EUROPEAN MOBILITY ATLAS

Facts and figures about transport and mobility in Europe

Focus country: **Greece**

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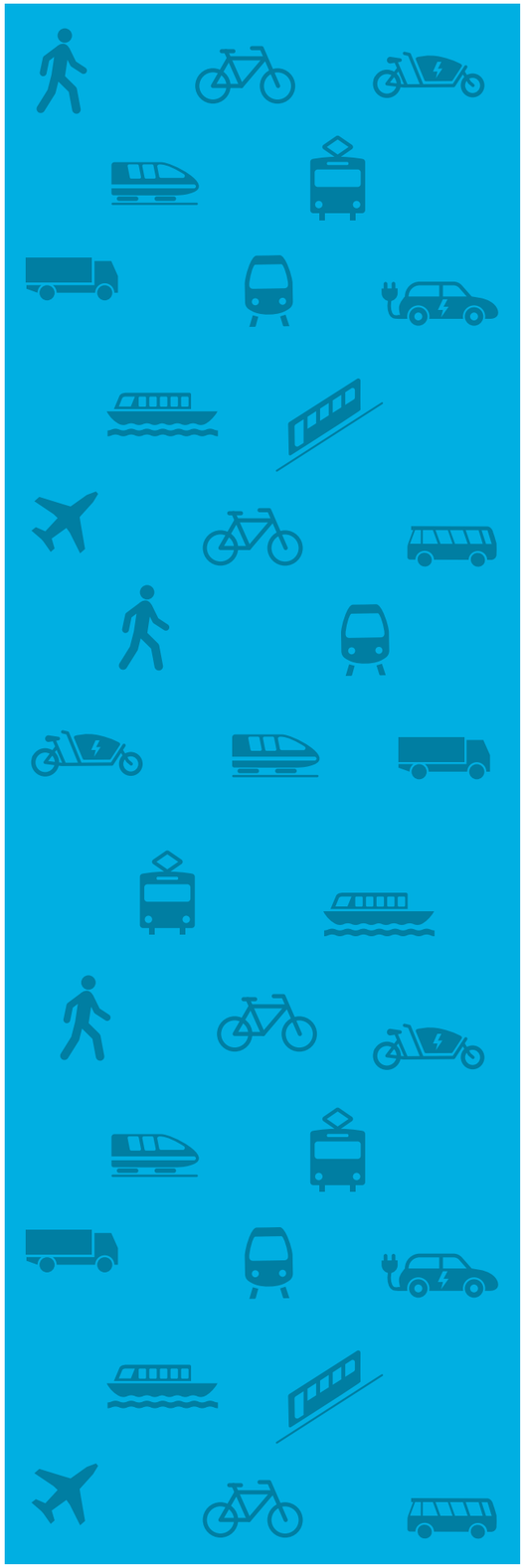


PREFACE

Europe is the continent where multiple forms of transportation have been invented or brought to technological maturity. The free movement of persons has made Europe grow together and led to an ever-stronger sense of cohesion. Cross-border mobility is a prerequisite for a united EU and the experience of inter-connectedness on all levels.

The democratisation of modern means of transport after the first half of the 20th century led to enormous benefits for many individuals, enhancing their mobility, social permeability and comfort to a great extent. However, ever increasing levels of fossil fuel consumption and greenhouse gas (GHG) emissions became the other side of the coin.

However, transport today accounts for nearly 30 percent of the CO_2 emissions within the European Union. While it is imperative to reduce these emissions to fight climate change, our joint efforts must aim at creating and maintaining jobs in a sector transformed by electrification, other alternative fuels, digitalisation and automation. At the same time, a transition in the field of mobility and transport can only be truly sustainable if it is socially equitable and just.

These challenges can only be tackled in a joint effort on all levels: the EU institutions, Member States, as well as local authorities and communities. It is upon all of us to address these issues to tackle the climate crisis that we are facing. The European Green Deal as the overarching political framework needs to be at the forefront of this battle. It aims to make Europe climate neutral by 2050 and entails significant steps for the transport sector: The Sustainable and Smart Mobility Strategy will need to deliver on boosting passenger rail, multimodal ticketing, but also highly important infrastructure investment as with the revision of the Trans-European Transport Network (TEN-T) regulation. These plans can only be achieved with the necessary funding. As finance is key, the orientation of the EU's multiannual budget for 2021-2027 and recovery instrument "Next Generation EU" will thus be decisive to direct investment into the right transport infrastructures and mobility segments.

With more and more people being mobile, Europe is a continent that needs to remain innovative in order to achieve the relevant climate goals. We need new technologies to align our mobility infrastructure and behaviour with the pressing challenges of the upcoming years. To save our climate, the European Green Deal has to be Europe's first priority.

The Covid-19 pandemic has limited the freedom of movement extensively and shows the vulnerability of Europe as a place of constant movement. While air traffic decreased and the use of bicycles increased, there has also been a strong negative shift from shared transport to individual transport. If this change prevails, a great deal of earlier efforts to reduce GHG emissions in the transport sector will be nullified.

Recovery packages to overcome the effects of the Covid-19 pandemic must be accompanied by a commitment to transformation: they need to include sustainability criteria that avoid further carbon lock-in with a transport sector still largely powered by fossil fuels. A recovery of the EU's economy will not be a lasting one, if the focus is not going to be on future-oriented investments. For European mobility, that implies investments into a better rail infrastructure, helping public transport companies to survive the crisis, bailing out airlines only under strict climate conditions and, most importantly, creating a transparent polluter-pays principle across all means of transport.

It is good news that EU institutions agreed to make 2021 the 'European Year of Rail'. Railways, by nature, are and need to become even more the strong backbone of a sustainable and resilient European transport architecture. This can be achieved by overcoming the predominance of current national frameworks, as well as the limits imposed by them, in favour of one new, cross-border integrated network spanning the continent.
We therefore decided to complement the European Mobility Atlas 2021 with a folding map which provides an overview of sustainable green transport projects across Europe and, most importantly, highlights competitive rail projects such as night trains and high-speed lines. There are lots of best practices we can build on!

Our European Mobility Atlas seeks to contribute to the efforts towards sustainable and just mobility in Europe. Thus, it covers a multitude of transport-related aspects relying on evidence-based research and highlighting concrete, tangible mobility solutions from across our continent.

We would like to thank the chief executive editors, Martin Keim and Philipp Cerny, for their excellent work and efforts in devising and compiling this Atlas. We hope that this publication and endeavour will help its readers to get insights and new perspectives on European mobility.

Berlin and Brussels, February 2021

DR. ELLEN UEBERSCHÄR
President / Heinrich-Böll-Stiftung

EVA VAN DE RAKT
Director / Heinrich-Böll-Stiftung European Union

Mobility may be considered as a fundamental issue Greece still needs to properly address. There are several reasons to make such a claim:

- the deep urban-rural divide in a country, where more than half of the population lives in and around the capital of Athens, is to a certain extent also a result of the poor railway network that contributes to disconnected shrinking areas (according to the latest census). This is a reality that is also a very significant democratic deficit, as it increases inequalities among the regions. Furthermore, the tragic train crash in Tempi in early 2023 that had as a result the death of 57 people, underlines the failures of years of under-investment and lack of maintenance in essential public infrastructure.

- Cities other than Athens are confronted with poor means of public transport, while also completely missing adequate and affordable alternatives. The first metro line has just been inaugurated, for instance, in Thessaloniki after decades of delays, but there is still a long way to go.

- As is the case with buildings, there are still a lot of old, polluting vehicles in Greece, responsible for a large amount of emissions. In a country, heavily reliant on private cars, this is an area of particular concern.

- Safe bike lanes are just an exception in smaller cities like Trikala, while the rule is traffic jams.

- Connections with the wider (Balkan) region are quite problematic. This is obvious when one looks, for example, at the map of night trains in Europe, where the only disconnected area is Greece and its neighbourhood.

For all the reasons above, we decided not to just translate the European Mobility Atlas in Greek but to also adapt it to the national context, adding chapters illustrating the reality in the country. This edition aims at making this information accessible also to non-Greek speaking audience and facilitating further exchange on such a crucial issue that is shaping citizens' everyday life.

MICHALIS GOUDIS
director, Heinrich Böll Foundation, Thessaloniki Office, Greece

12 BRIEF LESSONS

ON MOBILITY IN EUROPE

1 European mobility as it has developed has empowered many people and implies self-determination; but these **ACHIEVEMENTS** also generate social and ecological **STRESSES**.

2 Mass tourism and trips on aircraft and cruise ships are particularly harmful to this **ENVIRONMENT**. The European single market has a DECISIVE ROLE to play in this regard and therefore Europeans have a fair share of **RESPONSIBILITY**.

3 Motorised **MASS TRANSPORT** has reached its limits. A European transport sector dominated by **FOSSIL FUELS** adds to global warming, pollution and stress.

4 Cars occupy too much space. The **LIMITED AVAILABLE PUBLIC SPACE** should be used **MORE** efficiently for cycling, walking and various forms of public transport, especially in towns and cities.

5 Climate-friendly means of transport and fossil fuels are incompatible. Sustainable **ENERGY AND MOBILITY TRANSITIONS** go hand in hand.

6 **TRAINS** and railways will essentially be the backbone of a climate-compatible European transport system, but are today often limited to individual countries. Investments to extend and **REACTIVATe RAIL ROUTES** within and across borders are necessary.

7 With its Trans-European **TRANSPORT NETWORK CORRIDORS**, the EU has set up a system for a Europe-wide transport infrastructure. It is crucial that policies implemented within the European Green Deal follow this **TRANS-EUROPEAN IDEA.**

8 **DIGITALISATION** of European transport brings along **OPPORTUNITIES** by linking different forms of transport in one single **APPLICATION**. The accessibility and availability of such technologies for everyone is a **CHALLENGE**.

9 Transport industries are manifold. The **EUROPEAN AUTOMOTIVE SECTOR** is undergoing thorough **CHANGES**. Bicycle production reinforces regional value creation and strengthens European small and medium-sized businesses.

10 **AVOID – SHIFT – IMPROVE** is the strategy to make mobility in Europe more sustainable. The Covid-19 pandemic has forced people to adapt their mobility behaviour and has created the need to **RETHINK** conventional practices.

11 The external costs of cars and planes as the most polluting modes of transport are not reflected in what we pay for using them. So far the implementation of the **POLLUTER-PAYS PRINCIPLE** is deeply flawed and needs to be tackled by EU policies such as taxation, carbon pricing or road tolls.

12 The **EUROPEAN MOBILITY OF THE FUTURE** entails interlinked, attractive, resource-efficient and climate-friendly means of transport within a European framework and contributes to a **HIGH QUALITY OF LIFE** in cities and **WELL-CONNECTED** rural areas.

SETTING SAIL: CHALLENGES FOR SEA TRANSPORT

Maritime transport is the most important, most efficient, but also dirtiest way of shipping goods. Not covered by the Paris Agreement, the industry is trying to set guidelines for a more environment-friendly maritime transport.

Transporting cargo is a vital aspect of international trade and maritime logistics are a primary function of shipping on a global scale. Cargo ships carry billions of tonnes of commodities along maritime trade routes. Maritime shipping is the most efficient low-cost, but also the dirtiest transportation method, and over 90 percent of world trade and 94 percent of developing country trade is handled by maritime shipping. Most ships still burn dirty heavy fuel oil, especially when they are in international waters. Shipping is not covered by the EU's Energy Taxation Directive.

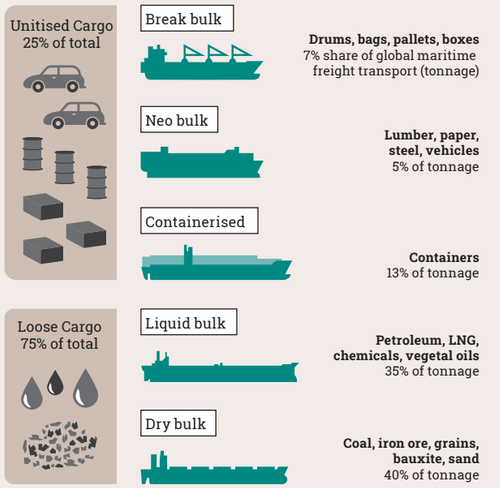
The shipping sector is also not covered by the 2015 Paris Agreement. Even so, the Paris Agreement contains non-binding targets for reducing gross annual shipping greenhouse gas (GHG) emissions by at least 50 percent by 2050 relative to 2008, starting as soon as possible. In addition, the new 0.5 percent global sulphur emission cap which entered into force on 1 January 2020 will apply to about 70,000 ships worldwide.

Another major problem is the use of flags of convenience. Shipowners register their vessels in countries other than the country in which they themselves are registered. That way, they can avoid (higher) taxes and circumvent national labour and environmental regulations.

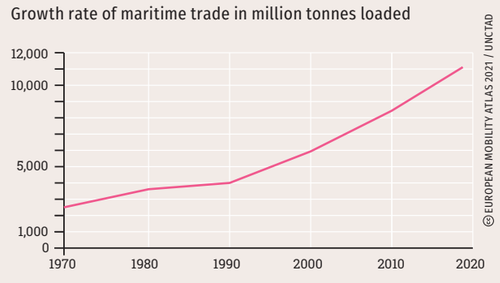
Maritime transport plays an important role in the world's economy. While container ships are booming, 75 percent of tonnage is still dry and liquid bulk.

DEVELOPMENT OF MARITIME TRADE

Share of vessel types

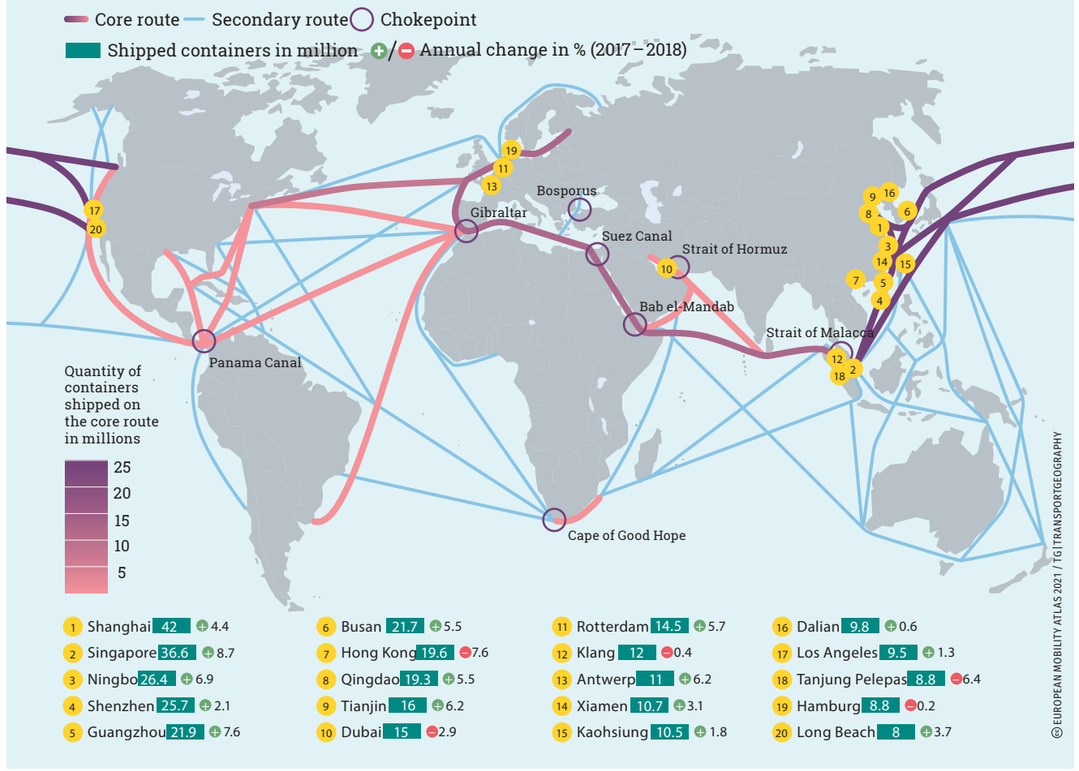


Growth rate of maritime trade in million tonnes loaded



MARITIME SHIPPING ROUTES AND THEIR MAIN DESTINATIONS

Worldwide shipping routes and the biggest container ports in 2018

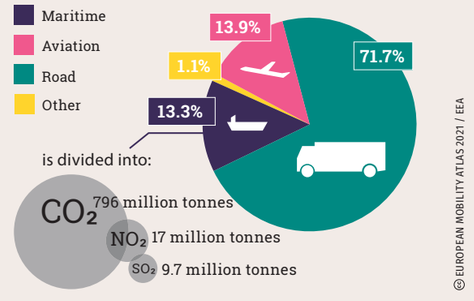


High traffic on transatlantic and transpacific shipping routes mirrors the interdependency of these markets. Asia is clearly dominating the market when it comes to container shipping.

Maritime shipping is the lowest emitter of CO2 per tonne of products transported per kilometre.

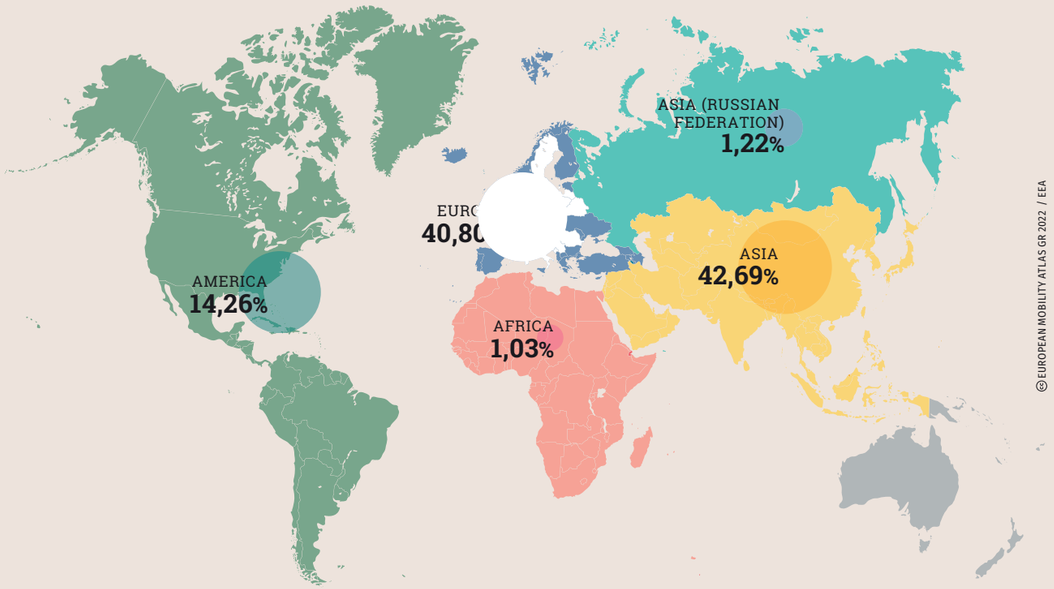
SHIPPING'S SHARE OF GREENHOUSE GAS EMISSIONS

In relation to European transport emissions



THE ECONOMIC IMPORTANCE OF PORTS WORLDWIDE, BY CONTINENT

Percentages of ship-owning economies by continent, as of January 2021



Ports play a remarkable role in the global economy, occupying an important share in countries such as Asia and Europe, shaping the global economic map.

Positive aspects of shipping include the 'greening' of port handling by reducing their GHG emissions. Many larger port authorities are currently undertaking projects to improve cargo handling equipment and techniques.

Shore-to-ship power offers ships in harbour the possibility to shut down their fossil-fuel engines and run vital equipment on shore-based electricity. Burning crude oil in order to keep the ships' systems running has been banned in most European ports.

