

# Comparison of Petrol Vehicle And Electric Vehicle

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**Abstract-** *The transition from internal combustion engine (ICE) vehicles (petrol-fueled) to electric vehicles (EVs) has become a central component of strategies to mitigate climate change, reduce air pollution, and lessen dependence on fossil fuels. This study provides a comparative analysis between petrol vehicles and EVs, examining total cost of ownership, environmental impact, performance, and infrastructural and policy challenges. Using recent data from India—covering running costs per kilometer, maintenance and depreciation, emission footprints (both tailpipe and lifecycle), range & refueling or recharging issues, and current government incentives—the analysis reveals that, despite higher upfront purchase costs, EVs tend to offer significantly lower operating and maintenance costs over typical usage periods. Moreover, EVs provide substantial environmental benefits, particularly in urban settings, provided that electricity generation becomes cleaner. However, petrol vehicles still retain advantages in of longer range, faster refueling, resale value in some segments, and in regions with weak charging infrastructure. The study concludes with policy recommendations to enhance EV adoption, including expanding charging infrastructure, improving battery technology, and enhancing incentives and regulatory support*

**Keywords-** EV vehicle

## I. INTRODUCTION

Transportation is one of the largest sources of greenhouse gas emissions and local air pollution worldwide, and motorized road vehicles powered by petrol continue to contribute significantly to these environmental challenges. In many countries, especially in rapidly developing economies like India, there is increasing concern about the sustainability of relying on internal combustion engine (ICE) vehicles, due to fuel import dependence, fluctuating oil prices, health impacts of air pollution, and climate change.

Electric vehicles (EVs) have emerged as a promising alternative, offering potential gains in energy efficiency, reduced operations cost, lower emissions, and improved air quality. Advances in battery technology, government subsidies and incentives, and expanding charging infrastructure are further driving interest in EV adoption. For instance, recent

studies in India show that electric two- and three-wheelers already have a lower total cost of ownership compared to their petrol counterparts—EV two-wheelers cost around ₹1.48 per km vs petrol two-wheelers at about ₹2.46 per

However, despite these advantages, petrol vehicles still have several comparative strengths, including longer established infrastructure, greater driving range under certain conditions, shorter refueling times, and lower upfront purchase prices. Furthermore, the environmental benefits of EVs are strongly dependent on how electricity *is generated (the grid mix), lifecycle emissions (including battery manufacture and disposal), and the availability of reliable and convenient charging infrastructure.*

*This study aims to provide a systematic comparative analysis of petrol vs electric vehicles along multiple dimensions: cost (purchase, fuel/electricity, maintenance), environmental impact (tailpipe emissions, lifecycle emissions), performance (range, refueling or recharging convenience, power/torque), and infrastructure or policy factors. The goal is to understand under what conditions EVs offer net benefits over petrol vehicles, what trade-offs remain, and what policy or technological changes are needed to accelerate a transition to cleaner mobility.*

## OBJECTIVES

- To Compare the environmental impact of Eves and petrol cars by assessing carbon energy consumption and sustainability
- To Evaluate The economic feasibility of both vehicle types, considering initial purchase costs, maintenance, fuel/charging expenses, and long- term savings.
- To analyze the performance differences between Eves and petrol cars, including factors such as speed, acceleration, efficiency, and durability.

## STATEMENT OF PROBLEM

Motor vehicles powered by petrol continue to dominate the automotive market, owing to their mature technology, widespread fuel availability, familiarity in

maintenance, and perceived reliability. However, this dominance comes at substantial economic, environmental, and social costs: high fuel consumption, fossil fuel dependency, volatile petrol prices, significant greenhouse gas emissions, and local air pollution.

Electric vehicles (EVs) promise to address many of these issues by offering lower operating costs, reduced emissions, and less dependence on petroleum imports. Yet, despite growing awareness and government incentives, the adoption of EVs is hindered by several critical challenges: higher upfront costs, range limitations, insufficient charging infrastructure, uncertainties around battery life and disposal, and concerns about the electricity generation mix (how clean or dirty the grid is).

In particular, in many regions:

- The **total cost of ownership** (purchase + running + maintenance + resale) of EVs is not always clearly lower than that of petrol vehicles, especially when accounting for battery replacement, charging costs, and depreciation.
- The **infrastructural readiness**—public and private charging stations, grid capacity, and convenience—is often inadequate, causing “range anxiety” and deterring consumers.
- The environmental benefits of EVs are contingent on how electricity is produced; in areas where electricity comes largely from fossil-fuel sources, the net emission advantages may be reduced.
- Consumer awareness, policy consistency, and financing mechanisms for EVs are often lacking or fragmented, making it difficult for potential buyers to evaluate the trade-offs.

Thus, there is a need for a rigorous comparative analysis of petrol vs electric vehicles that quantifies and contextualizes these trade-offs. Such a study can help answer: under what circumstances (distance driven, cost of electricity vs petrol, charging infrastructure availability, battery lifetime, etc.) does an EV provide net economic and environmental benefit? What policy, technological or infrastructural improvements are needed to make EVs more competitive across more use-cases

## II. REVIEW OF LITERATURE

**Koroma et al. (2022)** A systematic LCA-focused review finds that battery production makes battery-electric vehicles (BEVs) more carbon-intensive at manufacture than internal combustion engine vehicles (ICEVs), but BEVs commonly

deliver lower cradle-to-grave greenhouse-gas emissions over typical lifetimes — provided the electricity used for charging is not highly carbon-intensive. The paper highlights that results are sensitive to assumptions about battery size, vehicle lifetime, driving patterns, and the regional electricity mix, and it calls for standardized LCA methods to improve comparability.

