DOI https://doi.org/10.58423/2786-6742/2023-3-75-85
UDC 338.45:629.113

Eszter MAKLÁRI
student, Institute of Accounting and Financial Studies,
Faculty of Economics and Business, University of Debrecen,
Debrecen, Hungary
ORCID ID: 0000-0001-5294-0684

ECONOMIC COMPARISON BETWEEN CONVENTIONALLY POWERED AND ELECTRIC CARS

Анотація. *Однією з найсерйозніших екологічних проблем сучасності є забруднення повітря, яке завдає величезної шкоди не лише екосистемі, а й організму людини. Збільшення забруднення повітря не тільки збільшує ризик респіраторних інфекцій, але й збільшує ризик астми, хронічного бронхіту та серцевих захворювань. Щоб зменшити ці негативні наслідки, Європейське агентство з навколишнього середовища підтримує впровадження заходів, вжитих відповідальними особами ЄС для зменшення забруднення повітря. На засіданні в Страсбурзі 14 лютого 2023 року Європейський парламент прийняв угоду про очищення повітря, вимагаючи, щоб усі нові автомобілі та мікроавтобуси, що продаються в Європейському Союзі з 2035 року, мали електроживлення. Коли це положення стане остаточним, почнеться поступове розширення ринку електромобілів, частка яких у загальній кількості автомобілів на дорогах постійно зростає. Цей останній факт виправдовує перевірку проникнення, експлуатаційних і фінансових наслідків транспортних засобів із зеленими номерами. У дослідженні представлено економічне порівняння найпопулярнішого чисто електричного легкового автомобіля в Європейському Союзі в 2022 році, Tesla Model Y із зеленим номером, і Peugeot 208 зі звичайним двигуном. До розгляду було взято чотири економічно розвинені країни-члени ЄС: Угорщину, Данію, Норвегію та Францію. Досліджено фінансове навантаження на власників цих типів автомобілів у рік покупки та в наступні роки використання. Розрахунки базуються на законодавстві та ринкових цінах у 2023 році Враховуючи середню зміну ринкових цін, розраховано зростання витрат на обидва типи автомобілів на 10% на рік. Аналіз показує, що хоча в короткостроковій перспективі власники електромобілів стикаються з набагато вищими витратами, ніж їхні бензинові аналоги, у довгостроковій перспективі вони є чудовою інвестицією в екологічно чистіший автомобіль. Висновки підтверджуються тим фактом, що загальні витрати на легковий автомобіль Peugeot 208 у 2023 році перевищать загальну вартість покупки та витрати на технічне обслуговування моделі Tesla Y у 2023 році в Угорщині приблизно через 10 років, 13 років у Норвегії, 10 років у Данії і 12 років у Франції.*
Ключові слова: *сталість, електромобільність, автомобільна промисловість, вартість обслуговування, транспортний податок, вартість зарядки, вартість палива*

JEL Classification: Q56, Q55, Q58

Absztrakt. *Napjaink legsúlyosabb környezetvédelmi problémái közé tartozik a légszennyezés, amely nemcsak az ökoszisztémára, de az emberi szervezetre is rendkívül káros hatással van. A levegő szennyezettségének az erősödése ugyanis amellett, hogy növeli a légúti fertőzések kialakulásának az esélyét, fokozza az asztma, a krónikus hörghurut, a szívbetegségek megjelenésének a kockázatát is. Az említett negatív következmények visszaszorítása érdekében az Európai Környezetvédelmi Ügynökség támogatja a légszennyezés csökkentése céljából az Európai Unió döntéshozó szervei által meghozott intézkedések végrehajtását. A 2023. február 14-én megrendezésre kerülő strasbourgi ülésen az Európai Parlement elfogadta a levegő tisztábbá tétele érdekében napirendi pontra kerülő*

