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Directorate-General for Mobility and Transport

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Evaluation of the White Paper 'Roadmap to a single European transport area–towards a competitive and resource efficient transport system'

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1 INTRODUCTION

1.1 Purpose of the evaluation

The purpose of the evaluation is to provide a robust evidence-based assessment of the 2011 White Paper and the actions following from it since its adoption in 2011. It should examine the effectiveness, efficiency, coherence, relevance and EU added value of the 2011 White Paper in line with the Better Regulation Guidelines.

The evaluation looks at the identified needs for transport policy, the objectives and goals set, the proposed initiatives, reached outcomes and their results, as well as the overall impact of the strategy since it was put in place.

1.2 Scope of the evaluation

The evaluation covers all areas and aims of the White Paper and all actions associated with its implementation. It includes the period since its adoption in 2011 and until the end of 2018 and examines any possible effects up to 2050. The geographical scope of the analysis is the EU although possible impacts of actions that go beyond the EU borders need to be considered.

2 BACKGROUND TO THE INITIATIVE

2.1 Description of the initiative and its objectives

2.1.1 Background to the adoption of the White Paper

The "White Paper on transport – Roadmap to a single European transport area" that was published in 2011 sought to define a vision for a competitive and sustainable European transport system, and thus set a framework for the necessary short to medium-term actions to guide the development of EU transport policy to meet long-term objectives.

2.1.2 The 2011 White Paper vision

The 2011 White Paper set the vision for the future development of the EU transport system. It identified four broad areas:

1. Under **'Growing transport and supporting mobility while reaching a 60% emission reduction target',** it was stated that curbing mobility was not a viable option. It noted that reducing the dependence on oil without sacrificing efficiency or compromising mobility was going to be a particular challenge, but one that was necessary to face if to reduce GHG emissions.

   The White Paper argued for a change in transport patterns so that the majority of travel would be performed using the most efficient transport option and that personal transport was used only for the final mile of a journey and was undertaken using clean vehicles.

   In order to improve the efficiency of transport, it called for the implementation of improved traffic and transport management systems (e.g. intelligent transport systems (ITS) for road transport, Single European Sky air traffic management research (SESAR), European railway traffic management system (ERTMS)).

2. In the context of delivering **'An efficient core network for multimodal intercity travel and transport',** it was noted that EU action can have most immediate impact on intermediate journey distances, where new technologies were less mature (e.g.

as a result of the limited range of electric vehicles) and where modal choices were more restricted than in cities.

The White Paper underlined that improved vehicle technologies were not sufficient to solve the problems of either emissions or congestion. Therefore, the increased use of other modes was needed, e.g. buses, coaches and trains for passenger transport, along with multimodal solutions using rail and waterways for freight transport. A greater integration of the modal networks, together with improved online information, booking and payment systems covering all modes, would facilitate better modal choices.

It was also acknowledged that, for short and medium distances (i.e. below 300 km), freight transport would continue to rely heavily on road transport; therefore, there was a need to improve the fuel efficiency of trucks. For longer distance freight transport, it called for the development of efficient freight corridors, which allowed the use of multimodal transport to minimise energy use and emissions. It noted that significant investment was required in long-distance rail networks to allow them to compete effectively with road, especially for freight transport, while improved seaports and inland waterways were also needed.

3. Under **'A global level-playing field for long-distance travel and intercontinental freight'**, the White Paper noted that there was a need to improve the efficiency of aircraft and air traffic management. Airport capacity needed to be optimised and increased to meet the growing demand for travel. The EU aviation industry was expected to be a frontrunner in the development of alternative low-carbon fuels to meet the 2050 target.

   With respect to maritime transport, the White Paper noted that the EU should work with the International Maritime Organisation (IMO) and other international organisations to improve standards for safety, environmental protection and working conditions, as well as to eliminate piracy.

4. Finally, in the context of promoting **'Clean urban transport and commuting',** the White Paper argued that there was a need for a gradual phasing out of conventionally fuelled vehicles, while switching to other transport modes, including walking and cycling, was also needed to reduce congestion and improve safety. The increased use of public transport would enable the density and frequency of services to be increased, thus improving the overall level of service offered to the travelling public. Walking and cycling options should be considered to be an integral part of urban mobility and infrastructure planning.

   The White Paper noted that to reduce environmental impacts and congestion, improvements were required to the interfaces between long-distance freight transport and last-mile delivery. The introduction of ITS was also expected to contribute to reducing the impacts of urban freight transport.

The White Paper translated this vision into ten goals (headline goals) as set out in

Table **2-1**

Table 2-1: Ten goals (headline goals) for transport identified in the 2011 White Paper

Develop and deploy new and sustainable fuels and propulsion systems	
1	(1) Halve the use of 'conventionally-fuelled' cars in urban transport by 2030; phase them out in cities by 2050; achieve essentially CO_2-free city logistics in major urban centres by 2030.
2	(2) Low-carbon sustainable fuels in aviation to reach 40% by 2050; also, by 2050 reduce EU CO_2 emissions from maritime bunker fuels by 40% (if feasible 50%).
Optimise the performance of multimodal logistic chains, including by making greater use of more energy-efficient modes	
3	(3) 30% of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050, facilitated by efficient and green freight corridors. To meet this goal will also require appropriate infrastructure to be developed.
4	(4) By 2050, complete a European high-speed rail network. Triple the length of the existing high-speed rail network by 2030 and maintain a dense railway network in all Member States. By 2050 the majority of medium-distance passenger transport should go by rail.
5	(5) A fully functional and EU-wide multimodal TEN-T 'core network' by 2030, with a high quality and capacity network by 2050 and a corresponding set of information services.
6	(6) By 2050, connect all core network airports to the rail network, preferably high-speed; ensure that all core seaports are sufficiently connected to the rail freight and, where possible, inland waterway system.
Increase the efficiency of transport and of infrastructure use with information systems and market-based incentives	
7	(7) Deployment of the modernised air traffic management infrastructure (SESAR) in Europe by 2020 and completion of the European Common Aviation Area. Deployment of equivalent land and waterborne transport management systems (ERTMS, ITS, SSN and LRIT, RIS). Deployment of the European Global Navigation Satellite System (Galileo).
8	By 2020, establish the framework for a European multimodal transport information, management and payment system.
9	By 2050, move close to zero fatalities in road transport. In line with this goal, the EU aims at halving road casualties by 2020. Make sure that the EU is a world leader in safety and security of transport in all modes of transport.
10	Move towards full application of "user pays" and "polluter pays" principles and private sector engagement to eliminate distortions, including harmful subsidies, generate revenues and ensure financing for future transport investments.

2.1.3 Objectives of the White Paper

The White Paper and the associated supporting Staff Working Document (European Commission, 2011b) do not provide an explicit statement of the objectives. These have been derived from the described vision also taking into account the objectives identified in the Impact Assessment accompanying the White Paper (SEC(2011)358) (European Commission, 2011a). These are summarised in Table 2-2 below.

The **general objective** reflects the overall role of the White Paper as a strategy document for the EU's transport policy and whose main purpose is to develop a transport system that meets the needs and aspirations of people while minimising undesirable impacts.

At the level of the **specific objectives** there are three main objectives that reflect the main issues that had been identified in the White Paper (the need to reduce GHG emissions from transport by 60% relative to 1990 levels by 2050; to drastically reduce oil dependency; and to limit the growth of congestion). At the same time, from the general objective and the goals of the EU transport policy, we can also derive additional specific objectives that concern the accessibility, equity, quality and provision of transport services and the minimisation of the external costs.

Finally, in line also with Terms of Reference of the study, the ten headline goals presented in

Table **2-1** are, for the purpose of this evaluation study, considered **as the operational objectives** of the White Paper. They mainly reflect the three initial specific objectives but are also relevant for the additional derived specific objectives.

Table 2-2: Summary of White Paper objectives

Objective level	Definition
General objective	Define a long-term strategy that would help the EU transport system achieve the overall goal of the Common Transport Policy, namely to: • Provide current and future generations with access to safe, secure, reliable and affordable mobility resources to meet their own needs and aspirations • Minimise undesirable impacts such as congestion, accidents, air and noise pollution, and climate change effects
Specific objectives	1) Reduce transport-related emissions of CO2 by around 60% by 2050 compared to 1990 2) Achieve drastic decrease in the oil dependency ratio of transport-related activities by 2050 3) Limit the growth of congestion 4) Allow the basic access and the development of mobility needs of individuals and companies 5) Promote equity within and between successive generations 6) Offer safe, secure and reliable transport services of high quality 7) Ensure that transport services are affordable, operate fairly and efficiently, offer a choice of transport mode, promote high quality employment 8) Minimise the external costs of accidents, noise and air pollution, biodiversity loss and increased land use
Operational objectives	1. Halve the use of 'conventionally-fuelled' cars in urban transport by 2030; phase them out in cities by 2050; achieve essentially CO2-free city logistics in major urban centres by 2030. 2. Low-carbon sustainable fuels in aviation to reach 40% by 2050; by 2050 reduce EU CO2 emissions from maritime bunker fuels by 40% (if feasible 50%). 3. 30% of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050, facilitated by efficient and green freight corridors. To meet this goal will also require appropriate infrastructure to be developed. 4. By 2050, complete a European high-speed rail network. Triple the length of the existing high-speed rail network by 2030 and maintain a dense railway network in all Member States. By 2050 the majority of medium-distance passenger transport should go by rail. 5. A fully functional and EU-wide multimodal TEN-T 'core network' by 2030, with a high quality and capacity network by 2050 and a corresponding set of information services. 6. By 2050, connect all core network airports to the rail network, preferably high-speed; ensure that all core seaports are sufficiently connected to the rail freight and, where possible, inland waterway system. 7. Deployment of the modernised air traffic management infrastructure (SESAR) in Europe by 2020 and completion of the European Common Aviation Area. Deployment of equivalent land

Objective level	Definition
	and waterborne transport management systems (ERTMS, ITS, SSN and LRIT, RIS). Deployment of the European Global Navigation Satellite System (Galileo). 8. By 2020, establish the framework for a European multimodal transport information, management and payment system. 9. By 2050, move close to zero fatalities in road transport. In line with this goal, the EU aims at halving road casualties by 2020. Make sure that the EU is a world leader in safety and security of transport in all modes of transport. 10. Move towards full application of "user pays" and "polluter pays" principles and private sector engagement to eliminate distortions, including harmful subsidies. Generate revenues and ensure financing for future transport investments

2.1.4 Delivering the plan

To deliver on this vision and achieve the headline goals, the White Paper set out **a ten year strategy** covering **four main (strategic) areas of intervention.** It was structured **around 12 thematic areas (pillars)** and **40 specific Action Points** (or "initiatives" in the terminology used in Annex I of the White Paper[1]). In many of the action points a number of initiatives were identified at that time (total of 132). The following paragraphs provide an overview of the work plan along the four strategic areas of intervention.

First strategic area - An efficient and integrated mobility system

The first part of the strategy focused on the creation of '**An efficient and integrated mobility system**. This included actions and measures in **five thematic areas** (pillars) focusing on the further development and/or completion of the internal market for transport services, across all transport modes, to ensure market access and remove existing obstacles. This was to be implemented in parallel with actions intended to ensure high quality jobs and working conditions focusing on the promotion of a social agenda. It also included actions intended to strengthen the security and safety of the transport system and reduce fatalities. Finally, it included measures intended to improve the quality, accessibility and reliability of transport services, including action to further strengthen passengers' rights, promote seamless mobility, and plans to minimise disruption.

Most of the action taken in this strategic area is primarily linked with the objective of developing a transport system that meets the needs of individuals and business (i.e. by covering aspects related to the openness of the transport services market and issues of access, quality, security and safety of transport services). Through improving the efficiency of the transport system, these actions can be expected to also contribute to the three main objectives related to CO_2 emissions, oil consumption and congestion.

[1] To avoid any confusion, we will use the term Action Points to refer to these 40 areas of intervention.

Table 2-3: Strategic pillars and action points under the first strategic area of the White Paper (An efficient and integrated mobility system)

Strategic pillars	Action points
1.1 A single European transport area	1. A true internal market for rail services
	2. Completion of the Single European Sky
	3. Capacity and quality of airports
	4. A maritime "Blue Belt" and market access to ports
	5. A suitable framework for inland navigation
	6. Road freight
	7. Multimodal transport of goods: e-Freight
1.2. Promoting quality jobs and working conditions	8. Social code for mobile road transport workers
	9. A Social Agenda for maritime transport
	10. A socially responsible aviation sector
	11. An evaluation of the EU approach to jobs and working conditions across transport modes
1.3 Secure transport	12. Cargo security
	13. High levels of passenger security with minimum hassle
	14. Land transport security
	15. 'End-to-end' security
1.4. Acting on transport safety: saving thousands of lives	16. Towards a 'zero-vision' on road safety
	17. A European strategy for civil aviation safety
	18. Safer shipping
	19. Rail safety
1.5. Service quality and reliability	21. Passengers' rights
	22. Seamless door-to-door mobility
	23. Mobility Continuity Plans

Second strategic area - Innovating for the Future – technology and behaviour

There were three pillars in the second part of the strategy on 'Innovating for the Future – technology and behaviour'.

- In relation to 'technology', the focus was on developing a transport research, innovation and deployment strategy to support the technological innovation that was needed for the transport system, as well as on the development of smart mobility systems and the development of an appropriate regulatory framework to support the adoption of new technologies.
- In relation to 'behaviour', the focus of the strategy was on supporting and facilitating more sustainable travel behaviour through the use of tools that would inform consumer and passenger behaviour (labelling, carbon footprint) and support better planning (e.g. travel information).
- The third pillar focused specifically on the urban dimension of transport, including actions and measures (such as urban mobility plans, urban charging schemes) intended to support and promote sustainable urban mobility and a strategy for a gradual move to net-zero emission urban logistics.

Actions in this strategic area were more directly linked with the key objectives of the White Paper concerning the reduction of CO_2 emissions and the minimisation of the external costs and, less so, with aspects related to the operation of the transport system.

Table 2-4: Strategic pillars and action points under the second strategic area of the White Paper (Innovating for the future: technology and behaviour)

Strategic pillars	Action points
2.1. A European transport research and innovation policy	24. A technology roadmap
	25. An innovation and deployment strategy
	26. A regulatory framework for innovative transport
2.2. Promoting more sustainable behaviour	27. Travel information
	28. Vehicle labelling for CO_2 emissions and fuel efficiency
	29. Carbon footprint calculators
	30. Eco-driving and Speed limits
2.3. Integrated urban mobility	31. Urban mobility plans
	32. An EU framework for urban road user charging
	33. A strategy for near-'zero-emission urban logistics' 2030

Third strategic area - Modern infrastructure, smart pricing and funding

The third part of the strategy entitled 'Modern infrastructure, smart pricing and funding' had two distinct parts.

- The first part (Pillars 3.1 and 3.2), related to 'infrastructure' focused on the development of a European mobility network consisting of a core TEN-T network covering all modes of transport. This was to be supported by appropriate levels of funding from the EU, as well as other, public and private, sources with the aim of ensuring the appropriate framework to support investment in the development of the TEN-T network (including the deployment of ITS technologies to increase the efficiency of infrastructure).
- In relation to 'pricing' (which was to be developed in two phases), the focus was on ensuring the right level of pricing for all modes and avoiding distortions through *inter alia* the application of the 'polluter-pays' and 'user-pays' principle and, eventually, the internalisation of most of the external costs of transport.

Action in this area is much more directly linked with the key specific objectives of reducing CO_2 emissions, as well as the reduction of congestion. The last pillar is also directly linked with the objective to minimise the external costs of transport and, as a result, promote equity among generations.

Table 2-5: Strategic pillars and action points under the third strategic area of the White Paper (Modern infrastructure, smart pricing and funding)

Strategic pillars	Action points
3.1. Transport infrastructure: territorial cohesion and economic growth	34. A core network of strategic European infrastructure — A European mobility network
	35. Multimodal freight corridors for sustainable transport networks
	36. Ex ante project evaluation criteria
3.2. A coherent funding framework	37. A new funding framework for transport infrastructure
	38. Private sector engagement
3.3. Getting prices right and avoiding distortions	39. Smart pricing and taxation (Phases I + II)

Fourth strategic area – External dimension

The final part of the strategy recognised the international nature of much of transport, particularly of aviation and maritime transport. As such, actions in this area called for an active engagement with relevant international organisations, as well as with the EU's immediate neighbours. The actions envisaged cover a broad range of thematic areas and modes, and focus on promoting cooperation in order to address existing issues for the transport system (in terms of safety, security), to extend the application of internal market rules, and to establish agreements with third countries to ensure access to markets for the EU transport sector.

Action in this area is relevant across most of the objectives of the White Paper although, in many cases, any such contribution may be indirect or only complementary to the impact expected from the action points indicated earlier.

Table 2-6: Strategic pillars and action points under the fourth strategic area of the White Paper (External dimension)

Strategic areas and pillars	Action points
N/A	40. Transport in the world: the external dimension

2.1.5 Intervention logic diagram

On the basis of the needs, objectives, actions identified above, the intervention logic diagram has been developed (see Figure 2-1 and Figure 2-2 below) presenting the links between the key elements of the intervention and the respective evaluation criteria. It identifies the following:

- The **initial needs and issues** as identified in the White Paper at the time of its adoption. To these needs we have also added the **expected new needs and issues** as these have arisen from the technological, social and environmental developments and trends. These developments and trends include demographic changes (i.e. urbanisation and ageing populations), the emergence of the collaborative economy concept, connected and autonomous vehicles, digitalisation, changes to supply chains, alternative fuel technologies, new mobility patterns (such as increasing uptake of active travel and micro-mobility[2]) and increasing security threats.
- The **general, specific and operational objectives** of the White Paper. The general objective refers to the overall expected role of the transport system to satisfy the mobility needs while avoiding and minimising the negative consequences. The specific objectives include the three main objectives related to congestion, GHG emissions and oil dependency that reflect the pressing challenges as identified in the White Paper. In addition, they include the other five objectives concerning accessibility, equity, quality of services, provision and external costs to society that reflect the more general objectives of the EU transport policy. As indicated, we have identified the 10 headline goals as representing the operational objectives of the White Paper. However, we note that the 10 headline goals do not provide a full coverage of the corresponding specific objectives.
- The **envisaged actions** (in the form of the individual initiatives under each of the 40 action points of the White Paper) **and activities** (including regulatory measures, standards and guidelines, financial support instruments, studies/reports, social dialogue activities and other cooperation and information/knowledge exchange activities) to implement the White Paper and deliver the vision;
- The main **inputs** that refer to the financial and human resources allocated at the EU and national/regional level and by the different actors. These include: the European Commission and the national authorities involved in the implementation of the White Paper action points and initiatives and in the transport sector; and other stakeholders that may be involved in the implementation, or incur compliance and administrative costs, as a result of

[2] Refers to the use of very light vehicles such as electric scooters, electric skateboards, shared bicycles and electric pedal assisted, pedelec, bicycles.

some initiatives. The analysis of the inputs in comparison to the results were used to assess the efficiency of the White Paper.

- The **expected outcomes (outputs, results and impacts)** of the intervention. These include the immediate outputs arising from the 40 action points under the four thematic areas, the results related to the achievement of the headline goals, and the longer-term impacts which reflect the vision of the White Paper for a competitive and sustainable transport system. Outputs, results and impacts were assessed against the objectives as part of the analysis of effectiveness. Additional unintended or unexpected outcomes have also been captured as part of the evaluation (specifically Evaluation question 5).
- **The external factors and developments** that may have an influence on the objectives and/or the outcomes of the activities adopted, and against which were needed to assess the coherence of the White Paper. These include the EU policy documents adopted in relevant policy areas including the recently adopted "The European Green Deal" (COM(2019) 640), "A Clean Planet for all - A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy" (COM (2018) 773), and "A European Strategy for Low-Emission Mobility" (COM (2016) 501). It also includes other EU/national/international initiatives in specific fields related to mobility, climate, employment in the transport sector, taxation and sustainable development. In addition, there are the broader societal, technological and economic developments that may lead to changes to needs and the objectives (thus affecting the relevance) or that have implications to the effectiveness and efficiency of the White Paper initiatives.
- Finally, the diagram also illustrates that the assessment of the **EU added value** captured the specific role of the White Paper in achieving the results. In this case it reflected on the role of the White Paper – as an EU level intervention – in ensuring greater level of coherence and synergies and higher level of effectiveness and efficiency of the adopted actions in comparison to what would have been possible through actions at national or international level.

The diagram below (in two parts - Figure 2-1 and Figure 2-2) presents the intervention logic diagram of the initiative. Besides editing/presentation elements there are no changes to the content related to any of the needs/problems, objectives, activities, inputs and outcomes (outputs/results and impacts) from the diagram presented in the first interim report.

Figure 2-1: Intervention logic diagram – Part A

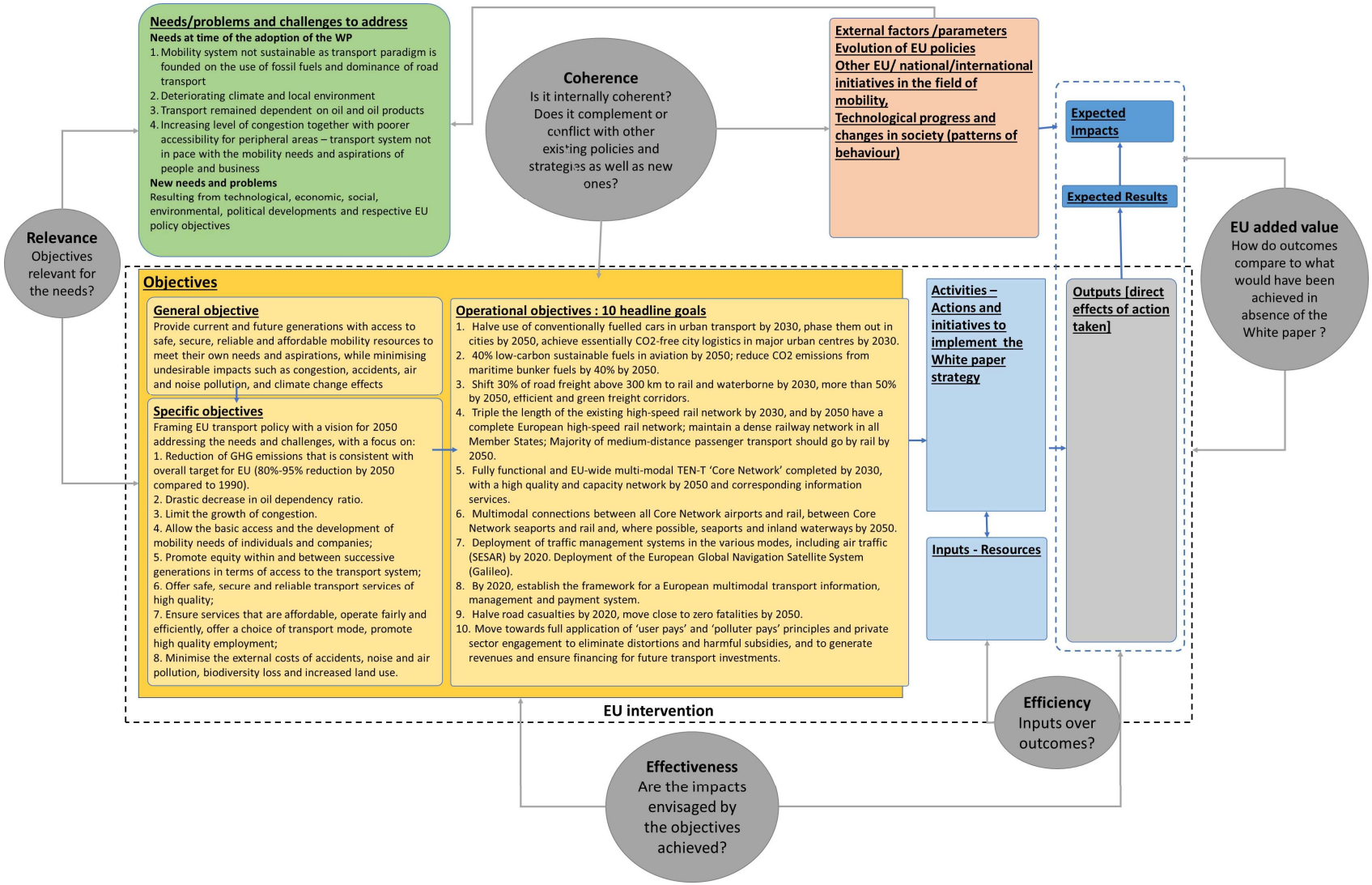
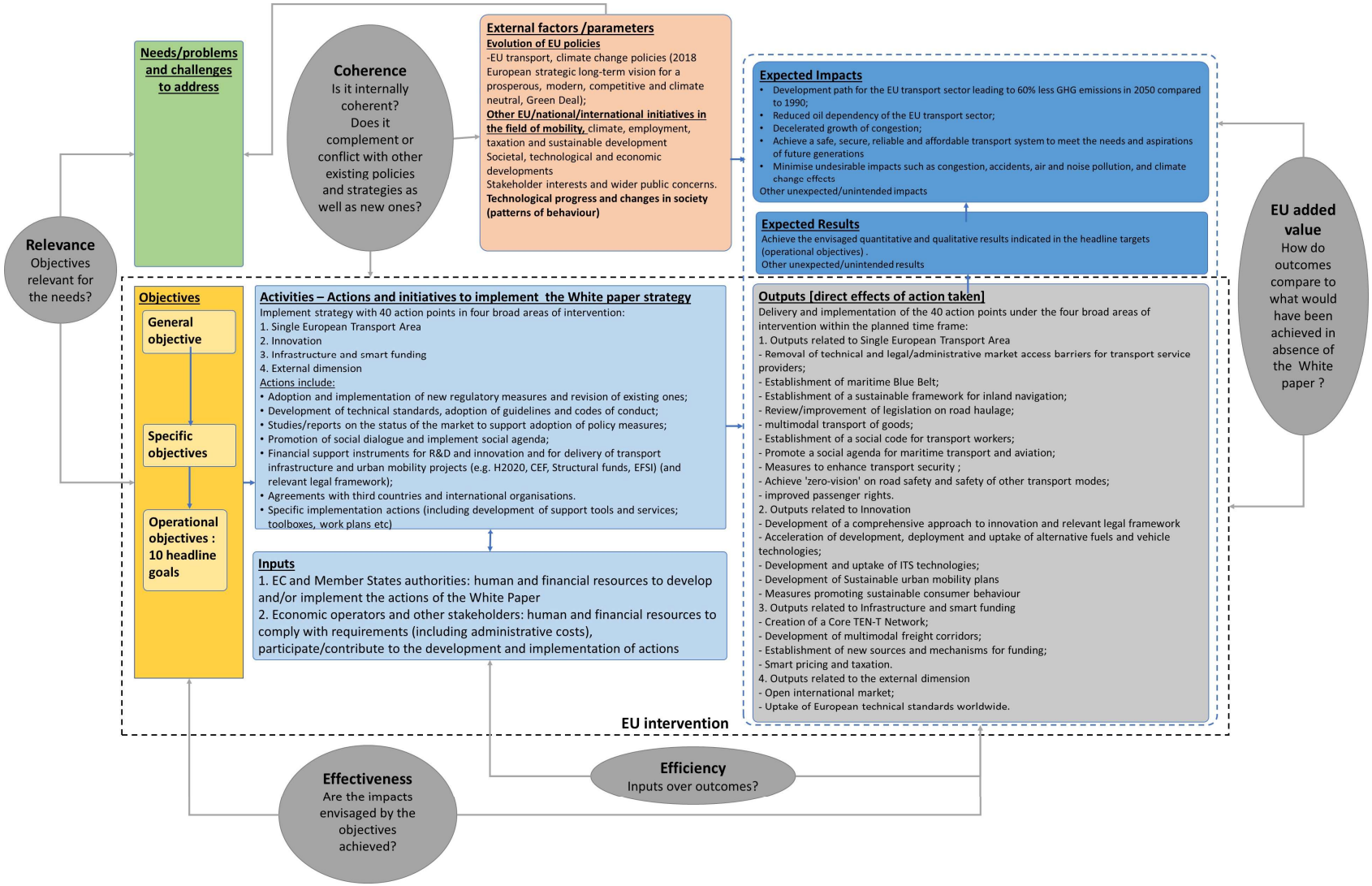


Figure 2-2: Intervention logic diagram – Part B



2.2 Baseline

In order to assess the contribution of the White Paper, it is important to define the Baseline scenario that will provide the benchmark against which we will measure the contribution of the interventions. For the needs of the White Paper evaluation, this includes:

- A description of how the problem and its underlying causes – as identified at the time of the adoption of the White Paper – is expected to evolve in the case of no policy action.
- A definition of the expected evolution of the relevant parameters of the transport system that reflects the key objectives of the White Paper. This presents in quantitative terms (or where not possible, in qualitative terms) the Baseline scenario, namely what would have happened if the policies and measures that are considered to have emerged as a result of the White Paper, were not in place.

For the purposes of this exercise, we have used desk research and modelling. More specifically:

- We analysed the Impact Assessment (IA) report that supported the development of the 2011 White Paper (European Commission, 2011a). We focused on the description of the problem, its underlying root causes and the expected evolution under the 'no policy change' scenario. Where relevant, we also incorporated input from the White Paper Staff Working Document (European Commission, 2011b). The analysis is presented in Section 2.2.2, where we present in qualitative terms the main aspects of the Baseline scenario.
- We used the PRIMES-TREMOVE model to quantify the Baseline. The quantitative analysis involves a number of key indicators covering economic, environmental and social aspects of the operation of the transport system and reflects the objectives of the White Paper. In Section 2.2.3, we provide an overview of the key results of the model runs for the two scenarios. As part of a quality check of the Baseline scenario results, we compared the Baseline scenario and the 'no policy change'[3] scenario (as presented in the Impact Assessment (IA) report of the White Paper), to identify areas where there are deviations between the two scenarios.

2.2.1 Definition of the problem at the time of the adoption of the White Paper

We have already presented the broader context and identified the issues and needs which were identified at the time of White Paper adoption. Despite the progress made in the EU transport system, there was no structural change in the way it operated. It was considered unsustainable, characterised by an ever-increasing level of CO_2 emissions, persistent oil dependency and high levels of congestion.

More specifically, three main problem areas were identified:

- The mobility of people and businesses remained unsustainable - CO_2 emissions from transport were growing.
- Transport remained extremely dependent upon oil and substitution with other energy carriers was negligible.

[3] Referred to as the Policy Option 1 scenario in the Impact Assessment study accompanying the White Paper in Transport, in 2011.

- Rising levels of congestion prevented the EU transport system from keeping pace with the mobility needs and aspirations of people and businesses.

The IA also identified four underlying root causes that prevented the EU transport system from developing into a sustainable system. They reflected various market and regulatory failures that existing policies had not effectively addressed:

1. **Inefficient pricing:** Most of the costs induced by transport activities (including the cost of infrastructure provision and maintenance) were not correctly reflected in the costs borne by transport users. As a result, demand for transport remained above its optimal level while the pricing system failed to steer transport demand towards the most efficient and sustainable mobility choices.

2. **Inadequate R&D policy:** Despite efforts and some progress, a range of market and regulatory failures hindered the fast development and deployment of key technologies for sustainable mobility. These included inappropriate research, path-dependency (e.g. continuous focus on fossil fuel-based vehicles) and a lack of sufficient coordination of efforts between the EU, Member States, public and private actors. From the demand side, the uptake of new technologies was still quite slow.

3. **Inefficient transport services:** The achievement of a single, integrated and efficient transport system was also delayed by regulatory and market barriers (e.g. barriers to market entrance, burdensome administrative procedures and protectionist regulations and attitudes). Different health, social, safety and security standards across the EU also lead to market fragmentation. Thus, with the possible exception of air transport, other transport modes suffer from different degrees of fragmentation at national borders and implementation of EU regulation was still ineffective. In addition, investments to modernise the rail network and transhipment facilities had not sufficiently addressed the bottlenecks in multimodal transport and modal networks continued to be poorly integrated.

4. **Lack of integrated transport planning:** Land-use planning or location decisions both at local level and at continental level by public authorities and companies, often did not take into account the consequences on the operation of the transport system as a whole. Local authorities often lacked the necessary capacity and EU policies had not effectively enabled them to develop appropriate policies to tackle congestion, pollution, and safety problems. In the case of the TEN-T Network, planning and implementation had so far not been driven sufficiently by a coherent European design. National infrastructure remained disconnected from planning at the EU level and was mainly completed at a modal level rather than in an integrated way across countries and modes of transport. Lack of cooperation and coordination produced a number of inefficiencies, including different investment plans, disconnected or even contradictory timelines, incompatible technical characteristics; and inadequate joint management of cross-border infrastructure projects.

As a conclusion, the 2011 IA report states that the EU "had not succeeded in containing the growth of the economic, environmental and social costs of mobility while simultaneously ensuring that current and future generations have access to safe, secure, reliable and affordable mobility resources to meet their own needs and aspirations".

2.2.2 What was expected to happen if no policy action was taken?

The IA study developed a projection of the expected evolution of the problem and its expected impacts under the 'no policy change' scenario, where there would be no additional

policy interventions besides those already in place. These included all transport-specific policies adopted by March 2010, as well as the 2008 Climate and Energy Package[4,5].

In Table 2-7, below we provide a qualitative description of how the root causes of the problem would be expected to evolve under the Baseline scenario, taking into account the initiatives and measures already in place by March 2010.

Table 2-7: Expected evolution of the root causes of the problem under the Baseline scenario

Root cause of the problem	Expected evolution under the Baseline
Use/role of pricing mechanisms	• Measures already adopted (i.e. Eurovignette Directive, Emissions Trading System for aviation) to play a role. • Overall, external costs of transport expected to remain only partly (if at all) internalised in the costs borne by transport users and not coordinated among Member States. • Fuel taxes/subsidies to continue to have a distorting effect on behaviour and demand for non-sustainable mobility choices to remain above its optimal level.
R&D and innovation policy	• Measures to support research and technological development in transport to continue including the use of funding instruments (e.g. Horizon 2020 and the Joint Technology initiatives) and the implementation of measures/policies already adopted (e.g. ITS action plan/Directive for road transport; support for the development of pan-European traffic management systems in all modes and also between modes (e.g. SESAR (aviation), VTMIS, LRIT (maritime), RIS (inland navigation), ERTMS (rail), CO_2 standards for passenger cars and vans). • Path-dependency to lead to continuing focus on the development of more efficient fossil fuel-based vehicles, and less so on other alternatives. • Coordination of efforts between the EU, Member States, public and private actors in the promotion and development of new mobility technologies to remain fragmented/problematic. • Consumers and passengers to remain unaware of the relative advantages of alternative technologies and transport modes and unwilling to change established ways of travelling and

[4] The list of policy interventions considered under the Baseline scenario included policies adopted up to 2010 covering a broad range of areas. The complete list of 24 such measures included in the Baseline is provided in the Annex of the IA report. It has also been taken into account in the development of the Baseline presented in Section 3.

[5] The White Paper was adopted as part of the seven flagship initiatives that were adopted to implement the Europe 2020 strategy for smart, sustainable and inclusive growth. In fact, the White Paper was part of the resource efficiency flagship initiative to support the shift towards a resource-efficient and low-carbon economy. At the same time, it was relevant for additional flagship initiatives. As such, in the absence of the White Paper, it is likely that some relevant measures/actions would still have been introduced in the context of these initiatives that would be relevant to the transport system. However, besides information on specific policy measures already provided in the IA, it is not possible to make such predictions. Thus, for the purposes of the analysis we have assumed that only the measures already identified in the IA would be adopted as part of the no policy change scenario.

Root cause of the problem	Expected evolution under the Baseline
	transporting goods. This would lead to a lower uptake of alternative technologies and more efficient transport modes.
Efficiency of transport services	• Development of the internal market for transport services (including as a result of relevant EU legislation) to continue but at a different pace depending on the mode (more advanced and effective for aviation and rail than in road or maritime transport). • Action to address capacity constraints in aviation (e.g. Single European Sky II and action plan on airport capacity) to help address the capacity constraints. • Barriers to entry and protectionist measures and legislation to continue in Member States although action to clarify/simplify could be expected. • The EU internal market Regulation in transport services would remain only partially implemented and enforced. • Health, social, safety and security standards across EU to remain uneven among Member States. • Modal networks to continue to be poorly integrated from the European and multimodal perspective and most often focusing on addressing national needs. • Investment in the TEN-T network to continue with a gradual completion of existing priority projects up to 2020. Funding to increase over time but remain an important constraint in infrastructure development.
Role/use of transport planning	• Many regional/urban/local authorities to face challenges in developing integrated and sustainable urban mobility plans and policies to tackle congestion, pollution and safety problems. Level of coordination among authorities with different responsibilities at national and local level to continue to vary. • EU support (Civitas, Action Plan on Urban Mobility) to provide some relevant support to national and local authorities addressing some of the above limitations. • National infrastructure planning to remain largely disconnected from planning at EU level and, in most cases, mainly completed at a modal level rather than in an integrated way across countries and modes of transport. • Land-use planning or infrastructure location decisions not taking into account the consequences on the operation of the transport system as a whole, resulting in excessive or sub-optimally distributed transport demand. • Problems in coordination of infrastructure plans to continue (in terms of timelines, technical characteristics, management of cross-border infrastructure projects).

On the basis of the above, under the Baseline scenario the transport system would not be expected to become sufficiently resource efficient so as to promote sustainable growth (within the meaning of the Europe 2020 strategy). Three main aspects of the problem would remain:

1. Transport would remain dependent on oil and CO_2 emissions from transport-related activities would still grow.

2. Congestion would continue to grow.

3. The transport system would not keep pace with the mobility needs and aspirations of people and businesses.

2.2.3 Expected evolution of the relevant economic, environment and social indicators under the Baseline scenario

In this section, we present the expected evolution under the Baseline scenario, developed using the PRIMES-TREMOVE transport model. We present the key assumptions on the development of the Baseline scenario and the evolution of key indicators for the EU27.

Methodological aspects for Baseline scenario definition

The Baseline (no policy change) scenario serves as a counterfactual scenario which presents what would happen if the policies and measures adopted, on account of the White Paper, were not in place.

The Baseline scenario is compared to an Alternative scenario which includes the White Paper policies and measures. The comparison facilitates evaluation of the impact of the White Paper, in quantitative terms. The comparison between the Baseline and the Alternative scenario provides insights on the expected maximum impacts up to 2050, as a result of the White Paper.

The project team considered two possible equivalent ways to approach the development of the Baseline scenario using the PRIMES-TREMOVE model:

- The first approach involved using the Reference scenario 2010, with a cut-off date of March 2010 as the starting point. This is the same scenario as in the 2011 White Paper Impact Assessment.

  Some of the assumptions used in the Reference scenario were outdated since the underlying framework conditions (e.g. GDP, fuel prices and technology developments) changed. To utilise the Reference scenario (March 2010 cut-off), it would have been necessary to consider the impacts of the changes in the framework conditions that took place in the meantime, and which were not influenced by the White Paper policies (e.g. GDP, fuel prices trajectory). We also note that this scenario had been quantified with an earlier version of the PRIMES-TREMOVE model in 2010 that has been further developed.

- To address the caveats of the first approach, the project team considered an equivalent approach, which ensures full comparability and compatibility of the framework context between the Baseline and Alternative scenarios (the second scenario for the purpose of the evaluation of the White Paper), and other scenarios that supported the Commission's 'Clean Planet for All' initiative. To develop the Baseline scenario, we used as a starting point the more recent Reference Scenario 2016[6]. The project team excluded from the Reference Scenario 2016 the policies and measures adopted as a result of the White Paper (after the cut-off date of March 2010). This approach ensures that the overall modelling framework context (GDP and fuel prices trajectory) is also in line with the Commission's long-term strategy.

It should be emphasised that the approach used is equivalent to building on the Baseline scenario of the impact assessment accompanying the White Paper and taking into account the revised macro-economic framework, fuel price projections and changes in technology

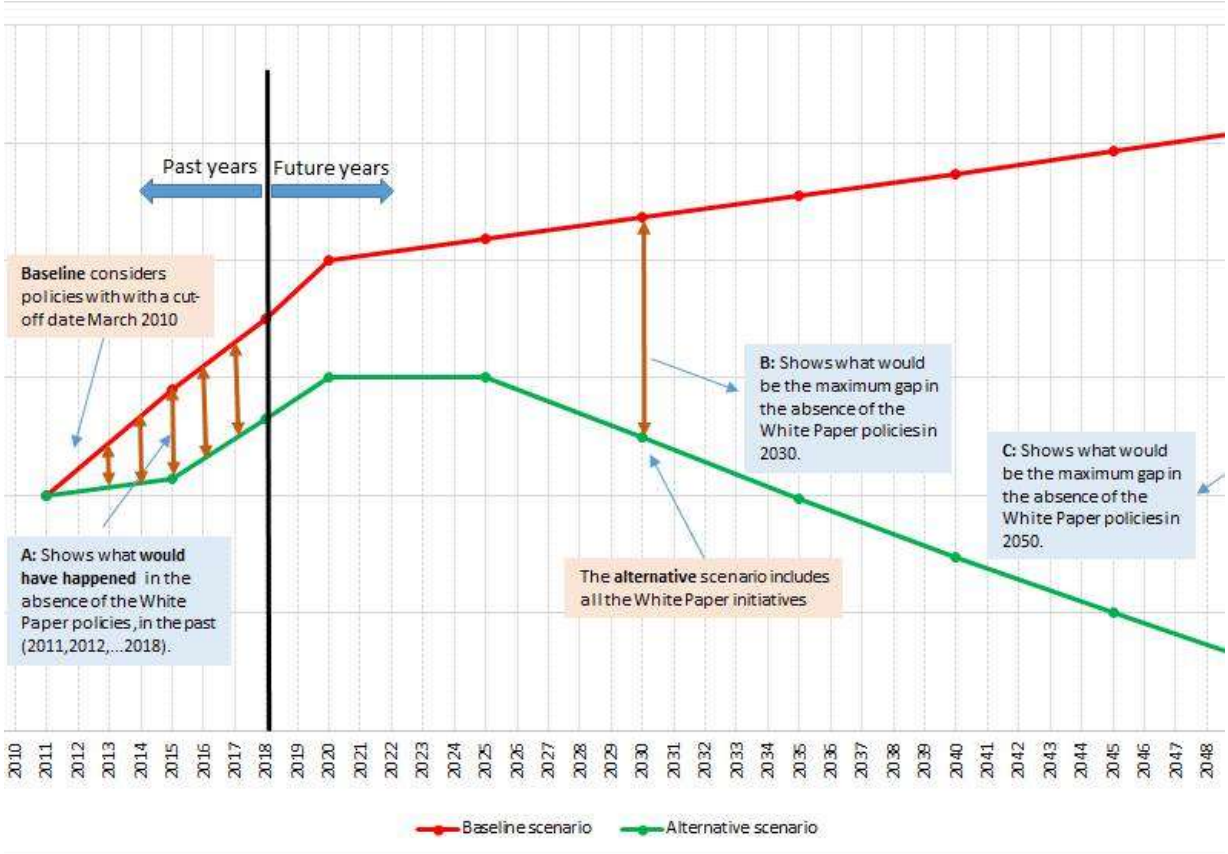
[6] https://ec.europa.eu/energy/data-analysis/energy-modelling/eu-reference-scenario-2016_en

costs. At the same time, it ensures consistent use of the most recent version of the PRIMES-TREMOVE model throughout the analysis.

