



European
Commission

The transition pathway for the EU Mobility Industrial Ecosystem



EUROPEAN COMMISSION

Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs
Directorate I — Mobility & Energy Intensive Industries
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THE TRANSITION PATHWAY FOR THE EU MOBILITY INDUSTRIAL ECOSYSTEM

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This publication by the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs summarises the discussions with European stakeholders on the twin transition of the EU mobility ecosystem. The content of this document, however, does not necessarily represent the position or endorsement of all stakeholder groups nor the position of individual Member States or the European Commission. This document is without prejudice to Commission's future initiatives in the field of mobility. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of the information contained in this document.

Manuscript completed in January 2024

First edition

EN PDF

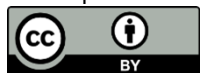
ISBN 978-92-68-11801-6

doi:10.10.2873/85261

ET-02-24-103-EN-N

Luxembourg: Publications Office of the European Union, 2024

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I/ INTRODUCTION

The mobility ecosystem has an important place in the EU economy. It is therefore critical that the ongoing industrial transformation of the ecosystem is supported by a bottom up understanding of the scale, cost, long term benefits and conditions of the required actions to accompany the green and digital transition (the twin transition).

The idea of the transition pathways was introduced in 2021 by the update of the **EU Industrial Strategy**¹. A transition pathway is a co-creation exercise involving Member States, industry, and other relevant stakeholders, guiding and supporting the twin transition of the EU industrial ecosystems, including the mobility ecosystem. The transition pathways aim at mapping, with a bottom up approach, the challenges and identifying further actions to achieve this objective. In line with this approach, the Commission's role in the process was one of facilitator. The main priorities, actions and potential outcomes to support the green and digital transition of the mobility ecosystem were further specified in January 2022, in the **Staff Working Document** "*For a resilient, innovative, sustainable and digital mobility ecosystem - Scenarios for a transition pathway*"², which initiated the consultation process.

Since the launch of the transition pathways co-creation process, which has been based on a working premise of risks, challenges and opportunities identified in the Staff Working Document, the invasion of Ukraine by Russia and the disruptions along the value chain, broadened the focus of the exercise encompassing strategic discussions on the EU economy's resilience and strategic dependencies of the EU value chain.

¹ COM(2021) 350 final

² SWD(2022) 16 final

II/ THE EU MOBILITY ECOSYSTEM AND LINKS WITH OTHER INDUSTRIAL ECOSYSTEMS

The mobility ecosystem covers the entire value chains of automotive³, rail, waterborne and cycling, and includes services.

It employs 17.6 million people and generates approximately EUR 1.2 trillion contribution to the EU GDP (7.6% of EU total GDP)⁴.

The ecosystem is characterised by long and complex supply chains which are dominated by a few enterprises that became global players on the one hand, and a large number of smaller and locally rooted suppliers, retailers and aftersales products and service providers on the other hand. It is mainly composed of small and medium-sized enterprises (SMEs), which represent 99.7% of the companies active in this ecosystem⁵.

The main different value chains at a glance:

- The **automotive** value chain is a pillar of the EU economy, accounting for 12.9 million direct and indirect jobs, EUR 1 trillion contribution to the EU GDP, and almost one third of private sector research and development investments in the EU. It is EU's stronghold as leader in the global technology race⁶. The industry is one of the most competitive in the world and generates a substantial trade surplus for the EU (€96 billion in 2022)⁷. Inside the EU, the automotive value chain is present with manufacturing activities in most Member States and accounts for a very high share of manufacturing employment in certain Member States and regions. Strong economic integration since the turn of the millennium has led Central and Eastern European countries to move up in the value chain, becoming key players for the EU automotive industry. This trend is visible in countries such as Czechia, Hungary, Poland, Romania and Slovakia, which joined countries historically central for the automotive industry such as France, Germany, Italy, Spain and Sweden. In 2021, 15.3% of motor vehicles produced in the world

³ Including motorcycles and other L-category vehicles.