megállapodást, 2035-től az Európai Unióban az értékesítésre kerülő új személygépkocsiknak és kisteherautóknak elektromos meghajtással működő járműveknek kell lenniük. Feltételezem, hogy a rendelkezés véglegessé válásának hatására fokozatosan bővülés tapasztalható majd az elektromos járműveknek a jelenleg is az összes forgalomban lévő autó állományában folyamatosan egyre nagyobb arányt képviselő piacán. Az utóbbi tény indokolttá teszi a zöld rendszámmal rendelkező közlekedési eszközök elterjedtségének, működési és pénzügyi következményeinek a vizsgálatát. Tanulmányomban a 2022-es évben az Európai Unióban legkeresettebb tisztán elektromos meghajtással rendelkező személygépjármű, a „Tesla Model Y" típusú zöld rendszámmal rendelkező autó, valamint a „Peugeot 208" hagyományos meghajtású gépjármű gazdasági összehasonlítását mutatom be. A példát négy gazdaságilag fejlett európai uniós tagállamra, Magyarországra, Dániára, Norvégiára és Franciaországra vonatkoztatva prezentálom. Folyóiratcikkemben ismertetem az említett autótípusok tulajdonosainak a beszerzés évében és az azt követő használati években jelentkező anyagi terheit. Számításaimat a 2023-as évben érvényes jogszabályok és piaci árak ismeretében végeztem el. A piaci árak átlagos változását figyelembe véve a táblázatban szereplő költségek évi 10%-os növekedésével kalkuláltam mindkét autótípus esetében. Az elemzés alapján kijelenthetem, hogy bár rövidtávon az elektromos autó tulajdonosainak sokkal több kiadással kell számolniuk, mint a benzines meghajtású személygépjárművel rendelkező társaiknak, azonban hosszútávú befektetésként kiváló választás a környezetkímélő gépjármű választása. Megállapításomat alátámasztja, hogy a Peugeot 208 típusú, 2023-as kiadású személygépjárműre költendő ráfordítások összege Magyarországon megközelítőleg 10 év, Norvégiában 13 év, Dániában 10 év, Franciaországban 12 év elteltével meghaladja a 2023-ban piacra kerülő Tesla Y modell beszerzési árának és fenntartási költségeinek összértékét.
Kulcsszavak: *fenntarthatóság, elektromobilitás, autóipar, fenntartási költség, gépjárműadó, töltési költség, üzemanyagköltség*

Abstract. *One of the most serious environmental problems of our time is air pollution, which has a profoundly damaging effect not only on the ecosystem but also on the human body. Increasing air pollution not only increases the risk of respiratory infections, but also increases the risk of asthma, chronic bronchitis and heart disease. In order to reduce these negative effects , the European Environment Agency supports the implementation of measures taken by EU decision-makers to reduce air pollution. At its meeting in Strasbourg on 14 February 2023, the European Parliament adopted an agreement to clean up the air by requiring all new cars and vans sold in the European Union from 2035 to be electrically powered. When this provision becomes definitive, there will be a gradual expansion of the market for electric vehicles, which already represents a steadily increasing proportion of the total number of cars on the road. This latter fact justifies an examination of the penetration, operational and financial consequences of vehicles with green plates. In the study an economic comparison between the most popular pure electric passenger car in the European Union in 2022, the Tesla Model Y with a green plate, and the Peugeot 208 with a conventional engine has been presented. Four economically developed EU Member States, Hungary, Denmark, Norway and France have been taken for consideration. The financial burden on owners of these car types in the year of purchase and in the following years of use has been investigated. The calculations are based on the legislation and market prices in 2023. Taking into account the average change in market prices, an increase of 10% per year in the costs shown in the table for both types of car has been calculated. The analysis shows that, although in the short term, owners of electric cars face much higher costs than their petrol-powered counterparts, in the long term they are an excellent investment in a cleaner vehicle. Conclusions are supported by the fact that the total expenditure on a Peugeot 208 passenger car in 2023 will exceed the total purchase price and maintenance costs of a Tesla Y model in 2023 in Hungary after approximately 10 years, 13 years in Norway, 10 years in Denmark and 12 years in France.*
Keywords: *sustainability, electromobility, automotive industry, maintenance cost, vehicle tax, charging cost, fuel cost*

A general formulation of the problem. In 1987, the United Nations World Commission on Environment and Development published its report "Our Common Future", which for the first time presented the phenomenon of sustainable development at international level. It set the goal of a new era of economic growth, growth that is robust but also socially and environmentally sustainable [1]. All the definitions of sustainability that have been developed since then have understood the concept in terms of the interaction between the natural, social and economic environment. The most general and comprehensive system is the natural environment, which partly determines the operating conditions of the society living in it, resulting in an efficient economy, reflected in the competitiveness of the country concerned. Until the turn of the millennium, competitiveness was divided into only three well-known categories: income, trade and investment competitiveness. However, in addition to these dimensions, the last decade has seen the emergence of new dimensions of competitiveness: technological, digital and sustainable competitiveness [2, p. 219; 3, p. 359-362]. These dimensions should not move forward in isolation, but in support of each other. The dissemination of new, advanced knowledge and skills (in the form of products, tools, technologies, information, etc.) and their transfer to users in the digital revolution must be carried out with environmental sustainability in mind [4]. The automotive industry, too, has adopted this approach, and has begun to produce and market hybrid and pure electric vehicles in search of alternatives to conventional cars.

