



# Sustainability aspects and indicators in mobility

Csaba, Fási

Eötvös József Research Centre, University of Public Service, Hungary  
fasi.csaba@uni-nke.hu

## ABSTRACT

The study focuses on sustainability, and presents the objectives of the United Nations and the European Union. The Hungarian results in connection with sustainability are also presented, with particular attention to the issue of mobility. In the study, therefore, the concept of sustainability is presented first, followed by the global and Hungarian frameworks. With the exception of air and maritime transport, in the second part of the study certain measurable indicators related to sustainable mobility are highlighted from an environmental and social perspective. These include air quality, the size of green areas, transportation safety, and the state of public transportation.

## CCS CONCEPTS

• ; • Sustainability; • Sociology; • Law;

## KEYWORDS

Sustainability, Mobility, Transport, Indicators

### ACM Reference Format:

Csaba, Fási. 2023. Sustainability aspects and indicators in mobility. In *Central and Eastern European eDem and eGov Days 2023 (CEEeGov 2023)*, September 14, 15, 2023, Budapest, Hungary. ACM, New York, NY, USA, 8 pages. <https://doi.org/10.1145/3603304.3605912>

## 1 INTRODUCTION

One of today's most prominent topics is sustainability. As we will see, its definition has evolved over time and has significance in an increasing number of fields. In this study, the term "mobility" refers not to social mobility, but rather to physical movement and its ability, with transportation generally used as a synonym. However, due to the topic's complexity, we attempted to consider other factors in addition to environmental factors when selecting the indicators.

The term sustainable mobility or transportation goes beyond environmental factors and reducing emissions. Sustainable transport, as defined by the United Nations in 2016, is the provision of services and infrastructure for the mobility of people and goods advancing economic and social development to benefit today's and future generations in a manner that is safe, affordable, accessible, efficient, and resilient, while minimizing carbon and other emissions and environmental impacts [3]. This study aims to explore the relationship between sustainability and mobility, and to present current measures and select and analyze several indicators, based

on the above definition and others, to provide an overview of the situation, particularly in Hungary.

## 2 THE CONCEPT OF SUSTAINABILITY

Indeed, sustainability and sustainable development have become some of the defining issues of our time, along with topics such as security, digitalization, and competitiveness. Sustainability has now become one of the most important global challenges for humanity.

The issue of sustainability emerged significantly in the 20th century, when industrialization reached such a scale that it seriously threatened the previously delicate balance of systems. In 1972, the report titled "Limits to Growth" was presented (commissioned by the Club of Rome), which drew attention to the serious harmful effects of population growth, excessive industrialization, and environmental pollution, and also advocated the need for change [18]. The next milestone in the concept formation was the 1987 Brundtland report, titled "Our Common Future". Here, the widely used definition appears, which states that development is sustainable if it does not endanger the ability of future generations to meet their needs while satisfying the needs of the present [5]. The United Nations (UN) declaration adopted at the Conference on Environment and Development held in Rio de Janeiro from June 3 to 14, 1992 [9] also includes the definition expressed in the Brundtland report and provides some background for understanding the decision-maker's goal system. The purpose of the declaration was to:

- create a new and just global community through increased cooperation;
- promote the conclusion of international agreements that respect everyone's interests and protect the unity of global environmental and development systems.

In recent decades, the interpretation and significance of the concept of sustainability have changed significantly. In the 1980s, reducing ecological footprint and ensuring the sustainability of natural resources were considered key elements of sustainability. In the 1990s, economic development and social welfare were also included in the concept of sustainability, while in the 2000s, the concept of sustainable development became more widely spread, which emphasizes the balance of economic, social, and environmental factors. In recent years, reducing greenhouse gas emissions and fighting climate change have also played an increasingly important role in the field of sustainability.

Environmental sustainability means the use, protection, and renewal of natural resources. In this dimension, the goal is to use natural resources in a way that does not deplete them and does not cause harm to the environment. Economic sustainability means the sustainability of economic growth and development. In this dimension, the goal is for economic activities to not harm the environment and deplete natural resources, but rather contribute to sustainable development [6]. Social sustainability means the sustainability of social equality, trust, well-being, and development. In

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

CEEeGov 2023, September 14, 15, 2023, Budapest, Hungary

© 2023 Copyright held by the owner/author(s).

ACM ISBN 979-8-4007-0006-4/23/09.

<https://doi.org/10.1145/3603304.3605912>

this dimension, the goal is for achieving economic and environmental sustainability not to happen at the expense of certain groups in society, but rather contribute to ensuring social equality and well-being. There are huge global social inequalities, as it can be said that the highest-income people are the ones who pollute the planet the most. But the CO<sub>2</sub> emissions of people in different social statuses differ, which can be attributed not only to their financial situation but also to their different attitudes. One effect of these inequalities is that they reduce the effectiveness of collective actions because if large social inequalities develop within a group, the willingness to participate in community action decreases [13] [23].

