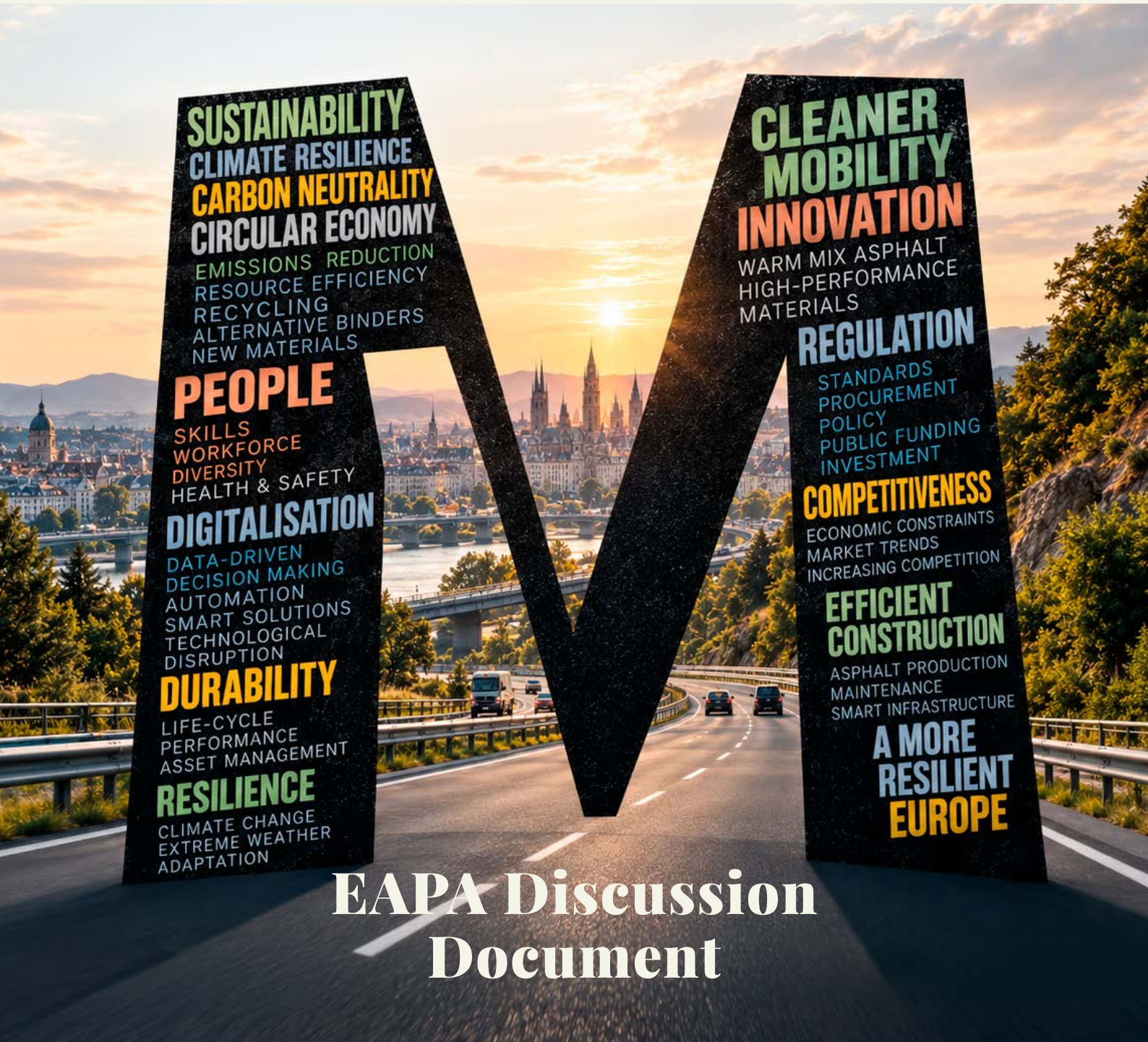
EAPA

Megatrends in the European Asphalt Paving Sector



EAPA Discussion Document

September 2026

Published by the European Asphalt Pavement Association
Square de Meeûs 40
1040 – Brussels (Belgium)
www.eapa.org
info@eapa.org

The present document may be cited as:
European Asphalt Pavement Association (EAPA). Megatrends in the Asphalt Paving Sector (2026) 25 pages.
https://eapa.org/download/22026/?tmstv=1788790226

Except where otherwise noted, content in this document is licensed under a Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND) 4.0 International license. It is allowed to download and share it with others as long as appropriate credit is given. It is not allowed to change it in any way or use it commercially.



Summary

The European asphalt paving sector is operating in a rapidly evolving environment shaped by major socio-economic, environmental, and technological megatrends. Climate ambitions, digital transformation, demographic change, and shifting mobility patterns are redefining how infrastructure is designed, built, and maintained. At the same time, geopolitical uncertainty, supply chain disruptions, and economic pressures are increasing complexity across the sector.

Decarbonisation and climate neutrality are key drivers of change. European policies are accelerating the transition towards low-carbon materials, circular construction, and more energy-efficient processes. In parallel, digital technologies are enabling improvements in productivity, quality, and transparency, supporting a more data-driven and efficient sector.

These developments bring both challenges and opportunities. Increasing regulatory demands, funding shifts, and workforce shortages require adaptation, while innovation in materials, recycling, and digitalisation positions the sector to respond effectively. The role of asphalt is also evolving, from a traditional construction material to a key component of sustainable, resilient, and high-performing infrastructure systems.

This document does not aim to predict the future, but to analyse current trends and explore possible scenarios. Its objective is to support informed decision-making and strategic reflection in a context of ongoing change.

Contents

page

Summary **2**
Contents **3**
1. The Asphalt Paving Sector at a Turning Point **4**
2. General megatrends in Europe **4**
3. Challenges in the Asphalt Paving Sector **6**
3.1. Sustainability and Environmental Pressures 6
3.2. Economic and Regulatory Constraints 7
3.3. Labour and Workforce Shortages 7
3.4. Technological Disruption and Digitalisation 8
3.5. Durability and Climate Resilience 9
3.6. Public Funding and Investment 9
4. Potential scenarios for the asphalt sector **11**
4.1 Asphalt Production 11
4.2 Warm Mix Asphalt 13
4.3 Digitalisation 14
4.4 Automation 15
4.5 New Materials for Resilience and Circular Economy 16
4.6 Carbon-Neutrality 18
4.7 Efficient Construction 19
4.8 Data-Driven Decision Making 19
4.9 Increasing Competition 20
5. Conclusions and Final Remarks **20**
6. References **21**

1. The Asphalt Paving Sector at a Turning Point

Road infrastructure is one of the foundations of modern society. In Europe, it enables the movement of more than 80% of passengers and 70% of inland freight, supports economic growth and competitiveness, provides access to essential services, and connects communities across the 5.5 million km of the European network. As mobility patterns evolve and societies strive to become more sustainable, resilient, and digitally connected, the road network remains a critical asset that must continuously adapt to changing demands.

As more than 90% of this network is surfaced with asphalt, the asphalt paving sector plays a central role in delivering and maintaining this essential infrastructure. Beyond constructing and preserving road networks, the sector has consistently been one of the most innovative segments of the construction industry. Driven by the need to improve performance, safety, sustainability, and efficiency, it has pioneered advances in materials, production processes, digital technologies, automation, and circular economy practices that have often influenced the wider construction sector. These innovations demonstrate the sector's ability to combine engineering excellence with continuous technological progress while responding to society's evolving expectations.

Still, the sector is currently operating in a period of profound and almost unprecedented transition. Shifting socio-economic realities, geopolitical uncertainty, accelerating climate ambitions, and rapid technological change are reshaping the environment in which infrastructure is planned, delivered, and maintained. Rising costs, supply chain volatility, labour shortages, and evolving regulatory frameworks are no longer isolated challenges, but interconnected forces influencing decision-making across the entire value chain.

At the same time, long-term policy directions such as decarbonisation, circular economy principles, and digital transformation are setting a clear trajectory for the sector. These developments are creating both pressure and opportunity: pressure to adapt quickly to new expectations, and opportunity to innovate in materials, processes, and business models.

In this context, understanding megatrends becomes essential. Not as fixed predictions of what lies ahead, but as structured ways of interpreting change.

This document addresses all stakeholders of the European asphalt paving sector but without the aim of providing a precise forecast of the future. Instead, it offers an analysis of the key trends currently shaping the sector and explores how these trends may evolve. By identifying patterns, tensions, and possible directions, it seeks to support informed discussion, strategic thinking, and better preparation for a range of plausible future scenarios.

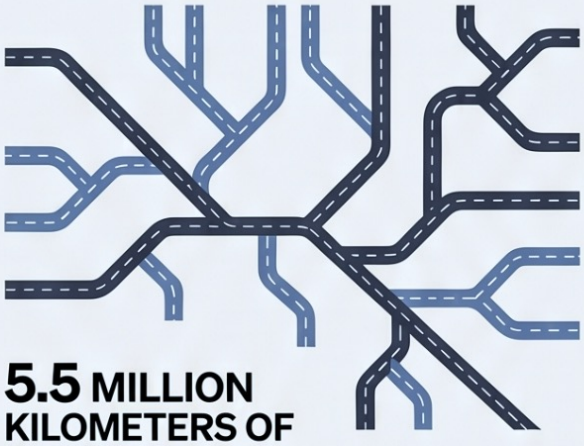
The choices made today will determine whether the sector adapts to change or leads it.