Globally, the number of electric cars on the market has been gradually increasing since 2012, and in the European Union since 2019. In the EU, 724% more electric vehicles will be registered in 2021 than in 2018. Since then, this rate has been steadily [5;6] increasing.

Despite this growing trend, in March 2023 the share of pure electric passenger cars was still only 13.9%, while the share of plug-in hybrid cars was only 7.2% of all passenger cars on the road in the European Union [7].

The use of pure electric vehicles significantly improves the environmental indicators measuring air pollution [8], and the European Environment Agency supports the implementation of measures taken by the EU's decision-making bodies to reduce air pollution [9].

Analysis of the latest research and publications. Consumers are motivated to buy vehicles with green plates by a number of operational incentives, financial benefits and incentives provided by governments. These include lower emissions [10, p. 2], lower noise pollution [11, p. 323], safer driving [12, p. 57] and lower potential for component failure [13, p. 31]. In my research, I explore the explanation for the fact that, despite the operational and direct financial benefits of using electric vehicles and the incentives provided by governments, the share of electric cars in the total number of passenger cars on the road was below 15% in 2023. The calculations for my analysis were carried out using the example of the pure electric and petrol passenger car most in demand in the European Union in 2022. In 2022, the car with the highest sales in the EU was the Tesla Model Y, while the best-selling petrol car was the

Peugeot 208 [14; 15].In my study, I have calculated the market prices of four economically developed countries that offer significant financial incentives to consumers to buy electric cars.

In Hungary, the local authorities in several large cities offer free parking to owners of vehicles with green plates [16]. In Denmark, the vehicle tax is based on carbon dioxide emissions [17]. In Norway, electric cars with a purchase price of less than NOK 500 000, i.e. approximately HUF 19 million, are exempt from VAT for consumers. For purchases of vehicles with a purchase price above this amount, the buyer can claim the discount on the part of the purchase price of the electric car below NOK 500 000 [18].

In France, there are plans to develop a programme to strongly encourage the use of electric cars. Under an initiative called "social leasing", the government will allow lower-income families to lease a purely electric car for €100 per month [19].

Formulate the purpose of the article. In my study, I have estimated the costs of the most popular electric cars and petrol cars in the European Union in 2022, according to the literature, taking into account the market conditions and current legislation in four developed economies. My aim is to prove or disprove the fact that, despite the lower maintenance costs of electric cars, the high initial purchase prices make it uneconomic for consumers to buy them.

Presentation of the research results. In order to prove our hypothesis in the previous chapter, I compared the financial expenditures of the electric passenger car with the highest sales number in 2022, the Tesla Model Y, and the car with the highest sales number in 2022, the Peugeot 208 petrol passenger car (*Tables 1 and 2*).

Table 1.

The financial costs of the "Tesla Model Y" in the year of acquisition defined in euros

	Hungary	Norway	Denmark	France
purchase price	53.254	50.996	51.361	44.990
maintenance cost	96	92	92	81
charging cost	-	1.237	1.303	1.436
car tax	0	260	99	0

Source: Own editing based on [20; 21, 22; 23; 24; 25; 26; 27; 28; 29; 30; 37; 38; 39]

Table 2.

The financial costs of the "Peugeot 208" in the year of acquisition defined in euros

	Hungary	Norway	Denmark	France
purchase price	21.302	19.285	26.855	19.200
maintenance cost	87	79	110	79
fuel costs	2.364	2.572	2.926	2.681
car tax	68	260	99	0

Source: Own editing based on [31; 40; 41; 42; 37; 36; 42; 43 ; 44; 29; 30; 37; 38; 39; 48]

First, I have determined the purchase prices of the new Tesla Y model, which will be launched in 2023 and will be powered by a new all-electric propulsion system, and the Peugeot 208 model, which will be powered by a 75 hp, 1.2 litre PureTech petrol engine, for the countries listed.

Currently, the market purchase price of the new Tesla Model Y is 2.5 times the purchase price of a Peugeot 208 passenger car in Hungary, 2.64 times in Norway, 1.91 times in Denmark and 2.34 times in France for the 2023 model.

The consumer prices of the two types of car under consideration are almost at the same level in each of the countries under consideration, with only a difference of a few thousand euros between the markets of the priority Member States.