We note that, by assumption and as part of the scenario design, the Baseline scenario excludes all the White Paper initiatives, as it would be arbitrary to determine, in an ad hoc manner, which initiatives could have been implemented regardless of the White Paper. The Alternative scenario, on the contrary, takes into consideration all the White Paper initiatives that can be quantified with the model. Hence, the difference between the Alternative and the Baseline scenario represents the maximum gap that could be attributed to the White Paper, and the model results should be read within this context.

The model outputs, which cover a large spectrum of indicators, are used to provide the basis for answering a number of evaluation questions, by quantifying the impact of the White Paper policies in the past (until 2018) and in the future (up to 2050) Figure 2-3 provides an illustrative example of the comparison between the Baseline and the Alternative scenario to assess such impacts.

Figure 2-3: Illustrative diagram explaining the use of the Baseline and Alternative scenarios to assess impacts of the White Paper



The list of policies covered in the modelling, which are included in the Alternative scenario but not in the Baseline scenario, are presented in Table 2-8 below.

Table 2-8: List of the policies covered by PRIMES-TREMOVE which are included in the Alternative scenario and not in the Baseline scenario

Act or subject matter	Reference
Amendment on ILUC of the Directive on the promotion of the use of energy from renewable sources ("RES Directive") and Fuel Quality Directive	Directive (EU) 2015/1513 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources
Eurovignette Directive on road infrastructure charging	Directive 2011/76/EU amending Directive 1999/62/EC; proposals for Directives amending Directive 1999/62/EC, COM(2017) 275 and COM(2017)276,
Directive establishing a single European railway area (Recast)	Directive 2012/34/EU
Regulation on noise-related operating restrictions at Union airports	Regulation (EU) No 598/2014
Directive on the Sulphur content of marine fuels	Directive 2012/33/EU
Roadworthiness Package	Directive 2014/45/EU, Directive 2014/46/EU amending Directive 1999/37/EC, Directive 2014/47/EU
Regulation on the sound level of motor vehicles	Regulation (EU) No 540/2014
Regulations governing the performance and charging schemes in as well as the network functions of the Single European Sky	Commission Implementing Regulations (EU) No 390/2013, 391/2013 and 677/2011; later replaced by Regulations (EU) 2019/317 and 2019/123
Directive on the deployment of alternative fuels infrastructure	Directive 2014/94/EU
TEN-T guidelines	Regulation (EU) No 1315/2013 supported by the Connecting Europe Facility (Regulation (EU) No 1316/2013)
The recast Renewable Energy Directive	Directive (EU) 2018/ 2001
Regulation on setting post-2020 CO_2 emission standards on new cars and light commercial vehicles and the replacement of the New European Driving Cycle (NEDC) test cycle by the new Worldwide harmonized Light-vehicles Test Procedure (WLTP)	Regulation (EU) 2019/631
Improving testing procedures - real driving conditions ('Real Driving Emissions' – RDE) and improved laboratory test ('World Harmonised Light Vehicle Test Procedure' – WLTP)	Commission Regulation (EU) 2018/1832 Commission Regulation (EU) 2017/1151 Commission Regulation (EU) 2017/1154 Commission Regulation (EU) 2016/646 Commission Regulation (EU) 2016/427

Act or subject matter	Reference
Regulation on setting post-2020 CO_2 emission standards on new heavy-duty vehicles	Regulation (EU) 2019/1242
Clean Vehicle Directive	Directive (EU) 2019/1161
Regulation on electronic freight transport information	Proposal for Regulation on electronic freight transport information[7]
European Maritime Single Window	Regulation (EU) 2019/1239
Inland waterways and port services	Directive 2016/1629/EU on technical requirements for inland waterway vessels and the Regulation on non-road mobile machinery (NRMM) Regulation (EU) 2017/352 establishing a framework for the provision of port services
Directive on weights & dimensions	Directive 2015/719/EU amending Directive Directive 96/53/EC
Road infrastructure safety management Directive and General Safety Regulation	Directive (EU) 2019/1936 amending Directive 2008/96/EC; Regulation (EU) 2019/2144
4th Railways package	Directives (EU) 2016/798 on railway safety, Directive (EU) 2016/797 on railway interoperability and the Directive 2016/2370/EU regarding the opening of the market for domestic passenger transport services by rail and the governance of the railway infrastructure
Single European Sky 2+	Proposal COM(2013) 409 final; amended proposal COM(2020)579, complemented through proposal COM(2020)577.

Main results of the Baseline scenario on the basis of PRIMES-TREMOVE model

The quantification of the Baseline scenario was performed by executing the PRIMES-TREMOVE model code for the years 2015 until 2050. The key results of the Baseline scenario are presented in this section. Annex F also provides a comparison with the Alternative scenario. Modelling results refer to the EU27 scope. The impacts of the COVID-19 outbreak have not been covered in the present modelling exercise. A qualitative

[7] https://data.consilium.europa.eu/doc/document/ST-5142-2020-REV-1/en/pdf. This proposal has meanwhile given rise to Regulation (EU) 2020/1056.

description of the potential repercussions of the COVID-19 pandemic on the transport sector is presented in Annex F.

Transport activity modal shares

Road passenger transport is projected to maintain the largest modal share in passenger transport activity throughout the period until 2050 in the Baseline scenario. Nevertheless, the projections show that the modal share of road transport would follow a decreasing trend. The road passenger modal share would decrease by approximately 3.4p.p. and 5.9p.p. in 2030 and 2050, respectively, compared to 2010, in the Baseline scenario for the EU27.

The modal share of passenger rail (including conventional and high-speed rail and metro) in the Baseline scenario remains relatively constant; 8.1% and 8.5% in 2030 and 2050 respectively in the absence of future developments in the TEN-T core, and comprehensive network and other initiatives providing policy support for rail.

Air passenger transport activity (i.e. activity denoting international intra-EU) continues to grow until 2050, driven by the GDP growth, and increases its modal share by 3.1p.p by 2030 and 5.2p.p by 2050, relative to 2010.

Table 2-9: Passenger transport activity (modal shares in the Baseline scenario)

	2010	2030	2050
Road	83.5%	80.1%	77.6%
Rail	7.7%	8.1%	8.5%
Aviation	8.1%	11.2%	13.4%
Inland navigation	0.6%	0.6%	0.5%

Similarly, to passenger transport, road freight transport is projected to continue to hold the largest share of freight transport activity in the Baseline scenario at EU27 level by 2050. In particular, trucks and light commercial vehicles are projected to retain a progressively increasing modal share in the Baseline scenario to 2050. The modal share of road freight would increase on the 2010 baseline by approximately 0.8p.p in 2030, and by 2.1p.p in 2050.

Non-road freight transport modal shares are projected to gradually decrease over time. This due to the absence of measures to support the completion of the TEN-T core and comprehensive network, and absence of measures to increase transport network infrastructure coverage and intermodal integration (road, rail and inland navigation[8]).

[8] Covering inland waterways and national maritime.

Table 2-10: Freight transport activity (modal shares in the Baseline scenario)

	2010	2030	2050
Road	70.3%	71.1%	72.3%
Rail	16.0%	16.0%	15.1%
Inland navigation	13.7%	12.9%	12.6%

Final energy consumption and CO_2 emissions in transport

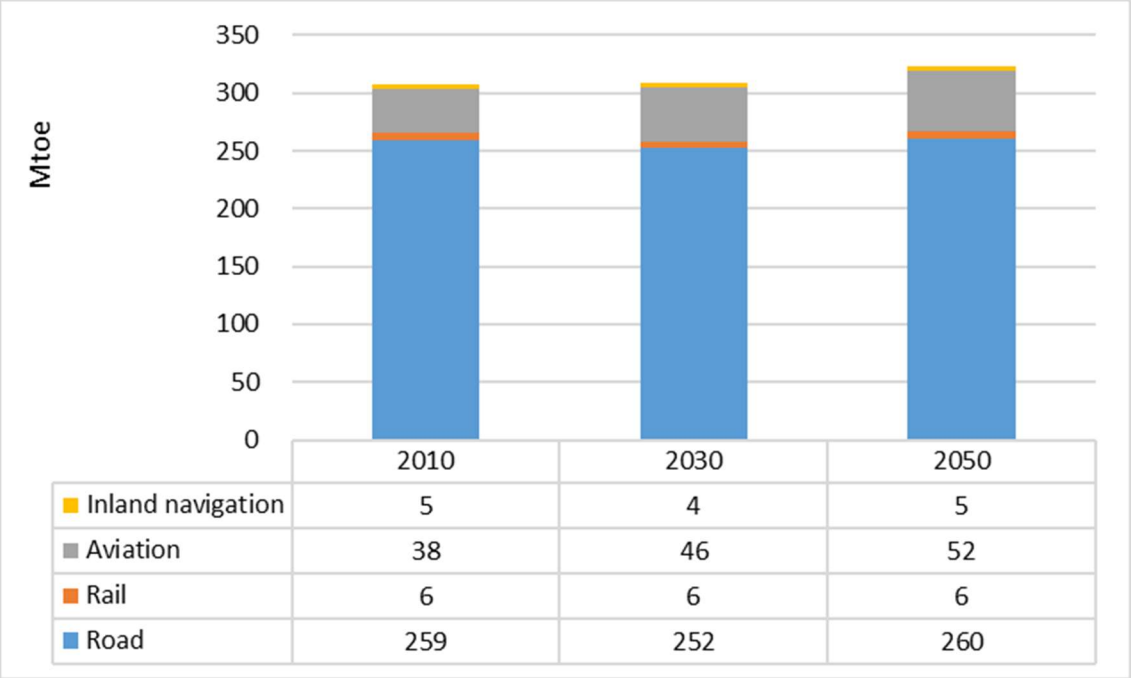
The final energy consumption in the transport sector is projected to remain relatively stable in the Baseline scenario throughout the projection period[9]. Final energy consumption includes road, rail, inland navigation and national maritime, as well as domestic and international aviation.

The Baseline scenario shows that the road transport sector would retain relatively stable levels of energy consumption throughout the projection period. The reason for this development can be associated with the absence of a number of initiatives which are not included in the Baseline scenario, such as the post-2020 CO_2 emission targets on road vehicle manufacturers, the Directive on alternative fuels infrastructure, the TEN-T Regulation and others. Road transport would continue to rely on petroleum products, while alternative fuels such as electricity would see limited inroads in the Baseline scenario.

Aviation is projected to continue increasing its energy consumption, also being favoured by a limited expansion of high-speed rail. The overall rail energy consumption is projected to remain relatively stable, retaining its historical levels throughout the projection period.

[9] As explained earlier in the report, the modelling exercise does not reflect the Covid-19 outbreak, which is especially relevant for the 2020-2025 time horizon. A qualitative presentation of the impact of the COVID-19 pandemic on the transport system is presented in Annex E.

Figure 2-4: Energy consumption by transport mode in the Baseline scenario in the EU27



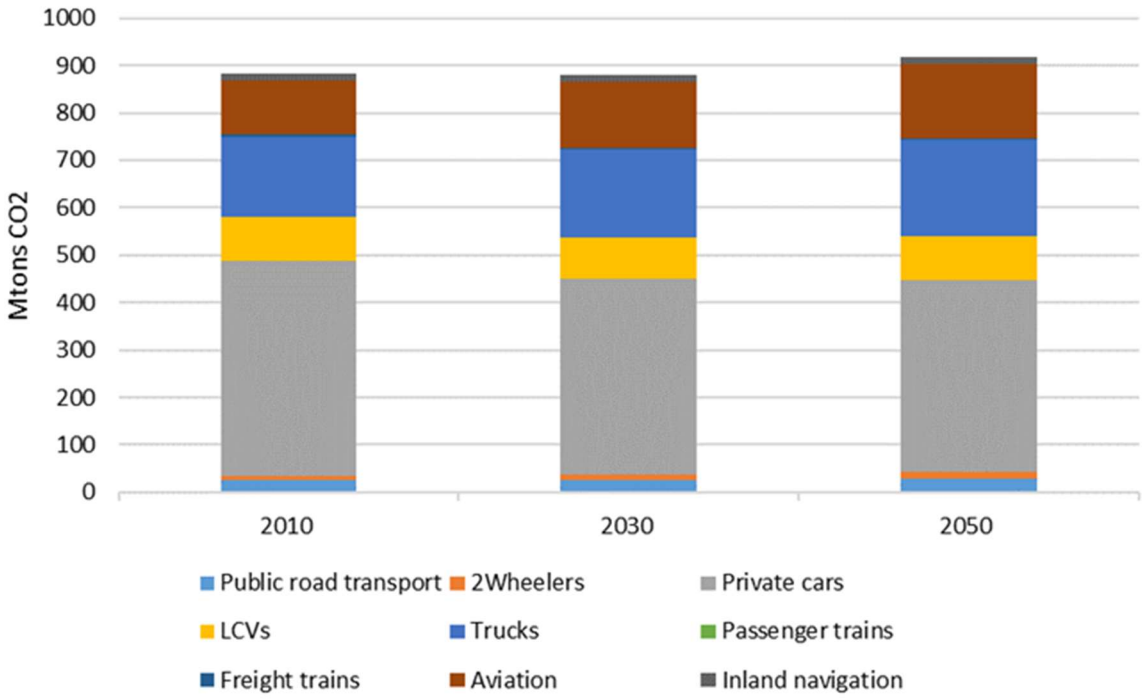
	2010	2030	2050
Inland navigation	5	4	5
Aviation	38	46	52
Rail	6	6	6
Road	259	252	260

In absence of additional policies beyond 2011, Tank-to-wheel CO2 emissions from transport would stabilise by 2030 and increase by 4% by 2050 relative to 2010.

Compared to 1990, the reference year for the White Paper objectives, CO2 emissions from transport would still be 29% higher in 2050. This is due to the persistent use of petroleum products across the various transport modes, particularly in road transport. This is further amplified by the limited uptake of alternative fuels such as electricity, hydrogen and natural gas.

Cars are projected to hold the largest share in the overall CO_2 emissions in transport, as model results indicate a continuing dependence on internal combustion engine technologies using fossil fuels. The evolution for trucks and light commercial vehicles is similar.

Figure 2-5: Tank-to-Wheel CO_2 emissions by transport mode in the Baseline scenario in the EU27



3 EVALUATION QUESTIONS

The following presents a complete list of evaluation questions considered during this study. The evaluation matrix used to develop responses to these questions is shown in Annex A.

No	Question
EQ1	What progress has been made towards the objectives (both general and specific) and the headline goals of the White Paper? What has been the progress towards less oil-dependency, less congestion and less GHG emissions in terms of these objectives?
EQ2	What is the expected progress by 2030 and 2050? How does this compare to what was initially expected in the impact assessment? (European Commission, 2011b)
EQ3	To what extent have the 40 action points, which are broadly covered by all the policy options in the impact assessment of the White Paper, contributed to reaching the objectives and headline goals of the White Paper?
EQ4	Which factors and developments (e.g. digitalisation, mobility as a service, technology cost, etc.) have, negatively or positively, contributed to the achievement of the objectives and headline goals?
EQ5	Which unintended positive and negative economic, social and environmental effects, if any, have been produced?

No	Question
EQ6	To what extent have the 40 action points of the White Paper been implemented by the Commission, by the Member States, regional and/or local authorities, or by other actors (e.g. transport operators)?
EQ7	To what extent have the costs of the 40 action points in the White Paper been proportionate to the overall benefits achieved?
EQ8	To what extent have the initiatives under the White Paper been cost effective? Which benefits have been achieved for the different stakeholder groups? What costs have resulted for the different stakeholder groups?
EQ9	Is there room to streamline or simplify the various initiatives under the White Paper?
EQ10	Are the problems/needs identified in the White Paper still valid?
EQ11	Have there been any changes in the EU transport or climate change policy objectives making the White Paper objectives less relevant? To what extent are the objectives of the White paper still relevant in relation to current broader EU policy objectives?
EQ12	How well do the original objectives and 10 headline goals of the White Paper still correspond to the current transport and climate policy needs?
EQ13	Are the proposed 10 headline goals still adequate benchmarks for achieving an integrated, sustainable and efficient transport system in the EU?
EQ14	Are the White Paper objectives coherent with the 2018 European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy and the 2016 Low-emission mobility strategy?
EQ15	How does the White Paper interact with other EU/ national/ international initiatives which have similar objectives (e.g. actions in the field of mobility, climate, employment, taxation and sustainable development)?
EQ16	To what extent are the White Paper initiatives complementary to each other, mutually supportive and non-contradictory? Are there any synergies, overlaps and/or inconsistencies between them?
EQ17	What is the added value resulting from the EU level intervention of the White Paper compared to the results brought by the actions which could have been achieved by Member States at national and/or regional level?
EQ18	To what extent do the issues addressed in the White Paper continue to require intervention at the EU level?
EQ19	What would be the progress made in the EU to date and by 2050 in reducing GHG emissions, oil dependency and congestion without the actions put forward in the White Paper?

4 METHOD/PROCESS FOLLOWED

4.1 Process/Methodology

This section provides an overview of the research tools used in this study. These were identified, developed in line with the evaluation methodology matrix that was developed in the initial stages of the study, and updated in subsequent stages. The evaluation support matrix elaborated on the methodology to answer the evaluation questions, identifying relevant operational questions, indicators, research tools and data sources and the approach to answer the questions. The evaluation matrix is included in Annex A.

4.1.1 Desk research

The desk research was divided into three separate parts:

1) General desk research

The general desk research task encompassed the wide-ranging literature review needed to support the analysis of the evaluation questions. This task continued throughout the course of the study to help address evidence needs and gaps as they emerged and to extract relevant input that was used to answer the evaluation questions.

2) Data requests

To establish the current status of implementation of the White Paper at the EU level and the Member State level, including any changes and progress to date, data were requested from European Commission desk officers using a structured catalogue of questions.

The data collection template was issued to 57 contacts on 25 November 2019. The last of the responses were received on 12 March 2020.

3) Analysis of existing evaluations, impact assessments and other relevant studies

The last desk research subtask consisted of an analysis of existing evaluations, impact assessments and other studies related to the initiatives covered by the White Paper. This analysis informed the development of a summary of the main conclusions on the relevance, efficiency, effectiveness, coherence and EU added value of the White Paper initiatives. The summary was used to answer the relevant evaluation questions for this study.

In total, 82 documents were reviewed. This included 36 evaluations, 40 impact assessments, 1 fitness check, and 5 documents categorised as "other". A list of these documents, including title, author and year of publication is presented as Annex B.

4.1.2 Data collection - Indicators

A set of indicators was compiled for assessing the progress made towards achieving the objectives of the White Paper and the 10 headline goals. Data for these indicators were extracted from publicly available sources including, for example, Eurostat and the European Environment Agency (EEA). These indicators were used to assess the effectiveness and relevance of the White Paper measures.

Annex E presents the list of relevant indicators that reflect the general and specific objectives and the headline goals. It also includes indicators identified in the impact assessment support study for the monitoring and evaluation of the White Paper. The priority for the geographical scope of data collection was EU27 coverage or, where data was unavailable, information was collated at Member State level.

4.1.3 Targeted Stakeholder Consultation

1) Survey

Two surveys were distributed aimed at national authorities and regional, local and/or city authorities in EU Member States. These were launched on 13 December 2019 and remained open until 31 March 2020 (following an extension agreed with the Commission). The surveys focused on cross-checking or complementing the information collected via desk research and collecting evidence and opinions in relation to the various evaluation questions. Responses received to the survey are shown in Table 4-1. The full list of respondents to the survey are included in the stakeholder consultation report in Annex C.

Table 4-1: Summary of survey responses

Survey type	Number of responses received	Number of Member States represented
National Authority	17	13
Regional, local or city authority	8	6
TOTAL:	25	14

2) Stakeholder interviews

Interviews were conducted with a range of relevant stakeholders representing EU institutions (i.e. European Commission Directorates-General, EU agencies, and joint undertakings), industry organisations, labour and passenger organisations, research organisations, and NGOs (see Table 4-2). The targeted interviews focused on cross-checking or complementing the information collected via desk research. The interviews also aimed to collecting further evidences and opinions in relation to the various evaluation questions.

Between December 2019 and May 2020, 66 interviews were conducted, with an additional three stakeholders submitting written responses to the interview questionnaire, bringing the total number of contributions to 69. An additional five stakeholders submitted position papers.

Table 4-2: Summary of stakeholder interviews

Type of stakeholder	Number of interviews conducted
EU institutions and other agencies	16
Social partners	3
Region/City Networks	3
Industry organisations	29
Transport organisations/experts	10
Civil society	8

Type of stakeholder	Number of interviews conducted
TOTAL	69

The full list of stakeholders interviewed is included in the stakeholder consultation report in Annex C.

3) Open Public Consultation

The Open Public Consultation (OPC) was open between 1 July and 23 September 2020 (12 weeks). It covered questions relating to both the evaluation of the 2011 Transport White Paper and the forthcoming 'Sustainable and Smart Mobility Strategy'. In total, 684 responses were received. The breakdown by stakeholder type is shown in Table 4-3. For further information, please refer to the stakeholder consultation report in Annex C.

Table 4-3: Classification of stakeholders responding to the OPC

Stakeholder group	Number of responses	% of responses
Industry organisations	276	40.4
Civil societies and research organisations	108	15.8
National and regional authorities	77	11.3
Citizens	223	32.6

4.1.4 Case Studies

An inventory of national, and where relevant subnational, transport strategies was developed as part of this study. The individual strategies were analysed for their consistency and contribution to the objectives of the White Paper.

Data were collected through a combination of desk research and a specific survey to all Member States at the national level, and a selection of 15 regions. Annex G presents an overall summary detailing the findings from this activity, and individual country fiches.

4.1.5 Modelling

The PRIMES-TREMOVE model was used to help quantify the Baseline and the Alternative scenarios for the evaluation. It was then used to assist in the answering of evaluation questions. PRIMES-TREMOVE has been utilised in numerous transport and energy-related impact assessment studies and other analytical documents in the past.

The development of the Baseline scenario follows the "counterfactual" logic, aiming to reply to the question "*What would have happened in the past and in the future years if the White Paper policies were not adopted*". The complexity of this type of analysis when analysing the White Paper (and its numerous initiatives) lies in the fact that it is difficult to determine if some of the initiatives would have been adopted regardless of the White Paper. Such analysis could be done only on an ad hoc basis and would result in more caveats than potential benefits. Hence, the Baseline scenario has been designed by removing all the White Paper initiatives. Hence, the modelling exercise depicts the maximum potential impact of the White Paper and the results should be read within this context.

The model provides a quantitative analysis for the transport sector in the EU27, covering transport activity, vehicle stock, energy and emissions. Annex F provides a detailed overview of the development of both the Baseline and Alternative scenarios, and the results from the modelling.

4.2 Limitations – robustness of findings

There were some challenges to the study and limitations inherent to the methodology. The main limitations are described below, together with the measures taken to mitigate the impacts.

Availability of relevant data from the literature/data sources

Input from the literature was important in terms of analysing the overall impacts of the White Paper, but also understanding the progress made in the implementation of the White paper action points and their impacts.

However, given that the majority of action points were still in the initial stages of their implementation, in many cases there were no relevant studies (e.g. evaluations) or other reports to support an assessment of their impacts. In total, for only 39 of the 132 initiatives of the White Paper is there a relevant evaluation support study available. Impact assessments had been completed for only 45 initiatives.

This limited numbers of evaluation studies and impact assessments had implications for our ability to assess the impacts and the costs associated with action points, and thus our ability to respond to some of the evaluation questions concerning the effectiveness and efficiency of specific action points. Where possible, we used alternative sources – including input from EC officers, stakeholders and other secondary sources – to collect relevant data to support this assessment. Nonetheless, these data limitations impacted our ability to reach conclusions on the efficiency of the White Paper.

Relevant data were available for most of the indicators identified to support the analysis. Nonetheless, there were also gaps in relation to some of the objectives (e.g. future progress towards the other general objectives in terms of accessibility, equity, provision and quality of services, and minimising the external costs to society), and gaps in relation to headline goals (e.g. indicators on the progress towards the target of achieving CO_2-free city logistics in major urban centres by 2030; indicators on the progress towards the target of achieving the modal shift of freight over 300 km, etc.). These gaps were partly addressed by using qualitative input from stakeholders to supplement the analysis. The gaps are not considered to have a significant impact on the robustness of our findings.

There were specific challenges in collecting information to answer evaluation question EQ6 concerning the progress of the implementation of the White Paper. In several cases, information was only partially available on the actual status of implementation of initiatives requiring action from Member States (e.g. transposition or enforcement of legislation), or action from other stakeholders.

Desk research was conducted with the objective of understanding whether the deadlines envisaged in legislation relating to each action point had, or had not, already entered into force. Some evidence on the level of implementation by Member States/other actors were captured (e.g. from evaluation studies or implementation reports collected, see paragraph below). Some sources also provided an explanation for delays.

Stakeholder engagement

The stakeholder engagement task aimed to involve all affected stakeholders via the most appropriate methods. A variety of tools were used to collect the evidence required for the

evaluation, including an Open Public Consultation, interviews, surveys and targeted data requests. There were however some limitations that impacted the collection of relevant data:

- The very wide scope of the White Paper (in terms of themes, modes, type of activities and objectives), meant that obtaining detailed input across the full range of activities was challenging. It required the use of a lengthy questionnaire and other data collection tools that had a negative impact on the response rates. The study team attempted to keep the length of these tools manageable by directing respondents to those questions relevant to the action points and modes identified by each stakeholder to be of interest. Nonetheless, the overall response rate to the targeted consultations was low. Input from other sources, including the OPC and the follow-up interviews helped to mitigate the low response rates from these questionnaires.

- Given the nature of the White Paper as a strategy document, not all stakeholders were aware of its existence and its role. As such, some of them were unable to comment on its overall role while others could not make a direct connection between specific initiatives and their outcomes and the White Paper. In our analysis, this was not considered as a relevant point for the effectiveness of these actions. All responses in relation to specific activities (initiatives) implemented within the context of the White Paper were considered.

Establishing the role of specific actions points and initiatives

Responses to effectiveness and efficiency questions required an assessment of the impacts and respective costs of specific action points. Besides the information and data limitations already mentioned, identified or expected impacts were often the result of a combination of initiatives and it was not possible to disentangle the contribution of individual actions.

As a result, it was not possible to make an assessment of the effectiveness and efficiency of individual action points of the White Paper. As such, our analysis focused on the combined impacts of the White Paper (actual and expected). This was based on analysis using the PRIMES-TREMOVE model, on inputs from other sources, and a qualitative assessment of the expected contribution (direct or indirect) of action points towards the achievement of the objectives and targets of the White Paper.

5 IMPLEMENTATION STATE OF PLAY (RESULTS)

As indicated in Section 2, the White Paper was structured around four main strategic areas, 12 thematic areas (pillars), and 40 specific action points. The action points were implemented through a total of 132 specific initiatives, including the introduction of new/revised pieces of legislation, financial support instruments, studies, new strategy documents, the development of tools or the promotion of social dialogue.

This section provides an overview of the main actions and initiatives which have been implemented within the framework of the White Paper. It focuses on action taken at the EU level to implement the White Paper, providing information on action taken by other actors where relevant.

Information on the state of play of the implementation of specific initiatives focusing on action needed at the EU or national level by other stakeholders (e.g. Member States, industry etc.) is presented in EQ6.

Analysis

The 2016 implementation report on the 2011 White Paper for Transport (European Commission, 2016) indicated significant progress in a number of areas. The Commission had made significant progress since the adoption of the White Paper, having acted upon most of the 40 action points of the programme. Since then, new initiatives have followed or accompanied those defined in 2011, forming part of the overall picture.

Table 5-1 below provides a summary of the assessment made towards the implementation of each action point at the EU level on the basis of the information collected in the context of the study (Further detailed information is provided in Annex H). From this analysis it can be concluded that, since its adoption in 2011, the European Commission has made considerable progress on the implementation of the White Paper. On the basis of the review of the underlying initiatives, 15 out of 40 action points were completed at the time of the evaluation, with seven more at an advanced stage and the remaining in progress[10]. Overall, the most progress has been made in the first strategic area (11 action points considered completed).

Table 5-1: Status of implementation of the White Paper initiatives by the Commission (status at the end of 2019)

ACTION POINTS		Status		
		Completed	Advanced	In progress
Strategic area 1 - An efficient and integrated mobility system				
1.1 A single European transport area				
1	A true internal market for rail services	✓		
2	Completion of the Single European Sky			✓
3	Capacity and quality of airports	✓		
4	A maritime "blue belt" and market access to ports	✓		
5	A suitable framework for inland navigation		✓	
6	Road freight			✓
7	Multimodal transport of goods: e-Freight	✓		
1.2. Promoting quality jobs and working conditions				
8	Social code for mobile road transport workers			✓
9	A social agenda for maritime transport		✓	
10	A socially responsible aviation sector			✓
11	An evaluation of the EU approach to jobs and working conditions	✓		
1.3 Secure transport				
12	Cargo security	✓		
13	High level of passenger security with minimum hassle		✓	
1.4. Acting on transport safety: saving thousands of lives				

[10] We note though that the status of specific actions points (or the underlying initiatives) may change. For example, initiatives such as the adoption of a legislation indicated as "completed" may be considered as "in progress" at a later stage once an evaluation and possible revision process is initiated.

ACTION POINTS		Status		
		Completed	Advanced	In progress
14	Land transport security	✓		
15	End-to-end security			✓
16	Towards a "zero vision" on road safety	✓		
17	A European strategy for civil aviation safety		✓	
18	Safer shipping	✓		
19	Rail safety			✓
20	Transport of dangerous goods	✓		
1.5. Service quality and reliability				
21	Passengers' rights			✓
22	Seamless door-to-door mobility			✓
23	Mobility continuity plans	✓		
Strategic area 2 - Innovating for the Future – technology and behaviour				
2.1. A European transport research and innovation policy				
24	A technology roadmap		✓	
25	An innovation and deployment strategy			✓
26	A regulatory framework for innovative transport			✓
2.2. Promoting more sustainable behaviour				
27	Travel information			✓
28	Vehicle labelling for CO2 emissions and fuel efficiency			✓
29	Carbon footprint calculators			✓
30	Eco-driving and speed limits	✓		
2.3. Integrated urban mobility				
31	Urban mobility plans/ Urban Mobility Package[11]			✓
32	An EU framework for urban road user charging	✓		
33	A strategy for near "zero-emission urban logistics" 2030		✓	
Strategic area 3 - Modern infrastructure, smart pricing and funding				
3.1. Transport infrastructure: territorial cohesion and economic growth				
34	A core network of strategic European infrastructure			✓
35	Multimodal freight corridors for sustainable transport networks			✓
36	Ex-ante project evaluation criteria		✓	
37	A new funding framework for transport infrastructure	✓		
3.2. A coherent funding framework				
38	Private sector engagement	✓		
3.3. Getting prices right and avoiding distortions				
39	Smart pricing and taxation			✓
Strategic area 4 - External dimension				

[11] The Urban Mobility Package (COM(2013) 913) was presented as a communication with a series of accompanying Commission Staff Working Documents. It was not formally included within the initiatives of the White Paper although it overlaps with action point 31.

ACTION POINTS		Status		
		Completed	Advanced	In progress
40	Transport in the world: the external dimension			✔

At the level of initiatives, the analysis found that 64 out of the 132 initiatives originally planned are assessed as completed, 12 initiatives are in an advanced state of completion, and 46 initiatives are ongoing. Two initiatives have not yet started (initiative 94 related to linking EU funds to cities with urban mobility audit certificates, and initiative 100 on the definition of a strategy for zero-emission urban logistics). Eight initiatives were withdrawn. Of those withdrawn, some of them may receive further consideration in the future (e.g. initiative 117 on the revision of motor fuel taxation in light of the review of the Energy Taxation Directive envisaged by mid-2021).

The following sections provides an overview of the progress made in relation to each of the 40 action points along the four main thematic areas identified in the White Paper.

5.1 Strategic area 1 - An efficient and integrated mobility system

5.1.1 Single European Transport Area

The EC has already implemented a number of activities in this area covering all transport modes. Under **Action Point (AP) 1 concerning the rail sector**, all initiatives have been completed. The implementation of the 4th Railway Package led to the adoption of six legislative texts designed to complete the single market for rail services (Single European Railway Area). It included the 'technical pillar' (Regulation 2016/796, Directive 2016/797 and Directive 2016/798) to ensure common standards and a market pillar (PSO Regulation (EU) 2016/2338; and Directive 2016/2370/EU, Regulation (EU) 2016/2337) that introduced the principle of competitive tendering for public service contracts and brought changes to the way that infrastructure is governed to create a non-discriminatory environment. Furthermore, the Commission proposed in 2017 to amend the legislative framework applicable to rail passenger rights (COM(2017) 548 final), expected to enter into force in early 2021.

In terms of the development of rail infrastructure, there was progress made in regard to the development of the Rail Freight Corridors. Eight of the nine corridors identified in Regulation (EU) 913/2010 became operational on time, whilst the Alpine-Western Balkan was also expected to become operational in 2020. One additional corridor (the Amber Corridor) became fully operational in 2019.

In relation to **Aviation, under AP 2**, the Commission has moved forward with a number of initiatives intended to achieve the completion of the Single European Sky, including the Single European Sky 2+ proposal in 2013 and an amended recast proposal put forward in 2020, inspired by the same objectives but updated compared to the initial proposal[12]

[12] Complemented by a proposal to amend the rules regarding the European Union Aviation Safety Agency contained in Regulation (EU) 2018/1138: COM(2020)577.

However, a fully implemented Single European Sky has been not yet been achieved as it is a complex initiative, entailing challenges in several domains (i.e. technological, economic, institutional) and involving a great number of stakeholders (see also EQ6).

In the case of **AP 3 (concerning airports)** there has been much less progress. The proposal (COM (2011) 827) on common rules for the allocation of slots at European Union airports is on-hold while the ground-handling proposal (COM/2011/0824 final) was withdrawn in 2015. At the policy level, the Commission adopted in 2015 the EU Aviation Strategy that seeks to improve services, market access and investment opportunities with third countries, whilst guaranteeing a level playing field, reducing capacity constraints and improving efficiency and connectivity.

Concerning the maritime transport (AP 4), the Commission put forward its plan for 'Blue Belt, Single Transport Area for shipping' (Communication (COM/2013/0510 final) in 2013. Two key initiatives were recently adopted: Regulation (EU) 2019/1239 establishing a European Maritime Single Window environment; and the Port Services Regulation 2017/352 establishing a framework for the provision of port services and common rules on the financial transparency of ports (part of the Ports strategy package).

For inland navigation (AP 5), initiatives in the context of the NAIADES II programme are well advanced. Key initiatives include: Directive 2014/112/EU concerning the organisation of working time in inland waterway transport, adopted on 19 December 2014; and Directive (EU) 2016/1629 on technical standards for inland navigation vessels that was adopted in 2016.

In the **road transport sector (AP 6)**, key initiatives included the proposals made in the context of the first Mobility package. These included: the revision of Regulations 1071/2009 and 1072/2009, concerning the access to the road haulage market (Regulation (EU) 2020/1055); and the proposal for the revision of Tachograph Regulation 165/2014. Both sets of revisions are in the last stages of negotiations with the Council and the Parliament before adoption. Directive 2015/719 on weight and dimensions of road freight vehicles was adopted in 2015. The Commission also proposed in 2017 a revision of the EU legislation aiming at a major liberalisation of the bus and coach market[13], for which inter-institutional negotiations are still ongoing.

As part of **AP 7 (Multimodal transport of goods: e-Freight)**, the Commission put forward, as part of the third 'Europe on the move' package, a proposal for a Regulation on electronic freight transport information that was adopted in 2020 (Regulation (EU) 2020/1056). However, an initiative on multimodal liability regimes was withdrawn.

5.1.2 Promoting quality jobs and working conditions

In relation to the **social aspects of the road transport sector** (**AP 8)**, the Commission brought forward new proposals (COM(2017) 277 final) for amending Regulation (EC) No 561/2006 on driving times and rest periods as part of the First Mobility Package. This aimed to bring clarity on minimum standards for the social protection and pay of posted workers in the road transport sector, and to help eliminate illicit employment and business practices, such as letterbox companies and nomadic drivers.

[13] Regulation (EC) No 1073/2009 of 21 October 2009 on common rules for access to the international market for coach and bus services, and amending Regulation (EC) No 561/2006, OJ L 300, 14.11.2009, p. 88–105.

In the maritime sector, a number of initiatives were taken to improve the **social conditions of seafarers** (**AP 9**). A European Strategy for more Growth and Jobs in Coastal and Maritime Tourism (COM(2014) 86) was adopted in 2014. Action was also taken towards enhancing the enforcement of the Maritime Labour Convention. Directive EU/2015/1794 amended five labour Directives (2008/94/EC, 2009/38/EC, 2002/14/EC, 98/59/EC, 2001/23/EC) including for seafarers, thus improving their working rights. Further relevant action included the revised Directives 2013/38/EU on port State control, 2013/54/EU concerning certain flag State responsibilities, and 2019/1159 on the minimum level of training of seafarers.

In the **aviation sector (AP 10)**, a study on the employment and working conditions of aircrews in the EU internal aviation market was completed in 2019, but the initiative which intended to ensure EU-wide minimum service and quality standards for workers in the whole aviation chain was withdrawn. Still, the Commission has taken measures to facilitate the exchange of good practices for mitigating the impact of strikes on network performance.

Finally, as part of **AP 11**, the EC completed a number of studies to support the assessment of the EU approach to jobs and working conditions across the transport sector (Analysis of the trends and prospects of jobs and working conditions in transport; Study to evaluate the effectiveness of European Works Councils (EWC) in the transport sector; Study on employment and working conditions of aircrews in the EU internal aviation market).

5.1.3 Secure transport

The main initiative under **AP 12 concerning cargo security** was the entry into force of Regulation 2015/1998, laying down detailed measures for the implementation of the common basic standards on aviation security. Furthermore, the mutual cargo recognition signed with the US in 2012 permits EU-wide one-stop security for US bound cargo.

In terms of **passenger security (AP 13)**, the relevant initiatives are at an advanced status. The Commission brought changes to the Regulation concerning common basic standards on aviation security (2015/1998) with the intention to update requirements. Furthermore, the draft proposal by the Commission on the approval of civil aviation security equipment has already received positive feedback from Member States.

Concerning **land transport (AP 14)**, the Expert Group on Land Transport Security (LANDSEC) was established in May 2012 intended to support the Commission in developing policy on security relating to land transport and to foster exchanges of relevant experience, policies and practices. A similar expert group on rail security (EU Rail Passenger Security Platform) was created in 2018 focusing on matters relating to the security of rail passengers.

The LANDSEC group has been involved in the implementation of initiatives to **promote end-to-end security under AP 15**, supporting the development of '"end-to-end" security certificates' and 'Joint security assessment'.

Furthermore, actions have been taken to implement the Maritime Security Strategy (MSS) adopted in 2014, including information exchange (security exercises) and cybersecurity. The second report on the implementation of the EU Maritime Security Strategy Action Plan (European Commission, 2017) indicates that implementation is progressing well and has led to an important change in mind-sets among maritime security players. However, an initiative intended to integrate the potential effects of terrorist and criminal attacks in mobility continuity plans was withdrawn.

5.1.4 Acting on transport safety: saving thousands of lives

In terms of road safety (AP 16), relevant action taken in a number of areas has been completed. The Roadworthiness package was adopted in 2014 and included revisions in a number of relevant pieces of legislation (i.e. Directive 2014/45/EU on periodic roadworthiness tests; Directive 2014/47/EU on technical roadside inspections for commercial vehicles; and Directive 2014/46/EU on vehicle registration documents). Directive 2018/645 on the initial qualification and periodic training of drivers was also revised in 2018. In addition, Directive 2015/413/EU, which set rules on the cross-border pursuit of road traffic offences, facilitating cross-border exchange of information on road-safety-related aspects, has already been fully transposed, followed by a revision of the Road Infrastructure Safety Management Directive (2019/1936).

Furthermore, specific measures were taken requiring the adoption of a range of safety technologies in vehicles. Lane departure warning and advanced emergency braking for lorries have been regulated since 2015 through the General Safety Regulation (661/2009), and anti-lock braking systems became mandatory for motorcycles in the EU from 2016. In 2019, the General Safety Regulation was reviewed again, requiring cars, trucks and buses to be fitted with a range of safety technologies. Furthermore, the EU-wide eCall system was made compulsory in all new car types sold as of 31 March 2018.

In 2018, the Commission adopted the Road Safety Policy Framework 2021-2030 as part of the Third Mobility Package, along with a Strategic Action Plan on Road Safety. This set a new target for 2021-30 to reduce deaths and – for the first time – serious injuries by 50%.

In the **aviation sector (AP 17)**, the initially identified activities have been completed. Regulation (EU) No 376/2014 on the reporting, analysis and follow-up of occurrences in civil aviation was adopted in 2014.

In the context of the implementation of the EU Aviation Strategy, the Commission took action to support the development of new technologies in the area of aviation safety (SESAR) by adopting Regulation 2017/373. This established safety requirements for all ATM/ANS service providers and identified EASA as the competent authority for the certification and oversight of pan-European service providers.

Furthermore, Regulation 2018/1139 (EASA Basic Regulation) introduces the obligation for EASA to assist the Commission in the implementation of Union law technical domains of civil aviation regulation, such as the Single European Sky, with effect from 11 September 2018 (no need for transposition). A number of Implementing and Delegated Regulations have already been adopted, shifting from a compliance-based to a risk-based approach.

In addition, the Commission worked on the development of the legal framework to ensure the safe use of drones, including technical requirements (Commission Delegated Regulation 2019/945) and the rules and procedures for their operation (Regulation (EU) 2019/947).

