

# Balancing Transport Regulation and Sustainability: the Mobility Package's Environmental Impact

**Aurelijus Vaškys**  
Faculty of Civil Engineering  
Vilniaus kolegija  
Vilnius, Lithuania  
[a.vaskys@stf.viko.lt](mailto:a.vaskys@stf.viko.lt)

**Jurgita Ginavičienė**  
Faculty of Civil Engineering  
Vilniaus kolegija  
Vilnius, Lithuania  
[j.ginaviciene@stf.viko.lt](mailto:j.ginaviciene@stf.viko.lt)

**Jūratė Romeikienė**  
Faculty of Civil Engineering  
Vilniaus kolegija  
Vilnius, Lithuania  
[j.romeikiene@stf.viko.lt](mailto:j.romeikiene@stf.viko.lt)

**Abstract** – The European Union's Mobility Package was introduced to improve road transport regulation but has generated significant debate due to its economic, legal, and environmental implications. One of its most controversial provisions is the requirement for trucks to return to their home base every eight weeks. While intended to ensure fair competition, this rule has led to an increase in empty runs, resulting in higher CO<sub>2</sub> emissions and operational inefficiencies. The study evaluates this regulation by integrating a legal analysis of the European Court of Justice ruling, a review of EU environmental laws, and a statistical analysis of road freight data. The findings indicate that, rather than enhancing sustainability, the return obligation contradicts the EU's Green Deal and Fit for 55 objectives by increasing emissions and congestion. Statistical data reveals that empty mileage rose from 20% in 2020 to 21.8% in 2023, with national transport (25.9%) experiencing greater inefficiencies than international transport (13.1%). The ECJ annulled the provision due to its disproportionate economic and environmental impact and lack of impact studies carried out before new regulations are adopted (further ex-ante assessments). The study concludes that future transport policies should prioritize reducing empty runs, ensuring compliance with EU primary law, and conducting ex-ante regulatory assessments to align economic and environmental priorities effectively.

**Key words** – Mobility package, empty run, EU transport policy, sustainability

## I. INTRODUCTION

The European Union (EU) introduced the Mobility Package to enhance road transport efficiency, improve drivers' working conditions, and promote environmental sustainability. One of its most debated provisions is the requirement for trucks to return to their home base every

eight weeks. While intended to combat unfair competition and prevent "letterbox companies" firms registered in low-cost jurisdictions while operating elsewhere - the rule has had unintended consequences, particularly in terms of environmental impact. Several studies [1], [2], [3], [4], [5] argue that this measure increases empty vehicle kilometers, raising CO<sub>2</sub> emissions, operational costs, and inefficiencies in freight logistics. Others maintain that the provision ensures fairness in the EU transport market by preventing companies from exploiting regulatory loopholes [6], [7], [8].

The Mobility Package has also been criticized for contradicting the EU's Green Deal objectives, which aim for climate neutrality by 2050 [9]. Research suggests that the regulation inadvertently increases road transport emissions as trucks are forced to return without cargo [10], [11]. The European Commission acknowledges that transport accounts for 25% of total EU greenhouse gas emissions and emphasizes the need for sustainable transport solutions [10]. However, the return obligation appears to conflict with these sustainability goals.

This study examines the impact of the Mobility Package's vehicle return requirement on empty runs in EU road transport and analyzes the primary motives behind its annulment by the European Court of Justice (ECJ) [12]. By integrating legal analysis, statistical data analysis, and environmental evaluations, this research provides a critical perspective on EU transport regulations. It is important to carry out thorough impact assessments before introducing new rules to make sure that future policies balance economic, legal, and environmental priorities effectively.

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## II. MATERIALS AND METHODS

The EU Mobility Package, adopted in 2020, introduced regulations to improve road safety, enhance drivers' working conditions and ensure fair competition. Key provisions include updated tachograph requirements for monitoring driving hours [13], market access regulations to prevent unfair competition [14], and electronic transport information systems to reduce administrative burdens in cross-border logistics [15]. The Posting of Drivers Directive clarifies wage and working conditions for international truck drivers [16].