The purchase price of the Tesla Model Y was the lowest in France, where customers could buy the car for €44,990, while in Hungary the purchase price of the Tesla Model Y was €53,254, in Norway €50,996 and in Denmark €51,361 [20; 21; 22; 23].

Currently, Hungary has the highest purchase price of the analysed countries, but since January 2023, consumers have been able to buy the Tesla Model Y at a reduced gross price [20].

In 2023, consumers will be able to buy a Peugeot 208 passenger car in the range of €19,000 to €26,000 in the countries under review. The lowest purchase price (€19,200) will be in France, while the highest purchase price (€26,855) will be in Denmark.

In Hungary and Norway, the new Peugeot 208 passenger car will have a 2023 price tag of €21,302 and €19,285 respectively [31; 40, 41; 42].

After studying the purchase prices, I estimated the cost of replacing parts and repairs needed to keep these vehicles in working order for one year. Experts say that to ensure reliable operation, vehicle owners should have their brake fluids checked every two years, cabin air filters should be replaced every two years, and HEPA filters and carbon filters every three years. In addition, it is recommended that brake calipers are cleaned and lubricated annually and tyres replaced after 10,000 km [32].

In my research, I estimated the annual cost of maintaining a Tesla Model Y. As the underlying literature suggests that the brake fluid should be assessed every two years and the cabin air filter should be replaced every two years, I have calculated the annual maintenance cost as half the service charge for these two jobs.

Since it is recommended that the HEPA filters be replaced every three years, I have added one third of the latter cost to the annual maintenance charge. According to the literature, the average annual mileage of a passenger car in Hungary is 20,000 km [24].

I based my calculations on the latter fact. Since, as mentioned above, tyres should be replaced after 10,000 km, I have included twice the service charge for this in the calculation of the annual maintenance cost.

The annual maintenance fees for the Tesla Model Y were estimated based on the service charges applicable in Hungary in 2023, which were calculated to be €30.62 for brake fluid condition assessment, €5.99 for changing the cabin air filter, €3.99 for HEPA filters, €37.28 for cleaning and lubricating the calipers, and €17.31 for changing the tyres [33; 45; 46; 47].

The service costs per year for the Tesla Model Y, calculated based on market prices in 2023, are summarised in *Table 3*.

Table 3.

"Tesla model Y" service cost per year defined in euros

Job description	Service costs per year (in EUR)
brake fluid condition assessment	30,62
replacement of the passenger compartment air filter	5,99
HEPA filter replacement	3,99
cleaning and lubricating calipers	37,28
replacement of tyres	17,31
total	95,18

Source: Own editing based on [24; 33; 45; 46;47]

Based on my estimate, the total annual maintenance fee for a Tesla Model Y car in Hungary is €95.18, which is 0.18% of the car's purchase price in Hungary (€53,254). Based on this fact, I estimated the annual maintenance fee for an electric car in each of the countries under study at 0.18% of the purchase price of the car. In Norway and Denmark, I estimated the maintenance costs at €92 and in France at €81. For the annual maintenance of a new Peugeot 208, many service stations offer a discounted price package [34]. Consumers currently have access to the latter service from €87.34, which represents 0.41% of the purchase price of a new Peugeot 208 in Hungary (€21,302), and I therefore estimated the annual maintenance costs in the countries studied at 0.41% of the purchase price. Based on these figures, the estimated annual cost of a Tesla Model Y is €79.07 in Norway, €110.10 in Denmark and €78.72 in France.

In addition to the annual maintenance costs, the cost of charging a car for electric vehicles and the cost of fuel for petrol cars also represents a significant burden for consumers. To determine the annual charging price, I first calculated the average annual consumption. Based on the literature, I have calculated a consumption of 19.4 kilowatts/100 km [25]. As mentioned above, I assume a mileage of 20,000 km per year. On this basis, an annual consumption of 3,880 kilowatts per year is assumed.

In Hungary, electric vehicles can be charged free of charge in the car parks of some supermarkets, so owners of cars with green plates in the country do not necessarily have to pay for charging [26]. In Norway, consumers can obtain 1 kilowatt of electricity by paying at least NOK 3.75 [27]. At this price per kilowatt, consumers have to pay EUR 1,236.65 for 3,880 kilowatts. In Denmark, owners of electric cars can buy a kilowatt of electricity for as little as DKK 2.5 [28]. The purchase price of 3,880 kilowatts of electricity in Denmark is EUR 1,302.51. On the motorways of France, Tesla owners can charge their cars for 37 cents per kilowatt [35]. In France, 3,880 kilowatts of electricity can be purchased for EUR 1,435.60.