### 3 GLOBAL AND HUNGARIAN FRAMEWORKS OF SUSTAINABILITY

#### 3.1 The UN Sustainable Development Framework and its predecessors

In 2000, the UN adopted the Millennium Development Goals [19], which outlined 8 main goals with associated sub-goals and indicators to measure progress:

- MDG 1: Eradicate extreme poverty and hunger
- MDG 2: Achieve universal primary education
- MDG 3: Promote gender equality and empower women
- MDG 4: Reduce child mortality
- MDG 5: Improve maternal health
- MDG 6: Combat HIV/AIDS, malaria and other diseases
- MDG 7: Ensure environmental sustainability
- MDG 8: Develop a Global Partnership for Development

The resolution adopted at the United Nations General Assembly in 2005 identified three interrelated and interdependent dimensions of sustainable development: economic, social, and environmental [20], which were reaffirmed in 2015 (although supplemented in its goals). On September 25, 2015, the leaders of the 193 member states of the United Nations General Assembly unanimously adopted a new, global, 2030 sustainable development agenda and framework for sustainable development called “Transforming Our World: The 2030 Agenda for Sustainable Development”, with sustainable development goals at its core. The framework, also known as Agenda 2030, is based on balanced social development, sustainable economic growth, and environmental protection [1] [26]. A total of 17 Sustainable Development Goals (SDGs) and 169 targets were identified, the former being:

- Goal 1: End poverty in all its forms everywhere
- Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3: Ensure healthy lives and promote well-being for all at all ages
- Goal 4: Ensure inclusive and quality education for all and promote lifelong learning
- Goal 5: Achieve gender equality and empower all women and girls
- Goal 6: Ensure access to water and sanitation for all
- Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 8: Promote inclusive and sustainable economic growth, employment and decent work for all

- Goal 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation
- Goal 10: Reduce inequality within and among countries
- Goal 11: Make cities inclusive, safe, resilient and sustainable
- Goal 12: Ensure sustainable consumption and production patterns
- Goal 13: Take urgent action to combat climate change and its impacts
- Goal 14: Conserve and sustainably use the oceans, seas and marine resources
- Goal 15: Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss
- Goal 16: Promote just, peaceful and inclusive societies
- Goal 17: Revitalize the global partnership for sustainable development

The Sustainable Development Report [22] monitors the contents of Agenda 2030, which includes rankings and country profiles on sustainable development.

#### 3.2 European Green Deal

The European Union also aims to play a role in sustainability, in line with the previously outlined goals of the United Nations, and has made ambitious and resounding commitments. They acknowledge that climate change and environmental damage pose an existential threat to Europe and the world. They have created the European Green Deal [2], a comprehensive package of proposals with the ambitious goal of making Europe a climate-neutral continent. This will be supported by a budget of nearly 2 trillion euros. To achieve this, the EU aims to transform its economy into a modern, resource-efficient, and competitive economy, with the following commitments [7]:

- no net emissions of greenhouse gases by 2050
- at least 55% less net greenhouse gas emissions by 2030, compared to 1990 levels
- 3 billion additional trees to be planted in the EU by 2030
- 55% reduction of emissions from cars by 2030
- 50% reduction of emissions from vans by 2030
- 35 million buildings could be renovated
- 40% new renewable energy target for 2030
- 36-39% new 2030 energy efficiency targets for final and primary energy consumption
- 0 emissions from new cars by 2035
- economic growth decoupled from resource use
- no person and no place left behind.

In order to achieve the above goals, particularly the 55% reduction in emissions, EU decision-makers have developed a proposal package called Fit for 55 [11]. This package includes comprehensive topics such as:

- Emissions: EU emissions trading system, carbon border adjustment mechanism, member states' emissions reduction targets, emissions and removals from land use, land use change and forestry, CO<sub>2</sub> emission standards for cars and vans, reducing methane emissions in the energy sector
- Fuel: sustainable aviation fuels, greener fuels in shipping, alternative fuels infrastructure
- Social climate fund

- Energy: renewable energy, energy efficiency, energy performance of buildings, hydrogen and decarbonised gas market package, energy taxation

From our point of view, perhaps the area of CO<sub>2</sub> emission standards for cars and vans is the closest, as according to the EU's situation assessment, cars and vans account for 15% of the EU's total carbon dioxide emissions. Therefore, the proposal focuses on these tools, proposing a 100% emission reduction by 2035 (as well as a 55% reduction in CO<sub>2</sub> emissions for new cars and a 50% reduction for new vans between 2030 and 2034 compared to the 2021 level until then). The progress of the measure planned for 2035 will be subjected to a thorough evaluation by the European Commission in 2026. If the measure planned for 2035 could be implemented, it would improve air quality and the well-being and health of the population [21].

### 3.3 Hungarian answers

In Hungary, the Hungarian National Council for Sustainable Development, which operates as an advisory, interest-representative, and independent body of the Parliament, developed the National Sustainable Development Framework Strategy in 2013. This body also examines Hungarian data related to the United Nations' 2015 sustainable development goals [5], and the Hungarian Central Statistical Office (hereinafter referred to as the KSH) coordinates data reporting duties [1]. The Sustainable Development Indicator Set, managed by the KSH [14], which fits the dimensions and resources defined in the National Framework Strategy on Sustainable Development [20], should also be highlighted. Although the UN distinguishes the three dimensions mentioned earlier, the Hungarian framework strategy supplemented the social dimension with the human (human dimension). The KSH's indicator set is also available in this four-part breakdown.