Finally, in the context of the Air Safety List, regular exchanges of relevant safety information take place with ICAO and with FAA, as well as with Boeing and Airbus. Agreement was also reached with IATA to use the information it collects from the safety assessments performed on its member airlines.

In the case of **shipping (AP 18)**, the adoption of Directives 2017/2108, 2017/2109 and 2017/2110 were intended to help in the modernisation of the passenger ship safety legislation. Furthermore, 'SafeSeaNet (SSN)', the vessel traffic monitoring and information system, became fully operational in 2016, enabling the provision and receipt of information on ships, ship movements, and hazardous cargoes.

Relevant action was completed to improve coordination and cooperation in shared functions for coastguards in the EU through the revision of FRONTEX and EMSA Regulations. In contrast, the initiative to assess the feasibility of the creation of an EU register and EU flag for maritime and inland waterway transport was withdrawn.

In the **railway sector (AP 19)**, action has been taken in the context of the 4th railway package adopted in 2013. The European Railway Agency has gradually become the EU authority responsible for issuing authorisations for placing railway vehicles on the market, for single safety certificates for railway undertakings, and for ERTMS trackside approvals across the EU.

Considering the **transport of dangerous goods (AP 20)**, the main action involved the adaptation to scientific and technical progress that was addressed by Directive 2012/45/EU.

5.1.5 Service quality and reliability

Moving to actions to promote service quality and reliability, under **AP 21 (Passengers' rights)**, the Commission took action to improve the legal framework for passenger rights and facilitate the application and enforcement of the legislation. Proposals to improve air and rail passenger rights have been tabled and the proposal for rail passenger rights was approved by the co-legislators in October 2020. The proposal for air passenger rights has not yet been approved.

Despite the actions taken in relation to rights to information, assistance and financial compensation in case of denied boarding, long delays, service cancellation and passenger safety, a number of studies observed that passengers are still insufficiently aware of their rights[14]. Due to enforcement shortcomings, passengers often do not obtain the support or compensation they are entitled to. This is a result of different interpretations of provisions of the passenger rights Regulations covering air, rail, bus and coach, and waterborne transport (despite the issuing of guidance by the Commission), and variations in enforcement practices across Member States.

The Commission conducted studies reporting the implementation of existing regulations on passenger rights in bus and coach transport and on waterborne transport. It conducted a study to identify best practices on the carriage of persons with reduced mobility (PRMs) that identified good practices in the implementation of the legal framework (CERTH , Ramboll , Transport & Mobility Leuven, 2019). The Commission also conducted a study on passenger rights in a multimodal context to support the identification of appropriate mix of policies to support passenger welfare (EY, 2019).

Concerning the **promotion of Seamless door-to-door mobility (AP 22)**, five delegated acts have been adopted since the entry into force of the ITS Directive 2010/40/EU. The Commission Delegated Regulation (EU) 2017/1926 on the provision of EU-wide multimodal travel information services was adopted in October 2017.

In addition, a new work programme of the ITS Directive was adopted in December 2018 including, among others, two new activities: extension of the scope of the delegated act on ITS specification for real-time traffic information to urban areas; and an activity on ticketing.

[14] Including a report by the European Court of Auditors (European Court of Auditors, 2018)

Concerning the **development of Mobility continuity plans (AP 23)**, the Staff Working Document (SWD(2014) 155 final of 07/05/2014) on the continuity of passenger mobility following the disruption of the transport system, concluded that there was no need for a specific new legislative initiative at the European level. However, the issue of mobility continuity should have been taken into consideration in relation to rail and air, when adopting the proposals in 2013 (air) and 2017 (rail).

5.2 Strategic area 2 - Innovating for the Future – technology and behaviour

5.2.1 A European transport research and innovation policy

The first set of actions **(APs 24 and 25)** in this area focused on the **development of a technology roadmap and an innovation and deployment strategy** across a broad range of thematic areas. They cover:

- The development of vehicle technology (fuel efficiency, pollutant emissions, safety).
- The development of supporting alternative infrastructure (i.e. for electromobility, hydrogen).
- Technologies to improve security and safety across all transport modes; development of new or unconventional transport systems (unmanned aircraft, etc.).
- Development of integrated transport management and information systems.
- Intelligent infrastructure and innovations for sustainable urban mobility.

At the broader policy/strategy level, the Commission adopted a number of relevant documents. This included the Clean Power for Transport package (COM(2013)17), which laid out a comprehensive European alternative fuels' strategy.

As part of the Strategic Transport Research and Innovation Agenda, the Commission adopted roadmaps for the development and deployment of relevant technologies in the above thematic areas.

The Commission's communication (SWD(2017) 223) elaborated on the contribution of Transport Research and Innovation to the Mobility Package objectives.

On the practical side, the implementation of EU R&D funding programmes (FP7 and Horizon 2020) has been used to support progress with technological and non-technological innovation. Horizon 2020 had a budget of €77 billion for the 2014-2020 period with transport-related activities covered in a number of categories and a total budget (2014-2020) of €6.3 billion. The Horizon 2020 Work Programmes included specific research topics and Innovation Actions on alternative powertrains for road, maritime, ITS, ICT infrastructure, and smart electric mobility in cities, and urban mobility solutions.

Within the context of the R&D programme, the Commission supported a number of collaborative Research and Innovation Partnerships such as the European Green Vehicles Initiative, Shift2Rail, SESAR, Clean Sky, and the Fuel Cells and Hydrogen Joint Undertaking. Most of these actions have already been completed (in the sense that that relevant EU level action has been taken and that the relevant instruments/projects are in the implementation stage).

Targeted support for the deployment of alternative fuel infrastructure and ITS infrastructure and services across the different parts of the TEN-T network came via CEF-Transport.

In addition to the financial support instruments, specific action was also taken to **strengthen the regulatory framework for innovative transport (AP26).** Actions included the adoption of more stringent CO2 emission standards for new passenger cars and for new light commercial vehicles (vans) in the EU for the period after 2020 (Regulation (EU) 2019/631), and the introduction of similar standards for heavy-duty vehicles (Regulation (EU) 2019/1242). Both Regulations are technology-neutral and are designed to incentivise the uptake of zero- and low-emission vehicles.

Vehicle standards for noise emission levels were adopted as part of Regulation (EU) 540/2014 to reduce noise produced by cars, vans, buses and coaches (adopted on 16 April 2014).

Besides the emission limits, the Commission also introduced changes to the type approval legal framework. This included more demanding testing procedures, revising the test cycle (adopting the WLTP) and aiming to capture real driving emissions (RDE test procedures) and to reduce the gap between the type approval emissions and real world emissions of vehicles.

Action was taken in relation to charging/refuelling infrastructure to support the uptake of alternative fuelled vehicles in the context of the Alternative Fuels Infrastructure Directive (2014/94/EU) including the adoption of relevant technical standards for normal and fast charge recharging points for electric vehicles.

Commission Delegated Regulation (2019/1745) addresses recharging points for L-category motor vehicles, shore-side electricity supply for inland waterway vessels, hydrogen supply for road transport and natural gas supply for road and waterborne transport.

Similarly, progress was made in the area of Intelligent Transport Systems. In the context of the ITS Directive, this included the development of standards for communication between vehicles and infrastructure. Through work from the two EU standardisation bodies (ETSI and CEN) and the C-ITS platform (established in November 2014), standards and relevant specifications were developed to support day-1 C-ITS services deployment.

Relevant legislation was adopted to facilitate the development of an interoperable EU-wide eCall service. In order to support access to transport data for safety and security, two Delegated Acts were adopted: Commission Delegated Regulation 886/2013 on the provision of road safety-related minimum universal traffic information; and Commission Delegated Regulation 885/2013 on the provision of information services for safe and secure parking places for trucks and commercial vehicles.

Further development (e.g. for new services) is ongoing in the context of the ITS, albeit at a different pace.

5.2.2 Promoting more sustainable behaviour

Under AP 27 (Travel information), the Delegated Regulation 2017/1926 on the provision of multimodal travel information services was adopted in 2017 and is expected to help increase awareness of alternatives to individual conventional transport. It is also supported by projects on this topic, under Horizon 2020 and CEF.

In addition to the updated CO_2 standards mentioned previously, the White Paper identified measures to support to **uptake of fuel-efficient, safe vehicles and low-noise tyres (AP 28)**. In that respect, work has been ongoing for the revision of the car labelling Directive 1999/94/EC to enhance its relevance and effectiveness. Progress has been relatively slow, and the revision of the Directive is still on-hold. However, Recommendation (EU) 2017/948 sought to improve car labelling by supporting Member States to make full use of the new test procedure (WLTP) in a coordinated way, to provide improved

information to consumers, and encourage Member States to make air pollution related information available to consumers.

In relation to tyres, as part of the Low Carbon Mobility package in May 2018, the Commission presented a proposal (COM(2018) 296 final) to update the tyre type-approval requirements in General Safety Regulation (EC) 661/2009 for lower rolling resistance, rolling noise and wet grip safety. While the updated Regulation has not been adopted, an agreement was reached in November 2019 between the European Parliament, the Council and the Commission.

Concerning the development of Carbon footprint calculators (AP 29), there has been some progress made (e.g. European CEN standard EN 16258 focused on carbon footprint measurement of transport services) towards a 'Standardised methodology for carbon footprint calculation and business-based GHG certification schemes' but work is still ongoing. Private and public-private initiatives monitoring GHG emissions from transport services still use different methodologies, mostly covering one transport mode and focusing on self-assessment rather than benchmarking of different operations. The results of EU funded RTD project LEARN are expected to support the work of a working group of the International Standards Organisation that aims at establishing a global standard for transport and logistics emissions calculation.

The recast of the driving licence Directive 2006/126/EC was intended to include also eco-driving requirements for buses and trucks was finalised in 2012.

In the context of the revised General Safety Regulation 2019/2144, new mandatory safety features for vans (and also cars, trucks and buses) included intelligent speed assistance (ISA) devices.

5.2.3 Integrated urban mobility

In the case of the development of **urban mobility plans (AP 31),** work is still ongoing. The Commission has focused on supporting Member States and local authorities by developing guidelines and supporting the dissemination of knowledge exchange and good practices for the development of Sustainable Urban Mobility Plans (SUMPs).

Support for the development of SUMPS was part of the implementation of the Urban Mobility Package (COM(2013) 913) adopted in 2013. The Urban Mobility Package set out how the Commission would strengthen its actions on sustainable urban mobility in areas where there is EU added value and in coordination with Member States.

Support has been in the form of EU project funding (such as the CIVITAS SUMPs-Up project) and information dissemination via ELTIS, the Urban Mobility Observatory.

Areas where there has been limited progress are: cities access to EU funding being linked to cities having developed a SUMP; and urban mobility audit certificates, which have not been developed at the EU level.

Concerning the development of an **EU framework for urban road user charging (AP 32)**, the European Commission completed an action to publish six non-binding guidelines in 2017 to encourage a common approach to the design and implementation of Urban Vehicle Access Regulations (UVARs) schemes. The aim being to avoid fragmentation and to ensure a seamless transport system.

The implementation of the strategy for near "zero-emission urban logistics" 2030 **(AP 33)** has not yet started. However, the EC developed in 2019 'Best-practice guidelines for monitoring urban freight flows' aimed at public authorities responsible for the management

of traffic and transport infrastructure within urban areas. The revision of the Clean Vehicles Directive (see AP 25) should also be expected to contribute in this respect.

5.3 Strategic area 3 - Modern infrastructure, smart pricing and funding

5.3.1 Transport infrastructure: territorial cohesion and economic growth

The Commission set out its strategy for the development of the **Trans-European Transport Network (TEN-T Network) (AP 34)** in the Communication on Building the Transport Core Network COM(2013) 940 that was adopted in 2014. This built on the TEN-T Network Regulation adopted a year earlier (2013), providing Union guidelines which set an EU-wide framework for transport infrastructure enhancement across all Member States. The Communication and Regulation enable the coherent identification of projects of common interest and give direction to transport investment.

The Regulation establishes a legally binding obligation to develop the so-called "Core" and "Comprehensive" TEN-T Networks. The TEN-T Regulation covers all transport modes and connections between them (ports, airports and other transport terminals). It sets standards and requirements to be met along the whole network, and it includes smart and innovative components to facilitate efficient infrastructure use and high-quality services.

Work is ongoing, with the most important part of the TEN-T network expected to be completed by 2030 within the EU, as well as through the extension to neighbouring regions (following high-level agreements with European Economic Area countries, Switzerland, Eastern Partnership and Western Balkans and the ongoing preparatory work with the Southern Mediterranean partners). Funding to support the implementation of the TEN-T has also been provided via the CEF, as well as through the structural funds.

In addition, some progress was made in terms of the deployment of large-scale intelligent and interoperable technologies (SESAR, ITS, ERTMS). This included the adoption of the SESAR Pilot Common Project, the SESAR Deployment Programme (Regulation (EU) (2013) and the new ERTMS European Deployment Plan (EDP) (2017).

In terms of the **promotion of the multimodal freight corridors (AP 35),** the relevant provisions were adopted as part of the TEN-T Regulation adopted in 2013, along with a provision for financial support as part of CEF. The Commission completed a number of studies to support policy development and identify appropriate financial tools in this area.

The Commission also developed a 'Guide for Cost-Benefit Analysis of Investment Projects' as part of the TEN-T Regulation, and a process for streamlining **ex-ante project evaluation criteria (AP 36).**

Provisions to support the screening of Public Private Partnership projects to be financed under CEF were adopted in 2018. Work is ongoing towards streamlining procedures for projects of overriding European interest, with one relevant study completed in 2018.

5.3.2 A coherent funding framework

The Commission completed a number of initiatives to **develop a more coherent funding framework (AP 37**) to support the completion of the TEN-T core network and decarbonisation. It established the CEF for transport within the context of the MFF 2014 – 2020. It has also adopted provisions to support the development of a multimodal Single European Transport Area in both the ERDF Regulation and in the Cohesion Fund Regulation. This included ex-ante conditions for receiving financial support from the Cohesion Fund and European Regional Development Fund, requiring Member States to develop a comprehensive framework for transport investments in the form of a comprehensive transport master plan.

The White Paper initiatives have been completed in support of **private sector engagement (AP 38)**. The CEF Regulation introduced new financial instruments (through the European Fund for Strategic Investments) together with existing ones (Loan Guarantee Instrument for the TEN-T projects (LGTT) or the European Project Bonds Instrument) to boost the support of private finance and capital markets in general for sustaining investment in long-term transport infrastructures.

Whilst the Commission has adopted several Regulations relevant to **smart pricing and taxation (AP 39)**, most of the initiatives identified in the White Paper relevant to this Action Point on are ongoing.

The Commission brought forward a proposal to revise the Eurovignette Directive, as part of the first Mobility Package. However, discussion with the European Council is still ongoing and the proposal has yet to be adopted.

The European Commission adopted several Regulations to support the internalisation of external costs of transport. These included Regulation 598/2014 on noise-related operating restrictions at airports, Regulation (EU) 2015/757 on Monitoring Reporting and Verification mechanism for CO_2 emissions from maritime transport, and Commission Implementing Regulation on Noise Differentiated Track Access Charges 2015/429.

Initiatives by the Commission in relation to taxation have not made much progress, primarily due to the different views of Member States on such issues. Thus, the proposed revision of motor fuel taxation was withdrawn in 2015, while the proposal for full and mandatory internalisation of external costs from transport activities has experienced long delays. In relation to VAT for transport, a new initiative is planned on passenger transport with the timing set for 2022.

5.4 Strategic area 4 – External dimension

Although most of the initiatives are still ongoing, progress has been made in a number of areas in relation to the **external dimension (AP 40)**.

At the policy/strategy level, the Commission published in 2011 the Communication "The EU and its neighbouring regions: A renewed approach to transport cooperation" and in 2012 "The EU's External Aviation Policy - Addressing Future Challenges".

At the operational level, the Commission has continued its work in extending internal market rules via international organisations (IMO on Energy Efficiency Design Index and in relation to maritime security; ICAO in relation to the CORSIA system). Furthermore, it pursued bilateral agreements on maritime transport (with US, Japan, Brazil and Norway), and rail (with Brazil), with a number of aviation agreements completed (Western Balkans, Morocco, Jordan, Georgia, Moldova and Israel, and negotiations have been finalised with Ukraine) or in progress (ASEAN, Oman, Azerbaijan and Turkey).

In the case of road transport, the Commission defined in cooperation with a number of neighbouring countries (Armenia, Azerbaijan, Belarus, Moldova and Ukraine (November 2017) and Georgia) the core network that was included in the 2014 TEN-T Regulation. Similarly, the core and comprehensive networks of the West Balkan countries were incorporated into the TEN-T Regulation in 2016.

Since 2013, work has been ongoing in identifying a Trans-Mediterranean Transport Network (TMN-T) as an extension of the TEN-T network, covering both road and maritime transport.

In the R&D area, SESAR and NextGen (US) cooperation has made progress with specific applications (e.g. green procedures tested under the collaboration project Atlantic

Interoperability Initiative to Reduce Emissions) already implemented into 'day-to-day operations'.

6 ANSWERS TO THE EVALUATION QUESTIONS

6.1 Effectiveness

6.1.1 EQ1: What progress has been made towards the objectives (both general and specific) and the headline goals of the White Paper?

6.1.1.1 Introduction

This question is intended to set the background for the evaluation, by examining the overall observed progress achieved towards the objectives and headline goals set by the White Paper, and to show the progress made so far due to the White Paper in combination with other EU policies in other sectors.

The question therefore assesses the progress towards the **specific objectives** of reducing GHG emissions from transport, decreasing oil dependency and limiting congestion.

In addition, it evaluates the progress towards the **ten headline goals** set to achieve the reduction of GHG emissions from transport by 60% by 2050 compared to 1990 levels.

The analysis also attempts to measure progress in the achievement of the **other objectives** of the White Paper in terms of accessibility (i.e. satisfaction of mobility needs for passengers and freight), equity (i.e. promoting high quality employment and equity within and between successive generations), provision and quality of transport services (i.e. offering affordable, reliable, safe and secure transport services) and minimization of the external costs of transport operations (i.e. from accidents, noise and air pollution).

The answer to the evaluation question draws on observed statistics, desk research, and stakeholder consultations.

It is worth clarifying that this question is intended to provide a description of the status-quo and not to discuss the impact of the policies and measures of the White Paper. The impact of the White Paper is discussed in EQ2 (estimated contribution by 2030 and 2050) and in EQ3 (estimated contribution by 2018).

6.1.1.2 Main findings

<u>Current progress towards the specific objectives</u>

The specific objective for **emissions from transport** (including international aviation but excluding international shipping) is, by 2050, to reduce emissions to a level that is 60% below that of 1990. This includes the intermediate goal for 2030 of reducing GHG emissions from transport by 20% compared with 2008 levels. Similarly, emissions from international shipping are to be reduced by 40% from 2005 levels by 2050. It is to be noted that the White Paper does not assume a linear trajectory of emission reductions, but expects increased decarbonisation efforts after 2030, with cleaner and more efficient technology becoming gradually more widespread.

EEA data[15] show that, in 2018, GHG emissions from transport in the EU27 (including international aviation but excluding international shipping) were still 32% above 1990 levels and that, to meet the 60% greenhouse gas emission reduction goal of the 2011 Transport White Paper, they need to fall by two-thirds by 2050.

Nonetheless, despite a decline between 2008 and 2013, **GHG emissions from the EU transport sector** (including aviation and excluding international shipping) **have been increasing since 2014 in the context of a period of low oil prices** (European Commission, 2019)**.**

The trend in emissions is in line with transport activity of both passenger and freight, which plateaued between 2007 and 2013 and grew up again from 2014 onwards (see Figure 1-1 in Annex H) (European Commission, 2020).

In 2018 the transport sector (including aviation and excluding international shipping) was responsible for 25% of total GHG emissions in the EU-27. This figure rises to 27% if international shipping is included. Road transport is the largest contributor in the sector, being responsible for almost 82% of GHG emissions from transport (excluding international maritime); of these, 60% were from passenger cars, 12% from light duty trucks and 27% came from heavy-duty trucks and buses.

In comparison to 1990 levels, GHG emissions from international aviation more than doubled (+141%), followed by increases in international shipping (36%) and road transport (27%) emissions (European Commission, 2019).

Compared with 2005, EU27 GHG emissions from international shipping were 10% lower in 2018. However, they will need to decrease by 56% by 2050 in order to meet the White Paper EU goal of a 40 % reduction in emissions from 2005 levels.

Although slightly but gradually decreasing from 98% in 1990 and 95% in 2010, **the oil dependency of the EU27 transport[16] sector is still high**. In 2018 the EU27 transport sector was dependent on oil for 93% of its energy needs. Gas oil and diesel were the most consumed fuels in 2018, with an 8% increase above 2011 levels (Eurostat, 2021).

The increase in the use of electricity and biofuels in transport has been the main determinant of the decrease in oil dependency in recent years. Although still limited, the share of biofuels increased by 21% in the 2011-2018 timeframe. The use of electricity in transport registered a limited growth of about 2.2% during the same period (Eurostat, 2021).

Congestion is still responsible for high social and economic costs. For the year 2016, delay costs in the EU27 accounted for about €230 billion whereas deadweight loss accounted to €32 billion[17] (European Commission, 2019).

Being generally limited in inter-urban areas, road congestion is mainly an issue for urban areas and a few bottlenecks in Europe. The evidence collected shows that **urban road congestion has generally grown during the last decade**. From 2013 to 2018 congestion increased on average by between 5% and 16% in several European cities. Rome, Berlin and Paris were among the most congested cities in 2018. In terms of hours

[15] https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer

[16] Including international maritime transport

[17] The delay cost gives a value of the travel time lost relative to a free-flow situation. The deadweight loss costs is the part of the delay costs which is regarded as a proper basis for transport pricing

lost yearly in congestion, the ranking places Rome first in the EU (254 hours/year), followed by Paris (237 hours/year) and Berlin (154 hours/year) (Tom-Tom, 2018).

Congestion does not only affect the road sector, but also air transport. Between 2014 and 2017 the share of delayed flights on departure grew from 37.4% to 44.4% (Airbus, 2014). As estimated by EUROCONTROL, total costs for delays in the ECAC (European Civil Aviation Conference) countries in 2018 was approximately €14.5 billion, mainly due to air traffic control staff shortages, capacity issues, strikes, bad weather and technical issues (European Commission, 2019).

Current progress towards the 10 headline goals

The passenger car fleet in the EU is still dominated by petrol and diesel cars. In 2019 the share of petrol cars in the fleet was 52.9% while the share of diesel cars was 42.3% (ACEA, 2019).

Although generally increasing, cars powered by alternative fuels (AFVs) still make up only a small share of the total passenger fleet and have a low registration rate compared to conventionally fuelled vehicles. The number of new registered passenger cars powered by alternative fuels (AFVs) grew from 2.5% in 2011 to 9.2% in 2020 (up to 30 October), with a strongly increasing trend since 2018, especially for Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicle (PHEVs).

Main determinants of this increment were the introduction of CO2 standards for cars and government incentives in terms of tax reductions, subsidies and access or parking privileges granted to low-emissions vehicles. The automotive industry has also contributed to this aim, providing consumers with various AFVs models at relatively competitive prices (Eurostat, 2019). However, incentives are mainly at individual country level and, as a result, sales are unevenly distributed across Europe.

The uptake of electric vehicles was also supported by an increasing availability of charging points, mainly on urban streets, pushed by the Directive on the Alternative Fuels Infrastructure. According to EAFO, the number of public charging points for electric vehicles increased exponentially between 2011 and 2020. In 2011, only 2,379 normal (<=22kW) charging points existed in the EU27, whereas by 2020 the number of normal charging station (<=22kW) grew to 175,318 and the number of fast charging stations (>22kW) deployed amounted to 19,543. As of 2020, the Netherlands with 58,275 charging points, is the country with the largest number of public charging points in the EU 27, followed by Germany (40,524) and France (37,646) (EAFO, 2020).

As regards the goal of halving the use of conventionally fuelled cars in urban transport, 10 out of 24 authorities surveyed in the context of the study admitted to not having adopted any new measures since the adoption of the White Paper in 2011 (see Annex C). More specifically, while regional authorities admitted lagging behind (only 2 out of 8 regional authorities registered measures to halve the number of conventionally-fuelled cars in cities), a slight majority of national authorities (7 out of 16) considered adopting relevant measures.

Hundreds of European cities have urban vehicle access regulations. Entry can depend on vehicle emission, vehicle types and other factors. However, these entry regulations are often under the prerogative of local (not regional) authorities which have not been surveyed for this evaluation.

Urban freight transport accounts for 10% to 15% of total kilometres travelled, for about 25% of urban transport GHG emissions, and for 30% to 50% of other transport related pollutants such as PM and NOx (European Commission, 2017).

The number of buses in the EU that are powered with alternative fuels has increased from 3,500 in 2011 to 28,000 in 2020 (although not exclusively in urban areas). Against this background, **cities are slowly moving towards CO_2-free city logistics**, an objective that the Commission planned to achieve by 2030, and city logistics fleets are still dominated by Internal Combustion Engine Vehicles (ICEV).

According to ACEA, the market for new light commercial vehicles in 2018 was dominated by diesel-powered vehicles (91.2%), whereas gasoline (7%), natural gas (1.3%) and Battery Electric Vehicles (0.3%) were very limited (ACEA, 2019). Even if not supported by statistics, the prevailing opinion among stakeholders (22 out of 39 interviewees) is that some progress has been made towards CO_2-free city logistics in some European cities, however it is not enough for achieving significant levels of decarbonisation. Improvements largely differ from city to city and between Member States.

Progress has been triggered either by city regulation, or by the industry itself. Large freight companies are able to invest significant amounts in cleaner logistics and are actively involved in research and development. Smaller companies are struggling to restructure to become more sustainable businesses. Moreover, the exponential growth of e-commerce, especially since the insurgence of the COVID19 pandemic, has led to increasing shipping demand, putting notably the last-mile segment under strain.

After road transport and waterborne transport, aviation is the third largest source of transport-related GHG emissions. According to EEA data, in 2018 aviation was accountable for 3.6% of the total EU27 greenhouse gas emissions and for 13.2% of the emissions from transport. Between 2011 and 2018 emissions from air transport in the EU27 have increased by 22%.

The aviation sector is still dominated by kerosene. According to Eurostat, the consumption of kerosene by the air transport sector in the EU27 increased by 21% in the period 2011-2018. In recent years, the introduction of sustainable biofuels and electro fuel gained interest. Blended bio-fuels (a combination of kerosene and bio-fuels) are nowadays being employed in regular flights in Europe, although making up a very low share of total fuel uplift (IEA, 2019). In 2018, global bio-fuel production accounted for 15 million litres, hence only 0.1% of total aviation fuel consumption (IEA, 2019). Currently, only three airports in Europe have regular biofuel distribution (IEA, 2019).

One of the barriers to market penetration of biofuels is the cost differential with kerosene, which renders many sustainable fuels not yet competitive. Innovation efforts are also being directed at the production of fuels from non-biogenical sources (ICAO, 2017) although their cost is even higher than that of biofuels.

GHG emissions from international maritime transport in the EU27 in 2018 were 8% lower relative to 2011 (EEA, 2020). However, an increase of about 9% has been registered between 2015 and 2018 due to an increase in maritime transport activity, also linked to increased trade.

Road transport remains the dominant mode of transport for inland freight. In 2018, road transport has accounted for 75% of the total inland freight transport (based on tonne-kilometres performed). The share of road has constantly increased between 2013 and 2018. By contrast, the share of rail in the inland transport performance has remained relatively stable since 2013 and below 20%. Between 2013 and 2018, the share of inland waterways in EU freight transport has constantly decreased from 7.4% to 6.0% (Eurostat, 2020).

The length of high-speed rail lines in the EU27 increased between 2010 and 2018. Specifically, **2,634 km of new lines were added to the 2010 European high-speed rail network,** increasing the overall length of the high-speed network to 8,839 km in 2018

(Eurostat, 2020). This figure shows that whilst Member States are seeking to reach the objective of completing a European high-speed rail network, efforts have so far resulted in limited improvements. **The current extensions to the network represent about 50% of what would be expected if to triple the length by 2030 (a total network length of approximately 19,000 km).**

Although the performance of high speed passenger rail increased by 22% growing from 103.7 in 2011 to 126.09 billion pkm in 2018 (Eurostat, 2020), the **share of passenger transport activity performed with high speed trains on total rail transport increased** by 2.5% p.p. between 2011 and 2018. However, over the same period the performance of rail passenger transport in terms of passenger-kilometres travelled has increased by 11.2%, more than the average for all passenger transport modes (9.2%). The respective performance increases of passenger cars and aviation have been 7.6% and 39.1%. In the modal split for passenger transport, passenger cars are still by far the most important transport mode (Eurostat, 2020).

When looking at passenger modal split over medium / long-distances (i.e. between 300 km and 1,000 km), in 2018 private cars were still the dominant transport mode in the EU27. Train is the second most used mode; however high-speed rail comes after coach and is in direct competition with plane.

Table 6-1: Modal split of passenger trips between 300 and 1,000 km, 2018, EU27

	Car	Conventional train	Coach	HS Train	Plane	Ship	Motor-cycle	Car - ride sharing
Business	70.5%	10.9%	6.6%	3.3%	6.1%	0.7%	0.6%	1.4%
Non-business	73.2%	9.4%	5.2%	3.2%	5.5%	0.8%	1.4%	1.3%

Source: JRC, EU Survey on issues related to transport and mobility 2018

About 126,700 km of core network infrastructure is included in the framework of the EU-wide multimodal TEN-T comprehensive network. In August 2020 the Commission published a report on implementation of the TEN-T network in 2016-2017 (European Commission, 2020). It concludes that, in terms of compliance with the TEN-T Regulation requirements, the network of the Core Network Corridor (CNC) reaches between 81% and 100% for most (10 out of 13) of the available indicators. The increase in compliance at CNC level can be extrapolated to the Core and Comprehensive Network.

According to the recent progress report on the implementation of the TEN-T network in 2016-2017 (European Commission, 2020), as far as airports are concerned, the TEN-T Regulation defines that the core airports fall under the obligation to be connected with the railway infrastructure of the trans-European transport network by 2050. In this regard, the compliance rate is at 67% per 2017 data. Airports not yet compliant are scattered across the EU, indicating a common need to achieve full airport connectivity.

Compliance in the connection of maritime ports to rail is at 89% per 2017 data. Non-compliance concerns only 14 ports, more than half of them in southern Member States including Italy and Greece. It needs to be underlined that the TEN-T standard only refers to a connection by rail and does not state anything about the quality of such rail connection. Therefore, there might be still limitations, e.g. with regard to the last mile connection of a port, even if formally that port is compliant with the TEN-T standard.

143 projects have been completed so far under the two SESAR deployment programmes ('SESAR 1' (2008-2016) and 'SESAR 2020'). 202 SESAR projects are still ongoing (SESAR Deployment Manager, 2020). These figures however refer to the implementation of only a

subset of SESAR projects that are coordinated by the SESAR Deployment Manager. Many other projects are currently deployed outside of that manager's coordination.

A number of the above mentioned SESAR projects were mandated for synchronised deployment as part of the EU's Pilot Common Project (PCP). To measure the progress of PCP implementation activities, the Deployment Manager tracks the coverage of existing implementation gaps, specifically the number of "covered" (or "closed") gaps over the years. A closed gap means no further activities are needed to ensure the functionality of the implemented solutions.

The deployment of the European Railway Traffic Management System (ERTMS) has advanced over the years. European countries (including the EU, the United Kingdom, Switzerland and Norway) have so far put in operation the European Train Control System (ETCS) on some 8,850 km of tracks, most of them equipped also with GSM-R, of which 69% belong to Core Network Corridors. This means that almost 7% of the 128,300 km of European comprehensive network are currently in operation with ERTMS technologies (TENTec, 2020).

According to a recent evaluation of the River Information System (RIS) Directive[18], RIS technologies have been implemented in all relevant Member States with some degrees of difference in relation to their conformity to the standards prescribed by the Directive (Ramboll et al., 2020). Discrepancies exist in the extent of utilization of RIS technologies among Member States and river corridors, especially between the traditional more advanced riparian states in the Rhine region, and those less developed in the Danube region (Ramboll et al., 2020).

Services offered by the European Geostationary Navigation Overlay System (**EGNOS**) already cover almost 99% of the EU, Norway and Switzerland. In 2016, 93 European airports had EGNOS procedures at an operational status (European Commission, 2017).

In accordance with requirements of Article 17(1) of the Directive 2010/40/EU, Member States have provided national reports on ITS implementation. According to the reports and to national authorities, as of 2017, all 28 Member States have adopted specifications to ensure **multimodal transport information and ticketing**. In 2011, only 7 Member States had adopted such a specification.

According to a 2019 study (VVA et al., 2019), full EU-wide integration of ticketing schemes has not been achieved, hence it is still not possible to purchase integrated tickets for multimodal journeys across Europe. The study shows that the development and implementation of integrated ticketing schemes is still heterogeneous across Member States and may diverge significantly throughout regions of the same country. Barriers and challenges to an EU-wide integration of ticketing schemes are mainly related to data access and cooperation between stakeholders.

The number of road deaths in the EU decreased by 43% between 2001 and 2010 and by another 23% between 2010 and 2019. This shows that progress in reducing road fatalities in Europe has slowed down in recent years. In 2019, 22,800 people lost their lives on EU roads and about 135,000 were seriously injured. **The mid-term goal of halving the**

[18] Directive 2005/44/EC of the European Parliament and of the Council of 7 September 2005 on harmonised river information services (RIS) on inland waterways in the Community, OJ L 255, 30.9.2005, p. 152–159.

number of road deaths between 2010 and 2020 is unlikely to be met (European Commission, 2019).

External costs of transport refer to the difference between social costs (i.e. all costs to society due to the provision and use of transport infrastructure) and private costs of transport (i.e. the costs directly borne by the transport user).

The external and infrastructure costs of transport are, without policy intervention, generally not borne by the transport users and hence not taken into account when they make a transport decision. The internalisation of external and infrastructure costs by using market-based instruments (e.g. taxes, charges, emission trading) is one of the leading principles of the EU's transport policy. By internalising the external and infrastructure costs (i.e. making these costs part of the decision-making process) the efficiency of the transport system can be increased.

This concept is at the basis of **the application of "user pays" and "polluter pays" principles** which, however, **are still far from being achieved.** The EC study 'State of play of Internalisation in the European Transport Sector' (European Commission, 2019) examined the application of the "user pays" and "polluter pays" through the cost coverage ratio for each mode of transport, namely how much external and infrastructure costs are covered by taxation and other charges.

The study clearly indicates that total external and infrastructure costs of transport are only partly covered by current taxes and charges. If fixed infrastructure costs are excluded, internalisation of external costs is higher in rail (69%) and road transport (56%), compared to aviation (37%), Inland Waterway Transport (12%) and maritime transport (4%). If fixed infrastructure costs are included, internalisation of external costs is higher in the road sector (45%), followed by the aviation sector (30%) and the rail sector (20%). (European Commission, 2019).

Stakeholders interviewed during the course of the study agreed that there has been limited progress on the application of the 'user pays' and 'polluter pays' principle in the last decade since initiatives were launched quite late or faced strong opposition in their adoption. Only small and very country-specific improvements in the application of the principles have occurred.

Current progress towards other objectives

Evidence from stakeholder consultations (surveys and interviews) shows that a large majority of respondents consider that some improvements on accessibility of transport services to individuals and companies occurred since the launch of the White Paper. Figure 7-4 of Annex C shows that out of 58 respondents, 34 noted a slight improvement, eight considered this improvement as significant, while two pointed out a slight deterioration. All 18 respondents from national and regional authorities agreed on an improvement, while industry organisations only disagreed by one respondent, with similar results from civil society and research organisations.

In this regard, one stakeholder from the railway industry noted that steps have been taken towards linking (high speed) train travel with major airports. In addition, although a proper European framework for multimodal transport information, management and payment system still appears some way off, some railway companies and airlines have started offering tickets covering both services within the same booking process.

Views are still significantly positive as regards the accessibility of peripheral regions (see Figure 7-5 of Annex C): out of 57 respondents, 23 identified a slight improvement, three considered this improvement as significant, and three identified a slight deterioration. All national and regional authorities supported progress on the matter. As for industry

organisations, all except two of them share the same positive viewpoint. Civil society and research organisations spotted less progress though, with three respondents believing in no change, and three respondents pointing out a slight improvement.

One representative of regional authorities points out that, compared with the situation in 2011, there has been an improvement of regional train connections with a wider choice of connections. The rise of flexible bus services operated by private companies has been a good new addition to transport services.

For people with special needs, slight to significant improvements to accessibility of transport services have been identified by most respondents, with industry organisations unanimously supporting this statement (see Figure 7-6 of Annex C). Improvements in the accessibility of rail are attributed by stakeholders to Regulation (EU) 1300/2014, and with the extension of its scope beyond the TEN-T network and the inclusion of the accessibility of stations (ramps, information etc.), besides the accessibility of rolling stock.

Employment in the transport sector has increased by 11% between 2011 and 2019 in the EU-27 (Eurostat, 2020). The share of alternative employment forms has not changed during the same timeframe[19]. Gender equality among employees of the transport sector is not yet a reality. Between 2011 and 2019, the share of women employed in transport remains low as a proportion of total employees (around 22%). That proportion has not increased over those years (Eurostat, 2020).

Stakeholders' views on the progress made in relation to the **quality of working conditions** for those occupied in the transport sector since 2011, are quite mixed: out of 61 respondents, 20 noted a slight to significant improvement, 11 noted no change, seven noted a slight deterioration, two noted significant deterioration and 21 did not express an opinion. Some stakeholders indicated a deterioration of working conditions (e.g. for workers of low-cost airlines and those involved in cabotage) as a side-effect of increased competition due to the liberalisation of transport markets.

The **level of affordability of transport services** remained stable between 2011 and 2018 in the EU27. Both the share of total household income spent on transport-related goods and services, and the unit costs of transport modes, have generally remained unchanged (Eurostat, 2019).

Transport services in the EU27 are relatively high performing. On average, the Market Performance Indicator (MPI) grew from 75.8 in 2013 to 79.1 in 2017 (European Commission, 2014) (European Commission, 2016) (European Commission, 2018). Consumer satisfaction is high with rail and air transport services. The MPI of rail services was 71.1 in 2013 and 76.8 in 2017, whilst that of air transport grew from 78.9 in 2013 to 82.2 in 2017 (European Commission, 2013) (European Commission, 2015) (European Commission, 2017).

Passengers' satisfaction in the EU (with the exclusion of Malta and Cyprus) is high for both rail and air transport services. Satisfaction with rail services is high with the overall ease of buying tickets and the quality of information about timetables and platforms (respectively 75% and 74% of users in 2018 were either satisfied or very satisfied, losing 4 and 2 percentage points compared to 2011 levels) (European Commission, 2018).

[19] Study team elaboration on Eurostat data. The number of self-employed, temporary employment and total employment in the transport sector have been taken from separate Eurostat datasets. These have been combined to calculate the share of alternative employment forms in the transport sector.

Between 2011 and 2018, satisfaction with availability of seats, availability of parking facilities for cars and bikes at stations, cleanliness and maintenance of stations, overall ease and accessibility of complaint handling has been generally improving.

Users have been losing satisfaction with the quality of information on connecting services with other modes, frequency of trains, punctuality and reliability, provision of information during the journey, and assistance on trains (Eurobarometer , 2011) (Eurobarometer, 2013) (Eurobarometer, 2018): in 2018 only 64% were happy with the availability of tickets for journeys using several trains, and 62% for journeys using several transport modes.

Evidence from the stakeholder consultation shows a general positive assessment of the progress made on the overall **quality of transport services** since 2011. Out of 70 respondents, 36 noted a slight improvement, and six even highlighted a significant improvement, with enhancements often enabled by new digital technologies.

The safety and security of transport services have been assessed positively by stakeholders engaged within the study, with 32 out of 65 identifying slight improvements and 13 significant improvements since 2011. Only four respondents identified deterioration.

In 2016, **external costs of transport** varied substantially across modes. Considering all categories (accidents, air pollution, noise pollution, climate impact and habitat damage), road (passenger and freight) caused the highest external costs across transport modes. In passenger transport, road external costs accounted for 4.3% of EU27 GDP, whereas those of aviation for 0.3% and rail for 0.1%. In freight transport, external costs of road were 1.4% of EU27 GDP, 0.04% for rail and 0.03% or aviation. External costs of maritime transport as a whole accounted in 2016 for 0.7% of EU27 GDP (European Commission, 2019).

The stakeholders consulted had a mixed opinion on how external costs to society have changed as a result of transport operations since the adaptation of the White Paper. The number of respondents identifying no change or even some deterioration is significant (33 out of 68). Only three respondents perceived significant improvements whilst 20 consider that slight improvements occurred.

Some national and regional authorities identified increases in external costs mainly due to noise pollution (higher exposure to road noise) and land-use (due to the increasing need for infrastructure), whilst they agree on a significant reduction in costs from road fatalities and injuries.

6.1.2 EQ2: What is the expected progress by 2030 and 2050? How does this compare to what was initially expected in the impact assessment? (European Commission, 2011)

6.1.2.1 Introduction

This question analyses the expected future developments by 2030 and by 2050 towards the key goals outlined in the objectives, and in the headline goals. Answers to this question build upon the results of the PRIMES-TREMOVE model and on other EU level projections (where available) in the case of indicators not included in the model.

Specifically, to describe the expected future development due to the White Paper in combination with other EU policies in other sectors (e.g. environmental and energy policies) we make use of the results from the PRIMES-TREMOVE model's 'Alternative' scenario which includes EU level policy measures adopted and proposed by the end of 2018.

The comparison between the 'Baseline' and the 'Alternative' scenario provides insights on the maximum expected impacts of the White Paper by 2030 and by 2050 on those indicators covered by the model. Results from the model are provided in the form of relevant indicators as identified in the evaluation matrix.

Expected progress by 2030 towards the general objective of the White Paper in terms of accessibility, equity, provision and quality of services, and minimisation of the external costs to society, is discussed on the basis of the inputs collected during the interviews with stakeholders performed in the context of this study.

6.1.2.2 Main findings

Future progress towards the specific objectives

Results from PRIMES-TREMOVE Alternative scenario show that, in the EU27, overall CO_2 emissions from transport (including international aviation but excluding international maritime shipping) are projected to be about 16% lower in 2030 and 39% lower in 2050, relative to the Baseline.