To determine the fuel costs of the petrol car under study, the Peugeot 208, I used the average price of unleaded 95 octane petrol in January, February, March and April 2023. I calculate the average price of a litre of unleaded 95 octane petrol at EUR 1,69 in Hungary, EUR 1,84 in Norway, EUR 2,09 in Denmark and EUR 1,92 in France, based on data for the first trimester of 2023 [36; 43; 44; 48]. Based on this average

petrol price, the annual cost of petrol is €2,364.34 in Hungary, €2,571.98 in Norway, €2,926.08 in Denmark and €2,681.00 in France.

After determining the annual cost of filling up a Tesla Model Y and the annual fuel cost of a Peugeot 208 petrol car, I determined the value of the vehicle tax that increases the expenditure of the owners of these cars, taking into account the legislation in force in the Member States analysed. In Hungary, according to Article 7(1) of Act LXXXII of 1991 on the Motor Vehicle Tax, the motor vehicle tax rate is HUF 345 per kilowattonne in the year of manufacture of the car and in the three calendar years thereafter. According to § 5 of the Act, the owner of an environmentally friendly car is exempt from paying the tax [29]. According to paragraph 5.5 of the Regulation No. 6/1990, a clean vehicle is a vehicle that is electric and capable of operating without carbon dioxide emissions [30]. On the basis of this provision, it can be concluded that owners of a Tesla Model Y are exempt from paying vehicle tax, while owners of a new type Peugeot 208, which runs on petrol, are liable to pay HUF 345 per kilowatt hour to the tax authorities. According to the literature, the vehicle has a power output of 74 kilowatts, so owners are liable to pay car tax to the value of €2,364 per year [31]. In Norway, the compulsory motor insurance premium for both electric cars and passenger cars under 7,500 kg is NOK 8.38 per year [37].110 kg, the Norwegian tax authority's rules require owners to pay a car tax of EUR 260 for both the electric Tesla and the petrol Peugeot 208 [31]. In Denmark, the green car tax for electric and plug-in hybrid cars will be DKK 370 for six months in 2023. According to current legislation, cars registered on or after 1 July 2021 with carbon dioxide emissions above 116 g/km and below 131 g/km will be subject to a car tax of DKK 600 per half-year [38]. Based on these figures, owners of a Tesla will have to pay a car tax of €99, while owners of a Peugeot 208 will have to pay a car tax of €161. In France, owners of pure electric vehicles are exempted from paying vehicle tax, while cars emitting CO2 are subject to a so-called "Malus tax". Owners of passenger cars with CO2 emissions of 123 g/km are required by law to pay a "Malus tax" of €50 per year [39].

Finally, based on the assumptions made, and taking into account the purchase price, annual maintenance costs, fuel and filling fees, and car tax, I have estimated the costs that consumers in the four EU Member States under study will have to expect to pay for a car that will be on the market in 2023, the new all-electric Tesla Model Y and the Peugeot 208 with a 75 hp, 1.2 litre PureTech petrol engine in the year of purchase and in the years of use thereafter. Our results are shown *in Tables 4 and 5.* Taking into account the average change in market prices, I have calculated an increase in the costs shown in the table of 10% per year for both car types. My calculations show that the total expenditure on the petrol car under analysis, taking into account the market prices in Hungary and Denmark, will reach the total cost for the owners of the electric car under analysis in 10 years, 13 years in Norway and 12 years in France. After these years, the total expenditure on petrol cars is significantly higher.

Table 4.

The "Tesla Model Y" maintenance costs defined in euros

	Hungary	Norway	Denmark	France
year of purchase (year 1)	53.254	51.256	51.460	44.990
Year 2	105	1.747	1.644	1668
Year 3	116	1.922	1.808	1835
Year 4	128	2.114	1.989	2019
Year 5	140	2.326	2.188	2.220
Year 6	154	2.558	2.407	2.442
Year 7	170	2.814	2.647	2.687
Year 8	187	3.095	2.912	2.955
Year 9	205	3.405	3.203	3.251
Year 10	226	3.745	3.524	3.576
Year 11	249	4.120	3.876	3.934
Year 12	273	4.532	4.263	4.327
Year 13	301	4.985	4.690	4.760

