rapid-charging technology in adoption decisions [4]. However, the development of charging infrastructure remains uneven across Europe. Western and Northern countries, such as Norway, benefit from dense and reliable networks—reflected in BEVs already accounting for more than 30% of new car sales as early as 2018—while Southern regions such as Italy reported EV shares as low as 0.5% in the same year [1]. This disparity underscores the infrastructural gap that continues to hinder balanced adoption across the continent.

Another critical area is the strategic positioning of premium brands. New high-end electric models from brands like Tesla, Audi, and BMW are adding features like efficient charging, driver assistance systems, and technologically advanced interior designs. These innovations are also enhancing their appeal to status-conscious consumers, potentially accelerating diffusion across mainstream markets as premium technologies gradually filter down to mid-range and entry-level segments [2, 9].

### **2.5. Legal Factors**

The European law offers both challenges and opportunities for the hybrid and electric vehicle (HEV/EV) market. At the EU, tough legislation on safety, emissions, and recyclability of battery materials imposes stringent requirements on carmakers. Such requirements are not only consolidating consumers' confidence in the electric vehicle technology but are also ensuring a lower environmental footprint of electric vehicles during their whole lifecycle, from the production phase until their end-

of-life management [11]. Additionally, future EU regulations on batteries are intended to increase their sustainability.

At the national level, authorities have enacted low-emission zones (LEZs) and limitations on high-emission vehicles. Such restrictions exist in cities like London, Paris, and Milan, where they impose fines on or prohibit the sale of aged internal combustion engine vehicles, thereby incentivizing their replacement by electric vehicles [4].

## **2.6. Environmental Factors**

A key benefit of increasing electric vehicle adoption is reducing greenhouse gas emissions from vehicle use, which can help improve air quality in European cities. Transport is one of the largest contributors to Europe's overall carbon footprint [5, 6]. In addition to reducing carbon emissions, electric vehicles also lower nitrogen oxide (NO<sub>x</sub>) and particulate matter emissions, contributing to improved urban public health by reducing risks of respiratory and cardiovascular diseases and alleviating pressure on healthcare systems.

However, analyses indicate that the mining of raw materials such as lithium, cobalt, and nickel used in battery manufacturing raises concerns about resource depletion [4]. Looking ahead, the European EV market is expected to further expand as battery costs decline and policy frameworks tighten, though regional disparities may persist.

## **3. Recommendation**

Building on the PESTLE analysis, several recommendations can be made to accelerate the adoption of hybrid and electric vehicles (HEVs/EVs) in Europe. These recommendations address the key political, economic, social, technological, legal, and environmental factors identified in the analysis, and are aimed at reducing barriers while maximizing opportunities for growth.

Policymakers should harmonize subsidies and incentives across member states to reduce regional disparities in adoption. In Northern and Western Europe, purchase subsidies and tax exemptions are effective, while support is weaker in Southern and Eastern European countries. A coordinated EU-wide incentive framework would ensure fairness and enhance consumer confidence. In addition, local governments should expand benefits such as free parking and lower taxes, as these measures directly reduce daily costs.

Affordability gap needs to be closed. The governments and car-makers can collaborate to introduce special programs for middle- and low-income families, such as income-targeted subsidies, low-interest loans, or used-EV support programs. Auto-makers can also experiment new models of ownership—leasing, subscription models, or battery-swapping—to reduce the upfront payment. At the same time, communication of total cost of ownership (TCO) savings due to reduced fuel and maintenance expenditure needs to be promoted to exhibit financial benefits in the long run.

Public information campaigns need to reflect not simply the environmental advantages of EVs but the day-to-day benefits, for example, reduced running expenses and enhanced driving experience. Tailored campaigns aimed at younger cohorts can highlight technology and innovation, while campaigns for mature consumers can zero in on reliability and affordability. The use of social influence by displaying champions and networks of peers can also help routine EV ownership in various socio-cultural contexts become the norm.

Investment in charging infrastructure should prioritise underserved regions in Southern and Eastern Europe. Public-private partnerships can ensure rapid deployment of fast-charging stations along highways and in urban centres. Manufacturers should also continue to enhance battery efficiency and expand the range of mid-priced models, ensuring that advanced technologies pioneered by premium brands gradually filter down to mass-market vehicles.

Regulators will need to continue to enforce safety and emissions requirements while increasing the roll-out of recycling standards for EV batteries. Standardization of charging connectors and

payment devices must remain at the top of the agenda to increase interoperability across borders to enable easy mobility throughout Europe.

To ensure maximum environmental benefits, EV deployment needs to go hand in hand with simultaneous advances in electricity generation decarbonization. Renewable energy growth needs to be aligned by policymakers to the increasing demand for electric mobility. The sustainable sourcing of raw materials and advances in recycling technologies will also bring down the environmental impact of EV manufacturing and help the EU achieve its long-term climate ambitions.

## 4. Conclusion

The research aimed to investigate the determinants of European consumers' buying decisions for hybrid and electric vehicles. The investigation indicated that numerous political, economic, social, technological, legal, and environmental determinants influence adoption. These factors also play a leading role in shaping consumers' behaviors and cognition.

The report reveals that despite favorable EU climate policies and technological advances, high initial prices, inconsistent charging infrastructure, and local differences in incentives remain major inhibitors for slower uptake. Social and cultural variations in Europe also shape consumers' attitude towards electric vehicles, where for some segments environmental and symbolic advantages are important, while for others affordability and ease of use are more important.

On the basis of these learnings, a series of recommendations were made, centering on harmonizing subsidies, reducing the price of EVs, increasing investment in infrastructure, generating awareness, and achieving supply chain sustainability. All these steps are geared to help bridge the gap between the potentials unlocked by policy and technology and the limitations faced by consumers in their day-to-day life.

The value added by this research stems from its scientific and practical contributions. For policymakers, it offers a framework for crafting more efficacious intervention measures that intervene in economic as well as social barriers. For industry actors, it highlights the imperative for aligning price, infrastructures, and marketing strategies for meeting consumer aspirations.

Overall, speeding up the European take-up of HEVs and EVs demands concerted effort in all aspects of the external environment. By tackling the barriers in an integrated manner, Europe can reinforce its international leadership in the field of sustainable transport and bring it another step closer to meeting its long-term climate and mobility goals.

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