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# SHOULD THE STATE INVEST IN ELECTRIC CAR INCENTIVES, AND WHY NOT?

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***Abstract***

*Government subsidies are a powerful economic tool that allows the state to achieve its objectives. When combined with repressive measures, they become even more potent. The central question is whether the incentives are directed toward the right goals and carefully considered. If they are, the benefits can be substantial; otherwise, the consequences could be severe. This paper analyzes state investments in fostering electric vehicles (EVs). To better understand the effects of subsidies, the authors examined them from ecological, economic, and technological perspectives, as well as considerations of justification, timing, distribution of benefits, infrastructural challenges, and the potential creation of dependency on subsidies. The research is conducted based on established research questions regarding whether electric cars are the best option for addressing climate change, whether government incentives are the best and fairest solution for increasing the share of EVs among the total number of cars in various countries and globally, and what the impact of government incentives is in the EV sector. This topic involves multiple fields, which resulted in the creation of specific null and alternative hypotheses. The authors conducted a detailed analysis of the claims about the importance and effectiveness of electric vehicles (EVs) in ecology and economic development. They present results organized into sections that discuss the advantages and disadvantages of government incentives for EVs. The paper concludes with findings and recommendations for a more effective reduction of environmental pollution caused by urban transportation.*

**Keywords:** *Electric vehicles (EVs), Government incentives, $CO_2$ emissions, Sustainable development, Economic growth, Public health, Technological innovations, Infrastructure.*

## 1 INTRODUCTION

### 1.1 Significance of the Topic

The topic of government investments in incentives for electric vehicles (EVs) is exceptionally important and timely, particularly in the context of global efforts to reduce greenhouse gas emissions, promote sustainable development, and transform the transportation sector. Government investments in EVs are indispensable within these objectives. This subject is multidisciplinary and needs examination from various perspectives.

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### 1.1.1 Pros

Government incentives for electric vehicles (EVs) offer a range of benefits across multiple domains, from environmental protection to economic growth. The following key advantages illustrate their broad impact.

- *Ecological Significance:* From an ecological standpoint, EVs have the potential to significantly reduce $CO_2$ emissions and other harmful gases when powered by electricity generated from renewable sources. The transportation sector is one of the largest sources of emissions, with automotive traffic occupying a significant place within it. Government incentives for EVs can accelerate the transition to *greener* transportation.
- *Economic Significance:* Incentives for EVs boost demand, stimulate production, create new jobs, and encourage innovation in the automotive industry (EmobEV, 2024). EVs reduce dependence on fossil fuels, which can increase energy security and trade balances in countries that do not possess sufficient fossil fuel resources. Investments in electric vehicles pave the way for new sectors' development, such as battery manufacturing, charging stations, and smart grids.
- *Social Significance:* EVs reduce air pollution in urban areas, improving air quality. That can positively affect public health. Incentives such as subsidies and tax breaks can make EVs more accessible to a broader population segment. Government support can encourage a shift towards more sustainable lifestyles.
- *Technological Significance:* Government incentives for EVs promote research and development of new technologies, such as advanced batteries, autonomous driving, and smart grids. This enhances the technological capacity of the country and strengthens its position in the global economy. Countries that invest in EVs can become leaders in this sector, granting them a more significant influence on the world market.

Based on the above, one can conclude that carefully planned government incentives can provide long-term economic benefits. In such cases, EV incentives can have a direct positive impact on the quality of life for citizens.

### 1.1.2 Challenges and Critiques

While the advantages of government investment in electric vehicle (EV) incentives are compelling, a detailed examination reveals several risks and challenges that need consideration. Some key challenges include:

- *Justification:* Questions arise regarding the justification for subsidies aimed at electric vehicle purchase and why there has been a sudden shift towards transforming the automotive industry when many fundamental issues related to EVs remain unresolved. As of 2023, electric vehicles, including battery electric vehicles (BEVs) and plug-in hybrids (PHEVs), represent only about 1-2% of the global vehicle fleet (Clsbe, 2022). Even if the number of electric vehicles were to increase tenfold, the impact on the environment might not be decisive. Are there more effective solutions available?
- *Timeliness:* Is it justified to promote the production and sale of electric vehicles at the current level of technological development? Evidence suggests that the electrical grids in most countries cannot replace fossil fuel-derived energy with renewable electric energy. In many regions, despite a minimal share of electric vehicles in the total vehicle fleet, a significant portion of electricity is still generated from coal-fired power plants. Would investing in public transportation and the research and development of more environmentally friendly electric vehicles be more prudent? Increased investments in research and development could potentially yield solutions that surpass current technologies more quickly.
- *High Costs:* Government incentives for EVs can be expensive if implemented on a large scale. This concern is particularly relevant for developing countries. Could this funding be allocated more effectively in alternative areas?

- *Unequal Distribution of Benefits:* Incentives often disproportionately benefit wealthier individuals who can afford higher-priced EVs. Meanwhile, those without any car, or low-income individuals reliant on older, less environmentally friendly cars, effectively subsidize the purchase of expensive vehicles. This dynamic can exacerbate the gap between the rich and the poor without producing significant environmental benefits.
- *Dependency on Subsidies:* If demand for EVs relies solely on subsidies, the market may become unstable if these incentives are reduced or eliminated.
- *Infrastructure Challenges:* Without adequate charging infrastructure, the incentive effectiveness may be limited. The number of charging stations, particularly in rural areas, is insufficient to meet the needs of an increasing number of EVs. Additionally, the electrical grid often lacks sufficient capacity in locations with high EV concentrations. There have been instances where diesel generators charged EV batteries. That is a suboptimal solution.
- *Global Context:* Considering that the atmosphere is shared by everyone, one might question whether the high cost of marginally cleaner air in certain areas is justified, especially if it leads to increased harmful emissions in other regions. Such a consideration is relevant globally and locally in contexts involving energy production from fossil fuel-based power plants.

The pros and cons highlight a range of complex issues that require careful reflection to avoid making detrimental decisions. A single poor decision can lead to a cascade of subsequent choices aimed at rectifying initial mistakes. Thus, the topic of government investments in EVs becomes critically significant for the future of transportation, the economy, and the environment. While government investments hold the potential to yield numerous benefits — including reduced emissions, economic growth, and improved quality of life — the success of these initiatives hinges on careful planning, addressing challenges, and a long-term commitment to sustainable development goals.