Source: Own editing based sources used in the journal article

Table 5. The "Peugeot 208" maintenance costs defined in euros

	Hungary	Norway	Denmark	France
year of purchase (year 1)	23.734	22.117	29.942	21.931
Year 2	2.772	3.202	3.517	3.091
Year 3	3.049	3.522	3.869	3.400
Year 4	3.354	3.875	4.256	3.740
Year 5	3.689	4.262	4.681	4.114
Year 6	4. 058	4.688	5.149	4.525
Year 7	4.464	5.157	5.664	4.978
Year 8	4.910	5.673	6.231	5.475
Year 9	5.401	6.240	6.854	6.023
Year 10	5. 941	6.864	7.539	6.625
Year 11	6.535	7.550	8.293	7.288
Year 12	7.189	8.305	9.122	8.016
Year 13	7.908	9.136	10.035	8.818

Source: Own editing based sources used in the journal article

Conclusions and options for further research. In the light of the data presented in the table above, it can be stated that the purchase price of the analysed electric car in each of the countries under study is significantly higher than the purchase price of the petrol car under study. The purchase price of a Tesla Y model to be launched in 2023 is 2.5 times higher in Hungary, 2.64 times higher in Norway, 1.91 times higher in Denmark and 2.34 times higher in France than the purchase price of a Peugeot 208 passenger car in 2023. In contrast, my calculations show that the value of the expenditure on a petrol car in the years of use after purchase is higher than for a car with a green number plate. The sum of the annual costs of an electric car and a petrol car is closest in Denmark and France, but even in these countries the annual

maintenance costs of a petrol car are 1.8 times higher than the annual maintenance costs of an electric car.

Based on the above analysis, the hypothesis formulated at the beginning of my research, that the initial high purchase prices of electric cars make it uneconomic for consumers to buy them, despite the lower maintenance costs, is refuted. My conclusion is supported by the fact that the total expenditure on a Peugeot 208 passenger car in 2023 will exceed the total purchase price and maintenance costs of a Tesla Y model in 2023 after approximately 10 years in Hungary, 13 years in Norway, 10 years in Denmark and 12 years in France. The analysis suggests that, although in the short term, owners of electric cars will have to pay much more than their petrol-powered counterparts, in the long term they are an excellent investment in a cleaner vehicle.

In order to reduce these payback times, I propose that Member State governments should provide financial support for the purchase and use of pure electric vehicles, because my calculations confirm the fact that, although the use of these vehicles is extremely beneficial from an environmental point of view, the purchase of these vehicles entails a significant financial burden for consumers. I believe that financial assistance for citizens is essential in order to achieve the European Union objective mentioned at the beginning of this study.

"Supported by the ÚNKP-22-2-1 New National Excellence Program of the Ministry for Culture and Innovation from the source of the National Research, Development and Innovation Fund."

References

1. Gonda T. (2022). Alternative tourism. Budapest. Akadémiai Kiadó. Available from: https://mersz.hu/gonda-alternativ-turizmus// (accessed: 02.05.2023.)
2. Béresné Mártha, B. (2018a). The factors of digitalisation and sustainable competitiveness in Hungary. International Journal of Engineering and Management Sciences. Vol. 3. No. 3. pp. 217-226.
3. Béresné Mártha B. (2018b). Sustainable competitiveness - focus on Hungary. Dinya, László; Baranyi, Aranka (edited) XVI International Scientific Day. XVI. 359-366.
4. Béresné Mártha B. (2018c). Sustainable competitiveness of Hungary - focusing on the years 2013-2017. Annals of the University of Oradea Economic Science. Vol. 1. No. 1. pp. 269-278.
5. Camille, B. (2023): Sales of electric cars in the EU broke records in 2022. Which country in Europe is leading the way?. Available from: https://www.euronews.com/next/2023/02/20/sales-of-electric-cars-in-the-eu-broke-records-in-2022-which-country-in-europe-is-leading (accessed: 25.03.2023)
6. IEA (2022). Global EV Data Explorer. Available from: https://www.iea.org/data-and-statistics/data-tools/global-ev-data-explorer (accessed: 07.04.2023)
7. E-cars (2023a). Huge increase in new electric cars in the EU. https://e-cars.hu/2023/04/19/hatalmasat-nott-az-uj-elektromos-autok-szama-az-eu-ban/ (accessed: 20.05.2023)
8. Nagyváradi R. (2015). Characteristics and consumer habits of the trade of environmentally friendly cars in Hungary. Budapest School of Economics, Faculty of Commerce, Hospitality and Tourism. 84. p.
9. EEA (2023). European Environment Agency. Available from: https://european-union.europa.eu/institutions-law-budget/institutions-and-bodies/search-all-eu-institutions-and-bodies/european-environment-agency-eea_hu (accessed: 20.05.2023)