Countries with a big shipping sector are in a strong position to renew their logistics and transportation services, making them smarter, more efficient, and environmentally friendly. The Greek-owned fleet is the biggest among European nations. Greece is the top ship-owning economy of the world, owning 10.2 percent (in terms of commercial value) of total global ships, 53 percent of all European ships and 17.8 percent of global total dead-weight tonnage. The vast majority (85.2 percent) of Greek ships are registered under a foreign flag. Taxing shipowners in Greece has not been a priority of Greek governments in the last century. Maritime shipping in Greece represents almost 7 percent of gross domestic product (GDP).

The majority of operations in Europe pass through the ports of Rotterdam, Antwerp and Hamburg. The advantage of these ports is their relatively good infrastructure connection to the most important markets and industrial sites. Southern European ports face the disadvantage of geographical barriers such as the Alps and an unfavourable hinterland connection with the need to cross the entire Balkans in order to reach central Europe.

The Marine Environment Protection Committee adopted mandatory requirements in October 2016 for ships to record and report their consumption of fuel oil with the Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP). This International Maritime Organisation (IMO) consumption data collection system came into effect in March 2018, requiring ships of 5,000 gross tonnage and above to submit annual reports on fuel oil consumption to their administrations. To accelerate the transition to zero GHGs shipping, A.P. Møller-Mærsk, Europe's biggest shipping company and a global tycoon in maritime trade, set a new and optimistic target in 2018 to emit zero CO_2 emissions from its activities by 2050. But the company has also been found to have out-flagged older vessels in order to cheaply scrap them on South-Asian beaches. While the relevance of maritime trade will continue to grow, it is even more important to green this sector and to enhance and enforce international rules and regulations. An example of this is the recent push by the European Parliament to include shipping in the European Emissions Trading System (EU ETS).

The strongest ship-owning economies in the world market, based on the value of the of their owned fleet.

TOP SHIP-OWNING ECONOMIES

as of 1 January 2021

THE IMPACT OF PORTS ON SOCIETY

Ports are at the heart of global trade. At the same time, their characteristics and day-to-day operations make them one of the most environmentally harmful industries, regardless of their size. They are strongly linked to many social, economic and environmental aspects, thereby affecting the well-being of nearby cities and regional socio-economic conditions.

Port authorities and governmental bodies make every effort to ensure that the progress in ports is built on broad social support. Unfortunately, the conflicts of interest between different stakeholders may overshadow this holistic impact on the community. The growth and operation of ports can become the centre of intense social and economic debates when local community groups perceive an imbalance between the benefits and costs brought about by major ports. Concerns focus primarily on potential negative impacts on the local community, such as road congestion caused by loading and unloading activities, degradation of the visual landscape, and issues pertaining to noise and air pollution.

Usually, ports are situated within or in close proximity to urban areas, serving as a symbol of the maritime industry for local communities. As a result, ports are required to respond to the collective concerns of citizens and foster favourable social reactions towards their operations. To this end, ports have increased the transparency of their actions and operations, as demonstrated by their continuous efforts to communicate and collaborate with local bodies and the society in the implementation of their initiatives.

Zero Energy Ports (ZEPs) can serve as a vital element in achieving sustainability, as they integrate sustainable technologies to create an emission-free, self-sufficient and modern infrastructure that uses, almost explicitly, green energy with zero greenhouse gas emissions. This energy transition from fossil fuels to clean energy will also benefit the circular economy by promoting coexistence between ports and neighbouring cities.

ZERO ENERGY PORTS
ZEP influence on society

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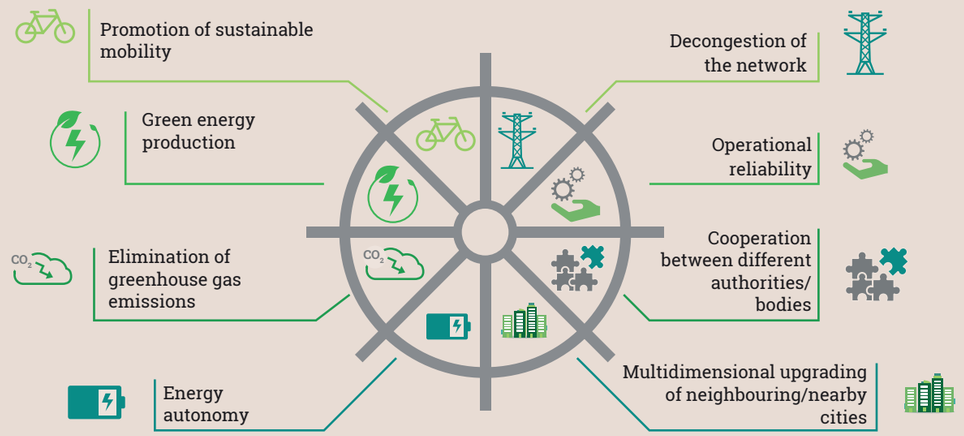
PORT INFLUENCE ON SOCIETY



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TRAVELLING SUSTAINABLY OR WITH THE CROWD?

Tourism is a major economic sector in Europe. But its negative impacts on the environment and local communities raise concerns. Sustainable travel is growing, yet Covid-19 could change everything.

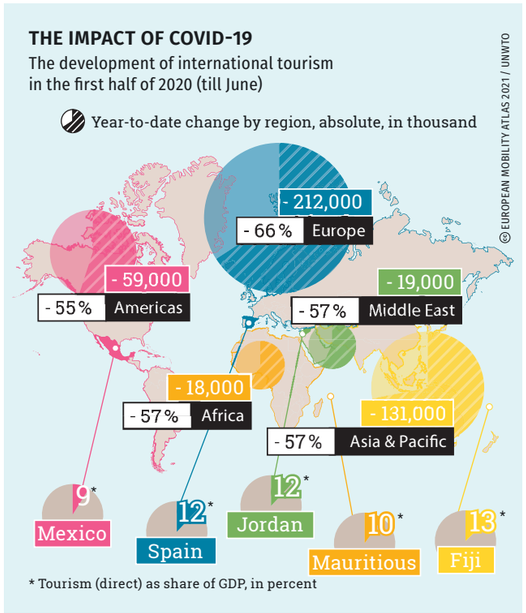
Over the past few decades, tourism trips have become an increasingly important part of the lives of many Europeans. In 2017, 62 percent of the adult EU population made at least one tourism trip. Of the 1.2 billion trips that were taken that year, the majority were domestic, representing three quarters of the trips, with 20 percent to other EU Member States, leaving almost six percent to destinations outside the Union.

Europe is the world's most popular tourism destination and the continent's tourism industry has enjoyed sustained growth. It is currently estimated that it contributes 10.3 percent of the EU's GDP and employs over 27 million people.

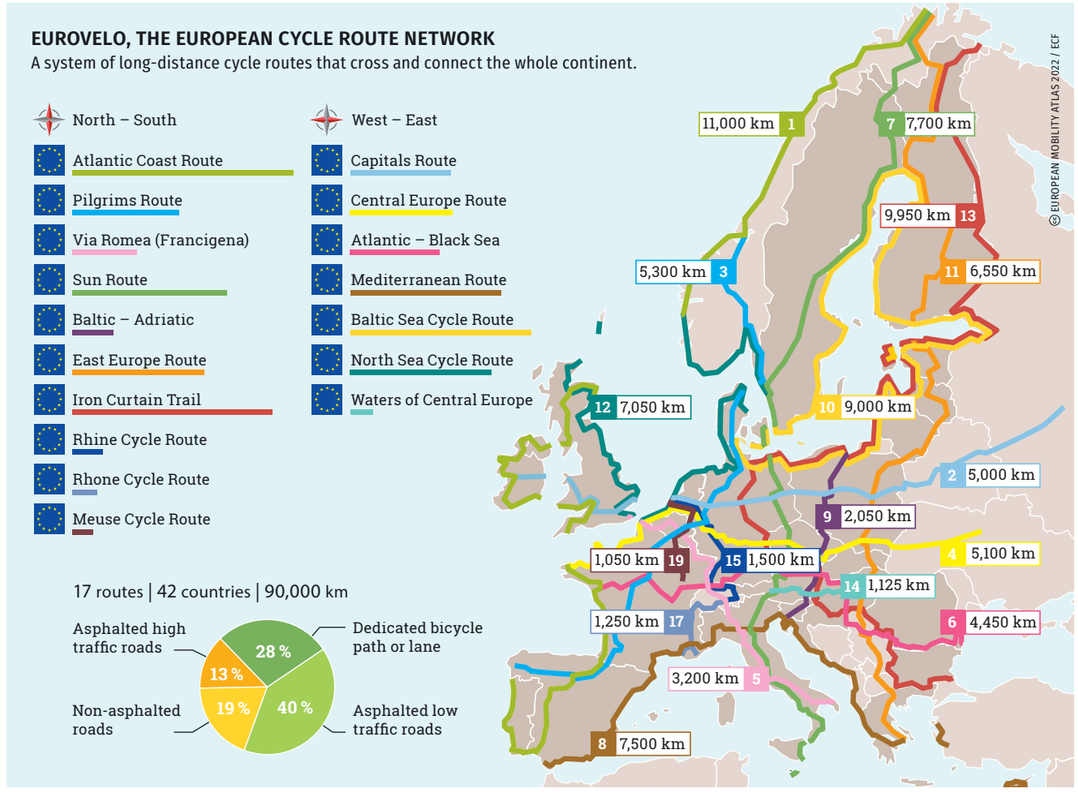
In recent years, however, there has been increasing awareness of some of the challenges that have been created by this growth, particularly in terms of the negative impact that it can have on the environment and communities located in or close to the most popular touristic destinations. The concept of 'overtourism' has become a growing concern. Venice received more than 25 million international tourists in 2018, in a city with a population of less than 55,000. Popular tourist destinations are therefore increasingly focusing on 'destination management' rather than 'destination promotion'. This is likely to take on even greater significance following the Covid-19 pandemic.

One of the main challenges when dealing with increasing numbers of tourists is how they move around. Tourism goes hand in hand with travel, even for domestic tourism trips. Unfortunately, the growth of the tourism industry in recent years has largely been built on unsustainable travel patterns. To take the example of air travel, between 2012 and 2017 tourist air travel grew by 15 percent. While the airline industry is keen to stress that air travel is now cheaper, safer and open to more people than ever before, there is no hiding its negative impact on the environment. This coincided with the overall environmental impacts from aviation increasing—10 percent for carbon dioxide, 12 percent for nitrogen oxide and 14 percent for noise between 2014 and 2019.

To change that, EU citizens are going to have to adapt how they go on holiday. Sustainable

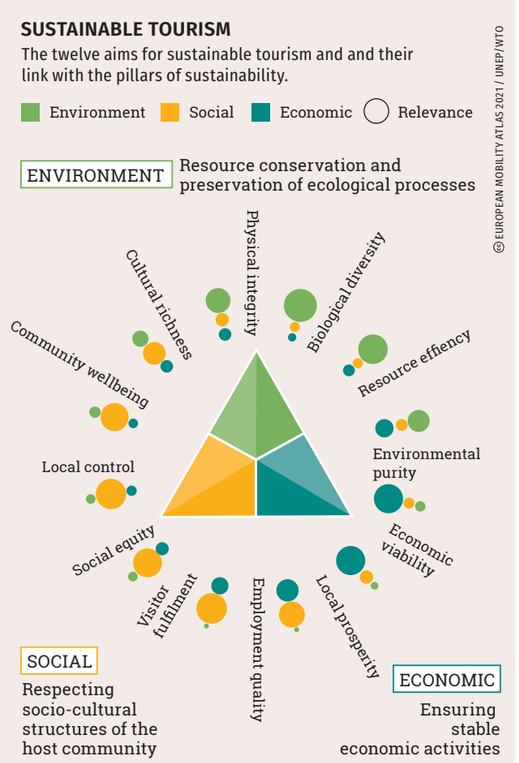


The decrease in international travel due to the Covid-19 pandemic has especially harsh consequences for countries with a high dependency on tourism.



The routes can be used by cycle tourists as well as by local people making daily journeys and leisure trips.

Truly sustainable tourism needs to respect the conservation of the natural foundations for life in a global perspective.



forms of tourism have always existed and in recent years, more of these options have started to make their way onto the market. It is promising that consumers are increasingly taking sustainability into consideration when choosing their holidays. In a recent study, 50 percent of the respondents stated that deciding an environmentally-friendly holiday option was important to them, with the figure rising to 56 percent for those born in the mid-to-late 1990s. This is reflected in the growing numbers of people taking more sustainable holidays. For example, approximately 5.5 million Germans went on a cycling tourism trip in 2018, representing 8 percent of the total population.

Coinciding with this growing recognition of the importance of sustainability, the Covid-19 pandemic may prove to be a pivotal moment for the tourism sector. The travel patterns that have developed in recent decades have been abruptly halted and at the time of writing, it is not clear when they will be able to return to anything like the situation prior to the pandemic. This disruption is forcing millions of Europeans to rethink their holiday plans and to seriously consider their options for travelling to planned destinations.

Encouragingly, the tourism sector also appears to acknowledge that this is a watershed moment and is not simply attempting to restore 'business as usual', despite the devastating short-term economic impact. As the EU Tourism Manifesto Alliance, the voice of the European travel and tourism sector, noted in its recent statement to the European Commission: "This crisis creates a downturn, but also an opportunity for change, for a new beginning in tourism across Europe."

It is a positive development that tourism trips are increasingly open to a larger percentage of the European population, helping to break down barriers and enabling people to better understand each other. Tourism can continue to make a significant contribution to the European economy while preserving and enhancing the continent's valuable cultural heritage and natural environments that are so attractive to visitors. However, all stakeholders—the industry, public authorities, transport operators, tourists and the local communities—need to develop clear recommendations and guidance for the consumers. That should start with the journey to the destination.

URBAN MARITIME TRANSPORT IN THESSALONIKI

The initiative developed in the Thessaloniki region and studied within the scope of the "DESTI-SMART" project (Delivering Efficient Sustainable Tourism with Low-Carbon Transport Innovations: Sustainable Mobility, Accessibility and Responsible Travel) is moving towards a tourism model that is sustainable, responsible, and accessible. This project is part of the low carbon economy aspect of the "Interreg Europe" programme and is being implemented by the Major Development Agency Thessaloniki (MDAT S.A.) as lead partner.

With a vision for sustainable tourism development based on resilience, intermodality and modernised transport systems, the overall objective of this project is to improve transport and tourism policies by integrating sustainable mobility and accessibility strategies. Efforts are underway to shift from overtourism to other variants of cultural and sustainable tourism that uphold environmental and cultural heritage values. Furthermore, embracing low-carbon transportation systems within the tourism sector at a local level yields notable advantages in terms of quality of life, socio-economic progress, and environmental and climate initiatives.

The project also included a questionnaire survey on commuting behaviour in Thessaloniki. The elements examined as part of the research were the following:

- Assessment of commuting behaviour
- Travellers' intentions
- Willingness to switch to alternative modes of transport
- Assessment of intentions and needs to promote urban maritime transport

The collected sample of 400 questionnaires consisted of both residents (63%) and visitors (37%) of Thessaloniki. It is worth noting that 16% of the participants were international visitors.

The survey was conducted at 12 key places along the seafront. In particular, the selected locations were highly frequented points such as Aristotelous Square, the White Tower, the Triumphal Arch of Galerius (Kamara), the port, the airport etc., as well as transfer points between different means of transport, like the area of the "Macedonia" bus terminal, the new railway station and the area near the IKEA store. The other locations selected were points of interest for the project, such as the Concert Hall, the area of Aretsou Marina and the cities of Perea and Nei Epivates.

The local plan developed specifically for Thessaloniki, as part of the "DESTI-SMART" project, is based on the "Urban Resilience Strategy 2030" and promotes collaboration, connectivity, and enhancement of its two critical parameters: tourism, recognising its significance as a growing yet delicate sector for economic activity and business growth on the one hand, and urban and suburban transportation systems and sustainable urban mobility, as key points for developing public infrastructure and services, on the other.

The seafront municipalities, with the support of MDAT S.A., the Transport Authority of Thessaloniki S.A. and other bodies involved in mobility and tourism, actively promote maritime transportation, as an eco-friendly mode of transport using innovative technologies that rely on alternative energy sources, as well as a means of tourism development for the city.

The map shows both Phase A, which involves the promotion of maritime transport as a public transport service, with the operation of the six stops already planned on the seafront, and Phase B, which involves the extension of the network and the improvement of service provision. This will be complemented by the inclusion of six additional stops, building on both the historical framework of the project and the results of the questionnaire survey carried out, focusing not on costly and time-consuming solutions, but on the use/improvement of existing and already authorised infrastructure.

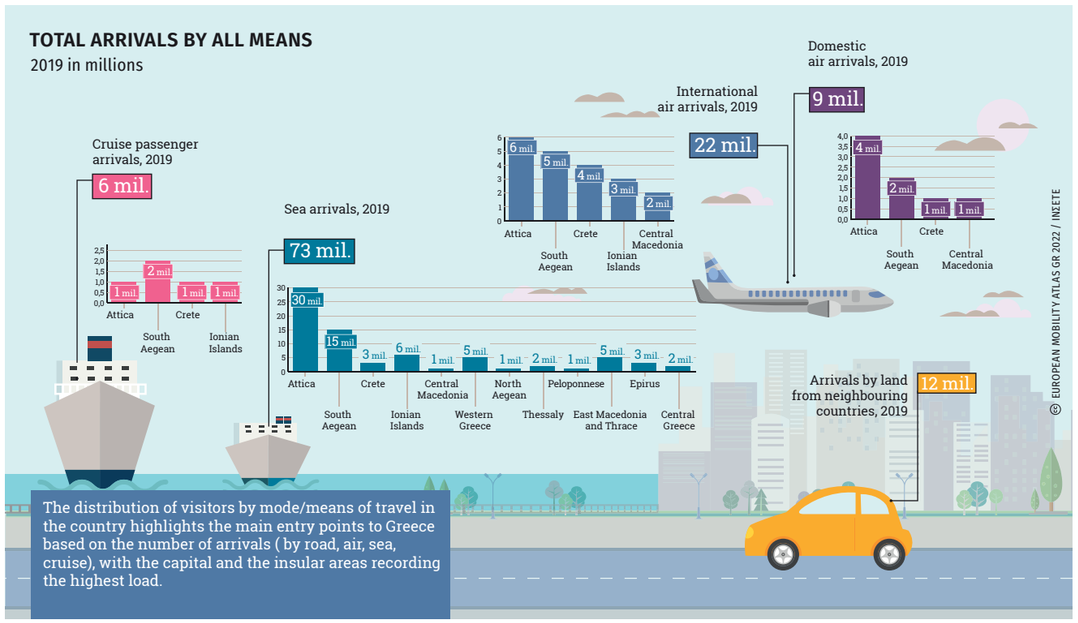
Finally, Phase C of the project will explore the potential of extending maritime services to popular tourist destinations beyond the Thessaloniki metropolitan area and its connection with Halkidiki and Pieria, as such an approach is expected to generate significant tourist demand and further attract investment interest.

The urban maritime transport in Thessaloniki and its extension to popular urban destinations.

