

## Attitudes of a selected group of consumers to car electrification

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<https://doi.org/10.53465/EDAMBA.2021.9788022549301.216-225>

**Abstract.** "In order to achieve the EU's goal of climate neutrality by 2050, in line with the objectives of the Paris Agreement, the EU must increase its ambitions for the coming decade and update its climate and energy policy framework. To this end, the European Council endorses the EU's binding 2030 domestic reduction of greenhouse gas emissions by at least 55% compared to 1990. "These are the conclusions of the European Council from December 2020. As part of EU action, it calls on car makers to increase the share of electric cars by reducing quotas for maximum CO2 emissions. Our article deals with the causes and factors that prompted these steps and examines the attitude of the selected group to these steps.

**Keywords:** Electromobility, European Union, Electrification, Students, Attitude

**JEL classification:** M38, O14, O18

### 1 Introduction

"In order to achieve the European Union's climate neutrality target by 2050, in line with the objectives of the Paris Agreement, the European Union must increase its ambitions for the coming decade and update its climate and energy policy framework. To this end, the European Council endorses the European Union's binding a net domestic reduction in greenhouse gas emissions of at least 55% by 2030 compared to 1990. "These are the conclusions of the December 2020 European Council. In this paper we characterize these goals and their impact on the electrification of cars and then, based on a quantitative survey, we examine the attitudes of a selected group of consumers to the electrification of cars.

## 2 Methodology

The main aim of the article is to find out how a selected group of consumers perceive the actions of the European Union in the fight against climate change and whether or how it would affect their behavior when deciding to buy a car.

To meet the main goal, we will be helped by partial theoretical goals, in particular the analysis of factors influencing the decisions of the European Union in this area and the analysis of the conclusions of the European Council of December 2020 and May 2021. In addition, we characterize the electrification strategies of individual car makers.

We obtained primary sources using the method of marketing quantitative research by standardized inquiry through a structured questionnaire. The selected sample was a group of potential car users, students of the fourth year of the Faculty of Business of the University of Economics in Bratislava. The inquiry took place on 19.4.2021 on a sample of 114 respondents. From the total number of respondents, we obtained 63 answers. Before asking a selected group of consumers - potential car users - on the topic of car electrification, these respondents were thoroughly acquainted with the steps of the European Union as well as individual car producers for the purpose of forming a relevant opinion to the issue.

To meet our objectives, we used the following research methods:

- comparison and analysis of the source of publications on the chosen topic and synthesis of the identified approaches and theories to understand the interrelationships of the issue,
- collection, critical analysis, and synthesis of collected data from secondary sources,
- a method of scientific abstraction to identify and disclose irrelevant information,
- a method of deduction aimed at formulating the main areas of research,
- the method of marketing quantitative survey by standardized inquiry through a structured questionnaire,
- graphical methods aimed at clarifying the information obtained.

## 3 Results and Discussion

### 3.1 Literature review

According to survey conveyed in London on 1263 respondents, who had purchased Hybrid electric vehicle Toyota Prius in the last 24 Months concludes based on binary factor analysis that UK financial incentives and transport policies play important role in decision making for switching to electric vehicle. Moreover, this study also pointed out that factors influencing the rise of electric vehicles purchase are besides governmental policies for example environmental benefits such as low emissions, comfort of driving and economic benefits. [1]

Based on structural equation modelling on survey of 167 consumers participating in electric vehicles test driving are the factors slowing the electric vehicles rise the expensive purchase cost, long recharge duration, insufficient charging infrastructure and short travel range. They also think that to determine the effectiveness of electric

vehicles as climate-friendly it is important to measure the renewable energy share of electricity generation. [2]

### **3.2 European Council steps towards achieving net zero greenhouse gas emissions**

The European Union has committed itself to achieving a net domestic reduction in greenhouse gas emissions of at least 55% by 2030 compared to 1990. They made this commitment at the European Council of 10-11 December 2020.[1] Based on this commitment, the Council adopted a general approach on 17 December 2020, followed by the launch of a series of dialogue meetings between the Council and Parliament aimed at reaching a final agreement.[3]