10.Gelmanova Z. S. - Zhabalova G.G.- Sivyakova G.A. - Lelikova O.N. - Onishchenko O.N. - Smailova A. A. - Kamarova S.N. (2018): Electric cars. Advantages and disadvantages. In: Journal of Physics: Conference Series. Available from: doi :10.1088/1742-6596/1015/5/052029
11.Lapko A. (2016). The Use of Auxiliary Electric Motors in Boats and Sustainable Development of Nautical Tourism - Cost Analysis, the Advantages and Disadvantages of Applied Solutions. 16. pp. 323-328. Available from: https://www.sciencedirect.com/science/article/pii/S2352146516306457?via%3Dihub
12.Targonya A. - Khmeluk A. - Bankovskaya I. (2019). electric cars: advantages and disadvantages. belarusian national technical university. minsk, belarus. pp. 56-59. Available from: https://rep.bntu.by/bitstream/handle/data/60789/56-59.pdf
13.Morgan R.K. - Badar M. A. Rodchua S.- Shahhosseini A.M. (2021). fuel economy, annual fuel costs, and maintenance of conventional and electric vehicles. international association of journals & conferences. Vol. 13. No. 1. pp. 25-33.
14.Electric Car Drivers (2023a). Driving share of electric cars in Europe has increased spectacularly. https://villanyautosok.hu/2023/02/08/40-szazalekkal-nott-a-villanyautok-reszesedese-europaban/ (accessed: 21.05.2023)
15.Zách D. (2022). These are now Europe's most popular new cars. Telec. Available from: https://telex.hu/tech/2022/12/07/ezek-most-europa-legnepszerubb-autoi (accessed: 25.05.2023)
16.Electric cars (2023c): in which cities can you park for free with a green number plate? Available from: https://villanyautosok.hu/zold-rendszam/mely-varosokban-lehet-zold-rendszammal-ingyen-parkolni/ (accessed: 20.05.2023)
17.Greendex (2020). At least 775,000 electric cars will be on the road in Denmark within 10 years. Available from: https://greendex.hu/daniaban-10-even-belul-legalabb-775-ezer-elektromos-auto-lesz-forgalomban/ (accessed: 25.05.2023)
18.Autopro (2023). Electric cars take off in Norway. Available from: https://autopro.hu/elemzesek/taroltak-az-elektromos-autok-norvegiaban/828444 (accessed: 20.03.2023)
19.E-cars (2022). Social leasing for electric cars would be introduced. Available from: https://e-cars.hu/2022/08/30/szocialis-lizinget-vezetnenek-be-elektromos-autokra/ (retrieved 01/05/2023)
20.E-cars (2023b). Tesla has once again cut prices in Hungary. Available from: https://e-cars.hu/2023/04/14/ismet-arat-csokkentett-a-tesla-magyarorszagon/ (accessed: 22.05.2023)
21.Ccarprice.com (2023). Tesla Model Y SR Plus RWD 60kWh 2023. Available from: https://www.ccarprice.com/no/tesla-model-y-sr-plus-rwd-60kwh-2023-price-in-norway-16424 (accessed: 10.05.2023)
22.Tesla (2023a). Maintenance service intervals. Available from: https://www.tesla.com/ownersmanual/2015_2020_modelx/hu_hu/GUID-E95DAAD9-646E-4249-9930-B109ED7B1D91.html (accessed: 20.03.2023)
23.Automobile-propre.com (2023). Tesla Model Y. Available from: https://www.automobile-propre.com/voitures/tesla-model-y/ (accessed: 09.05.2023)
24.Pénzcentrum (2019). We calculated: this is how long it takes to pay for an electric car in Hungary. Available from: https://www.penzcentrum.hu/auto/20190201/kiszamoltuk-ennyi-ido-alatt-terul-meg-egy-elektromos-auto-magyarorszagon-1074337 (accessed: 20.03.2023)
25.Szörényi A. (2023). This car can be "refuelled" for free in Hungary. Vezess.hu. Available from: https://www.vezess.hu/ujauto-teszt/2023/01/07/teszt-tesla-model-y-performance-autoteszt-tesla-model-y/ (accessed: 21.03.2023)
26.Electric car drivers (2023b). Traveling to Hungary with an electric car. Available from: https://villanyautosok.hu/traveling-to-hungary-with-an-electric-car/ (accessed: 02.05.2023)
27.Tiltak.no (2022). loaders for elbiler. Available from: https://www.tiltak.no/c-miljoeteknologi/c4-atferdspaavirkning/c-4-6/ (accessed: 12.05.2023)
28.Norlys.dk (2023). price for charging of electricity at private charging stations and public charging stations. Available from: https://norlys.dk/inspiration/opladning/pris-for-opladning-af-elbil-ude-og-hjemme/ (accessed: 10.05.2023)