However, one of the most controversial measures is requiring trucks to return to their home base every eight weeks. While aimed at fair competition and driver welfare, critics argue it contradicts EU climate goals by increasing emissions. The European Commission says, "Transport accounts for a quarter of the EU's greenhouse gas emissions and is still growing. To achieve climate neutrality, a 90% reduction in transport emissions is needed by 2050" [9].

"Recipients of European legislation are usually the Member States. According to Article 258 of the Treaty on the Functioning of the European Union (TFEU), the Member States and their central governments are responsible for ensuring compliance with EU law" [17]. This provision highlights that compliance with EU law is a fundamental obligation of Member States, requiring them to ensure adherence at all levels of government. However, in this case, the Mobility Package rules are compulsory for Member States despite possible objections to the Green Deal.

The EU's environmental policy framework is built on fundamental principles such as sustainability, integration and the precautionary approach, guiding legislative actions across various sectors, including transport [18].

The EU's commitment to environmental sustainability is enshrined in its founding treaties, which mandate "competitive economy and sustainable development" [19].

The European Climate Law sets a legally binding framework for climate neutrality by 2050, including a 55% reduction in greenhouse gas emissions by 2030 (compared to 1990). The Fit for 55 package supports these goals by reinforcing CO<sub>2</sub> limits for vehicles, advancing alternative fuel infrastructure, and updating energy taxation [20].

The efficient and green mobility promotes rail transport investment, zero-emission urban mobility, and decarbonized public transport. The EU's Political Guidelines for 2024-2029 reaffirm these goals: "We will scale up investment in clean energy infrastructure, including renewables, low-carbon technologies, and CO<sub>2</sub> transport infrastructure" [21]. The EU also emphasizes digitalization in transport to enhance efficiency and reduce emissions [22].

The EU Green Deal and Fit for 55 provide a decarbonization roadmap. However, achieving success depends heavily on active stakeholder engagement. The Political Guidelines for 2024-2029 acknowledge: "We

must and will stay the course on the European Green Deal but also listen and respond to partners impacted by EU legislation" [21].

The 2011 European Commission White Paper on Transport aims to shift freight from road to energy-efficient rail and waterways, stating: "30% of road freight over 300 km should shift to rail or waterborne transport by 2030, and more than 50% by 2050" [23]. This target underscores the EU's commitment to reducing carbon emissions and improving logistics sustainability.

"Scientists and institutions that have analyzed and conducted research on the Mobility Package often emphasize the possible negative consequences not only for the sustainable development of the transport sector but also for the performance of companies. Business representatives also point out that the Mobility Package leads to increased distances travelled by road vehicles, additional costs and time costs" [3]. These findings indicate that while the Mobility Package aims to regulate the transport sector, its implementation may create challenges.

Although the Mobility Package aims to enhance drivers' working conditions and promote fair competition, its environmental repercussions contradict the EU's sustainability objectives. "More poorly utilized homecoming trips will reduce the overall efficiency and capacity of the truck transport system, with ensuing needs for more trucks, more drivers, and more congestion and negative environmental impact" [2].

Botyrius [1] examined the broader effects of the Mobility Package and highlighted the contradiction in policy objectives: "This is at odds with the EU's Green Deal plans, which aim to make the EU climate neutral by 2050." The provision intended to improve drivers' safety and working conditions inadvertently reduces the effectiveness of the Green Deal by perpetuating reliance on high-emission transport. The environmental impact of the Mobility Package is profound, as it may result in millions of tons of additional CO<sub>2</sub> emissions [2].

The political response to the Mobility Package has been divided mainly between Western and Eastern European countries. Countries like Germany and France support the package, arguing that it ensures fair competition and protects drivers' rights. However, Eastern European countries, such as Lithuania and Poland, say that the rules disproportionately burden their transport sectors. Study have shown that "the biggest negative impacts are projected for Eastern European transport companies, which are responsible for the bulk of international, cabotage, and cross-border transport" [3].