## 1.2 Overview of the Article

Section 2 presents a short review of electric vehicle (EV) manufacturers, their most significant models, and the attributes that make them recognizable. There is also a presentation of the current state of investments in electric vehicles and some preliminary results of government incentives. Section 3 discusses the main arguments that support the implementation of government incentives, while Section 4 addresses the arguments of those who oppose state intervention and government incentives for EVs. The authors discussed the issues from various perspectives, with particular emphasis on the role of public administration, the viewpoint of citizens, and the overall impact of EVs on the environment.

The following research questions guided this analysis:

a. *Are electric vehicles the best option for addressing climate change and protecting the environment?*
b. *What is the impact of government incentives on the production and acquisition of electric vehicles?*
c. *Are government incentives the best and fairest solution for increasing the share of electric vehicles in the overall fleet of passenger cars?*

To this end, the author formulated null hypotheses as:

$h_{A0}$: Electric vehicles are the best option for addressing climate change and protecting the environment.
$h_{B0}$: Government incentives do not affect the production and acquisition of electric vehicles.
$h_{C0}$: Government incentives are the best and fairest solution for increasing the share of electric vehicles in the overall fleet of passenger cars.

In this context, alternative hypotheses can be:

$h_{Aa}$: Electric vehicles are not the best option for addressing climate change or protecting the environment.
$h_{Ba}$: Government incentives do affect the production and acquisition of electric vehicles.

$h_{Ca}$: Government incentives are neither the best nor the fairest solution for increasing the share of electric vehicles in the overall fleet of passenger cars.

Section 5 presents conclusions about the research questions and the hypotheses put forth.

## 2 ELECTRIC VEHICLES AND GOVERNMENT INCENTIVES

### 2.1 Brief Overview of Electric Vehicles in 2025

Without reliable statistical data, based on estimations, global electric vehicle (EV) production exceeded 15–20 million units in 2024. In recent years, manufacturers have produced large quantities of small city cars. The demand for urban EVs is high in Europe. Small city cars are the most affordable, making them ideal for urban environments. Mid-sized cars are the most popular category because they offer a balanced combination of performance, size, space, and affordability. They typically allow enough room for battery placement, enabling a solid driving range. For instance, many mid-sized EVs provide a range of 400-500 kilometers, sufficient for most daily needs. Luxury vehicles offer high performance and advanced technology but come at a higher price point. Compared to other categories, luxury EV production is less. Yet it is increasing due to growing demand. The SUV and crossover segments are experiencing significant growth as they combine practicality with range.

A summarized overview of electric vehicles (EVs) by categories, manufacturers, current models for 2025, price ranges, and their specifications is presented in Table 1. This overview follows current trends and manufacturer announcements.

*Table 1 Overview of Electric Vehicles Available in 2025*

| Category (Price Range) | Manufacturer | Models for 2025 | Specificities |
|---|---|---|---|
| **Small City Cars** (20,000–35,000 EUR) | Renault (FR) | Zoe | One of the most popular EVs in Europe |
| | FIAT (IT) | FIAT 500e (IT) | Modern design, ideal for the city |
| | Renault-Nissan-Dongfeng (CN) | Dacia Spring (CN) | The most affordable EV on the market |
| | Peugeot (FR) | e-208 | Sporty design, good range |
| | BMV Group (GB) | Mini Cooper SE | Compact and urban |
| **Mid-sized Cars** (35,000-55,000 EUR) | Tesla (US/CN) | Model 3 | Best-selling EV in the global market |
| | Volkswagen (DE) | ID.3 | Focused on the European market |
| | Hyundai (KR) | Ioniq 5 | Futuristic design, fast charging |
| | KIA (KR) | EV6 | Competitor to the Ioniq 5 |
| | Škoda (CZ) | Enyaq | Spacious and family-friendly |
| **Luxury Cars** (80,000–150,000 EUR or more for premium models) | Tesla (US/CN) | Model S | High performance, long range |
| | Porsche (DE) | Taycan | Sports luxury EV |
| | Audi (DE) | e-tron GT | Competitor to Taycan |
| | Mercedes-Benz (DE) | EQS | Luxury sedan with cutting-edge technology |
| | Lucid Motors (US) | Lucid Air | Competitor to Tesla Model S |
| | BMW (DE) | i7 | Luxury electric sedan |
| **SUV & crossover EV** (45.000–80.000 EUR) | Tesla (US/CN) | Model Y | Best-selling SUV EV in the global market |
| | FORD (SAD) | Mustang Mach-E | Sporty SUV |
| | Volkswagen (DE) | ID.4 | Popular in the EU and the U.S. |
| | Hyundai (KR) | Ioniq 5 | Crossover with fast charging |
| | Audi (DE) | Q4 e-tron | Luxury SUV EV |
| | Rivian (US) | R1S | Electric SUV designed for off-road use |

*Source: Author*

### 2.2 Previous Results of Government Investments in Electric Vehicles

Investment in electric vehicles (EVs) is rapidly increasing worldwide. In the European Union (EU), governments and the private sector are engaged in promoting sustainable transportation actively. Government investments in electric vehicles are crucial for accelerating the transition to sustainable transport. The results have varied

depending on specific policies, market conditions, and infrastructure capacities. Below, we will examine the current state and provide an overview of the results achieved by regions and globally.

### 2.2.1 Global trends

The field of electric vehicles (EVs) is evolving rapidly, driven by technological advancements, environmental awareness, and government support. Different regions yield various outcomes depending on the area under consideration. Globally, the trends are as follows:

1. *Growth in Electric Vehicle Sales:* In 2022 and 2023, electric vehicle sales have continued to rise, particularly in China, the United States, and the EU. China remains the largest market for EVs, while the EU and the U.S. are making significant investments in infrastructure and incentives. In 2022, electric vehicles accounted for approximately 10% of global sales of new cars (Liu, 2023), with further growth expected.
2. *Investment in Battery Technologies:* Batteries are a critical factor for EVs, and investments in research and development (R&D) of batteries have significantly increased. Companies like Tesla, CATL, and others invest billions in these activities. There is considerable progress, with a focus on reducing costs while increasing battery capacity and lifespan. New technologies, like solid-state batteries, are being developed, promising more safety and efficiency.
3. *Charging Infrastructure:* New charging stations arise worldwide, which is crucial for the broader adoption of EVs. The network of fast and ultra-fast chargers is expanding. For example, ambitious plans are underway in the U.S. and EU to construct hundreds of thousands of new charging stations.
4. *Political Support and Regulations:* Many countries are introducing stricter emissions regulations and setting deadlines for the ban on the sale of new fossil fuel vehicles. Currently, incentives such as subsidies, tax breaks, and benefits for EV drivers are in place.
5. *Growth of the Used Vehicle Market:* As technology matures, the market for used electric vehicles is becoming increasingly important, making EVs more accessible to a broader range of consumers. There is a noticeable increase in supply and significantly lower prices already in the second year of vehicle operation. That is favorable for used vehicle buyers, but it can be discouraging for buyers of new vehicles.
6. *Smart Vehicles:* Electric vehicles lead in the integration of advanced technologies, such as autonomous driving and intelligent features, which further enhance their appeal.
7. *Global Competition and Collaboration:* The U.S. and Europe strive to increase their competitiveness through investments in domestic production and innovation. Collaboration between countries and companies is crucial for further technological development; however, existing collaborations are often limited to specific projects or companies, although global trends in cooperation are evolving. One of the most active collaborations in manufacturing is the Renault-Nissan-Dongfeng partnership. However, there is a noticeable interference from governments in the competitive dynamics among companies through the introduction of various restrictions, such as the 10% import duty imposed by the U.S. on China effective February 1, 2025 (Roščić, 2025). Cooperation in the creation and implementation of standards has proven to be much more effective.