In particular, road transport is projected to register a drop in CO_2 emissions by 19% in 2030 and by 46% in 2050 in the Alternative scenario compared to the Baseline. This is due to the CO2 standards for new light duty vehicles and heavy duty vehicles post-2020, supported by the deployment of recharging and refuelling infrastructure, but also due to policies driving greater use of sustainable transport modes, such as for example the implementation of the TEN-T Core and Comprehensive Networks and the 4th Railway Package.

When looking at **progress towards the White Paper's 2030 and 2050 goals**, it can be noted that the **measures and policies of the White Paper adopted by the end of 2018 will contribute significantly towards the 2030 GHG milestone but will not be sufficient to meet the 60% emissions reductions by 2050.** In this context, it is important to note that the impact assessment accompanying the 2011 White Paper had assumed further intensification of policies after 2030, whereas the Alternative scenario only takes into account policies adopted by the end of 2018.

This goes hand in hand with the substantial progress in reducing the oil dependency of the sector. Modelled projections show that the EU27 **transport sector[20] oil dependency would be about 17 percentage points lower by 2050 compared to the baseline**, driven by the projected progress on electromobility, further electrification of rail and uptake of renewable and low carbon fuels. The oil dependency however **is still expected to be** 87% in 2030 and 77% in 2050.

Concerning the objective of limiting the growth of congestion, PRIMES-TREMOVE projections show that in the EU27 the Alternative scenario (accounting for policies adopted by the end of 2018), only shows a limited decrease in the total external costs of congestion relative to the Baseline (1.1% reduction in 2030 and 0.4% in 2050). Such reduction being driven mainly by greater use of more sustainable transport modes.

[20] Including international maritime shipping

The model estimated that, due to the policies and measures of the White Paper, road users will enjoy savings in congestion costs of approximately €3.7 bn in 2030 and €1 bn in 2050 in the 'alternative' scenario compared to 'baseline'.

Projections of airport congestion provided by EUROCONTROL show that by 2040, air traffic in Europe is expected to grow to over 16.2 million flights. Average flight demand is expected to grow between 40% and 55%. This growth will put pressure on the continent's airport capacity. By 2040, 16 airports will be congested[21]. As a consequence, total delay time will climb from 12.3 minutes to 20.1 minutes on average per flight. By 2040, around 470,000 passengers each day would be delayed by 1 – 2 hours, compared to 50,000 per day in 2016 (EUROCONTROL, 2018). However, in light of the Covid-19 pandemic these estimates would need to be reviewed as it is not yet clear what kind of long-term effects the pandemic will bring on future demand for flights.

Future progress towards the 10 headline goals

The impact of **current transport policies and measures would be enough to reach the objective of halving the use of 'conventionally-fuelled' cars in the EU27 by 2030, but not for phasing them out by 2050**. According to the PRIMES-TREMOVE 'Alternative scenario' the share of transport activity of conventionally fuelled cars in the total urban passenger transport activity (expressed in passenger-kilometres) is projected to go down to 43% by 2030 but still be 16% in 2050. The decrease in their share is driven by both the uptake of electric vehicles and other alternative fuel vehicles, but also by the greater use of public transport

Regarding the goal of achieving 'essentially CO2-free city logistics in major urban centres by 2030', stakeholder responses gathered from interviews and a survey of national authorities carried out to support the study, show that a vast majority of respondents expect to have made some progress towards the goal, but to not achieve it by 2030. Generally, stakeholders believe that cities are heading in the right direction, but given the various local situations, and the slow deployment of solutions and strategies at the local level, it seems unlikely that most cities will reach the 2030 goals.

Future projections from PRIMES-TREMOVE show that, with policies and measures in place, the goal of a 40% share of low-carbon sustainable fuels in aviation by 2050 will not be reached. In the 'Alternative scenario', this share is instead expected to remain below 3% by 2050.

The goal of **reducing EU27 CO_2 emissions from international maritime bunkers** by 40% in 2050 compared with 2005 levels (92 $MtCO_2$ to be reached by 2050 according to EEA data) **is not projected to be reached** with policies and measures in place. CO_2 emissions in the 'Alternative' scenario are projected to be reduced only by 1% in 2030 and 2050 relative to the Baseline scenario.

According to the 'Alternative' scenario, road freight transport is projected to remain dominant in the EU27. However, the share of passenger rail is projected to increase by 1.6 percentage points in 2030 relative to the Baseline and by 2.3 percentage points in 2050. For rail freight the impact would be more significant showing an increase in its modal share

[21] A "congested" airport operates at 80% or more of its capacity for more than 6 consecutive hours per day.

by 3.1 percentage points in 2030 relative to the Baseline and by 5.6 percentage points in 2050. Inland waterways and national maritime is also project to gain 1.2 percentage points in terms of modal share in 2030 relative to the Baseline and 1 percentage point in 2050.[22]

The goal of tripling the number of kilometres of high-speed rail lines by 2030 will not be reached. Approximately 8,840 km of high-speed lines are currently in use in the EU27 and around 1,460 km of lines were under construction in 2017. Achieving the goal set by the White Paper means reaching a length of about 19,000 km of high-speed railways by 2030. Considering that, on average, it takes around 16 years for new high-speed lines to proceed from the start of works to the beginning of operations, the goal cannot realistically be met.

However, a **significant increase in the amount of passenger transport activity on high-speed rail in the EU27 is projected**. The 'Alternative' scenario projects that the share of high-speed rail in total rail passenger transport activity would increase to around 38% by 2030 and 43% by 2050[23], 6 percentage points higher in 2030 and 9 percentage points higher in 2050 relative to the Baseline.

The completion of the trans-European transport network is a high priority for the Union. Regulation (EU) 1315/2013 sets the deadlines for achieving the core network by 2030 and the comprehensive network by 2050. **There are no official projections on the achievement of these goals by 2030 and 2050**.

In 2017, 67% of the TEN-T core airports and 89% of the core maritime ports were connected to rail. **There are no official projections on the achievement of the full connection of core seaports and airports to rail by 2050.**

In relation to road safety, according to PRIMES-TREMOVE, the number of road fatalities in the EU27 compared to 2010 levels will only decrease by approximately 26% by 2030, and 30% in 2050. **The goal of moving close to zero fatalities in road transport by 2050 is thus not expected to be achieved without additional ambitious measures**.

Most stakeholders are positive about some progress on the **application of "user pays" and "polluter pays" principles** by 2030. 33 respondents out of 60 expect some or significant progress, while 19 on the other hand envisage limited or no progress at all. The totality of national and regional authorities shared a rather positive viewpoint with 10 of them expecting some or significant progress by 2030, and 6 respondents expecting limited progress.

Future developments (like Mobility as a Service (MaaS)) are expected to enhance the application to 'user pays' and 'polluter pays' principles in the future.

However, stakeholders generally acknowledge that a major issue linked to this goal is the low public acceptance of measures in this field. While internalisation of external costs and 'polluter pays' principles are generally recognised by most stakeholders as effective measures, these face strong political opposition. As a consequence, national governments are reluctant to propose such policies to their electorates.

[22] The PRIMES-TREMOVE model does not provide results for freight transport activity by distance bands, therefore it is not possible to project to what extent modal shift away from road transport for freight movements over 300 km could be reached.

[23] An increase of 8 p.p. by 2030 and 13 p.p. by 2050 compared to 2010 levels.

In general, it appears that progress on this goal by 2030 will depend on the determination of the European Commission and the Member States to implement the "user pays" and "polluter pays" principles. The European Commission's commitment and efforts in assessing comprehensively transport externalities across all transport modes is underlined by many stakeholders. In this regard, the new study on the internalisation of external costs is considered as a scientific roadmap to proceed towards the goal.

Future progress towards other objectives

In terms of **accessibility of transport services**, a vast majority of interviewed stakeholders shares the view that improvements can be expected by 2030.

The massive use of Information Technologies and the increased availability of information is expected to enhance accessibility. Although effects are considered still limited, the expectation is that by 2030 these IT solutions will have a much bigger impact. However, a potential deterioration of accessibility of transport services is expected in the aviation sector if current policies and measures fail in managing the expected shortages of capacity in the aviation system.

Improvements are also expected on **accessibility of transport services in peripheral regions**, where transport services in the past have been slightly reduced compared to cities, as lower demand and longer distances make the provision of transport services more expensive compared to high-density areas. Transport operators and authorities are already engaged in finding new solutions made possible thanks to emerging technologies and business models.

Stakeholders are also positive in relation to **progress in the accessibility of transport services for people with special needs** (i.e. persons with disabilities and elderly people) as their needs will be increasingly taken into account, also thanks to the new developments in European legislation (i.e. Directive (EU) 2019/882 European accessibility act).

More divergent and fewer positive views were collected in relation to the expected progress on the **quality of working conditions in the transport sector**. While a relatively high number of respondents did not know what to expect for the future, others envisage limited progress based on the limited progress (or, in some cases, the deteriorations) observed so far. For example, in the aviation sector, increased competition and the shrinking profit margins of airlines has led to a deterioration of working conditions for air crews and no positive expectations have been expressed by stakeholders.

Moreover, new developments like automation and digitalisation are also seen as potentially heavily impacting on jobs and future working conditions in the transport sector as new technologies can create, replace, change, facilitate and re-organise labour. This process is reinforced by new mobility service providers with disruptive business models.

Stakeholders interviewed regarding future progress on the **affordability of transport services** submitted rather negative views. Although the costs of transport services are expected to decrease due to increasing competition following the opening of the market (e.g. in the rail sector), taxes and charges are expected to increase, also in light of the increasing application of 'user pays' and 'polluter pays' principle. Therefore, although affordability has remained relatively constant so far, it is expected to reduce in the future.

On the other hand, stakeholders expect progress in the **quality of transport services** with more and increasingly personalised transport services likely to appear and to provide multiple mobility services due to the developments in digitalisation and automation. However, the quality or reliability of services can be improved only if infrastructure capacity constraints do not occur. The demand for passenger transport within the EU will grow considerably in the coming decade. This, in combination with increasing urbanisation,

might lead to a strain on the current transport infrastructure, making it challenging to ensure the quality of transport services in the future.

Safety and security of transport services are also expected to improve according to stakeholders. Safety standards for all vehicle types have been significantly increased by the new General Safety Regulation[24] and, combined with improvements in infrastructure safety thanks to the revised Road Infrastructure Safety Management Directive[25] and other initiatives; this should provide a positive effect in the future. Some deterioration in road safety might occur due to new emerging micro-mobility services (e.g. e-scooters). Future regulations are considered necessary to mitigate any deterioration.

The majority of stakeholders also envisage progress, although limited, in the **reduction of external costs to society** due to transport. However, as few measures in this field are currently in place, it is hard to determine and forecast the extent of the progress. This is also due to the complexity of the factors surrounding these developments. New ambitions outlined in the Green Deal and the increased consciousness of citizens could lead to significant progress by 2030.

6.1.3 EQ3: To what extent have the 40 action points, which are broadly covered by all the policy options in the impact assessment of the White Paper, contributed to reaching the objectives and headline goals of the White Paper?

6.1.3.1 Introduction

This evaluation question focuses on assessing the contribution that the 40 action points of the White Paper have so far had on achieving its objectives and headline goals.

The White Paper is a long-term strategy composed of 132 initiatives and 40 action points specifically designed to exert synergies between them and to deliver the results of the overall strategy. In most of the cases, action points contribute to more than one objective and/or headline goal and this means it is not possible to isolate the contribution of a specific action from the contribution of other actions on the achievement of the White Paper goals.

For the same reason, it is not possible to perform a quantitative assessment of the impact of each action point by modelling it individually. Past modelling experience has indeed shown that assessing the impact of each action individually (i.e. out of a bundle of actions composing the strategy) is not methodologically sound as it would lead to an overestimation of the impacts of the actions when their impacts would be simply added up

[24] Regulation (EU) 2019/2144 of the European Parliament and of the Council of 27 November 2019 on type-approval requirements for motor vehicles and their trailers, and systems, components and separate technical units intended for such vehicles, as regards their general safety and the protection of vehicle occupants and vulnerable road users, amending Regulation (EU) 2018/858 of the European Parliament and of the Council and repealing Regulations (EC) No 78/2009, (EC) No 79/2009 and (EC) No 661/2009 of the European Parliament and of the Council and Commission Regulations (EC) No 631/2009, (EU) No 406/2010, (EU) No 672/2010, (EU) No 1003/2010, (EU) No 1005/2010, (EU) No 1008/2010, (EU) No 1009/2010, (EU) No 19/2011, (EU) No 109/2011, (EU) No 458/2011, (EU) No 65/2012, (EU) No 130/2012, (EU) No 347/2012, (EU) No 351/2012, (EU) No 1230/2012 and (EU) 2015/166, OJ L 325, 16.12.2019, p. 1–40.

[25] Directive (EU) 2019/1936 of 23 October 2019 amending Directive 2008/96/EC on road infrastructure safety management, OJ L 305, 26.11.2019, p. 1.

and the synergies of the policies (and the potential overlapping effects) would not be accounted for.

Therefore, in answering this challenging question we first discuss the potential overall impact of the White Paper as a whole (i.e. all 40 action points together) in 2018 by means of quantitative results from the PRIMES-TREMOVE model. More specifically, the assessment of the impacts observed up until 2018 is based on the relative comparison between the 'Baseline' and the 'Alternative' scenarios for key indicators covered by the model. It is to be noted that PRIMES-TREMOVE alternative scenario includes only adopted policies and measures by the end of 2018 whilst the impact assessment accompanying the 2011 White Paper had assumed further intensification of policies after 2030.

In a second step we present a qualitative discussion on the contribution (direct and indirect) that action points may have in delivering the objectives and goals of the White Paper, highlighting which action(s) is/are expected to play a major role. Where possible, the discussion is informed by findings of impact assessment and evaluation studies supporting the implementation of the key EU initiatives in the scope of the White Paper.

6.1.3.2 Main findings

Current contribution of the White Paper towards the specific objectives

The analysis of the level of implementation of the White Paper (see EQ6) suggests that the most of White Paper's measures **adopted so far** cannot have delivered their expected impacts as their implementation by Member States and other stakeholders is yet to come or it is too recent in time. As a consequence, the current contribution of the White Paper towards its objectives and headline goals can only be rather limited. This is confirmed by model's outcome.

Indeed, the comparison between the PRIMES-TREMOVE 'Alternative' and 'Baseline' scenarios shows that by 2018, the contribution of the adopted policies and measures of the White Paper towards the reduction of GHG emissions from the EU27 transport sector (including international aviation and excluding international maritime shipping) was an overall decrease of 3.2% relative to the Baseline (as a maximum impact). Key policies contributing to this achievement are the implementation of the CO_2 standards for car and van manufacturers, and the Alternative Fuels Infrastructure Directive implementation, as well as policies supporting the shift towards non-road transport modes.

As far as the specific objective of reducing the oil dependency is concerned, by 2018 the maximum contribution of adopted policies and measures from the White Paper as estimated by PRIMES-TREMOVE, was a reduction of 1.8 percentage points relative to the Baseline level of oil dependency of the EU27's transport sector (including aviation and excluding international maritime)[26].

Concerning congestion, model results show that the measures in the White Paper implemented until 2018 are not expected to have substantially contributed to relieving road congestion. The total hours spent in road congestion annually in 2018 were reduced only by 0.4% relative to the Baseline (i.e. a reduction of 6 minutes per person as a maximum impact).

[26] In 2018 the EU-27 transport sector was dependent on oil for 91.6% of its energy needs. (Eurostat data)

Current contribution of the White Paper towards the headline goals

No contribution from the policies and measures of the White Paper adopted by the end of 2018 is assumed to have happened so far towards achieving the goal of increasing the share of low-carbon sustainable fuels in aviation.

The contribution of policies and measures of the White Paper towards the reduction of CO_2 emissions from international maritime bunkers is instead estimated as a saving of around 0.2% relative to the Baseline in 2018.

As per the goal of increasing the share of rail for medium-distance passenger transport, in 2018 the White Paper could have contributed to this goal with an increase of around 2.2 percentage points relative to the Baseline (as a maximum impact).

Finally, the maximum contribution of the White Paper to improving EU27 road safety can be quantified as a reduction of 0.2% in fatalities and of about 0.3% in injured persons in 2018, relative to the Baseline figures for the same year.

Contribution of the 40 action points

A qualitative analysis on the contribution (direct and indirect) that the 40 action points may have in delivering the objectives and goals of the White Paper (see the extended discussion of EQ3 in Annex H), allows us to conclude that, although they are conceived to deliver the EU transport strategy, not all of them are expected to contribute to achieving each of the specific objectives. Similarly, not all of them are expected to contribute to meeting each of the headline goals.

Moreover, the policy measures in the White Paper are quite different in nature, objective and complexity. Some require physical investments; others are mainly a matter of setting (and enforcing) different rules; others are preparatory measures (i.e. guidelines or definition of standards) mainly intended to pave the way for subsequent actions, etc.

Consequently, also the type of contribution expected from each instrument is different: some may have direct impacts whilst others may have indirect complementary effects. Also, measures can differ in terms of the timing of their expected impact (i.e. short-term, mid-term, long-term impacts).

Therefore, according to the objective or goal, certain action points are expected to be more effective than others in the time frame considered and it is not possible to conclude on the absolute importance of the actions irrespective of the goals to be achieved.

The analysis of the expected contribution of the 40 action points is based (i) on the review of the description of each action point as provided in the White Paper and (ii) on the analysis of the initiatives within each action point that are expected to have a direct or indirect contribution to the achievement of the White Paper's specific objectives and headline goals.

It can be concluded that White Paper's objectives are generally addressed by a considerable numbers of action points. The overarching objective of reducing **GHG emission from transport** is targeted by 21 actions and 11 of them will address it directly. Enhancing the **provision and quality of transport services** is also an objective largely addressed by the White Paper: 26 actions will contribute to this aim, out of which 17 in a direct way. 27 out of 40 actions are expected to enhance the **equity** of the European transport system within and between successive generations, with a majority of actions (17) expected to have an indirect effect, mainly coming from an increased environmental sustainability.

As far as headline goals are concerned, given their specific nature they are generally addressed by a more limited number of focused actions in comparison with the objectives which are more broadly covered. **Improving safety** in all transport modes (Goal 9) is a key goal of the EU transport strategy directly targeted by 14 actions. **Reducing CO2 emissions in urban areas** (Goal 1) is another key goal directly contributed by six actions and indirectly by five. On the contrary, fewer actions are expected to contribute to increasing the **high-speed rail network** and its usage (Goal 4) which is directly targeted by three actions and to improving the **connections of core airports and ports** (Goal 6) addressed directly by two action points.

6.1.4 EQ4: Which factors and developments (e.g. digitalisation, mobility as a service, technology cost, etc.) have, negatively or positively, contributed to the achievement of the objectives and headline goals?

6.1.4.1 Introduction

Since the launch of the White Paper many new developments impacting on transport and mobility have emerged. This evaluation question tries to examine which and how external factors and developments have positively or negatively contributed to the achievements of the objectives and goals so far.

The following key factors and developments are considered: digitalisation and new business models; new technological trends; evolution in technology costs; new mobility patterns (e.g. micro-mobility); changes to consumer and passenger behaviours; evolution of e-commerce; new security and safety issues; climate change.

The analysis is based on evidence collected from the stakeholder consultations (i.e. survey to national and regional authorities and interviews with stakeholders).

In general, many of the identified trends and factors are considered by stakeholders as still too recent to have significantly influenced the achievements of the White Paper so far. They may all have had an impact, but it is difficult to measure it at this stage. However, they are seen to play a major role in the future. Often stakeholders provide diverging views on the analysed trends as for many of them they expect both positive or negative impacts. It is seen as crucial to introduce legislation to ensure that positive effects prevail on the negative ones.

6.1.4.2 Main findings

Digitalisation and new business models in the transport sector are largely considered by stakeholders to be exerting a positive impact on the achievement of the objectives and headline goals of the White Paper, especially in relation to increasing the affordability and accessibility of transport services. However, in general respondents also recognise that these developments are still recent and that assessing their full contribution to the achievements of the goals might be too early.

Digitalisation appears as a two-sided trend, like automation. It has been described by some respondents as one of the top developments in the European transport landscape over the past years, as it is able to address many of the challenges faced by the transport sector such as emissions and congestion. However, at the same time, it could support business models which prevent the shift towards collective modes of transport and lead to a negative impact on working conditions (as these models are often built on the externalisation of social costs). A proper enforcement of existing EU and national labour regulations has been raised by respondents.

New business models in the sector, especially for MaaS and ride-sharing, are also considered relevant though no concrete development has yet been noted. The challenge they often bring lies in balancing the interests of service providers with those of operators and ensuring that the end product is financially viable and still attractive for the consumer.

In relation to new business models, a federation of workers argues that the success of low-cost air carriers comes from their business model based on social dumping or indirect subsidies. Similarly, in the coach sector the European expansion of low-cost companies has been possible due to the outsourcing model, putting downward pressure on salaries. Similar mechanisms could be seen in relation to the expansion of e-commerce with 'next day delivery'. Higher efficiency has often been achieved at the cost of the working conditions of the delivery workers. According to this organisation, the above-mentioned trends have been facilitated by a lack of enforcement of existing EU and national labour regulations, as well as the difficulty in certain cases to establish the beneficiary owner/principal place of business.

New technological trends are considered to have strongly impacted on the research agenda, but they are yet to be established in the market, with the exception of electrification which is being introduced and will continue to have a large impact in the future.

For one industry organisation, new trends such as cyberattacks and technologies such as drones potentially enable security measures to be circumvented and represent an important threat for the security of European transport networks. While the NIS Directive (EU) 2016/1148 is an important step towards a more cyber-resilient transport sector, the EU Drone Regulation so far fails to sufficiently address security challenges related to drones.

Another industry organisation argues that in the maritime sector new technological trends in information technology such as blockchain, real time information, improved satellite coverage, etc. have had an overall positive impact on the sector (e.g. by improving awareness of maritime conditions), but they did not really contribute to the completion of the internal market for shipping.

Automation and electrification are considered powerful trends, but arguably it would be a little too early, at this stage, to evaluate their real impact on the achievements of the White Paper's objectives. Notably, when it comes to electrification, its uptake has been slower than expected and has produced real changes only in a handful of EU Member States.

In relation to autonomous vehicles, stakeholders consider that they are still far away although they were announced as the forthcoming reality about one decade ago. Some stakeholders argue that autonomous vehicles might have a rather negative impact for the achievement of the White Paper objectives, especially if they are meant to be for private use. If autonomous vehicles are used extensively as private vehicles, congestion may considerably worsen (as citizens who currently walk, cycle or use public transport may choose to use autonomous vehicles instead). Furthermore, cybersecurity risks may increase exponentially as autonomous vehicles are used more intensively.

Many stakeholders believe that **technology costs** will decrease in the future. This evolution should boost the take up of new technological trends.

For one representative of the aviation industry, while decarbonisation pathways are not as readily available for aviation in comparison to other transport modes, there has been some improvement to the cost of technologies and renewables. Pilot projects on electric aircraft suggest that they may become a reality for short-distance flights by the 2030s. There is a greater availability of certified sustainable aviation fuels now than a decade ago, but production remains low and prices high. Although airlines need them, their cost makes

them still a deterrent. This evolution has not yet reached a level where it can substantially contribute to the White Paper's objectives and goals for aviation. Although aircraft propulsion systems have become ever more fuel-efficient, these gains in lower fuel burn and emissions per passenger have been outstripped by demand growth.

While **new mobility patterns** such as MaaS and micro-mobility are growing in cities, the take up is not yet as big as expected.

Stakeholders' views on micro-mobility are rather divergent. Some see it as not a major positive development, as trips using these modes tend to be transferred from cycling, walking or public transport, so the increase in micro-mobility is not reducing congestion. Other stakeholders consider micro-mobility as complementary to public transport and potentially contributing to the reduction of conventionally fuelled cars in urban transport. As such, they believe that micro-mobility solutions should be integrated into public transport especially in relation to journey planning and ticketing.

Behavioural changes are considered to have positively affected the achievement of the objectives and headline goals of the White Paper as they incentivise more sustainable transport choices. However, they are still at the early stages and to be tapped and accelerated through regulation. The new challenges brought by COVID-19 are also considered to potentially lead to long-lasting changes in consumer and transport user behaviour, but it is too early to tell. According to a representative of the national and regional authorities, crises induced by security threats and the Coronavirus pandemic made it clear that the resilience of the transport system needs to be established, and it is an aspect not sufficiently addressed by the White Paper initiatives.

The **evolution of e-commerce** is the development that has received the most controversial assessment from interviewed stakeholders in relation to the achievements of the White Paper: 17 out of 40 respondents believe e-commerce expansion has led to negative effects. 8 respondents opposed this position and, on the contrary, considered e-commerce evolution as beneficial. 4 respondents identified no impact and 11 did not have an opinion on this.

The majority of respondents believe e-commerce expansion has led to negative effects as it created a new demand for transport and increased the activity of vans for home deliveries in urban areas.

From the industry perspective e-commerce in itself is not a negative trend. However, the rise of e-commerce has resulted in an additional strain on the overall transport system adding to challenges such as congestion. E-commerce indeed increases the fragmentation of freight flows and reduces the loading rates of vehicles.

In the aviation sector e-commerce is considered as having both a positive and negative impact; while it created more business opportunities it also induced more hassle on air cargo security. New security measures have had an impact on the quality of jobs, led to increased delays, and made working conditions more difficult for the sector.

New transport security and safety issues appear to have had some negative influence on the achievement of the objectives and headline goals of the White Paper. All transport modes are considered increasingly vulnerable to intentional unlawful acts, e.g. terrorism and criminal activities. They are seen as facing very similar threats and developments: from attacks with simple weapons such as knives, to sophisticated attacks involving homemade explosives, cyber, drones, use of vehicles as a weapon etc. Terrorist modus operandi have also changed tremendously since 2011 and changed the security environment in which transport networks operate in today. Most attacks or attempts concern cross-border transport hubs, notably in the airport landside and land transport area.

In the aviation sector, the increased security requirements have resulted in a fundamental reorganisation of security checks and airport infrastructure/layout. Aviation experts argue as well that the increase in security needs is negatively impacting the passenger experience (intrusive) and may cause delays thus reducing the quality of air services.

Some stakeholders also noted a lack of an active European approach to the broad and complex area of land transport security, in particular to the security of passenger transport. The increasing frequency of terrorist attacks on mass passenger transport raises the question of whether the EU needs to better secure train stations and transport hubs, particularly cross-border ones. The attack on a Thalys train in 2015 shows that these cross-border networks are attractive goals for terrorists. The same applies to Member States that insufficiently transpose EU legislation on transport security in aviation and maritime transport.

With respect to **climate change**, the majority of interviewed stakeholders consider that, in a certain way, climate change has positively impacted on the achievement of the objectives and headline goals of the White Paper i.e. boosting the need to adopt and deploy environmentally-friendly measures. It is considered having increased the need for White Paper actions to be timely implemented, leading to one step further with the recent adoption of the EU's Green Deal. The extreme weather events of the latest years have seen a rising awareness of the level of criticality of our planet's situation. Consequently, the sustainability-related ambitions, timelines and goals of the White Paper, which were felt appropriate some years ago, may be perceived as insufficient nowadays. Climate change is supposed to strongly influence the transport sector and related policies in the future, not only through the EU's Green Deal, but also through many local actions (e.g. climate-friendly cities).

6.1.5 EQ5: Which unintended positive and negative economic, social and environmental effects, if any, have been produced?

6.1.5.1 Introduction

This evaluation question discusses the unintended or unexpected (either positive or negative) effects perceived by the stakeholders as a result of the actions taken in the context of the White Paper. The analysis is based on evidence collected from the stakeholder consultation (i.e. interviews).

It is worth mentioning that, in general, respondents found it difficult to clearly identify the unintended effects coming from the actions of the White Paper due to a lack of reliable evidence on the causal links.

Indeed, some unintended effects coming from key drivers like technology and digitalisation in transport would have occurred irrespective of the promotion of related measures in the White Paper. However, they are perceived by some stakeholders as having a relation with the White Paper's actions and hence are presented here.

6.1.5.2 Main findings

According to one stakeholder, a positive impact of the White Paper is the increased awareness of consumers and passengers about climate change impacts and vehicles emissions. This has contributed to boost the change of market transport supplies with new propulsion methods coming onto the market (e.g. electric and hydrogen vehicles). Consumers are becoming increasingly well informed about such issues.

According to another stakeholder, the focus of the White Paper on environmental goals and sustainable mobility has also helped in creating a favourable condition for the spread of

new urban mobility patterns linked to electric mobility. The success of micro-mobility (e-scooters in particular) was rather unexpected and indeed reached the market in the absence of a legislative framework. Technology and digitalisation are seen as having unexpectedly indirectly contributed to creating favourable conditions for the uptake of disruptive services, such as Google and Amazon door to door delivery, which have provided new features for the end users. Some of them are seen as creating even more dependency on oil by increasing transport demand.

An industry organisation also perceives the increase in cyber risks and threats as an unintended consequence of the process of digitalisation promoted by the White Paper. Last year's cyber-attack to Maersk Lines is considered one example. As a consequence of this event, all ports and terminals came to a standstill.

The massive uptake of transport apps, new waves of innovation and new business models in the transport sector are also considered as unintended indirect positive effects of digitalisation by another stakeholder.

One representative of a civil society and research organisation explained that, although the Fourth Railway Package (one of the key actions emanating from the White Paper) was designed in the interest of passengers and was generally received positively, some key stakeholders from the railway sector chose to adopt a protectionist approach when it came to market opening. This ended up having an unexpected negative effect on the economic, social and environmental domains, according to the same organisation.

From the perspective of another industry organisation, an unexpected effect of the White Paper initiatives is that the prioritisation of rail for passengers had a negative impact on rail freight and freight modal shift objectives.

In addition, another stakeholder believes that the recommended shift to rail may be positive where the capacity of the networks allows it, but an unexpected effect of the White Paper was the saturation of the railway network to handle freight and cross border passenger demands adequately and efficiently. This is also seen as one of the factors hampering the desired modal shift.

Likewise, according to the same stakeholder, the desired development of multimodality has not occurred, again possibly due to the creation of a complex dedicated framework in the form of the Combined Transport Directive and not dealing adequately with the real problems which are, for instance, additional costs, slowness and scarcity of terminals.

An industry organisation explains that when the revision of the Clean Vehicles Directive was adopted in 2019, it was wary of the fact that it created new obligations for the public transport sector, a sector that was already providing sustainable mobility, without providing financial compensation. The purchase of the newest bus technologies will indeed require financial resources that cannot be spent on other priorities, such as expanding the public transport offer or providing better passenger information. In the worst case, it could lead to a reduction of services, which would counteract the goal of modal shift.

In the same year, the adoption of the Open Data Directive[27] led to a situation where public companies and public sector bodies operating a public transport service have to provide certain data sets to third parties, in some cases for free, otherwise for marginal costs. However, private companies operating the same services do not have the same obligations

[27] Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information. OJ L 172, 26.6.2019, p. 56–83

and may keep or sell their data, the same industry organisation argues. This is perceived as creating distortions in the mobility market between both public and private companies. The cross-sectoral approach adopted in the case of this Directive meant that this crucial piece of legislation did not fall under the transport strategy and the objectives set out in the White Paper.

6.1.6 EQ6: To what extent have the 40 action points of the White Paper been implemented by the Commission, by the Member States, by regional and/or local authorities (where relevant), or by other actors (e.g. transport operators)?

6.1.6.1 Introduction[28]

This evaluation question aims to analyse the current level of implementation of the 40 action points of the White Paper. The evaluation question supplements the analysis of the implementation presented in section 6 that focused on the actions taken by the European Commission in relation to each of the 132 initiatives of the White Paper. It focuses on the role of Member States and other actors to cover the status of implementation and to document significant implementation aspects at regional and/or local level.

6.1.6.2 Main findings

Implementation by the European Commission

As indicated in section 6 (implementation) 64 out of the 132 initiatives originally planned can be considered completed, whereas 12 initiatives are in an advanced status of completion and 46 initiatives are on-going. In terms of action points, 15 out of the 40 action points of the White Paper have been fully implemented by the Commission and another seven can be considered in an advanced state of implementation (five action points have at least 65% of their initiatives labelled as "in advanced status of implementation" and two further action points have all their initiatives (100%) labelled as "in advanced status of implementation"). All other actions are in progress.

Only two initiatives (i.e. initiative 94 related to linking EU funds to cities with urban mobility audit certificates, and initiative 100 on the definition of a strategy for zero-emission urban logistics) have not started yet, whilst eight initiatives were withdrawn.

Implementation by Member States and other actors

A detailed analysis of the level of implementation of the **40 action points** by Member States and other actors is presented in Annex H. It focuses on the deadlines envisaged in key initiatives and related legislations with the objective to understand whether they already entered into force or not.

The analysis shows that in most of the cases White Paper's measures have not yet delivered their expected impacts as their implementation by Member States is yet to come or it is

[28] In the following we refer to the numbering of action points and initiatives as provided in Annex H. Names and numbering of initiatives are not elements of the official 2011 White Paper document. Names of initiatives are derived from the 2016 review of the White Paper (SWD(2016) 226 final). Numbering of initiatives has been set by the study team for practical reasons. It is worth to notice that the Urban Mobility Package is not originated from the White Paper. As such, it does not correspond to any of the 40 action points.

too recent in time. However, this appears in line with the medium- long term of the strategy which was designed to deliver results at 2030 and 2050.

Since 60 initiatives out of the original 132 are still on-going at EC level, their related action points cannot yet be fully implemented by MSs or other actors.

Regarding the 64 initiatives already completed by the Commission, in most cases they are addressed by more than one intervention (e.g. revision of existing Directives/Regulations, adoption of new pieces of legislation etc.). The analysis shows that it is often the case that only some of these interventions have completed their formal process at European Institutions' level, while others are still to be finalised. Therefore, the implementation of the initiative by Member States or other actors can only be deemed to be 'partial' and related to the specific intervention (and not to the full initiative).

In other cases, initiatives have been fully delivered by the European institutions, but (i) the time for their implementation/transposition at Member State level has not yet come, or (ii) the initiatives have been transposed by Member States but they will enter into force in future years, or (iii) have too recently come into force to produce the expected impacts.

Most of the initiatives within the White Paper are delivered by Regulations and do not need transposition. Those initiatives addressed by Directives are to be transposed into national laws.

However, in both cases, although the legislation is in place, this does not necessarily mean that Member States are (i) (already) compliant with their requirements and (ii) that they are progressing towards the objectives. A real assessment could be done only in case of information coming from reporting obligations by Member States and evaluation studies. Such a detailed assessment at initiative level is out of the scope of this evaluation.

Table 6-2 provides a synthesised view of the status of implementation of the 40 action points by Member States[29].

It is worth noting that stakeholders surveyed and interviewed in the context of the study generally agree that there have been delays in the implementation of White Paper actions and/or initiatives, mainly stemming from delays in the implementation at Member States level.

Several reasons for these delays have been indicated by stakeholders: (i) difficulty to implement EU legislation caused by a lack of enforcement and inadequate powers or resources at Member State level; (ii) strong differences between Member States not only

[29] Those actions fully delivered by the Commission but not yet fully implemented by Member States (either because transposition by MSs is not completed or because the deadline for implementing the provisions has not yet arrived) are classified as 'in progress'. The actions not yet fully delivered by the Commission and whose implementation by MSs can only be partial are classified as 'partially in progress'. Those actions that do not imply formal obligations by Member States (e.g. those related to urban dimension which, according to the subsidiarity principle, falls under the local responsibility) but showing implementation progress at local/national level are clearly identified. Some actions that do not require direct actions by Member States as they mainly pertain to the European Commission (e.g. delivering communications, setting requirements for access to EU funding, setting agreements with EU neighbouring countries, etc.) are clearly identified as well. Action point 7 'Multimodal transport of goods: e-Freight' this is composed by only one initiative (as the other was cancelled) that has not been yet formally delivered by the EC and therefore has not yet entered into force.

due to the economic development, but also to different regulatory approaches and levels of ambition; (iii) lack of clarity in EU legislation, or a lack of policy coherence between different initiatives; (iv) countries pursuing national interests rather than Community interest, or unwillingness to work across national and political divides.

Stakeholders consider that delays at EU level on adopting new proposals also occurred due to diverging positions between Member States and the European Commission which either slowed down the process or even prevented new legislation from being adopted.

Table 6-2: Summary of implementation of the 40 action points by Member States at the end of 2019

ACTION POINTS		Status					
		Completed	In progress	Partially in progress	Deadlines yet to come	No formal obligations / in progress	No direct actions required
1	A true internal market for rail services		√				
2	Completion of the Single European Sky			√			
3	Capacity and quality of airports						√
4	A maritime "blue belt" and market access to ports		√				
5	A suitable framework for inland navigation			√			
6	Road freight			√			
7	Multimodal transport of goods: e-Freight				√		
8	Social code for mobile road transport workers			√			
9	A social agenda for maritime transport			√			
10	A socially responsible aviation sector						√
11	An evaluation of the EU approach to jobs and working conditions						√
12	Cargo security	√					
13	High level of passenger security with minimum hassle			√			
14	Land transport security						√
15	End-to-end security			√			
16	Towards a "zero vision" on road safety		√				
17	A European strategy for civil aviation safety			√			
18	Safer shipping	√					
19	Rail safety			√			
20	Transport of dangerous goods	√					
21	Passengers' rights			√			
22	Seamless door-to-door mobility			√			
23	Mobility continuity plans						√

ACTION POINTS		Status					
		Completed	In progress	Partially in progress	Deadlines yet to come	No formal obligations / in progress	No direct actions required
24	A technology roadmap			√			
25	An innovation and deployment strategy			√			
26	A regulatory framework for innovative transport			√			
27	Travel information			√			
28	Vehicle labelling for CO_2 emissions and fuel efficiency			√			
29	Carbon footprint calculators						√
30	Eco-driving and speed limits		√				
31	Urban mobility plans					√	
32	An EU framework for urban road user charging					√	
33	A strategy for near "zero-emission urban logistics" 2030					√	
34	A core network of strategic European infrastructure					√	
35	Multimodal freight corridors for sustainable transport networks			√			
36	Ex-ante project evaluation criteria						√
37	A new funding framework for transport infrastructure						√
38	Private sector engagement						√
39	Smart pricing and taxation			√			
40	Transport in the world: the external dimension						√
""	Urban Mobility Package					√	

Table 6-3 shows the action points that required implementation efforts **by other actors**. The majority of them entail on-going activity within dedicated working groups or similar involvements and therefore are '**continuously on-going'**.

The other two actions related to the establishment of the LANDSEC group and the enhanced role for ERA are classified as '**completed'**.

Table 6-3: Summary of implementation of the 40 action points by other actors at the end of 2019

ACTION POINTS		Status	
		Completed	Continuously on-going
10	A socially responsible aviation sector	□	√
12	Cargo security	□	√
14	Land transport security	√α□	
17	A European strategy for civil aviation safety	□	√
19	Rail safety	√α□	
26	A regulatory framework for innovative transport	□	√
40	Transport in the world: the external dimension	□	√

6.2 Efficiency

6.2.1 EQ7: To what extent have the costs of the 40 action points in the White Paper been proportionate to the overall benefits achieved?

6.2.1.1 Introduction

This question examines the costs of implementing the 40 action points and the related 132 initiatives in relation to the benefits derived from its implementation. The analysis covers the following aspects:

- The costs for the development and implementation of the 40 action points (EU level and national/regional/local level).
- Comparison of those costs with the benefits resulting from the implementation of the 40 actions, and the progress made towards achieving the specific objectives and the headline goals.
- The expected contribution of the White Paper intervention to the total costs of the transport system and in comparison with the expected benefits, as outlined in the impact assessment for the White Paper.

Given the large number of White Paper initiatives and the absence of a dataset with information on the relative costs, we prioritised our analysis towards those initiatives where more significant costs were expected. The focus of the analysis and the data collection effort was thus on the initiatives that included regulatory measures and financial instruments.

The data sources that have been used include:

- Input from the tailored data requests and interviews of Commission desk officers and other EU entities (e.g. executive agencies).
- Information/data extracted from available evaluations and, to a lesser degree, impact assessment studies.
- Data on EU financial instruments (Horizon 2020, CEF, etc.).

- Input from stakeholders via surveys and interviews.

Even then, there were difficulties and limitations in identifying relevant cost data and associating these costs with the White Paper action points (see Box 1).

Box 1: Limitations in the analysis of efficiency

The analysis of the costs associated with the White Paper and its efficiency was limited by the availability of relevant and appropriate data.

- The main source of quantitative information were evaluation studies, of which only around 20, covering 39 initiatives, were available with information about the White Paper initiatives. Even among those evaluations that are available, sometimes they only cover a specific aspect of an initiative, not the overall initiative, and extrapolation is not possible.
- Furthermore, when assessing costs and "cost-efficiency", the level of detail provided, and the methodology used in these evaluations vary considerably. This complicates any comparison between initiatives and between action points to assess the overall cost-efficiency of the White Paper.
- The information on costs in evaluations tends to diminish as we move from the EU institutions (where some data might be available), to Member States (where data might be available in some Member States and then is perhaps extrapolated to the entire EU), to industry, where only a small number of data points might be available.
- In the case of EU funding programmes (including TEN-T programme, CEF Transport, Horizon 2020 and Cohesion Funds), we were able to collect detailed information, both from the Commission's websites, and with the support of the EU's Innovation and Networks Executive Agency (INEA). However, it was not always possible to attribute costs of a funding programme to a specific initiative. Funding programme are often related to multiple initiatives across a few action points, consequently the level of information available was not sufficient to correctly attribute costs to each initiative. In those cases, the overall figures for each funding programme were presented, with an indication in which action points and initiatives these costs have been spent on.
- Besides the data collected in the evaluations, we also have data from field research. However, data provided on efficiency was scarce and mostly qualitative. A number of stakeholders that contributed to the study pointed to the difficulties in providing relevant quantitative information. As such, field research was not able to address gaps beyond those where information was available from other evaluations and studies.

Because of these issues, the analysis of efficiency of the White Paper is limited in its scope (as information is lacking for some areas of action) and in its conclusions (as this limits that types of overall analyses that are possible; e.g. in most instances it is not possible to assess what costs can be directly attributed to the White Paper and what costs would have been incurred nonetheless).

6.2.1.2 Main Findings

1. <u>Cost of White Paper initiatives</u>

The first part of the analysis examined the costs associated with the preparation and implementation (both one-off and ongoing) of the 40 action points and respective initiatives.

These costs have been disaggregated into the costs of measures for developing and implementing EU legislation (covering 58 initiatives), financial instruments (eight initiatives), and other measures such as studies, development of standards, social dialogue (a total of 66 initiatives).