29.LXXXII of 1991 law about the vehicle tax
30.6/1990 (IV. 12.) KöHÉM decree on the technical conditions for putting road vehicles into service and keeping them in service
31.Peugeot-Vagép.hu (2023): Peugeot 208 Active Pack 1.2 PureTech 100 HP 8-speed automatic. Available from: https://www.peugeot-vagep.hu/uj-autok/uj-auto-keszlet/?caru-smPage=1&caru-smVehicleId=17653 (accessed: 02.03.2023)
32.Tesla (2023b). Model Y. Available from: https://www.tesla.com/da_DK/modely/design#overview (accessed: 04.05.2023)
33.Auto-detektiv.com (2023): Car Detective on-site car condition assessment and inspection. Available from: https://auto-detektiv.com/allapotfelmeres-arak/ (accessed: 06.05.2023)
34.Peugeot.hu (2023): Available from: https://www.peugeot.hu/szerviz-es-alkatresz/karbantartas/karbantartasi-csomagok/kotelezo-karbantartas.html (accessed: 02.05.2023)
35.Gomez P. É. (2023). combien coûte vraiment la recharge d'un véhicule électrique ?. Available from: https://media.roole.fr/transition/voiture-propre/combien-coute-vraiment-la-recharge-dun-vehicule-electrique (accessed: 08.05.2023)
36.NAV (2023): fuel prices applicable in 2023. Available from: https://nav.gov.hu/ugyfeliranytu/uzemanyag/2023-ban-alkalmazhato-uzemanyagarak (accessed: 04.05.2023)
37.Skatteetaten.no (2023). Trafikkforsikringsavgift. Available from: https://www.skatteetaten.no/bedrift-og-organisasjon/avgifter/saravgifter/om/trafikkforsikringer/ (accessed: 12.03.2023)
38.Skm.dk (2022) Brændstofforbrugsafgiftsloven. Available from: https://www.skm.dk/skattetal/satser/satser-og-beloebsgraenser-i-lovgivningen/braendstofforbrugsafgiftsloven (accessed: 10.04.2023)
39.Service-public.fr. (2023). taxe malus 2023 sur les véhicules les plus polluants. available from: https://www.service-public.fr/particuliers/vosdroits/F35947 (accessed: 21.05.2023)
40.Nye.naf.no (2023). Peugeot 208. Available from: https://nye.naf.no/bilguiden/bilmodell/peugeot-208 (accessed: 02.05.2023)
41.Peugeot.dk (2023). Available from: https://www.peugeot.dk/kampagner/aktuelle-kampagner/208.html (accessed: 02.05.2023)
42.Largus.fr (2023). Fiche technique Peugeot 208 II 1.2 PureTech 75ch S&S Like 2023. Available from: https://www.largus.fr/fiche-technique/Peugeot/208/Ii/2023/Berline+5+Portes/12+Ptech+75+Ss+Like+2023-2715098.html (accessed: 14.05.2023)
43.Drivkraftdanmark.dk (2023). prisudvikling på benzin. Available from: https://www.drivkraftdanmark.dk/priser/benzin/ (accessed: 10.05.2023)
44.Insee.fr (2023). prix moyens mensuels de vente au détail en métropole - Supercarburant sans plomb, indice d'octane 95 (1 litre). Available from: https://www.insee.fr/fr/statistiques/serie/000849411 (accessed: 10.05.2023)
45.Ka-autoszerviz.hu (2023): Available from: https://ka-autoszerviz.hu/olajcsere/ (accessed: 03.05.2023)
46.Qjob.hu (2023): Available from: How much does a rubber scooter cost?. Available from: https://qjob.hu/blog/articles/gumicsere-arak (accessed: 02.05.2023)
47.Szerviz16.hu (2023): Available from: https://szerviz16.hu/fek-javitas-arak/ (accessed: 29.04.2023)
48.Ssb.no (2023): Sal av petroleumsprodukt og flytande biodrivstoff. Available from: https://www.ssb.no/statbank/table/09654 (accessed: 12.05.2023)