⁴ The reported numbers account for the people employed, and added value in EUR, generated by the automotive, motor-cycles and tractors industries, sale, repair and maintenance of motor vehicles, renting or leasing of motor vehicles, passenger and freight road transport, port activities, shipbuilding and repair, maritime transport, rail supply industry, rail transport services, bicycle manufacturing, cycling infrastructure, cycle tourism, cycle hiring schemes, cycle logistics, other cycling-related services. Below the sources utilised:

- <https://www.acea.auto/publication/the-automobile-industry-pocket-guide-2023-2024/>
- <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/a-road-map-for-europes-automotive-industry>
- <https://acem.eu/acem/about-us>
- <https://www.cema-agri.org/about-cema>
- https://blue-economy-observatory.ec.europa.eu/news/eu-blue-economy-report-2023-edition-now-online-2023-05-24_en
- https://errac.org/wp-content/uploads/2019/03/122017_ERRAC-RAIL-2050.pdf
- 2 million green and sustainable cycling jobs by 2030 - Jobs and job creation in the European Cycling Ecosystem (April 2023)
- <https://www.conebi.eu/industry-market-reports/>

⁵ European Commission, 2021 Annual Single Market Report Brussels, 5.5.2021 SWD (2021) 351 final

⁶ The global technology race is concentrated in the four sectors which account for more than three-quarters of total private R&D: ICT producers of hardware and technology, ICT software & services, Health, and Automotive. While the US is leading in the former three and China has overtaken the EU in ICT services and growing in health, automotive remains our global R&D stronghold. See: European Commission, Joint Research Centre, Nindl, E., Confraria, H., Rentocchini, F. et al., The 2023 EU industrial R&D investment scoreboard, Publications Office of the European Union, 2023, <https://data.europa.eu/doi/10.2760/506189>, December 2023)

⁷ Peak in car exports in 2022 - Eurostat (2023) [https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20230629-1#:~:text=Imports%20in%202022%20amounted%20to,surplus%20of%20%E2%82%AC96%20billion.&text=The%20value%20of%20extra%20DEU,faster%20than%20exports%20\(3.6%25\)](https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20230629-1#:~:text=Imports%20in%202022%20amounted%20to,surplus%20of%20%E2%82%AC96%20billion.&text=The%20value%20of%20extra%20DEU,faster%20than%20exports%20(3.6%25))

were produced in one of the 213 automobile assembly and production plants located in the EU⁸. The motorcycle, manufacturing and trading, sector is also one in which the EU is a leading region globally, providing 133,000 jobs, associated with EUR 5.8 billion of GDP.

- The EU **waterborne** value chain includes the shipbuilding and repair industry, (with Germany, France, Italy, and the Netherlands being the main contributors in terms of GDP), maritime and inland waterway transport of goods and passengers, and port activities. It has a strategic dimension as more than 80% of the EU's external trade⁹ and 40% of the EU's internal trade are carried by sea¹⁰ and EU shipping controls 39.5% of the world fleet¹¹. Europe's maritime technology sector comprises some 300 shipyards and more than 28,000 maritime equipment manufacturers and technology suppliers. This sector generates an aggregated production value of EUR 125 billion, accounting for 23.8% of the world maritime technology production value (EUR 482.5 billion), and creates directly and indirectly (mainly highly skilled) jobs for more than one million people in Europe¹². EU shipyards are global leaders in complex shipbuilding and cruise ships represent 80% of the EU shipyards' commercial orderbook value, which can however lead to problems in case of a sudden demand reduction as was the case during the COVID crisis. The building, maintenance and refit of recreational boats is also a sector in which the EU is leading globally with production having remained and grown in Europe.
- The EU **railway** value chain is a global leader in the design, manufacturing and maintenance of railway systems and products, providing clean transport solutions and employment to 2.3 million Europeans and making a significant contribution of EUR 143 billion to the EU total GDP¹³, of which 659,000 jobs and EUR 102 billion correspond to the rail supply industry. In the EU, manufacturers have maintained a positive trade balance in the past decade in the context of a strongly consolidated global market¹⁴. These manufacturers are primarily situated in countries with large domestic markets (such as France, Germany, Italy, and Spain) and compete for contracts worldwide¹⁵.
- The EU **cycling** value chain, which includes manufacturing, cycling infrastructure, cycle tourism, cycle hiring, cycle logistics, other services, is responsible for 1.3 million jobs and EUR 21 billion contribution to the EU GDP. In 2022, 20 million bikes were sold of which 5.5 million were Electrically Pedal Assisted Cycle (EPAC)¹⁶. The assembly of bicycles in the EU in 2022 amounted to 15.3 million¹⁷ of which 5.4 million were EPACs¹⁸.