These trends indicate that electric vehicles have become increasingly significant for the global transition toward more sustainable transportation.

### 2.2.2 Situation in the European Union (EU)

As mentioned, the EU is a global leader in supporting electric vehicles through subsidies, infrastructure projects, and stringent regulations. To date, manufacturers have made significant progress in various areas:

1. Green Policy and Regulations: The EU has set stringent targets for reducing $CO_2$ emissions. It encourages automakers to focus on electric vehicles. By 2035, the EU plans a ban on new ICE car sales. That includes gasoline and diesel engines, as well as hybrids. According to the latest announcements, there will be an allowance for the sale of ICE vehicles as long as they

utilize fuels from renewable sources. Additionally, the announcement of even stricter regulations on $CO_2$ emissions has compelled manufacturers to invest in EVs (BESEN, 2024). Concurrently, there is growing criticism from industry stakeholders and political groups who argue that these targets are unrealistic or overly ambitious. Many have also emphasized that if the EU does not ease its efforts, it could inflict existential damage on the leading European industry, the automotive sector. (Forbes, 2024) Some manufacturers have shifted their policies toward electric vehicles, such as Alfa Romeo, which has announced that it will keep internal combustion engines available as long as customers demand them (Monroy, 2025).

2. *Subsidies and Incentives:* Many EU countries provide financial incentives for purchasing electric vehicles, such as grants, tax breaks, and free parking or city driving privileges.
3. *Investments in Factories and Production:* Major car manufacturers, such as Volkswagen, BMW, and Renault, are investing billions in electric vehicles and battery production within the EU. Furthermore, new "gigafactories" for batteries are being established, including Northvolt in Sweden (Northvolt, 2022).
4. *Infrastructure:* The EU has built thousands of new charging stations and is actively working on further developing the network, particularly along highways. The aim is to ensure EV drivers have reliable and fast charging options across the continent. In 2023, in the EU, there were over 630,000 public charging stations (acea, 2024). The goal is to install one million public charging stations in the EU by 2025, and by 2030, there should be 3.5 million public connections active on EU roads. That could facilitate seamless travel for electric vehicles throughout the EU. Currently, most charging stations are AC chargers with slower charging speeds, but the number of DC fast chargers is rapidly increasing, especially along highways. Ensuring compatibility of all connections with various EV models is essential.
5. *Growth in EV Sales:* In 2022, approximately 1.83 million battery electric vehicles (BEVs) and plug-in hybrids (PHEVs) sold accounted for 18-22% of the total number of new cars sold. The largest market in the EU, with around 840,000 sold EVs, was Germany, followed by France, with approximately 400,000. In 2023, roughly 2.4 million EVs (BEVs + PHEVs) were sold in the EU, representing 20-25% of total vehicle sales. Over one million units were sold in Germany, while around 450,000 in France. Projections suggest that over 2.8 million vehicles were sold in the EU, which constitutes a share of 25-30% of total vehicle sales (BIHMK, 2024; Energetika.ba, 2024). The current sales growth of 2 to 5% is insufficient to meet the target for banning the sale of ICE vehicles.
6. *Subsidies and Tax Incentives:* Countries such as Germany, France, and the Netherlands offer significant subsidies for purchasing EVs, contributing to a rise in demand.

Despite these positive developments, notable challenges remain regarding the further adoption of EVs in the EU:

- *Dependency on Imported Batteries:* The EU still imports a significant portion of its batteries from China, although investments are underway to develop domestic manufacturing facilities.
- *Dependency on Critical Materials:* Battery production requires materials such as lithium, cobalt, and nickel, the markets for which are currently under considerable pressure. The EU is working to secure these resources and develop recycling technologies.
- *Cost of Electric Vehicles:* Although EV prices are gradually decreasing, they remain significantly more expensive than traditional vehicles, which may hinder mass adoption.
- *Uneven Support:* Some EU countries have better infrastructure and incentives than others.
- *Renewable Energy:* For EVs to be genuinely environmentally friendly, renewable energy sources must generate electricity. The EU is investing in renewable energy, but significant challenges still exist.

Considering the points mentioned above, it is evident that investments in electric vehicles are booming, and the EU stands as one of the global leaders in this transition. With support from governments, the private sector, and growing

environmental awareness, some anticipate that EVs will become the dominant mode of transport in the coming decades.

### 2.2.3 China

China is the world's largest producer and market for electric vehicles (EVs). The EV industry in China has experienced explosive growth in recent years, driven by clearly defined goals, strong government support, significant investments in technology, and rising domestic demand. While China leads in electricity generation from renewable sources, it is simultaneously the chief energy producer from fossil fuels (coal, oil, and natural gas). Approximately 30-33% of electricity in China comes from renewable sources, while fossil fuels account for 60-65%. Additionally, 4-5% of electricity comes from nuclear power plants, while other contributors, like waste-to-energy facilities, produce the remainder. China is at the forefront of installing new renewable energy capacities but continues to face challenges in reducing its dependence on coal. The country has ambitious targets for reducing greenhouse gas emissions and increasing the share of renewable sources, with a plan for 40% of total energy production to come from renewables by 2030.