## 4 SUSTAINABLE MOBILITY

Sustainable transport is fundamental to progress in realizing the promise of the 2030 Agenda for Sustainable Development and in achieving the 17 Sustainable Development Goals. Sustainable transport supports inclusive growth, job creation, poverty reduction, access to markets, the empowerment of women, and the well-being of persons with disabilities and other vulnerable groups. It is also essential to our efforts to fight climate change, reduce air pollution and improve road safety [3].

Looking at the European Union level, the transportation sector - which generates about 5% of the EU's GDP and employs over 10 million people in Europe - is vital for European businesses. Greenhouse gas emissions from transportation have been on the rise in recent years and currently account for about a quarter of the EU's total greenhouse gas emissions. In order for Europe to become a climate-neutral continent by 2050 - the first in the world to do so - major changes must be made in the transportation sector. This will make it possible to reduce transportation-related greenhouse gas emissions by 90% by 2050, while providing affordable solutions to the public. The comprehensive steps planned by the EU have been summarized in the earlier part of the study [24].

On the other hand, the other side of mobility - besides individual, typically road transport by car - is the support of the use of and access to public transport. The EU considers the issue of railways

particularly important, as it is seen as the most sustainable form of transport, as only 0.5% of the EU's total greenhouse gas emissions came from the rail sector in 2017. 2021 was the year of the railway in the EU, and as we will see, national measures have also been taken to ensure widespread access to travel by rail [4].

## 5 INDICATORS RELATED TO SUSTAINABLE MOBILITY

Regarding sustainable mobility, it is necessary to determine which indicators are taken into account during the analysis. The data can be accessed on the Eurostat and KSH websites [14].

While environmental sustainability was one of the goals of the Millennium Development Goals adopted in 2000, which aimed to provide adequate responses to urgent and specific problems [19], the Agenda 2030 program examines the issue in a more complex way. Thus, there is an opportunity to analyze the issue in relation to domestic conditions in line with the 11th goal of Agenda 2030 - in accordance with the European Green Deal - by defining which indicators to consider for sustainable mobility.

### 5.1 Livable cities - Environmental perspective

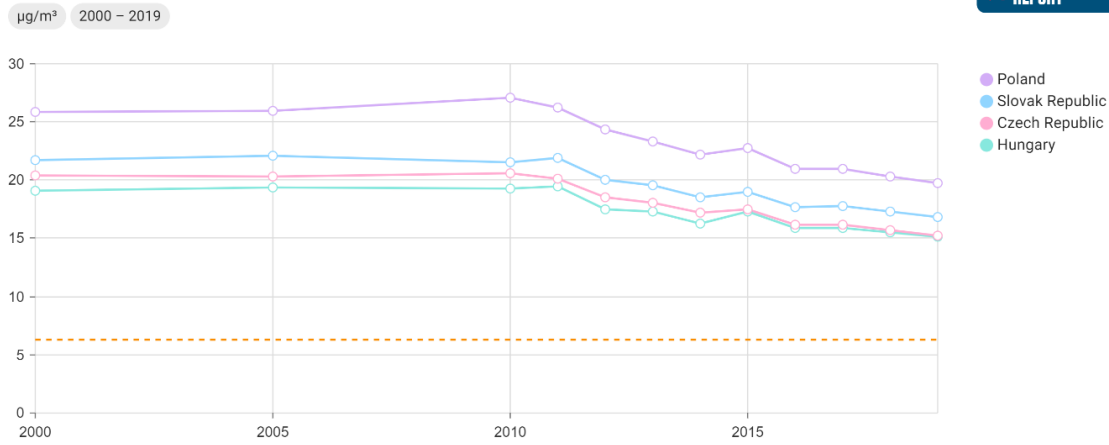
The European Union has set a key objective to reach net-zero greenhouse gas emissions by 2050. In line with this, it is expected to reduce net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. Within this, a 55% reduction in emissions was mandated for passenger cars by 2030, and zero emissions, or full emission-free, new passenger cars by 2035. It can be seen that mobility (as interpreted in this study) is an area that is affected in order to achieve the above goals. For example, the number and quality of vehicles affect air quality, the size of green spaces has an impact on air quality and the ability to keep residents in their area. Safety during transportation is a key factor, but it also has significance in the lives of the population and their relationship to their place of residence, as well as public transport. The following indicators were selected in accordance with Agenda 2030 and the European Green Deal.