Lithuanian haulers, in particular, have criticized the package for creating a "discriminatory" burden that favors Western EU companies, which are better positioned to absorb compliance costs. "It creates different conditions for haulers from different EU Member States" [4].

Advocate General Giovanni Pitruzzella's Opinion, delivered on Nov. 14, 2023, reinforced this ruling. He

argued that the measure disproportionately burdened transport operators, particularly in peripheral Member States such as Lithuania, Bulgaria, and Romania, restricting their competitiveness in the EU market [24]. Additionally, he highlighted the absence impact assessment, raising concerns about the rule's legal validity and the transparency of the legislative process. Pitruzzella's Opinion further reinforced the ECJ's ruling. He argued that:

- The absence of an adequate study evaluating the return obligation's impact on competition, operational costs and the environment raises concerns about its legal validity [24].
- The EU legislature has not demonstrated why a less restrictive alternative, such as increased monitoring of letterbox companies, would not have been sufficient to achieve the same objectives [24].

His Opinion reflects broader concerns regarding regulatory overreach. The lack of alternative measures, such as targeted enforcement against fraudulent transport companies, suggests a failure of regulatory imagination. Instead of imposing a broad obligation on all transport operators, a more tailored, risk-based regulatory approach could have been pursued.

### III. RESULTS AND DISCUSSION

#### A. Conflicts Between the Mobility Package and EU Sustainability Goals

The Table 1 summarizes discernible contradictions between EU environmental legislation, primary treaty provisions, and sustainability policies, highlighting how the Mobility Package may conflict with the EU's climate and mobility goals.

TABLE 1 ENVIRONMENTAL LAWS ANALYSIS

Key Insights	Potential contradictions
Conflict with EU Climate Goals	The European Climate Law and Fit for 55 package aim to reduce greenhouse gas emissions by 55% by 2030 and achieve climate neutrality by 2050. [20]. However, the Mobility Package's vehicle return obligation could increase CO <sub>2</sub> emissions by forcing empty truck trips, contradicting these targets.
Contradiction with the "Green Deal"	The EU's "Green deal Vision" promotes alternative transport and zero-emission mobility. [9]. Mobility Package continues to favor road transport, increasing reliance on high-emission freight instead of encouraging a shift to sustainable alternatives.
Inconsistency with Stakeholder Centric Policy	The EU's Political Guidelines stress the importance of adapting regulations based on stakeholder feedback, particularly concerning the Green Deal. [21]. However, the rigid structure of the Mobility Package does not sufficiently account for the concerns of affected transport operators.

#### B. Empty Runnings of Road Freight Vehicles: No Signs of Reduction

The regulation mandating the return of vehicles to their home base every eight weeks has sparked debates about its environmental impact. Several studies emphasize the unintended consequences of this measure, particularly its contribution to increased carbon emissions and empty running of road freight vehicles. "This rule is expected to reduce market capacity as vehicles will be required to return to their home countries and might be forced to run on empty during their returning journeys" [5].

"Looking at the impact of the Mobility Package on additional journeys, in 2023, the number of journeys made by trucks could increase from 1,1 % to 2 %, or from 1016,000 to 1915,000 additional trips. When analyzing the Mobility Package's impact according to the Member States' geographical location, it should be noted that the most negative impact is projected for Eastern European transport companies" [3].

In addition, the forced return of vehicles, especially from peripheral countries, results in numerous empty journeys, significantly increasing fuel consumption and emissions.

Empty runs, or the movement of freight vehicles without cargo, remain a significant issue in the EU road transport sector. According to Eurostat, around one-fifth of total road freight vehicle-kilometers in the EU were carried out by empty vehicles in both 2020 and 2023 [25].

The data on road transport carried out by empty vehicles, categorized by type of operation in 2020 and 2023, is presented in Fig. 1.