China has achieved impressive results in the EV sector:

- *Market Dominance:* China has become the global leader in electric vehicles (EVs) and battery production. Chinese manufacturers such as BYD, NIO, and Xpeng are leading both production and sales of EVs, with electric vehicles constituting over 25% of new vehicle sales in the country in 2022. (Miladinović, 2024) Reports indicate that Chinese companies such as BYD and CATL dominate the global market for lithium-ion batteries, with an estimated market share of 70% to 80% in battery production by 2030 (Johnson, 2025). BYD became the world's largest producer of battery electric vehicles (BEVs) in 2023, surpassing Tesla in this segment. The reasons for success lie in model diversification, vertical integration, government support, and global expansion.
- *Subsidies:* The Chinese government has long offered substantial subsidies for the purchase of EVs, which has fueled widespread adoption.
- *Infrastructure:* China boasts the largest network of charging stations, with approximately 1.8 million public EV chargers reported by the end of 2022 (Zhang, 2024).
- *Exports:* Chinese EVs are becoming increasingly popular in global markets, particularly in Europe.

However, there are several challenges associated with EVs in China:

- *Overdependence on Subsidies:* The reduction of government subsidies in recent years has slowed growth in some segments.
- *Market Saturation:* Many local manufacturers create intense competition.
- *Access to Green Electricity:* Production capacities do not provide sufficient electricity from renewable sources, limiting the potential positive effects of electric vehicle implementation on overall environmental pollution.

### 2.2.4 UNITED STATES

The United States (U.S.) is one of the leading global markets for electric vehicles (EVs). In recent years, the U.S. has significantly accelerated the development of the EV industry, owing to government support, investments in technology, and rising consumer demand. However, compared to China and Europe, the U.S. still lags in some aspects of EV production and implementation.

The U.S. has achieved notable results in:

- *Sales Growth:* In 2022, EVs accounted for approximately 6% of new vehicle sales in the U. S, with Tesla as the dominant producer. In 2023, Americans bought around 1.4 million electric vehicles. That represented 8-10% of total new vehicle sales. This sales growth indicates that it will take many more years for the structure of cars on the U.S. roads to change.
- *Government Support, Federal and State Subsidies:* Incentives for consumers are provided through federal and state subsidies for the purchase of EVs. For qualified vehicles, federal tax credits of up to $7,500 are also included. This credit is deducted from the taxes individuals owe to the federal government, effectively reducing the vehicle's price.

- *Infrastructure:* By the end of 2024, the U.S. had over 200,000 public charging stations; however, this infrastructure is unevenly distributed. California has the most developed network, while rural areas lag**.** (Lewis, 2024) The U.S. government has announced plans to construct 500,000 new charging stations by 2030 through programs such as the Inflation Reduction Act (IRA, 2022).
- *EV Production:* Companies like Tesla, Ford, and GM invest heavily in EV manufacturing. In 2023, the U.S. produced approximately 1.85 million electric vehicles (BEV + PHEV), constituting 10-12% of total automobile production in the U.S. (Statista, 2024). Tesla is the largest EV manufacturer in the U.S., producing over one million vehicles in 2023.
- *Batteries:* The U.S. invests in building battery manufacturing plants, including Tesla's facility in Nevada and joint projects between GM and LG Chem. The goal is to reduce dependence on battery imports from China. The Inflation Reduction Act (IRA), enacted in 2022, promotes domestic production of EVs and batteries through tax incentives and subsidies.

However, significant challenges remain:

- *Political Divisions:* Support for EVs varies among states. Some actively support the transition, while others show less interest.
- *Infrastructure Shortcomings:* The charging stations network is still underdeveloped in rural areas, limiting the broader adoption of EVs.
- *Import Dependence:* The U.S. remains largely dependent on imports of batteries and critical minerals (e.g., lithium and cobalt) from China and other countries.
- *Competition:* Chinese EV manufacturers, such as BYD, are increasingly entering the U.S. market, posing challenges for domestic producers.
- *EV Prices:* Although EV prices are slowly decreasing, they remain higher than those of fossil fuel vehicles, which may limit accessibility.

### 2.2.5 Norway

Norway is a global leader in electric vehicle adoption and an exceptional example of how a country can successfully facilitate the transition to sustainable transportation. Some of the most significant outcomes include:

- *Record Sales:* In 2023, over 88.9% of all new passenger vehicles sold in Norway were fully electric vehicles (BEVs), while the number of light commercial vehicles decreased by 1.3% (Elbil, 2025). Norway is the first country in the world where electric vehicles dominate the new vehicle market.
- *Government Incentives and Subsidies:* Electric vehicles are exempt from high purchase taxes (VAT and customs duties), making them more competitive than internal combustion engine vehicles. Public charging stations are often free or very low-cost. EV owners can park for free in public parking lots. EVs are permitted to use HOV lanes even with just one occupant.
- *Infrastructure:* Norway boasts a dense charging station network, including fast and ultra-fast chargers. As of 2022, there were over 20,000 public charging points throughout the country (Mokkelgard, 2023), making charging practical and accessible. The extensive network of charging stations facilitates the easy use of EVs.
- *Environmental Awareness:* Norwegians are highly conscious of environmental challenges and support sustainable initiatives. The government actively promotes EVs as part of its strategy to reduce greenhouse gas emissions.
- *Geographical and Economic Advantages:* Norway enjoys inexpensive electricity due to its abundance of hydroelectric power. A relatively small population and well-developed infrastructure further ease the adoption of EVs.

Like everywhere else, Norway faces challenges in the implementation of electric vehicles, including:

- *Loss of Revenue:* As more individuals transition to EVs, the government loses revenue from fuel taxes and vehicle registration fees, which may become a concern in the future.
- *Increased Load on the Electrical Grid:* With the growing number of EVs, the electricity demand is rising, potentially straining the grid.

- *Cost of EVs:* Although EVs are more affordable due to incentives, their absolute price remains high.

As evidenced by the above points, Norway serves as a global example of a successful transition to electric vehicles. Thanks to strong government support, robust infrastructure, and ecological awareness among citizens, Norway has become a country where EVs are the norm rather than the exception.

### 2.2.6 India

India is relatively new to the electric vehicle (EV) sector but invests in EV promotion and development to cut air pollution and fossil fuel dependency. Though behind China, Europe, and the U.S., India has made significant progress and has ambitious plans for the EV market.