*5.1.1 Air quality.* PM<sub>10</sub> and PM<sub>2.5</sub> represent suspended particles with a diameter of up to 10 and 2.5  $\mu\text{m}$ , respectively. Inhaling these particles is responsible for the development of numerous cardiovascular and respiratory diseases. The main sources of pollution emissions in cities are diesel-powered vehicles, industrial, household, and other combustion. The European Union's definite goal is to reduce pollutant emissions from transportation to a level that has minimal impact on human health and the environment. The current limit value for the annual average concentration of PM<sub>10</sub> in the EU is 40  $\mu\text{g}/\text{m}^3$ , while for PM<sub>2.5</sub> it is 25  $\mu\text{g}/\text{m}^3$ . Between 2003 and 2020, the exposure of the population to solid particulate matter (PM<sub>10</sub>) in Hungary was below the EU limit value, and in 2020, the PM<sub>10</sub> exposure in Hungary was 23  $\mu\text{g}/\text{m}^3$ . The EU's annual average concentration limit value for PM<sub>2.5</sub> is 25  $\mu\text{g}/\text{m}^3$ , which in Hungary (Figure 1) was only exceeded once in 2021 [15].

As can be seen from the above data, the measured values of the V4 countries (Czech Republic, Hungary, Poland, and Slovakia) have been moving together since 2000. Hungary and the Czech Republic have had similar trends since 2015, and they are the closest to



Annual mean concentration of particulate matter of less than 2.5 microns in diameter (PM2.5)



Source: IHME

Figure 1: Annual mean concentration of particulate matter of less than 2.5 microns in diameter (PM2.5), 2000-2019 (Source: Sustainable Development Report 2022)

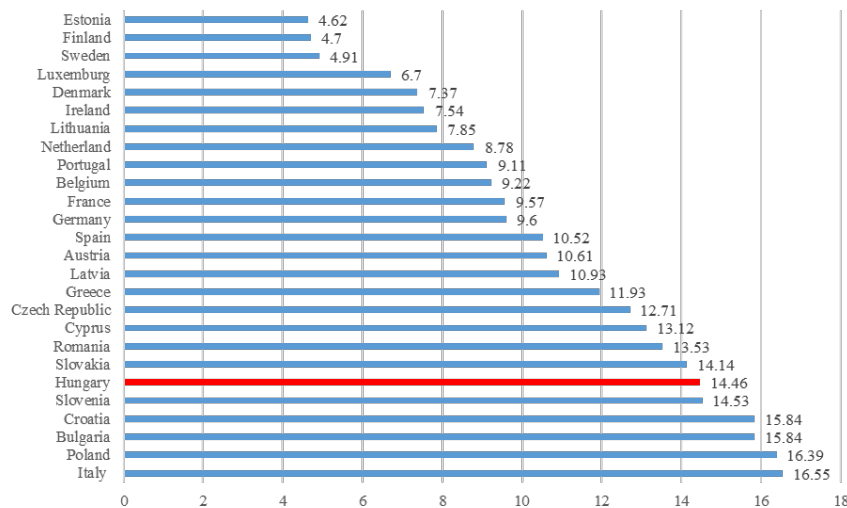


Figure 2: Exposure of the urban population to solid air pollution (PM2.5), 2020 (Source: KSH)

achieving the long-term goal. Slovakia and Poland have less favorable values, although a decrease can be observed in all states (Figure 2).

It is worth examining the issue from another perspective, namely the exposure of urban populations to solid particle pollution in the air (PM2.5). The data shows that in 2020, the PM2.5 exposure for this group was 14 µg/m3 in Hungary and Slovakia. Among the V4 countries, Poland had the highest value (16 µg/m3), while the lowest was in the Czech Republic (13 µg/m3). Among the neighboring countries, Croatia had the most unfavorable value (16 µg/m3), while Austria had the most favorable (11 µg/m3). The value in Romania

was 14, and in Slovenia it was 15 µg/m3. Estonia, Finland, and Sweden had the best values, while Poland and Italy had the worst values.

5.1.2 *Green areas.* As stated in the European Green Deal, increasing green areas and planting 3 billion trees across the EU by 2030 is an expectation. The presence, size, and quality of green areas are an important indicator of the Sustainable Development Goal for sustainable cities and communities in Agenda 2030, as they have a positive impact on overall quality of life in a given location.

The data on green areas in Hungary (Figure 3) includes information on green areas owned by municipalities. The number and

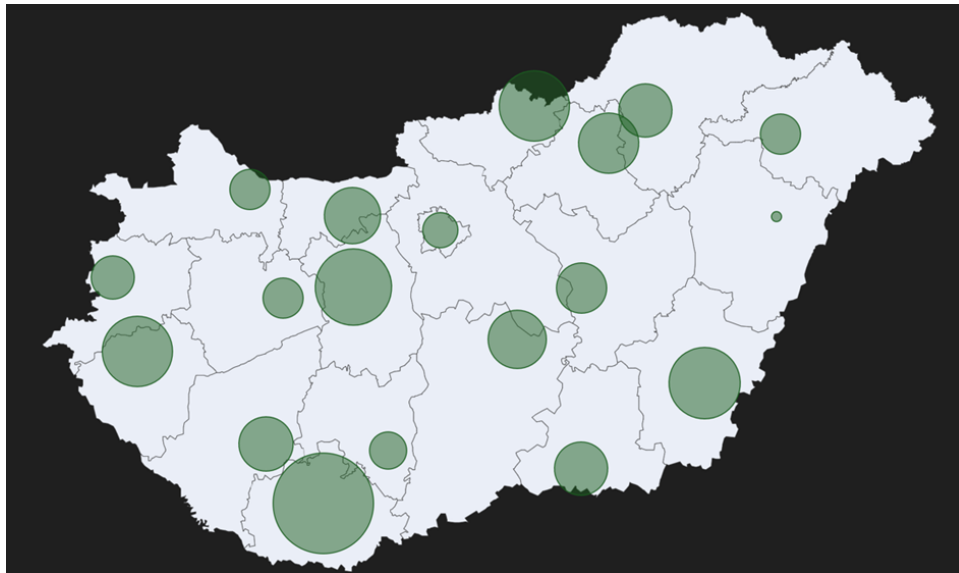


Figure 3: The amount of green space per capita, 2021 (Source: KSH)