Adoption/implementation of EU legislation related to the White Paper

The White Paper included a large number of initiatives related to the adoption and implementation of EU legislation (e.g. Regulations, Directives). For these activities, costs were incurred by the Commission, by Member States' authorities at different levels, by industry and by civil society organisations. These include costs to participate in the policy process (a role where the EU or MS-wide trade associations play an important role, although individual companies can also, and do, participate), and costs to implement the various provisions related to specific EU legislation. Individual industry stakeholders throughout the EU can also incur costs.

Data on the costs of such initiatives is summarised in Table 6-4 below (a more detailed analysis is presented in Annex H). We note that the cost estimates are not always directly comparable due to different methodologies used in the respective evaluation and impact assessment studies. With this in mind, we estimate the total costs (for all entities) of the 25[30] initiatives where relevant information was available, at around €65 billion in the 2011-2020 period[31], excluding the financial instruments discussed in the next section. Given that there are additional initiatives were the costs were considered to be significant but not quantified, the actual costs should be higher.

[30] Some legislative initiatives where quantitative information is available cover multiple initiatives in different action points (e.g. ITS directive 2010/40/EU). This number is thus only an approximation of the number of initiatives here considered.

[31] This estimate does not include any ongoing costs of the different initiatives, only initial implementation costs (even if spread out over several years). Given the different methodologies used to assess these costs, this overall figure should be seen with caution as it represents a very rough estimation of the total implementation costs of these initiatives.

Table 6-4: Costs incurred with the implementation of the White Paper (by action point and initiative) by type of entity affected

Key	
	Quantitative information available
	Qualitative information only; costs considered to be important
	Qualitative information only; costs considered to not be important or no assessment available

Action point(s)	Initiative(s)	Entity(ies) incurring costs	Estimated costs
1, 19	1,2, 4, 52-54	ERA	Implementation of 4th railway package: preparatory costs of >€1M; ongoing costs for implementation of >€1M; dissemination costs of €100k-€1M.
2	5	EC	Single European Sky ATM Research (SESAR): • Development phase (2008-2024): €1.2 billion, including €585 million on SESAR JU (2012-2020). • Deployment phase (2015-2035): €1.8-€2.8 billion.
		Eurocontrol	€1.2 billion for SESAR development phase (2008-2024).
		Industry	€1.3-1.7 billion for implementation of each Functional Airspace Block (FAB) (NPV, 2012-2020). €1.2 billion for SESAR development phase (2008-2024); €16.2-€25.2 SESAR deployment phase (2015-2035).
	6	EC	Implementation of the SES performance and charging scheme: €28 million (2012-2015).
		MS	Implementation of the SES performance and charging scheme: €20 million (2012-2015).
		ANSPs	Implementation of the SES performance and charging scheme: €33 million (2012-2015).
4, 18	10, 49	MS	Implement the reporting requirements of Directive 2010/65/EU under the National Single Window (NSW): €300k-€12m per MS (EU total of €8m-€336m). Implementation costs of Directive 2002/59/EC establishing VTMIS (vessel traffic monitoring and information system): €203 million (costs combined with the EC, no disaggregation available).
		Industry	Implementation costs for NSW (not quantified) such as cost of adaption to new regulatory framework, participation in pilot projects, and costs related to the meetings held to negotiate agreements with social partners.
	13	MS	Implementation of the regulation on common rules on the financial transparency of ports (2017/352): €9.9 million for public sector (EU total)
		Industry	Implementation of the regulation on common rules on the financial transparency of ports (2017/352): €15.7 million for businesses (EU total)
5	14	EC	€1.7 billion for 52 inland waterways (2014-2017).
		Other	Additional €2.1 billion of investment was leveraged from EC money.
6	15	MS	Implementation costs related to the completion of the internal market in road transport and road haulage market: €22.1 million. Implementation (and enforcement costs) of up to €166 million for authorities (NPV; 2020-2035) for regulation 2020/1055 on developments in the road transport sector.
	16	EC	Very limited (assessment by EC experts; not quantified).
	17	EC	Insignificant costs (assessment by EC experts; not quantified).
7	18	EC	Very limited (assessment by EC experts; not quantified).
		MS	Very limited (assessment by desk officers; not quantified).
	19	EC	Very limited (assessment by desk officers; not quantified).

Action point(s)	Initiative(s)	Entity(ies) incurring costs	Estimated costs
		MS	Very limited (assessment by desk officers; not quantified).
12	30	EC	Quite significant costs (assessment by desk officers; not quantified).
	31	EC	Very limited (assessment by desk officers; not quantified).
		MS	Quite significant costs (assessment by desk officers; not quantified). These costs relate to continuous regulatory and on-site implementation reassessment.
13	32	EC	Insignificant costs (assessment by desk officers; not quantified).
		MS	Very limited (assessment by desk officers; not quantified).
	33	EC	Insignificant costs (assessment by desk officers; not quantified).
		MS	Very limited (assessment by desk officers; not quantified).
14	34	EC	Insignificant costs (assessment by desk officers; not quantified).
		MS	Insignificant costs (assessment by desk officers; not quantified).
16	39	EC	ITS directive (2010/40/EU): €1.8 billion (2007-2020). (ITS directive also applies to initiatives action points 22, 25 and 27.)
		MS	ITS directive: €150 million (2010-2020, EU total).
	40	EC	Road safety policy: costs of limited significance (assessment by desk officers), €3.5 million per year.
		MS	Road safety policy (2011-2020): Over €4 billion per year (EU total). The most significant costs are the implementation of the updated roadworthiness testing, which was estimated at €3.3 billion for all member states each year.
	42	MS	Road safety policy (2011-2020): over €4 billion per year (EU total). Of those: €3.3 billion per year (EU total) for implementation of updated roadworthiness testing.
17	43	MS	Implementation costs (EU total) of regulation 996/2010 on the investigation and prevention of accidents and incidents in civil aviation: €3.2-€4.7 million.
18	48	EC	Quite significant costs (assessment by desk officers; not quantified).
	51	EC/Frontex	Very significant costs (assessment by desk officers; not quantified). These costs related to the formation of the European Border and Coast Guard Agency (Frontex). Frontex had a budget of €289 million in 2018, €330 million in 2019 and €460 million in 2020.
19	52-54	EC	Costs incurred (assessment by desk officers; not quantified).
		MS	Costs incurred (assessment by desk officers; not quantified).
		Industry	Costs incurred (assessment by desk officers; not quantified).
20	55	EC	Insignificant costs (assessment by desk officers; not quantified).
		MS	Insignificant costs (assessment by desk officers; not quantified).
22	62	EC	Multimodal Travel Information Services (MMTIS): €5 million over four years.
23	63	EC	Insignificant costs (assessment by desk officers; not quantified).
		MS	Insignificant costs (assessment by desk officers; not quantified).
24	64-66, 70	EC	Significant costs (assessment by desk officers). The next section on the financial instruments explores these costs.
26	79	MS	Implementation of the Clean Vehicles Directive (2009/33/EC): around €35-€431 million.
	80-81	Industry	Alternative Fuels Infrastructure Directive (2014/94/EU): "quite significant" costs (not quantified) for charge point operators, related to interoperability and standards of charging infrastructure.
27	86	EC	MMTIS (€5m), Transmodal (€2m) and alternative fuels (€3m).
28	88	EC	Tyre labelling regulation (2020/740): €2.1 million one-off costs.
		MS	Tyre labelling regulation (2020/740): costs of limited significance (assessment by desk officers; not quantified).

Action point(s)	Initiative(s)	Entity(ies) incurring costs	Estimated costs
		Industry	Tyre labelling regulation (2020/740): one-off costs of €70 million; ongoing costs of €157 million per year.
31	92, 94, 95	EC	Significant costs but not quantified (assessment by desk officers; not quantified).
		MS	Significant costs but not quantified (assessment by desk officers; not quantified).
		Other	Other stakeholders who promote urban mobility: quite significant costs (assessment by desk officers; not quantified).
34	102	MS	Very significant but not quantified (assessment by desk officers; not quantified).
		Industry	Very significant but not quantified (assessment by desk officers; not quantified) for stakeholders such as port authorities and private companies.
	103	MS	Very significant but not quantified (assessment by desk officers; not quantified).
		Industry	Very significant costs but not quantified (assessment by desk officers; not quantified). for stakeholders such as port authorities and private companies.
	104	EC	"High costs" for items such as ERTMS (assessment by desk officers; not quantified).
		Industry	"High costs" for stakeholders such as infrastructure managers, railway operators and rolling stock keepers (assessment by desk officers; not quantified).
	102-105	EC, MS	Administrative costs related to TEN-T implementation (NPV figures for 2018-2030): €185 million.
		Industry	Administrative costs related to TEN-T implementation (NPV figures for 2018-2030): €937 million for project promoters (e.g. port authorities and infrastructure managers).
35	106	MS	Combined Transport Directive (92/106/EEC): costs of up to €2 million per year per MS.
39	118	EC	Limited costs (assessment by desk officers; not quantified).

Sources: Study team analysis based on desk and field research inputs. More details about sources for specific action points are presented in Annex H.

Financial instruments, public-private partnerships (PPPs) and R&D funding

EU-level financial support through a range of instruments has had a crucial role in supporting the deployment of transport infrastructure across the EU.

The TEN-T funding programme (which existed in the 2007-2013 multiannual EU financial framework, with some spending taking place until 2015) and the subsequent Connecting Europe Facility (CEF) (being created in the 2014-2020 multiannual EU financial framework) have been the major sources of EU level funding of transport infrastructure across the EU, covering all modes.

These programmes are mainly related to action points 34 and 37 of the White Paper. Put together they have supported (or will support in the near future, in the case of the CEF) infrastructure investment of over €80 billion of total investment, with TEN-T representing €30.6 billion and CEF €50.1 billion. A significant share of the costs was covered by the EU budget – 18% in the case of the TEN-T programme and 46% in the case of the CEF. From the modal perspective, rail-related projects represented the majority of investment (around two-thirds in each case), with other modes or thematic areas representing much smaller portions.

In addition, the European Structural and Investment Funds (ESIF) programme has also been used to support investment in transport in the EU (related to action points 31, 34 and 37 of the WP). In the 2016-2019[32] period of the current 2014-2020 ESIF programme[33], actual expenditures in categories related to investment in TEN-T transport infrastructure were €47.8 billion, with EU contribution of €40.1 billion (84%).

In addition to TEN-T, ESIF expenditures in other transport investments were €26.7 billion, with EU contribution of €21.9 billion (82%).

The White Paper also aims to promote the use of Public Private Partnerships (PPPs) in transport (action point 38). According to the European Investment Bank's European PPP Expertise Centre (EPEC), during the 2011-2019 period, across Europe[34] 118 transport PPPs[35] were completed, representing a total investment of €74.7 billion. No information about the EU contribution was available.

Finally, the White Paper includes measures to support EU level research and technology development (R&D) covering all aspects of the transport system (action point 24). The bulk of the financial support in this area came via the Horizon 2020 programme. From a total budget of €77 billion for the 2014-2020 period (EGVI, 2020), transport sector related R&D had a total budget of (2014-2020) of €6.3 billion. This investment was split amongst the following thematic areas:

- Automated Road Transport (including Digitising and Transforming).
- Blue Growth (maritime transport).
- Green Vehicles (including Low Carbon).
- Mobility for Growth.

[32] DG REGIO data on the current ESIF programme reports implemented expenditures for the 2016-2019 period only.

[33] In the 2007-2013 period the category called "transport infrastructure" received €66.4 billion of funding. The EU contribution is not known and no disaggregation by mode was available.

[34] Defined as EU28 plus Turkey and the Western Balkans

[35] These are not disaggregated by mode.

Table 6-5 summarises these results.

Table 6-5: Costs of financial instruments associated with the White Paper

Instrument	Period	WP Action points	Total Expenditure (€ billion)	EU contribution (€ billion)
TEN-T	2007-2015	34, 37	30.6	5.5
CEF	2014-2023	34, 37	50.1	30.6
ESIF	2014-2020	31, 34, 37	74.5	62.0
PPP	2011-2019	38	74.7	n/a
H2020	2014-2020	24	6.3	n/a
Total	**-**	**-**	**236.2**	**98.1**

Source: INEA and EPEC databases.

Put together, the total amount of funding allocated through the various initiatives of the White Paper for the 2007-2023 period is around €235 billion[36], including around €160 billion funded via a variety of EU funding mechanisms (TEN-T, CEF, ESIF, H2020). An important portion of this (around €100 billion) was funded via the EU with the remaining coming from national authorities and industry.

2. How do the costs compare with the benefits resulting from the implementation of the 40 actions?

In order to assess the overall efficiency of the White Paper and its 40 action points, the costs of the White Paper, as discussed in the previous section, need to be considered against the overall benefits to have been derived from their implementation and the progress made towards achieving the headline goals and specific objectives[37].

As noted above, overall, it was estimated that the implementation of the regulatory measures of the White Paper resulted in costs of over €65 billion in the 2011-2020 period. Additionally, around €160 billion has been estimated for the EU financial instruments of which around €90 billion came from the EU budget.

Against these implementation costs, the results from the model presented in EQ1 (section 6.1.1) show some progress by 2018, in terms of achieving the specific objectives and headline goals in the EU27 transport sector.

Progress includes a net reduction in GHG emissions by 3.2% (32 Mt) in comparison to the baseline, a reduction in oil dependency by 2.4% (10.2 Mtoe) (including aviation and excluding international maritime) and a reduction in congestion levels by 0.4% (6 minutes per person).

There was also progress in terms of the headline goals, including in the share of alternative fuelled passenger cars in new registrations (3.6 percentage points increase), reduced consumption of gasoline and diesel in urban areas of about 6.5% and 4.7%,

[36] It is possible that these figures include some overlap between the different funding mechanisms (i.e. double counting of the same investment in different programmes), but it is not possible to estimate how much that would represent. In any case, it is not expected that this represents an important proportion of these overall figures. Please also note that of these investment was made outside of the EU, namely in the case of PPPs.

[37] An analysis of the cost-effectiveness for the different stakeholder groups is presented in EQ8.

share of rail for medium-distance passenger transport: 2.2 percentage points and reduction in road casualties by 3.2%.

The available data do not allow for an analysis of the costs at the level of individual action points as there are important gaps. However, the evaluation studies examining specific initiatives point to certain initiatives having clear positive cost-effectiveness (Table 6-6). The initiatives with the highest levels of benefits relate to enhancing the internal market (rail), technological improvements (aviation), safety (road and aviation). However, as this analysis covers only a small subset of the initiatives and does not allow to reach conclusions for the overall cost-effectiveness of the White Paper action points.

Table 6-6: Cost-effectiveness for society of selected White Paper initiatives

Action points covered	Initiatives covered	Discussion on cost-effectiveness
1	1-4	Full implementation of the single market for rail transport: benefits of €1-€2.7 billion per year. Further integration with road sector, would bring additional benefits of €2.5-€4.5 billion per year.
2	5	Benefits of €8-€15 billion per year derived from the deployment phase of SESAR; the development phase expected to bring €6 of benefits for each €1 spent on R&D.
16	39-42	€17.5 billion annual reduction in statistical costs for fatalities and serious road injuries, compared to an annual investment of €4.3 billion by MS. Considered to be a cost-effective investment.
16	41	The directive on cross-border exchange of information of road safety related traffic offences is deemed to be cost effective, with costs insignificant compared to benefits.
17	43	Regulation 996/2010 on the investigation and prevention of accidents and incidents in civil aviation: costs of €1.1 million per year, compared with a combined value of saved accidents of €202 million. Regulation would only to prevent 0.6% of fatalities to be cost-effective.
30	90-91	Evaluation of Directive 92/6/EEC on the installation and use of speed limitation devices, concluded that the directive had a positive cost-benefit ratio, suggesting that similar results can be expected if the scope is expanded.
26, 33	n/a	Clean Vehicles Directive: benefits of €14-€174 million per year, compared to total costs of €12-€144 million per year. This low-cost benefit (1.1-1.2) ratio is a result of the limited direct impacts associated with public procurement.
38	114-115	EPEC was considered to be cost-efficient.

Sources: Study team analysis based on desk and field research inputs.

6.2.1.3 Conclusions

While significant data gaps exist, it can be concluded that capital costs, including investments in items such as technology or infrastructure, form the majority of implementation costs. These costs are spread across many entities, including the EU itself, Member States, industry and civil society stakeholders, but it is not possible to determine the share of each one.

In terms of the cost-effectiveness of the White Paper actions, quantitative inputs from relevant evaluation studies shows that there is positive cost-effectiveness for society for some of the White Paper initiatives. Namely, significant positive cost-effectiveness is

expected in those initiatives focused on safety. However, these only represent a small portion of the total initiatives.

6.2.2 EQ8: To what extent have the initiatives under the White Paper been cost effective? Which benefits have been achieved for the different stakeholder groups? What costs have resulted for the different stakeholder groups?

6.2.2.1 Introduction

While EQ7 focused on the overall implementation costs and efficiency of the White Paper, this evaluation question focuses on the costs and benefits of the initiatives of the White Paper for the different categories of stakeholders affected, including national and local authorities, industry and civil society stakeholders, and how they compare with the benefits that have resulted.

The analysis is based on the same detailed analysis of sources used for EQ7 and the limitations of those sources are also applicable here (see EQ7 Annex H for more details). Thus, data are mostly available in relation to regulatory measures and financial instruments, and the quantitative data available mostly came from studies (evaluations and impact assessments), with field research and data requests offering mostly qualitative information.

The first section of this question analyses the costs of the initiatives under the 40 action points for the different categories of stakeholders. The second, examines how these costs compare with the resulting total benefits of the initiatives.

6.2.2.2 Main findings

1. Costs for different categories of stakeholders

Besides the costs to the EC (discussed in EQ7), stakeholders incurred costs as a result of the White Paper initiatives. Depending on the type of initiative these included:

- Costs for participation in preparatory actions for the different measures.
- Costs for the implementation of the initiatives (including implementation, enforcement, monitoring).
- Other types of costs.

Input from stakeholders suggests that costs for the implementation were the most common (respondents could select more than one type of cost):

- Amongst authorities, 12 out of 20 incurred costs with implementation, and 9 out of 20 costs with preparatory actions. Eight out of 20 indicated no costs.
- Eight out of 16 industry stakeholders incurred costs with implementation, and 7 out of 16 with preparatory actions. Five out of 15 indicated no costs.
- For civil society stakeholders and research organisations, 4 out of 11 noted costs with implementation and 4 out of 11 with preparation. Five stakeholders (out of 11) indicated no costs.

Looking further into the costs incurred by the different categories of stakeholders, we used available evidence to identify the type of costs by action point. The following conclusions were reached:

- **Member States' authorities** incurred costs in relation to most action points of the White Paper. The most significant costs are the costs for the implementation (e.g. enforcement, monitoring and administrative costs) of the various legislative measures as well as costs associated with the financial instruments.

  The available data indicate that the costs varied considerably, with some initiatives corresponding to tens of thousands of Euros of ongoing costs per MS (e.g. some costs related to the ITS Directive (2010/40/EU), in action points 16, 22, 25 and 27), up to hundreds of millions of Euros (e.g. implementation of the updated roadworthiness testing in action point 16).

  Overall, for the 44 regulatory measures identified in the White Paper, annual costs for national authorities are typically in the range of €0.1-€1 million per measure per Member State (reflecting the different types of initiatives and the varying sizes of the Member States). As such, we can estimate a total annual cost of €4.4-€44 million per Member State and a total of €0.12-€1.2 billion/year across the national authorities of all 27 MS.

  No similar data has been found on the share of MS expenditures in financial instruments such as TEN-T, CEF or ESIF and no estimate was possible for expenditures by regional and local authorities.

- In the case of **industry** (referring to sector representatives and individual enterprises), costs incurred were mainly for the implementation and compliance with legislative measures. While stakeholders did not provide any specific quantitative information (the quantitative data in the table below comes from ex-post evaluations) they did provide an overall assessment of how they view the costs that they have to incur with the White Paper initiatives:

  - Stakeholders representing different transport manufacturing and services sectors (ACEM, A4E, CER, ECSA, ECF, ETSA, NGVA Europe, UETR) pointed out that industry incurs costs for participation in the policy process as well as in the actual implementation of initiatives. One of these stakeholders (A4E, representing the aviation sector) noted that for trade organisations most costs take place during the preparatory stages, and it is their members that incur more costs during implementation. One association (NGVA Europe, alternative fuels) summarised its costs directly attributed to the White Paper as being minimal; however, given the wide scope of the White Paper, NGVA Europe estimated that 70% of their staff costs are spent on activities that are somehow linked to White Paper initiatives.
  - Industry stakeholders also pointed to important compliance costs for their industries. For example, this was the case for compliance with CO_2 targets for LDVs and HDVs (ACEA) and for motorcycles (ACEM). Different (unspecified) costs were incurred by the rail industry (CER, EIM and UIC), Road operators (IRU) incur costs related to safety and environmental improvements.
  - While some studies were found that present quantitative or qualitative information for some specific initiatives, the information gathered concerning the costs to industry stakeholders was very limited. This makes it impossible to estimate the overall costs for the different industry stakeholders and to identify whether any of them have been subjected to any undue burdens. On this last point, no evidence was found that this was the case.

- In the case of **other stakeholders** (e.g. NGOs, research organisations, standards-setting bodies, consumer protection bodies and social partners) the costs associated with the White Paper were generally limited. They typically include costs for participating in and influencing the policy development process (e.g. consultations), and costs for the organisation in attendance at meetings and events related to the policy areas in which they operate (including in actions related to social dialogue). Standards-setting organisations also incur costs

related to their activity. It has not been possible to quantify any of the costs incurred.

More details on this analysis of costs (including sources) is available in Annex H.

Concluding, stakeholders have incurred costs associated with the White Paper for participation in preparatory actions for the different measures of the implementation of the initiatives (including implementation, enforcement, monitoring). Stakeholder input suggests that the latter is the most common cost that they incur.

In terms of the level of costs incurred, these vary considerably depending on the type and scope of initiative in question. Overall, we estimate the overall burden for the 27 MS national authorities at €0.12-€1.2 billion/year. Given the limited information available it was not possible to estimate an overall burden for industry and civil society stakeholders.

2. Costs-effectiveness of initiatives for different stakeholders

The available data on costs and benefits is not comprehensive enough to allow for a proper assessment of the costs and benefits for each group of stakeholders. As such, our assessment is based mainly on the input from the different categories of stakeholders that contributed to the study:

- For **Member States' authorities**, input from national and regional authorities suggests that, in most cases, the costs of the initiatives for authorities were justified by the benefits. In total, 10 out of 21 national and regional authorities that contributed to the study considered that the benefits of the White Paper outweighed the costs to their administration fully, or to a significant extent. Only one authority indicated that the benefits did not outweigh the costs. This authority considered that the costs associated with the ITS directive (2010/40/EU) (action points 16, 22, 25 and 27) were not justified.
- In the case of **industry**, and in contrast to authorities, industry representatives made a more negative assessment on the cost-effectiveness of the White Paper initiatives. A majority of stakeholders participating in the study indicated that, at best, the costs were only justified by the benefits "to some extent" (9 out of 12 stakeholders, with six of them saying that costs are unjustified by the benefits derived). This was a result confirmed, at least for some initiatives, by desk-based research and analysis. For others, a positive assessment of cost-effectiveness was found in desk research (see Table 6-7 below for more details). Reasons provided by stakeholders for this negative assessment varied, but two main themes emerged:
  - Lack of progress in implementation, leading to a delay in benefits materialising. This is sometimes compounded by the fact that successful implementation is dependent on actions by multiple stakeholders, and some of these stakeholders might make investments that are not accompanied by the necessary investments by the other stakeholders, leading to reducing benefits (e.g., the uptake of alternative fuels vehicles, which requires both investment from the manufacturers in the vehicles themselves and from other stakeholders to provide the necessary infrastructure).
  - Burdens imposed by multiple requirements from multiple pieces of legislation. This was noted as being particularly burdensome for small businesses.
- In the case of **civil society stakeholders**, it was not possible to identify in the literature information regarding the cost-effectiveness of the White Paper to them. In the field research conducted for this study, relevant stakeholders were somewhat sceptical about the cost-effectiveness of the White Paper, with only

one out of eight indicating that the costs of the White Paper are fully justified by the costs, and a further three indicating that this is true to some extent. One labour organisation noted the difficulty of making this assessment, given the difficulty of quantifying social impacts (both positive and negative) of any specific initiatives.

Table 6-7: Cost-effectiveness for industry

Action point(s)	Initiative(s)	Cost-effectiveness for industry
1, 19	1-4; 52-54	Positive cost-effectiveness expected from the implementation of the 4th railway package
2	5	High costs of the FABs not fully offset by the operational and performance benefits. Lack of a complete SES does not allow all benefits to materialise
2	6	SES performance and charging schemes considered cost-efficient
4	10	Majority of stakeholders found the implementation of Reporting Formalities Directive (RFD) (including NSW) as not cost efficient.
6	15	Regulations 1071/2009 and 1072/2009 on completion of the internal market in road transport and road haulage market: benefit-cost ratio of 0.2, indicating that regulations have not been cost-effective.
7	18	Regulation 2020/1056 on electronic freight transport information expected to be cost effective: reduction of €19,709 billion (2013 prices, NPV) in administrative costs for businesses over 2018-2040, compared to compliance costs of €4,375 million over the same period.
9	21	Shipowners perceive administration costs relating to the port-state control directive (2009/16/EC) as proportional to the goal of eliminating substandard shipping.
16	39	Stakeholders were generally positive about the impacts of the ITS Directive (2010/40/EU), and thought the benefits outweighed the costs.
24	67	Scepticism about cost-effectiveness for industry on the investment on alternative fuels road vehicles.
28	87	Investment costs on mandatory fuel compatibility labelling considered unjustifiably high compared to the benefits.

Sources: Study team analysis based on desk and field research inputs. More details about sources for specific action points are presented in EQ7 and EQ8 in Annex H.

6.2.2.3 Conclusions

This evaluation question examined the overall cost-effectiveness of the White Paper initiatives for the different groups of stakeholders (Member States, industry, and other stakeholders). In general, while national and regional authorities considered that the costs of the initiatives were justified by the benefits, industry stakeholders showed greater scepticism in terms of the cost-effectiveness for them. This assessment by industry stakeholders was partially confirmed by desk research, which indicated that for some initiatives there is indeed a low level of cost-effectiveness for industry stakeholders.

6.2.3 EQ9: Is there room to streamline or simplify the various initiatives under the White Paper?

6.2.3.1 Introduction

This question examines the scope for improvements in efficiency for the various White Paper initiatives.

First, we examined the presence of potential synergies amongst the different action points and initiatives and whether any of these could be merged to avoid duplications of activities (procedures; requirements) and resulting costs. Secondly, we considered the potential for changes within each initiative that could reduce the respective costs without affecting the level of the (expected) benefits.

The analysis is based on our own assessments combined with input from the Commission experts and other stakeholders (through interviews and surveys) that were involved in the implementation of the initiatives. Input from evaluations and other studies that analysed specific initiatives was also used.

6.2.3.2 Main findings

1. Are there action points or initiatives that could be merged to avoid duplications of activities (procedures; requirements) and resulting costs?

Overall, there was limited evidence indicating duplications among the various initiatives. Analysis of the initiatives together with the input from Commission experts and stakeholders pointed to a few instances where the implementation of some legislative acts appears to be relevant for more than one action point.

This is the case of the ITS Directive (2010/40/EU), which is related to the implementation of action points 16, 22, 25 and 27, and the Clean Vehicles Directive (2009/33/EC), related to action points 26 and 33. The same is true for the VTMIS Directive (2002/59/EC) for the maritime sector, which is related to action points 4 and 18.

However, by itself this is not evidence of duplication and can be justified by the different aspects covered by the respective Directive. It does not indicate that the relevant action points are overlapping and need to be merged. It is also not the case that any such merging would lead to reduced costs.

2. Are there procedures and requirements under the various initiatives that could be eliminated or simplified to reduce the respective costs without affecting the level of the (expected) benefits?

As part of the analysis we also explored the potential for efficiency gains that could arise from the simplification of specific procedures and legislative requirements, or to the further enhancement of EU harmonisation efforts.

While results (see Table 6-8) show areas of potential efficiency gains, none of the sources (from desk and field research) used to answer this sub-question were able to provide estimates for the savings that could result if such efficiency-improving efforts were implemented.

Table 6-8: Potential simplifications found in the different White Paper initiatives

Action point	Initiative	Potential simplification found
1	2	Twofold authorisation procedure could be merged into a single ERA-led process.
2	5	Economic regulation related to the SES are complex, and could be simplified to reduce the high administrative burden they impose The SESAR deployment manager was seen as a duplication of efforts.
2	6	FABs could be optional for Member States to implement as they bring little benefits.
4	10	Reduce duplication in the information reporting process of VMTIS
5	14	Streamline procedures for environmental and other assessments in the NAIADES II package, especially in a cross-border context.
9	22	Justification for a missed inspection should be made more flexible in Port State Control Directive (2009/16/EC).
24	64	Shift2Rail JU: a simpler procedure should be found to select the projects constituting the JU work plan.
24	67	Instead of requiring Member States to show the cost of alternative fuels at individual fuel stations (a very costly procedure), operational costs for a vehicle should be detailed at the point of vehicle purchase The definition of clean fuels should be aligned between the Clean Vehicles Directive (2009/33/EC) and the Alternative Fuels Infrastructure Directive (2014/94/EU).
31	92, 93, 95	ELTIS: a SUMP contact point at the Member State level could check the quality and status of each plan in the local language and provide input for the SUMP city database. SUMP guidelines should be simplified: capacity building and financial support mechanisms should be provided to cities to develop locally appropriate SUMPs that can guarantee its implementation.
37	111	Scope for improvement in the communication between the Commission and the EIB. Access to infrastructure funding is complex and can be seen as one of the causes for lack of investment in safe and secure truck parking areas for trucks. EPEC: governance could improve, including the way that its governing body's meetings work and the procedure to approve its work plans.
39	118	Variable tolls for HDVs based on the CO2 emissions is a complex part of the proposal on fair and efficient road pricing. Compulsory distance-based charging may be a technically simpler option, although politically it is definitely more difficult to implement.
39	118-120	Fragmentation of national and municipal levels of decarbonisation policies (e.g., bans of certain vehicles within cities).

Sources: Study team analysis based on desk and field research inputs.

6.2.3.3 Conclusions

There is very limited evidence indicating that there is scope for simplification and streamlining of the White Paper that could lead to important efficiency gains. Very few areas of duplication were found, were mainly related to specific initiatives and action points that were implemented by the same instruments. Additionally, a number of

possible simplifications proposed included aspects such as revising reporting requirements, reducing the scope of legislation, and changing the way that specific legislative acts are implemented across the EU. Still, none of these potential simplifications relate to the White Paper itself, but rather to the specific legislative acts that implement the White Paper initiatives.

6.3 Relevance

6.3.1 EQ10: Are the problems/needs identified in the White Paper still valid?

6.3.1.1 Introduction

At the time of the White Paper's adoption in 2011, **four overarching problems/needs were identified** in the transport sector:

1. The mobility system is not sustainable as the transport paradigm is founded on the use of fossil fuels and the dominance of road transport;
2. Deteriorating climate and local environment;
3. Transport remained dependent on fossil fuels;
4. Increasing level of congestion together with poorer accessibility for peripheral areas – the transport system is not in pace with the mobility needs and aspirations of people and business.

These problems/needs were disaggregated, to allow for a comprehensive assessment of their validity. Since 2011, a series of **technological developments, as well as economic, social and environmental trends, have emerged**. The analysis presented in this question examines the impact of these trends on the validity of the White Paper problems/needs. The analysis also presents developments in the problems/needs since 2011, through reference to key indicators. It draws upon the findings from the Alternative scenario, presenting projections to 2050 to indicate if the problems/needs are likely to remain valid. This is complemented by outputs from the stakeholder consultation, and by findings from the case study, which assessed the alignment of the White Paper problems/needs with those identified in national and regional transport strategies.

6.3.1.2 Main findings

1. The mobility system is not sustainable as the transport paradigm is founded on the use of fossil fuels and the dominance of road transport

To explore the continued validity of this original need of the White Paper, the relevance of the need to address the dominant role of road transport is assessed.

The dominant role of road transport remains a valid problem. In 2011, road transport comprised 74% of the modal share of freight transport in the EU27, measured in tonne-kilometres (tkm) (Eurostat, 2020a) and 92.7% of the modal share of land passenger transport, measured in passenger-kilometres (pkm) (Eurostat, 2020b). By 2018, road transport remained the dominant mode in freight transport (75.3% of total tkm) and land passenger transport (92.1% of total pkm). The ongoing dominant role of road transport at the EU level hides significant variations at the national level. For example, Malta and Cyprus continue to rely exclusively on road transport for logistics, due to a lack of railway or inland waterway infrastructure (Eurostat, 2020c). In contrast, between 2011 and 2018, Lithuania, Portugal and Italy experienced a substantial

increase in the tkm performed by rail (and a subsequent fall in the share of road transport in the modal split).

The significance of this problem in the future will also depend on the uptake of AFVs in Europe. Passenger electric vehicle sales increased from 450,000 to 2.1 million between 2015 and 2019. The Alternative scenario projects that AFVs may represent around 33% of new passenger car registrations in 2030, and 64% by 2050. Therefore, the dominance of road transport could become less concerning from an emissions generation perspective as AFV uptake is expected to contribute towards a decline in road-related transport emissions.

The need to overcome the dominance of road transport is also recognised in the majority of national and regional strategies (61 out of 88) reviewed as part of the case study. These strategies acknowledged the need to encourage the shift towards more efficient modes of transport, such as public transport in urban environments and rail in inter-urban environments. In addition, the continued need to address the dominance of road transport is supported by the majority of stakeholders that contributed to the study, with 47 out of 64 stakeholders expressing that they 'fully agree' or 'partly agree' that there is still a need for policy action.

2. Deteriorating climate and local environment

To explore the continued validity of this original need of the White Paper, the relevance of the level of CO_2 emissions (climate) and air pollutants (local environment) is assessed.

The level of CO_2 emissions and air pollutants remains a valid problem. Between 2011 and 2018, transport-related GHG emissions (including international aviation, excluding international maritime) in the EU27 increased by 5.2%, from 910 $MtCO_2$ to 957 $MtCO_2$ (European Commission, 2020). By 2018, transport-related GHG emissions were 32% higher than 1990 levels (726 $MtCO_2$ in 1990) (European Commission, 2020).

Although emissions associated with rail have declined since 2011, emissions associated with road transport have increased. Domestic aviation and inland waterway emissions have remained stable.

Between 2011 and 2017, air pollutant emissions associated with the transport sector fell, with $PM_{2.5}$ levels falling from 73.5% of 2000 levels, to 56.3% (EEA, 2019a). Over the same period, NOx levels fell from 68.1% of 1990 levels, to 59.2%. Despite this, in 2017, 8% of the urban population was exposed to $PM_{2.5}$ levels above the EU annual limit value, and 62% of the European ecosystem area remained exposed to levels of NOx (EEA, 2019b).

Even though transport-related CO_2 emissions (including international aviation, excluding international maritime shipping) would be 16% lower in the Alternative scenario relative to the Baseline in 2030, and 39% lower in 2050, further policy action will be required to encourage emissions reduction in line with the ambition of the European Green Deal.

The need to address CO_2 and air pollutant emissions is also supported by the majority of national and regional strategies (65 out of 88). In addition, the continued need to address this problem is supported by the majority of stakeholders, with 67 out of 70 stakeholders expressing that they 'fully agree' or 'partly agree' that there is still a need for policy action.

3. Transport remained dependent on fossil fuels

To explore the continued validity of this original need of the White Paper, the relevance of the need to address the dependency of the transport sector on fossil fuels is assessed.

The dependency of the transport sector on the use of fossil fuels remains a valid problem. In the road sector, although the number of alternative fuel vehicle models available on the European market has increased since 2011, the EU market is still largely dominated by petrol and diesel vehicles (European Parliamentary Research Service, 2019). In the aviation sector, the share of low-carbon fuels used is still negligible. Significant investment into supporting infrastructure, and further technological development into alternative fuels, has the potential to transition the sector away from fossil fuel use.

Under the Alternative scenario, the dependency on fossil fuels is projected to remain an issue. In particular, the reliance on fossil fuels in the aviation and waterborne transport systems is projected to remain high. This suggests that further policy action is required to address fossil fuel use in these modes. ReFuelEU Aviation and FuelEU Maritime represent examples of initiatives which aim to boost the deployment and demand for sustainable fuels.

The need to overcome fossil fuel dependence is also recognised in a small majority of national and regional strategies (45 out of 88). In addition, the continued need to address the dependence of the sector on fossil fuels is supported by the vast majority of stakeholders, with 67 out of 69 stakeholders expressing that they 'fully agree' or 'partly agree' that there is still a need for policy action.

4. Increasing level of congestion together with poorer accessibility for peripheral areas – the transport system is not in pace with the mobility needs and aspirations of people and business

To explore the continued validity of this original need, the relevance of congestion and poor accessibility are assessed. To ensure that the '*mobility needs and aspirations of people and business*' are also captured, road safety, service quality, accessibility for people with disabilities, integration of new technologies in vehicles and transport systems, the competitiveness of the EU transport sector, and the completion of the single internal market, are also assessed.

High levels of congestion remain a valid problem. The decrease in congestion in the Alternative scenario relative to the Baseline scenario would be limited, with a 1.1% reduction in 2030 and a 0.4% reduction in 2050. The projected increase in congestion could be linked to the growing trend of urbanisation, which in 2018, was projected to increase in the period to 2050 (JRC, 2018). As the collaborative economy and Mobility as a Service (MaaS) concept starts to develop further, there is potential for these emerging mobility paradigms to alleviate congestion.

Although there is the potential for congestion levels to worsen in light of urbanisation, intelligent transport systems (ITSs) may alleviate congestion as transport users are provided with easier access to public transport service information. In addition, as active travel uptake increases in cities, there is potential for the gradual displacement of conventionally-fuelled privately-owned vehicles, which could alleviate congestion. The need to address congestion is also recognised in the majority of national and regional strategies (50 out of 88). In addition, the need to address congestion is supported by the majority of stakeholders, with 62 out of 69 stakeholders expressing that they 'fully agree' or 'partly agree' that there is still a need for policy action.

Inadequate accessibility for peripheral areas also remains a valid problem. In 2012, 21.3% of the EU27 population experienced 'very high' or 'high' difficulty in accessing public transport. This was more pronounced in rural areas, where 36.8% faced 'very high' or 'high' difficulty accessing public transport, relative to only 9.9% in cities

(Eurostat, 2012)[38]. While there are no more recent data available to assess whether the progress made, the need to address accessibility for peripheral areas was a policy priority in the majority of national and regional strategies analysed (50 out of 88). In addition, the large majority of stakeholders that contributed to the study identified an ongoing need to address accessibility to peripheral areas. 52 out of 68 stakeholders indicated that they 'fully agreed' or 'partly agreed' that there is still a need for policy action.

Poor road safety remains a valid problem. Although road deaths fell by 24% between 2010 and 2019, there were still 51 road deaths per million inhabitants in the EU27 in 2019 (ETSC, 2020). Whilst deaths among car drivers and passengers fell by 24% over this period, and pedestrian deaths fell by 19%, cyclist deaths remained stable (ETSC, 2020). Due to this, the share of cyclist deaths as a proportion of total road fatalities has increased. Therefore, it is particularly important to address cyclist safety, in light of the projected increase in the uptake of active travel and micro-mobility in cities (ECF, 2013).

The emergence of connected and automated vehicles (CAVs) may pose new challenges from a road safety perspective (e.g. automatic detection of pedestrians). Furthermore, as many Member States report increasingly older populations, the increase in the proportion of vulnerable road users (VRUs) needs to be accounted for. The continued need to address road safety is also supported by the majority of stakeholders, with 50 out of 65 stakeholders stating that they 'fully agree' or 'partly agree' that there is still a need for policy action. The relevance of this need was not assessed as part of the case study.

Improving service quality/consumer protection remains a valid need. In 2013, the market performance indicator (MPI), which is a composite index indicating how well a market performs according to consumers, was 74.6. By 2017, the MPI had increased to 78.3. This indicates that there is a growing level of trust, performance and choice in the transport market from a consumer perspective (European Commission, 2013).

As digitalisation becomes more intrinsic to transport use, passengers are continuing to demand higher levels of service quality, with services, such as ride-hailing, offering improved user experience (Frazzani, et al., 2019). Despite this positive shift for consumers, the increasing role of data in transport has resulted in growing concerns over data protection. The need to improve the quality of transport services and consumer protection is supported by the majority of stakeholders, with 51 out of 69 stakeholders stating that they 'fully agree' or 'partly agree' that there is still a need for policy action. The relevance of this need was not assessed as part of the case study.

Enhancing accessibility for people with disabilities remains a valid need. In 2017, 81% of passengers with disabilities or reduced mobility who requested assistance when travelling were satisfied with the assistance provided (European Commission, 2019). Although this is positive, the share of the population that is likely to face reduced mobility is expected to increase, with those aged 65 or over projected to comprise 27.5% of the EU27 population by 2050 (relative to 20.3% in 2019) (Eurostat, 2020). Therefore, a growing share of the population is likely to face difficulty driving and will become more reliant upon public transport. Given this, accessibility is still an essential need to address.

In addition to this, there is a trend marking the progressive ageing of the older population itself, as the relative significance of the very old (80 years or above) is

[38] More recent data related on accessibility is not available.

growing at a faster pace than any other age segment of the EU27's population. The share of people aged 80 years or more is projected to reach 11.3% of the EU27 population by 2050, relative to 5.8% in 2019 (Eurostat, 2019e). Despite the satisfaction of people with reduced mobility at the EU level with accessibility, it will be important to remain attuned to the needs of those with reduced mobility, and for policy action to address emerging concerns as the need develops into the future. The relevance of this need was not assessed as part of the stakeholder consultation or case study.

The effective development and integration of new technologies in vehicles and transport systems remains a valid need. Since the adoption of the White Paper, a series of transport technologies have evolved, including ITSs, CAVs and low-emission transport alternatives, such as AFVs and low-carbon fuels. These technologies still require validation, testing and implementation to varying degrees, to allow integration in vehicles and transport systems.

Despite the technological feasibility, the deployment of AFVs has remained relatively low (12.6% of new passenger car registrations in 2020 (EAFO, 2021)) and the share of low-carbon fuels in aviation remains negligible (EASA, 2019). Whilst AFV uptake is projected to rise to 2050, there is still a need for research and policy to support the use of sustainable aviation fuels, which are projected to maintain a low level of penetration to 2050 (up to 3% of the jet fuel mix). With regard to CAVs, expected deployment in the coming years indicates that it will be essential to provide the necessary infrastructure to support these vehicles (ERTRAC, 2019). Market predictions indicate that 20% of all vehicles sold by the end of 2020 will have some level of automation (INEA, 2019), and by 2030, connected trucks will comprise 80% of the fleet (McKinsey, 2019).