2. General Megatrends in Europe

Europe is being shaped by several long-term megatrends that influence its economy, infrastructure, society, and policy priorities. The most widely recognised ones include:

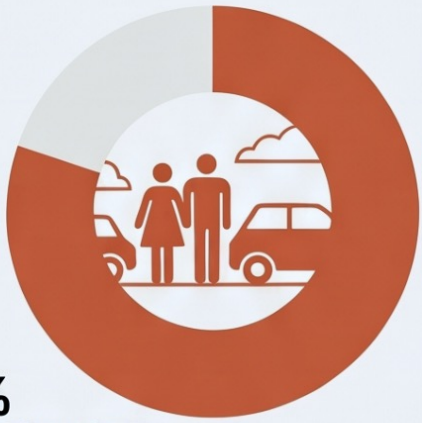
1. **Climate transition and decarbonisation:** Europe is undergoing a major transformation to achieve climate neutrality. Policies such as the European Commission's European Green Deal aim to reduce greenhouse-gas emissions, expand renewable energy, electrify transport, and promote circular economy practices. This trend is reshaping industries such as energy, construction, and mobility.
2. **Digital transformation:** The rapid adoption of digital technologies—AI, IoT, big data, and automation—is transforming businesses, infrastructure, and public services. The EU's digital strategy promotes smart infrastructure, digital connectivity, and data-driven decision-making across sectors including transport and urban planning.
3. **Demographic change and ageing population:** Europe has one of the oldest populations in the world. Lower birth rates and longer life expectancy are leading to labour shortages,

THE FOUNDATION OF EUROPEAN MOBILITY



5.5 MILLION KILOMETERS OF CONNECTIVITY

The expansive European road network serves as the backbone of modern society and economy.



80% OF PASSENGER MOVEMENT

Asphalt-surfaced roads enable the vast majority of inland passenger and freight transport.



90% ASPHALT COVERAGE

The sector plays a central role in maintaining almost ail existing road infrastructure.

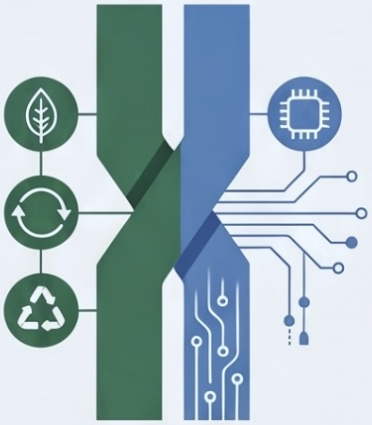
DRIVERS OF SECTOR EVOLUTION

EAPA



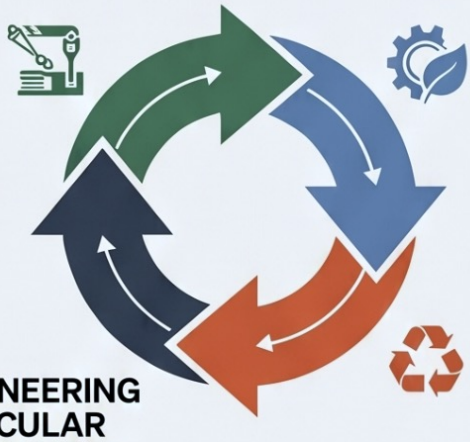
INTERCONNECTED MARKET PRESSURES

Rising costs, supply chain volatility, and labor shortages are reshaping the value chain.



THE GREEN AND DIGITAL TWIN TRANSITION

Decarbonization, circular economy principles, and digital transformation are the primary policy trajectories.



PIONEERING CIRCULAR INNOVATION

The sector is leading advances in materials and automation to meet climate ambitions.

Figure 1. The asphalt paving transition – shaping the future of European infrastructure

increased healthcare demands, and pressure on pension systems, while also reshaping housing, mobility, and infrastructure needs.

4. **Urbanisation and smart cities:** More Europeans are living in cities, which drives the need for sustainable urban mobility, resilient infrastructure, and smart city technologies. Investments in public transport, digital infrastructure, and green urban spaces are central to managing growing urban populations.
5. **Geopolitical shifts and strategic autonomy:** Global geopolitical tensions and supply chain disruptions are pushing Europe to strengthen its strategic autonomy in areas such as energy, technology, defence, and critical raw materials. This affects infrastructure investment, industrial policy, and trade relationships.
6. **Sustainable mobility transformation:** Transport systems are evolving toward low-carbon and multimodal mobility. European policies increasingly promote rail, public transport, electric vehicles, and active mobility to reduce emissions and congestion.
7. **Resource scarcity and circular economy:** Europe is moving toward more efficient use of materials and resources, driven by environmental pressures and supply risks. Circular economy policies.

3. Challenges in the Asphalt Paving Sector

The above-mentioned megatrends influence the asphalt sector bringing numerous challenges:

3.1. Sustainability and Environmental Pressures

- General perception: Transport accounts for about **25% of total EU greenhouse gas emissions** [1] and road transport generates roughly three-quarters of transport emissions in the EU [2]. With these figures, policymakers and public opinion tend to link the road transport to a polluting sector, which may be replaced by other "more sustainable" options, such as railways.
- **Stricter environmental policy** is driving the industry toward greener materials, low-emission processes, and circular economy practices. As raw materials become scarcer, there is increasing pressure for cost-effective, environmentally responsible production and maintenance.
- **Carbon neutrality goals,** such as the 55% reduction of carbon emissions by 2030 (compared to 1990 levels) and becoming carbon-neutral by 2050 apply to the companies of the sector, like any others.
- **EU Taxonomy for sustainable activities** is increasingly affecting companies in the asphalt sector across Europe by shaping how infrastructure projects are evaluated and financed. Developed by the European Commission as part of the European Green Deal, the taxonomy defines which economic activities can be considered environmentally sustainable. As a result, companies involved in road construction and asphalt production face growing pressure to demonstrate lower carbon emissions, improved energy efficiency, and more circular use of materials such as recycled asphalt. Projects that do not align with these sustainability criteria may face greater difficulty accessing public funding or private investment, pushing the sector to adopt greener technologies and practices.
- **Green public procurement** is increasingly shaping the asphalt sector in Europe as public authorities integrate environmental criteria into infrastructure tenders. Promoted by the European Commission within the framework of the European Green Deal, these procurement policies encourage contracting authorities to prioritize solutions with lower environmental impacts over their lifecycle. As a result, several countries have already developed national Product Category Rules (PCR) for the Environmental Product Declaration (EPD) of bituminous mixes. Asphalt companies are facing growing requirements to provide EPDs with their products and become more competitive in tenders through the reduction of carbon emissions, increase of the use of recycled materials, and adoption of more energy-efficient production methods.
- **Recycling and alternative materials** are gaining importance. Techniques like re-using Reclaimed Asphalt (RA), recycled rubber, steel slag and waste foundry sands, and even plastic waste are being explored to reduce reliance on virgin materials. It is especially remarkable that countries, like Italy, have

recently changed the national specifications, moving from the traditional maximum contents of RA to minimum contents, which is expected to boost the circularity within the sector.

- **Lack of End-of-Waste (EoW) criteria for site-won asphalt in most countries,** which involves the application of a waste regime, which makes the handling of this material more complex, for example due to increases in testing frequency or limitations on maximum storage capacity, storage time, applications, etc. This normally results in lower efficiency and higher costs.
- **New mobility in cities** is transforming how people move by prioritizing flexibility, sustainability, and safety. Cities are converting car lanes into bike lanes and pedestrian zones, while e-scooters and shared bikes offer convenient options for short trips. Car-sharing services reduce the need for private vehicle ownership, and the shift toward electric and autonomous vehicles helps cut emissions and improve road safety.
- **New innovations**, such as nanotechnology, bio-materials or self-healing are being investigated to improve durability, sustainability and performance characteristics of asphalt.
- **Increasing constraints on asphalt production capacity due to environmental and social pressures.** Asphalt plants are facing progressively stricter environmental operating requirements, driven not only by formal regulation but also by growing sensitivity among neighbouring communities to emissions, odours, noise, traffic, and visual impact. As urban development expands and residential areas encroach on historically industrial zones, plants are subjected to greater scrutiny and lower tolerance for operational externalities. This trend is making the permitting, expansion, and continued operation of production facilities increasingly challenging. If production capacity becomes persistently constrained by these external factors, the industry could face significant consequences, including reduced supply flexibility, higher production costs, longer transport distances, and increased barriers to meeting future infrastructure demand.

3.2. Economic and Regulatory Constraints

- **Inflation and volatile input costs** for aggregates, bitumen, labour, fuel and equipment—are creating budget pressure and cost overruns.
- **Complex regulatory compliance,** including emissions regulations, adds to operational complexity and requires investments in new equipment and monitoring systems.
- **Bureaucratic hurdles,** geopolitical conflicts and disruptions in supply chains (e.g. due to tariffs, wars, embargoes, etc.) can discourage the adoption of innovative materials, as inertia and vested interests often stifle progress.
- **New Construction Products Regulation** and an overly complicated regulatory and standardisation framework in Europe is making it challenging for producers to be updated on administrative and functioning procedures.
- **Other crossed regulations**, such as on Odour Management, PFAS, REACH, End-of-Waste, Circular Economy Act, Tyre and Road Wear Particles, Microplastics, etc. are shaping a new legislative framework with capacity to significantly impact the conventional production and installation processes.

3.3. Labour and Workforce Shortages

- **Persistent skills gap:** The industry faces a shortage of skilled and multidisciplinary labour (e.g. on fields such as IoT, data analytics, BIM, and automation, among others) able to drive the change towards alternative ways of production and increased efficiencies.
- **Low attractiveness.** Societal stigma around manual jobs and the low rates of implementation of new technologies discourage younger generations from entering the field.
- **Ageing workforce:** according to recent figures, in most of European countries the majority of the workforce are close to the retirement age. This shows that it will not be possible to replace the massive number of retirements expected in the coming years with the younger workers.
- **University and training programmes** at practically every level are deeply based on traditional methods and not yet aligned with the digital needs that could result in a new generation of workers able to drive the necessary disruption in the sector.
- **Traditional perception of the sector as a male-dominated field** has led to a significant scarcity of women willing to start and develop

a career, contributing to the above-mentioned issues of low attractiveness and ageing workforce.