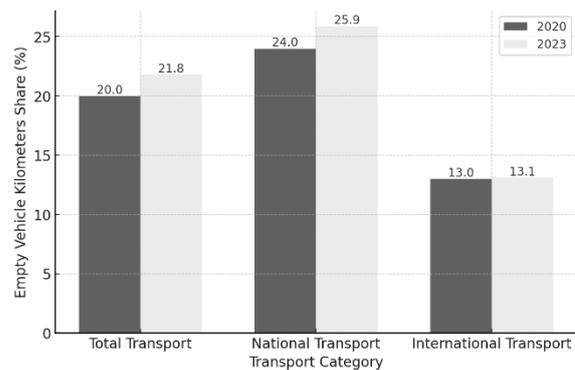


Fig. 1. Road transport performed by empty vehicle by type of operation in 2020 and 2023

According to Fig. 1, the share of empty vehicle kilometers in total road freight transport increased from 20 % in 2020 to 21,8 % in 2023. This rise was primarily driven by national transport, where the percentage of empty trips grew from 24 % to 25,9 % over the same period. In contrast, international transport remained relatively stable, with only a minor increase from 13 % in 2020 to 13,1 % in 2023.

The EU aims to reduce empty runs (or empty mileage, where trucks travel without cargo) as part of its

sustainability and efficiency goals in logistics and transport. The analysis of statistics from 2020 onward shows that no reduction has been achieved. Instead, the share of empty vehicle kilometers has remained stable or even increased.

Country-level data (Fig. 2) highlights disparities in empty mileage across the EU. Countries like Ireland, Austria, and Luxembourg exhibit the highest shares, indicating inefficiencies in freight logistics. In contrast, Denmark and Portugal have relatively lower empty mileage, likely due to better route planning or stronger logistics networks.

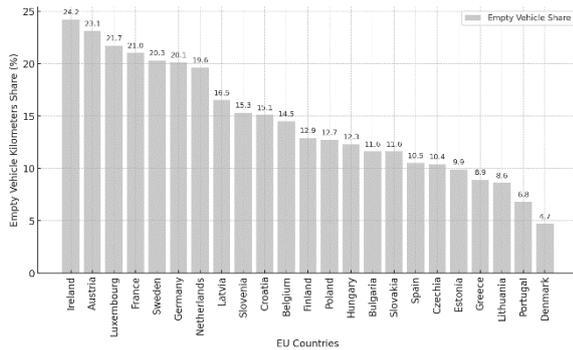


Fig. 2. Share of Empty Runs in International Road Transport by EU Countries in 2023

Reducing empty runs - particularly in national transport – through digital freight matching, multimodal transport investment, and optimized logistics hubs is crucial for enhancing efficiency and meeting the EU's Green Deal and Fit for 55 climate objectives.

### C. Environmental Impact Analysis of the Vehicle Return Provision

The assessment of the vehicle return obligation within the EU Mobility Package highlights significant negative environmental impacts, particularly due to the increase in road freight traffic. The study conducted by the European Commission's Directorate-General for Mobility and Transport found that the increased vehicle movements stemming from this rule would undermine EU climate targets, leading to increased CO<sub>2</sub> emissions, air pollution, and congestion [21].

According to the study, "the environmental impacts from the provision will be directly linked to the potential increase in traffic flows (in vehicle-kilometers)" [26]. The provision could result in up to 2,9 million tons of additional CO<sub>2</sub> emissions in 2023 under the simple market compliance scenario, representing "an increase of 4,6 % on the international road freight emissions in 2023 in the baseline" [26].

The International Road Transport Union (IRU) also highlighted concerns over the regulatory impact of the Vehicle Return Provision, emphasizing its potential to disrupt the road transport sector and exacerbate environmental challenges. [27].

Beyond CO<sub>2</sub> emissions, the report states that "costs of air pollution due to negative health effects and other

damages were estimated at EUR 25,9 million associated to an increase in NO<sub>x</sub> and PM<sub>2.5</sub> emissions in 2023 under the simple market compliance scenario" [26]. Under all market restructuring scenarios, these costs were estimated to range between EUR 4.5 million and EUR 25,9 million.