The continued need to support the development and integration of new technologies in transport systems is also supported by the majority of stakeholders, with 64 out of 69 stakeholders expressing that they 'fully agree' or 'partly agree' that there is still a need for policy action. The relevance of this need was not assessed as part of the case study.

Maintaining the competitiveness of the EU transport sector is still a valid need. Between 2011 and 2017, the R&D intensity, measured by business expenditure on R&D, increased by 28% in Europe[39,40] (Eurostat, 2018). In 2019, the Commission announced intentions to invest over €117 million in key transport projects, with a focus on sustainable transport modes (European Commission, 2019). In addition to this, the EU's Recovery Plan, in response to COVID-19, includes measures to mobilise investment in the transport sector, with a focus on climate-resilient infrastructure (European Commission, 2020). The continued need to maintain the competitiveness of the transport sector is also supported by the majority of stakeholders, with 48 out of 68 stakeholders expressing that they 'fully agree' or 'partly agree' that there is still a need for policy action. The relevance of this need was not assessed as part of the case study.

The completion of the single internal market for transport remains a valid need. The completion of the core TEN-T network varies significantly between Member States and modes. In 2016, completion of the core road network ranged from 7% in

[39] Data is only available for select Member States (BE, CZ, HR, FR, IT, MT, PL, PT, RO, SK, FI, SE).

[40] However, it is worth noting that for HR, FI, FR, PL, RO and SE, data on specific R&D activities were available for 2017 but missing for 2011.

Lithuania to 100% in Spain, equating to 81% completion at the EU level. For conventional rail and high-speed rail, EU-level completion of the networks was lower, at 60% and 45% respectively.[41] (European Commission, 2016). In addition, 85% of the TEN-T network is meeting the technical requirements for depth and bridge height.

As road is projected to maintain a dominant share of freight transport by 2050 in the Alternative scenario, the completion of the TEN-T rail network has the potential to play an important role in encouraging modal shift and multimodality. This has the capacity to support the decarbonisation of the transport sector, as well as facilitating connectivity and economic growth. The continued need to complete the single market is also supported by the majority of stakeholders, with 54 out of 67 stakeholders expressing that they 'fully agree' or 'partly agree' that there is still a need for policy action. The relevance of this need was not assessed as part of the case study.

6.3.1.3 Conclusions

The key problems/needs identified in the White Paper (i.e. dominance of road transport, deteriorating climate and local environment, dependence on oil, increasing congestion and poor accessibility) are **all still valid today**. Even though in some cases the efforts to address these needs have resulted in improvements (i.e. road fatalities have fallen since 2011), policy action is still required to achieve further progress, and to ensure alignment with the objectives of the White Paper. This finding was reflected by the case study and by stakeholder inputs, with the majority of stakeholders expressing that there was still a need for policy action to address all of the needs identified in the White Paper.

6.3.2 EQ11: Have there been any changes in the EU transport or climate change policy objectives making the White Paper objectives less relevant? To what extent are the objectives of the White Paper still relevant in relation to current broader EU policy objectives?

6.3.2.1 Introduction

Since the adoption of the White Paper in 2011, EU transport and climate policy has evolved to reflect the recognition of increasing challenges from environmental and climate degradation, and the increasing need to ensure the sustainability of the transport system. This question assesses the continued relevance of the White Paper objectives, in light of the objectives outlined in post-2011 EU transport and climate change policies.

A number of key strategy documents were identified, which were considered to reflect overarching EU policy objectives, in relation to transport and climate change policy. The documents were selected on the basis of their ongoing relevance and scope, capturing all aspects of the transport sector and key EU policy objectives to 2030 and 2050 (see Annex H for more detail on these set of key EU policy objectives). These include the European Green Deal (2019), the 'A Clean Planet for all' analysis (2018), the 'On the road to automated mobility' strategy (2018), the three Mobility Packages (2017 – 2018), the European Strategy for Low-Emission Mobility (2016), the Digital Single Market (2015), the Energy Union (2015), the Aviation Strategy for Europe (2015) and the 2030 climate and energy policy framework (2014).

The analysis draws upon a combination of desk-based research and stakeholder inputs, to assess the continued relevance of the White Paper objectives in view of the more

[41] This section refers to EU28 data, as EU27 data is not yet available.

recently-adopted EU policy objectives and priorities. An overview of key EU policy objectives is presented, which informs an assessment of the relevance of the White Paper objectives in terms of ambition and scope. This is complemented by inputs from national and regional authorities, industry organisations and civil society and research organisations.

6.3.2.2 Main findings

With regards to the **first objective of the White Paper**, to ***'reduce transport-related GHG emissions by around 60% by 2050 compared to 1990*** levels' and the 2030 milestone[42]***,*** recently-adopted policies suggest that, while in the same direction, the level of ambition it sets is no longer sufficient. The recently-adopted European Green Deal (2019) established a newfound level of ambition in regard to emissions reduction, through establishing an objective for climate neutrality by 2050 (and including an associated target to reduce GHG emissions in the transport sector by 90% by 2050). Due to this, this White Paper objective is no longer sufficiently ambitious in relation to EU policy objectives.

Although the majority of stakeholders that contributed to the study (32 out of 46) indicated that the first objective was still relevant 'to a significant extent' in light of new policy objectives, the need to enhance ambition in line with the Green Deal was reflected by stakeholders.

In regard to the **second White Paper objective**, to ***'achieve drastic decrease in the oil dependency ratio of transport-related activities by 2050'***, subsequent policy documents have echoed the need to shift away from fossil fuel dependency. Under the 2030 climate and energy policy framework (2014), a target was set to achieve a share of energy from renewable sources in the final consumption of energy of at least 32% by 2030. This was formalised in the recast Renewable Energy Directive (Directive (EU) 2018/2001), which set an obligation on fuel suppliers to ensure that the share of renewable energy in the final consumption of energy in the transport sector is at least 14% by 2030. In addition, the European Strategy for Low-Emission Mobility outlines an objective to accelerate the transition to low-emission mobility (and hence reduce oil dependency). These indicate the continued relevance of the White Paper objective in terms of scope.

The oil dependency of the transport sector is also noted as a key issue in the Energy Union strategy. The Energy Union notes the need to gradually transform the transport system to reduce reliance on fossil fuels, and to increase the deployment of alternative fuels. Its Annexes also include a series of actions for the transport sector, including the review of legislative measures, with the aim of enhancing energy efficiency and reducing GHG emissions in the sector.

In addition, although there is no specific objective for reducing oil dependency in the European Green Deal, the increase in ambition in the GHG emission reduction target suggests that the current level of ambition in regard to reducing oil dependency should also be revisited.

The vast majority of stakeholders (38 out of 43) considered the second White Paper objective to still be relevant at least 'to a significant extent' in light of new policy objectives. However, a number of stakeholders referenced the role of the European

[42] In addition to the 2050 target, the White Paper also includes a 2030 milestone, to achieve a 20% reduction in GHG emissions on 2008 levels.

Green Deal, indicating that this objective now needs to be pursued with even stronger drive.

The **third White Paper objective**, to ***'limit the growth of congestion'*** is still entirely relevant in view of subsequent EU policy documents, with the Aviation Strategy for Europe (2015) and the European Green Deal noting the importance of limiting congestion and pollution. However, the European Green Deal includes a greater focus on cities, which is absent from the scope of the White Paper objective.

The Energy Union includes an action to create a master plan for Cooperative Intelligent Transport Systems, which would aim to address traffic congestion. However, the Energy Union itself does not include any direct objectives on congestion.

The majority of stakeholders (38 out of 45) also considered the White Paper objective to still be relevant at least 'to a significant extent', in light of new policy objectives.

With regard to the **fourth White Paper objective**, to ***'allow basic access and the development of mobility needs of individuals and companies',*** the European Green Deal notes that the provision of 'accessible, healthier and cleaner alternatives' is key to achieving sustainable transport. In addition to this, the Digital Single Market (2015) and Ten Priorities for Europe (2015) highlight the importance of accessibility on a broader level. Therefore, the theme of accessibility is still relevant in view of more recent EU policy documents, which reflect the White Paper objective.

This was echoed by stakeholders, with the majority (34 out of 44) considering the fourth objective of the White Paper to still be relevant at least 'to a significant extent', in light of new policy objectives.

The focus of the **fifth White Paper objective**, to ***'promote equity within and between successive generations'*** is not explicitly reflected in more recent strategy documents. However, it is worth noting that any legislative or policy document advocating climate change response indirectly promotes equity within and between generations.

From the perspective of stakeholders, a large proportion (19 out of 41) considered the objective to still be relevant at least 'to a significant extent', in light of new policy objectives. However, a large proportion (13 out of 41) of industry organisations indicated that they 'did not know' if the objective is still relevant, suggesting that the objective lacks clarity for industry.

The **sixth White Paper objective**, to ***'offer safe, secure and reliable transport services of high quality'***, is still largely relevant in view of more recent EU policy objectives. In 2018, the Third Mobility Package included an objective to reduce the number of road deaths by 50% between 2020 and 2030, and to reduce the number of serious injuries by 50% in the same period. Although this introduces an updated objective, which is not currently covered by the White Paper, the Mobility Package echoes the 'Vision Zero' target of the White Paper, which aims to achieve zero fatalities in road transport by 2050.

In the 2014-2019 priorities of the Commission, tackling security threats, and increasing collaboration in the fight against terrorism, organised crime and cybercrime, are noted as priorities across all sectors. The need to address cybersecurity is also reflected in the overarching objective of the Digital Single Market, one of the priorities of the 2014-2019 Commission, which has been built upon by the current Commission through the 'Europe fit for the digital age' priority. The 'On the road to automated mobility' strategy (2018) also displays an increasing focus on cybersecurity, which is not covered by the White Paper objective.

Although the majority of stakeholders (36 out of 44) considered the sixth objective of the White Paper to still be relevant at least 'to a significant extent', broadening the scope to include cybersecurity could better reflect new policy objectives.

Regarding the **seventh White Paper objective**, to ***'ensure provision of services that are affordable, operating fairly and efficiently, offering a choice of transport mode and promoting high quality employment'***, the topic areas covered are still referenced in strategies such as the Aviation Strategy for Europe and the 'On the road to automated mobility' strategy, which indicates the continued importance of establishing fair and efficient transport services, as well as high-quality employment. A number of strategies released since 2011 indicate the continued importance of ensuring the provision of efficient and fair services.

In regard to rail, the Fourth Railway Package indicated the need to enhance interoperability and the efficiency of the sector more broadly. This was echoed by the Green Deal, which included an objective to increase the capacity of railways and inland waterways, aligning with the 'offering a choice of transport mode' aspect of the White Paper objective.

In regard to affordability, the European Green Deal noted that achieving sustainable transport means providing users with 'more affordable' alternatives. Therefore, the European Green Deal echoes this White Paper objective, suggesting that the affordability aspect of the objective is still relevant.

The majority of stakeholders (29 out of 41) considered the seventh objective of the White Paper to still be relevant at least 'to a significant extent', in light of new policy objectives.

The **eighth White Paper objective**, to ***'minimise the external costs of accidents, noise and air pollution, biodiversity loss and increased land use'*** is still considered relevant, in view of recent climate change and transport policy objectives, and broader policy objectives. In 2015, the Energy Union strategy noted the importance of internalising external costs, indicating the Commission's intentions to promote the use of road charging schemes based on the 'polluter pays' and 'user pays' principles. In addition, the European Green Deal included an objective to ensure that the price of transport reflects the impact it has on the environment and health, reflecting the intention of the White Paper objective.

This reflects the ambition of the White Paper, which refers to minimising external costs, to ensure that the price of transport 'reflects the impacts'. Through the smart pricing and taxation action point (action point 39), the White Paper also notes the need to 'proceed to the full and mandatory internalisation of external costs for road and rail transport' between 2016 and 2020, as well as noting the need to internalise costs for local pollution in ports and airports, and air pollution at sea. Therefore, the White Paper represented a high level of ambition in regard to smart pricing and taxation, which remains relevant in the context of the Green Deal.

In support, the majority of stakeholders (36 out of 42) indicated that the eighth objective of the White Paper is still relevant at least 'to a significant extent', in light of new policy objectives.

6.3.2.3 Conclusions

Since 2011, several EU-level policies have been implemented which aim to transform the transport system. In view of these transport and climate change policies, broader EU policies, and their associated objectives, the majority of White Paper objectives can still be considered relevant. However, in view of more recent policy objectives, two objectives of the White Paper appear to be less relevant.

Firstly, the climate neutrality vision outlined in the European Green Deal has made the first White Paper objective, for a 60% GHG emissions reduction by 2050 compared to 1990 levels, insufficient.

Secondly, in regard to transport safety and security, a number of strategies, including the Digital Single Market, have included a greater focus on data security and cybersecurity. Therefore, the sixth White Paper objective could be considered less relevant in its scope, due to the lack of coverage of data security and cybersecurity.

6.3.3 EQ12: How well do the original objectives and 10 headline goals of the White Paper still correspond to the current transport and climate policy needs?

6.3.3.1 Introduction

Since the adoption of the White Paper in 2011, **transport and climate policy needs have emerged or evolved**, which are associated with emerging technological, societal and environmental trends in the transport sector (i.e. digitalisation, alternative fuels, automation and connected vehicles, urbanisation and security threats).

Transport policy needs:

1. An increasing need to improve road safety for VRUs and active travel users;
2. An increasing need to provide a comprehensive charging and refuelling infrastructure network and address range concerns;
3. A need to support emerging transport services (i.e. micro-mobility, CAVs, ride-hailing apps) and determine their legal nature to avoid roadblocks;
4. An increasing need to address data privacy and cybersecurity concerns;
5. An increasing need to support intermodality/multimodality, through completion of key infrastructure/provision of efficient services.

Climate policy need:

1. An increasing need to align with the scientific evidence and political ambition to address the urgency of climate change.

This question examines the continued relevance of the original objectives and headline goals of the White Paper, in light of these transport and climate policy needs. To facilitate the evaluation of the alignment of the objectives and headline goals with the current transport and climate policy needs, a detailed assessment of trends in the transport sector was developed. This assessment was used to inform the identification of policy needs, which have emerged or evolved since 2011 (see Annex H for more detail).

Logical analysis was complemented by input from the stakeholder consultation, to provide an assessment of the relevance of the White Paper objectives and headline goals in view of the policy needs identified. The question also examines potential gaps which have arisen, due to the headline goals not properly reflecting the current transport and climate policy needs. The response to this question is supported by the analysis presented in EQ11 (on the relevance of the White Paper objectives) and EQ13 (on the relevance of the headline goals).

6.3.3.2 Main findings

Relevance of the White Paper objectives in view of the needs identified

The first three White Paper objectives, which display a focus on the environmental impacts of the European transport sector, are still of relevance in relation to the climate and transport policy needs identified.

The climate policy need has emerged in light of the pressing need for global climate change response, as indicated by the Intergovernmental Panel on Climate Change (IPCC) (2014). Therefore, the **first White Paper objective**, to ***'reduce transport-related emissions of GHG by around 60% by 2050 compared to 1990'*** is still of relevance in view of this policy need (despite requiring alignment with the ambition of the European Green Deal).

Closely linked to the first White Paper objective, the **second White Paper objective**, to ***'achieve drastic decrease in the oil dependency ratio of transport-related activities by 2050'***, also corresponds to the climate policy need, through echoing the need to urgently shift the transport sector away from fossil fuel dependence.

Both the **first and second White Paper objectives** also align with the transport policy needs identified which aim to facilitate GHG emissions reduction, such as the second transport policy need relating to the provision of a comprehensive charging and refuelling infrastructure network. As e-commerce continues to develop and urban freight plays an increasing role in congestion, the increasing uptake of emerging transport services, such as last-mile solutions and freight consolidation, will help to limit the levels of congestion in city centres.

In addition, in a number of cases, the emerging technologies identified in the third transport policy need (e.g. ride-hailing, micro-mobility) help to reduce the number of vehicles on the road, which in turn, tackle congestion. Therefore, the **third White Paper objective**, to ***'limit the growth of congestion'***, remains relevant in view of the third transport policy need identified on emerging technologies. This White Paper objective also remains relevant in view of the climate policy objective, as attempts to limit congestion (through a reduction in the use of conventionally-fuelled privately-owned vehicles) correspond with reductions in GHG emissions.

The **fifth White Paper objective**, to ***'promote equity within and between successive generations'***, also corresponds closely to the climate policy need, as applying the principle of equity to the transport sector remains an important consideration in the context of climate change response.

The fourth and sixth White Paper objectives, which display a focus on the social aspects of the European transport sector, are still of relevance in relation to the transport policy needs identified.

The **fourth White Paper objective**, to ***'allow basic access and the development of mobility needs of individuals and companies'***, displays close links to the first transport policy need on ensuring road safety for VRUs. As the share of the older population in Europe increases, it will become essential not only for transport to 'allow basic access', but for transport to provide more tailored access to VRUs and people with reduced mobility.

Similarly, the **sixth White Paper objective**, to ***'offer safe, secure and reliable transport services of high quality'*** is also relevant in light of the first transport policy need identified, as the emergence of micro-mobility, active travel and CAVs have further enhanced the importance of improving road safety. Therefore, this objective remains pertinent to improving the safety of the current transport system, and it will remain

relevant as urbanisation, and associated increases in population density, contribute to the need to ensure transport services are safe, and considerate of VRUs.

The **seventh White Paper objective**, to ***'ensure provision of services that are affordable, operating fairly and efficiently, offering a choice of transport mode and promoting high quality employment'***, corresponds very closely with the fifth transport policy need, to support intermodality, through the provision of efficient services. This White Paper objective also reflects the third transport policy need, to support the emergence of new transport services, such as micro-mobility and ride-hailing. These new services offer the potential to enhance the efficiency of the transport system, providing alternatives to private vehicle ownership in some cases, and offering a greater variety of more affordable (in some cases) options.

Finally, the aims of the **eighth White Paper objective**, to ***'minimise the external costs of accidents, noise and air pollution, biodiversity loss and increased land use'*** remain relevant in light of the transport policy needs identified. In regard to noise, biodiversity loss and increased land use, there are few direct links between the emerging transport policy needs which largely link to safety, low-emission vehicle adoption and data privacy. However, this does not deter from the fact that it is still important to minimise these external cost categories, where possible.

Relevance of the headline goals of the White Paper in view of the needs identified

In general, the headline goals can still be considered relevant in view of the needs identified and for most of the headline goals, the majority of stakeholders support their continued relevance. The **first two headline goals** correspond to the climate policy need, through their attempts to guide action on CO_2 emissions reduction associated with road, air and maritime transport.

The majority of stakeholders (31 out of 54) supported the continued relevance of the **first** headline goal, with a number of industry organisations and civil society organisations noting that the goal requires updating to better align with the climate neutrality target set out in the European Green Deal and the targets implemented by a number of Member States, to phase out the sale of conventionally-fuelled cars completely by 2035 or earlier. Similarly, a large proportion of stakeholders (23 out of 52) supported the continued relevance of the **second** headline goal in light of emerging policy needs. However, a couple of stakeholders in the maritime and research sectors also noted that progress towards achieving this goal is currently limited by the relatively slow technical progress made in the area of sustainable aviation and maritime fuels.

Through their focus on infrastructure, the **third, fourth and fifth headline goals** all aim to encourage action against the second and fifth transport policy needs, on the provision of alternative fuel infrastructure and intermodal transport infrastructure, respectively.

The majority of stakeholders (34 out of 56) supported the continued appropriateness of the **third** headline goal in light of emerging policy needs. However, a couple of stakeholders in the road and research sectors suggested that the goal should be more focused on enhancing the complementarity of modes, rather than focusing on promoting modal shift, in order to enhance the performance of the entire network.

A large proportion of stakeholders (25 out of 51) also displayed support for the continued relevance of the **fourth** headline goal in light of emerging policy needs. However, some stakeholders questioned whether tripling the length of the EU's high-speed rail network is the best use of funding for facilitating alignment with the net-zero aspiration for 2050.

The **fifth** headline goal is also of relevance to emerging transport policy needs, as the TEN-T is a key infrastructure network, which will be closely tied to the provision of a comprehensive charging and refuelling infrastructure network.

The majority of stakeholders (46 out of 62) supported the continued relevance of the fifth headline goal in light of emerging policy needs, noting that the implementation of a coherent TEN-T is crucial for the proper functioning of the EU transport system.

The **sixth and eighth headline goals** correspond to the fifth policy need, on the provision of intermodal transport infrastructure, through encouraging the development of physical and digital infrastructure required to facilitate intermodality. The majority of stakeholders (39 out of 57) considered the **sixth** headline goal to still be relevant.

Similarly, the majority of stakeholders (31 out of 56) considered the **eighth** headline goal to still be relevant in light of emerging policy needs, with a stakeholder in the maritime sector noting that the lack of alignment of actors in regard to cooperation and data sharing remains an issue which requires management.

The **seventh headline goal** displays links to the fourth transport policy need on data privacy and cybersecurity, as these transport management systems need to maintain high levels of security, to ensure that they are protected against cybersecurity threats.

A large proportion of stakeholders either stated that they considered the **seventh** headline goal to still be relevant in light of emerging policy needs (23 out of 47). However, some stakeholders in the aviation sector indicated that the timeframe is no longer relevant, due to the progress made against the deployment of these systems to date.

The **ninth headline goal** displays close links with the first transport policy need, to improve road safety for VRUs and active travel users.

The majority of stakeholders (38 out of 53) considered the **ninth** headline goal to still be relevant in light of emerging policy needs, noting the continued need to address road safety (particularly for cyclists) in light of the lack of improvement to date. Finally, the **tenth headline goal** is still relevant in view of the climate policy need, as attempts to internalise environmental externalities will address the external costs associated with climate change.

In line with this, the majority of stakeholders (41 out of 56) displayed support for the continued relevance of the **tenth** headline goal in light of emerging policy needs. The stakeholders indicated that fair, transparent and non-discriminatory rules on infrastructure charging and external costs for all modes of transport are still needed, indicating the continued relevance of the goal. Although there are existing headline goals relating to the TEN-T Network and rail infrastructure, there are **no headline goals** specifically relating to refuelling or charging infrastructure (the focus of the second transport policy need). There are also no headline goals relating to the third transport policy need, on emerging transport services (i.e. micro-mobility, CAVs, ride-hailing apps). Through the stakeholder consultation, Helsinki's Regional Planning and Transport Department, and city network, Polis, both suggested that these technologies could be covered by a new headline goal.

6.3.3.3 Conclusions

In light of the new transport and climate policy needs identified, the **objectives of the White Paper still remain largely relevant**. In some cases, the specific focus of the objective could be tailored to better reflect the transport policy needs (e.g. the White Paper objectives on accessibility and safety do not explicitly mention VRUs). However,

none of the objectives would be considered irrelevant, in view of the transport policy needs identified.

In regard to the climate policy need, it will be important to assess the continued relevance of the ambition of the first two White Paper objectives in view of the increasing international policy ambition on climate neutrality.

The **headline goals of the White Paper also remain relevant** in view of the needs identified. In some cases, there are no direct links between the headline goals and the transport policy needs identified. However, the goals are still aligned with the broader climate policy need, and therefore, are still relevant goals for the sector. The emerging needs have resulted in the need to consider the potential to implement new headline goals. In light of the transport policy needs identified, gaps have been identified in the headline goals in regard to charging and refuelling infrastructure and new transport services (i.e. micro-mobility, CAVs).

6.3.4 EQ13: Are the proposed 10 headline goals still adequate benchmarks for achieving an integrated, sustainable and efficient transport system in the EU?

6.3.4.1 Introduction

In 2011, the White Paper outlined a vision for 2050, to establish an integrated, sustainable and efficient mobility network. To achieve this vision, the headline goals of the White Paper were introduced, on the deployment of sustainable fuels and propulsion systems, optimisation of logistic chains and modal choices, and efficient exploitation of the network.

The headline goals are benchmarks for guiding policy action and helping to assess progress towards a competitive and resource efficient transport system (European Commission, 2011). In view of policy developments, shifting priorities and progress made against the headline goals of the White Paper since 2011, it is important to examine whether the headline goals remain adequate benchmarks for achieving an integrated, sustainable and efficient EU transport system.

This question draws upon Better Regulation guidance, to allow a logical assessment of the adequacy of the headline goals based on the S.M.A.R.T. criteria. The continued relevance of the headline goals is assessed, through analysing the clear and realistic nature of the headline goals, and whether they reflect the objectives of the White Paper.

This question also assesses how effective the headline goals are in helping to guide policy and assess the performance of the EU and national transport systems, drawing upon a review of national and regional transport strategies, to examine whether the headline goals are reflected in the targets set at a more local level. The analysis also draws upon stakeholder views, to help determine whether there is the need to revise or remove any of the headline goals. The analysis brings all of these inputs together, to determine if the 10 headline goals can be considered adequate benchmarks for achieving an integrated, sustainable and efficient transport system in the EU.

6.3.4.2 Main findings

The **first headline goal**, to *'halve the use of 'conventionally fuelled' cars in urban transport by 2030; phase them out in cities by 2050; achieve essentially CO_2-free city logistics in major urban centres by 2030'* is considered to be **clearly defined**, setting out **clear, time-bound** and measurable goals.

There has been **some progress to date**, with the share of AFVs in new vehicle registrations increasing from 2.5% in 2011, to 12.6% in 2020 for passenger cars, and from 0.7% to 3.1% for light-goods vehicles in the EU27 (EAFO, 2021). Despite relatively slow progress to date, under the Alternative scenario, projections suggest that AFVs could comprise 33.1% and 64.3% of new passenger car registrations in 2030 and 2050, respectively.

In regard to CO_2-free city logistics, urban freight traffic accounted for about 25% of urban transport-related GHG emissions in 2017 (European Commission, 2017). Under the Alternative scenario, the final energy consumption from diesel, petrol and other petroleum products in urban areas is projected to fall by 33% by 2030, and by 63% by 2050, on 2011 levels. Despite projected progress, in regard to both phasing out conventionally-fuelled vehicles and achieving CO_2-free city logistics, further action is required to achieve these goals by 2050. However, assuming the adoption of policy measures which will support the transition towards AFV adoption, in addition to those adopted in the context of the White Paper, this goal is **achievable**.

The **first** headline goal can be considered **relevant** in relation to the first three objectives of the White Paper, as it aims to reduce transport-related GHG emissions and oil dependency, as well as addressing congestion through encouraging the uptake of active travel modes in place of the use of conventionally-fuelled vehicles. Judging from the analysis of the national and regional transport and climate strategies, it is also **useful for guiding policy action**, as it is consistent with 73 out of 88 national and regional transport and climate strategies reviewed as part of the case study. There was not unanimous support for this goal under the OPC, with some calls for this headline goal to be reassessed in light of the respondents' perceptions of the benefits associated with using 'conventionally-fuelled' vehicles in cities.

In light of the evidence, should the **first** headline goal be maintained, the **level of ambition will need to be at least maintained**, to facilitate a sustainable EU transport system, which aligns with the European Green Deal.

The **second headline goal***, 'low-carbon sustainable fuels in aviation to reach 40% by 2050; also by 2050 reduce EU CO_2 emissions from maritime bunker fuels by 40% (if feasible 50%)'* is **clear** and **easily measurable**. However, the addition of 'if feasible 50%' in the maritime bunker fuels aspect of the goal reduces the precise nature of the goal, and it could help to reduce uncertainty over ambition to only reference one percentage reduction.

The second headline goal can be considered **relevant** in relation to the first and second objectives of the White Paper on GHG emissions reduction and oil dependency, respectively, as the headline goal helps to address the root cause of emissions in the transport sector.

However, there has been a **lack of progress** to date, with biofuels accounting for only 0.1% of global aviation fuel consumption in 2018 (IEA, 2019). Projections to 2050 under the Alternative scenario suggest that low-carbon aviation fuels will only comprise 2.6% of aviation fuels by 2050, significantly lower than the 40% goal. Although GHG emissions from international maritime decreased by approximately 8% between 2011 and 2018 (EEA, 2018), emissions are projected to increase in the coming years due to an expected increase in maritime transport activity. Given this, further policy measures are likely to be required to ensure that the goal is **achievable**, for both the aviation and maritime sectors.

Judging from the analysis of the national and regional transport and climate strategies, the **second** headline goal is considered to be **useful for guiding policy action**, as it is consistent with 73 out of 88 national and regional strategies reviewed as part of the case study. A general finding from the case study is that, while the deployment of low-carbon alternatives in road transport is broadly covered in transport strategies, much

less attention is paid to the aviation and maritime sectors, the focus of this headline goal.

In light of the evidence, the existing **second** headline goal should be **at least maintained**, to facilitate a sustainable EU transport system, which reflects international policy and the climate neutrality target which underpins the European Green Deal.

The **third headline goal**, *'thirty per cent of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050, facilitated by efficient and green freight corridors. To meet this goal will also require appropriate infrastructure to be developed'* is **clearly defined** in terms of its timetable**.** However, the reference to 'appropriate infrastructure' does not clearly indicate which particular infrastructure measures should be prioritised. The development of a 'modal shift potential' indicator by Eurostat has allowed the goal to become **measurable**, through representing the number of containers transported by road in journeys longer than 300 km which could be shifted to other modes.

However, there has been a **lack of progress** against the goal to date, as road transport remains the dominant mode of transport in inland freight, comprising over half of all goods transport in the EU27. Between 2011 and 2018, there was relatively minimal change in the modal shift potential of long-distance road freight (over 300km) in containers, an indicator which displays the potential to shift road container transport to rail or inland waterway transport (Eurostat, 2020). Therefore, further policy action is likely to be required to **achieve alignment** with the vision put forward by the White Paper.

The perspectives of respondents to the OPC were mixed. Some respondents suggested that the headline goal was not appropriate (as all modes, including road, should contribute to an integrated, sustainable EU transport system), or that the aspiration of delivering modal shift is not realistic. Others were more supportive, noting that it was fundamental to decarbonising transport and suggesting the introduction of an additional modal shift goal, which focuses on cities (i.e. shifting transport to public transport, shared mobility, walking and cycling). This would more properly reflect the objective of an integrated and sustainable transport system.

Despite the lack of progress to date, a modal shift goal **remains a relevant headline goal** for achieving an integrated and sustainable EU transport system, through complementing measures which aim to accelerate the adoption of cleaner road vehicles.

The **fourth headline goal**, *'by 2050, complete a European high-speed rail network. Triple the length of the existing high-speed rail network by 2030 and maintain a dense railway network in all Member States. By 2050 the majority of medium-distance passenger transport should go by rail'* **could benefit from greater clarity**. There is no definition for what encompasses a 'dense railway network', and the final goal on medium-distance passenger transport could be made more specific, through quantifying the 'majority'.

Since 2011, there has been **some progress** with regard to the extension of the high-speed rail network. Achieving the goal set by the White Paper means reaching a length of about 19 000 km of high-speed railways by 2030. Considering that, on average, it takes around 16 years for new high-speed lines to proceed from the start of works to the beginning of operations, to achieve this goal would require significant efforts by Member States.

A lack of progress has also been made in relation to the 2050 goal for medium-distance passenger transport. In regard to passenger modal split over medium and long distances (i.e. between 300 km and 1,000 km), privately-owned cars were the dominant mode in the EU27 (JRC, 2018). Therefore, additional policy measures are likely to be required to achieve the final aspect of the headline goal on medium-distance passenger transport.

This **fourth** headline goal is **relevant** in relation to the first objective of the White Paper, aiming to address GHG emissions, through its aim to support the shift to rail transport (and hence, encourage a reduction in transport-related GHG emissions). The headline goal is also relevant in relation to the seventh White Paper objective on the provision of affordable and efficient transport services, which offer modal choice, through addressing the infrastructure gaps required to improve the operation of the rail sector.

Judging from the analysis of the national and regional transport and climate strategies, the headline goal is also considered **useful for guiding policy action**, as it is reflected in 58 out of 88 national and regional strategies.

In light of the evidence, the **fourth** headline goal **should be maintained** to be able to support the development of an integrated and efficient EU transport system, which provides the infrastructure necessary to facilitate efficient intermodal travel, and aligns with the ambition of the Green Deal, through encouraging progress on modal shift.

The **fifth headline goal**, *'a fully functional and EU-wide multimodal TEN-T 'core network' by 2030, with a high-quality and capacity network by 2050 and a corresponding set of information services'* is **precise** in its aim to complete the TEN-T 'core network'. However, it could be more specific in regard to the corresponding information services which it aims to achieve. The goal is **easily measurable**, and progress against the goal can be reported on a modal basis.

There has been **some progress** to date. However, the completion of the core TEN-T network varies significantly between Member States and modes. The rail aspect of the goal still requires the most progress, as the conventional rail and high-speed rail networks reported 60% and 45% completion respectively. The most recently available data shows that 90% of the inland waterways core network and 80% of the TEN-T road core network were completed by 2016 (European Commission, 2016).

The **fifth** headline goal is particularly **relevant** in relation to the seventh White Paper objective, on the provision of efficient and fair services. Through aiming to achieve completion of the TEN-T 'core network', this goal aims to enhance the quality of transport infrastructure and services available for freight and passenger transport.

Judging from the analysis of the national and regional transport and climate strategies, the headline goal is also considered **useful for guiding policy action**, as it is reflected in 58 out of 88 national and regional strategies.

Although there may be some difficulty completing the core network across all Member States by 2030, the **fifth** headline goal is still considered relevant from the evidence reviewed, and it **should be maintained** to facilitate the achievement of an integrated EU transport system, and align with broader EU policy objectives to implement key supporting infrastructure.

The **sixth headline goal**, *'by 2050, connect all core network airports to the rail network, preferably high-speed; ensure that all core seaports are sufficiently connected to the rail freight and, where possible, inland waterway system'* outlines **precise** intentions to enhance rail connectivity. However, instead of indicating 'preferably high-speed', a desired percentage of high-speed rail could be quantified to enhance the concrete nature of the goal. The goal is easily **measurable**, as all core airports and seaports have already been identified, enabling progress to be tracked against this goal to 2050.

The **sixth** headline goal is particularly **relevant** in regard to the fourth White Paper objective, to allow basic access and the development of mobility needs of individuals and companies. Through aiming to enhance the connectivity of the rail network, this headline goal addresses the need to enhance accessibility for both passenger and freight transport.

Since 2011, **progress has been made** to enhance connectivity in the rail network. However, as of 2017, 39.5% of the core airports still needed to be connected to the TEN-T rail network (European Commission, 2017). Despite this, if progress continues, this aspect of the goal will be achieved. All 329 seaports belonging to the TEN-T network (104 of which belong to the core network) were already connected to the TEN-T rail network in 2017 (European Commission, 2017), **achieving this aspect of the goal**. Therefore, **this element of the goal could be removed**.

In light of the evidence, the first element of the **sixth** headline goal on connecting airports is displaying progress to 2050 and **should be maintained** to provide an adequate benchmark for supporting the achievement of an efficient EU transport system.

The **seventh headline goal**, on the *'deployment of the modernised air traffic management infrastructure (SESAR) in Europe by 2020 and completion of the European common aviation area. Deployment of equivalent land and waterborne transport management systems (ERTMS), (ITS), (SSN and LRIT), (RIS). Deployment of the European global navigation satellite system (Galileo)'* **clearly outlines** the transport management systems which it aims to develop. Progress against the deployment of these transport management systems can be tracked, and the level of deployment required for each goal is outlined in respective policies referenced in the White Paper. For example, the White Paper notes that SESAR should be deployed in line with the European ATM Master plan. Therefore, this goal can be considered **measurable**.

This headline goal is reflected in 59 out of 88 national and regional strategies, indicating that the headline goal is also considered **useful for guiding policy action**.

The **seventh** headline goal is particularly **relevant** in regard to the seventh White Paper objective, on the provision of efficient and fair services. Through aiming to deploy traffic management systems across all transport modes, this headline goal addresses the need to enhance the efficiency of both passenger and freight transport. There has been **some progress to date** in regard to deploying these transport management systems. The traffic management systems which fall under this headline goal have been deployed to varying levels of success, and to varying extents.

As the **seventh** headline goal is to 2020, the **goal could be revised with a new achievement date**, to ensure that the goal continues to offer a benchmark for implementing transport management systems which encourage the achievement of an efficient and integrated transport system.

The **eighth headline goal**, *'by 2020, establish the framework for a European multimodal transport information, management and payment system'* is **precise**. However, as this goal is not quantified, and there is an absence of clearly-defined indicators, it does not allow for easy measurement of progress against this goal.

The **eighth** headline goal is particularly **relevant** in relation to the seventh White Paper objective, on the provision of efficient and fair services. Through aiming to establish a multimodal transport information system, this headline goal aligns with the goal of enhancing the provision of affordable and efficient services, which offer a choice in regard to transport mode.

In accordance with requirements of Article 17(1) of the Directive 2010/40/EU, Member States have provided national reports on ITS implementation. According to the reports and to national authorities, as of 2017, all 28 Member States had adopted specifications to ensure multimodal transport information and ticketing. Although there has been **some progress** in regard to the adopted specifications, a full EU-wide integration of ticketing schemes has not been achieved. Therefore, it is still not possible to purchase integrated tickets for multimodal journeys across Europe (VVA et al., 2019).

Moving forward, it could be appropriate to **revise the eighth headline goal with a new achievement date**.

The **ninth headline goal**, 'by 2050, move close to zero fatalities in road transport. In line with this goal, the EU aims at halving road casualties by 2020. Make sure that the EU is a world leader in safety and security of transport in all modes of transport' is sufficiently precise. Due to existing reporting of road fatalities, the quantified aspect of this goal is easily measurable.

This headline goal is particularly **relevant** in relation to the sixth White Paper objective, to offer safe, secure and reliable transport services. Through aiming to reduce fatalities and encouraging improvements in transport safety and security more broadly, this headline goal addresses the core safety issues inherent to the sixth White Paper objective.

There has been **some progress** to date in regard to road safety improvements. However, in 2018, 25,100 people lost their lives on EU roads and about 135,000 were seriously injured (European Commission, 2019). Given this, the mid-term 2020 goal has not been completed. The 2050 goal is still of relevance, and road safety remains a key aspect of EU transport policy.

Under the third Mobility Package, the Commission introduced new interim targets, to reduce the number of road deaths by 50% between 2020 and 2030, as well as to reduce the number of serious injuries by 50% in the same period. This headline goal is reflected in 59 out of 88 national and regional strategies, indicating that it is **useful for guiding policy action**. From the OPC, it was suggested that the goal had been too ambitious, whilst it was also noted that there was no mention of reducing transport-related fatalities linked to air pollution.

The mid-term 2020 goal **should be revised** to reflect the 2030 goal noted in the Third Mobility Package. Further policy action is likely to be required to achieve the 'Vision Zero' goal for 2050. However, this **ninth headline goal** should be maintained, to allow for the development of a safe and efficient EU transport system, which aligns with broader EU policy objectives.

The **tenth headline goal**, 'move towards full application of 'user pays' and 'polluter pays' principles and private sector engagement to eliminate distortions, including harmful subsidies, generate revenues and ensure financing for future transport investments' is not as concrete as the other goals, due to its focus on the application of principles. Progress against this goal can be measured by examining the internalisation of external costs for different transport modes. However, the broad 'move towards full application' phrasing of the goal, which does not indicate an end date or a quantified goal, could make it difficult to measure progress in a meaningful way.

There has been a **lack of progress** to date, and the complete internalisation of external costs in the transport sector has not been achieved. The internalisation of external and infrastructure costs (excluding fixed infrastructure costs) is higher in rail (69%) and road transport (56%), compared to aviation (37%), inland waterway transport (12%) and maritime transport (4%) (European Commission, 2019). Therefore, none of the transport modes have fully internalised external costs.

Under the OPC, some respondents suggested that the headline goal is too ambitious. However, other respondents explicitly supported this headline goal and called for the full implementation of the 'polluter pays' principle. To facilitate alignment of the transport sector with this set of principles, restructuring of transport charges and taxes is likely to be required.

In light of the evidence, it may be productive to **revise the tenth headline goal to include an end date**, as well as attempting to more clearly quantify or outline the end

goal, to allow this headline goal to contribute towards the achievement of a sustainable transport system.

6.3.4.3 Conclusions

Overall, the set of headline goals can largely be considered to act as **adequate benchmarks for achieving an integrated, sustainable and efficient transport system**. Although the headline goals and objectives of the White Paper do not appear to have explicitly applied the Better Regulation S.M.A.R.T. criteria, our assessment found that the goals largely align with the criteria. The majority of goals are time-bound, with the notable exception of the tenth headline goal on the application of the 'user pays' and 'polluter pays' principles. The majority of headline goals are also specific and measurable, including specific quantified goals or, as a minimum, clear qualitative descriptions to specify the intended goal. Nonetheless, greater clarity could be provided for some of the goals, through quantification and the specification of clearly defined indicators.

There was **greater variation in the realistic nature of the headline goals**. Although one aspect of the sixth headline goal has been achieved, through connecting seaports to the rail network, progress against the remaining headline goals is still under development. In order to achieve the majority of these goals to 2030 and 2050, and facilitate the achievement of an integrated, sustainable and efficient transport system, particularly in relation to the first and second headline goal on the phasing out of conventionally-fuelled vehicles and the adoption of sustainable fuels, further policy action is likely to be required.

In regard to the use of the headline goals to facilitate assessment of EU, national and regional transport systems, a review of the national and regional strategies as part of the case study indicated a **relatively high level of consistency between the headline goals and the strategies**, suggesting that the goals are useful for guiding policy action at the national and regional level.

6.4 Coherence

6.4.1 EQ14: Are the White Paper objectives coherent with the 2018 European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy and the 2016 Low-emission mobility strategy?

6.4.1.1 Introduction

This question focused on the external coherence of the White Paper's objectives with those of specific, more recent, EU strategies. The focus of the analysis was on:

- 'A Clean Planet for All' Communication (European Commission, 2018), and its supporting 'In depth analysis' (European Commission, 2018b).
- Low Emission Mobility Strategy (European Commission, 2016) and its Impact Assessment. (European Commission, 2011).
- European Green Deal (European Commission, 2019).
- 'Climate Target Plan' (European Commission, 2020a) and its Impact Assessment (European Commission, 2020b).