Some of the most notable outcomes include:

- *Sales Growth:* In 2023, EV sales in India surpassed one million vehicles, marking a substantial increase compared to previous years. Most of these sales consist of electric two-wheelers (scooters and motorcycles) and three-wheelers, while electric cars and light commercial vehicles hold a smaller share.
- *Government Initiatives and Policies:* The Indian government offers subsidies through the "Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME II)" program (BlueWeave, 2024). This program, valued at approximately $1.2 billion, aims to stimulate the production and purchase of EVs through subsidies and support for infrastructure development. EV buyers can benefit from tax incentives, making electric vehicles more affordable. In some states, EVs are exempt from excise duties and road taxes. The Indian government aims for 30% of all vehicles to be electric by 2030.
- *Charging Infrastructure:* India has over 10,000 public charging stations, although the infrastructure is still underdeveloped, particularly in rural areas. The government and the private sector are investing in establishing charging stations, including fast and ultra-fast chargers. There is ongoing construction of a charging network, but many regions of the country still lack adequate facilities.
- *Support for Domestic Manufacturing:* The government encourages the production of batteries and components for EVs through initiatives such as the "Production Linked Incentive (PLI) scheme."
- *Success Stories:* Electric scooters and motorcycles have gained immense popularity, particularly among youth and in urban areas. Companies such as Ola Electric and Ather Energy are experiencing significant sales growth. Some cities, including Bangalore and Delhi, have introduced electric bus fleets to mitigate air pollution. Electric rickshaws have also become popular in urban transportation, especially for short distances.

Given the level of EV adoption achieved so far, significant challenges remain, particularly regarding:

- *Low Purchasing Power:* Despite subsidies, the prices of EVs are still high for the average Indian consumer.
- *Insufficient Infrastructure:* The charging network is still under development and insufficient for mass adoption. That is particularly evident outside major cities.
- *Dependency on Imports:* India still heavily relies on imported batteries and critical minerals, which increases the cost of EVs.
- *Lack of Awareness:* Many consumers in India remain insufficiently informed about the benefits of EVs.

## 3 ARGUMENTS FOR STATE INVESTMENT IN EV INCENTIVES

There are numerous arguments related to the social, economic, and environmental benefits of state investments in incentives for electric vehicles (EVs). These incentives represent a strategic step towards a sustainable, green economy. The role of public administration is crucial in facilitating the transition, effectively implementing policies, and maximizing the benefits associated with the adoption of electric vehicles. Proponents of government investments in incentives for electric cars cite diverse reasons, such as:

- The reduction of harmful gas emissions, environmental protection, and combating climate change.

- The improvement of public health and reduction of healthcare costs.
- The economic growth and the creation of new jobs.
- The development of charging infrastructure and promotion of sustainable mobility.
- Encouragement of innovation and technological advancement.

The reasons for government investment vary, but at least nominally, they are most motivated by harmful gas emissions reduction, environmental protection, improvement of air quality, and the fight against climate change. The transportation sector is one of the largest sources of carbon dioxide ($CO_2$) emissions and other pollutants that contribute to global warming. Electric vehicles produce significantly fewer emissions when charging is powered by renewable energy, contributing to the fight against climate change (Andrić, 2025, 01 22). Many countries have committed to emission reduction by international agreements, such as the Paris Agreement (UNFCCC, 2015). EV incentives help countries meet their obligations and avoid penalties or negative consequences for their reputation.

Internal combustion (IC) vehicles emit harmful gases and particulates (e.g., CO, HC, NOx, and PM2.5), which can cause health problems such as respiratory diseases and cardiovascular deaths. EVs produce no exhaust emissions during operation, significantly improving air quality in urban areas and reducing healthcare costs. Internal combustion vehicles also generate noise, which detracts from the quality of life in urban settings. In contrast, EVs are significantly quieter, contributing to reduced noise pollution and positively impacting the quality of life by decreasing stress for residents.

The traditional automotive industry faces significant pressure from tightening regulations on permissible air pollution and potential reductions in demand. Even with the application of the most advanced technologies, it is unlikely that they will meet future standards due to the inherent limitations of internal combustion engine processes. Incentives for EVs boost demand, fostering innovation in batteries and electric motors. That, in turn, stimulates economic growth and creates new jobs, particularly in industries focused on manufacturing, innovation, and infrastructure. Global EV markets are growing rapidly, and countries that do not invest in this technology risk falling behind their competitors. Incentives can assist domestic manufacturers in developing competitive EV models and remaining relevant in the global market. Countries with developed electric vehicle infrastructure are becoming more attractive for investment.

Many nations depend on imported oil, making them vulnerable to price fluctuations and geopolitical crises. Electric vehicles can be powered by locally produced electricity, thereby reducing dependence on imported fossil fuels and increasing energy independence (Automobili, 2025). An increase in the use of electric cars will raise the need for electricity. If this energy does not come from renewable sources, it could lead to increased usage of fossil fuels. Governments can align EV incentives with investments in renewable energy to ensure that EVs genuinely contribute to emissions reductions.

There is a noticeable lack of charging infrastructure for vehicles around the world, which can be a barrier to the widespread adoption of electric vehicles. It is also unrealistic to expect that electric vehicle manufacturers or electricity producers will be able to provide adequate charging stations on their own. Government incentives often include investments in infrastructure, facilitating the quicker development of the charging network and increasing the convenience of EVs for users. Investment in charging stations and the electrical grid is crucial for electric vehicle utilization (BESEN, 2024). Strengthening infrastructure improves availability and reduces "range anxiety" for consumers, thus enhancing the adoption of these vehicles.

The initial cost of EVs can be high, which deters consumers. Government incentives decrease the costs of purchasing and maintaining EVs, making them more accessible to a broader population. Financial incentive programs are often accompanied by awareness campaigns regarding the benefits of electric vehicles and the importance of sustainable transportation, contributing to consumer behavior changes and increased acceptance of new technologies. If public administration successfully creates policies that encourage the adoption of electric vehicles, including financial incentives, regulations, and the

construction of necessary infrastructure, its engagement with manufacturers and local communities becomes essential for developing strategies that meet the specific region's needs.

In summary, the stated arguments suggest that government investments in incentives for electric vehicles provide a wide range of benefits, from emission reductions and health improvements to economic growth and increased energy independence. These incentives are critical for accelerating the transition to a sustainable transportation system and achieving long-term climate goals. This transition supports the development of a sustainable transportation framework. A comprehensive approach to state investments in electric vehicles represents a clear strategy for creating a more sustainable future. This strategy benefits not only the environment but also the economy and social welfare.

## 4 ARGUMENTS AGAINST STATE INVESTMENT IN EV INCENTIVES

Numerous counterarguments related to social, economic, and environmental benefits follow Government investments in incentives for electric vehicles.