The provision would increase the distance heavy goods vehicles travel and cause major congestion at key transport hubs. The study estimates that the new provision could result in up to 2,5 million additional vehicle-kilometers in 2023, representing an increase of 4.8% in international road freight vehicle kilometers under simple market compliance [17]. This would significantly impact border crossings, especially between Eastern and Western Europe. For example, at Vidin – Calafat (Bulgaria-Romania), waiting times were projected to increase from 130 minutes to 282 minutes, and at Nadlac – Nagylak (Romania-Hungary), from 55 minutes to 162 minutes [26].

A major finding of the study was that the environmental costs of the provision were not compensated by any economic benefits. As noted in the report, "the negative impacts on the environment are not compensated by any additional benefits from trade as the volume of cargo transported by freight is expected to remain unchanged compared to the baseline (i.e., business-as-usual case in 2023)" [26].

TABLE 2 ENVIRONMENTAL IMPACT ANALYSIS

Impact Category	Key Findings
CO <sub>2</sub> Emissions Increase	Up to 2,9 million tons of additional CO <sub>2</sub> emissions in 2023 (4.6% increase in international road freight emissions, in case of simple market compliance). All market restructuring scenarios result in 0,5 to 2,9 million tons additional CO <sub>2</sub> emissions (0,8 % - 4,6 % increase). [26].
NO <sub>x</sub> and PM <sub>2.5</sub> Emissions Increase	EUR 25.9 million in air pollution costs due to increase NO <sub>x</sub> and PM <sub>2.5</sub> emissions in 2023 under the simple compliance scenario. All market restructuring scenarios estimated costs range from EUR 4,5 million to EUR 25,9 million. [26].
Increased of Additional Vehicle-kilometers	2,5 million additional vehicle-kilometers (4,8 % increase in international road freight) under the simple compliance scenario. All market restructuring scenarios result in 0,4 million to 2,5 million additional vehicle-kilometers. [26].

The table 2 highlights the negative environmental impacts of the vehicle return obligation, including increased CO<sub>2</sub> emissions (up to 2,9 million tons), higher air pollution costs (EUR 25,9 million), and worsening congestion at key transport hubs. Additionally, it emphasizes that these negative effects are not offset by any trade benefits, making the provision environmentally and economically inefficient.

### D. Legal Assessment of the ECJ Decision on the Return of the Vehicle Rule

The ECJ annulled point 3 of Article 1 of Regulation 2020/1055, which introduced paragraph 1(b) in Article 5 of Regulation No 1071/2009. This provision mandated

that vehicles engaged in international transport return to an operational center in their Member State of the establishment at least once every eight weeks. The ECJ ruled that the measure violated the principle of proportionality, lacked sufficient justification and conflicted with EU environmental policies [12].

General Advocate Giovanni Pitruzzella's Opinion, delivered on November 14, 2023, played a crucial role in the ECJ reasoning. He argued that the rule imposed disproportionate economic and environmental burdens on transport operators and that the EU legislature failed to justify its necessity [24].

ECJ's legal assessment of the provision was based on three primary considerations: 1) Lack of an adequate impact assessment. The ECJ concluded that the European Parliament and Council had not thoroughly assessed the economic, environmental and operational impacts of the vehicle return obligation. 2) The EU legislature did not sufficiently evaluate the measure's consequences, particularly its impact on the single market, competition and the environment [12]. 3) The obligation was introduced late in the legislative process without adequate analysis or consultation with affected stakeholders [12].

From a legal perspective, the failure to conduct a comprehensive ex-ante assessment before implementing a restrictive provision raises concerns about legislative transparency.

Disproportionate Burden on Peripheral and Smaller Member States. It was acknowledged that the return of the vehicle rule disproportionately affected transport companies based in peripheral EU Member States, such as Lithuania, Bulgaria, Romania and Malta. These businesses argued that the measure imposes significant operational costs, limits their ability to compete in central and western European markets and creates an unfair competitive disadvantage [12].

This finding matches concerns from industry groups, who say that uniform rules unfairly harm transport companies from Eastern European countries. The ruling highlights an ongoing structural problem in EU policymaking - the tendency to favor larger, centrally located economies at the expense of smaller or peripheral ones.