The analysis examined the coherence of the respective objectives and level of ambition of the different strategies with those of the White Paper. It is based on a combination of a mapping exercise based on the respective documents/communications and any

other supporting IA or analysis. It was supplemented by input from stakeholders as part of the stakeholder engagement exercise.

Complementary analysis, including the full desk-based mapping and the qualitative analysis of the stakeholder responses, is presented in Annex H), while the quantitative analysis of stakeholder responses is presented in Annex C.

6.4.1.2 Main findings

When considering the coherence of the different strategy documents, the respective publication dates and the focus of the respective documents need to be taken into account. The Transport White Paper was published five years earlier than the next strategy document to be published, which was the Low Emission Mobility Strategy (published in 2016). The other three strategies, which were published later, in 2018, 2019 and 2020, respectively, each focused on environmental issues (the earlier of these, 'A Clean Planet for All', and the most recent, the '2030 Climate Target Plan', focused only on climate change) and what might be done in different sectors, including transport, in order to address these issues. Hence, it might be expected that there would be an evolution in terms of what is covered in the respective documents and how.

Such an evolution can be seen in relation to the context of the different documents. At the time of the publication of the Transport White Paper, the Intergovernmental Panel on Climate Change (IPCC) was calling for developed countries to reduce their GHG emissions by at least 80% by 2050 compared to 1990 levels in order to keep the global temperature rise to 2°C below pre-industrial levels. In its 2011 'Roadmap to a Low Carbon Economy by 2050' (European Commission, 2011), the Commission translated this to mean a reduction of between 54% and 67% from transport, the mid-point of which was used in the Transport White Paper as one of document's core aims. The Low Emission Mobility Strategy reiterated the need to reduce transport's GHG emissions by at least 60% compared to 1990 levels by 2050 and for these to be "firmly on the path to zero" by then.

In between the publication of the Low Emission Mobility Strategy and the EU's 'Clean Planet for All' Communication, the Intergovernmental Panel on Climate Change (IPCC) published its analysis of the implications of the United Nations' Framework Convention on Climate Change (UNFCCC)'s Paris Agreement (IPCC, 2018). The Paris Agreement, published in 2015, reiterated the Parties' desire to limit the global temperature increase to "well below 2°C above pre-industrial levels" and to pursue efforts to limit the temperature increase to 1.5°C (UNFCCC, 2015). The IPCC's analysis demonstrated that, in order to limit global warming to 1.5°C, there needed to be net zero GHG emissions by around 2050.

The 'Clean Planet for All' Communication was the EU's high-level response to the Paris Agreement (and to the UN's Sustainable Development Goals; SDGs). The scenarios presented in the Communication included ways of delivering net zero emissions in the EU by 2050, in accordance with the IPCC's analysis of the implications of the Paris Agreement. The European Green Deal effectively translated the findings of this Communication, specifically how to deliver a net zero GHG emissions economy by 2050, into a political commitment, while the Climate Target Plan focused on the implications for the EU's 2030 climate change policy framework of this increased ambition.

In this respect, these three documents translated the net zero aspiration to mean a 90% reduction in GHG emissions from transport by 2050, which is clearly a greater reduction than the GHG emissions reductions that underpin the 2011 Transport White Paper. Hence, the first two documents, the White Paper and the Low Emissions Mobility Strategy, are not coherent with the more recent documents, as a result of the fact that the GHG reductions from transport that are assumed to be needed by 2050 in the first two are not as stringent as those identified as now being needed by the later documents.

A majority of stakeholders from all categories that expressed an opinion thought that the objectives of both the Low Emission Mobility Strategy and the 'A Clean Planet for All' Communication were consistent with those of the White Paper. There were only three (out of 39) dissenting opinions in relation to the Low Emission Mobility Strategy, whereas there were eight (out of 34) contrary views with respect to the 'A Clean Planet for All' Communication, the majority of which came from either industry organisations (four) or representatives of civil society and research organisations (three). The reasons that were given for the dissenting views were: the GHG emissions that underlay the White Paper were not sufficient to deliver the ambition of the 'A Clean Planet for All', which is in line with the conclusion from the desk-based analysis; or that there was a need for there to be more coherence with respect to the policies on vehicles, fuels and infrastructure, in order to ensure that a wider range of technologies were able to contribute to delivering net zero emissions (which is more relevant for the next coherence question – see Section 6.4.2).

The only other area in which a potential issue was identified was in relation to the measures that were mentioned in the respective documents. The most obvious example is in relation to connected and automated mobility. The White Paper (and its IA) makes only one reference to 'cooperative systems' in relation to safety and makes no mention of 'connected and automated mobility', while the Low Emission Mobility Strategy mentions the latter in an Annex. However, the two more recent publications, i.e. the 'A Clean Planet for All' Communication and the Green Deal, give a much higher profile to automated mobility, even though transport is only one of a number of sectors covered by each of them. This probably reflects the increasing attention given to the potential for, and the technological developments relating to, connected and automated mobility in the second half of the past decade.

6.4.1.3 Conclusions

The desk-based analysis identified two issues in relation to the coherence of the 2011 Transport White Paper with the 2016 Low emission mobility strategy, the 2018 'Clean Planet for All' Communication, the 2019 Green Deal and the 2030 Climate Target Plan (published in 2020). However, the last three reflect subsequent developments – scientific/policy and technological, respectively – so do not reflect limitations of the White Paper itself.

The first of these relates to the way in which the understanding of the need to reduce GHG emissions more generally, and from the transport sector in particular, has evolved in the last decade. At the time of the Transport White Paper, the IPCC was calling for developed countries to reduce their GHG emissions by at least 80% by 2050 compared to 1990 levels in order to keep the global temperature rise to 2°C below pre-industrial levels, whereas the 2015 Paris Agreement introduced an aspiration to limit global warming to no more than 1.5°C by 2050. The GHG reductions that underlay the White Paper (and also the Low Emission Mobility Strategy) assumed that there was a need to reduce transport's GHG emissions by 60% in order to reduce GHG emissions by at least 80% by 2050. On the other hand, the Green Deal sets a political commitment to deliver net zero GHG emissions by 2050 that requires a 90% reduction in GHG emissions from transport and the 2030 Climate Target Plan focused on the implications of this commitment for the EU's 2030 climate policy framework. Hence, the assumptions relating to the need to reduce transport's GHG emissions that underlie the Transport White Paper are not coherent with the aspirations of the Green Deal. The minority of stakeholders that identified an inconsistency between the objectives of the White Paper and those of the 'A Clean Planet for All' Communication (from both the 'industry' and 'civic society' categories) identified the same issue.

The second issue that was identified was the increasing attention given to connected and automated mobility, even in the Green Deal, which had a relatively brief section on transport, particularly compared to the White Paper. This probably reflects the

technological developments that have occurred of the last decade in relation to connected and automated mobility and consequently to the increasing amount of attention being paid to self-drive vehicles to support the objectives of transport policy, including emissions reductions and improving safety.

6.4.2 EQ15: How does the White Paper interact with other EU/ national/ international initiatives which have similar objectives (e.g. actions in the field of mobility, climate, employment, taxation and sustainable development)?

6.4.2.1 Introduction

The focus of this evaluation question was on assessing the coherence between the White Paper and other relevant high-level initiatives, including the initiatives of relevant international organisations, other EU strategies and initiatives (that were not covered in response to EQ 14; see Section 6.4.1) and relevant national strategies.

Each of them is analysed in a separate section below. Given the wide range of initiatives and strategies covered, the analysis did not go into as much depth as for EQ14.

In the case of international initiatives, the focus was on the work of the respective organisations that overlapped with the action points contained in the White Paper. The work of the respective international organisations was reviewed in order to understand the extent to which it was in line with the White Paper's action points.

In relation to EU initiatives and strategies focused on policy areas other than transport, the focus of the analysis of these was on their purpose and how they covered, or might be relevant to, transport.

Finally, the analysis of the coherence of the White Paper with relevant national strategies focused on an assessment of the coherence of the White Paper with the various strategies that were identified in the national case studies (see Annex H). It drew on the conclusions of the case study work in relation to how the selected national strategies were consistent with, or were informed by, the White Paper's objectives.

The analysis drew on both desk-based research and the views of stakeholders. Further analysis, including the full desk-based mapping and the qualitative analysis of the stakeholder responses, is presented in Annex H), while the quantitative analysis of stakeholder responses can be found in Annex C.

6.4.2.2 Main findings

6.4.2.2.1 White Paper consistency with initiatives at the international level

Few issues were identified for which there was a lack of consistency between the approach set out in the White Paper and the initiatives undertaken by international organisations. The obvious discrepancy is in relation to the UNFCCC's Paris Agreement, which committed the Parties to limit global warming to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C. As was noted in the analysis for EQ14 (see Section 6.4), the GHG reductions that were core to the White Paper were based on the aim of keeping this temperature increase to no more than 2°C.

This finding was also supported, in different ways, by a number of stakeholders, including with references to the work of ICAO and IMO. Whilst a majority of stakeholders (from all categories) that expressed a view felt that the work of these two organisations was coherent with the White Paper, dissenting voices (two 'civic society' stakeholders out of 18 respondents with respect to ICAO, two 'civic society' stakeholders out of 15 respondents with respect to IMO) made reference to the respective GHG reduction ambitions. It was suggested that the work of ICAO and the White Paper were coherent, as neither were sufficient to meet the goals of the Paris Agreement, while the work of IMO was considered not to be coherent with the White Paper as it was more ambitious in terms of its GHG reduction ambitions than the White Paper.

The high-level transport themes covered by the UN's Sustainable Development Goals (SDGs) are similar to those addressed by the White Paper. The one exception worth noting is the former's emphasis on the affordability of transport, whereas none of the initiatives of the White Paper explicitly covers either the affordability of transport or the particular concerns of low income groups, even though 'affordability' is an element of one of the White Paper's additional objectives. The majority of stakeholders from all categories (27 out of 32) felt that the objectives of the White Paper were consistent with the UN's SDGs, although one of the dissenting views argued that the UN's Agenda 2030, of which the SDGs were a part, gave a much higher prominence to social and gender issues, including that no one should be left behind, which was not reflected in the White Paper. Another dissenting voice suggested that that there was an incoherence between the SDGs and the White Paper, as the former put more emphasis on modal shift and alternatives to travel than the White Paper.

The one dissenting voice (out of 29) that proposed that the work of the UNECE was not consistent with the White Paper noted that under the umbrella of THE PEP (Transport, Health, Environment Pan-European Programme), which sits under the UNECE and the World Health Organisation, a pan-EU Master Plan for Cycling Promotion was being developed. They argued that this helped to implement the 11th goal of the UN's SDGs, i.e. that relating to the quality of urban life, public space and safety, whereas the White Paper did not have an equivalent provision.

6.4.2.2.2 White Paper consistency with initiatives at the EU level

The Europe 2020 strategy (European Commission, 2010) was effectively the Commission's strategic document that set out the framework for policy-making for the following decade, i.e. up to 2020. The Transport White Paper was one of the main elements that was produced under one of the Europe 2020 strategy's so-called Flagship Initiatives, i.e. the 'A resource-efficient Europe' Flagship Initiative (European Commission, 2011). References to transport in this and other Flagship Initiatives cover similar ground to the White Paper, in that they mention the need to make transport smarter (through the application of ITS), cleaner (by reducing its GHG emissions) and more efficient (through using innovations in information and communications technology; ICT).

The 'Roadmap to a Low Carbon Economy by 2050' was another output of the same Flagship Initiative and, as was noted in the analysis of EQ14 (see Section 6.4.1), the analysis underlying this document provided the basis for the 60% GHG reduction target that was one of the core elements of the White Paper.

A majority of stakeholders (from all stakeholder categories) that expressed a view (21 out of 24) felt that the objectives of the Europe 2020 strategy and the White Paper were consistent.

The initiatives analysed that were published after the White Paper address many of the latter's main themes, or at least issues that were covered by the White Paper. Common themes include the importance of clean, efficient and integrated transport and resilient infrastructure. Various references were made in these documents either to the White Paper itself, or to the Low Emission Mobility Strategy, which was covered in more detail in the analysis relating to EQ14 (see Section 6.4.1). As was also noted in that section, a similar observation could be made in relation to the increasing importance of connected and automated mobility in later EU initiatives, for example, as mentioned in the context of the Digital Single Market Strategy. A similar point was also mentioned by a public authority.

Stakeholders were asked about the consistency between the White Paper and EU policies at a general level (e.g. EU environmental policy, rather than a specific initiative) and a

number of other transport strategies. In all cases, a majority of stakeholders[43] believed that the White Paper was consistent with actions taken in other policy areas and the other transport strategies. Of those stakeholders that felt that there were inconsistencies or conflicts, few explained their response, although some themes emerged.

The first of these was in relation to modal shift. Some stakeholders, often those that potentially lost out as a result of existing targets that aimed to deliver a shift away from road transport, argued that the current focus undermined the potential complementarity between different modes. On the other hand, representatives of those modes that would benefit from a greater focus on modal shift in urban areas believed that insufficient emphasis was put on this by the White Paper.

The second was in relation to the fuels that should be part of the EU's long-term aim of decarbonising transport, including those covered by the 'Clean Power for Transport' Communication (European Commission, 2013). On the one hand, an industry stakeholder argued for a well-to-wheel approach to take account of emissions in order to improve the environmental performance of transport, and to ensure that the most appropriate fuels could be used to decarbonise different modes. Another called for more ambition with respect to the use of biofuels from sustainable forestry and agriculture.

On the other hand, the inclusion of gas as an alternative fuel was criticised by other 'civic society' stakeholders as not being consistent with EU climate change policy, whereas others suggested that there was an inconsistency as the 'Clean Power for Transport' Communication included fossil fuels. That EU tax policy did not provide sufficient support to alternative fuels, including the exemptions that were still given to some fossil fuels and to aviation, was also criticised by some 'civic society' stakeholders.

There were also criticisms of the EU's aviation policy. A 'civic society' stakeholder suggested that, while EU support for airports will have improved connectivity, it will have made things worse from the perspective of reducing GHG emissions. Another 'civic society' stakeholder noted that the Aviation Strategy (European Commission, 2015) only focused on improving aviation through technical means, whereas modal shift away from aviation was not mentioned in the Aviation Strategy whereas it was (at least implicitly) in the White Paper. It was also suggested by a 'civic society' stakeholder that the Aviation Strategy had not sufficiently dealt with working conditions in the sector, whereas the White Paper covered these.

Finally, it was suggested that the White Paper did not sufficiently reflect the increasing importance given to the accessibility of persons with disabilities, as set out in the European Accessibility Act (Directive 882/2019).

6.4.2.2.3 White Paper consistency with initiatives at the national level

Overall, the findings from the case studies (see Annex H) on which the analysis in support of this sub-question was based, suggest that, in a majority of cases, national and regional transport strategies[44] focus on similar problems and have similar objectives

[43] The figures believing that there was no issue in terms of the consistency of the White Paper and other policy area were as follows: 27 out of 42 for mobility/transport policy; 26 out of 39 for climate change policy; 27 out of 40 for environmental policy; 14 out of 23 for taxation policy; and nine out of 14 for employment policy.

[44] For example, of the 88 strategies examined, 49 were consistent (and only 2 inconsistent) with the White Paper's GHG reduction objective and 49 were consistent with its objective of reducing oil dependency. Of the 60 strategies that were relevant to reducing congestion, 35 were consistent with the White Paper.

as the White Paper. Around half of those who were interviewed for the case studies considered that the White Paper's objectives had fully, or to a significant extent informed the objectives set in national and regional strategies.

This suggests that the White Paper is generally consistent, or at least not obviously inconsistent, with most national initiatives. To some extent, this is not surprising, as EU Member States are facing similar challenges in terms of transport and its associated adverse impacts, although these my differ in their extent and coverage between different countries.

Few stakeholders expressed an opinion on the consistency between the White Paper and national initiatives. Of those that expressed an opinion, a minority (three out of nine) believed that there were inconsistencies between the White Paper and national policies, although they did not provide any additional details. It was suggested, however, that many local Sustainable Energy and Climate Action Plans (SECAPs) went beyond the White Paper, as did many local mobility policies.

6.4.2.3 Conclusions

The main issue that was identified in relation to the coherence of the White Paper and the initiatives of international organisations, as well as in relation to some other EU policy initiatives, was the lack of coherence between the GHG reductions that underlay the Transport White Paper and those that are considered to be necessary to meet the aspirations of the Paris Agreement (and current EU climate change policy), as was already discussed in the analysis for EQ14 (see Section 6.4.1).

The other main issue that was identified was a lack of coherence between the UN's SDGs aspirations for transport, which underline the importance of the affordability of transport, with the White Paper, which does not explicitly address affordability (even though this is explicitly mentioned in one of its additional objectives).

A third issue was that there had been a progression in the way in which other EU initiatives addressed CCAM, which was also noted in the analysis relating to EQ14.

In addition, there were a number of issues on which stakeholders disagreed, depending on their perspective:

- The way in which the White Paper treated modal shift, which reflected the extent to which a stakeholder would be affected by the different approaches. On the one hand, it was argued that other initiatives, including the UN's SDGs and the SUMPs promoted by the Commission's Urban Mobility Strategy (European Commission, 2013), put more emphasis on modal shift in urban areas than the White Paper. On the other hand, it was argued that the White Paper – and some other EU polices – focused too much on modal shift, which undermined the positive role that the road transport could play.
- The approach to alternative transport fuels was raised from opposing perspectives by different stakeholders, again often reflecting their respective interests. On the one hand, it was argued that the promotion of gas as an alternative transport fuel, and the favourable tax treatment of some diesel applications, were not consistent with the EU's climate change objectives. On the other hand, there was a call for the potential of all fuels in decarbonising transport to be recognised in policy.
- It was also suggested that the EU's Aviation Strategy was not consistent with the White Paper in terms of modal shift (as a shift away from air was implied in the White Paper), as well as with respect to reducing GHG emissions and ensuring good quality working conditions in the sector that were not adequately addressed in the former strategy.

Overall, Member States' national strategies are consistent with, or at least not obviously inconsistent with, the White Paper. To some extent, this is not surprising, as individual Member States are facing similar challenges in transport as the EU as a whole.

6.4.3 EQ16: To what extent are the White Paper initiatives complementary to each other, mutually supportive and non-contradictory? Are there any synergies, overlaps and/or inconsistencies between them?

6.4.3.1 Introduction

The focus of EQ16 was on the internal coherence of the White Paper's action points. We used logical analysis (desk-based mapping), supported by input from the Commission and stakeholders to address the following questions:

- whether the action points provided a coherent framework for delivering sustainable transport in the EU;
- whether there were any synergies between the action points; and
- whether there were any overlaps or inconsistencies between the action points, and the importance of these.

The desk-based mapping required assumptions to be made about the potential contribution of different action points to different objectives. It allowed for the assessment of the potential of the action points to deliver the objectives of the White Paper and to cover all of the relevant modes, and enabled, at a high level, the identification of potential synergies or overlaps/inconsistencies. This was then supplemented by input from the respective engagement exercises where stakeholders were asked to comment on internal coherence of the White Paper, both in the engagement with Commission officials, as well as that with Member State authorities and other stakeholders.

Complementary analysis, including the full desk-based mapping and the qualitative analysis of the stakeholder responses, is presented in Annex H), while the quantitative analysis of stakeholder responses is presented in Annex C.

6.4.3.2 Main findings

6.4.3.2.1 Does the White Paper provide a coherent framework to guide the development and implementation of sustainable transport policy in the EU?

The desk-based mapping (see Annex H) suggested that the White Paper generally provided a coherent framework for the development and implementation of sustainable transport policy in the EU, as there appears to be an appropriate modal coverage under most of the objectives. However, there are some observations that are worth making.

The first point worth noting is that none of the three priority objectives (i.e. reducing GHG emissions by 60%, reducing oil dependency and limiting the growth of congestion) themselves address any social considerations, which is one of the three pillars of sustainable development and so of a sustainable transport policy. However, the White Paper's additional objectives address this gap, as they cover access and mobility needs (which also has an economic dimension), equity and affordability, as well as safety and security. These additional objectives also expand economic considerations (beyond energy security and congestion that are covered in the three priority objectives) to include efficiency and high quality services, as well as the environmental impacts covered to include air pollution, noise, biodiversity loss and increased land use. Hence, together, the priority and additional objectives, although not the priority objectives on

their own, can be seen to provide a coherent set of objectives to support the development and implementation of sustainable transport.

Generally, the White Paper includes a coherent set of action points that have the potential to contribute to delivering the objectives of the White Paper across all transport modes, taking account of the different characteristics of each mode (e.g. where and how they might be used). While there are some apparent gaps, many of these are justified. Whilst there is no action point relating to security for private road transport, this is clearly less of an issue for this mode due to the fact that individuals or companies have control over the way in which their vehicles are used, while security for land-based transport more generally is covered in action point 14. Similarly, there is no action point on passenger rights for private transport; again, this is clearly appropriate, as there are no passengers involved. However, there are some potential gaps.

First, there is a potential gap in relation to inland waterway transport. There is no explicit action point addressing the security of inland waterway transport and this mode is not explicitly covered in the respective cross-modal action point. However, this could be considered to be appropriate taking account of the lower level of risks associated with the use of this mode.

The second issue is that there is no action point in the White Paper that explicitly covers the affordability of transport, even though this is explicitly mentioned as part of the White Paper's fourth additional objective, i.e. ensuring that the services provided are affordable, fair and efficient and that jobs are of high quality. Action points may have addressed affordability in practice, but this is not explicit in the White Paper itself.

The final issue that was identified is in relation to the White Paper's fifth additional objective, i.e. to minimise transport's external costs and the loss of biodiversity. Biodiversity loss is not explicitly mentioned in the White Paper, although there is a recognition in the text of the White Paper that transport infrastructure needs to reduce its negative impacts on natural assets, including land and ecosystems. However, biodiversity loss, along with the impact on other environmental resources, does receive appropriate attention in the White Paper's IA, which suggests that it is more of a case that they could have been given an explicit mention in the White Paper, rather than that these impacts have been overlooked. Again, while action points, such as action point 34 (which mentioned the need for infrastructure to be climate resilient) and 36 (taking account of environmental issues in planning procedures) may have taken account of the impact on biodiversity in practice, this was not explicit in the White Paper.

From the perspective of stakeholders, there was a general consensus that the White Paper had provided a coherent framework for the development and implementation of sustainable transport policy at the EU and national levels. Issues that were raised often related to the implementation of the initiatives, either at the EU or Member State level, which relates to the effectiveness of the White Paper rather than its coherence.

6.4.3.2.2 Synergies among the elements of the White Paper

There are clear potential synergies among the elements of the White Paper. The majority of the action points potentially contribute to the delivery of more than one objective, while the delivery of each objective requires the contribution of at least six action points. This underlines how the action points have the potential to work together to deliver the objectives.

For some objectives, the action points are modal-specific, e.g. for security and safety, which is appropriate, as each mode will have its own specific issues in relation to security and safety. For the same reason, the action points relating to security and safety potentially contribute to the delivery of only one or two objectives. On the other hand, the delivery of the wider objectives, such as reducing transport's GHG emissions and

minimising its external costs/biodiversity loss, requires a range of actions, as is clear by the number of actions points that contribute to these objectives.

The majority of stakeholders (19 out of 23) from all categories that expressed an opinion believed that there were synergies between the different initiatives set out in the White Paper, with various examples provided, while no specific examples were given to illustrate a lack of synergy.

6.4.3.2.3 Presence of overlaps or inconsistencies

The desk-based mapping suggested that there are no obvious overlaps or inconsistencies between the White Paper's action points to its objectives. The four high level areas focus on distinct elements of the transport system, i.e. its operation (those action points that focus on 'efficient and integrated mobility system'), technology and behaviour (under 'innovating for the future'), infrastructure, funding and pricing and the external dimension.

The first three broad areas are suitably sub-divided into non-overlapping sets of action points. For example, the first area ('efficient and integrated mobility system') is sub-divided into five sub-sets focusing on the internal market, jobs/working conditions, security, safety and the quality and reliability of services. The second ('innovating for the future') has a set of action points focusing on researching and deploying technologies, another set on promoting sustainable travel behaviour and a third on integrated urban mobility, which is where most of the mobility challenges lie. Similarly, the action points of the third area are sub-divided into infrastructure, its funding and its pricing. Within each of these sub-sets, the action points suitably cover the respective modes, or are cross-cutting, in ways that are appropriate. Hence, there are no overlaps or inconsistences that were evident from the high-level mapping.

While 11 out of the 29 stakeholders[45] that expressed a view believed that there were some inconsistencies of overlaps between the specific individual initiatives set out in the White Paper, many of the examples provided related to the detail of specific initiatives and the perceived effectiveness, rather than its coherence. As in responses to other coherence questions (see Section 6.4.2), issues relating to modal shift, the fuels that should be considered to be sustainable and the potential contradiction between supporting aviation and reducing CO_2 emissions were mentioned in this respect.

6.4.3.3 Conclusions

The analysis concluded that the action points of the White Paper generally provided a coherent framework to deliver the objectives of the White Paper, which themselves were considered to be an appropriate framework for developing and implementing sustainable transport. Examples of where the White Paper had influenced national polices were provided by some stakeholders. However, the mapping did identify that biodiversity loss and affordability were not explicitly covered in the White Paper itself, although both could implicitly be covered by specific action points. While there was no explicit mention of the security of inland waterway transport, this was probably appropriate given the associated risks.

The analysis also concluded that there were a range of potential synergies between the action points, as the majority of them potentially contribute to the delivery of more than one objective, while the delivery of each objective requires the contribution of at least

[45] Of these, 2 out of the 11 public authority respondents felt that there were inconsistencies, as did 7 out of 14 industry representatives and 2 out of 4 'civic society' respondents.

six action points. Hence, the action points have the potential to work together to deliver the objectives.

Finally, the analysis suggests that there were no evident overlaps or inconsistencies between the action points. The four high level areas focus on distinct elements of the transport system (its operation; technology/behaviour; infrastructure; and funding/pricing/the external dimension), and the first three of these are suitably sub-divided into non-overlapping sets of action points. Within each of these sub-sets, the action points suitably cover the respective modes, or are cross-cutting, in ways that are appropriate. A minority of stakeholders felt that there were some overlaps or inconsistencies in the White Paper, citing issues that had been raised in response to the previous coherence question, such as on the role of modal shift, the alternative fuels that should be supported to decarbonise transport and a potential contradiction between supporting aviation and reducing GHG emissions.

6.5 EU Added Value

6.5.1 EQ17: What is the added value resulting from the EU level intervention of the White Paper compared to the results brought by the actions which could have been achieved by Member States at national and/or regional level?

6.5.1.1 Introduction

The assessment of EU added value examines the extent to which the White Paper (reflecting the common EU transport strategy) and its initiatives has brought specific and additional benefits towards the objectives beyond those that would have been possible only on the basis of national or sub-national action. The analysis presented is based on a combination of input from the literature (relevant evaluation and impact assessment literature on legislation), as well as information from European Commission experts, and opinions gathered from stakeholders on the specific role of the EU action.

We have used three criteria to assess EU added value:

- Effectiveness: Whether the adopted EU action has (or is expected to be) more effective towards achieving the expected results than action only at national/regional level (e.g. creating missing links, helping avoid fragmentations, or contributing to realising the potential of border-free transport).
- Efficiency: Whether action at the EU level resulting from the White Paper action is (or is expected to be) more efficient than action only at national/regional level and offers better value for money by addressing externalities, pooling resources or ensuring better coordination.
- Synergies: Whether EU action has helped (or is expected to help) create synergies by complementing, stimulating and leveraging action at national level that would not be possible in its absence.

The analysis presented examines both the EU added value of the White Paper at a general level, followed by a further assessment at action point level and whether there are actions which could have been achieved by Member States at national and/or regional level alone.

6.5.1.2 Main findings

Added value of the EU level intervention of the White Paper

From a legal perspective, EU action taken in the context of the White Paper was based on several articles of the TFEU, including Articles 90 and 91 that make provisions for

the Common Transport Policy and on the trans-European networks. Furthermore, article 192 provides a legal basis for addressing the environmental sustainability of the transport system. The Common Transport Policy should aim to remove obstacles at the borders between Member States, facilitate the free movement of persons and goods (and thus complete the internal market for transport), ensure sustainable development, promote a better territorial cohesion and integrated spatial planning, improve safety and develop international cooperation.

However, given that transport policy is not an EU exclusive competence, EU action taken in the context of the White Paper has to be justified in terms of its necessity and its expected added value.

At the time of the adoption of the White Paper, EU intervention was justified in view of the high level of complexity of transport system, the interaction between multiple actors, the global relevance of transport and its effect on the economy, society and the environment. The rationale for a European action was based on three aspects:

1. The trans-national nature of the identified problems and the benefits of action at EU level including greater negotiating power when dealing with third parties:

- The issues being addressed by the Transport White Paper, namely CO2 emissions, oil dependency and overall efficiency of the transport system, have transnational aspects that could not be dealt with satisfactorily at national level. Cross-border connections between national infrastructure networks required coordination at EU level developed on the basis of a common vision towards a more competitive sustainable transport system. Similarly, by its nature, international transport could not be properly regulated at Member State level.
- Action at EU level was also considered appropriate to achieve the appropriate scale, to magnify efforts and ensure more effective and efficient achievement of results. This include actions concerning capacity building, research, information and data gathering, exchange of best practices, development and cooperation, seen as particularly relevant in relation to addressing problems of urban mobility. Similarly, only EU action would ensure that all EU citizens benefit from a resource efficient and competitive transport system.
- In relation to action outside the EU, the increased negotiating power of the EU, rather than individual Member States, could strengthen the role to the EU when it comes to issues related to international transport that have impact to the broader EU economy.

2. The fact that EU action reaches the objectives and complements the action of stakeholders and Member States whilst addressing risks associated with uncoordinated action and fragmentation of the internal market.

- Individual actions by Member States, such as for example to set new limit values for noise or emissions, introduce financial incentives or implement their own access restriction rules in urban areas, could hinder the development of the single market by giving a competitive advantage to some players, increase regulatory burden and negatively impact the free circulation of both goods and people, especially for transnational services. Coordinated action at EU level was needed to overcome such issues and to ensure a coherent framework to support the necessary investment. Similarly, congestion affects enterprises from other Member States and action by just a few individual Member States, could lead to less informed decisions and damage the financial and policy interests of other Member States.

3. EU level action ensured solidarity and support for those adversely affected.

- The issues identified above were also expected to have different impacts across the EU Member States and regions. As such, EU action could ensure solidarity in

the development of the relevant transport policies and provide support to those most adversely affected in order to adapt.

It was concluded that national action alone would most probably lead to less effective and less efficient answers to the identified problems – with potentially negative effects in certain areas. It would also represent a suboptimal solution as it would not make use of the possible synergies that could arise from EU action.

At the same time however, the impact assessment pointed out that there was a great level of variability in terms of the appropriate scale of action and that a 'one size fits all' approach would not be adequate. Depending on the specific topic and issue, action at EU level coupled with actions at all administrative levels would yield significant added value.

The points discussed are still applicable to date, and our analysis presented below generally support the impact assessment in terms of the role that EU level intervention plays.

Looking into the detail of the 40 action points, we considered the EU added value of each point in relation to the three criteria (effectiveness, efficiency and synergies). This was a logical analysis where each action point was scored specifically on the main forms of added value experienced under the criteria and then an overall score (low/medium/high) was given. This was based on input from the stakeholders, European Commission desk officers and relevant evaluation and impact assessment literature on legislation relevant to the specific action points.

We found that **all the action points included in the 2011 White Paper would have either not have been possible without EU level intervention or would have been less effective/ efficient** (as presented in Table 6-9 below). More specifically, we conclude that:

- For 23[46] out of 40 action points there is quite clear and significant EU added value in terms of one or more of the three criteria of effectiveness, efficiency and synergies, with its absence resulting in either significantly reduced or no action towards the White Paper objectives. There are no evident common elements among these action points; they cut across different priorities, different types of action of the White Paper and multiple transport modes.
- For the remaining 17[47] action points, progress could be expected on the basis of national action, but this would mostly be uncoordinated and lead to a fragmented approach. As such, EU action is thought to provide a positive role beyond what would have been achieved at national level alone, resulting in a medium score.
- No action points were identified where national level action only would be expected to sufficiently achieve relevant objectives and would not benefit from some sort of EU intervention.

We note that there were five action points[48] for which there is no sufficient evidence to make an assessment of the actual EU added value. However, we conclude that in principle (and by taking activity and other similar action points into account), EU action should provide at least some EU added value, and were hence determined as 'medium' based on this. Within these five, action point 8 (develop social code for mobile road transport workers) is a point where EU added value should be expected (mainly in the

[46] Action Points: 1,2,4,6,7,9,12,13,16,17,18,19,22,24,25,26,28,31,34,35,37,38,40

[47] Action Points: 3,5,8,10,11,14,15,20,21,23,27,29,30,32,33,36,39

[48] Action Points: 8, 11, 15, 20, 36

form of ensuring broader coordination) but in practice not much has happened up to now (see also analysis EQ6).

Therefore, EU level intervention is considered to have had a distinct and significant value in comparison to the action achieved at national/regional level.

Table 6-9 Overall analysis of the action points of the White Paper in terms of their EU added value

Assessed Level of EU added value[49]	Strategic priority	Action points
++ High - *Clear EU added value (in the absence of EU action the result would have been/is expected to be significantly reduced/worsen or action would not have been possible)*	*1 – An efficient and integrated mobility system*	1, 2, 4, 6, 7, 9, 12, 13, 16, 17, 18, 19, 22
	2 – Innovating for the future: technology and behaviour	24, 25, 26, 28, 31
	3 – Modern infrastructure and smart funding	34, 35, 37,38
	4 – The external dimension	40
+ Medium - *Some contribution/ coordination affect (EU action has/is expected to have a positive role beyond what would have been/be achieved at national level)*	*1 – An efficient and integrated mobility system*	3, 5, 8[50], 10, 11, 14, 15, 20, 21, 23
	2 – Innovating for the future: technology and behaviour	27, 29, 30, 32, 33
	3 – Modern infrastructure and smart funding	36, 39
O Low - *No obvious EU added value (no similar action or results expected by action at national level)*	-	-

We also examined how each of the 40 action points score (low/medium/high) in relation to each of the three added value criteria of effectiveness, efficiency and synergy. The analysis is based on relevant literature and desk research as well as the input from stakeholders.

Overall, as some action at Member State level would be possible without the presence of EU intervention for a fairly large amount of actions (albeit fragmented and limited), the majority are assessed to have a medium rating when considering their EU added value towards effectiveness (11 actions were scored as high and 29 medium). However, for efficiency and synergy it was seen that the action points split more evenly across both high and medium (for 'efficiency' 16 action points were scored as high and 24 as medium, and for 'synergies' 18 were scored as high and 22 as medium).

[49] Note an action point is given an overall high rating if the EU added value role associated with one or more of the three categories (effectiveness, efficiency and synergies) is high. The low category follows this same approach too.

[50] In theory there should be some added value from EU action, however in practice not much has happened to date so more unclear of the added value.

Below we summarise the main points for the three added value criteria.

When analysing the role of EU action in terms of **effectiveness** of the intervention, the evidence available was generally positive:

- There is support from the literature and from the stakeholder consultation (33 out of 56 stakeholders) that EU level intervention has increased effectiveness by either developing (or enhancing) a substantial and *harmonised EU-wide implementation framework with common objectives* (e.g. action point 6 road freight). In comparison, one national authority acknowledged sectors are different with their own specificities, and frameworks need to give Member States certain flexibility (supporting the no 'one size fits all' approach highlighted in the IA).
- It has helped to *avoid or reduce a patchwork of fragmented, bi-lateral actions* seen across the EU (where only some, more proactive or able Member States have been able to develop them) (supported by literature and 31 out of 55 stakeholders) (e.g. action point 7 multimodal e-freight). One industry organisation (UITP) pointed out that the full freedom of Member States to implement certain provisions in the White paper has resulted in an uneven picture of implementation across the EU and led to enforcement challenges, but this was against the consensus.
- According to several stakeholders such as ETSC, EPF and the Portuguese national authority, the White Paper has facilitated target setting benefits as it provides a *coherent focal point* and a valuable example of best practice.
- Our analysis has found it has *opened up more opportunities* for all Member States and smaller projects to take action by (for example) providing suitable and fairly allocated funding (e.g. action point 37 transport infrastructure funding).
- Analysis has shown it helps create *level playing fields* for the transport industry sector by promoting fair business conditions and avoiding discrimination and distortion (e.g. action points 4 a maritime 'blue belt' and market access to ports and 12 cargo security). It has opened up the opportunity for Member States and smaller projects to take action by e.g. providing suitable funding which is allocated fairly (e.g. action point 37 funding for transport infrastructure).
- According to our analysis and stakeholder consultation (supported by 37 out of 59 stakeholders), EU action has addressed and contributed to *increased border-free transport* by reducing the risk of actions acting as barriers to the free movement of goods and people (e.g. through cross-border legislation and packages), improving the functioning of the single EU internal market (e.g. action point 19 rail safety). One industry organisation (INE) highlighted that for Directives, Member States tend towards own objectives which may turn into new cross-border barriers, but negative views were minimal.

Analysis was also mostly positive when considering EU action's role in ensuring **efficiencies**:

- Based on our analysis and stakeholder consultation, EU-level intervention has enhanced efficiency by ensuring *common*, *coordinated approaches/procedures* are adopted with aligned efforts, which has helped *avoid bilateral financial, technical or administrative efforts/burdens* experienced with national level action alone, especially for cross-border mobility (supported by 30 out of 57 stakeholders) (e.g. action point 35 multimodal freight corridors). One industry association (UNIFE) highlighted that continued inconsistent national policies has made it difficult to positively value the streamlining of effort and resources deployed, and a national authority (LV) also noted that new EU frameworks can create additional administrative burdens, but these were not common points.

- According to our analysis, harmonisation and interoperability has facilitated *market confidence* and encouraged *proportional and large-scale investment*. This has helped lead to *economies of scale* occurring e.g. in the production of clean vehicles and infrastructure, which, in turn, lowers costs for investors, operators and users, whilst also increasing choice for users (e.g. action point 26 innovative transport regulatory framework).
- Analysis has highlighted that it has facilitated the *increased use of guidance and information available*, which decreases or avoids administrative hassle, and allows for easier decision-making (e.g. action point 31 urban mobility plans).
- According to our analysis it has provided *financial instruments* which incentivise investment, helping to reduce cost and time efforts (e.g. action point 34 a core European infrastructure network). One industry organisation stated they perceive the administrative/application procedures for funding as slightly burdensome however, but this was against the consensus.

Finally, in terms of EU action's role in creating **synergies**, the evidence was mostly positive:

- According to our analysis, collaboration between Member States/national authorities, the European Commission and EU institutions, local authorities and industry stakeholders (e.g. transport operators) has been facilitated through various interactions such as expert groups, many of which would not exist otherwise (e.g. action point 37 infrastructure funding framework).
- There is strong support from our analysis and the stakeholder consultation (41 out of 58 stakeholders) for the view that EU action has increased opportunities for interaction in data and information sharing, best practice exchange and synchronised management systems, as well as mutual cooperation and recognition, reducing the risk of conflict between Member States (e.g. action point 18 safer shipping).
- According to the stakeholder consultation, it has helped skills development at the regional level through access to EU expertise (supported by 25 out of 58 stakeholders), and also stimulated R&I at a greater scale e.g. research instruments such as Horizon 2020 (supported by 39 out of 56 stakeholders). A German regional authority (Deutscher Städtetag) did point out that some current research seems to still be more nationally driven than European, however.
- Analysis has shown it has facilitated synergies between different EU legislation, policies or initiatives which help create coordinated plans for the development of the transport system going forward (e.g. action point 40 external dimension of transport).

Only a few stakeholders considered that EU action may not be necessary in certain areas. These included some national and regional authorities, civil society representatives (DECO, ETSC and FIA) and industry organisations (UITP, UIC, ACEA and CEN-CENELEC). Their full responses are presented in section 7.2.5.3 of the stakeholder consultation report. As suggested:

- National action can be seen to be more flexible than EU level action and can be implemented more quickly (in the case of traffic management (action point 24) and road safety respectively (action point 16)).
- In some instances, specific 'legislative' EU action is not appropriate and focusing more on coordination and information exchange would be more appropriate (in the case of road charging for HGVs (action point 39 and urban mobility (action point 31)).

- It makes marketing sense to be as competitive as possible with other modes of transport regardless of EU action (regarding CO_2 emissions from rail (action point 26)).

However, for most action points discussed by these stakeholders (i.e. road safety, consumer protection, MaaS systems, traffic management, standards, CO_2 reduction and calculation, UVARs, zero emission strategies and infrastructure implementation), comments from stakeholders pointed to the fact that specific action has already been taken to address these at national or regional level without EU intervention (while not necessarily questioning the benefit from EU level action).

In comparison, a significant share of opposing respondents considered that EU-level action was necessary. According to stakeholders, the White Paper successfully identified actions which required an EU-level framework or intervention. They suggested that the objectives of the White Paper could not be fully reached at the national or local level, without EU-level coordination. In addition, they noted that EU-level action brought improvements in harmonisation and coordination, a more significant collective impact from Member States and strengthened international links.

As such, whilst there are certain aspects of action points that could have been implemented without EU level action (at least up to a point), these would most likely not be expected to achieve the same results. They would not benefit from a number of advantages that are associated with EU level action, including a powerful, harmonised and consistent approach, healthy competition among Member States, and strengthened international links.

6.5.1.3 Conclusions

Overall, our own analysis and input from stakeholders suggests that EU-level action taken in the context of the White Paper has brought – or should be expected to bring – distinct and significant added value above and beyond what would be possible by action only at national level. The analysis suggests that most of the effort taken towards the actions in the 2011 White Paper would have either not have been possible without EU-level intervention or would have been less effective/efficient.

In terms of **effectiveness**, EU action has supported a harmonised framework with common objectives across the EU which helps create missing links, reduce fragmented action taken by only some MS, and facilitate cross-border transport. It provides a more competitive level playing field in the transport industry and reduces the risk of barriers to the free movement of goods and people, improving the function of the single EU internal market.

EU action through the White Paper has also ensured more coordinated and **efficient** approaches are adopted, minimising duplication of financial, technical, or administrative efforts. It increases market confidence and encourage larger scale investment (including with funding schemes), leading to economies of scale and reduction of costs.

Finally, EU action facilitates various **synergies** between MS, national and local authorities, EU institutions and industry stakeholders, many of which would be unlikely to exist otherwise. These can include research, data and information sharing, best practice exchange and synchronised management systems, as well as mutual cooperation and recognition.