size of green areas owned by a municipality are the basis for the annual asset report. These green areas can be public gardens, parks, welfare forests, protected forests, and arboretums. They contribute to improving air quality and preserving natural wildlife. Municipal green areas are accessible to all residents and visitors, thereby reducing social disparities, developing the municipality, supporting tourism development, contributing to the well-being of residents, and shaping the image of the municipality. They promote quality leisure time for the population, provide recreational opportunities, and help maintain physical and mental health [16].

In 2021, 29% of the country's territory consisted of green areas owned by municipalities, while in 2015, this ratio was 18%. The above map shows that Hungary is striving to use its natural resources, such as its forests, responsibly. There are forests and nature trails in the north (Salgótarján and its surroundings), the Órség and the Zalai hills in the west (Zalaegerszeg and its surroundings), the Mecsek in the south (Pécs and its surroundings), and arboretums near the capital (Székesfehérvár and its surroundings). In Pécs, 72 m<sup>2</sup> of green area is available per person, while in Székesfehérvár, it is 45 m<sup>2</sup>, and in Salgótarján and Zalaegerszeg, it is 38 m<sup>2</sup>.

## 5.2 Liveable settlements - Social perspective

One of the goals of the Agenda 2030 is to make cities and human settlements inclusive, safe, resilient, and sustainable. One of its elements states that by 2030, access to safe, affordable, accessible, and sustainable transport systems should be provided for all, improving road safety, notably by expanding public transport [26]. The following sections will present an analysis of road safety and public transport.

**5.2.1 Road safety.** In terms of the road safety indicator, the number of victims of traffic accidents was selected. Victims of traffic accidents include those who suffer such serious injuries as a result of a road accident that they die at the scene or within 30 days of the

accident. The long-term road safety goal of the European Union is "Vision Zero", which aims to bring the number of deaths and serious injuries from road accidents to near zero by 2050 in the EU. As an intermediate goal, they have set a target of reducing the number of deaths from road accidents by half by 2020 (compared to 2010). Despite the continuous growth of motor traffic since the turn of the Millennium, the total number of accidents and fatalities on the roads has decreased. Therefore, the increase in the number of vehicles on the road did not automatically lead to an increase in road accidents, including the number of fatalities [17] (Figure 4).

As shown in the above graph, Hungary's number of road traffic fatalities per one million inhabitants was above the EU average, except for 2011. There was a significant decrease in Hungary in 2020, mainly as a result of the restrictive measures implemented during the COVID-19 pandemic (Figure 5). However, the value for 2021 has already increased in Hungary, although it is lower than the values measured since 2010 (excluding 2020).

According to the data, more than 19,800 people died in road accidents on European roads in 2021, which on average amounts to 45 people per one million inhabitants. In 2021, Malta had the lowest death rate per one million inhabitants (17 people) and Romania had the highest (92 people). Hungary ranked 21st out of the 27 EU member states (down from 19th in 2019 and 17th in 2020). The goal set by the EU community in the past decade has not been achieved. Between 2010 and 2020, the number of deaths in road accidents decreased by only 36% in the EU member states. The general objective, which is to halve the number of fatalities, remains for the next ten-year period as well [17].

**5.2.2 The expansion of transportation options.** Creating sustainable transportation systems, expanding electric and rail-based modes of transportation, and improving the share of rail transport in both passenger and freight traffic are essential for Hungary's green transition. Electric vehicles, shared mobility, and public transportation