3.4. Technological Disruption and Digitalisation

- **Low efficiency.** Over the past two decades, sectors such as retail and manufacturing have achieved average annual productivity gains of 2.8 percent by continuously reinventing themselves through automation and process optimisation. In contrast, construction has yet to fully harness these opportunities, managing only about 1 percent productivity growth per year over the same period [3]
- **Automation and digital tools** are transforming construction, but adoption remains uneven. The sector is historically under-digitalised, contributing to inefficiencies.
- **Smart and future ready roads** are being developed to handle higher traffic loads and extend maintenance intervals.
- **Ethical implications of AI and robotics:** while these technologies offer efficiency gains, they bring concerns around job displacement, data privacy, and decision-making transparency.
- **Infrastructure for connected vehicles (V2I/V2V):** As vehicles become smarter, road infrastructure must support data communication and self-driving assistance, raising challenges around financing and data management.
- **Building Information Modelling (BIM) adoption barriers** remain high: education, cost, lack of standards, and resistance to change hinder implementation.
- **Lack of RandD transfer.** While Europe provides strong financial and structural support for research projects, bureaucratic hurdles and vested interests often discourage the adoption of innovative solutions. A major challenge lies in technology transfer, as research outcomes rarely translate into practical implementations embraced by industry.
- **Lack of awareness of new technologies** means that many companies and public administrations are still unfamiliar with the benefits that new technologies can provide, often focusing on the lowest upfront cost rather than considering the long-term lifecycle value. In addition, procurement staff may lack the knowledge needed to properly evaluate or require digital solutions in tenders and projects (low demand). This situation is further reinforced by the perception among many contractors and SMEs that digital technologies are only relevant for large-scale projects, which slows down the broader adoption of innovation across the sector.
- **Data security** has emerged as a new challenge for the asphalt sector as it gets increasingly digitalised. The collection and use of data create risks related to sensitive exposure and infrastructure vulnerabilities. These systems may also be targeted by cyberattacks or ransomware, potentially leading to system shutdowns or the manipulation of sensor data. Many existing systems rely on weak legacy technologies that were not designed for digital connectivity, as well as on human factor, further increasing the risks. In addition, the involvement of multiple stakeholders often results in unclear data ownership and responsibilities, making it more difficult to ensure strong and consistent data protection across the value chain.
- **Interconnectivity** is also becoming a new challenge as digital tools, machines, and stakeholders increasingly need to exchange information along the value chain. Communication channels between contractors, suppliers, machine manufacturers, and public authorities are often fragmented, making coordination more difficult. In addition, the lack of standardised digital interfaces creates interoperability issues between different brands and systems. Clear guidelines on what data should be shared and how it should be exchanged are often missing, which further complicates collaboration. As a result, the sector faces risks of inefficiencies, duplicated efforts, and the creation of isolated data silos that limit the full potential of digitalisation.
- **New policy,** such as the new Construction Products Regulation (2025), have also introduced important changes in this regard, such as the implementation of a digital passport, a digital record that ensures each product carries traceable information on its performance, safety, and sustainability, including declarations of performance/ conformity, technical instructions, lifecycle and environmental data, and recyclability. Its purpose is to improve transparency, comparability, and market surveillance, while supporting the EU's circular economy

and climate goals. For manufacturers, this means preparing to maintain comprehensive digital documentation, which may increase administrative work but also facilitates smoother access to the EU internal market.

3.5. Durability and Climate Resilience

- **Increasing traffic loads.** Continued growth in freight transport, urbanization, and economic activity is placing increasing demands on road networks. Many pavements are experiencing higher traffic volumes and heavier axle loads than originally anticipated, accelerating structural deterioration and reducing service life. As a result, infrastructure owners are shifting their focus from minimum compliance toward long-term resilience, seeking pavement solutions capable of maintaining performance under more demanding operating conditions while minimising maintenance interventions and lifecycle costs.
- **New road users.** The rapid evolution of vehicle fleets is changing the way loads are applied to road surfaces. Electric vehicles are generally heavier than their conventional counterparts due to battery weight, while autonomous and connected vehicles may follow more predictable wheel paths, concentrating stresses on specific areas of the pavement. The increasing use of heavy-duty electric trucks could further intensify loading conditions. These developments may accelerate certain distress mechanisms and require a reassessment of pavement materials, structural designs, and maintenance strategies to ensure long-term performance.
- **Climate change.** More frequent and severe heatwaves, cold spells, intense rainfall events, flooding, and prolonged droughts are exposing pavements to conditions beyond those considered in many existing designs. Asphalt materials will increasingly be required to perform reliably across a broader range of temperatures and environmental conditions, maintaining resistance to rutting, cracking, moisture damage, and ageing. This trend is expected to drive demand for more robust material formulations and performance-based approaches capable of addressing diverse and rapidly changing climatic challenges.
- **Obsolete standards, test methods, specifications and design methods.** Many current pavement standards, test methods, specifications, and design approaches were developed under assumptions regarding traffic, climate, and available technologies that are no longer fully representative of current or future conditions. As traffic patterns, vehicle technologies, environmental stresses, and material innovations continue to evolve, there is a growing risk that legacy frameworks will not adequately predict long-term pavement performance. The sector is therefore likely to move toward more performance-based specifications, advanced testing methodologies, digital design tools, and updated standards that better reflect real-world operating conditions and enable the adoption of innovative materials and technologies.
- **Growing emphasis on infrastructure resilience and emergency response.** Governments and infrastructure owners are placing increasing priority on the resilience of transport networks in the face of the above-mentioned impacts. Roads are no longer viewed solely as transportation assets but as critical infrastructure that must remain operational during emergencies and enable rapid recovery afterward. This requires greater investment in durable pavement solutions, accelerated construction and repair methods, strategic maintenance programmes, and local production capacity capable of responding quickly to unforeseen events. For the asphalt paving sector, resilience is emerging as a key value proposition, creating demand for technologies and operational models that enhance the reliability, adaptability, and recoverability of road infrastructure.

3.6. Public Funding and Investment

Although most of European countries still invest more in road infrastructure than in rail infrastructure, with only a few countries allocating more than half of their inland transport infrastructure investment to rail (Figure 2) [4], the data provided by the European Union Road Federation [5] shows a clear decreasing trend in maintenance expenditures in road infrastructure over the latest decades (Figure 3).

This is producing that across Europe, many countries have reported substantial investment

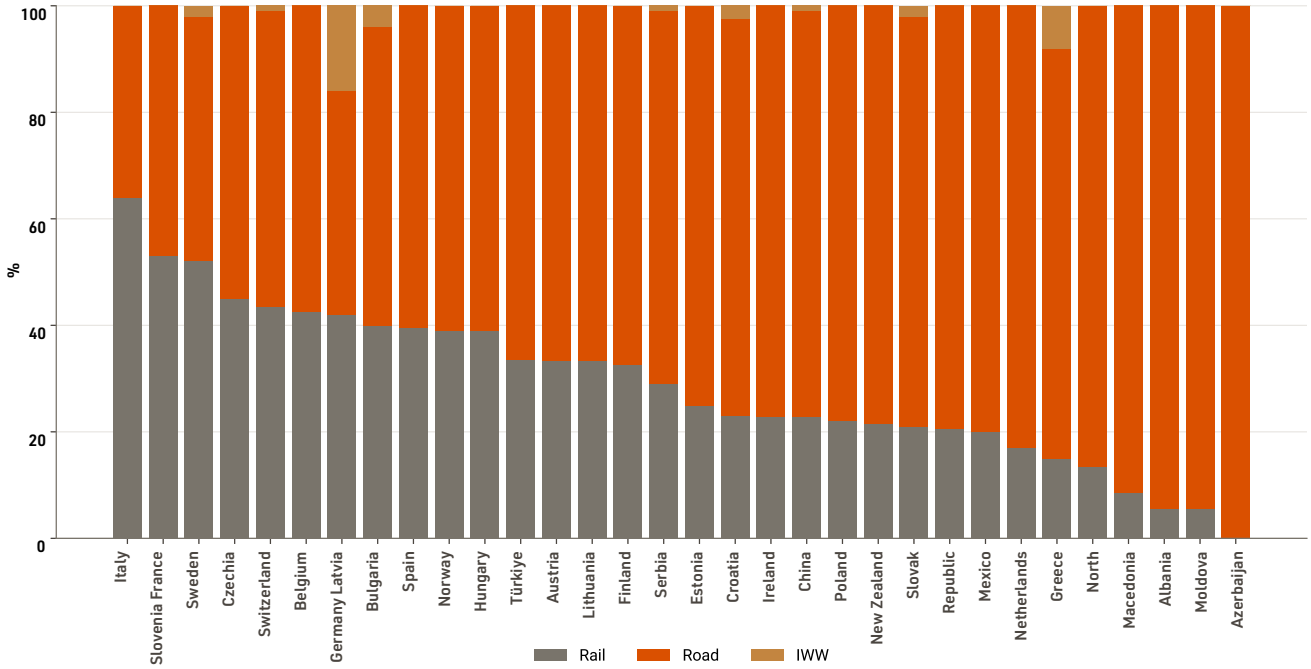


Figure 2. Modal investment mix by country.
Distribution of investment spending by mode, average 2021-23 [4]

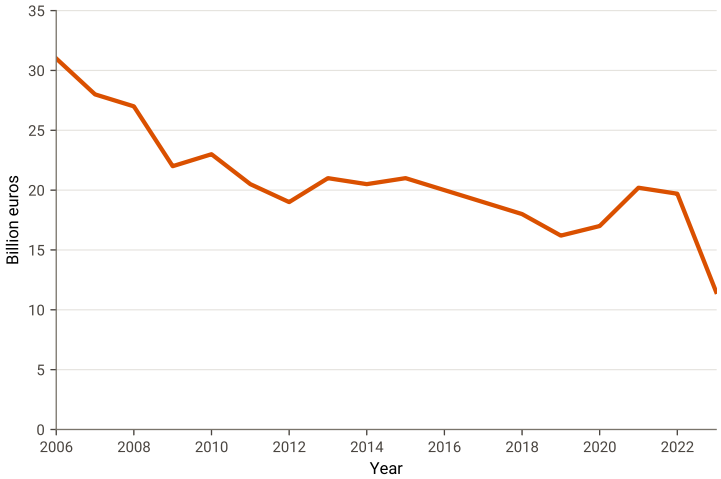


Figure 3. Maintenance expenditures in road infrastructure in Europe [5]

shortfalls when comparing annual road maintenance budgets with the funding required to keep road networks in good condition. For example, in 2026, the British Asphalt Industry Alliance (AIA) reported that local authorities in England and Wales would have needed an additional £8.1 million per authority during the previous year to meet their own maintenance targets (Figure 4). This corresponds to a total carriageway maintenance funding gap of £1.37 billion. Furthermore, the AIA estimated that £18.62 billion would be required as a one-off investment to bring the network back to a reasonable steady state [6].