The existential threat posed by climate change requires greater ambition as well as stronger climate action by the Union and the Member States. The Union is determined to further increase its efforts to combat climate change and to implement the 2015 Paris Agreement on Climate Change, which was the result of the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change, guided by its principles and based on the best available scientific knowledge in the context of the long-term goal of the Paris Agreement to reduce temperature. [4]

In its Communication of 11 December 2019 entitled The European Green Deal, the Commission set out a new growth strategy to transform the Union into a fair and prosperous society with a modern and competitive resource-efficient economy that will achieve net zero greenhouse gas emissions by 2050. It also aims to protect, preserve, and enhance the Union's natural capital and to protect the health and well-being of citizens from environmental risks and impacts. [5]

Actions preventing climate change should be an opportunity for all sectors of the economy in the European Union to help ensure industry leadership in global innovation. Led by Union regulators and the efforts made by industry, economic growth can be decoupled from greenhouse gas emissions. For example, while the economy grew by 60% between 1990 and 2019, greenhouse gas emissions in the European Union fell by 24% over the same period. Without prejudice to binding legislation and other initiatives taken at European Union level, all economic sectors - including energy, industry, transport, heating and cooling of buildings, agriculture, waste management and land use and forestry, and whether they are covered by the European Union Emissions Trading Scheme - should play a role in achieving climate neutrality in the European Union by 2050.

In pursuit of the European Union's new climate goal of 2030, the Commission has announced a revision of the relevant climate and energy legislation, which will be adopted in a package covering renewable energy, energy efficiency, land use, energy taxation, efficient CO<sub>2</sub> emission standards for commercial vehicles, effort sharing and the emissions trading scheme. The Commission intends to assess the impact of the introduction of other European measures that could complement existing measures, such as market measures, which include a strong solidarity mechanism.

As citizens and communities play an important role in promoting the transition to climate neutrality, strong public and social engagement in climate action at all levels,

including at national, regional, and local levels, should be encouraged, and facilitated in an accessible way. The European Commission should therefore work with all sections of society, including stakeholders representing different sectors of the economy to enable and empower them towards a climate-neutral society.

### **European Council conclusions with impact on electromobility**

Greenhouse gas emissions and removals regulated by Union legislation will be exported within the Union by 2050 at the latest, reducing emissions to zero by that date, after which the Union will strive to achieve negative emissions.

The relevant institutions of the European Union and the Member States shall take the necessary measures at European Union-wide or national level to enable the objective of climate neutrality to be achieved collectively, considering the importance of promoting justice and solidarity between Member States and cost-effectiveness in achieving those objectives.

Regarding the 2030 target, negotiators agreed on the need to prioritize emission reductions over their elimination. To ensure that sufficient efforts are made to reduce emissions by 2030, they have introduced a limit of 225 MtCO<sub>2</sub>, which corresponds to the contribution of removal to the target.

The Commission will use all relevant instruments, including the European Climate Pact, to involve citizens, social partners, and stakeholders to promote dialogue and the dissemination of scientific information on climate change and its social and gender aspects.

The Commission is working with the economic sectors of the European Union, which will decide to draw up indicative voluntary plans to achieve the European Union's goal of climate neutrality by 2050. The European Commission is monitoring the development of these plans. Its involvement includes facilitating dialogue at European Union level and sharing best practices between relevant stakeholders.

As stated in the Communication on the European Green Agreement, on 9 December 2020, the European Commission adopted a Communication on a strategy for sustainable and intelligent mobility - kick-starting the European transport of the future. The strategy sets out a roadmap for a sustainable and intelligent future for European transport, with an action plan to achieve a 90% reduction in emissions from the transport sector by 2050.[6]

### **3.3 Response of car producers to the European Union's strategies for achieving greenhouse gas reduction targets**

Based on the European Union's information on the intention to reduce greenhouse gas emissions in every sector of the economy, car manufacturers have had to adapt their approach and fleet to this goal. Many car producers publicly announce their intention to achieve greenhouse gas reduction targets in various ways.

### **Toyota Motor Corp.**

Toyota, one of the pioneers in electrification is lagging far behind its competitors since then, announced a strategy for electric vehicles, which will result in 15 new battery-powered electric vehicles introduced by 2025.