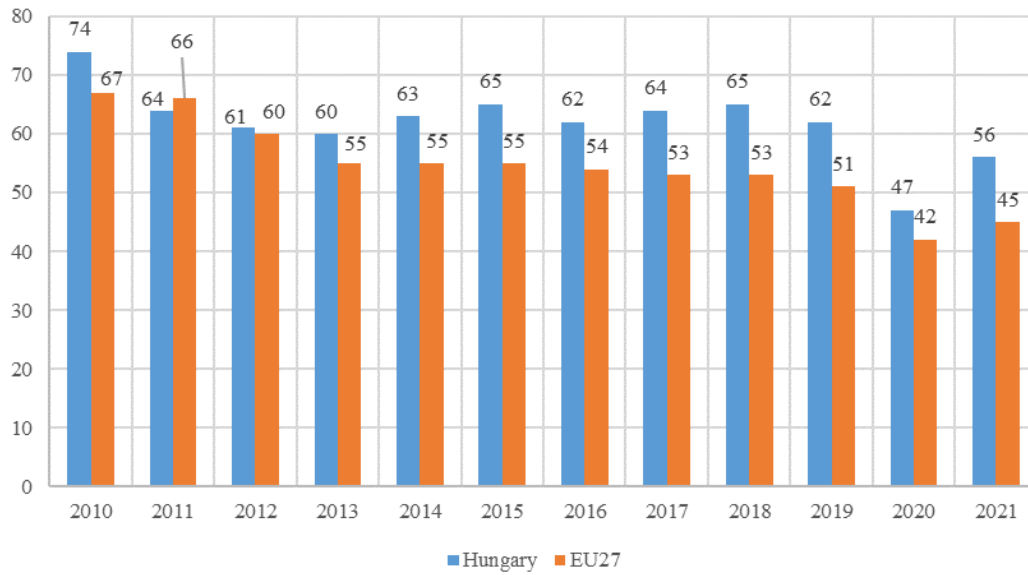


Figure 4: Number of people killed in road traffic accidents per million inhabitants (Hungary – EU27, 2010-2021, Source: KSH)

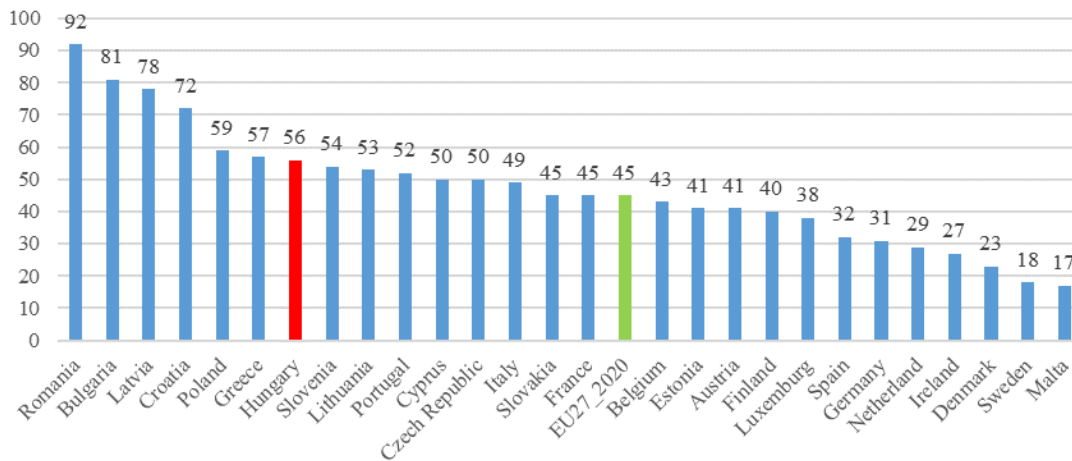


Figure 5: Number of people killed in road traffic accidents per million inhabitants in the 27 member states of the EU, 2021 (Source: KSH)

can help reduce the environmental impact of transportation. According to the European Environment Agency, the specific carbon dioxide emissions from cycling are about 110 grams lower per passenger-kilometer than those of passenger cars, and cycling also has other favorable characteristics, such as requiring less space and producing less air and noise pollution. Therefore, it is justified to implement investments that support cycling as well [10]. The community car-sharing service primarily targets those who would like to enjoy the benefits of mobility without the constant costs of car ownership. According to experience so far, every shared vehicle can replace 5-10 privately owned vehicles, which can reduce traffic,

the area required for parking, and contribute to the reduction of noise and air pollution [20].

The attractiveness of public transportation is of key importance for promoting employee mobility and mitigating the environmental impact of transportation. The poor condition of road and rail networks hinders mobility [12]. Therefore, the European Commission has proposed various infrastructure developments, vehicle acquisitions (railway carriages, locomotives, multiple units, etc.), and service improvements (improving the quality of transportation services, facilitating the transport of bicycles on public transport, etc.) to be implemented on railway lines. Considering the poor air

quality, the replacement of the bus fleet is justified in Hungary, which is being carried out under the Green Bus Program [10]. The implementation of the above measures can reduce the negative consequences of transportation, particularly traffic congestion, harmful emissions, and the number of transportation accidents.

Encouraging the use of public transportation has had noticeable results both in Germany and Hungary. For example, in Germany in the summer of 2022, they introduced a trial monthly public transportation pass for 9 euros, which allowed people to use any tram, train (excluding long-distance trains), or bus in the country. This measure had clear advantages for society members (especially those with modest financial means, retirees, or tourists). According to the Association of German Transport Companies (VDV), during the three-month period, they sold more than 52 million tickets, and an additional 10 million subscribers automatically received the pass. Based on VDV data, while the monthly pass cost 9 euros, car use decreased by 10 percent in the country. During the discount period, this reduced carbon dioxide emissions by 1.8 million tonnes. According to a leading consultant from Management Consultants, if the goal was to reduce the financial burden on citizens, it was successful. If the goal was to promote public transportation, it can also be positively evaluated. However, if sustainability was the program's goal, it can be considered a failure. This is because the German public transportation infrastructure was not ready for such a load, and crowding, overload, and delays were typical. Despite state support, transportation companies spent a lot of money launching more services to meet demand, increasing capacity required more people, who needed to be paid, and the large number of passengers caused vehicles to depreciate faster, so maintenance costs increased [25]. Based on the experience, decision-makers agreed to continue the program, and thus, starting May 1, 2023, the program will resume, but the monthly public transportation pass (Deutschland-Ticket) will cost 49 euros. The validity remains the same, but now, among the exceptions, are those transportation devices that operate mainly for tourism or historical purposes [8].