Another similar example is Spain, where the Spanish Association of Asphalt Manufacturers (ASEFMA) conducted a comprehensive survey where numerous municipalities participated [7]. According to this study, Spanish local councils believe that to adequately maintain the pavement of their road network, they would need to triple their budgets compared to the average figures over the previous years, although some municipalities have indicated that it would be necessary to increase it fivefold. In addition, the vast majority of the surveyed municipalities (70.8%) believe there is an accumulated deficit in pavement maintenance and estimate that, based on current investment, it would take an average of 11 years

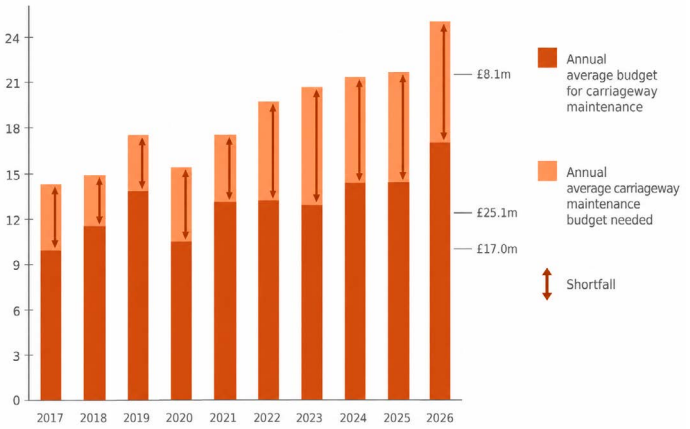


Figure 4. Annual average road maintenance budget needed per authority (£m) in England and Wales [6]

to eliminate it. This situation is also perceived by citizens: regarding complaints received from citizens, 65% of the municipalities stated that they keep a numerical record and, according to the data obtained in the survey, they receive an average of 571 complaints per year. At EU level, the main problem is that the vast majority of its transport infrastructure budget is allocated predominantly through the Connecting Europe Facility (CEF) and the Recovery and Resilience Facility (RRF), with rail receiving by far the largest share.

For example, in the latest call under the Connecting Europe Facility (CEF), the EU's main instrument for strategic infrastructure investment, the European Commission selected 134 transport projects to receive more than €7 billion in grants, the largest allocation under the current programme. Around 83% of the funding is dedicated to projects supporting the EU's climate objectives, focusing on improving and modernising railways, inland waterways, and maritime routes along the Trans-European Transport Network (TEN-T). Notably, the budget for rail projects alone was about 80% of the €7 billion, highlighting the EU's clear policy preference for rail transport over road infrastructure as part of its sustainability and xsation strategy.

Due to current geopolitical instability, funding options for infrastructure have increased alongside with programmes related to Military Mobility:

- ReArm Europe Plan of €150 billion in loans to support urgent investment in EU defence capabilities, the financing could be used for seven priority areas, including military mobility.
- Mid-term review of the cohesion policy programmes allows to reattribute cohesion funds to defence related investments, including for military mobility purposes, at up to 100%.
- European Investment Bank has shown interest in providing loans for military mobility transport infrastructure.

However, once again, the allocation per transport mode shows clear preference for the rail sector:

- Railways (Approx. 75% - 80%): The absolute largest beneficiary. Funds are primarily directed at cross-border missing links, high-speed rail development, and interoperability across the TEN-T core network (e.g., Rail Baltica, the Fehmarnbelt tunnel, and the Lyon-Turin high-speed rail) [8-10].
- Maritime and Inland Waterways (Approx. 10% - 15%): Investments here are targeted at port infrastructure upgrades, shore-side electricity supply, and cross-border inland waterway networks like the Seine-Scheldt basin and the Danube [8].
- Road, Air, and Multimodal Nodes (Approx. 5% - 10%): Road infrastructure receives a minor fraction of dedicated CEF grants, primarily limited to safe and secure parking areas or military mobility upgrades. The remainder is allocated to air traffic management (Single European Sky) and multimodal logistics hubs [9, 11, 12, 13].

4. Potential Scenarios for the Asphalt Sector

The consequences of the above-mentioned megatrends and drivers may lead to the following scenarios in the asphalt sector:

4.1 Asphalt Production

According to the Asphalt in Figures 2024, the total production was 208,5 million tonnes for the EU-27 countries and 268,7 Mt considering further countries in Europe (e.g. Great Britain, Iceland, Norway, Serbia, Switzerland and Turkiye). The value of 268,7 Mt is the lowest registered in the latest 3 decades, with the only exception of the

year 2014 (263,7 Mt), which was the lowest point after the financial crisis of 2008. It is also 40% lower than the historic maximum of 2007 (347,7 Mt).

In the previous chapters, different trends have been listed with potential to make these figures lower. For example, the McKinsey report [3], explains that cities are starting to convert road lanes into bike lanes (with obviously thinner pavements needs and reduced maintenance) and autonomous driving offers unmatched precision and reliability, making it unnecessary to maintain lanes significantly wider than the vehicles themselves. While conventional lanes—typically 3.50 to 3.75 meters wide—are designed to account for human driving errors, future lanes could be reduced to just 2.8 meters while still accommodating oversized vehicles. For roads reserved solely for passenger cars, lanes could be narrowed even further to 2.5 meters. As a result, a four-lane roadway could be up to 4 meters narrower than current designs. In the case of new road construction, this reduction in lane width could cut the amount of required building materials by as much as one-third.

Other contributing trends could be the reductions in public budgets for road infrastructures in favour of rail infrastructures, current geopolitical circumstances among others.

On the other side, asphalt is a material that can be also used for the construction and maintenance of railway tracks [14-15]. In addition, it has been proven that the road pavement surface can directly influence the fuel consumption of vehicles through the rolling resistance between the road and tyres riding over it. Various aspects of the quality and condition of the road will influence rolling resistance: evenness, rutting, potholes and deteriorated joints. Low rolling resistance asphalt in surface course layers can reduce fuel emissions by around 1-2%. In addition, scientific studies [16-19] have shown that proper maintenance to replace pavement surfaces that show "bad" or under-performing surface conditions by smooth road surfaces with "good" properties would lead to fuel use reductions and lower GHG emissions. This means that an improvement of 5% in fuel economy applied to just one third of the road network of Europe by 2030 could lead to annual savings of 14 million tonnes of CO2eq, or the equivalent to removing the emissions associated with 3 million cars [20]. Alternatively, a well-maintained surface could also add range to electric vehicles and add to their viability.

This would be only one of many potential benefits, including reductions in traffic noise and travel time while increasing driving comfort, with savings in vehicle maintenance costs.

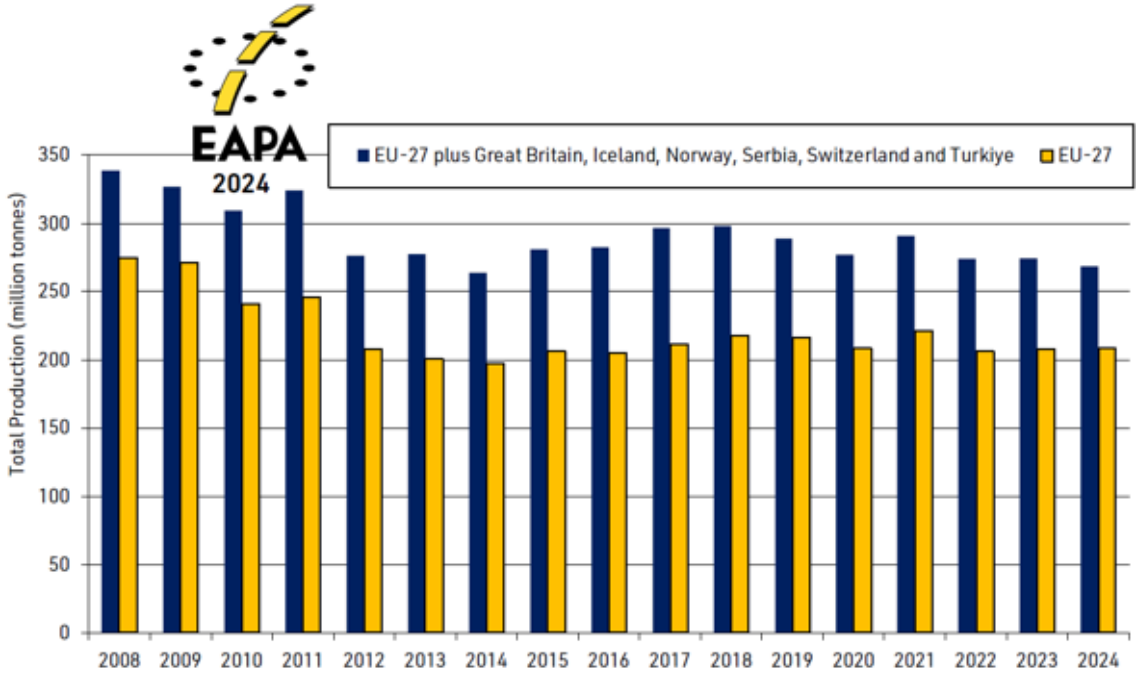


Figure 5. Total Production of Asphalt in EU-27 and EU-27 plus Great Britain, Iceland, Norway, Serbia, Switzerland and Turkiye, from 2008 to 2024

For these reasons, roads in good condition should not be left to deteriorate to a condition where they have negative environmental, societal and economic impacts. Unfortunately, the current reality is different. Studies from various countries, such as the ALARM Report in the UK, have long warned about the growing backlog of repairs needed to restore deteriorating road networks to acceptable standards.
In this regard, trends related to decarbonisation objectives, green public procurement or resilience, may push for higher investments in road maintenance and, consequently, increased productions in the future.