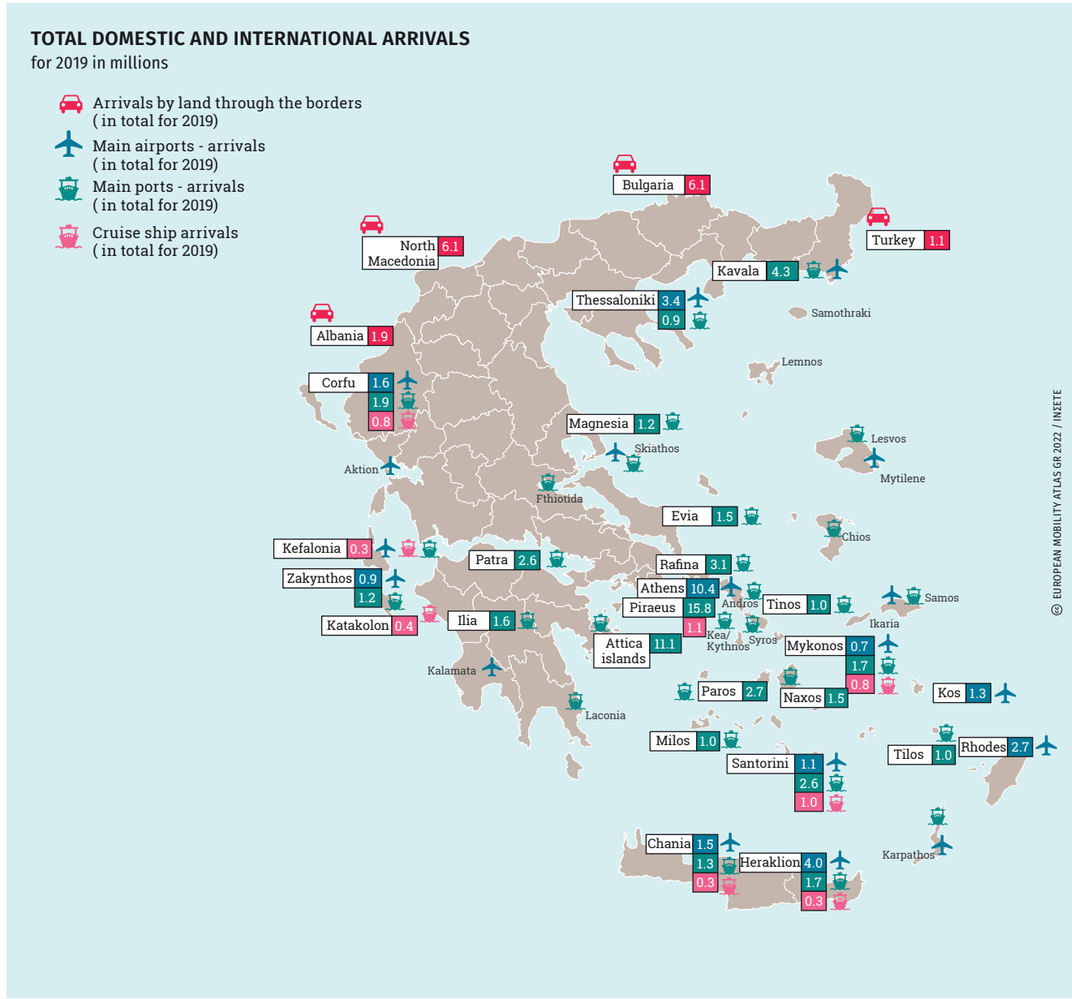
TOURISM DEVELOPMENT WITHOUT SUSTAINABLE MOBILITY... IS IT POSSIBLE?

Although Greece is a popular tourist destination, its transport infrastructure needs improvement. The increase in seasonal traffic is a source of many environmental problems and puts a lot of pressure on the transport network - roads, ports and airports. There is an urgent need for safe and environmentally friendly transport for residents and visitors alike.

Country's traditional hospitality, vast coastline, heavenly seas, sunshine and culture have made it one of the world's top tourist destinations. During the summer months in particular, Greece's coastal and island regions are flooded with millions of travellers, boosting the local economy. But are the necessary infrastructures in place to ensure that these journeys are carried out safely and with optimum service?



The distribution of visitors by mode/means of travel in the country highlights the main entry points to Greece based on the number of arrivals (by road, air, sea, cruise), with the capital and the insular areas recording the highest load.



Greece attracted more than 14 million foreign visitors in 2019. Taking into account both domestic and international travel by all available means, transport reached 122 million per year, reflecting the importance of sustainable management

The road network in most parts of the country, especially on the islands, is inadequate for visitors and citizens during the summer. The increase in the number of vehicles combined with the many problems of the Greek road network, such as the poor condition of the road surface, the lack of traffic lights, street lighting and road safety education, pose serious risks. This problem is even more severe on the islands, which receive millions of tourists every year.

Unfortunately, road accidents are on the increase. Every year, a large number of fatal and serious road accidents occur due to non-compliance with the Highway Code. The poor road network and the high number of traffic offences create serious risks and insecurity, with Greek and foreign drivers risking their lives.

Airport and port infrastructures also need to be improved. Increased traffic at certain times of the year causes overcrowding, delays and general discomfort for workers and travellers, as most airports and ports are not designed to cope with heavy tourist traffic. For instance, numerous ports lack the necessary space to accommodate the ferries and cruise ships required for transporting both passengers and goods to meet the demand for products. Similarly, airports, particularly those located on islands, are ill-equipped to cope with the substantial influx of arrivals.

At the same time, these increased flows are accompanied by significant emissions of greenhouse gases.

The transportation demand has not been adequately met by planes, ships, and cars adopting green electromobility, leading to air quality problems, with urban centres being particularly impacted.

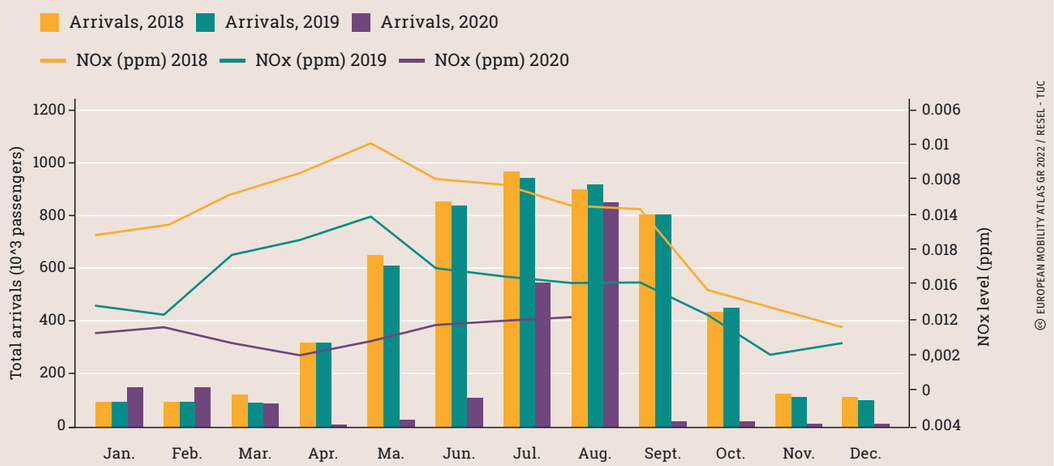
The outbreak of the Covid-19 pandemic had a significant impact on tourist arrivals and, for the first time, travel has been significantly reduced, with a corresponding reduction in emissions. The health crisis confirmed the inability to deal with serious health situations on the one hand, and the need to take measures to plan for resilient areas in the event of similar crises, on the other.

In conclusion, a country with such a large number of visitors needs to strengthen its sustainable mobility strategies. The design and implementation of new road infrastructure, the promotion of electromobility and the adoption of tailor-made sustainable urban mobility plans in popular destinations, a change in traveller behaviour, the modernisation of airports and ports, the use of green energy and the protection of sensitive habitats are all important for sustainable development and for meeting the challenges posed by increased tourism.

The impact of inbound tourism (arrivals) on air quality (NOx emissions) in a medium-sized island tourist city (Rethymno).

NOX EMISSIONS AND TOURIST ARRIVALS

NOx emissions and tourist arrivals in the city of Rethymno (2018, 2019 and 2020)



DESIGNING SUSTAINABLE MOBILITY IN TOURIST DESTINATIONS - MUNICIPALITY OF RETHYMNO

Sustainable Urban Mobility Plans (SUMPs) should include the formulation of strategies and the execution of actions that consider tourist influx and the seasonal demands placed on transportation services, while enhancing the safety, appeal, and accessibility of transport infrastructure and services for both residents and tourists.

In Greece, successful practices can be found in popular destinations such as the city of Rethymno and the Platanias region of Chania city, where the municipal authorities, in cooperation with the Renewable and Sustainable Energy Systems Laboratory of the Technical University of Crete, are implementing the European projects "CIVITAS DESTINATIONS" and "SUMP-PLUS" of "Horizon 2020".

The Municipality of Rethymno, with a population of 63,000, receives over 500,000 visitors per year and attracts over 1.5 million on day trips and cruises, visiting important archaeological sites, beautiful beaches, traditional villages and enjoying the local gastronomy and traditions.

CIVITAS DESTINATIONS showcased the effective collaboration between the tourism and transport sectors in tackling mobility obstacles and promoting the city as “green” destination. There were three key pillars: The improvement of public transport services, the promotion of behaviour change towards active mobility (cycling, walking) and the integrated participatory planning in cooperation with local bodies. Improvements to the transport system focused on effectively managing fluctuations in demand caused by tourism and improving the connectivity between public transportation, cycling, and walking options. The adopted measures include systems to monitor traffic congestion and urban environmental quality, smart parking technologies, e-mobility infrastructure, experiential activities and workshops to change the behaviour of hundreds of citizens, tourists and over 10,000 school children. The city of Rethymno has upgraded the existing SUMPs and managed to balance the city's role as a major tourist destination with the needs of its residents, by designing and implementing projects that improve accessibility and reduce road accidents. For its actions, it was awarded by the European Commission with the 1st EU Urban Road Safety Award 2021, among 3,184 European cities.

INNOVATION AS A WAY OF LIFE

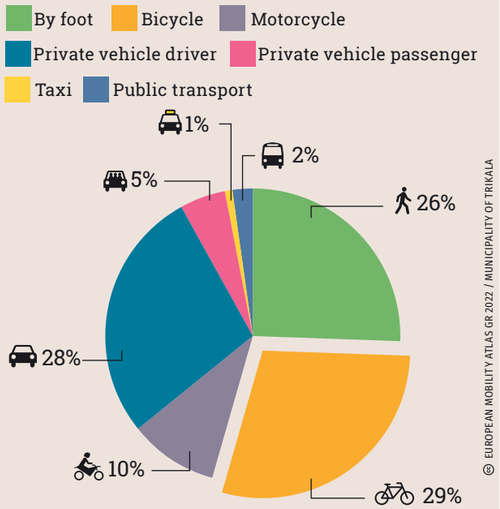
In this new era of rapid transformations in our daily lives, it is essential for local authorities to establish the necessary conditions to enable their citizens to adjust and adapt. These conditions encompass various aspects, including sustainable mobility, while emphasising the utmost importance of protecting the environment.

In this context, the City of Trikala embraces forward-thinking initiatives and carries out innovative programs that encompass not only their outcomes but also a broader perspective. The objective is to empower citizens to access improved services and enhanced living conditions while also serving as a reference point in fostering collaboration with local authorities to explore various pathways for transforming and elevating the situation on multiple levels.

"The driverless bus" in Trikala (Municipal archive of Trikala).

A very high percentage of the residents in Trikala opt for cycling or walking as their daily means of transportation.

USE OF MEANS OF TRANSPORT IN THE CITY OF TRIKALA BASED ON THE CITY'S SUMP

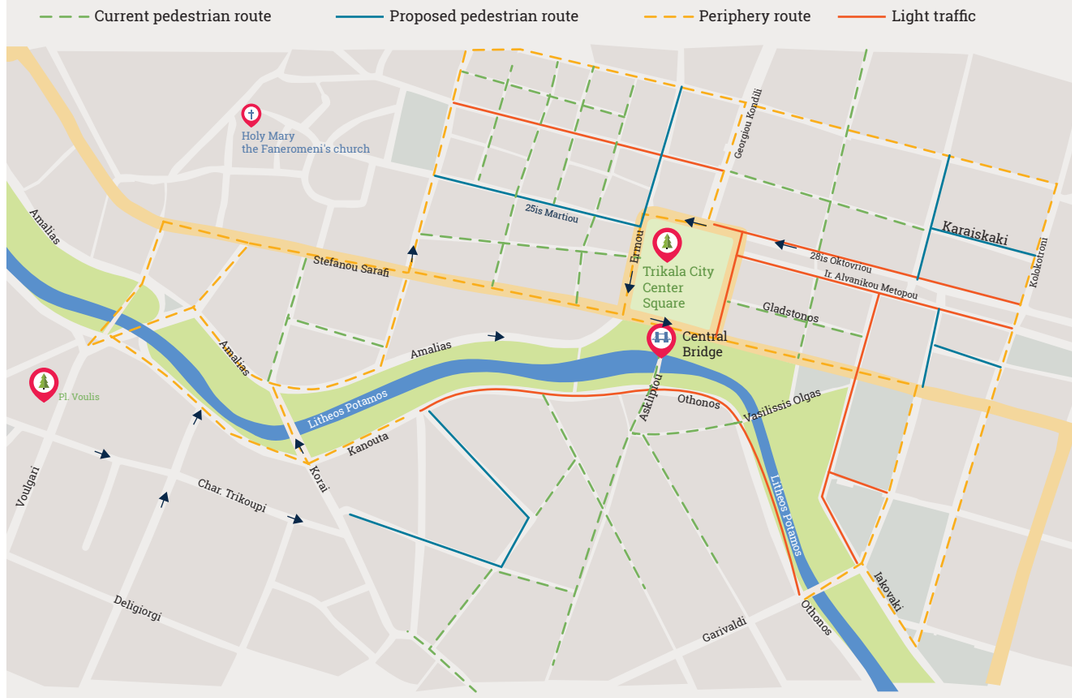


Over the last few years, Trikala has implemented programmes including:

Autonomy & Connected Mobility

"The driverless bus" marks the first global initiative to implement self-driving technology in real-world conditions, utilising advanced technology and electric vehicles. Its pilot implementation over a span of seven months has highlighted the necessity for expanding connected and automated mobility. The project has witnessed widespread usage and acceptance by all citizens, and yielded valuable insights into the technological capabilities of autonomous transportation. This has further enhanced the European Union's comprehension of self-driving vehicles through valuable feedback, enabling the study and implementation of a comprehensive integrated mobility framework for future cities. The Municipality of Trikala, aiming to strengthen autonomous transportation, is developing a second programme with regular services that will connect the city centre with the university, thereby facilitating transportation for students.

PROPOSED CYCLE LANE NETWORK IN THE REGION OF TRIKALA ACCORDING TO THE SUMP OF THE MUNICIPALITY OF TRIKALA



E-mobility - Reduction of environmental pollution

A series of micro-mobility programmes, such as e-bikes for use by the municipal police, the study on the placement of EV charging points in different parts of the city of Trikala, and the use of e-vehicles by municipal services and citizens are the elements that promote the culture of e-mobility in Trikala. The submission of a proposal for electric scooter charging stations is under consideration, particularly within the framework of new initiatives funded by the Recovery Fund, with a specific focus on Smart Cities. The use of e-scooters supports micromobility and the transition to e-mobility to save energy and resources, but also to improve the quality of life in the city. For this purpose, there will be 23 specific points in public spaces within the urban area of Trikala city for the installation of e-scooter charging and parking stations.

Thus, it is estimated that e-mobility (at the level of development and related infrastructure) will promote the decrease of emissions due to the expected reduction in the use of polluting vehicles, while, at the next level, the target should be the creation of a Zero Carbon City.

Finally, it is worth mentioning that the city of Trikala has started the process of creating the conditions that will allow it to become one of the first 100 climate neutral cities in the EU by 2030. The creation of a modern European city is a strategic goal of the local administration and the submission of a proposal for the city of Trikala aligns with the EU's aim for a carbon-neutral EU by 2050. Crucial components of this endeavour encompass collaboration with civil society, adoption of a new governance model and the climate city contract. A diverse range of intervention areas is involved, covering a wide range of social activities. These include essential projects aimed at reducing carbon dioxide emissions, with initiatives pertaining to "energy and buildings," as well as "transport and mobility" to foster the creation of an environmentally sustainable city.

Transport innovation - Urban air mobility

Trikala was the first city in Europe to carry out a pilot project using a drone to transport pharmaceuticals to suburban areas as part of the European Harmony programme, which aims to connect urban and rural areas. Unhindered access to health services for all residents (especially during a pandemic health crisis) is an important democratic citizens' right that the state and local government must uphold. Furthermore, the utilization of technology facilitates the provision of services and connectivity for inhabitants residing in remote or inaccessible areas, thereby making a substantial contribution to promoting equal rights and diminishing accessibility obstacles. Urban air mobility is a key instrument for achieving the above objectives, and the first results are expected shortly.

Drone delivering medicinal products (Municipal archive of Trikala).

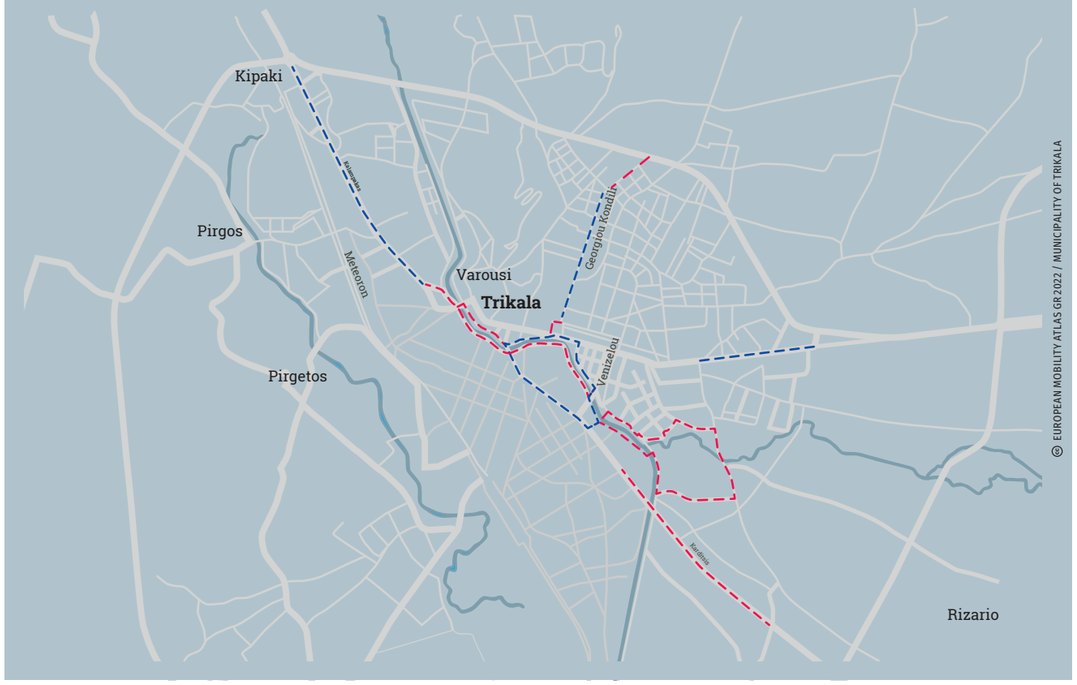
Cycling

It is well known that Trikala is one of the most bicycle-friendly cities. With the number of bicycle owners estimated at more than 40,000 (i.e. a percentage of bicycle users of more than 75%), bicycle is a daily choice of transport and plays a dominant role in the life of the city. The Municipality of Trikala aims to increase the number of cycle lanes in the city to 20 km by 2021 (from 2 km in 2014). The local community, which is directly linked to cycling and cycling culture in its everyday life and in all aspects of its social life, should enjoy a policy of strengthening this travel behaviour. Recognising this need, the local government aims to enhance the safe cycle network. This includes extending the cycle lane network in the southern entrance to the city, the central riverside route and the northern cycle lane linking the municipal sports centre and school facilities with the city centre. These routes will reinforce the already existing central cycle route, aiming to create an integrated network on the main roads and points of interest in the city of Trikala.

PROPOSED CYCLE LANE NETWORK IN THE REGION OF TRIKALA ACCORDING TO THE TECHNICAL SERVICE OF THE MUNICIPALITY OF TRIKALA

Current cycle lanes

Planned network extensions (according to the planning of the Technical Service of the Municipality)



Accessibility

At the same time, the daily life of pedestrians and people with mobility issues should be facilitated by developing an extensive network of pedestrian routes (that is already being upgraded and extended in the city), by creating optimal conditions for pedestrians and by implementing accessibility projects at central points and attractions of the city (Lithaios river, central square).