Each advantage also presents challenges, such as:

- The validity of claims that electric vehicles positively contribute to environmental protection.
- The accuracy of assertions that automotive engines are the primary contributors to air pollution.
- The legitimacy of claims regarding economic growth and new job creation.
- The financial burden is placed on taxpayers.
- Potential economic downturns due to improper execution of investments.
- Concerns regarding overreliance on government subsidies.
- Technical challenges and battery safety issues.

Although electric vehicles are considered environmentally friendly, their production, use, and recycling carry numerous environmental risks.

For instance, the average electric vehicle contains approximately 83 kg of copper, whereas a gasoline vehicle contains about 23 kilograms. (Bennett, 2022).

The battery of the Renault Zoe contains approximately 8 kg of lithium (Lima, 2020), while the equivalent Renault Clio does not contain any lithium.

If the entire vehicle fleet were to be electric vehicles, the energy systems of many countries would be unable to sustain this demand, especially with only renewable energy sources.

Lithium-ion (Li-ion) batteries now account for about 95% of all electric vehicle batteries, with demand increasing by 55% in 2022 (IEA, 2023). Batteries production requires significant energy and raw materials, while recycling is complex and costly.

According to T&E (2022), the production of a small vehicle like the Renault Zoe emits 6.85 tons of CO2, compared to 4.49 tons emitted during the production of the gasoline-powered Clio.

According to available data, the $CO_2$ emissions from these two vehicles become comparable after approximately 17,000 kilometers of driving. They reach the milestone during the third year of operation. (Cekerevac, 2025)

Literature compares the health impacts of emissions from internal combustion engines, fossil fuel power plants, steel mills, and cement factories. Several studies have demonstrated that emissions from industrial sources, particularly power plants and steel mills, are key contributors to air pollution that can lead to respiratory and cardiovascular diseases (Oberschelp, Pfister, & Hellweg, 2023). Urban heating plants predominantly use fossil fuels and contribute significantly to this issue. Research indicates that approximately 72% of buildings in Europe utilize fossil fuels for heating (Le Corre, 2024, 04 18)

According to Oberschelp, Pfister, & Hellweg (2023), exhaust emissions from vehicles are directly linked to urban pollution and have an immediate impact on public health, particularly in cities with high traffic levels.

That raises the question of whether new electric vehicles will automatically improve street conditions. The most likely answer is no. Therefore, a prudent choice for public administration would be to remove older vehicles

from the streets through buyback and recycling programs at market prices that are certainly lower than subsidies for purchasing electric cars. Such an approach would effectively eliminate pollutants.

However, if we consider $CO_2$ emission more broadly, we must also include the impact of wildfires. The most recent wildfire in California, which occurred in January 2025, emitted approximately 4.4 megatons of carbon dioxide ($CO_2$) (Petersen, 2025). That corresponds to the emissions associated with the production of about one million Clio cars, or an annual emission of around 4.9 million vehicles (assuming an emission of 120 g/km $CO_2$ and an annual mileage of 7,500 km). Additionally, this wildfire was smaller in scale compared to the annual fires in Chile and Canada.

The validity of claims regarding economic growth and the creation of new jobs raises a significant dilemma concerning the transition to electric vehicles (EVs): Will economic growth and job creation offset the losses in traditional sectors related to internal combustion engines (ICE)?

Several key reasons suggest that EVs may not significantly increase job numbers or could even lead to a net loss of jobs:

- *Reduced Jobs in Manufacturing:* Compared to ICE vehicles, EVs have fewer moving parts. For example, an electric motor typically has only 20 to 30 components, while an ICE engine can have over 200 parts. The production of EVs is often more automated, which diminishes the need for human labor. A smaller number of components and greater automation may lead to a reduction in manufacturing jobs.
- *Job Losses in Traditional Sectors:* If EVs become dominant, the production of ICE engines, transmissions, exhaust systems, and other components will decline, resulting in job losses in these sectors. ICE vehicles require regular maintenance (like oil changes and filter replacements), while EVs have lower maintenance demands. This may contribute to a decrease in jobs in auto service centers. Overall, it is anticipated that the transition to EVs could lead to job losses in the traditional automotive industry sectors.
- *Concentration of Battery Production:* The production of batteries for EVs is currently concentrated in a few countries (e.g., China, Japan, South Korea), suggesting that other nations may not benefit from this growth. Battery manufacturing is capital-intensive and highly automated, which limits job creation. It can be expected that battery production will not necessarily generate enough jobs to offset losses in other sectors.
- *Uneven Distribution of Benefits:* The EV industry requires a highly skilled workforce (engineers, programmers, battery specialists), while the traditional industries employ many less-skilled workers. Regions dependent on ICE vehicles and components production may experience economic downturns, while new jobs are created elsewhere. The uneven distribution of benefits could lead to regional economic inequalities and increased population migration.
- *Limited Growth in New Sectors:* Although new jobs will emerge related to the construction and maintenance of charging stations, the number of these positions may not be sufficient to compensate for losses in traditional sectors. Battery recycling is still under development, and the number of jobs in this sector is currently limited. It is anticipated that new sectors associated with EVs may not generate enough jobs to offset these losses.
- *Economic Risks:* The EV industry depends on government subsidies and incentives. If subsidies are decreased, industry growth may slow, adversely affecting job creation. High competition and rapid technological advancements could lead to instability in the EV sector, potentially jeopardizing jobs. Economic risks may limit the long-term growth and job stability in the EV sector. Additionally, one should not overlook the vehicle owners, who may experience a significant depreciation in the value of their purchased vehicle immediately after acquisition. According to Cekerevac (2025) and Autoscout24.de, the small electric vehicle Renault Zoe depreciates approximately one-third of its original price by the fifth year of use. Since small cars are primarily intended for urban driving, they

accumulate relatively low annual mileage. That significantly affects the cost per kilometer driven.

Active policies are needed to support worker training, promote new sectors, and encourage regional development to mitigate negative effects. Without such measures, the transition to electric vehicles may lead to a net loss of jobs and increased economic inequalities.

From the taxpayer's perspective, several key risks and issues are significant when examining government incentives for electric vehicles.