4.2 Warm Mix Asphalt

Warm mix asphalt is increasingly being adopted across Europe, with a growing number of countries raising its share in overall asphalt production (Figure 6).

Although WMA is a technology developed in Europe in the late 90's, it is the current sociopolitical context, which made it attractive for both companies and administrations.

Besides helping companies to meet decarbonisation objectives, it is important to highlight that its use can also lead to a complementary wide range of important benefits, such as:

1. Enhanced worker health and safety by reducing potential exposure to high temperatures and fumes during paving operations. As a rule of thumb every 12°C reduction in temperature reduces fumes by 50%.
2. Reductions in already regulated emissions, such as sulphur dioxide (SO_2), volatile organic compounds (VOC), carbon monoxide (CO), nitrogen oxides (NO_x) and particulate matter release [22-23].
3. Reduced energy consumption may translate into a reduced dependency on fuel supply from outside Europe.
4. Less short-term ageing of the bitumen during manufacture. This may lead to an improved pavement service life, reducing the frequency of repair and replacement interventions.
5. Reduced thermal stress on the plant components resulting in less wear and replacement.
6. Full compatibility with the use of Reclaimed Asphalt.
7. Reduced odour nuisance in the surroundings of asphalt plants.

Currently, not all European countries are progressing at the same pace (Figure 8) but countries, such as Ireland, Norway and UK already have market shares of around 30% and countries, such as Germany and the Netherlands have clear objectives of reaching 100% by the end of 2026. For all the drivers explained above, it is expected that more and more countries will join this trend

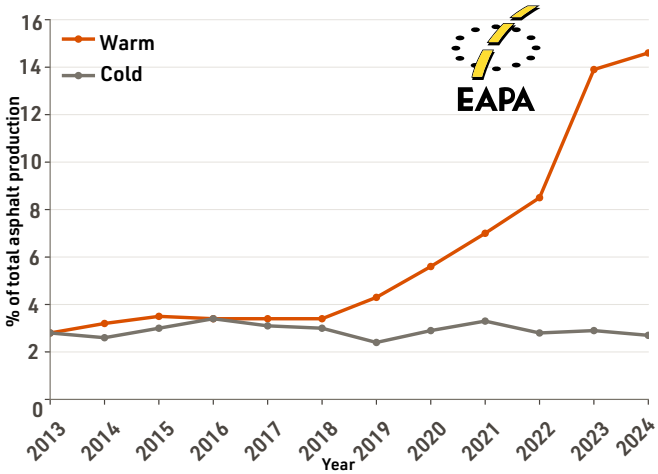


Figure 6. Percentage of WMA and CMA production over the total asphalt production in countries with complete data series available for the period 2011 – 2024 [21]

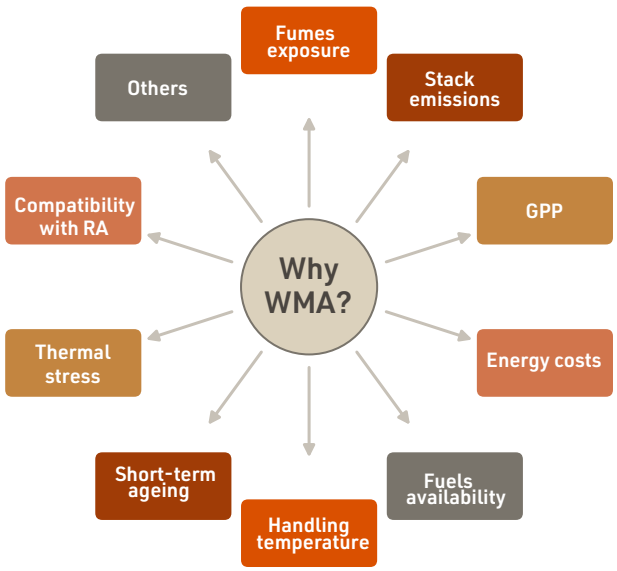


Figure 7. Reasons currently driving the market towards an increased production of WMA

in the coming years, until at some point, the term "warm" will become redundant and the sector will simply talk about "asphalt". More information is given in the EAPA documents on WMA [22-23].

This transition is not without challenges, and several barriers still need to be addressed. For instance, there is currently no clear consensus on how WMA is defined, making it difficult to monitor and compare its adoption across countries. In addition, no single WMA technology is suitable for all situations, often requiring the development and transfer of know-how, as well as adaptation to local materials, equipment, and conditions. Many countries also maintain specifications with minimum temperature requirements, which can effectively prevent the use of WMA. Moreover, changing the long-standing perception that higher mix temperatures equate to better quality may take time in some European regions. In this context, an on-site test method to measure mix workability could be helpful, but no reliable solution has yet been established.

All these factors mean that, although warm mix asphalt (WMA) is technically mature and has demonstrated satisfactory performance to date, it is still often perceived as a "high-risk" innovation in many countries. This is despite the availability of multiple techniques (such as foaming, chemical additives, modified binders, and sequential mixing) and its compatibility with standard asphalt plants and conventional paving and compaction equipment used for hot mix asphalt (HMA). As a result, WMA must often pass through a series of regulatory and practical filters (e.g. trial sections, laboratory studies, etc.) before it can become standard practice.

4.3 Digitalisation

As seen above, WMA is emerging as a practical solution to reduce emissions, lower energy consumption, and improve working conditions on site. As WMA adoption grows and sustainability expectations increase, the entire process chain becomes more complex and sensitive. Companies are facing tighter temperature and time constraints across production, transport, and paving, along with minimal tolerance for deviations during construction. At the same time, documentation and verification requirements are becoming more demanding, while pressure on personnel is intensifying amid ongoing skilled labour shortages.

These challenges carry clear economic implications. Without full transparency across the process chain, issues often only become apparent when it is too late, leading to quality deviations detected after paving, costly rework, disputes,

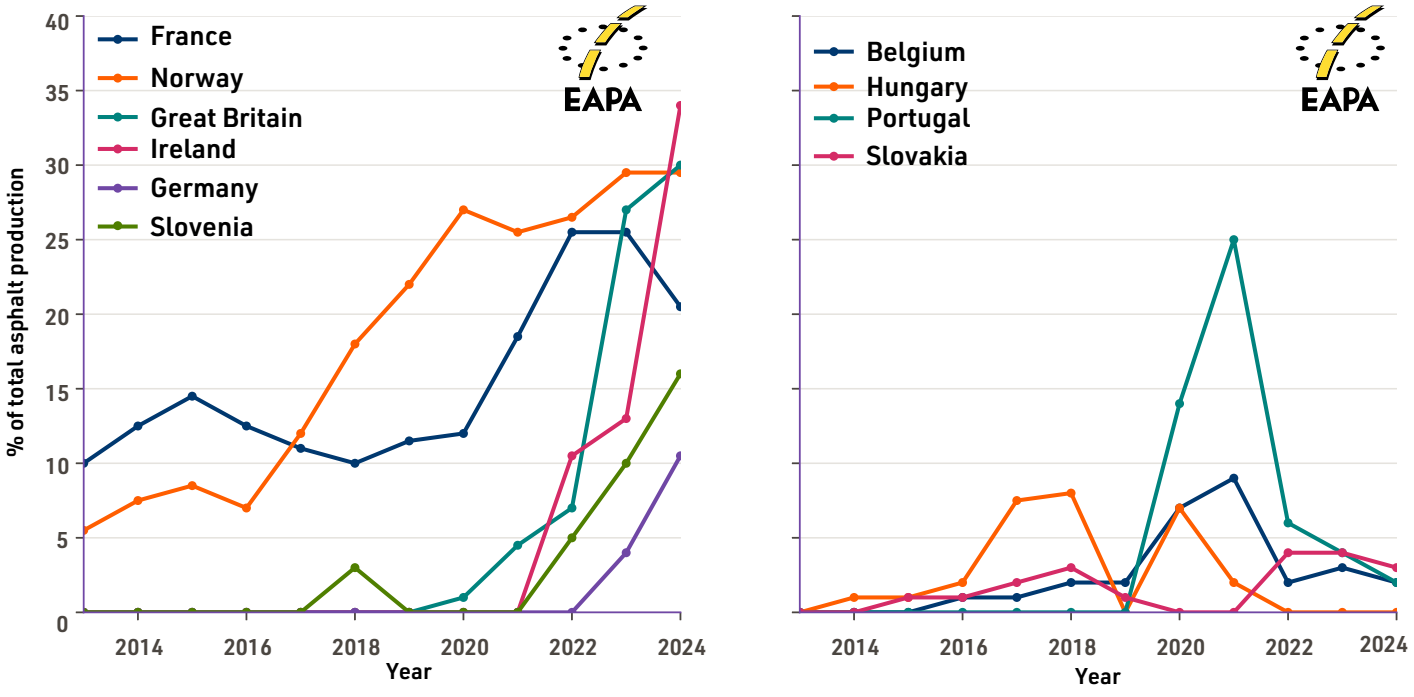


Figure 8. Percentage of WMA production over the total asphalt production in countries with increasing trends (left) and irregular trends (right)

and risks during acceptance procedures or public tenders. In many cases, avoidable process errors result in rising costs.
However, these challenges can be effectively managed through the consistent use of data across the entire production and paving process. New digital solutions providers are already helping asphalt producers and construction companies structure their operations so that new requirements become manageable standards rather than business risks. This includes continuous data collection from plant to paving site, automated integration of production, temperature, time, and quality data, and audit-ready documentation without additional manual effort. The result is transparent, reliable verification for clients and authorities, along with measurable improvements in energy efficiency, quality, and sustainability. This is not theoretical digitalisation, but a practical approach proven in real operating environments.