The main objective is the free movement of cyclists and pedestrians and, in general, the unhindered mobility in the central points of interest of the city of Trikala. A very high percentage of city's residents opt for cycling or walking for their daily commute.

WANTED: STRATEGIES TO PROTECT THE WEAKEST

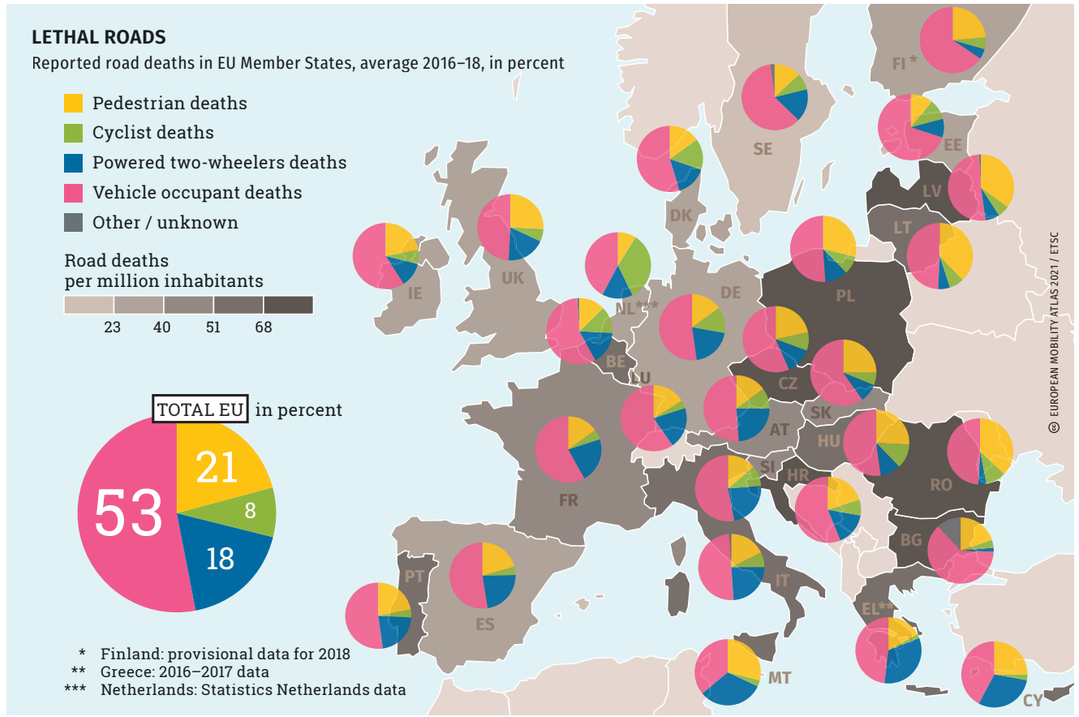
Cyclists and pedestrians run a high risk of being killed in road traffic. At national and EU levels, a variety of initiatives aims to protect them better. However, more is needed to ensure effective pedestrian and cyclist safety.

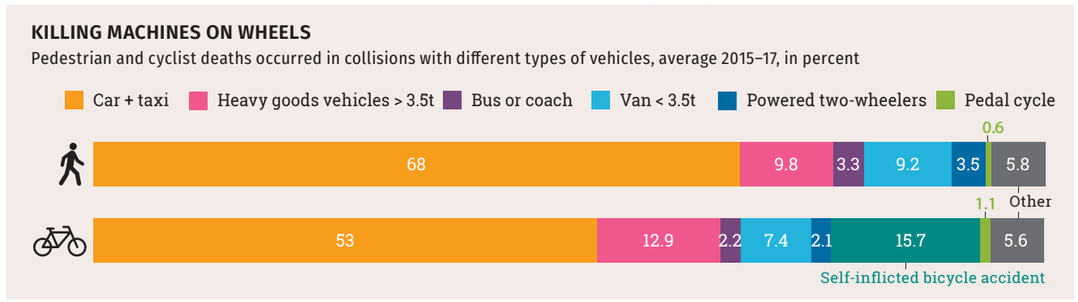
The European Union (EU) faces a multitude of interconnected demographic, public health and environmental challenges: the climate is changing; road deaths are not falling as fast as one would hope for—although the 'Covid-19 effect' is noticeable due to less traffic; urbanisation is increasing, air pollution is worsening, obesity is rising and the population is ageing.

There is an increasing recognition at local, but also national and EU level, that boosting active mobility, particularly walking and cycling, can play an important role in overcoming many of these challenges. Being the most vulnerable road users, at least 51,300 pedestrians and 19,450 cyclists were killed on EU roads between 2010 and 2018. In 2018 alone, total road deaths were 25,058, including 5,180 pedestrians and 2,160 cyclists. The total in 2019 was 22,800.

Deaths among pedestrians and cyclists accounted for 29 percent of all road deaths across the EU. These groups are also the least likely to harm other road users. There are no silver bullets for improving the safety situation. Several governments have started to put in place strategic planning to improve pedestrian and cyclist safety, including ambitious targets and priority areas for action. A proactive approach, involving all relevant stakeholders in the preparation and execution of the plans, clear deadlines and an appropriate budget for implementation are some of the crucial elements for success. Some governments have developed and are implementing national walking and cycling strategies, but the level of detail and ambition on safety differ.

The development of recommendations for action to protect the most vulnerable members in traffic could help to decrease the number of fatalities.





Not only are vehicle drivers more likely to be involved in fatal car accidents, but they are also responsible for well over half of all pedestrian and cyclist deaths.

A number of local authorities in the EU have started working on preparing and implementing Sustainable Urban Mobility Plans (SUMP), but improvements are needed to ensure that these plans are closely linked to road safety priorities, particularly for pedestrians and cyclists.

The EU road safety policy framework 2021-2030 includes a list of key performance indicators (KPI), developed in cooperation with Member States. The KPI on speed, protective equipment and vehicle safety are related to pedestrian and cyclist safety. Tracking the progress for each KPI will help decision-makers to develop well-informed and more targeted policies. Over the last years, the European Parliament, the Committee of the Regions and the European Transport Safety Council and other stakeholders that are working on reducing

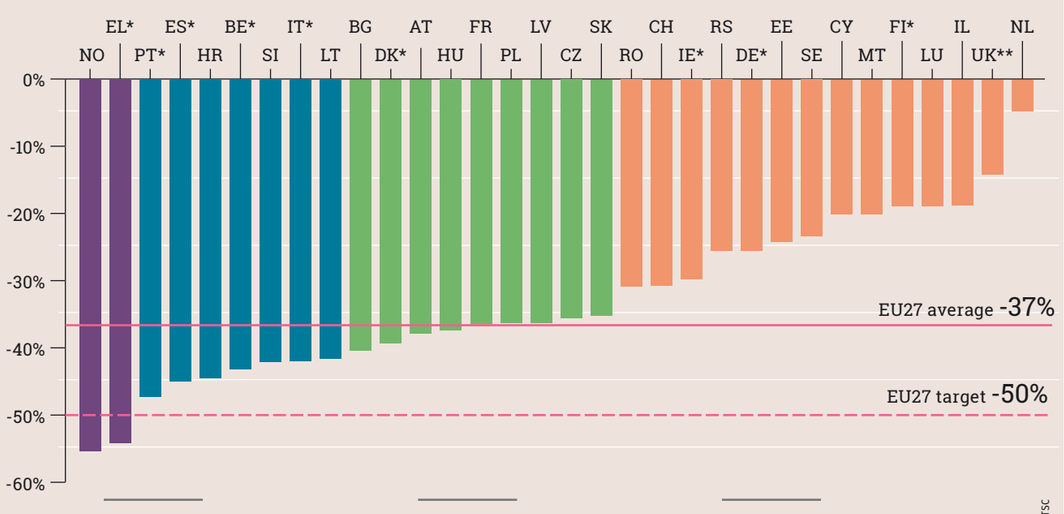
the numbers of deaths and injuries in transport have called for the European Commission to come forward with a cycling strategy for the EU. An EU-wide safe active mobility strategy, to encourage a coordinated European response to the challenge of making walking and cycling as safe as possible, could also be useful.

Infrastructure can contribute to reducing speeds and separating pedestrians and cyclists from motorised vehicles. This can reduce both pedestrian and cyclist deaths and severe injuries when collisions do occur, or even prevent those collisions from happening.

At the EU level, the revised EU Road Infrastructure Safety Management (RISM) directive mandates, for the first time, to systematically take vulnerable road users, including pedestrians and cyclists, into account in all infrastructure safety management procedures on the roads covered by the directive. Pedestrians and cyclists mostly travel on urban roads.

EU Member States are encouraged to extend the safety management principles of the RISM directive to their urban roads. At speeds of below 30 km/h, cyclists can mix with motor vehicles in relative safety. Traffic calming measures in 30 km/h zones are essential to discourage drivers from exceeding the speed limit. Enforcement on roads limited to 30 km/h also has a contribution to make where engineering measures by themselves are insufficient to bring drivers to safer speeds.

RELATIVE CHANGE IN ROAD DEATHS BETWEEN 2010 AND 2020 IN EU COUNTRIES

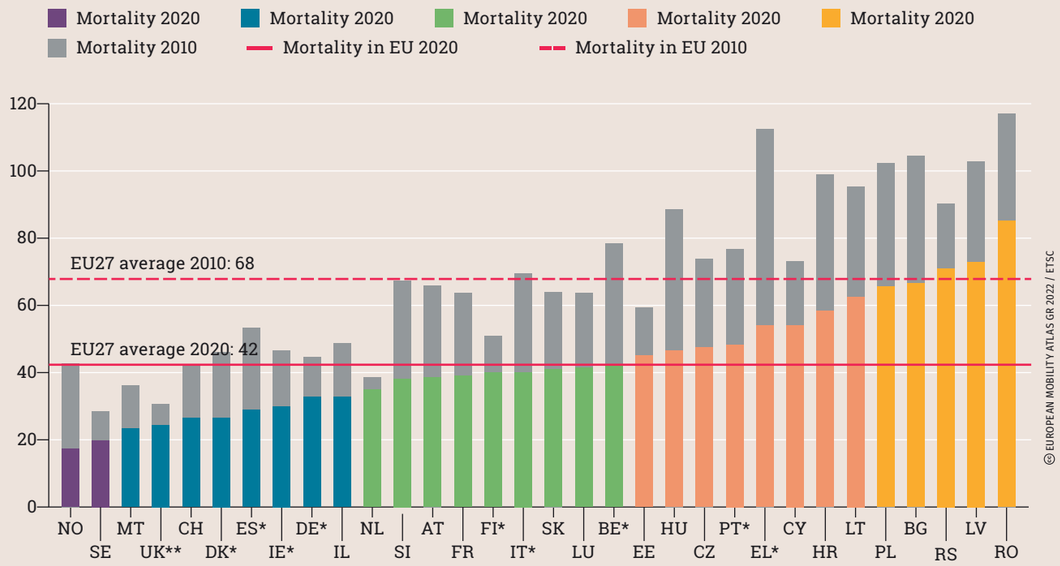


*National provisional estimates used for 2020, as final figures for 2020 are not yet available at the time this report went to print.

** UK data for 2020 are the provisional total for Great Britain for the year ending June 2020 combined with the total for Northern Ireland for the calendar year 2020.

The annual number of deaths in LU and MT are particularly small and, therefore, subject to substantial annual fluctuations. The annual numbers of deaths in CY and EE are also relatively small and may be subject to annual fluctuations.

MORTALITY (ROAD DEATHS PER MILLION INHABITANTS) IN EU COUNTRIES



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Efforts should also be made to keep cyclists and pedestrians separate, by giving each of them, where possible, enough space so that they do not intrude on each other's space. Increasingly, urban planning must also take into account new personal modes of transport such as e-scooters, particularly how to keep their riders, as well as pedestrians and cyclists sharing space with them, out of harm's way.

Following an agreement reached in 2019, the revised EU General Safety Regulation and Pedestrian Safety Regulation have been updated with improved passive and active safety requirements for all new vehicles sold in the EU. Many of those new vehicle safety requirements, such as Intelligent Speed Assistance (ISA), Automated Emergency Braking (AEB) with vulnerable road user detection, enlarged head impact protection zones, direct vision requirements and Blind Spot Detection Systems for heavy goods vehicles will contribute to improving pedestrian and cycling safety.

To accelerate the market penetration of safe vehicles, Member States and local authorities can introduce public procurement requirements and urban access regulations to promote safer vehicles. With a comprehensive approach, strategic planning and cooperation between all levels of government as well as with road safety stakeholders, many of the challenges in improving pedestrian and cycling safety can be met.

ROAD SAFETY IN GREECE

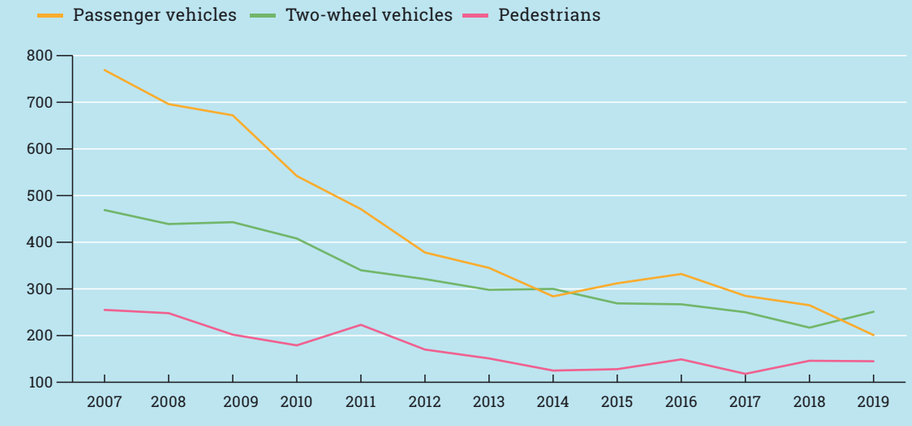
Greece is the only EU Member State to have exceeded the European target of a 50% reduction in road fatalities during the decade 2010-2020, achieving a reduction of 54%. Additionally, the number of serious injuries decreased by 63%.

Despite this significant reduction over the last decade, however, road accidents remain a major problem, as Greece ranks among the worst in the EU in terms of fatality rates: Greece ranks 9th from the bottom among the 27 European countries in terms of road deaths per million citizens, with a rate of 54 deaths compared to the European average of 42.

An analysis of the data for specific groups of road users shows that in 2019 more than half of the road deaths in Greece involved vulnerable road users (pedestrians, cyclists and motorcyclists). This rate is higher than the average observed in the entire European Union. At the same time, the percentage of cyclists killed in road accidents (3%) is relative low compared to other European countries, which can be explained by the limited use of this mode of transportation.

However, a worrying aspect about vulnerable road users is the notable difference in the reduction rates between pedestrian fatalities (19%) and accidents involving motor vehicles (61.4%) over the period 2010-2019. Measures must be taken in this direction including a proposal to introduce a 30 km/h speed limit in cities. As pedestrian deaths are almost exclusively caused by collisions with motor vehicles, lower speed limit can give drivers more time to react and avoid a dangerous situation.

NUMBER OF CASUALTIES CAUSED BY ROAD ACCIDENTS, PER MODE OF TRANSPORT, 2010-2019

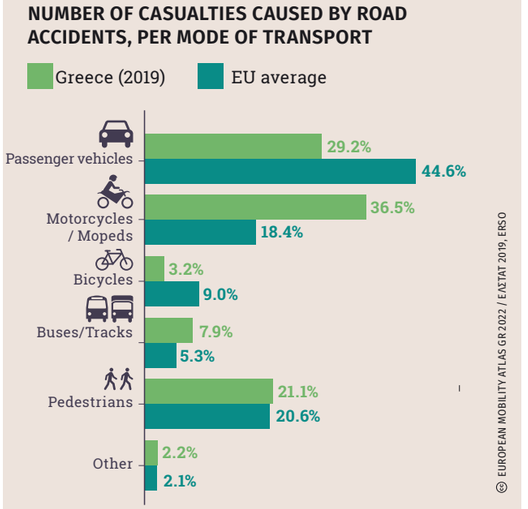


Contrary to the EU average, the majority of road accidents in Greece occur on urban roads (54%). It has also been observed that the majority of fatal vehicle collisions occur outside residential areas, while motorcycle and moped crashes occur in the city areas (ELSTAT 2019).

With over 1.6 million motorcycles in active use (1,637,608 to be exact according to 2020 ELSTAT data), Greece has the fourth largest number of motorcycles in Europe (excluding France). On the basis of these data, it is certainly necessary to take targeted measures for this particular group of road users. Ensuring the usage of protective gear by all individuals riding two-wheel vehicles and conducting regular inspections by traffic authorities hold significant importance.

In addition, emphasis should be placed on the protection of motorcyclists but also on the improvement of infrastructure for pedestrians and cyclists to ensure their safety and to promote alternative and more sustainable modes of transport.

NUMBER OF CASUALTIES CAUSED BY ROAD ACCIDENTS, PER MODE OF TRANSPORT

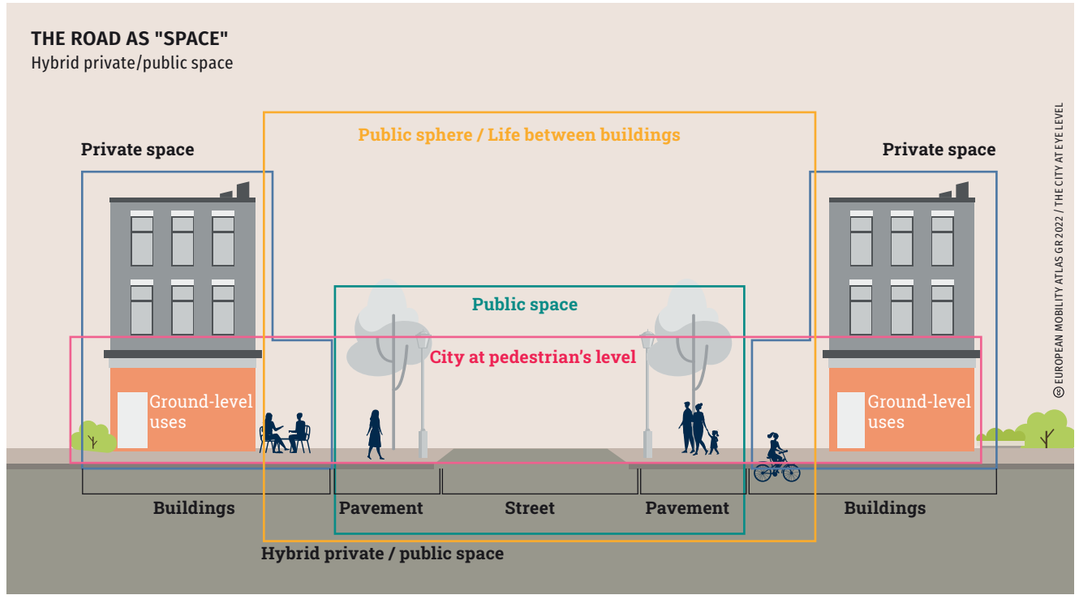


Overall, road safety in Greece is improving, but further measures are needed.

Last but not least, the role of citizens themselves is important in shaping the driving culture. Over the last decade, there have been information and awareness-raising activities for citizens and institutions to prevent road accidents, as well as information campaigns and educational programmes in schools by road safety organisations.

IMPROVEMENT AT A SLOW PACE

Roads serve as fundamental components of cities, playing a crucial role in serving the areas they connect. In recent years, there has been a shift in perceiving major road arteries as "public spaces" rather than mere transportation corridors that divide urban neighbourhoods.



Throughout the 20th century, the design and construction of modern cities primarily focused on facilitating private car mobility. Road arteries were exclusively seen as channels for car movement, disregarding and overlooking the development of neighbouring urban areas and the way pedestrians would move along them.

However, these same congested urban arteries are dynamic places, with diverse urban uses such as commerce, recreation, housing and central functions concentrated alongside them. In fact, they are intricate urban structures and complex socio-spatial entities.