The ECJ also focused on the environmental impact of the rule. The return obligation would increase empty trips, fuel consumption and CO<sub>2</sub> emissions, contradicting the EU's Green Deal objectives. The ECJ cited evidence showing:

"According to the Republic of Poland's assessments, the additional empty runs imposed by the obligation for vehicles to return, applicable to the Polish vehicle fleet of over 2.5 tones active in international transport, generate 672,024 tones of CO<sub>2</sub>" [12].

"The European Commission's study estimated that compulsory vehicle returns "would generate up to 100,000 additional tones of CO<sub>2</sub> emissions per year" [12].

The ECJ ultimately determined that the rule exceeded what was necessary to achieve its objectives, violating the principle of proportionality under Article 5(4) TEU: The measure imposes excessive restrictions on transport operators without demonstrating that less restrictive alternatives were considered [12].

ECJ annulled the return of the vehicle rule, given these considerations.

This case highlights a fundamental tension in EU transport policy - how to balance market regulation with economic freedom. The annulment of the rule suggests a growing judicial skepticism toward restrictive regulations that disproportionately harm specific Member States. Based on the analysis, future actions of EU institutions should focus on (authors' insights):

- Conduct thorough ex-ante impact assessments before implementing restrictive transport rules.
- Align economic regulations with environmental priorities to ensure internal consistency in EU law.
- Ensure Compliance with EU Primary Law to Prevent Institutional Overreach in Decision-Making.

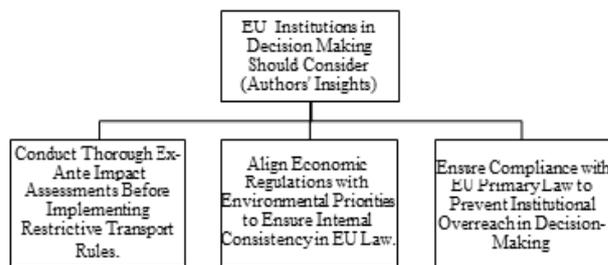


Fig. 3. EU Regulatory Strategies: Authors' Insight on Balancing Economy and Environment.

Fig. 3 illustrates a holistic regulatory strategy that integrating environmental sustainability into economic policies.

The ECJ's annulment of the return of the vehicle rule highlights the importance of proportionality, economic fairness and environmental policy coherence in EU law. Advocate General Pitruzzella's Opinion provided an additional layer of scrutiny, reinforcing concerns about overreach and lack of justification.

According to the authors, this case sets an important precedent for future EU transport regulations, emphasizing that:

EU policymakers must base regulatory measures on empirical evidence and comprehensive impact assessments.

Legislation should not disproportionately burden businesses from specific Member States.

#### IV. CONCLUSIONS

The EU Mobility Package's vehicle return requirement conflicts with the Green Deal, Fit for 55 objectives, and climate neutrality goals by increasing road freight emissions. The ECJ annulled the provision due to its disproportionate economic and environmental impact and lack of an ex-ante impact assessment.

Despite efforts to reduce empty runs, data shows an increase from 20% in 2020 to 21.8% in 2023, with national transport (25.9%) more affected than international transport (13.1%). This indicates that the policy has failed to improve transport efficiency and instead worsened logistical inefficiencies.

The environmental impact is significant. In 2023, CO<sub>2</sub> emissions possibly increased by up to 2.9 million tons, contributing to a 4.6% rise in international road freight emissions. Air pollution costs from NO<sub>x</sub> and PM<sub>2.5</sub> emissions may have reached EUR 25.9 million, while additional freight transport potentially added 2.5 million extra vehicle kilometers, further exacerbating fuel consumption, congestion, and emissions.

The research findings highlight both practical and theoretical implications for EU transport policy. Practically, ex-ante impact assessments are essential to prevent unintended economic and environmental consequences, ensuring that future regulations align with sustainability goals. Reducing empty runs is a key priority for improving freight efficiency and lowering emissions. Theoretically, the study underscores the importance of compliance with EU primary law to maintain regulatory proportionality and prevent institutional overreach. A data-driven, evidence-based approach is necessary to develop transport policies that balance economic efficiency, legal consistency, and environmental sustainability.

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