All these developments have led to the recent concept of Asphalt 4.0, which is the application of Industry 4.0 solutions to the asphalt sector. This refers to a series of smart and autonomous systems, a system of systems fuelled by big data, machine learning, artificial intelligence, blockchain, internet of things (IoT), etc. with capacity to significantly push forward the efficiency, productivity, quality, reliability and sustainability of a given industrial sector.

Asphalt 4.0 involves the use of digital tools to automate, monitor and improve the way, in which organisations develop conventional activities, such as management of production of mixtures in asphalt plants, transport/ supply or installation (e.g. laying, compaction, asset management, etc).

Using digital technologies in the asphalt paving sector, stakeholders can improve the way in which they develop their activities, obtain greater efficiency of processes and organisation, better performance, durability and guarantees of the offered products and services to meet customer requirements and specifications, savings of time and resources, a permanent innovation process and a totally different way of managing customer satisfaction (customer experience). In addition, it also facilitates and accelerates the transition of the mobility sector towards its new users, such as the electric and automated vehicles.

4.4 Automation

Beyond digitalisation, automation is also set to transform road construction, an industry long plagued by persistently low productivity. Over the past two decades, sectors such as retail and manufacturing have achieved average annual productivity gains of 2.8 percent by continuously reinventing themselves through automation and process optimisation. In contrast, construction has yet to fully harness these opportunities, managing only about 1 percent productivity growth per year over the same period [3].

The road paving sector, in particular, faces the dual challenge of increasing productivity with a shrinking labour force and younger generations showing little interest in entering the field. In this scenario, automation seems to be practically the only way of solving this problem.

Equipment manufacturers have been progressively developing an extraordinary range of autonomous and semi-autonomous machines, which have capacity to maximise the accuracy and speed of the job and make tedious and repetitive tasks easy for operators. In addition, automated machines, equipped with vision systems, which allow them to detect humans and obstacles in its vicinity, are continuously alert, follow more strictly the HandS rules and can work in dangerous places without endangering human lives (i.e. works on sloped ravines). For these reasons, reducing the human factor in construction sites might become an important milestone in HandS, significantly reducing the number of accidents and casualties in the construction sector.

Many brands have already developed different prototypes to carry out a wide range of construction tasks, such as compactors, dozers or dumpers. Some of them are already being tested in pilot sites and quarries and may be soon co-working with humans in real spaces.

At a more market-ready level, intelligent equipment meant for repetitive operations, such as excavators, cranes or handling machines, have incorporated systems that learn a specific task when the operator does it manually by the first time and then the machine repeats it as necessary. This, combined with machine-to-machine communication features, allows processes, such as an excavator moving earth from a pit to a

dumper, in a way that the operator does manually the first repetition and then the machine repeats the manoeuvre until the sensors detect that the desired level has been reached or the sensors of the dumper notify the excavator that the maximum load of the dumper has been reached.

In addition, the combination of additive manufacturing (e.g. 3D asphalt printer mounted onto an automated and electric robot) and high resolution computer vision can lead to a new whole generation of machines able to autonomously construct new road layers or to drive down the existing road network in search of cracks or imperfections and repair these at a constant driving speed.

These machines can also support construction/ maintenance operators by continuing the work beyond the bandwidth of the workforce employed. This would reduce road disruption times and the exposure of unrepaired roads, which commonly produces the further deterioration of these.

More information on EAPA document on Asphalt 4.0 [24].

4.5 New Materials for Resilience and Circular Economy

A further development set to transform road construction is the emergence of innovative building materials. Nearly half of current road construction costs are tied to raw materials such as crushed rock, bitumen (oil derivatives), cement, water, and sand. For years, researchers have explored alternatives that are lighter and more durable. While new road users, such as electric, autonomous and heavy-duty vehicles) may produce higher impacts on the pavements over the coming decades [25-27], roads by 2050 will need to be more resilient than today [28]. All this, at the same time that stricter environmental policy will require the development and selection of materials with lower impacts.

Circularity will continue to play a key role on this. Figure 9 shows the percentage of available reclaimed asphalt, which in 2024 was re-used for the manufacture of new mixes (including HMA, WMA, Half-WMA and CMA), recycled as unbound road layers and other civil engineering applications, and utilised in other unknown applications or put to landfill [21]. For the calculation of these values, only 16 European countries providing full data (total amount and use percentages) were considered. In these countries, a total of 40,0 Mt of reclaimed asphalt were available, out of which, 73% were re-used, 24% were recycled and only 3% were used on like Sed as a leading practice in the European market. Nevertheless, ongoing regulatory developments continue to drive industrial sectors toward greater circularity. For instance, the Italian Ministry of Environment and Energy Security approved in 2024 the so-called CAM Strade regulation [29], replacing, for the first time, requirements related to maximum RA contents by minimum RA contents.

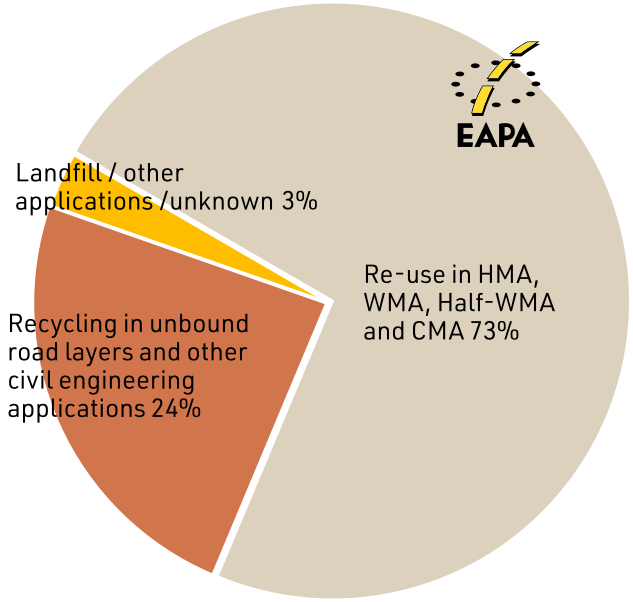


Figure 9. Application of reclaimed asphalt in 16 European countries providing data

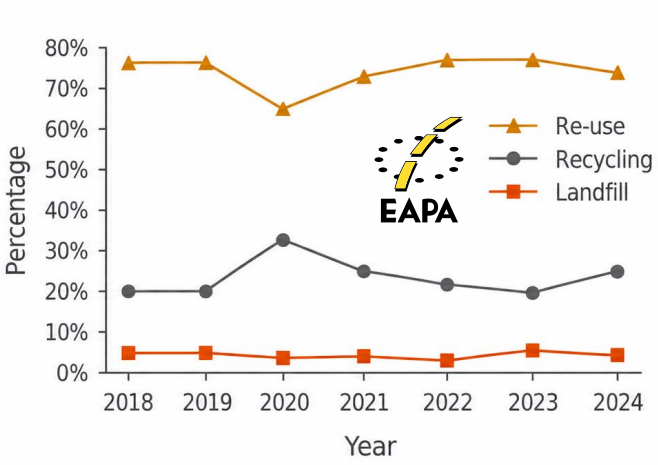


Figure 10. Percentage of total RA available for the European asphalt industry, which was re-used, recycled and used in unknown applications or put to landfill

These requirements apply to all types of roads (i.e. national, regional and local) and other countries, like Serbia has already followed this example. Consequently, current levels of RA reuse are expected to be maintained or potentially increase further in the coming years. More information in the EAPA documents on the Circular Economy of asphalt [30-32].

It should also be noted that not all site-won asphalt generated is available for use by the asphalt paving sector. On average, only about 80% of this material is accessible to the industry. The remaining fraction is effectively lost to pavement applications, as it may be diverted to other industries (e.g., processed as reclaimed aggregates) or, in less favourable cases, disposed of in landfill. However, driven by ongoing regulatory developments, the establishment of effective End-of-Waste criteria for asphalt, and the consolidation of circular economy practices, reclaimed asphalt is expected to become an increasingly valuable raw material. As a result, it will likely be prioritised for re-use in new asphalt mixtures rather than diverted to alternative applications.

Future roads may also incorporate increasing levels of other recycled materials (e.g. crumb rubber or waste plastics), low-carbon materials (e.g. bio-binders and low-carbon binders), and high performance materials, such as low-rolling resistance asphalt to reduce emissions from vehicles, highly draining surfaces to cope with frequent flooding and capture pollutants (e.g. tyre and road wear particles) and SMA-like mixes for long-lasting pavements.

In this regard, it is important to highlight that, although the strong EU policy on Circular Economy can facilitate the use of RA for the construction and maintenance of new roads, it can also boost a series of initiatives aiming at introducing a wide range of different by-products and waste materials from other sectors into asphalt. In this sense, EAPA has been warning over the last years, about the negative consequences that some of these products may produce into asphalt, especially in terms of quality/durability, environmental impact and health and safety of workers/operators [33]. The use of some waste materials and by-products into asphalt, could even endanger its re-usability and recyclability at the end of its service life. Therefore, and despite seeming paradoxical, the use of such materials could contradict the principles of circular economy, as it would make necessary to dump into a landfill, a material that otherwise would be 100% re-used and/or recycled several times.

Plastomeric polymeric compounds, typically engineered blends of waste plastics, are also gaining renewed attention in asphalt technology after being largely overlooked in favour of elastomeric polymers like SBS. Their resurgence is driven by environmental concerns, the growing use of reclaimed asphalt (RA), and their ability to enhance pavement performance by improving



Figure 11. Example of a plastomeric polymeric compound

stiffness, durability, and service life without negatively affecting emissions or low-temperature behaviour. Historically limited by a lack of field validation and regulatory support, plastomers are now supported by extensive research and evolving standards in regions such as Italy and the United States, facilitating wider adoption. Their compatibility with dry processing and suitability for high-RA mixtures make them a flexible and practical alternative to traditional additives.