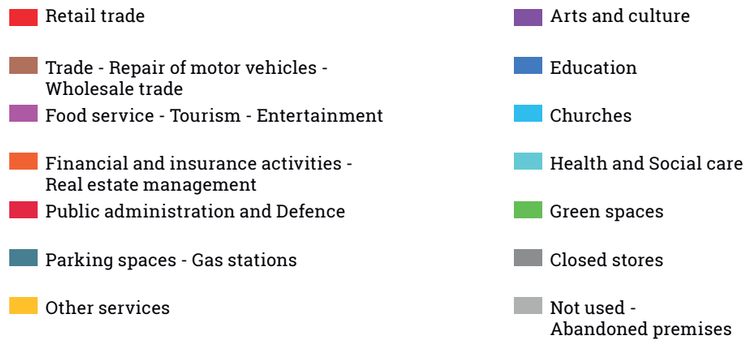
Mixed-use commercial streets are often at the heart of cities and some of them hold significant historical and geographical value for both residents and visitors. Major urban streets can be considered as 'linear cities', dynamic yet dense spaces that combine several urban functions and multiple levels of urban mobility.

Roads serve as fundamental components of cities, playing a crucial role in the areas they serve. In American cities, it is estimated that streets occupy an average of 25-35% of the total urban landscape, while in medium-sized Greek cities, such as Thessaloniki, it is estimated that streets occupy almost a third of the total urban area.

It is precisely for these reasons that, in recent years, there has been a shift in perceiving major road axes as "public spaces" rather than mere traffic lanes that divide neighbourhoods on either side. The planning concept is changing completely, and there are many who argue that streets and pavements constitute the public right of passage for everyone in cities. These 'user-friendly' approaches view road axes as public places, with multimodal mobility, providing space for pedestrians and cyclists, public transport and private vehicles, taking into account the 'life' on both sides of the pavements and neighbourhoods. At the same time, in terms of environmental quality, people-oriented street design is linked to policies that seek low-emission solutions to tackle air pollution, as vehicle emissions are the largest source of air pollution in a city.

LISTING OF USES FROM ARISTOTELOUS SQUARE TO DELPHON STREET, THESSALONIKI

LISTING OF USES FROM DELPHON STREET TO RING ROAD, THESSALONIKI



Ground floor uses along the traffic axis. On-site survey, July 2017, REMEDIO Project.

Human movement, by its very nature, is mainly limited to the horizontal axis and to a speed of about 5 kilometres per hour, as mentioned in the seminal 1971 book 'Life between buildings' by Danish architect Jan Gehl. According to Gehl, important factors for creating vibrant and pedestrian-friendly streets are the ground-level uses. "Life" on the roads is significantly reduced when small, active uses are displaced by larger ones that do not interact with the street, creating "holes" and gaps in the urban fabric, such as car dealerships and parking spaces, or neutral units like offices and banks. Even the side boundaries of a large park create discontinuities, and it's a fact that we don't enjoy walking along vast empty spaces, especially at night.

In order to avoid the problems of "gaps" and "lagging areas", many northern European cities have adopted building regulations that impose restrictions on the use of land that create "dead" ground floors. There have also been various initiatives by experts and citizens to reclaim public road space for pedestrians, following the logic of the pioneer Jan Ghel. In essence, these ideas, such as the 'City at Eye Level' initiative, claim the 'life between buildings'.

Greek cities, given their density, the way they were built, and the small land ownership, have never faced this problem. The roads of Greek cities, where small commercial and leisure uses are concentrated on the ground floors of buildings, are their most vibrant and active cells. This advantage of Greek cities is something we need to reconsider today, especially for some central areas of Athens and Thessaloniki, after the destabilisation and changes they have suffered during the years of economic crisis and pandemic.

All these issues have been taken into account in the process of strategic redesign of the eastern artery of Thessaloniki, which has been carried out as part of the implementation of the "REMEDIO - REgenerating mixed-use MED urban communities congested by traffic through Innovative low carbon mobility solutions" project.

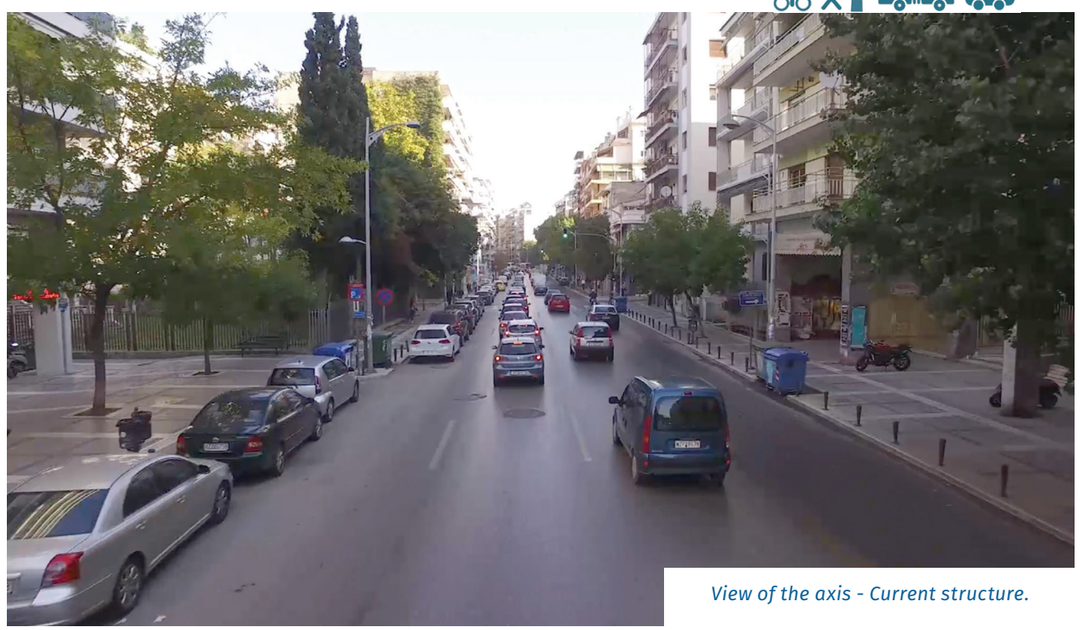
It is a major traffic artery that includes Ethnikis Antistaseos Street, Vassilissis Olgas Avenue, King George I Avenue and Manolis Andronikos Street. It has a total length of 6.2 km and crosses two municipalities of Thessaloniki, the Municipality of Thessaloniki and the Municipality of Kalamaria.

A detailed urban analysis revealed a real "linear city" developing along this axis, with 21,592 residents in its immediate zone of influence and 85,916 residents in the wider zone of influence. The ground floor properties on both sides have varied and diverse uses.

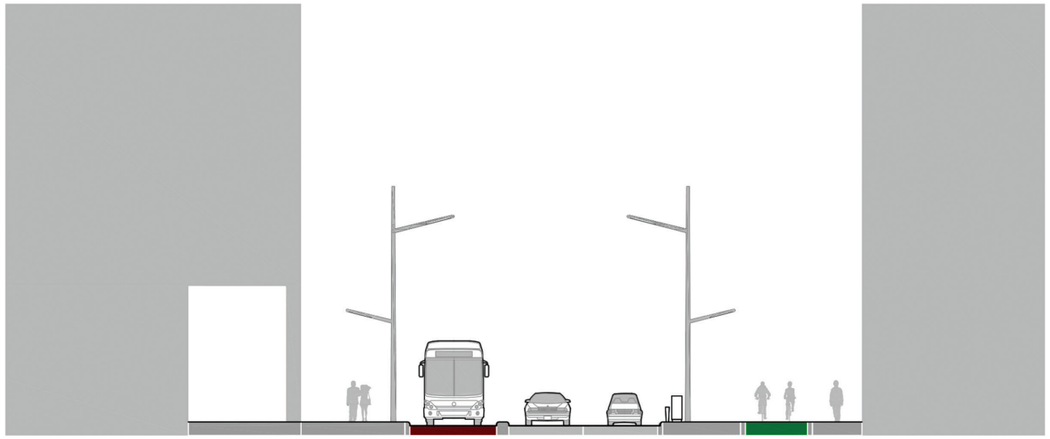
The axis was redesigned with the aim of promoting low-carbon traffic solutions and transforming it into a public space for everyone. The whole process was developed through an extended participatory planning 'experiment' involving relevant authorities, civil society organisations, residents and road users, as well as scientific experts.

We redesign the road, together

The solutions for the axis shape and individual sections were selected through extended participatory design processes.



View of the axis - Current structure.



Proposal for the redesign of the axis section - Vasilissis Olgas Avenue at its intersection with Ippokratous street.

View of the axis -Reconstruction proposal.

A MULTIFACETED CHALLENGE

What is mobility poverty? Is it a logical consequence of past problems or an emerging challenge? How easy is it to be identified and tackled? How often do we face it every day without even realising it?

The definition of the phenomenon can emerge from the concepts that comprise it: transport poverty (lack of or low quality of transport), transport affordability (ability to cover the financial costs of transport), accessibility poverty (lack of or reduced accessibility for all), transport related social exclusion (social differentiation due to lack of access), exposure to transport externalities (impacts of using the transport system, e.g. traffic accidents, chronic diseases or deaths from air pollutants).

These overlapping concepts are used to describe a complex and multidimensional situation: The inability to access basic goods or services and to reach one's destination in a comfortable, unhindered, accessible and safe way.

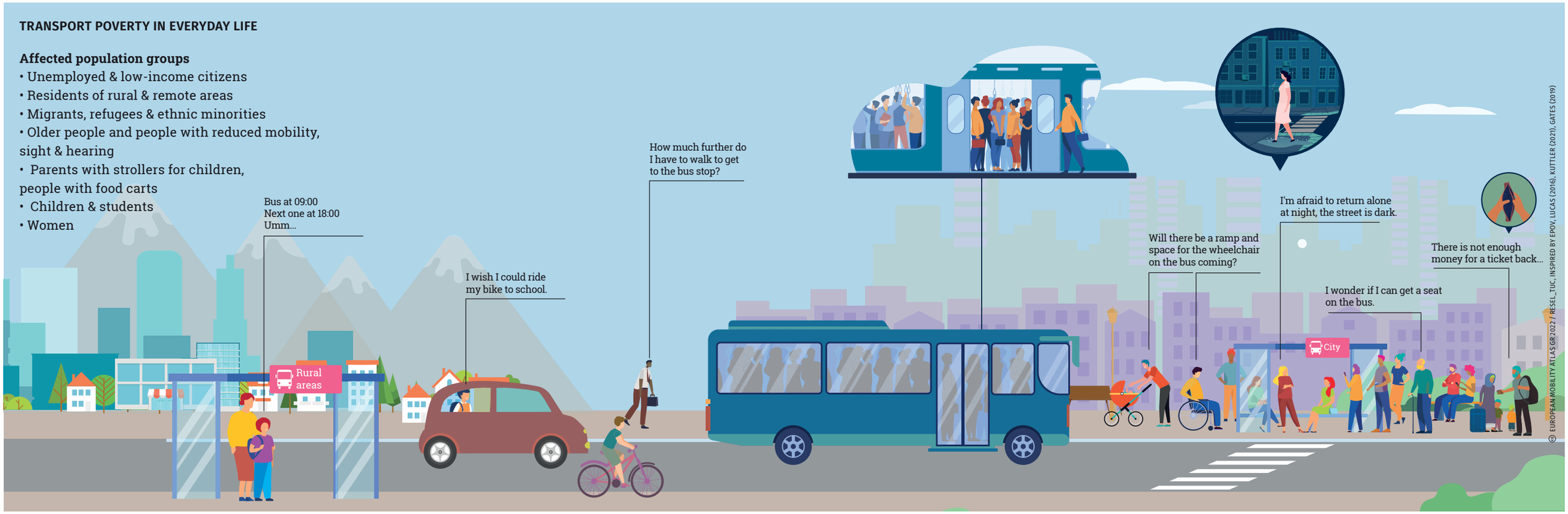
Although mobility poverty, as a subset of energy poverty, exhibits notable distinctions (e.g., within a household of five, only one member may experience mobility poverty), the principles of justice and democracy are equally important in addressing both forms of poverty: Promotion of universal accessibility and provision of equitable access to transportation across all modes.

How it is measured depends on the specific characteristics of each region. However, there are general indicators that can be used to assess the level of poverty, such as affordability, accessibility and user satisfaction of public transport, as well as indicators related to travel, such as the correlation between travel duration, distance and frequency of travel.

We have defined it, analysed it, measured it. How do we tackle it?

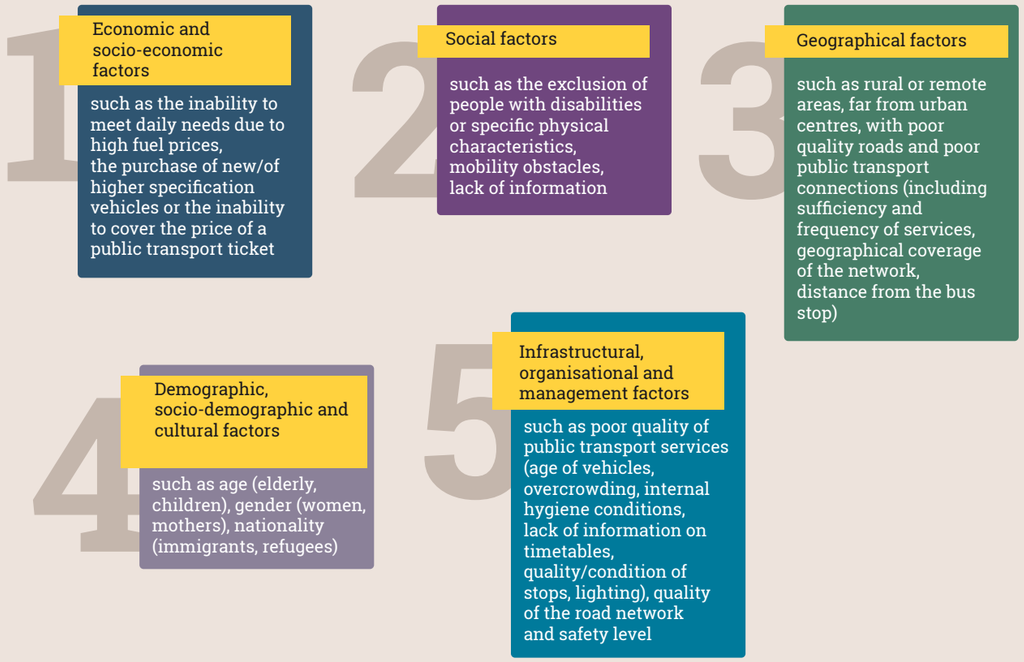
Is sustainable mobility a solution to tackle mobility poverty? The key principles of sustainable mobility include the concept of accessibility for all, the promotion of environmentally friendly modes of transport, active mobility, the improvement of public transport and the guarantee of free public space

Mobility poverty is present in daily life, impacting a wide range of population groups: the elderly, the unemployed, people living in remote areas, migrants, children and students, women, parents and visitors.



THE MULTIFACTORIAL PHENOMENON OF POVERTY IN MOBILITY

Factors that contribute to the intensification of the phenomenon:



for citizens. So, to a large extent, the answer is 'yes'. Besides, strengthening and promoting the use of public transport is a key objective of the European Green Deal. However, additional factors include ensuring energy transition in transport for climate neutrality and addressing social factors such as gender equality and migration policies.

At the same time, tackling these issues can improve the quality of life in cities for everyone, both residents and visitors.

Examples include improving public transport in terms of adequacy, coverage and frequency of services, improving bus stops and the infrastructure around and near them (pedestrian crossings, pavements, lighting), and providing some free rides in the urban area. A typical example of this concept is the city of Rethymno, with the first electric, fully accessible bus and the provision of trips free of charge for all, as a pilot project for the promotion of public transport under the European programme "CIVITAS DESTINATIONS". In addition, measures to increase the sense of security of vulnerable groups such as women (nighttime travel using public transport or shared mobility services like car-sharing/pooling) and children/students (reducing dependence on parental vehicles), as well as socially vulnerable groups such as migrants, refugees, unemployed or low-income citizens (provision of free public transport or rental of shared bicycles/micromobility vehicles) have also been tested as pilot projects in Luxembourg under the European project "HiReach".

On another level, the planning of cities and their transportation infrastructure should take a people-centred approach, focusing on the health and well-being of individuals, meeting their needs, as well as protecting the environment, conserving energy, reducing emissions, and ensuring air quality. In countries such as Greece, the need for better planning of fixed infrastructure on the mainland (trains, metro, electric railway, trams, modern motorways, bridges, etc.) is as important as the interconnection of islands (ports, quality/speed/capacity/frequency of ships and services, costs, etc.). ●

The Island Transport Equivalent Threshold is a tool to combat the transport poverty of island residents compared to mainland residents. The measure aims to equalise the cost of transport from an island to mainland Greece or to another island with the cost that would apply in mainland Greece for the same distance.

The Island Cost Compensation is paid as financial assistance to eligible residents and businesses (Law 4714/2020, Law 4551/2018). The beneficiaries use the Unique Islander Number and the amount deposited to them results from the difference of the actual transportation cost from the amount that they would pay if they moved in the mainland at the same distances. At the same time, eligible businesses established on the islands are also financed for the transport of their goods to and from the islands.

Some small Greek islands have been included in this pilot project with unleaded petrol, diesel fuel, heating oil and autogas as eligible liquid fuels for compensation. ●

CHARGING AHEAD

The path going forward is clear: for road vehicles, electricity and alternative fuels will soon replace petrol and diesel. The climate protection potential of this move is high, but some problems still need to be solved along the way.

At the beginning of the automobile age in the 1880s, various drive technologies competed with one another. Manufacturers used both electric motors and combustion engines in their vehicles. Around 1913, Henry Ford revolutionised car manufacturing by introducing assembly line production. Ford, and most of the rest of the industry, used petrol engines. Oil was abundant and cheap—a decisive advantage for the internal combustion engine.

Today, its potential has been all but fully realised, with an overall efficiency of 35 percent for petrol and around 40 percent for standard diesel engines. 'Overall efficiency' refers to the proportion of energy used that is converted into the movement of the vehicle. The impact on health and the environment from the exhaust gases of cars burning diesel and petrol is high—in some places, higher than permitted. Stricter requirements for climate protection and global competition are prompting manufacturers to invest more in electric vehicle technology.

For road use, these include battery-powered vehicles with electric motors, as well as so-called plug-in hybrids—vehicles with two drive systems, both a conventional internal combustion engine and fuel tank and an electric motor with a battery that can be charged using AC power (hence 'plug-in'); other hybrids charge their batteries using braking energy. Plug-in hybrids are considered to be a transitional solution between the internal combustion engine and a purely electric car. Another drive technology is the fuel cell, in which the electricity for the car is generated from a reaction of hydrogen and oxygen.

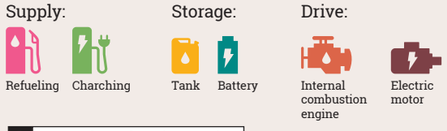
Experts consider hybrid vehicles to be transitional models. They will become obsolete as soon as the range, charging time and charging station coverage issues of electrical vehicles have been solved.

The use of synthetic fuels—so-called e-fuels—is controversial. In these products, water is broken down into hydrogen and oxygen; the addition of CO_2 turns the hydrogen into methane. The final fuels, which are obtained through further processing, are chemically identical to conventional petrol, diesel and kerosene, and can thus be used in internal combustion engines.

Aid organisations—but also opponents of the transition to renewable energy—have been speaking out against human rights violations and environmental destruction.

AUTOMOTIVE DRIVE TECHNOLOGIES

From the combustion engine to hybrids to the pure electric motor



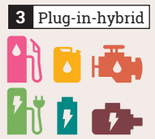
1 Internal combustion engine

A petrol or diesel engine generates its power by burning a fuel-air mixture that drives reciprocating pistons. At the same time, the engine drives the alternator (generator) via a V-belt. The alternator generates electricity and charges the battery.