The above analysis is supported by the great majority of stakeholders (28-41 out of 55-59) that consider that EU-level action has had a positive or very positive role in terms of the achievement of the objectives (i.e. increased effectiveness) as well as in terms of the resources needed (efficiency) and the development of the relevant synergies.

Looking at the role of EU action at the level of specific action points, the analysis found that for **23 out of 40 action points** (including actions on safety, cross border logistics and infrastructure funding)**,** a clear added value from EU intervention is evident. Its absence would result in significantly reduced action towards the White Paper objectives. For a further 17 action points, EU action is thought to provide a positive role beyond what would have be achieved at national level alone, with progress at national level being more fragmented and uncoordinated. No action points were deemed to have national level action that sufficiently achieved all the objectives and would not benefit from some sort of EU intervention

According to some stakeholders, specific actions such as road safety, MaaS, consumer protection, standards, CO_2 calculations and zero strategies, UVARs and some infrastructure implementation could or has taken place in some Member States without EU action. However, as this would most probably not happen in a harmonised or coordinated in anyway, this does not go against the conclusion of positive added value from EU level action in these areas.

6.5.2 EQ18: To what extent do the issues addressed in the White Paper continue to require intervention at the EU level

6.5.2.1 Introduction

This question examines the extent to which there is an ongoing need for EU-level action to address the key issues identified and addressed in the White Paper and to achieve the objectives set in this direction.

In summary, these include:

- Reduce transport-related emissions of CO_2.
- Achieve a drastic decrease in the oil dependency ratio.
- Limit the growth of congestion of the transport system.
- Ensure that the transport system is in pace with the mobility needs and aspirations of people and business, namely:
    - Allow the basic access and the development of mobility needs of individuals and companies.
    - Promote equity within and between successive generations.
    - Offer safe, secure and reliable transport services of high quality.
    - Ensure that transport services are affordable, operate fairly and efficiently, offer a choice of transport mode, promote high quality employment.
    - Minimise the external costs of accidents, noise and air pollution, biodiversity loss and increased land use.

To support the analysis, we also examined what would be expected to happen in terms of addressing the needs and achieving the respective objectives in the White Paper if EU action were to stop.

Our response draws on the analysis from the previous EU added value question (EQ17, see Section 6.5.1), as well as from the earlier analysis on the progress made towards achieving the specific objectives of the White Paper (EQ1, see Section 6.1.1) and their continued relevance (EQ10 and EQ11 – see Sections 6.3.1 and 6.3.2). We also use input from desk research, Commission desk officers (provided via data requests) and from various stakeholder groups via surveys and interviews.

6.5.2.2 Main findings (by objective)

1. Reduce transport-related emissions of CO_2

The analysis indicates that further EU level action is needed to achieve further reduction to the level of CO_2 emissions from transport. This is linked to the transborder nature of the problem of CO_2 emissions and of the transport system in itself, which makes EU action more effective and efficient.

Stopping EU action would not mean that no further action will take place. Member States should be expected to take further measures to respond to the recognised increased need for further and more ambitious measures to address the problem of climate change within the context set at international level on the basis of the Paris Agreement.

In certain areas, international action is already an important driver of developments – e.g. CORSIA for aviation and the IMO objectives for the maritime sector. Nonetheless, as EU has been a driving force in those agreements, their effectiveness might be in jeopardy without any further EU action.

In other areas where international action is absent or much more limited (e.g. in relation to road and rail transport and multimodal transport), the absence of EU level action would most probably lead to unilateral action by individual Member States. This will most probably mean reduced effectiveness as a result of the greater variation in terms of the scope and the level of ambition of measures adopted and the greater variation in the legislative framework. It would also mean reduced efficiencies as it will not be possible to benefit from the economies of scale provided by the action taken at EU level (e.g. in terms of the support for the development and deployment of new technologies).

This assessment is also supported by a majority of stakeholders: 38 out of 43 stakeholders agreed that EU action is still needed and 56 out of 64 stakeholders agreed that stopping EU action would have a negative impact in achieving the objective of reducing CO_2 emissions from transport.

2. Achieve drastic decrease in the oil dependency ratio

The analysis indicates that further EU-level action is needed to achieve the goals of decreasing the oil dependency ratio in transport. This is linked to the transborder nature of the transport system and to avoid risks to the internal market (e.g. by ensuring efficient cross-border connections when using alternative fuels vehicles). Additionally, the environmental aspect of this dependency of oil also gives justification for EU intervention, as this environmental issue is an area where this is clear legal basis for EU intervention[51]. The nature of the issue also makes EU action more effective and efficient.

If EU action were to stop, we would still expect measures at both national and international level. At the national level, the need to ensure smooth cross-border transport links might provide an incentive for Member States that share borders to work together to shift towards a greater use of alternative fuels. At the international level, the need to reduce CO_2 emissions would lead EU Member States to also need to act to reduce the oil dependency of the transport sector (given the high importance of oil use in transport to overall emissions).

Without EU action, effectiveness would be expected to be reduced, given the lack of a harmonised approached and the potential for Member States to focus on reducing their

[51] Article 192 of the Treaty on the Functioning of the European Union.

CO_2 emissions without reducing their oil dependency in transport. In terms of efficiency, the lack of a common EU framework to shift away from fossil fuels would mean less certainty for investments in alternative fuels, leading to fewer economies of scale and higher costs.

This assessment is also supported by a majority of stakeholders: 35 out of 41 stakeholders agreed that EU action is still needed and 53 out of 63 stakeholders agreed that stopping EU action would have a negative impact in achieving the objective of achieving a drastic decrease in the oil dependency ratio.

3. Limit the growth of congestion of the transport system

The analysis indicates that further EU-level action is needed to limit the growth of congestion. This is linked to the transborder nature of the transport system and to avoid risks to the internal market. This applies at least to the cross-border movements of people and goods. Pollution from intra-MS congestion also has cross-border environmental impacts, an issue where EU action is also warranted. Furthermore, actions on urban mobility like dissemination of information and knowledge, expansion of the knowledge base, and exchanges of best practices, are also better carried at EU level to avoid duplication of work and fragmentation of resources. The nature of the issue also makes EU action more effective and efficient.

Without any further EU action, we would have expected Member States to act to limit urban congestion as they felt a need to reduce congestion. It is hard to estimate if this would be less effective compared to action at EU level, but it would not be expected to be more effective or efficient than EU action.

Member States could also be expected to act to solve any cross-border congestion issues. This could be the case in aviation, e.g., where Member States that share an airspace could work together to deal with the issue[52]. Still, an EC desk officer noted that without EU action, modernisation of airspace technology (AP2) would not occur smoothly and in a synchronised way, leading to inefficiencies and reduced benefits. While there are some efforts at international level in terms of modernisation of airspace technology (under the auspices of ICAO), these are mostly about issues like technological standards, not in terms of actual implementation of actions to reduce congestion. As such, action at international level is not expected to replace EU action, at least at the same level of involvement.

This assessment is also supported by a majority of stakeholders: 35 out of 42 stakeholders agreed that EU action is still needed and 43 out of 61 stakeholders agreed that stopping EU action would have a negative impact in achieving the objective of limiting the growth of the congestion of the transport system.

4. Allow the basic access and the development of mobility needs of individuals and companies

The analysis indicates that, despite the fact that improvements have been seen, further EU-level action is needed on the issue of accessibility. This is linked to the transborder nature of the transport system, to avoid risks to the internal market, and to avoid duplication of work and fragmentation of resources. The nature of the issue also makes

[52] This could also involve third countries. For example, Member States like Portugal and Ireland have been working together with Canada to reduce congestion in the North Atlantic airspace (Nelmes, 2019).

EU action more effective and efficient, although for intra-MS issues the effectiveness and efficiency gains derived from EU action are not likely to be very pronounced.

As with the need to act on congestion, in case EU action was to stop regarding the issue of accessibility, Member States would most probably need to act to improve accessibility to their individuals and companies. They could potentially act together, particularly those that share borders, to ensure more efficient flow of goods and persons between those Member States.

This assessment is also supported by a majority of stakeholders: 31 out of 41 stakeholders agreed that EU action is still needed and 40 out of 60 stakeholders agreed that stopping EU action would have a negative impact in achieving the objective of allowing the basic access and the development of mobility needs of individuals and companies.

5. Promote equity within and between successive generations

The analysis indicates that further EU level action is needed to promote equity and deal with issues of accessibility for disadvantaged groups (e.g. the elderly and people with disabilities), working conditions, and improvements to the environment. This is linked to the transborder nature of the transport system, to avoid risks to the internal market and ensure a level playing field in terms of working conditions. The nature of the issue also makes EU action more effective and efficient, although for intra-MS issues the effectiveness and efficiency gains derived from EU action are likely to not be very pronounced.

If EU action was to stop, it could be expected that actions would be taken at national as well as international level. In terms of equity between generations, these mostly relate to the environmental issues discussed above, namely in relation to the need to reduce the level of CO_2 emissions in transport. For that, the same rationale in terms of national and international action would apply.

In terms of equity within generations, the EU plays an important role in ensuring greater levels of access to transport to disadvantaged groups as well as promoting improved working conditions. If EU action was to stop in those fields, it is likely that the actions of Member States would diverge, as Member States would have different priorities in terms of equity in relation to other aspects, potentially leading to less effective outcomes.

This assessment is also supported by a majority of stakeholders: 18 out of 38 stakeholders agreed that EU action is still needed (17 replied "do not know") and 13 out of 35 stakeholders agreed that stopping EU action would have a negative impact in achieving the objective of promoting equity within and between successive generations (14 replied "do not know").

6. Offer safe, secure and reliable transport services of high quality

The analysis indicates that, despite the facts that improvements have been seen, further EU level action is needed on the issue of quality of services. This is linked to the transborder nature of the transport system and the need to ensure the correct functioning of the internal market, which makes EU action more effective and efficient.

Stopping EU action would lead to action at national level, as well as international level. At national level, stopping EU action would lead to a fragmented approach depending on the priorities of each MS. For some areas, namely safety and security, some collaboration between Member States, in an ad-hoc basis or through international efforts (where there are already efforts happening within the umbrella of organisations like ICAO or the IMO).

This assessment is also supported by a majority of stakeholders: 34 out of 41 stakeholders agreed that EU action is still needed and 42 out of 60 stakeholders agreed that stopping EU action would have a negative impact in achieving the objective of offering safe, secure and reliable transport services of high quality.

7. Ensure that transport services are affordable, operate fairly and efficiently, offer a choice of transport mode, promote high quality employment

The analysis indicates that further EU level action is needed on the issue of affordability and efficiency of transport, as well as working conditions. This is linked to the transborder nature of the transport system, to avoid risks to the internal market and ensure a level playing field in terms of working conditions. The nature of the issue also makes EU action more effective and efficient, although for intra-Member State issues the effectiveness and efficiency gains derived from EU action are likely to not be very pronounced.

Action could be expected at national level if EU intervention was to stop. This action at national level would likely be fragmented: while some Member States might be expected to maintain the same level of ambition, other Member States might focus on some of them only (for example efficiency at the expense of affordability). This would negatively impact the effectiveness in achieving the objective at the EU level. Action at international level is expected to be less relevant for this issue.

This assessment is also supported by a majority of stakeholders: 33 out of 42 stakeholders agreed that EU action is still needed and 38 out of 61 stakeholders agreed that stopping EU action would have a negative impact in achieving the objective of ensuring that transport services are affordable, operate fairly and efficiently, offer a choice of transport mode, promote high quality employment.

8. Minimise the external costs of accidents, noise and air pollution, biodiversity loss and increased land use

The analysis indicates that further EU level action is needed on the issue of minimising the external costs of transport. This is linked to the transborder nature of the transport system and the need to ensure a correct functioning of the internal market, which makes EU action more effective and efficient.

Without continued EU intervention, action at both national and international level could be expected. At national level, once again a fragmented approach based on the individual priorities of Member States could be expected. Some Member States could follow an approach of trying to internalise the costs using pricing mechanisms, some could follow an approach of reducing the issues that cause the externalities in the first place (level of CO_2 emissions, accidents, etc.), or none of these. At the international level, there are actions that aim to mitigate some of the issues that lead to external costs (in practice leading to the reduction of those costs), but less action would be expected in terms of internalising costs.

This assessment is also supported by a majority of stakeholders: 37 out of 43 stakeholders agreed that EU action is still needed and 49 out of 61 stakeholders agreed that stopping EU action would have a negative impact in achieving the objective of minimising the external costs of accidents, noise and air pollution, biodiversity loss and increased land use.

6.5.2.3 Conclusions

The analysis identified a continuous need for EU action for most of the issues under consideration and this was a conclusion that was confirmed by stakeholders. With a few

exceptions, if EU action was to stop, national or international actions would be expected but these would, most probably, be less effective in achieving the objectives related to these needs. In terms of efficiency, absence of EU action would most probably lead to a fragmented approach across the EU.

6.5.3 EQ19: What would be the progress made in the EU to date and by 2050 in reducing GHG emissions, oil dependency and congestion without the actions put forward in the White Paper?

6.5.3.1 Introduction

At the time of the adoption of the White Paper, the EU transport system was providing Europe with a high degree of mobility with an ever-increasing performance in terms of speed, comfort, safety, and convenience. However, despite the progress made in certain areas there had been no structural change in the way the system operated. It was considered unsustainable, characterised by an ever-increasing level of CO_2 emissions, persistent oil dependency and high levels of congestion. Four root causes that were preventing the EU transport system from developing in a sustainable system were identified as inefficient pricing, inadequate research policy, inefficient transport services and a lack of integrated transport planning.

Thus, under the scenario of no EU intervention[53], the EU transport system was not expected to become sufficiently resource efficient so as to promote sustainable growth in the meaning of the Europe 2020 strategy. It was expected that the EU transport system would remain dependent on oil, CO_2 emissions from transport-related activities account would still grow and congestion would continue growing.

This evaluation question considers what would have been the situation to date and by 2050 in the absence of the EU intervention under the White Paper. In many respects it reflects the expected progress under the hypothetical Baseline scenario where there would not be an EU intervention and Member States would not strategically follow the guiding principles and framework for action to be taken as set out in the White Paper. In principle, some Member States would take some national level action for a number of the action points (albeit limited and fragmented) (as discussed in EQ17 and 18) and so the Baseline represents a worst-case scenario of expected progress.

In addressing this question, we have used the analysis developed to define the Baseline scenario based on the PRIMES-TREMOVE model defining the expected progress for the three specific objectives (reducing GHG emissions, oil dependency and congestion). We have also used the Alternative scenario developed using the model (that includes the policies adopted as a result of the White Paper) to help in this assessment. Finally, we have analysed the national case studies to see how national efforts without the White Paper would have contributed to achieving a reduction of GHG emissions, oil dependency and congestion.

6.5.3.2 Main findings

Predicted progress for transport related GHG emissions

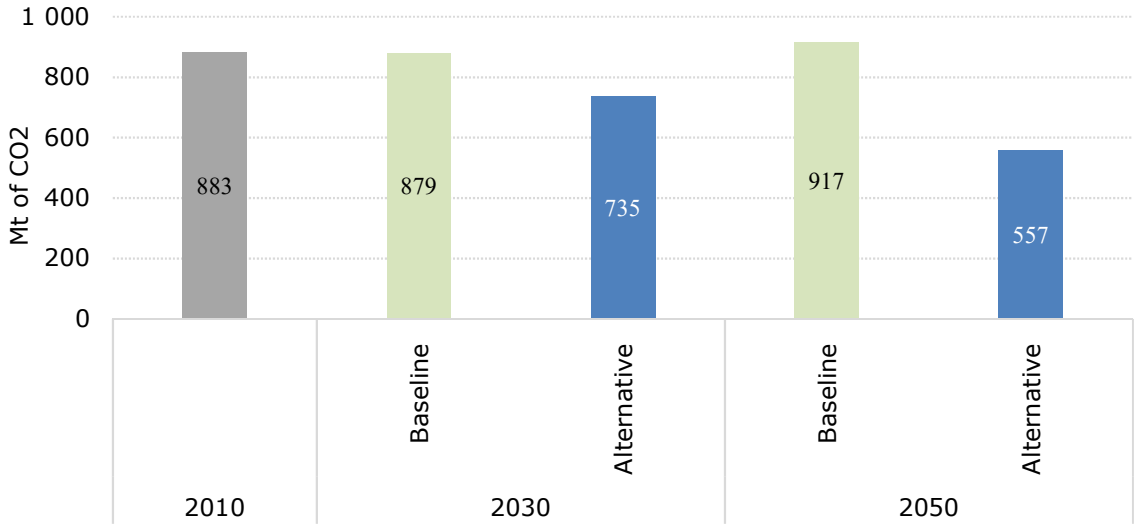
On the basis of the analysis using the PRIMES-TREMOVE model, under the scenario of no EU intervention we project that total **GHG emissions** across EU27 would have

[53] Note this still includes actions at national level that may have been seen by some Member States.

increased by 4% between 2010 to 2050. Compared to 1990, the reference year for the White Paper objectives, CO2 emissions from transport would be 29% higher in 2050. This is in contrast to the expected impacts of the Alternative scenario, (representing the evolution of the transport system taking into consideration the White Paper initiatives) (as discussed in EQ2 – see Section 6.1.2), that shows that, with the White Paper initiatives taken into account, emissions would be 16% lower by 2030 and 39% lower by 2050 compared to the Baseline. More specifically:

- In the absence of the White Paper interventions, ***CO_2 emissions from road transport*** would have been expected to decrease by less than 1% between 2010 and 2050 as a result of a small uptake of more efficient and cleaner cars in the long-term. In comparison, emissions in the Alternative scenario are projected to be 19% below the Baseline levels in 2030 and 46% lower in 2050. This is due to the CO_2 standards for new light duty vehicles and heavy duty vehicles post-2020, supported by the deployment of recharging and refuelling infrastructure, but also due to policies driving greater use of sustainable transport modes, such as for example the implementation of the TEN-T Core and Comprehensive Networks, and the 4th Railway Package.
- **For *rail*,** emissions under the Baseline scenario would decrease by 54% between 2010 and 2050. In comparison, with the White Paper taken into account, emissions under the Alternative scenario are projected to be 5% below the Baseline scenario in 2030 and 30% lower in 2050, driven by the further electrification of rail and despite the growth in activity.
- In the case of ***air transport***, the absence of EU action under the White Paper would lead to higher increases of CO_2 emissions between 2010 and 2050 of 39% driven by the growth in the transport activity. In comparison, emissions from air transport associated with the White Paper under the Alternative scenario, are projected to be 6% lower than the Baseline scenario in 2030, and 13% lower in 2050.
- Finally, CO_2 emissions from ***inland navigation and national maritime*** transport would have decreased by 4% between 2010 and 2050 under the Baseline scenario. Comparing to measures associated with the White Paper, emissions under the Alternative scenario are projected to be 2% below the Baseline levels in 2030 and 3% lower in 2050.

Figure 6-1: Projected evolution of transport related CO2 emissions under the baseline and alternative scenarios (MtCO2) (EU27)



Source: PRIMES-TREMOVE model

Projected progress on fossil fuel dependence for transport-related activities

Under the Baseline scenario of the PRIMES-TREMOVE model representing no EU intervention from the White Paper initiatives, we project that over the projection period from 2010 to 2050, transport energy demand[54] would increase by 5%. Oil dependency (share of total oil consumption in transport)[55] over this time period is projected to decrease by only around 2 percentage points. This is in contrast to the expected impacts in the Alternative scenario, where energy consumption would be 12% lower relative to the Baseline scenario by 2030 and 28% lower by 2050, mostly driven by the reduced energy consumption in the road transport sector and the shift towards more sustainable transport modes like rail, including high-speed rail, and inland navigation. Whilst fossil fuel dependency is projected to remain an issue, with the White Paper initiatives taken into account, oil dependency is projected to be 7 percentage points lower by 2030 and 17 percentage points lower by 2050, driven by the projected progress on electromobility, further electrification of rail and further uptake of renewable and low carbon fuels. However, the transport sector is projected to still be dependent on oil and petroleum products for about 87% of its energy needs in 2030 and 77% in 2050.

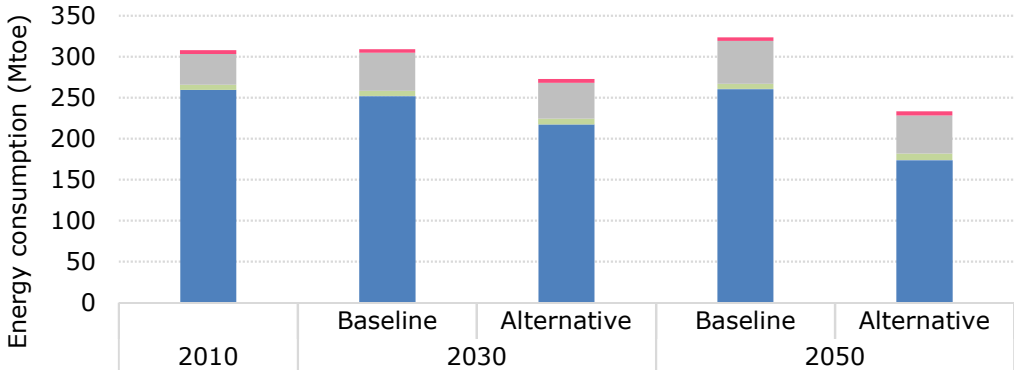
In addition, some insights in the projected evolution of energy use by transport mode in the Baseline and Alternative scenario are provided below:

- In the absence of the White Paper, ***road transport*** energy demand is projected to remain relatively stable between 2010 and 2050. The energy consumption of passenger cars is projected to slightly reduce over the projection period as a result of some autonomous progress in energy efficiency, in the absence of more ambitious policy measures post 2020. On the other hand, road freight energy demand would increase, driven by the growth in transport activity and lack of specific measures driving improvements in energy efficiency. In comparison, energy consumption in road transport under the Alternative scenario is projected to be 14% lower than the Baseline in 2030 and 33% lower by 2050.
- Under the Baseline scenario, energy use in ***rail transport*** would be relatively stable between 2010 and 2050 but the share of electricity use is projected to increase over time. In the Alternative scenario energy use is projected to be higher relative to the Baseline due to the shift in activity from road towards rail. On the other hand, the further electrification of rail relative to the Baseline scenario would still result in lower CO_2 emissions, as explained above.
- In the absence of the White Paper, energy consumption in ***air transport*** is projected to increase by almost 40% by 2050, relative to 2010, and drives the overall increase in the transport sector energy demand between 2030 and 2050. In the Alternative scenario energy use would be 6% lower than in the Baseline scenario by 2030 and 11% lower by 2050. Fossil kerosene is projected to represent around 97% of the energy use in the sector by 2050.
- In the absence of the White Paper, energy use in ***inland waterways and national maritime*** would decrease by around 3% between 2010 and 2050, with oil dependency also slightly decreasing over time. Energy use in the Alternative scenario would be higher (7% in 2030 and 8% in 2050) relative to the Baseline, but the uptake of renewable and low carbon fuels would also be higher.
- Energy use in ***international maritime*** would increase by more than 40% between 2010 and 2050 in the Baseline scenario, while the Alternative scenario shows some reduction in the oil dependency.

[54] Transport energy demand/ use is calculated excluding international maritime

[55] Oil dependency is calculated including international maritime

Figure 6-2: Projected evolution of energy use in transport under the baseline and alternative scenarios (Mtoe) (EU27)



	2010	2030 Baseline	2030 Alternative	2050 Baseline	2050 Alternative
Inland navigation	5	4	5	5	5
Aviation	38	46	43	52	47
Rail	6	6	7	6	8
Road	259	252	217	260	174

Source: PRIMES-TREMOVE model; Note: Inland navigation in this figure covers inland waterways and national maritime.

Projected progress in reducing the level of congestion

In terms of the level of **congestion**, the ***hours spent in road congestion annually per citizen*** would increase in both scenarios compared to 2010 levels (increasing by 71% under the Baseline scenario from 2010 to 2050). Under the Alternative Scenario, accounting for policies adopted by the end of 2018, hours spent are projected to be only 5% less than the Baseline in 2030 and 2.3% less in 2050.

External costs of congestion[56] are also projected to increase by 34% between 2010 and 2050, with the Alternative scenario showing only a limited difference relative to the Baseline (1.1% reduction in 2030 and 0.4% reduction in 2050), driven mainly by greater use of more sustainable transport.

Finally, under both scenarios (with and without measures under the White Paper), the ***external costs of congestion as a share of GPD*** (for both road and rail) are projected to remain similar.

In addition to the input from the PRIMES model, input from the case study analysing the national and regional strategies has been used to assess how national efforts without the White Paper would have contributed to achieving a reduction of GHG emissions, oil dependency and congestion (see Annex H).

It was found that the White Paper has played a significant role (informed and facilitated) in the development and implementation of national/regional strategies related to reducing GHG emissions, oil dependency and congestion in a large number of cases. 22 out of 39 respondents to the survey considered that the specific objectives of the White Paper related to CO_2 emissions, oil dependency and congestion have informed either

[56] Considering road, rail and aviation

fully or to a significant extent the objectives set in national or regional transport strategies, whereas only five out of 39 respondents indicated either to a limited extent or not at all[57].

This suggests that in the absence of the White Paper, there is a risk that less national/regional strategies would have set objectives explicitly related to reducing GHG emissions, oil dependency and congestion (however this is based on assumption and cannot be confirmed).

However, even without the presence on the White Paper, other EU legislation may assist national efforts in achieving a reduction of emissions, oil dependency and congestion. One public authority (CZ) commented that the implementation of national transport strategies is largely influenced by new EU legislation related to the White Paper, such as the Alternative Fuels Infrastructure Directive or the Clean Vehicle Directive, which sets ambitious goals that would be otherwise difficult to implement at national level. The Czech public authority added that other EU policies (TEN-T policy, cohesion policy) are also very helpful since they enable funding opportunities for implementation of new transport infrastructure or upgrading of existing one based on harmonized technical requirements.

6.5.3.3 Conclusions

It can be concluded that progress in relation to two of the three specific objectives would have been lower without the actions put forward in the White Paper, compared to the situation with the White Paper initiatives in place.

Under the scenario of no EU action, **CO_2 emissions** from transport[58] would be expected to stabilise by 2030 and increase by 4% by 2050 relative to 2010 levels, in absence of additional policies beyond 2011. This is in contrast to the expected impacts when taking into consideration the White Paper initiatives, with CO_2 emissions under the Alternative scenario projected to be 16% less by 2030 and 39% less by 2050 compared to the Baseline.

Reliance on oil products would also be much higher without the White Paper initiatives taken into account, with oil dependency expected to decrease only around 2% from 2010 to 2050. Under the Alternative scenario, whilst the dependency on oil products is projected to remain an issue (with fossil fuels still comprising 87% of final energy consumption in 2030, and 77% in 2050[59]), relative to the Baseline scenario, fossil fuel dependency would be about 7% lower by 2030 and 17% lower by 2050.

Finally, high **levels of congestion** are still projected by 2050 under the Baseline scenario, and progress made is expected to be very similar with or without the actions put forward in the White Paper. Under the Baseline scenario, hours spent in road congestion annually are expected to increase by 71% compared to 2010 levels, with hours projected under the Alternative scenario to only be 5% less than the Baseline in 2030 and 2.3% less in 2050. The external costs of congestion are also expected to increase by 34% between 2010 and 2050, with the Alternative scenario showing only limited decreases relative to the Baseline (1.1% reduction in 2030 and 0.4% reduction in 2050). Finally, external congestion costs as a share of GDP (for both road and rail), are projected to remain similar with or without the White Paper initiatives in place.

[57] One Member State and four regions

[58] Excluding international maritime, in line with the 2011 White Paper target for 2050.

[59] Oil dependency is calculated including international maritime

According the analysis of the case studies, the White Paper has played a significant role (informed and facilitated) in the development and implementation of national/regional strategies related to reducing GHG emissions, oil dependency and congestion in a large number of cases. Therefore, there is a risk that its absence would have resulted in less national/regional strategies setting objectives explicitly related to this.

7 CONCLUSIONS

In this section we present the overall conclusions of the study in relation to the effectiveness, efficiency, relevance, coherence and EU added value of the White Paper.

7.1 Effectiveness

Overall, the analysis shows that, until today, **limited progress has been made towards the specific objectives of the White Paper,** with GHG emissions levels from transport still on the rise, an everlasting oil dominance in the sector and a seemingly persistent growing congestion.

Since 2011, limited progress has been recorded towards the headline goals. The amount of alternatively fuelled vehicles has been limited; city logistics, as well as aviation, are still very much dependent on conventional fuels; freight transport still runs mainly on road; the application of the 'user/polluter pays' principles still lag behind; the development of high-speed rail lines and of the TEN-T network is not as fast as expected; progress on road safety slowed down in recent years. More progress occurred on the implementation of intelligent transport systems in all modes.

Some progress towards other general objectives has been registered, especially in terms of improving accessibility of transport service and equity in the transport sector. On the other hand, affordability of transport services and the external costs of transport to society have not registered much progress.

A key parameter that leads to the limited overall impact is that, nine years after the release of the 2011 White Paper, there has been only partial progress in the **level of implementation of the White Paper.** Our analysis found that, at EU level, out of the original 132 initiatives of the White Paper, 64 initiatives have been completed by the Commission while 60 initiatives are still on-going. Even more so, at national level initiatives were either only recently implemented or still to come. Consequently, **most of the White Paper's action points cannot have delivered their expected impacts so far**. This appears in line with the medium- long term nature of the strategy which was designed to deliver results at 2030 and 2050.

Considering the future impacts - and assuming the full implementation of all currently adopted initiatives - the analysis shows that **the current measures and policies of the White Paper should be expected to significantly contribute towards the 2030 GHG emissions milestone, but less so towards the 2050 goal.** This goes hand in hand with the limited progress on reducing the oil dependency of the sector. Also, congestion is likely to continue to grow.

To some extent, progress is expected toward the remaining objectives. Stakeholders showed confidence in a future improvement of accessibility of transport services, as well as in the overall quality and safety of the latter. They had reservations in respect of the future development of equity and affordability of transport.

In terms of the headline goals, by 2030 and 2050, partial progress is also expected to be achieved. Although with improving and encouraging trends in almost all areas, most of the 2030 or 2050 goals are not expected to be met with the currently implemented measures and policies of the White Paper.

We also examined the role of **external trends and factors** in the achievement of the White Paper objectives. We analysed the role of digitalization, adoption of new business models, technological developments, behavioural change, new mobility patterns, climate change, etc.). Our conclusion is that it was too early for any of these to have played a significant role so far.

Among the **unintended effects** of the measures of the White Paper, few (either positive or negative) have been identified by the stakeholders due to a lack of reliable evidence on the causal links.

Despite the differences in the framework conditions of the two scenarios, **the comparison with the White Paper Impact Assessment study** denoted a similar trajectory of emissions reduction in the Alternative Scenario with the White Paper's scenarios and ambition for the period up to 2030. However, this is clearly not the case vis a vis the expected 60% CO2 emissions reduction by 2050. In this context, it is important to note that the impact assessment accompanying the 2011 White Paper had assumed further intensification of policies after 2030, whereas the Alternative scenario only takes into account policies adopted by the end of 2018.

Overall, the analysis showed that there has been limited progress towards the achievement of the White Paper objectives, and that more effects are expected in the next decades when its measures and policies will be fully implemented. At the same time though, on a more qualitative aspect, the White Paper has contributed towards setting the scene for the future of the European transport system. By identifying the clear interdependence between transport and environmental policies, the White Paper gave a clear priority to reducing the impact of the transport system on the environment, in particular by increasingly promoting a cleaner and more energy efficient transport system that allows for a reduction in GHG emissions and dependency on fossil fuels. These key goals for the transport sector are now globally recognised as key priorities by all stakeholders. The European Green Deal (COM/2019/640 final) will complete this strategy and will go even further.

7.2 Efficiency

There are important limitations on the availability of cost data that make it very difficult to assess the total costs for the White Paper, the costs for different stakeholder groups and to make an overall assessment of its efficiency.

With these limitations in mind, we have developed estimates of the cost of important part of the White Paper:

- A total of around €160 billion has been allocated to support investments in the development of the transport system and the development of technology using a range of EU funding instruments (CEF, TEN-T, ESIF, H2020) over the 2007-2023 period. The EU contribution was estimated at around €100 billion.
- Costs for initiatives related to the adoption and implementation of EU legislation (e.g. Regulations, Directives) were estimated to be around €65 billion in the 2011-2020 period. This is an estimate of the total costs for all stakeholders affected and covers 25 out of the 68 such initiatives of the White Paper.

The above costs are spread across many entities, including the European Commission, Member States, industry and civil society stakeholders, but it is not possible to determine the share of the cost for each one of them.

Similarly, it has not been possible to assess the cost-effectiveness of the White Paper action points. Available analysis of a few initiatives (e.g. initiatives 39-42 on road safety, with a 4:1 benefit-cost ratio, and initiative 43 on aviation safety with a benefit-cost ratio of over 100:1), concluded that these have been cost-effective when the overall benefits

to society are considered. However, these only represent a small share of the total initiatives. As such, it is not possible to conclude much on the cost-effectiveness of the overall activities that fall under the White paper.

Having said that, qualitative input from national and regional authorities suggests that, in most cases, the costs of the initiatives were fully considered justified by the benefits. Industry representatives were more sceptical, with a majority of stakeholders participating in the study indicating that, at best, the costs where only justified by the benefits "to some extent". This was a result that was confirmed, at least for some initiatives, by desk research-based analysis. One of the main issues identified was the lack of progress in the implementation of some measures, which leads to a delay in the materialisation of benefits.

Finally, in terms of potential room for simplification of the White Paper, the analysis did not identify any major concerns regarding the structure of the White Paper. Within individual initiatives, aspects such as revising reporting requirements, reducing the scope of legislation, and changing the way that specific legislative acts are implemented across the EU were identified as possible areas of implementation, although it has not been possible to determine the potential combined savings that could arise if these simplifications were pursued.

7.3 Relevance

The White Paper objectives and headline goals remain largely relevant for guiding the EU transport system. However, as transport and climate policy needs and priorities have evolved since 2011, there are certain areas where the objectives and headline goals appear to be insufficient or missing. More specifically:

- The majority of needs and issues addressed by the White Paper are still valid today. Road freight transport is projected to remain the dominant mode to 2030 and 2050. Transport-related CO_2 emissions rose between 2011 and 2018, and although emissions are projected to fall by 2050, on 2018 levels, further policy action to address this need will be required in order to facilitate alignment with the ambition of the Green Deal. In addition, congestion levels have risen since 2011, and are projected to increase to 2030 and 2050.
- The emergence of recently adopted EU policy and strategy documents, such as the European Green Deal, has challenged the continued relevance of the White Paper objectives. The climate neutrality vision outlined in the European Green Deal has made the first White Paper objective, on GHG emissions reduction, insufficient. Through including a quantified goal, to reduce GHG emissions in the transport sector by 90% by 2050, the ambition of the Green Deal supersedes the first White Paper objective. In addition, a number of subsequently adopted EU strategies, including the Digital Single Market, have included a greater focus on data security and cybersecurity. This reduces the relevance of the scope of the sixth White Paper objective, on transport safety and security, due to the lack of coverage of data security and cybersecurity.
- The White Paper objectives and headline goals remain largely relevant in view of the transport and climate policy needs identified. However, a few important gaps have also arisen. In light of the transport and climate policy needs identified, gaps have been identified in the headline goals in regard to charging and refuelling infrastructure and new transport services (i.e. micro-mobility, CAVs). New headline goals could be implemented to account for these emerging transport modes/technologies.

The White Paper headline goals can largely be considered to act as adequate benchmarks for achieving an integrated, sustainable and efficient transport system. Although the headline goals and objectives of the White Paper do not appear to have

explicitly applied the Better Regulation S.M.A.R.T. criteria, our assessment found the majority of the targets to be both specific and measurable, due to the inclusion of quantified goals or clear qualitative descriptions. In some cases, greater clarity could be provided through introducing quantified goals and specifying clearly defined indicators, to allow progress to be more easily tracked.

Further policy action is likely to be required in order to achieve the majority of these targets to 2030 and 2050, particularly in relation to the first and second headline goals on the phasing out of conventionally-fuelled vehicles and the adoption of sustainable fuels respectively. The ambition of the goals should at least be maintained to align with the increasing policy ambition at the European and international level for GHG emissions reduction in the transport sector, allowing the headline goals to facilitate the achievement of an integrated, sustainable and efficient transport system.

Similarly, the headline goals of the White Paper also remain relevant in view of the needs identified. While in some cases there are no direct links between the headline goals and the needs identified, the targets are still aligned with broader transport and climate policy needs (i.e. GHG emissions reduction) and none of the headline goals can be considered detrimental to the needs identified. At the same time, specific gaps have been identified in the headline goals in regard to charging and refuelling infrastructure and new transport services (i.e. micro-mobility, CAVs).

7.4 Coherence

In general, we conclude that the White Paper is **coherent** with most of the recently adopted EU strategies, EU initiatives in other policy areas, relevant initiatives of international organisations and with relevant strategies being implemented in the Member States.

In addition, the White Paper objectives and action points provide a **coherent framework for the development and implementation of sustainable transport policy in the EU**. In addition, there are a range of potential synergies between the White Paper's action points and there were no evident overlaps or inconsistencies between the action points.

However, specific issues have been identified:

- First, there is a lack of coherence between the GHG reductions that underlie the White Paper (60% by 2050 compared to 1990 levels) and those that are considered to be necessary to meet the aspirations of the Paris Agreement (and current EU climate change policy, as set out in the Green Deal) and the more ambitious target of 90% reduction of CO2 emissions by 2050 compared to 1990 that has been adopted. This lack of coherence is the result of an evolution of scientific understanding and the subsequent policy developments, rather than a limitation of the White Paper.
- Second, the White Paper itself does not give as high a prominence to the affordability of transport, as the UN's SDGs do. This is in spite of the fact the affordability of transport was included in one of the White Paper's additional objectives. None of the initiatives of the White Paper explicitly covers either the affordability of transport or the particular concerns of low-income groups. While this oversight may have been addressed in the course of the development of specific action points, the lack of explicit reference to affordability in the White Paper reduces the prominence of affordability, if nothing else.
- Third, the White Paper did not mention connected, cooperative and automated mobility (CCAM), whereas more recent documents have given increasing attention to CCAM, including the 2015 Digital Single Market Strategy, the 2018 Strategy on CCAM and even in the Green Deal itself, even though it only had a

relatively brief section on transport. Hence, the way in which the White Paper referred to CCAM is not coherent with more recent documents. Rather than being an issue with the White Paper itself, this probably reflects the technological developments that have occurred over the last decade in relation to CCAM.

- Finally, even though it is mentioned in the White Paper's fifth additional objective, i.e. to minimise transport's external costs and the loss of biodiversity, biodiversity loss is not explicitly mentioned in the White Paper, although it contains a recognition that transport infrastructure needs to reduce its negative impacts on natural assets. While biodiversity loss could have been considered in the course of the implementation of relevant action points, the lack of an explicit reference in the White Paper creates the risk that the protection of biodiversity is not given sufficient prominence in EU transport policy.

7.5 EU added value

Overall, the analysis concludes that EU level action taken in the context of the White Paper has brought – or should be expected to bring - added value above and beyond what would be possible by action only at national level. This is also generally supported by a great majority of stakeholders (25-41 out of 55-59). More specifically:

- EU action has contributed to greater **effectiveness** of the intervention by supporting a harmonised framework with common objectives across the EU which helps create missing links, reduce fragmented action taken by only some MS, and facilitate cross-border transport. It provides a more competitive level playing field in the transport industry and reduces the risk of barriers to the free movement of goods and people, improving the function of the single EU internal market.
- EU action through the White Paper has also ensured more coordinated and **efficient** approaches are adopted, minimising duplication of financial, technical or administrative efforts. It increases market confidence and encourage larger scale investment (including with funding schemes), leading to economies of scale and reduction of costs.
- Finally, EU action has facilitated various **synergies** between MS, national and local authorities, EU institutions and industry stakeholders, many of which would be unlikely to exist otherwise. These can include research, data and information sharing, best practice exchange and synchronised management systems, as well as mutual cooperation and recognition.

Furthermore, at the level of specific action points, the analysis found that for 23 out of 40 action points there is clear added value from EU level intervention. Its absence would result in significantly reduced action towards the White Paper objectives. For a further 17 action points, EU action is thought to provide a positive role beyond what would have be achieved at national level alone, with progress at national level being more fragmented and uncoordinated.

No action points were identified where national level action could, on its own, sufficiently achieve all the objectives with no added value of EU level action. Some stakeholders considered that actions related to road safety, MaaS, consumer protection, standards, CO_2 calculations and zero strategies, UVARs and some infrastructure implementation could have taken place in some Member States without EU action. However, as this would most probably not happen in a harmonised or coordinated in anyway, EU added value is still evident in these areas.

Furthermore, when considering a scenario of no EU action, action at national or international level would in most cases be expected to be have been less effective in achieving the objectives while also leading to higher costs due to the resulting fragmented approach across the EU, duplication of efforts and not benefiting from

respective economies of scale. In terms of the expected development in the case of no EU action, analysis based on the PRIMES-TREMOVE model also suggests that:

- Overall **CO2 emissions from transport** (including international aviation but excluding international maritime shipping) are expected to be 16% lower in 2030 and 39% lower in 2050 compared to the Baseline with no EU action.
- **Reliance on fossil-fuel based energy** would be much higher without the White Paper initiatives taken into account. Relative to the Baseline scenario, fossil fuel dependency is expected to be 7% lower in 2030 and 17% lower by 2050, driven by the projected progress on electromobility, further electrification of rail and uptake of renewable and low carbon fuels.
- I**n terms of congestion**, progress made would be limited relative to the Baseline scenario with no EU action.

Looking into the future, in all areas addressed by the White Paper continued EU action is considered justified. If EU action was to stop, national or international action would be expected but it would be less effective in achieving the relevant objectives. Absence of EU action would most probably lead to a fragmented approach across the EU. In some cases (e.g. in terms of investments by vehicle manufacturers) this could lead to duplication of efforts while not benefiting from respective economies of scale, resulting in higher costs to achieve same or reduced overall results.

The same level of effectiveness as under EU action could possibly be achieved in only a few specific cases, e.g. where there are international agreements (modal-specific efforts in international shipping and aviation). Some progress should be expected towards addressing CO2 emissions in the context of the Paris Agreement but there is still strong added value from a coordinated action at EU level. In other cases (like the issue of urban congestion), where action might be more localised within a Member State, the effectiveness and efficiency disadvantages of stopping EU action may also not be as pronounced although there will still be a loss of the synergies and knowledge sharing provided by action at EU level.

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9 ANNEXES

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