Looking ahead, plastomeric polymeric compounds are expected to play an increasingly strategic role in the evolution of sustainable and high-performance asphalt technologies. Their ability to valorise waste plastics aligns strongly with circular economy principles and global decarbonisation objectives. As performance-based specifications continue to replace prescriptive ones, greater flexibility in material selection will likely further encourage their adoption. Moreover, advances in material characterization, mixture design optimisation, and long-term performance monitoring are expected to reduce remaining uncertainties and enhance confidence among road agencies and contractors. Future research will likely focus on improving compatibility between different plastic types and bituminous systems, optimizing gradation and dosage strategies, and developing predictive performance models tailored to plastomer-modified mixtures. With continued regulatory support, standardised guidelines, and robust field validation, plastomeric compounds have the potential to transition from niche solutions to mainstream components in next-generation asphalt production particularly in regions facing high traffic loads, elevated temperatures, and strong sustainability targets.

4.6 Carbon-Neutrality

One of the most transformative megatrends shaping the asphalt paving sector is the shift toward carbon neutrality. As governments tighten climate regulations and infrastructure owners commit to net-zero targets, the industry faces growing pressure to decarbonise both materials and processes. Asphalt production is traditionally energy-intensive, relying on fossil fuels and emitting significant amounts of CO_2. In previous sections, it was already explained that, to address this, companies are adopting low-temperature asphalt technologies, incorporating recycled materials such as reclaimed asphalt pavement and plastics, and exploring bio-based or alternative binders that reduce dependence on bitumen, with different savings over the life cycle of the pavement.

Nevertheless, a wide range of additional strategies can be pursued. For example, alongside the adoption of cleaner fuels and renewable energy in production, measures such as reducing moisture in aggregates, using more efficient bitumen storage systems, implementing energy-efficient technologies in asphalt plants and job sites, and adopting electric transport vehicles and optimized logistics can all contribute significantly.

If nowadays the production of a tonne of asphalt requires the emission of around 80 kg-CO2eq [34], together, these innovations can position the asphalt industry as a carbon-neutral player and asphalt pavements as a key enabler of sustainable infrastructures.

Achieving carbon neutrality not only helps meet current and future environmental goals but also enhances competitiveness, as contractors and suppliers that can deliver low-carbon solutions will be favoured in future Green Public Procurement and EU Taxonomy-based funding frameworks.

Despite these considerations and although EAPA has published a Decarbonisation Roadmap which illustrates that becoming Net Zero is possible, it is important to mention that not all countries will start from the same position, and not all will have the same opportunities to fully develop all the potential that certain technologies might offer.

Reaching each of the milestones on this path, while maintaining the competitiveness of the asphalt sector will require significant long-term strategies and synergies. These are not only between industry and direct stakeholders of the paving sector (such as material suppliers, Road Administrations, Governments and Academia), but between the asphalt sector and others, such as the automotive and energy sectors.

The asphalt industry has experience with some technologies that will need to be boosted beyond current limits (e.g. higher re-use of reclaimed asphalt or the implementation of WMA techniques). Other technologies, such as

the use of carbon-neutral energy sources at the asphalt plant or the replacement of conventional bitumen by low-carbon binders are still at a very early stage. In addition, some necessary external enablers, such as the decarbonisation of the transport sector and of electricity production, are beyond the efforts of the asphalt industry itself.

For all these reasons, underpinning such a long-term strategy relies on supporting strong developments and adaptations by the industry, aligned investments (private and public), innovative research programmes, enabling and flexible specifications and standards, and the commitment of Administrations to use the available technologies with shared risks. In other words, a holistic approach based on cumulative intersectoral synergies and which goes beyond the efforts of the asphalt industry alone must be embraced.

4.7 Efficient Construction

Reducing construction time in road projects is critical. According to the McKinsey report, delays lead to higher hiring, rental, and closure costs, as well as greater congestion-related economic impacts. Road projects frequently overrun schedules (by up to 105%) and budgets (by around 20%), with longer projects typically costing more per lane-kilometre. Extended timelines increase both the likelihood of budget overruns and the unit cost of construction.

For these reasons, historically, efforts have been put to road projects become progressively longer (in kilometres), less expensive (per lane-kilometre), and quicker to deliver (per lane-kilometre). According to McKinsey, this shift will accelerate, making road construction considerably faster and more cost-efficient by 2050.

Some of the trends mentioned above, such as automation and digitalisation will improve each stage of a road project, supporting not only analysis of what road specification is required (and subsequently reducing waste from overproduction) but also both faster design and faster construction through standardisation [3]. With all this, McKinsey has estimated that by 2050, the new process flow for road construction will decrease construction time and cost by up to 30%.

4.8 Data-Driven Decision Making

Future road construction will increasingly rely on advanced analytics to enable data-driven assessments and planning. Beyond evaluating traffic needs, data, such as signals from sensors in the vehicle suspension systems, can also identify road surface status and maintenance requirements. With billions of mobility data

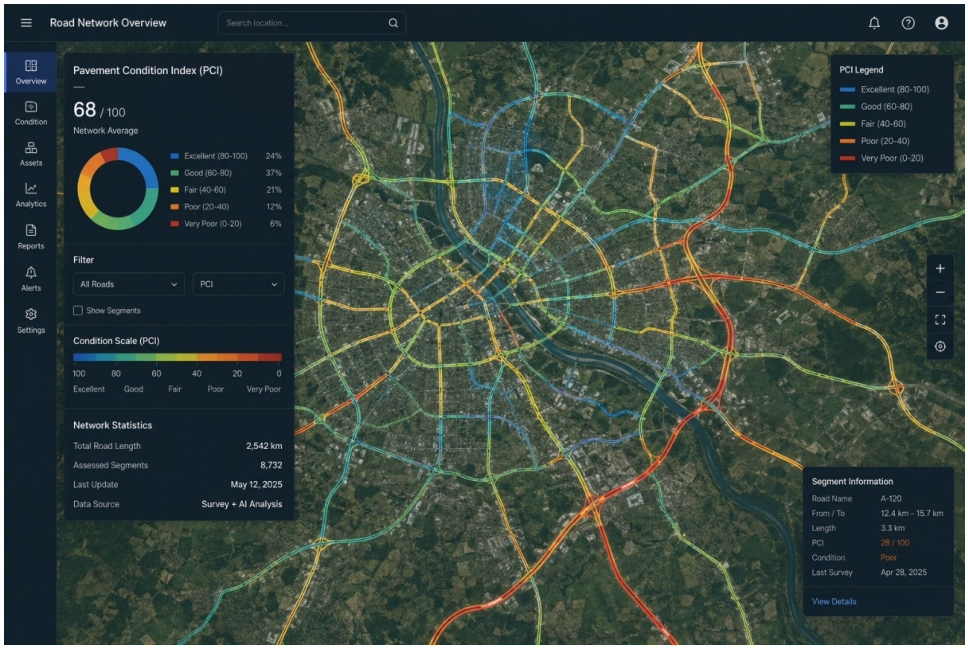


Figure 12. Illustration of how pavement status can be monitored based on data collected from driving vehicles

points already collected by car manufacturers and navigation apps, authorities can harness anonymised real-time data for analyses and simulations, replacing slow traditional methods like manual traffic counts or the extraction and laboratory testing of road cores. This would not only improve the asset management but also offer transparent, evidence-based guidance on whether projects will truly enhance traffic flow and road quality. By grounding decisions in data, approval processes will be accelerated significantly–potentially reducing the time to define project needs and specifications.

4.9 Increasing Competition

It is unclear whether traditional producers and contractors, still heavily reliant on manual labour and limited automation, will be able to attract a new generation of specialised workers and acquire the technological capabilities needed to deliver next-generation, digitally integrated road infrastructure.

Should they fall behind, major technology companies such as Alphabet, Apple, and Tesla could enter the space, either through partnerships or new ventures, albeit not necessarily as full-scale road constructors.

Early initiatives, including Alphabet's Sidewalk Labs smart neighbourhood project in Toronto and the Boring Company's smart tunnel concepts, indicate a growing interest in road-related systems.

If conventional players fail to adapt, they may be confined to the role of raw material suppliers, while technology firms capture emerging value streams through approaches such as dynamic tolling [3].

5. Conclusions and Final Remarks

Road infrastructure is one of the foundations of modern society. As more than 90% of it is surfaced with asphalt, the asphalt paving sector plays a central role in delivering and maintaining this essential infrastructure. The sector has demonstrated through decades its ability to combine engineering excellence with continuous innovation and adaption. Nevertheless, it stands nowadays at a critical juncture. The megatrends identified throughout this document, ranging from decarbonisation and digital transformation to demographic shifts and changing mobility patterns, are not isolated developments, but interconnected forces reshaping the sector's operating environment. Together, they are redefining how roads are designed, constructed, maintained, and valued within society.

One of the clearest conclusions is that the sector is moving from a traditionally production-driven model towards a more integrated, performance- and value-driven approach. Environmental considerations, lifecycle thinking, and data-driven decision-making are becoming central to both policy and practice. In this context, asphalt is no longer viewed solely as a construction material, but as part of a broader system contributing to sustainable, resilient, and efficient mobility.

At the same time, the sector faces a complex balance between pressure and opportunity.