2 Hybrid

A combination of internal combustion engine and electric motor; the battery is charged exclusively by the generator and regenerative braking energy. At full load, the internal combustion engine is electrically assisted, while purely electric operation is possible at low speeds and for short distances. Hybrids offer greater fuel economy.

3 Plug-in-hybrid



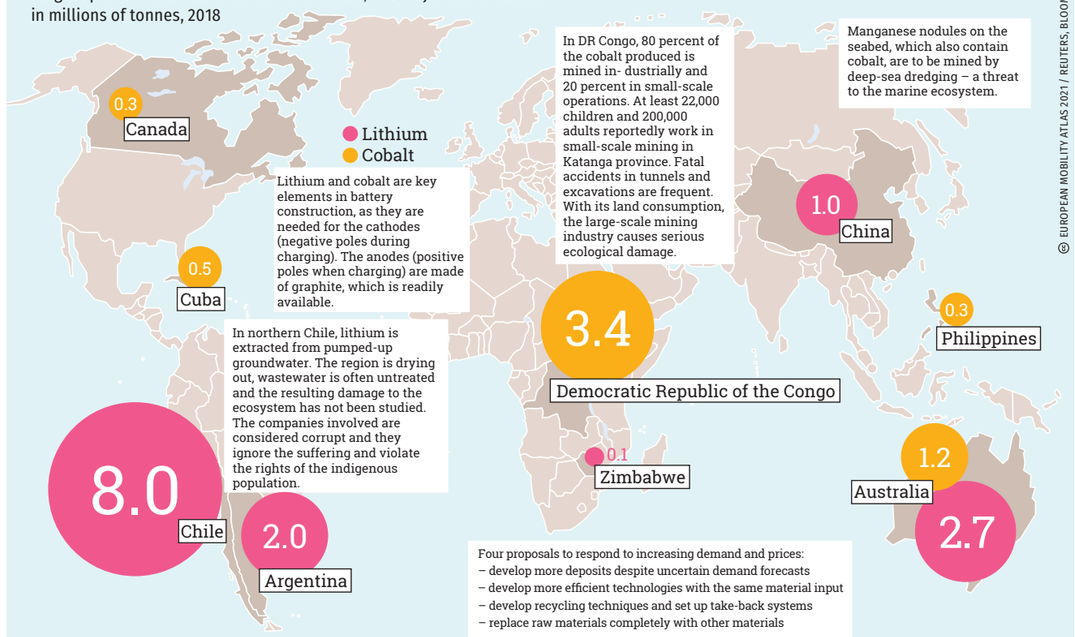
As (2); in addition, the battery can be charged using external power sources. This provides a range of around 50 kilometres in purely electric operation. Once the battery has been discharged, the internal combustion engine is used exclusively. The climate and fuel economy benefits depend on the share of total mileage driven electrically.

4 E-vehicles

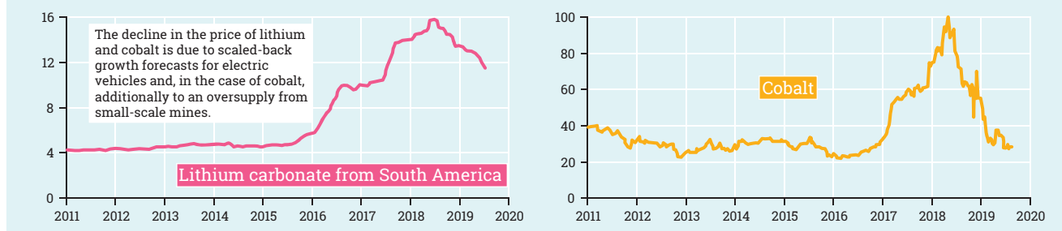
Battery electric vehicles produce zero emissions when driving. The source of their charging current is decisive for their climate impact: EVs are most sustainable when charged with green power. The battery materials must be sourced in an environmentally sound manner.

BATTERY RAW MATERIALS

Largest proven reserves of lithium and cobalt, five major countries each in millions of tonnes, 2018

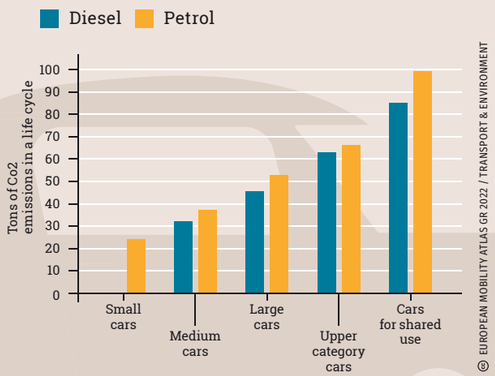


Price development (USD 1,000 per tonne)



EMISSIONS REDUCTION BY PURCHASING AN ELECTRIC CAR

Co2 emission savings over the life cycle of an electric car, compared to a conventional car (petrol or diesel), 2020



Main assumptions:
EU average electricity mix (ENTSO-E 2020 TYNDP and Sandbag), battery which is produced by the average electricity mix.

Replacing the purchase of a conventional diesel or petrol car with an electric car (of the same class and with unchanged driving behaviour) we observe that the larger electric cars can displace more CO_2, because they travel longer distances and consume more clean energy.

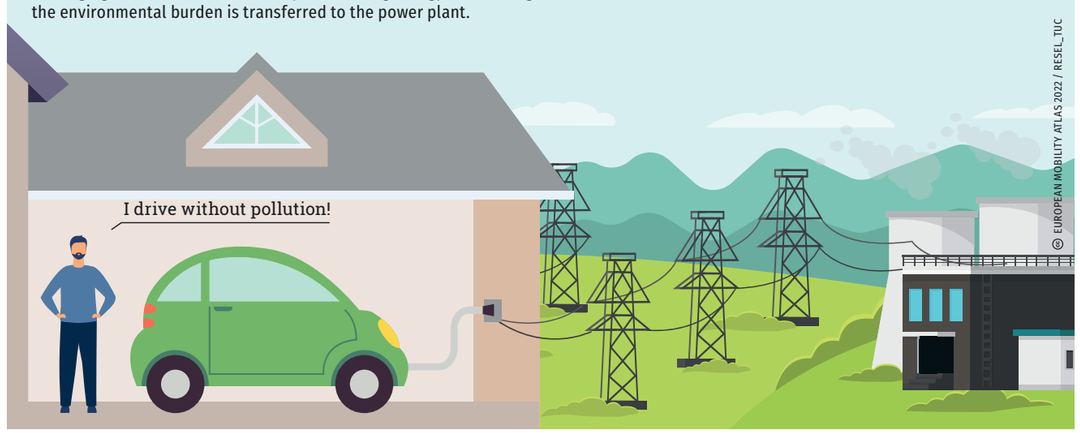
What are the pros and cons of the various systems? The use of electrical power directly without intermediate steps is the most efficient. The overall efficiency of an electric car is around 69 percent, as compared to around 26 percent for a car with fuel cell technology. An internal combustion engine burning synthetic fuels only reaches around 13 percent. The values for fuel cells and synthetic fuels are so low because a great deal of energy is lost in the conversion processes: an internal combustion engine running on synthetic fuels requires five times as much electricity for the same distance as an electric car.

E-fuels are currently only being produced on a laboratory scale and will not be available for general use in the foreseeable future. Because of the vast amounts of electricity required, synthetic fuels—as well as hydrogen for fuel cells—will tend to be produced in sunny regions in the future. The demand for green power is growing everywhere. Electricity-based fuels should therefore only be used in applications that do not have climate-neutral alternatives:

With the current energy mix, electrification improves to a small extent the overall gaseous emissions. The environment will benefit if the electricity generation (with regards to charging, manufacturing of components and final disposal of vehicles) is clean throughout their life cycle.

HOW "CLEAN" ARE ELECTRIC CARS?

If charging continues to be served by the existing energy mix of the grid, the environmental burden is transferred to the power plant.



These would include intercontinental air travel, as batteries would be much too heavy for use in aircraft. Experts agree that synthetic fuels will always be more expensive than either electrical power used directly or conventional fuels. Either way, the production of synthetic fuels should be subject to strict, effective sustainability criteria and close monitoring. Germany does not yet have an import strategy for e-fuels.

According to the Paris Agreement, the transportation sector must become climate-neutral by 2050. The electrification of passenger and freight transportation on land, water and in the air could increase the electricity demand from today's 600 terawatt hours (TWh) by an additional 540 to 900 TWh by 2050. The production of green power—currently 216 TWh—must be increased rapidly and the grid upgraded to handle the much higher demand.

Electric cars have a range of several hundred kilometres. Most people drive less than 60 kilometres a day, so the currently available range is enough for day-to-day commuting. Cars can be charged at work and at home. This takes two to six hours at a modern wall charger and eight to 14 hours using a regular household outlet.

For countries with an average income below 17.000€ (such as Greece), electric cars have a market share less than 3%, while in rich countries account for 15% of the total car sales (European Automobile Manufacturer's Association (ACEA).

By 2030, 10% of the total passenger car fleet in Greece will have been replaced by electric vehicles.

THE MARKET FOR ELECTRIC PASSENGER CARS

Penetration of electric vehicles in the car market in Greece

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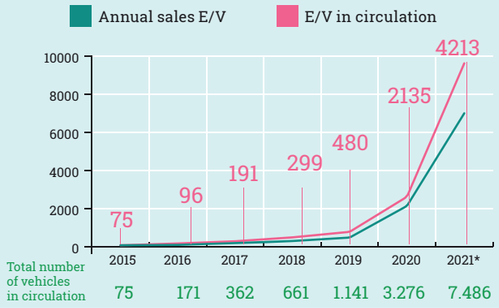
RAPID GROWTH FOR THE MARKET ELECTRIC VEHICLES (E/V).

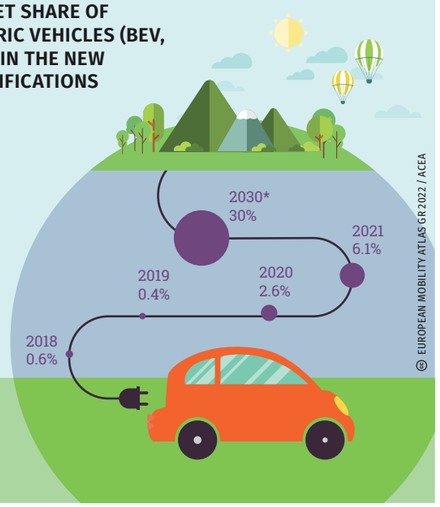


Total number of vehicles in circulation	2015	2016	2017	2018	2019	2020	2021*
	75	171	362	661	1.141	3.276	7.486

Electric cars are gaining ground year by year.
By 2030, one third of new registrations will be battery electric vehicles (BEV) or plug-in hybrid electric vehicles (PHEV).

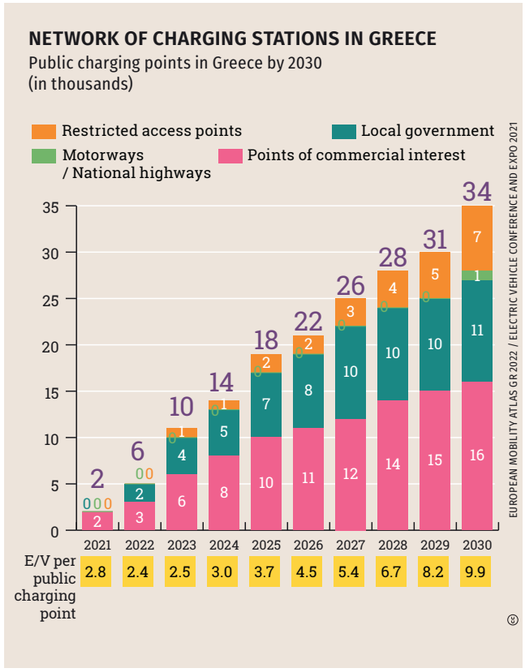
*2021 Expectation

MARKET SHARE OF ELECTRIC VEHICLES (BEV, PHEV) IN THE NEW CLASSIFICATIONS

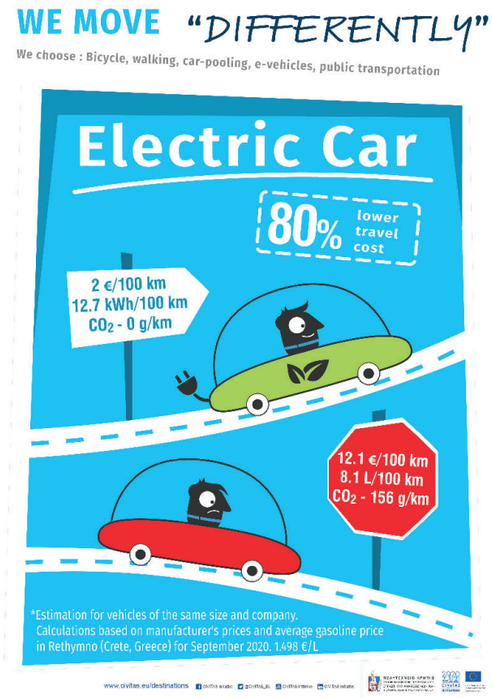


Germany's Federal Network Agency has registered over 9,600 public charging stations in the country, most of which have two charging points. The charging stations are mainly located in urban areas, however, and many sparsely populated regions are still underserved. Depending on a vehicle's battery capacity and performance, recharging at standard public charging stations takes two to four hours, or 20 to 30 minutes at fast charging stations.

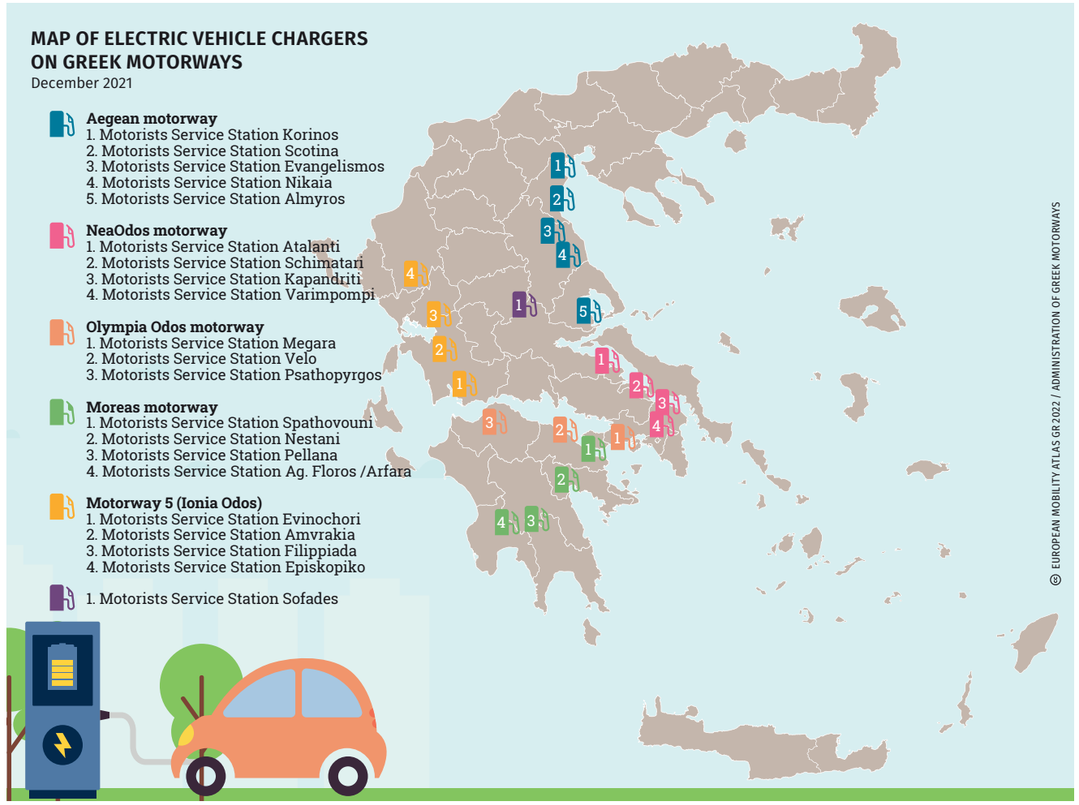
On average, a fast charging station can be found every 60 kilometres on European motorways. Coverage varies from country to country. In central and southeastern Europe, it is not yet adequate for driving long distances. Numerous websites and apps can be used to find charging stations in Europe.



The lack of or reduced frequency of refuelling points along motorways acts as a barrier to the development of electromobility. In order to meet demand, charging infrastructure in our country is being developed with target of 34,000 public charging points by 2030.



Finally, fuel cell vehicles not only have a low overall efficiency, there is also a lack of a hydrogen infrastructure throughout Europe. The refueling process for 500 to 800 kilometres takes only about three minutes. However, a mere 70 hydrogen filling stations are currently available in Germany, and their number is increasing only slowly. ●



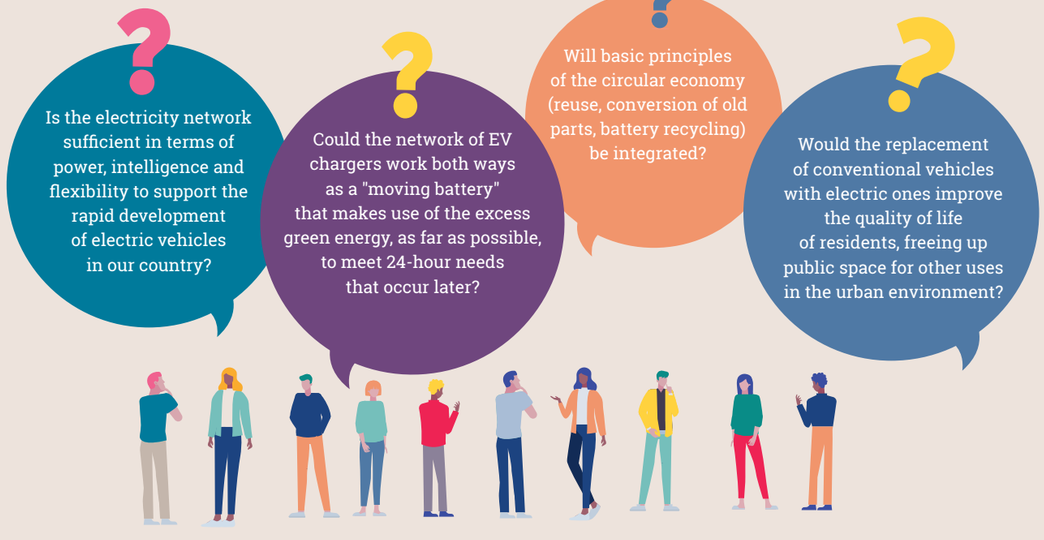
E-MOBILITY ON THE RISE IN THE GREEK MARKET

E-mobility is a new reality for Greece as well as elsewhere. Although the market share of electric cars is increasing, the inadequate charging network and the initial cost of ownership remain major obstacles. As a result, there is a large gap between this percentage and that observed in several other European countries.

The National Climate Law for the transition to climate neutrality and adaptation to climate change, as well as the National Recovery and Resilience Plan (Axis 1.3: Transition to a green and sustainable transport system), promote measures both to ensure sufficient publicly accessible charging points for electric vehicles (8,656 points by 2025) and to increase the market share of electric vehicles through significant financial incentives and tax exemptions. There are plans underway to replace a total of 220 old buses (157 in Athens and 63 in Thessaloniki) and 2,000 old taxis with an equal number of electric ones. Additionally, as part of the climate law currently under consultation, it is proposed that by 2025, all new taxis in Athens and Thessaloniki, along with one third of rental vehicles, must be either electric or zero-emission vehicles.