Toyota has announced that by 2025, it will launch 70 new models, including battery, hydrogen, and gas electric hybrids, which will offer customers a variety of "diverse options". The company, which is the largest car producer in the world, will manufacture these vehicles using a flexible platform, which it has developed in cooperation with the Japanese car producer Subaru.

Until now, Toyota has resisted that electric vehicles are considered the future of the automotive industry, even though it has been a pioneer in battery-powered transportation. In its announcement, Toyota described its success in the hybrid market by selling 17 million "electrified vehicles" since the launch of the Prius in 1997.[7]

### **Volkswagen AG**

Volkswagen wants electric vehicles to make up the majority of its main brand's European sales by 2030. It expects fully electric vehicles to account for more than 70% of total European vehicle market sales by 2030, compared to its previous target of 35%.

Facing the challenges of Apple, Google and Amazon, Volkswagen also plans to offer autonomous vehicles and wants to develop its own operating systems - the heart of future electric cars.

Volkswagen has set aside around € 16 billion to invest in future trends in electromobility, hybridization and digitization by 2025. [8]

### **Daimler AG**

The Daimler Group and its iconic Mercedes-Benz brand are global leaders in luxury cars made in Germany. The company is a classic driver of automotive innovation but has been slow to start making serious use of electric propulsion. Daimler, frightened by the success of his former junior partner Tesla, finally announced a dramatic shift towards a carbon-neutral future in transport and set ambitious new sustainability goals. The company has not yet decided to stop the development of internal combustion engines but plans to make its cars fully CO2 neutral by 2039.

In 2020, Mercedes-Benz tripled its global sales of plug-in hybrids and pure electric vehicles to more than 160,000 units, increasing the share of electric vehicles to more than 7% from 2% in 2019." The year 2021 represents primarily an acceleration of electrification in Mercedes-Benz Cars.

At the time of the introduction of the EQC, Daimler also committed to a more general climate initiative called "Ambition2039". Shortly before taking up his new role as CEO, Källenius promised to ensure that the entire Mercedes-Benz Cars fleet was carbon neutral by 2039. The company plans to produce CO2-neutral production in its European plants using renewable energy by 2022. By 2025, up to 25% of cars sold should be exclusively electric - but with the proviso that this will "depend on framework conditions". By 2030, Daimler aims to ensure that pure electric and plug-in hybrids

account for more than half of car sales, while reducing the number of internal combustion engine models by 70%. [9]

#### **Ford Motor Co.**

In 2021, Ford announced a doubling of investment in electric vehicles to \$ 22 billion (€ 18 billion) by 2025 and an increase in total investment in automated control to \$ 7 billion (€ 5.75 billion) from \$ 4 billion (€ 3.29 billion).

Ford began delivering the Mustang Mach-E, its first purely electric vehicle, in late December 2020 and plans to increase deliveries in early February 2021. Mach-E for North America and Europe is manufactured in Mexico, but the car producer recently announced that in the spring of 2021 it will expand production for the Chinese market from its assembly plant in Changan.

As part of an expanded commitment, Ford says electric vehicles will be the basis for the Lincoln premium brand.[10]

#### **Honda Motor Co.**

Honda has set its electrification strategy for the next two decades. The goal is the year 2040, in which all its offered vehicles will be electric or otherwise emission-free. Honda's transition to electric vehicles will be gradual and will not neglect hydrogen fuel cell vehicles - a technology that is provoking further debate about its importance.

The car producer plans to take various steps in various markets to have 40% of its offer in North America on battery or hydrogen vehicles by 2030, five years later this figure is expected to climb to 80%. By 2040, Honda wants 100% of its vehicles to be battery or hydrogen powered. Looking to the immediate future, the carmaker says it is working with General Motors to develop two large models of electric vehicles based on General Motors' Ultium powertrain and batteries, both of which should be available by 2024, one under the Acura brand and one under the Honda brand.[11]

#### **Volvo Cars**

Volvo Cars is committed to becoming a leader in the fast-growing premium electric car market and plans to become a fully electric company by 2030. Until then, the company intends to sell only fully electric cars and phase out any car from its global portfolio with internal combustion engines, including hybrids.