Government incentives are funded by public resources, specifically through tax revenues, making it significant to understand how the government utilizes these resources and what potential risks exist for taxpayers. Key points of concern may include:

- *High Costs to Taxpayers:* Government incentives for EVs directly burden the state budget. That implies that taxpayers bear the costs through higher taxes or reduced funding for other public services (healthcare, education, infrastructure). Sustained subsidies over a prolonged period could significantly burden public finances.
- *Unequal Distribution of Benefits:* Incentives for EVs often benefit wealthier segments of the population, as EVs remain more expensive than traditional vehicles. Low-income taxpayers may find themselves at a disadvantage, as they pay taxes that support those who can already afford EVs. Incentives may be concentrated in urban areas or regions with better infrastructure, while rural areas remain neglected.
- *Investment Efficiency:* Do incentives contribute to reducing $CO_2$ emissions, or do only certain groups benefit from them? If the incentives do not lead to a substantial increase in EV numbers and a corresponding reduction in harmful emissions, this may constitute a waste of public funds. Could these resources be better allocated to other environmental projects (e.g., renewable energy, public transportation)?
- *Dependency on Subsidies:* If demand for EVs relies solely on subsidies, the market may become unstable when those subsidies are reduced or eliminated. This could result in losses for taxpayers if investments do not pay off. The next question is, will the EV industry become self-sustainable without ongoing government incentives? If not, taxpayers will need to continue financing this support.
- *Environmental and Social Risks:* The production of batteries for EVs requires significant amounts of energy and critical materials (lithium, cobalt), which may have adverse environmental and social consequences. Here is a question about whether these risks are factors in the incentive costs. Due to unresolved battery recycling issues, taxpayers may incur costs for cleaning and remediating environmental damage.
- Transparency and Accountability: Is there a transparent system to monitor how funds from the incentives are utilized? Taxpayers have the right to know how their money is spent and if there was a regular evaluation of the incentive programs to determine whether they achieve the desired outcomes.
- Long-Term Economic Effects: The transition to EVs may lead to job losses in traditional sectors. A question is: Will new jobs in the EV sector compensate for losses? If incentives disproportionately benefit specific groups or regions, they may exacerbate economic inequalities. On the other hand, the closure of manufacturing plants for vehicles that use or produce internal combustion engines currently leads to job losses. Furthermore, to reduce costs, companies will eliminate many jobs even without the closure of plants. For example, Volkswagen, the largest automotive manufacturer in Europe, plans to eliminate over 35,000 jobs in Germany by 2030 (Biznis.rs, 2024). The transition to electric vehicles does not guarantee job security. Volkswagen plans to close its factory in Brussels, which produces the Audi Q8 e-tron. Audi planned to cease production in February 2025. Such a move would result in the loss of jobs for nearly 3,000 workers (Huseinagić, 2024).

Taxpayers have the right to demand that public funds be utilized responsibly and efficiently, with minimal risks and maximum benefits for society. With government incentives for improper

implementation of electric vehicles, numerous negative economic consequences may arise. These consequences can impact taxpayers, the economy, and society. The risks faced by taxpayers also affect the broader community. If the incentives do not result in EV usage increasing and a reduction in $CO_2$ emissions, it may lead to wasted funds. Poor incentive management may lead to corruption, nepotism, or misuse of resources.

Improper implementation of incentives can result in a loss of trust in government institutions and inefficient expenditure of public funds. Incentives must be properly planned, executed, evaluated, transparent, and accountable to taxpayers to mitigate these risks.

Ultimately, it is important not to lose sight of the technical challenges and battery safety. Electric motor drives have been relatively well studied thus far, and their expected performance is understood. However, battery technology remains an area of experimentation and has not yet reached a mature stage. Lithium-ion batteries, currently the dominant technology in EVs, offer numerous advantages but present uncertainties and challenges that are not yet fully resolved. Some of the key issues and uncertainties associated with EV batteries include:

- *Safety concerns:* spontaneous ignition and explosions. Lithium-ion batteries carry the risk of thermal runaway, which can potentially lead to spontaneous ignition or explosion. Nonetheless, statistics indicate that EVs are generally safer than internal combustion engine (ICE) vehicles concerning fire risks. Research shows that the incidence of fire in EVs is approximately 25 per 100,000 sold units, whereas, for ICE vehicles, it is around 1,530 per 100,000 sold units (Hoey, 2023). The most common causes are battery damage (e.g., due to an accident), manufacturing defects, overheating, or the use of inappropriate chargers. Electric vehicle (EV) manufacturers employ advanced Battery Management Systems (BMS) to mitigate the risks of overheating and thermal runaway. Despite their rarity, fires attract significant attention because of their dramatic nature. To further reduce these risks, technology is continuously advancing.
- *Submerging*: Submerging an electric vehicle in water can cause serious issues, including both short-term and long-term damage to the battery and electrical systems. If water penetrates the electrical components, it can lead to short circuits and damage vital parts of the vehicle. This hazard becomes especially significant when vehicles are fully submerged. In extreme cases, this may result in short circuits or even fires. These issues are especially pronounced when submerged in seawater, and an additional concern is that fires may occur later, even a month after the vehicle has been dry, rendering the car unsafe and potentially hazardous. (Goff, 2024; HB911, 2024; Tanim, 2024)
- *Durability and Degradation of Batteries:* Lithium-ion batteries lose capacity over time. The typical lifespan of a battery ranges from 8 to 15 years, depending on usage and environmental conditions. Batteries degrade due to the number of charge/discharge cycles, high temperatures, and depth of discharge (DoD). This degradation can reduce the range of vehicles over time. Most EV manufacturers offer warranties for batteries lasting 8 years or 160,000 kilometers, which covers a significant portion of the vehicle's lifespan. Although battery degradation poses a serious challenge, temperature management and proper charging can help alleviate this issue.
- *Environmental Issues:* The production of lithium-ion batteries requires substantial energy and critical materials (lithium, cobalt, nickel), which can have negative environmental and social consequences, such as habitat loss and poor labor conditions. Battery recycling is still evolving and remains costly. Only 5-10% of lithium-ion batteries are recycled currently, while the remainder are disposed of or used in secondary applications (e.g., energy storage).
- *Performance in Extreme Conditions:* Batteries lose capacity and performance at low temperatures, which can reduce the range of an EV by 20-40% in winter conditions. High temperatures can

accelerate battery degradation and increase the risk of thermal runaway. As demonstrated, the performance of batteries for electric vehicles is sensitive to extreme conditions; however, manufacturers are actively working to improve temperature management.