**Hasan (2021)** A comparative cost and performance study shows that total cost of ownership (TCO) and per-kilometre costs for BEVs can be lower than for petrol cars in many contexts, especially for higher annual mileage and where electricity prices or incentives are favorable; however, outcomes depend strongly on local fuel/electricity prices, resale values, maintenance costs, and assumptions about battery degradation and replacement. The study emphasises contextual factors (regional energy prices, vehicle lifespans, and usage patterns) that determine whether BEVs or petrol vehicles are economically preferable.

**Buhmann (2023)** Research on consumer preferences finds non-technical barriers (perceived range anxiety, charging convenience, initial purchase price, and social/status factors) remain major determinants of adoption even when BEVs offer lower operational costs or environmental benefits. The work suggests policies and industry actions that reduce perceived non-price barriers (expanded charging networks, transparent battery warranties, and targeted information campaigns) are as important as price/incentive signals for shifting consumers from petrol to electric vehicles.

## III. RESEARCH METHODOLOGY

### Research Design

The study follows a descriptive research design to explore the comparison of electric vehicle and petrol vehicle.

### Sampling Technique

**A random sampling technique was used to select respondents for the study.**

### Sample Size

The study was conducted among 110 respondents representing different demographic groups within the youth population.

### Sampling Tools

Structured questionnaires and survey forms were used as the primary tools for data collection. The collected data were analyzed using percentage analysis to interpret the responses and identify trends to comparison between the electrical vehicle and petrol vehicle

### Area of the Study

The research was conducted among the youths between the age groups of below 18 to the age group of 32

**Period of the Study**

The research was carried out over a period of one month.

**Data Collection**

Data collection involves gathering information or observations from various sources such as surveys, interviews, or observations. This process is crucial for obtaining empirical evidence to support research objectives and analyze trends or patterns.

**Methods of Data Collection****Primary Data**

Primary data is firsthand information collected directly by the researcher using tools such as surveys and questionnaires.

**Secondary Data**

Secondary data is information collected previously by other sources and is available in published formats. The secondary data collected for the study from various Journals, magazines, books, newspapers, reports, and online articles.

**IV. FINDINGS OF THE STUDY**

- Male respondents significantly outnumbered females, constituting 86.4% versus 13.6% respectively.
- Majority of respondents fall in the age group of 18-25 55.5%
- Most of the respondents are studying 40%
- Student dominated the occupation category at 40.00%, while student constituted only 37.3% and employee consists of 21.8%
- 37.6% of the respondents with the income level of 0 to 10000 and 28.04% with 10000 to 50000
- Most of the respondents 78.18% lives in urban areas, 21.82% lives in rural areas.
- Carbon dioxide emissions are seen as the biggest issue (43.06%).
- Noise emissions are also a major concern (32.07%).
- Electricity wastage is less commonly associated with petrol cars (19.01%).
- Renewable energy use is the least associated factor (4.05%).
- Most respondents identify emissions (carbon and noise) as the primary environmental issue
- Use of renewable energy in petrol cars is almost negligible
- Abundance of renewable energy (35.5%) is seen as key.

- Limited charging infrastructure (32.7%) is a major barrier.
- Too many subsidies (26.4%) complicate adoption.
- Infrastructure gaps hinder EV convenience.
- Renewable energy integration is both challenge & opportunity.
- Policy and infrastructure alignment remain critical for success.
- Ban on hybrid cars (32.7%) is the top policy driver.
- Fuel price hikes (31.8%) strongly push EV adoption.
- Tax incentives (21.8%) have a moderate impact.
- Compulsory EV ownership (13.6%) has the least support.
- Restrictive measures are viewed as more effective than incentives.
- Overall, policy pressure is seen as key to boosting EV use.

**V. SUGGESTION**

This project aims to promote the widespread adoption of electric vehicles (EVs) by focusing on awareness creation, infrastructure development, and technological advancement. It seeks to educate consumers through campaigns and advertisements about the long-term economic and environmental benefits of using EVs. To improve convenience and reliability, the project proposes establishing additional charging stations in both urban and rural areas. It also recommends providing financial incentives such as tax benefits, subsidies, and low-interest loans to motivate people to switch from petrol vehicles to electric alternatives. Furthermore, the project emphasizes investment in advanced battery technology to extend driving range, minimize charging time, and enhance performance. By encouraging eco-friendly practices and highlighting the role of EVs in reducing pollution and dependence on fossil fuels, the project envisions a sustainable and cleaner future for transportation

**VI. CONCLUSION**

The comparison between petrol and electric vehicles reveals that while petrol-powered cars continue to dominate due to their maturity, accessibility, and reliability, they impose considerable economic, environmental, and social costs. Electric vehicles, on the other hand, offer the potential for cleaner and more cost-efficient mobility, but their large-scale adoption is limited by high upfront costs, range constraints, charging infrastructure gaps, battery-related concerns, and dependence on the local electricity generation mix.

The study highlights that the overall competitiveness of EVs is highly context-dependent. In regions with affordable and cleaner electricity, strong charging networks, and supportive policies, EVs provide both economic and environmental advantages. Conversely, in areas with coal-heavy grids, weak infrastructure, and limited financing options, the benefits are less clear. Therefore, EV adoption cannot be treated as a one-size-fits-all solution; rather, it requires a holistic ecosystem approach that aligns technological innovation, infrastructural development, and policy support.

Ultimately, the transition to electric mobility can only be successful if governments, industries, and consumers collectively address the current barriers. Investments in renewable energy, battery technologies, and charging networks, coupled with consistent policy frameworks and consumer education, are crucial. With these measures in place, EVs can move beyond a niche alternative and become a mainstream, sustainable replacement for petrol vehicles in the future.

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