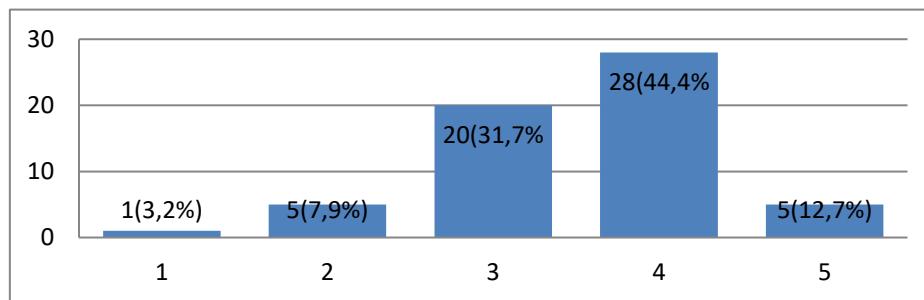
The company's transition to a fully electric car manufacturer is part of its ambitious climate plan, which aims to reduce the carbon footprint of a car's life cycle through concrete measures. Its decision is also based on the expectation that legislation, as well as the rapid expansion of available high-quality charging infrastructure, will accelerate consumer acceptance of fully electric cars.

The ambition to 2030 represents an acceleration of Volvo Cars' electrification strategy, driven by the strong demand for its electrified cars in recent years and the company belief that the market for internal combustion engines is shrinking. [12]

### 3.4 Attitudes of a selected group of consumers to car electrification

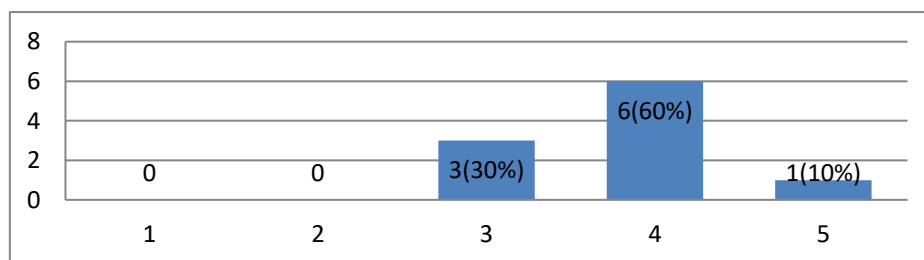
Based on a survey we conducted on a selected group of potential car users, we came to the following results.

Figure 1 shows the opinion of a selected group of consumers on the magnitude of the impact of electrification on climate change in terms of reducing greenhouse gas emissions from cars affecting the climate through electrification. The rating was on a scale of 1 to 5, with 1 meaning no and 5 a very high positive impact on climate change. We see that more than 57% of potential car users thought that the positive impact of electrification on climate change would be high and 32% thought that the positive impact would be medium. So we see that up to 89% of students think that electrifying vehicles will have a positive impact on climate change.



**Fig. 9.** How big impact do you think the electrification of car fleets will have on climate change?

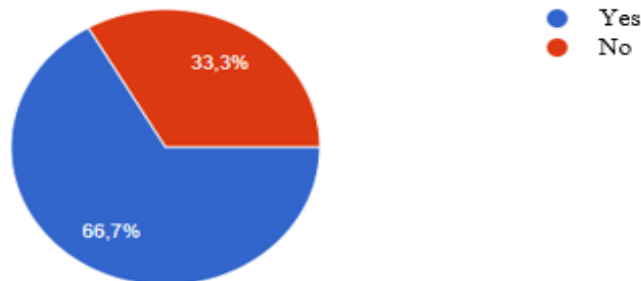
In Figure 2 we see the opinion on the same issue among respondents whose household does not own any car. In this group, we see that everyone thinks that electrification will have at least some positive impact on climate change.



**Fig. 2.** How big impact do you think the electrification of car fleets will have on climate change? (For respondents whose household does not own a car)

In Figure 3 we see the opinion of a selected group of consumers whether the benefits of electrification, i.e. especially the reduction of greenhouse gas emissions in order to reverse climate change outweigh the possible disadvantages of electrification, such as

increasing the total cost of purchasing an electric vehicle or its maintenance. Two-thirds of respondents think that the benefits outweigh the possible disadvantages.



**Fig. 3.** In your opinion, are the benefits (reduction of emissions) of electrification adequate to its possible disadvantages (increasing the total costs of procurement and maintenance)?