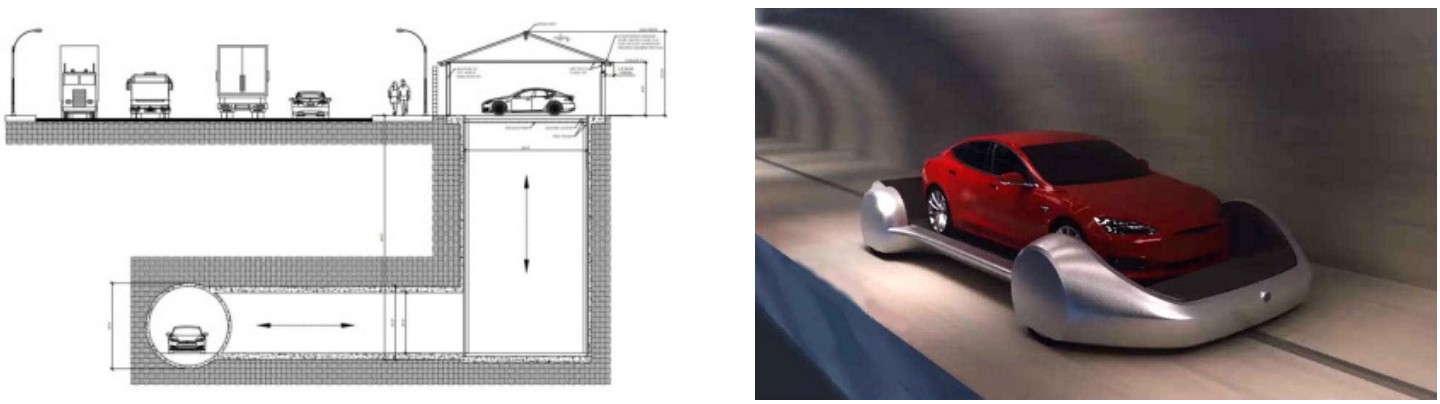


Figure 13. Elon Musk's Boring Company smart tunnel concept in Las Vegas

Increasing regulatory requirements, funding shifts, and public perception challenges are creating uncertainty and require continuous adaptation. However, these same drivers are accelerating innovation. Technologies such as Warm Mix Asphalt, digital process integration, automation, and advanced materials demonstrate that the sector already has the tools to respond effectively, provided they are widely adopted and supported by enabling frameworks.

A key insight from this analysis is that the future of the asphalt sector will depend not only on technological progress, but also on collaboration. Achieving climate neutrality, improving circularity, and increasing productivity will require coordinated efforts between industry, policymakers, research institutions, and other sectors such as energy and mobility. No single actor can drive this transformation alone.

The scenarios explored in this document illustrate that multiple futures are possible. Some trends may lead to reduced demand in certain areas, while others, such as increased maintenance needs, resilience requirements, and performance-based infrastructure, may create new opportunities. This reinforces the importance of flexibility and strategic foresight.

Importantly, this document does not seek to define a single, definitive future for the sector. Instead, it provides a structured understanding of current developments and their potential implications. The objective is to support informed decision-making and to encourage proactive positioning in a context of ongoing change.

Looking ahead, the asphalt paving sector has the potential to remain a key enabler of Europe's mobility and infrastructure systems. By embracing innovation, strengthening its value proposition, and actively engaging in the broader sustainability and policy agenda, the sector can reinforce its relevance and competitiveness in the decades to come.

6. References

[1] https://ec.europa.eu/eurostat/documents/15216629/20875401/KS-01-24-021-EN-N.pdf?utm_source=chatgpt.com

[2] https://www.eea.europa.eu/en/topics/in-depth/road-transport?utm_source=chatgpt.com

[3] McKinsey and Company. Road work ahead – The emerging revolution in the road construction industry. 21 Pages.

[4] International Transport Forum. Statistics Brief. July 2025. https://www.itf-oecd.org/global-transport-infrastructure-investment-data-update

[5] European Union Road Federation. Statistics – Road Maintenance and Investments 2025. https://erf.be/statistics/road-maintenance-and-investment-2025/

[6] Asphalt Industry Alliance (AIA). Annual Local Authority Road Maintenance Survey Report 2026. 28 Pages. www.asphaltuk.org/wp-content/uploads/ALARM-Survey-2026.pdf

[7] Asociación Española de Fabricantes de Mezclas Asfálticas (ASEFMA). Vías Urbanas, Encuesta Anual Sobre el Estado de Conservación (VUELCA 2016). www.asefma.es/wp-content/uploads/2018/07/INFORME_vuelca_2016.pdf

[8] European Commission. EU to invest record €7 billion into sustainable, safe and smart transport infrastructure. Press Release 17 July 2024. https://ec.europa.eu/commission/presscorner/detail/en/ip_24_3821

[9] European Commission. EU invests €2.8 billion in 94 transport projects to boost sustainable and connected mobility across Europe. News Article. 3 July 2025. https://transport.ec.europa.eu/news-events/news/eu-invests-eu28-billion-94-transport-projects-boost-sustainable-and-connected-mobility-across-europe-2025-07-03_en

[10] European Commission. CEF Transport: €2.8 billion for 94 projects to boost sustainable and connected mobility across Europe. News Article. 3 July 2025. https://cinea.ec.europa.eu/news-events/news/cef-transport-eu28-billion-94-projects-boost-sustainable-and-connected-mobility-across-europe-2025-07-03_en

[11] European Commission. Connecting Europe Facility: https://transport.ec.europa.eu/transport-themes/infrastructure-and-investment/connecting-europe-facility_en

[12] European Parliament. Smart and sustainable transport investments in the national recovery and resilience plans. Briefing Next Generation EU (NGEU) delivery Sectoral focus. www.europarl.europa.eu/RegData/etudes/BRIE/2025/775883/EPRS_BRI(2025)775883_EN.pdf

[13] European Court of Auditors. The EU core road network: shorter travel times but network not yet fully functional. Special Report 09/2020.

[14] European Asphalt Pavement Association (EAPA). Asphalt in Railway Tracks. Technical Briefing (2021) 16 pages. https://eapa.org/eapa-position-papers/

[15] European Asphalt Pavement Association (EAPA). Asphalt in Railway Tracks. Technical Review (2021) 27 pages.

[16] Sandberg, U. (1990) 'Road macro-and megatexture influence on fuel consumption', in Meyer, W. E. and Reichert, J. (eds) Surface Characteristics of Roadways: International Research and Technologies. Philadelphia, pp. 460–479. doi: 10.1520/STP23382S

[17] du Plessis, H. W., Visser, A. T. and Curtayne, P. C. (1990) 'Fuel Consumption of Vehicles as Affected by Road-surface Characteristics', in Meyer, W. E. and Reichert, J. (eds) Surface Characteristics of Roadways: International Research and Technologies. Philadelphia: American Society for Testing and Materials, pp. 480–496. doi: https://doi.org/10.1520/STP23383S

[18] Hammarström, U., Karlsson, R. and Sörensen, H. (2008) 'Road surface effects on RR -costdown measurements with uncertainty analysis in focus', Energy Conservation in Road Pavement Design, Maintenance and Utilisation (ECRPD). Deliverable D5(a). Linköping, Sweden.

[19] Chatti, K. and Zaabar, I. (2012) Estimating the Effects of Pavement Condition on Vehicle Operating Costs, NCHRP Report 720. Washington, DC

[20] EAPA-EUPAVE-FEHRL. Road Pavement industries highlight huge CO2 savings offered by maintaining and upgrading road (2016) https://eapa.org/road-pavement-industries-highlight-huge-co2-savings-offered-by-maintaining-and-upgrading-road-view

[21] European Asphalt Pavement Association (EAPA). Asphalt in Figures 2024. Published in 2026. https://eapa.org/asphalt-in-figures/

[22] European Asphalt Pavement Association (EAPA). Recommendations for Road Authorities to optimise paving sustainability, health and safety, and quality through the use of Warm Mix Asphalt. EAPA Technical Briefing (2024) 33 pages. https://eapa.org/download/17960/?tmstv=1708953656

[23] European Asphalt Pavement Association (EAPA). Technical Aspects of the use of Warm Mix Asphalt. EAPA Technical Review (2022) 45 pages. https://eapa.org/download/17970/?tmstv=1709204907

[24] European Asphalt Pavement Association (EAPA). Asphalt 4.0 - Digital Transformation (2025) 28 pages. https://eapa.org/asphalt-4-0-digital-transformationdigital-transformation/

[25] European Asphalt Pavement Association (EAPA). High-performance Asphalt Pavements – adapting for future road networks. EAPA Technical Review (2021) 22 pages. https://eapa.org/download/12745/

[26] The present document may be cited as: European Asphalt Pavement Association (EAPA). High-performance Asphalt Pavements – adapting for future road networks. EAPA Technical Review (2021) 22 pages. https://eapa.org/download/12741/

[27] European Asphalt Pavement Association (EAPA). Classification of Readiness of European Highways for Adopting Connected, Automated and Electric Vehicles. A discussion Document (2020) 19 pages. https://eapa.org/eapa-position-papers/

[28] European Asphalt Pavement Association (EAPA). Defining the Resilience of Asphalt (2024) 12 pages. https://eapa.org/download/18042/?tmstv=1711615471

[29] Ministero Dell'ambiente e Della Sicurezza Energetica. Adozione dei criteri ambientali minimi per l'affidamento del servizio di progettazione ed esecuzione dei lavori di costruzione, manutenzione e adeguamento delle infrastrutture stradali (CAM Strade). Gazzetta Ufficiale Della Repubblica Italiana Serie generale - n. 197, 2024

[30] European Asphalt Pavement Association (EAPA). The Circular Economy of Asphalt. EAPA Technical Review (2022) 34 pages. https://eapa.org/download/15684/

[31] European Asphalt Pavement Association (EAPA). Asphalt – A Key Construction Product for the European Circular Economy. EAPA Position Paper (2022) 8 pages. https://eapa.org/download/15517/

[32] European Asphalt Pavement Association (EAPA). Recommendations for Road Authorities to achieve circular economy goals through the re-use and recycling of asphalt. Technical Briefing (2022) 18 pages. https://eapa.org/download/15437/

[33] European Asphalt Pavement Association (EAPA). The use of secondary materials, by-products and waste in asphalt mixtures. Position Paper (2020) 10 pages. https://eapa.org/eapa-position-papers/

[34] European Asphalt Pavement Association (EAPA). Towards Net Zero - A Decarbonisation Roadmap for the Asphalt Industry (2024) 16 pages. https://eapa.org/towards-net-zero-view/



EAPA
Square de Meeûs 40
1040 Brussels – Belgium
www.eapa.org


eapa


eapa_org


eapa_org


eapa.org

September 2026