In Hungary, the government decree No. 1036/2023. (Feb 20th) [27] has been published, which introduces county and countrywide passes for intercity buses and trains, allowing for unified usage of both modes of transportation up to the administrative border of Budapest in Pest County. These county and countrywide passes can be purchased starting from May 1st, 2023 (the passes will not be valid for local public transportation). The necessary legal modifications for the introduction of the county and countrywide passes and the provision of the necessary financial coverage to the transport service providers offering public passenger transport as compensation for public service obligations are currently in progress. The county pass costs HUF 9,450 per month (approx. EUR 23.5), while the countrywide pass costs HUF 18,900 (approx. EUR 47). Students can receive a 90% discount on both passes when traveling by train.

## 6 CONCLUSIONS

When we talk about sustainability and its promotion, emphasis is placed on specific areas (reducing environmental pollution, transitioning to a green economy, reducing poverty), but the measures – in line with the will of decision-makers – aim to achieve complex effects.

Both the EU, the UN, and our country have identified the goals to be achieved in different dimensions of sustainability, which are ambitious and probably will not be fully realized by the set deadlines, but perhaps we can achieve sufficient results through them to demonstrate further progress in a more sustainable, equal, and livable world in the long run.

The study examines sustainable mobility (excluding air and maritime transport) in the context of Agenda 2030 and the European Green Deal. Typically, certain measurable indicators have been highlighted from an environmental and social perspective since the expression “sustainable mobility” or “transport” goes beyond environmental factors and emission reductions.

Examining environmental factors, we can say that the EU has set a limit of 25  $\mu\text{g}/\text{m}^3$  for the annual average concentration of PM<sub>2.5</sub>, which was exceeded only once in Hungary in 2021. Between 2003 and 2020, the exposure of the population to solid air pollution (PM<sub>10</sub>) in Hungary was below the EU limit, and in 2020, the PM<sub>10</sub> exposure in Hungary was 23  $\mu\text{g}/\text{m}^3$ . Hungary is in the forefront among the V4 countries in this comparison. Regarding the size of green areas, in 2021, 29% of the country's area was owned by municipalities, while this ratio was 18% in 2015.

Another aspect of mobility - beyond environmental impact - is traffic safety and public transportation. Regarding traffic safety, despite the continuous increase in motor vehicle traffic since the turn of the millennium, the number of accidents and fatalities on roads has decreased overall. However, with regard to the number of road traffic fatalities per one million inhabitants, Hungarian data - except for 2011 - were above the EU average. In terms of expanding transportation options, the European Commission has proposed various infrastructure developments, vehicle acquisitions (railway cars, locomotives, motor trains, etc.), and service improvements (raising the quality of transportation services, promoting the transport of bicycles on public transit, etc.) on Hungarian railway lines. Given poor air quality, replacing the bus fleet in our country is also justified, which is being carried out under the Green Bus Program. In Germany, to encourage the use of public transportation, the Deutschland-Ticket system will be introduced on May 1, 2023, following a trial period. In our country, the introduction of local county and state tickets has been decided, which allows for the unified use of local intercity buses and trains up to the administrative border of Budapest in Pest County, so local county and state tickets will be available for purchase from May 1, 2023 (i.e., the ticket will not apply to local public transportation). However, we do not yet have experience with the effects of this, as it has not yet been implemented.

It is apparent that there are several prerequisites for sustainable mobility, including reducing environmental impact, promoting safety, and diversifying and making transportation modes accessible. In each case, there are set objectives (Agenda 2030, European Green Deal, national efforts), and they are measurable. The data indicates that Hungary has taken significant steps towards achieving these objectives; however, even stronger efforts are necessary to reach the EU average.

## ACKNOWLEDGMENTS

“TKP2021-NKTA-51 has been implemented with the support provided by the Ministry of Culture and Innovation of Hungary from the National Research, Development and Innovation Fund, financed under the TKP2021-NKTA funding scheme.”