CRITICAL QUESTIONS ARISE IN RELATION TO THE FULL UTILISATION OF THE ADVANTAGES PROMISED BY THE NEW ERA OF E-MOBILITY:

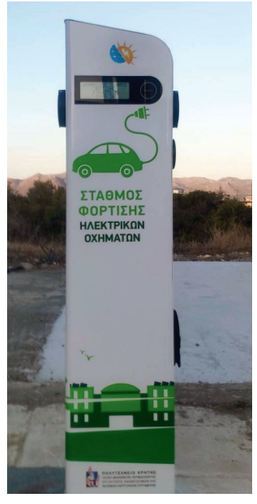
E-mobility is already a new reality that offers possibilities for the environment, the economy and the citizens



The Municipality of Rethymno is installing the first public charging points for electric vehicles and is introducing, for the first time in Greece, the use of fully electric vehicles in its fleet and urban transport, as part of the Horizon 2020 "CIVITAS DESTINATION" innovation programme.

The electric bus is accessible to all, while its small size allows access to the narrow streets of the historic centre. A new circular route is connecting the city centre with the seafront and the bus station, serving citizens and tourists alike.

The double electric charger at the Cretan Polytechnic University in Chania makes use of the solar energy generated in the institution.



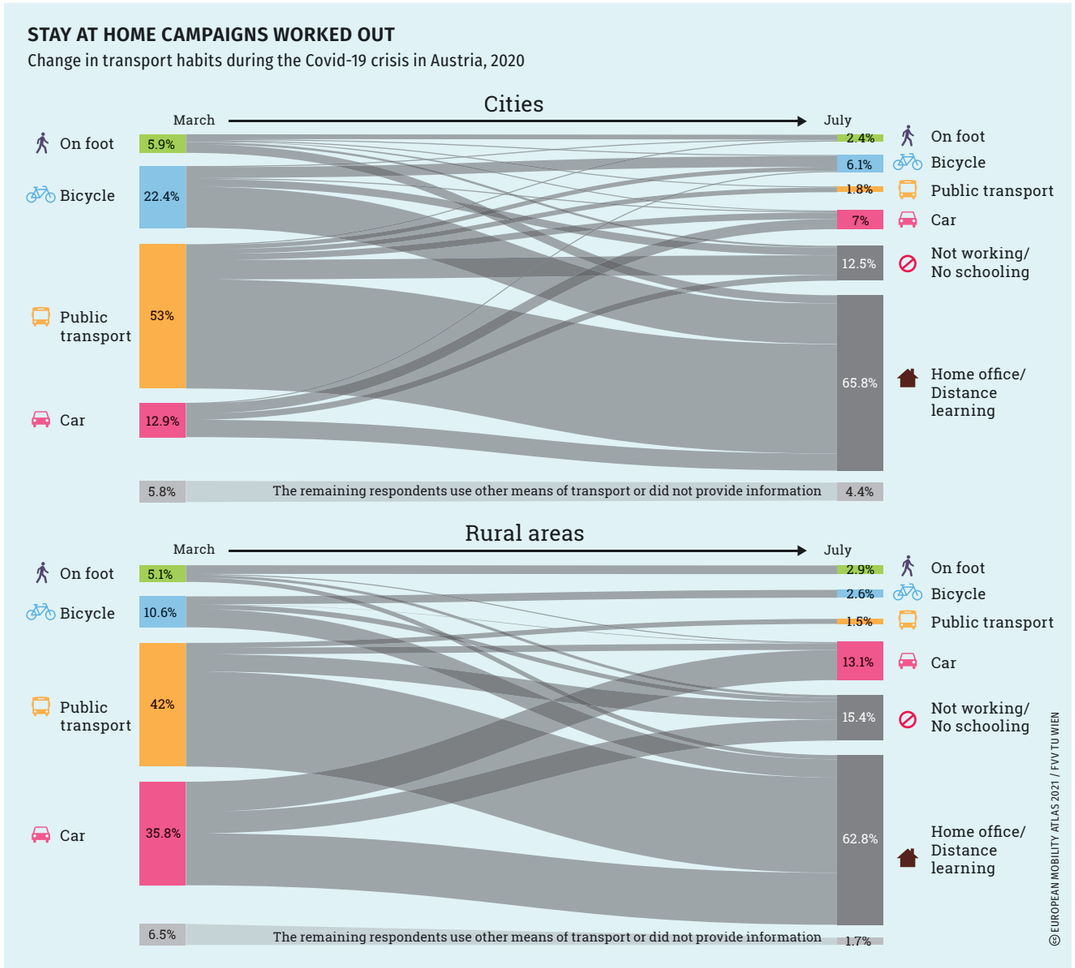
Archive of the Renewable and Sustainable Energy Systems Laboratory (ReSEL), School of Chemical and Environmental Engineering, Technical University of Crete.

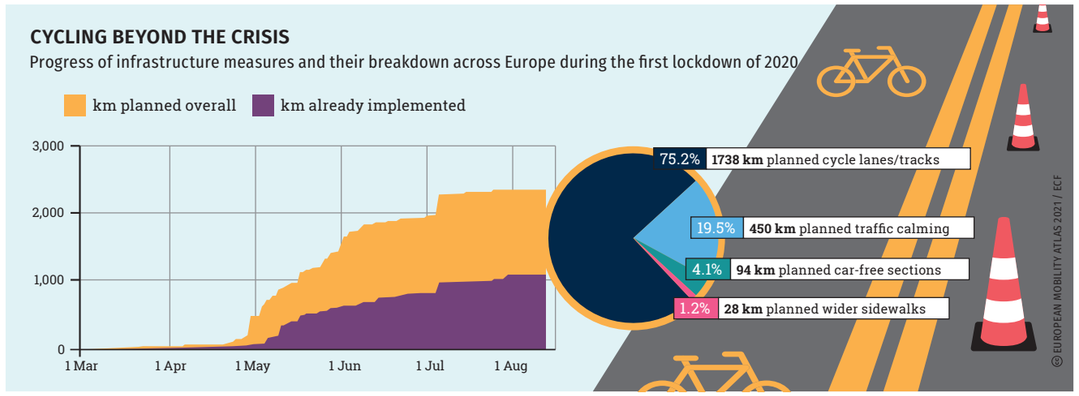
SHAKEN AND SHIFTED

Europe and the world have been hit by transnational crises before the Covid-19 pandemic. And almost all of them had a severe impact on mobility and transport.

By no means can the pandemic be compared to the monstrosity of the two World Wars, which also elude any comparison as to their effects on mobility. At the end of the Second World War, Europe and the world were split up into two blocs, which resulted in the creation of parallel transport industries and infrastructure. Infrastructure would usually end or at least be obstructed at the blocs' borders. Travelling from one side of the border to the other would usually only be possible indirectly, if at all.

During the first phase of the Covid-19 pandemic, usual standard mobility patterns were massively changed due to lockdown and home office measures.





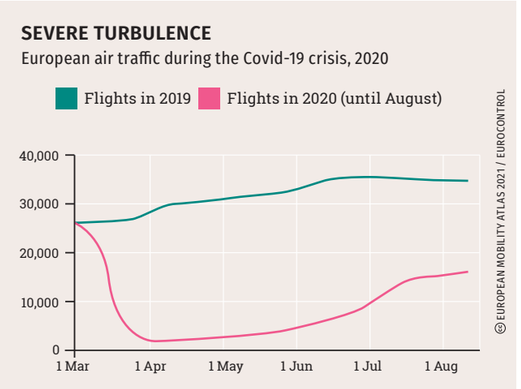
The Covid-19 lockdown gave the bicycle the opportunity to prove that it is the safest, most efficient urban mode of transport. As a result, European, national, and local authorities have started to put in place many permanent (and temporary) cycling measures in their cities and regions.

The Covid-19 pandemic is more comparable to crises such as the 1970s energy crisis or 9/11. The 1970s energy crisis, with its strong increase of global oil prices, resulted in halts of automobile traffic all over the world. Some western European countries introduced temporary speed-limits and car-free days. For the Netherlands, the crisis was the kick-starter for becoming one of the most bicycle-friendly nations in the world. 9/11 resulted in a temporary crash of the aviation market. While the general dependency on oil continues to exist, the Covid-19 crisis is more comparable to 9/11, in terms of its effects on the world economy and more specifically to mobility and transport.

The pandemic has already led to a crash in the aviation market. In April 2020, air traffic across Europe plummeted to ten percent of normal levels. Airlines are trying to re-boost their business during holiday seasons by claiming that, despite the impossibility of applying distancing rules on board aircraft flying does not entail a higher risk of a Covid-19 infection. These desperate claims are accompanied by 34.4 billion euros in state aid and counting.

While air traffic was almost grounded at the beginning of the pandemic, nearly all rail companies kept their services up and running to provide essential transport. Trains were partially limited to borders and the number of trains was reduced in some countries, while in others, normal services were maintained in order to allow for better distancing. Public transport has suffered a substantial decrease of passengers, which in the medium term will lead to a serious impact on its financing.

Air traffic was abruptly grounded in the wake of the Covid-19 crisis. Now, planes are flying less, but on more efficient routes. The challenge is to keep flying greener as traffic recovers.



One of the few clear winners of the pandemic is the bicycle. Sales have sky-rocketed during the lockdown, since people seem to consider the bicycle to be a safe alternative to public transport, with which distancing and keeping fit come naturally.

For longer journeys, the car became the most popular means of transport (again). Yet sales of cars have suffered heavily, due both to an interruption of car manufacturing supply chains and the economic uncertainty felt by the consumers and potential buyers.

The Covid-19 pandemic also had a strong impact on public space. Obviously, shopping streets have been hit hard by the immediate effects of the pandemic, especially the lockdown. They will continue to suffer from distancing rules. Public space is literally gaining ground in terms of an increased use for exercise, play and recreation. In general, the need for increased public space exceeding the pre-existing political demands has emerged as a result of the pandemic.

Although the immediate impact of the pandemic on mobility goes further than the conventional means of transport, those are among the main aspects that citizens experience in their everyday lives.

In the long run, the economic crisis that came with the pandemic and the national and international recovery measures will be more decisive. Climate change is looming, therefore governments need to take comprehensive decisions, combining solutions for the economy, the people and the planet.

The EU is focusing its Multiannual Financial Framework and the Next Generation EU funds on the recovery from the Covid-19 crisis. EU Member States have taken up a range of measures (such as the aforementioned bailouts for airlines) in order to overcome the most negative impacts of the pandemic. As the draft proposals show, transport is only a minor aspect of these recovery efforts. Yet the efficiency and the focus of the measures taken in this regard will shape societies for a long time to come.

Positive signs are the green conditionality of the airline bailouts in Austria and the German rejection of the so-called Kaufprämie (buyers premium) for conventional cars. ●

PANDEMIC MOBILITY INTERVENTIONS IN THESSALONIKI: AN ASSESSMENT

During the Covid-19 pandemic, there was a great need to tackle overcrowding on public transport as well as on narrow pavements used by pedestrians. Taking inspiration from successful European initiatives, the Greek government gave the green light for the immediate approval and implementation of new infrastructure suitable for cycling and walking. The aim was to enhance the existing networks and prioritise these modes of transportation as crucial elements of sustainable mobility, all with the aim of preventing overcrowding.

Following a study, the Municipality of Thessaloniki decided to temporarily reduce the number of traffic lanes on 2 roads in order to create more space for walking and cycling. Specifically, as part of a pilot initiative, two traffic lanes (one in each direction) were closed on Konstantinou Karamanli Avenue (3 km) and one traffic lane on Nikis Avenue (1.2 km) for the integration of a new cycling lane, and the improvement of the existing one, respectively. The evaluation of these pilot interventions involved conducting traffic load measurements twice: the first one, two months after implementation, and the second, one year later. The results indicated a positive outcome in terms of increased usage levels. To provide more details, in the city centre where cycling infrastructure was relocated from the promenade of the old waterfront (Palia Paralia) to the roadway, the traffic of bicycles and e-skates increased from 50 to 400 bicycles/hour, while on the main road of Konstantinou Karamanli Avenue increased from 5 to 50 and 65 bicycles/hour in 2020 and 2021, respectively (data from the Transport Planning Department, Directorate of Sustainable Mobility and Networks of the Municipality of Thessaloniki). The majority of the city's residents, particularly cyclists, e-skaters, and pedestrians, responded positively to these initiatives. However, there were some shop owners and car users who remained skeptical.

Nevertheless, in February 2022, the Municipality of Thessaloniki decided to temporarily suspend the operation of the cycle lane on Konstantinou Karamanli Avenue. This decision was made due to frequent instances of illegal parking, which occurred as a result of the lack of clear demarcation between the temporary cycle lane and general traffic. In contrast, the cycle lane on Nikis Avenue remains open.

Today, the challenge lies in establishing the long-term integration of cycling into daily commuting routine. This can be achieved by developing infrastructure that ensures necessary safety and comfort conditions, while also discouraging problematic behaviour by car drivers. Additionally, implementing promotional measures to encourage more people to cycle will be crucial in this endeavour.

Cycle lane on Nikis Avenue, Thessaloniki.

A EUROPEAN INITIATIVE TO PROMOTE SUSTAINABLE MOBILITY

Sustainable Urban Mobility Plans (SUMPs) represent an evolution of the long-standing transportation studies conducted in densely populated urban centres over the past decades.

They are strategic plans designed to meet the mobility needs of residents and businesses in a specific region with the ultimate aim of improving their quality of life. Built upon established practices, these plans duly consider the principles of integrated planning, participatory endeavours, and evaluation. The figure below summarises the differences between SUMPs and conventional transport planning.

The basis for the development of SUMPs was the 2011 Transport White Paper, which suggested, among other things, considering the possibility of establishing SUMPs as a mandatory approach for cities of a certain size, according to national standards based on European Union (EU) guidelines. In addition, it suggested considering the link between regional development and cohesion funds in cities and regions that have submitted a valid and independently validated urban mobility performance and sustainability audit certificate.

In simple terms, the EU had already decided in 2011 that cities should (mandatorily) prepare strategic mobility plans with common rules and standards in order to apply for funding from its structural funds for the development of the relevant infrastructure. In 2014, the EU published the first guidelines for the preparation of SUMPs, and the second generation of specifications has been available since 2019.

The methodology for developing SUMPs should meet specific rules and standards, while SUMPs themselves promote long-term planning and adopt a vision, emphasising on:

- citizen and stakeholder involvement and
- coordination among various sectors (particularly transport, land use, environmental planning, social policy, health, etc.) and different planning authorities

DIFFERENCES BETWEEN TRADITIONAL TRANSPORT PLANNING AND SUMP

The main tool used to develop a SUMP is the so-called 'SUMP cycle'.

This cycle sets out the steps that an undertaking must complete in order for a transport planning project to be certified as SUMP.

SUMPs undoubtedly represent a major breakthrough in transport planning for cities and congested areas in general. They try to mitigate differences, contradictions and irregularities that have occurred in the past, such as the participatory planning process, the long-term commitment of authorities to continue established policies, the assessment

In the 2nd edition of the SUMP guidelines, it is stressed that the approach to Sustainable Urban Mobility Planning should be based on 8 commonly accepted guiding principles.

Guidelines for developing and implementing a Sustainable Urban Mobility Plan, ELTIS (2014, 1st Edition, 2021, 2nd Edition).

and monitoring of proposed measures, the development of action plans for implementing those measures, the search for funding sources, and so on.

As evident from the brief overview, SUMPs serve as a mechanism to ensure that principles, standards and procedures are followed during their development, rather than as a strict guide for measures and interventions to address the traffic issues of a specific area, recognising that these problems vary from region to region in terms of their geographical and temporal characteristics.

However, by complying with rules and standards and by monitoring the objectives and funding procedures of the proposed interventions, it is clear that they ensure the viability and sustainability of the transport system under examination.

In Greece, SUMPs are now in their second phase, that of the implementation of short and long term interventions. Having overcome the problems of the recent past (lack of information, of funding, of legal framework, of experience of stakeholders and groups, etc.), it is expected that SUMPs will become the basic policy guidelines on which transport planning authorities will rely to meet the challenge of sustainable mobility, taking into account technological advancements and societal demands (e.g. autonomous and clean vehicles, renewable energy sources, etc.).

The first SUMP in Greece was carried out in 2010-2013 by the Transport Authority of Thessaloniki (formerly SASTH). In the absence of European and national guidelines, this SUMP did not follow the full logic of the process cycle mentioned above and focused mainly on public transport issues. Nevertheless, in 2014 it received the "SUMP 2014 award – Special Prize of the Jury" as it was one of the first SUMPs developed in Europe.

The year 2016 was a landmark for Greece since it was then that the development of SUMPs started, trailing behind the rest of Europe. The Green Fund announced a funding of 9 million euros to assist 150 municipalities (later increased to 162) in preparing their SUMPs. Unfortunately, as there were no national standards at the time, the first SUMPs were not bound by any specific rules, leaving the authorities and planners free to follow the European directives as they saw fit. It was not until 2019 (Law 4599/19, Article 22) that the first reference to national legislation on SUMPs was introduced, ultimately leading to the year 2021 (Law 4784/21), when comprehensive guidelines for the preparation of SUMPs were finally established.

Today, 6 years later, a large percentage of the country's 162 municipalities have developed SUMPs or are in the process of completing their development, making Greece one of the countries with the highest number of SUMPs in Europe.

PARTICIPATORY TOOLS FOR SUMP DEVELOPMENT

	Preparation & Analysis	Strategy development	Planning of measures	Implementation & monitoring
Information	**In person:** Information events, press conferences, information stands and exhibitions in public places, information campaigns in cooperation with "local celebrities", residents and local stakeholders as community representatives with the role of information distributors **Printed:** Posters, leaflets, brochures **Online:** Social media posts, websites, news apps, podcasts, video channel, subscription newsletters			
Consultation	**Social media (surveys)**. Comment form on websites, Survey / Comment forms via apps			
	Questionnaires and interview surveys (by phone, key persons, ...)		**Survey** on the choice of measure, **crowdsourcing**	**Evaluation questionnaires and surveys, evaluation interviews** (by phone, key persons, ...), **Crowdsourcing**, (travel journal, blind walk)
	Crowdsourcing, e.g. online survey based on maps or problem reporting via app, travel journal, walkability check	**The Delphi method** for future trends		
Cooperation	**Working groups**, worldcafe-style discussions, events on timely issues, round table discussions with stakeholders, public debat			Visit on site, participation in maintenance ("Adoption" programmes) Living Labs
	Training workshops for problem analysis. Brainstorming, brainwalking, "blind" walk	Scenario workshops, shared visioning events, **future search workshops***, open space meetings**, Geodesign*** planning method	Hackathon, **workshops on measures, Planning in practice**	
Support	Citizen's Panels/**Citizens' Advisory Committee,** Voting			**Participation in maintenance / Participation in implementation** ("Adoption" programmes e.g. adoption of trees)
			Participatory budgeting	

THE FUTURE OF AUTONOMOUS AND CONNECTED MOBILITY

"It's 7:35 in the morning... The alarm clock goes off... In exactly 25 minutes, the vehicle that will take me to work will be in front of my house... At 7:58 a.m. I receive a notification that the car will be at the usual spot in 2 minutes.... I leave my house... Oh! Today it is red, my favourite colour! The car picks me up and, knowing that today is Wednesday, the day that I usually do my shopping, during the drive it lists the offers of the supermarket... My order is completed and the products will be delivered to my home at the agreed time... I look out of the window... That's strange... Today the car chose to take me to work through the city centre... It must have been informed that there had been an accident on the ring road... A chance to sleep for the next 20 minutes until the car takes me to my destination..."

Really, how fictional do you think the above story is? How likely is it to become a reality soon? The answer? But it is already happening!

After years of research, the first tentative steps of what is known as Connected and Automated Mobility (CCAM) have begun to appear as pilot projects around the world. Examples of such implementations are now appearing in numerous cases: A typical example in the private transport sector is the "HumanDrive" project in the UK, which aims to create an autonomous vehicle that can operate in different environments (urban and interurban networks, motorways, etc.) and under changing traffic conditions. Similar challenges are being examined in the case of public transportation through the "Fabulos Project," in which five European cities participate, including one Greek city, Lamia. The project aims to introduce small minibuses in order to assess the traffic and economic framework of autonomous driving in public transportation. Finally, the economic impact of the introduction of autonomous and connected vehicles has been studied in numerous projects, such as "C-Roads", with very promising results as to the economies of scale that can be achieved. C-Roads involves a number of European and non-European countries, including Greece.