- *Uncertainties in Technological Development:* Lithium-ion batteries are dominant. Alternatives, such as solid-state and lithium-sulfur batteries, are being explored. These technologies promise good energy density, faster charging, and improved safety, but they are not yet commercially available. In 2023, Chinese companies Hina Battery and JAC introduced the first electric vehicle with sodium-ion batteries, the Sehol E10X model. (Kazbašić, 2023). New Battery Chemistry requires the development of new manufacturing processes, which can be challenging and costly.
- *Economic Challenges:* Batteries remain the most expensive component of electric vehicles (EVs), although prices are declining. The cost of lithium-ion batteries has decreased from $1,000 per kWh in 2008 to $143-$157 per kWh in 2021 (VreleGume, 2021) and further reduced to $115-$133 per kWh in 2024 (BloombergNEF, 2024). However, the pace of further price reductions may be slower. Lithium, cobalt, and nickel prices can fluctuate by impacting battery costs. While economic challenges persist, trends suggest that battery prices will continue to decline.
- *Charging Infrastructure:* Fast charging can accelerate battery degradation and increase the risk of overheating. Conversely, it is hard to expect drivers to be satisfied with several hours of battery charging. The lack of charging stations, particularly in rural areas, may limit the use of EVs. Charging infrastructure is critical for the broader adoption of EVs. It requires further investment.

## 5 CONCLUSION

It can be argued that government subsidies are often economic measures driven by political decisions. They can effectively stimulate economic growth, environmental initiatives, and/or social policies if the objectives are well-defined and quality implementation plans are established. Government incentives for electric vehicles (EVs) sought to achieve all three goals. However, based on the analysis, we conclude the governments introduced the incentives prematurely and directed them toward inappropriate purposes. The main issue is that these incentives supported an immature product.

In this context, lithium-ion batteries represent the most significant problem. Their production requires substantial energy and significant quantities of lithium. Lithium extraction processes cause considerable environmental degradation. The batteries are highly priced, and recycling remains underdeveloped and economically unviable. The manufacturing costs of electric vehicles are significantly higher than those of their gasoline-powered counterparts. All this poses risks for both manufacturers and consumers. Manufacturers would produce, and potential buyers would purchase, with everything flowing according to the principles of supply and demand. There would not be any harm had governments refrained from intervening with their subsidies and various incentives for electric vehicle buyers without proper consideration.

Governments have attracted many buyers through subsidies for electric vehicles and restrictions on internal combustion engine (ICE) vehicles. Buyers did not have complete information about electric cars and have unnecessarily spent significantly more money on vehicle purchases. That way, they formed a small EV fleet with substantial demands for electricity supply across various locations. Germans bought approximately 396,000 electric cars in 2023 out of 2.845 million new vehicles (about 14%). Even in Norway, which many consider a leader in EV adoption, the share of electric cars among all registered vehicles in 2023 was below 14%. Moreover, automobiles are not the only vehicles with ICE engines; there are buses, trucks, tractors, construction machinery, etc.

From the perspective of vehicle owners, aside from their desire to help the planet, there is no valid reason to purchase an electric vehicle. The discouraging factors include:

- *Significant Initial Cost Difference:* Electric vehicles are often substantially more

expensive than conventional vehicles, and the economic argument about reduced operational costs often does not justify this initial expense.

- *Battery Replacement Costs:* After a certain number of kilometers or years, the owner must replace the battery. Replacing the battery can be very costly. That further increases the total cost of ownership.
- *Limited Tax Incentives:* Tax incentives and subsidies are often temporary measures, and it is uncertain how long they will last. Once the government withdraws these incentives, the economic rationale becomes even less attractive.
- *Reduction in Government Revenue:* The transition to electric vehicles may decrease government revenue from fuel taxes. That must lead to tax policy changes and new challenges in funding infrastructure.

From an environmental perspective, the impact of 1-2% of electric vehicles is virtually negligible. Furthermore, it takes a minimum of two years for the CO2 emissions generated during the production of an electric vehicle to offset those from gasoline engines. The manufacturing process of electric vehicles, particularly batteries, results in higher CO2 emissions compared to the production of conventional vehicles. The replacement of vehicles with engines that are twenty years, or older, would yield a much more visible impact. Governments could have utilized taxpayer money more rationally by organizing the buyback and recycling of registered old vehicles. This approach would remove polluters from the streets, while modern EURO6 vehicles contribute significantly less to environmental pollution. Instead of distributing funds for purchases, they could have invested in the development of new battery technologies and similar initiatives, and then, upon achieving positive results, start supporting production.

It should not be overlooked that most of the electricity is generated from fossil fuels, thereby diminishing the effects of implementing electric vehicles. Additionally, the impact of heating homes with fossil fuels must not be forgotten. There are also concerns related to industrial pollution, wildfires, wars, and more.

Subsidies have also introduced risks in the social sphere. They have supported a wealthier group of individuals in purchasing more expensive vehicles, with funds being taken from all taxpayers. The poorer segments of the population have effectively subsidized the wealthier demographic.

Based on the research findings and these conclusions, it can be stated that there is evidence to reject the null hypotheses in favor of the alternative hypotheses:

$h_{Aa}$: Electric vehicles are not the best option for addressing climate change or protecting the environment.

$h_{Ba}$: Government incentives influence the production and procurement of electric vehicles.

$h_{Ca}$: Government incentives are neither the best nor the most equitable solution for increasing the share of electric vehicles in the overall passenger car fleet.

In conclusion, we must note that governments have not chosen the right moment to implement subsidies for electric vehicles; more broadly, they should not have provided subsidies for these purposes at all. A substantial amount of money has been invested, yet the effects remain negligible. The issue of electric vehicles is not of vital importance and has presented numerous unnecessary challenges.

## 6 RECOMMENDATIONS

Based on this study and prior experience, we can conclude that the modernization of automotive powertrains may yield only cosmetic results. For true environmental preservation, systemic changes in the organization of life and transportation in urban areas are necessary. It is crucial to alter the perception of transportation and vehicle ownership.

A public bus in urban transit occupies as much road space as three small cars, yet it can transport up to 35 times more passengers while consuming 11 times more fuel than a single car. After completing one route, the bus continues onward, while the small car remains parked. A personal vehicle spends 95% of its time parked.

Implementing a car-sharing model could decrease the number of cars by at least ten times. If buses were used exclusively instead of cars, the

number of vehicles could be decreased by an additional twenty-fold. Such a transportation arrangement would lead to reduced production of vehicles and batteries, as well as decreased pollution resulting from these manufacturing processes. The streets would become more accessible, parking problems would be resolved, and traffic congestion would disappear.

Only a reorganization of transportation can bring about significant results in environmental protection.

**Notes**

For more information on the application of various powertrains in vehicles, please refer to: Cekerevac, Z., & Prigoda, L. (2025). Ecological and Economic Risks of Using Gasoline, Electric, Hybrid, and Hydrogen-Powered Vehicles. *MEST Journal – SP FBIM Transactions, 13*(SP), 1-22. doi:10.12709/13.13.SP.01

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