## REFERENCES

- [1] United Nations. 2015. Transforming our world: the 2030 Agenda for Sustainable Development. Retrieved 10 May, 2023 from <https://sdgs.un.org/2030agenda>
- [2] European Commission. 2020. A European Green Deal: Striving to be the first climate-neutral continent Retrieved 10 May, 2023 from [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal\\_en](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en)
- [3] United Nations. 2016. Mobilizing Sustainable Transport for Development. High-level Advisory Group on Sustainable Transport. Retrieved 10 May, 2023 from <https://sustainabledevelopment.un.org/content/documents/12453HLAG-ST%20brochure%20web.pdf>
- [4] European Council. 2022. Clean and sustainable mobility. Retrieved 10 May, 2023 from <https://www.consilium.europa.eu/en/policies/clean-and-sustainable-mobility/>
- [5] Magdolna Csath. 2020. A fenntarthatóság mint emberi és társadalmi fejlődés. *Acta Humana* 8, 1, 25–65. <https://doi.org/10.32566/ah.2020.1.2>
- [6] Magdolna Csath. 2020. A fenntarthatóság árnyalatai. Ludovika Egyetemi Kiadó. Budapest, Hungary.
- [7] European Commission. 2020. Delivering the European Green Deal. Retrieved 10 May, 2023 from [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal\\_en](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en)
- [8] Deutsche Bahn. 2023. The Deutschland-Ticket is here. Retrieved 20 May, 2023 from <https://www.bahn.com/en/offers/regional/deutschlandticket>
- [9] Miklós Bulla, Tibor Faragó, and István Nathon (eds.). 1992. *Az Egyesült Nemzetek Szervezetének Környezet és Fejlődés Konferenciája: tények és adatok. Környezetvédelmi és Vízügyi Minisztérium (KvVM)*. Budapest, Hungary
- [10] Magyarország Kormánya. 2022. Fenntartható, zöld közlekedés. Retrieved 20 May, 2023 from [https://www.palyazat.gov.hu/download.php?objectId=\\$1092060](https://www.palyazat.gov.hu/download.php?objectId=$1092060)
- [11] European Council. 2022. Fit for 55. Retrieved 10 May, 2023 from <https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/>
- [12] Tamás Kaiser. 2009. Territorial strategies in the making: compulsory homeworks for the incoming Hungarian Presidency. *Acta Scientiarum Socialium* 30, 113–131.
- [13] Lea Kőszeghy. 2022. Társadalmi egyenlőtlenségek és környezeti fenntarthatóság: összefüggések és kiutak. Retrieved 11 May from [https://www.youtube.com/watch?v=\\$vGnltBmys](https://www.youtube.com/watch?v=$vGnltBmys)
- [14] KSH. 2022. A fenntartható fejlődés indikátorai. Retrieved 14 May 2023 from <https://www.ksh.hu/ffi/>
- [15] KSH. 2022. Air quality. Retrieved 14 May 2023 from <https://ksh.hu/s/kiadvanyok/fenntarthato-fejlodes-indikatorai-2022/3-39-sdg-11https://ksh.hu/s/kiadvanyok/fenntarthato-fejlodes-indikatorai-2022/3-39-sdg-11#4-abra>
- [16] KSH. 2022. Green areas. Retrieved 14 May 2023 from <https://ksh.hu/s/kiadvanyok/fenntarthato-fejlodes-indikatorai-2022/3-3>
- [17] KSH. 2022. Road safety. Retrieved 14 May 2023 from <https://ksh.hu/s/kiadvanyok/fenntarthato-fejlodes-indikatorai-2022/2-10-sdg-11>
- [18] Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, and William W. Behrens (1972). *The limits of growth. A Report for THE CLUB OF ROME's Project on the Predicament of Mankind*. Universe Books, New York, US.
- [19] FAO. 2023. Millennium Development Goal 7: Ensure environmental sustainability. Retrieved 17 May 2023 from <https://www.fao.org/sustainable-development-goals/mdg/goal-7/en/>
- [20] Gábor Bartus Gábor (ed.). 2013. *Nemzeti Fenntartható Fejlődési Keretstratégia 2013. Nemzeti Fenntartható Fejlődési Tanács (NFFT)* Retrieved 14 May 2023 from <https://eionet.kormany.hu/akadalymentes/download/1/26/71000/NFFT-HUN-web.pdf>
- [21] European Council. 2021. Regulation strengthening the CO2 emission performance standards for new passenger cars and new light commercial vehicles in line with the Union's increased climate ambition. Retrieved 16 May 2023 from <https://data.consilium.europa.eu/doc/document/PE-66-2022-INIT/en/pdf>
- [22] United Nations. 2022. Sustainable Development Report 2022. Retrieved 18 Oct 2022 from <https://dashboards.sdgindex.org/>
- [23] Tibor Tóth (2018). Az európai szociális modell történeti változásai és perspektívái. *Európai Tükör* 21, 2, 33–50.
- [24] European Commission. 2020. Transport and the Green Deal. Retrieved 10 May, 2023 from [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/transport-and-green-deal\\_en](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/transport-and-green-deal_en)
- [25] Világ gazdaság 2022. Ezért volt kudarc a 9 eurós német bérlet. Retrieved 20 May, 2023 from <https://www.vg.hu/nemzetkozi-gazdasag/2022/10/hetvegere-ezert-volt-kudarc-a-9-euros-nemet-berlet>
- [26] János Zlinszky, and Dorka Balogh (eds.) 2016. *Világunk átalakítása*. Pázmány Press. Budapest, Hungary
- [27] 1036/2023. (II. 20.) Korm. határozat a helyközi ország- és vármegyebérletek bevezetéséről. Retrieved Jun 10, 2023 from <https://njt.hu/jogszabaly/2023-1036-30-22>