In this new era, vehicles will be so intelligent that they will move around the network without a driver (automated), selecting the most efficient routes based on real-time traffic conditions. This information will be obtained from both other vehicles on the network and the infrastructure itself (connected).

The benefits? They are numerous and diverse, such as savings in time, optimal traffic flow, productive use of travel time and reduction in the impact of road traffic accidents, among others.

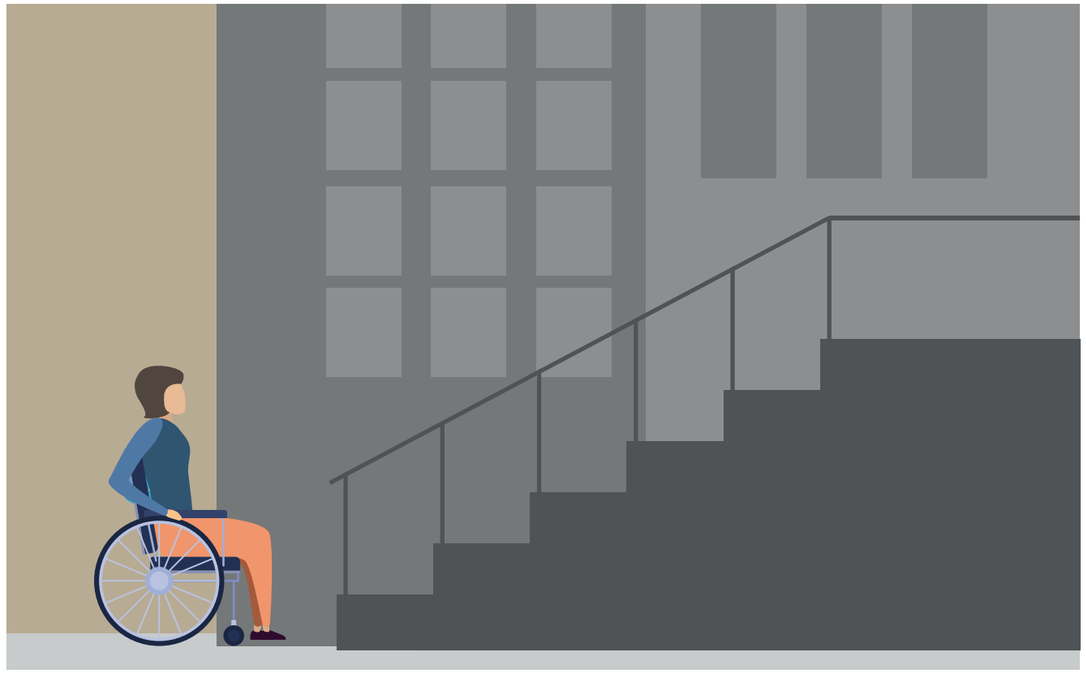
However, many voices of concern argue that there are also negative repercussions, such as an increase in the appeal of individual mobility, security and protection concerns regarding terrorist activities, as well as ethical dilemmas (e.g. whether the vehicle should decide on the outcome of an accident).

WEAKNESSES AND CHALLENGES

Mobility in Greece has grown significantly in recent years. However, there are notable deficiencies in certain transportation sectors when compared to other European countries. The ever-increasing influx of tourists, combined with the country's geostrategic position as an energy hub in the Balkans and South-East Europe, poses a challenge for upgrading its infrastructure in a manner that promotes equitable development without causing harm to the environment.

Greece has made several steps to implement a sustainable energy policy, and has also made considerable improvements to transport networks and infrastructure. Especially in relation to road transportation, the motorway network has almost been completed, which is reflected, among other things, in the 50% reduction in fatalities from road incidents during the 2010-2020 decade, as highlighted by the Panos Mylonas Institute of Road Safety in its article on road safety in Greece. However, there are yet areas in which deficiencies exist, leaving a considerable distance to be covered before we can discuss a new, integrated, modern, European era in transport.

Firstly, in urban mobility, the implementation of SUMPs is of utmost importance for the improvement of the living conditions of urban citizens. Moreover, the financial instruments provided by the EU present a significant opportunity for their implementation. As mentioned above in the relevant article by the Transport Engineering Laboratory of the Aristotle University of Thessaloniki, many municipalities that had planned to implement SUMPs are currently in the process of completing them, making Greece one of the countries with the highest number of SUMPs in Europe. The implementation of the proposed measures in individual projects is the next step in putting sustainable urban mobility plans into action, and it holds equal, if not greater, significance compared to the preparation of the SUMP itself as a mere study. Municipalities now have all the means (funding from European programmes, scientific expertise and the legal framework) to implement the measures proposed by each of the SUMPs.



Unobstructed access to all parts of a city is an inalienable right of all its residents.

Strengthening soft and sustainable mobility by creating the necessary infrastructure (cycle and pedestrian networks) will make a significant contribution to tackling both health and energy crises that our planet has recently been experiencing. A number of interventions, even of a temporary nature, have been made in this direction in the midst of the pandemic. The evaluation of these pilot schemes, based on traffic load measurements, has shown positive results in some cases.

Another aspect of urban transport that Greek cities suffer from is accessibility, which is part of mobility poverty, as mentioned in the article by the Renewable and Sustainable Energy Systems Laboratory of the Technical University of Crete. Unhindered access to all parts of a city (pavements, parks, public buildings, public transport, etc.) is an inalienable right of all its residents. In recent years, efforts have been made to improve the situation, not only by the municipalities through urban renewal projects, but also by the state through the introduction of suitable standards in the design and redevelopment of buildings and regions. However, there is still a lot of work to be done before we reach an adequate point. The right to free and unhindered movement of the citizens of a region can only be a sign of democracy and civilisation. The provision of more free public space for soft mobility will be an important contribution in this direction.

Urban planning, especially in recent decades, has been based on an 'everything for the car' approach. This has led to a number of problems, such as lack of accessibility, air pollution, etc. All these are being addressed by the new culture of urban planning, where the

street is treated as a public space and not as a transit axis, as described in the article by the Major Development Agency Thessaloniki about roads as public space. This new design logic is an important tool for creating user-friendly cities, where no one is excluded and everyone has the right to move freely and seamlessly.

A significant issue faced by major urban centres worldwide, including Greece, is air pollution. A significant amount of the particulate matter is emitted by the internal combustion engines of motor vehicles. Transitioning to more environmentally friendly forms of transportation, such as micro-mobility and clean electric vehicles, will greatly contribute to mitigating the problem. In addition to central government, local municipalities play a crucial role in addressing this issue. There are good examples of urban centres in Greece and abroad that have developed or promoted the culture of a clean and sustainable city. The city of Trikala, as presented in this edition, is such an example. It is worth noting that the city of Trikala, as mentioned in the relevant article, has already begun creating the necessary conditions to become a candidate for the first 100 climate-neutral cities in the EU by 2030. The creation of Zero Carbon Cities is part of the EU's goal of achieving a climate-neutral EU by 2050, as specified in its climate policy. The recent energy crisis affecting the planet calls for a shift to renewable energy sources together with clean transportation and the transition to a green city.

The recent energy crisis affecting the planet calls for a transition to renewable energy sources together with clean transportation and the transition to a "green" city.

Sustainable urban energy loop

Regarding long-distance travel, although considerable efforts have been made to improve it, particularly in the area of road transportation, there are things that still require enhancement and development. Specifically, Greece has a satisfactory and almost complete motorway network, but still falls short in terms of EV charging infrastructure, as evidenced by the limited number of charging stations. This can be seen in the map accompanying the article on electric vehicles, which shows charging points for electric vehicles on motorways.

Generally, long-distance transportation is mainly conducted by road, either private or public means, as the alternative land transportation mode, the railway, lacks sufficient infrastructure. As a result, citizens often do not have a second option (for example those wishing to travel between Thessaloniki and Ioannina). The railway connection between provincial cities and urban centres is a matter of democracy, as an increasing number of citizens choose to travel with a view to the least possible pollution of the atmosphere (green transport), which is ensured by means such as electric trains.

Several projects in the Greek rail network are due to be notified and implemented in the near future, but a more general upgrade and planning of new projects, such as the western part of the Egnatia Railway, is required. The creation of the Egnatia Railway is a major project of equal importance, as it will serve the less developed regions, such as those of Western Macedonia and Epirus, and will also connect many ports in Northern Greece (Igoumenitsa, Thessaloniki, Kavala, Alexandroupolis), which either link Greece with neighbouring countries or are important energy hubs.

In general, the connection of the country's ports with the railway system, and in some cases, particularly on the islands, with the road network, is inadequate. The country's ports attract numerous tourists every summer.

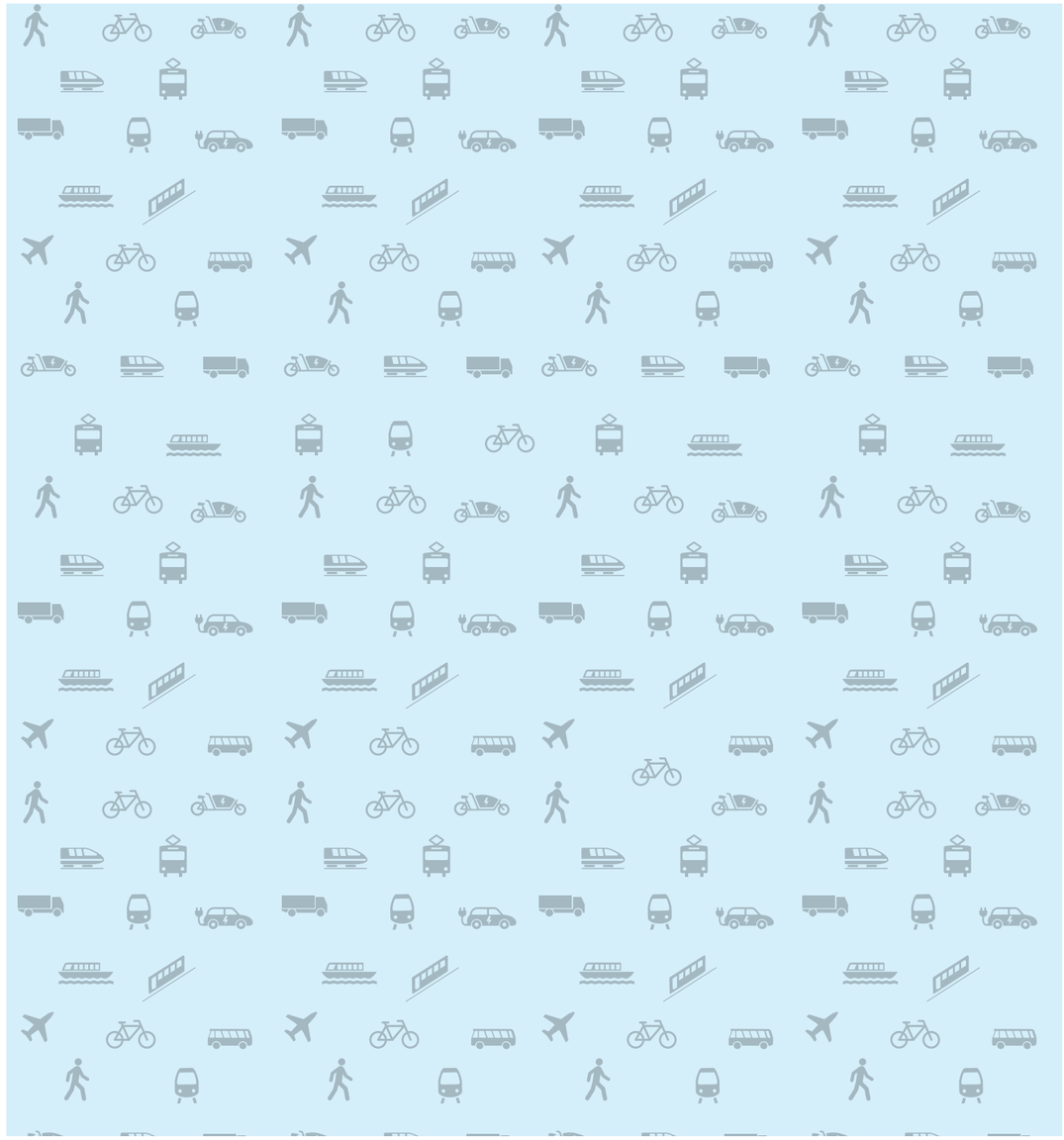
However, some of them also serve as significant energy and commercial hubs. This special role of Greek ports also creates certain issues, such as traffic congestion and environmental degradation of the surrounding areas. Therefore, both their integrated transport connection and the creation of Zero Energy Ports would make a significant contribution to the sustainability and viability of the regions and cities around the ports of the country, as stated in the relevant article by the Renewable and Sustainable Energy Systems Laboratory of the Technical University of Crete in this edition.

Ports, airports and other transportation system infrastructures face intense pressure and congestion from tourism, especially during the summer season. As highlighted in the article by the Renewable and Sustainable Energy Systems Laboratory of the Technical University of Crete, road infrastructure,

especially in islands, is unable to cope with the high traffic loads in the summer. However, the recent renovation of 14 regional airports has helped to mitigate the problem, although there are still other airports that need improvement. There are also several Greek ports that lack the necessary space to accommodate large ships and cruise liners. The result of all these problems is that tourist areas are burdened not only by traffic, but also by environmental pollution through the emission of air pollutants. For this reason, as stated in the article by the Major Development Agency Thessaloniki, the shift to low-carbon transport systems in the tourism sector at local level will have significant benefits for quality of life, socio-economic development and environmental and climate action.

THE EXISTING RAILWAY NETWORK IN GREECE AND PROPOSED NEW LINES

Finally, the future of mobility is vividly presented in the article by The Transport Engineering Laboratory of the Aristotle University of Thessaloniki. The initial stages of Cooperative, Connected, and Automated Mobility (CCAM) have already commenced, with numerous countries implementing related pilot projects. Of course, this new reality seems rather futuristic today and there is still a long way to go. ●



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Railway network, General network map, ose.gr

The Major Development Agency Thessaloniki S.A. A Local Government Organization (former Metropolitan Development Agency Thessaloniki, S.A.) - is a Development Limited Special Purpose Company, the Organizations of the Local Government of the wider metropolitan urban area of Thessaloniki and particularly the Municipalities of: Thessaloniki, Kalamaria, Pavlos Melas, Ampelokipi-Menemeni, Kordelio-Evosmos, Neapoli-Sykies, Delta, Oreokastro, Thermi, Chalkidona, Pylaia-Hortiatis. The Company operates as a development organization with the aim of providing technical and management support to its local government shareholders for development planning and the preparation, maturation and promotion in financial means of municipal projects and projects with significant inter- and supra-municipal implementation and supervision of inter-municipal projects and cooperation plans as well as projects and projects of supra-municipal scale, in collaboration with other development bodies of the local government and the public and social sector.

The Transport Engineering Laboratory of the Aristotle University of Thessaloniki is operating within the framework of the university's School of Civil Engineering, in the Division of Transport, Construction Management and Regional Development. It is specialised in the fields of Transportation Planning, Transportation Engineering, Traffic and Parking Management, Intelligent Transport Systems and Telematics, Assessment of Spatial and Environmental Impacts of Transport, Road Safety, Transport Economics, Organisation and Management of Freight Transportation Systems and Public Passenger Transport Systems including all means of transport.

The «Hellenic Research and Educational Institute for Road Safety, Prevention and Reduction of traffic accidents "Panos Mylonas"» was founded on May 12, 2005. It is a non-profit Organization founded by University Institutions, private operators, auditors and individuals. The Institute aims to support and promote actions advancing road safety and traffic education, as well as study, research, information and education sectors and initiatives targeting the prevention and reduction of traffic accidents. The main objective of "Panos Mylonas" Institute is raising awareness of citizens and authorities for road safety and moreover, the additional strengthening and support of the greek state in order to provide and enforce effective measures and policies which promote traffic education, road safety and reduction of traffic accidents.

The Renewable and Sustainable Energy Systems Laboratory (#ReSEL), School of Chemical & Environmental Engineering, Technical University of Crete (www.resel.tuc.gr), covers a wide range of knowledge subjects in the fields of Applied Research and Technology Development for Energy Planning and Sustainable Energy Management.

ReSEL expertise focuses on Sustainable Energy Systems- Policy and Planning; Renewable Energy and Energy Saving Systems; Sustainable Cities and Communities mostly on Mediterranean insular cases. Its main objectives are to turn research and scientific knowledge to mature energy solutions and practices that are economically and technically sound, and to support the island and the State to achieve the 2030 and 2050 targets. Its staff is creating synergies engaging the proper market actors, local/regional authorities, governmental organizations, chambers, professional associations, the energy/RES/EE sector, NGOs, and media representatives. Over the last years, it has established cooperation with UNWTO (UN World Tourism Organization), RMEI (Réseau Méditerranéen des Ecoles d'Ingénieurs et de Management), Reseau des Chambres de Commerce et d'Industrie Insulaires de l'UE (INSULEUR), etc. ReSEL is part of the technical support team of the EU initiative Clean Energy for EU Islands.

It also participates in regional innovation initiatives (i.e. Cretan Innovation Pole, Innovation Committee of Crete, etc.).

ReSEL has a strong orientation towards capacity building activities for policy/market actors, trainers, technical staff and public authorities, and towards transferability. It has developed expertise in leading EU-funded projects (Horizon 2020, Intelligent Energy-Europe, Interreg MED, COST, Erasmus, LEONARDO, FP7, FP6, SAVE, THERMIE, etc.), structural funds (3rd CSF, NSRF 2007-2013, NSRF 2014-2020) and other national contracts, in more than 40 as coordinators and 80+ as participating experts.

The Municipality of Trikala is a municipality of the Region of Thessaly and is located in Central Greece. It is the first "digital" municipality in Greece. Since 2004 it has introduced free wifi and became the first municipality to actively engage in technology and innovation, founding e-trikala SA. In 2017 it presented the "Smart Trikala" program, which is a national innovation in technology management and programs for the benefit of the administration and citizens. In 2020, the organizing authority of the European Mobility Week awarded the efforts of the Municipality to improve mobility in Trikala, creating a friendly and accessible city. In recent years, the Municipality of Trikala, has been actively involved in many European programs related to sustainable mobility and smart city.

HEINRICH-BÖLL-STIFTUNG

The Heinrich-Böll-Stiftung is a German political foundation affiliated with the German Green Party (Alliance 90/The Greens). Its primary task is political education and advocacy in Germany and abroad. Our main tenets are ecology and sustainability, democracy and human rights, non-violence and justice. In our work, we place particular emphasis on gender democracy, equal rights for minorities and the political and social participation of migrants.

Our namesake, the writer and Nobel Prize laureate Heinrich Böll, personifies the fundamental principles we stand for: defence of freedom and human dignity, civic courage, open debate and the acknowledgement of art and culture as independent spheres of thought and action. As a think tank for green visions and ideas, we are part of an international network with 33 offices worldwide and with partner projects in more than 60 countries.

The Heinrich-Böll-Stiftung European Union represents the foundation vis-à-vis European and international institutions, associations, non-governmental organisations and media based in Brussels. The office is a main point of contact for individuals, groups and organisations from around the world interested in EU politics and policies. The future of the European project and the role of the European Union in the world are at the centre of our activities and efforts.

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The Heinrich Böll Foundation's office in Greece has been operating in Thessaloniki since June 2012. Through a wide range of activities - educational programmes, studies, research, conferences and debates, publications, support to civil society organisations - it attempts to demonstrate alternatives and highlight policies that lead to the transformation of the Greek economy and society towards a model of ecological development, gender democracy and intercultural inclusion.

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