Figure 4 shows whether, in the opinion of a selected group of consumers, the interest in buying electric cars will increase, decrease or remain the same based on information about electrification. The answer that interest will increase is copying the trend of previous charts and was chosen by about two-thirds of respondents. About 29% of respondents think that interest will not change and only about 5% think that interest will decrease. Unsurprisingly, these consumers also think that the positive impact of electrification on the environment will be low.



**Fig. 4.** In your opinion, how will electrification, or rather consumer awareness of electrification, affect the approach of Slovak consumers to buying cars?

#### 4 Conclusion

Based on our article, we see that the European Union is working to reduce greenhouse gas emissions in all sectors. One of the main sectors of the economy affected by these plans is undoubtedly car manufacturers. Based on the analysis, we found that all larger carmakers have set electrification strategies for the coming period, some in the shorter, others in the longer term.



After conducting a quantitative survey of a selected group of respondents familiar with electrification at the European Union level and at the level of automobiles, we see that they mostly hold a positive view of the effects of electrification on access to electromobility at the level of Slovak consumers and personally. The selected group of respondents also mostly thought that the impact of electrification on climate change would be positive.

Unfortunately, we were unable to compare our research results to other research done in the past as the survey structure was very unique and linked to the latest European Council conclusions.

## References

1. Ozaki, R., & Sevastyanova, K. (2011). Going hybrid: An analysis of consumer purchase motivations. *Energy Policy*. <http://doi.org/10.1016/j.enpol.2010.04.024>, last accessed 6.10.2021
2. Degirmenci, K., & Breitner, M. H. (2017). Consumer purchase intentions for electric vehicles: Is green more important than price and range? *Transportation Research Part D: Transport and Environment*. <http://doi.org/10.1016/j.trd.2017.01.001> last accessed 6.10.2021
3. European Council conclusions (2020) European Council conclusions of 11.12.2020. <https://www.consilium.europa.eu/media/47340/1011-12-20-euco-conclusions-sk.pdf> , last accessed 17.5.2021
4. European Council conclusions (2020) European Council conclusions of 17.12.2020. <https://data.consilium.europa.eu/doc/document/ST-14171-2020-INIT/sk/pdf> , last accessed 17.5.2021
5. Official Journal L282 (2016) Official Journal of the European Union, L 282, 19 October 2016. <https://eurlex.europa.eu/legalcontent/EN/TXT/?uri=OJ%3AL%3A2016%3A282%3ATOC>, last accessed 17.5.2021
6. European Council conclusions (2021) European Council conclusions of 25.05.2021. <https://www.consilium.europa.eu/media/49809/2425-05-21-euco-conclusions-sk.pdf> , last accessed 26.5.2021
7. Hawkins,A.J. (2021) Toyota finally gets off its ass and announces a real electric vehicle strategy. <https://www.theverge.com/2021/4/19/22391738/toyota-electric-vehicle-strategy-bz4x-concept-subaru>, last accessed 17.05.2021
8. Schwarz,J., Steitz,CH. (2021) Main Volkswagen brand speeds up shift to electric. <https://www.reuters.com/article/us-volkswagen-brand-strategy-idUSKBN2AX0WE>, last accessed 17.05.2021
9. Amelang, S. (2021) Reluctant Daimler shifts gear in race to sustainable mobility. <https://www.cleanenergywire.org/factsheets/reliant-daimler-plans-radical-push-new-mobility-world>, last accessed 17.05.2021
10. Abuelsamid, S. (2021) Ford Doubling Investment In Electric Cars And Trucks To \$22 Billion. <https://www.forbes.com/sites/samabuelsamid/2021/02/04/ford-doubles-investment-in-electrification-to-22b-7b-for-avs/?sh=6075ee3d2d25>, last accessed 17.05.2021
11. Ramey, J. (2021) Honda Will Go Electric- and Fuel Cell-Only by 2040. <https://www.autoweek.com/news/green-cars/a36230978/honda-electric-and-fuel-cell-by-2040/>, last accessed 17.05.2021

12. Volvo Cars Media Relations (2021) Volvo Cars to be fully electric by 2030. <https://www.media.volvocars.com/global/en-gb/media/pressreleases/277409/volvo-cars-to-be-fully-electric-by-2030>, last accessed 17.05.2021