⁸ The Automobile Industry Pocket Guide 2023/2024 - ACEA (2023) <https://www.acea.auto/publication/the-automobile-industry-pocket-guide-2023-2024/>

⁹ https://transport.ec.europa.eu/transport-modes/maritime/international-cooperation-and-coordination_en

¹⁰ https://transport.ec.europa.eu/transport-modes/maritime/internal-market_en

¹¹ <https://www.ecsa.eu/sites/default/files/publications/Oxford%20Economics%20-%20The%20Economic%20Value%20of%20EU%20Shipping%20-%20Update%202020%20-%20Report.pdf>

¹² Figures reported in this paragraph were provided by SEA Europe

¹³ RAIL 2050 VISION – The Backbone of Europe's Mobility - ERRAC (2017) https://errac.org/wp-content/uploads/2019/03/122017_ERRAC-RAIL-2050.pdf

¹⁴ 20 rolling stock companies control about 80% of the global market.

¹⁵ Research for TRAN Committee – Perspectives for the rolling stock supply in the EU – European Parliament (2023) [https://www.europarl.europa.eu/RegData/etudes/STUD/2023/747263/IPOL_STU\(2023\)747263\(SUM01\)_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2023/747263/IPOL_STU(2023)747263(SUM01)_EN.pdf)

¹⁶ CONEBI/CIE/ECF: EU and UK Market and Industry forecast <http://ebma-brussels.eu/wp-content/uploads/2022/12/CONEBI-Ebikes-and-Bicycles-sales-forecast-%E2%80%93-EU27UK.pptx>

¹⁷ Includes the UK

¹⁸ 2023 CONEBI Bicycle Industry and Market Report (BIMP) <https://www.conebi.eu/industry-market-reports/>

EU is also the world leader for bike sharing. The EU cycling supply chain already represents over 1,000 small and medium-sized enterprises (SMEs)¹⁹.

Propelled by a **significant growth potential** on the one hand (demand for passenger & freight transport is expected to increase three-fold between 2015 and 2050)²⁰ and an increasingly shared sense of urgency to **address the climate challenge** on the other hand (transport is the only EU sector to have increased its CO2 emissions since 1990, mostly driven by rising road transport)²¹, partly driven by legislation, the industry has innovated and invested heavily in the green and digital transformation. Tapping this economic potential while steering the twin transition will require to tackle a series of social challenges.

Due to its multiple and complex value chains, the mobility ecosystem is closely linked with, and/or dependent on, other industrial ecosystems. From a supply chain perspective it has ties with the **digital, electronics, energy intensive industries, energy-renewables, and textile** ecosystems. On the other hand, other ecosystems are dependent on this ecosystem such as **agri-food, construction, defence** and **tourism** ecosystems.

¹⁹ [Idem](#)

²⁰ ITF Transport Outlook 2019 (OECD) <https://www.oecd-ilibrary.org/sites/57f51e1e-en/index.html?itemId=/content/component/57f51e1e-en>

²¹ European Environment Agency (EEA) - April 2023 <https://www.eea.europa.eu/en/topics/in-depth/road-transport>

III/ THE TRANSITION PATHWAY CO-CREATION PROCESS

The updated EU Industrial Strategy from May 2021 identified the need to accelerate the twin transition in 14 industrial ecosystems, including in the mobility ecosystem.

On this basis, the Staff Working Document with **scenarios for the transition pathway for the mobility ecosystem** established the main challenges and questions that must be addressed to support an **actionable plan in favour of smart, sustainable and resilient EU competitiveness**.

The mobility ecosystem covers the entire industrial value chain for automotive, rail, waterborne and cycling industries as well as associated retail and water and land transport services²². While the associated services are fully taken into account when reporting on the economic importance of the ecosystem in this document, it is important to note that the transition pathway for the mobility ecosystem undertaken under the Industrial Strategy focuses on the industrial angle including industry-related services, and does not cover the transport services. This is also reflected in the type of stakeholders involved in the co-creation process.

The process started with an open **public consultation** based on the Staff Working Document, which concluded at the end of April 2022 with 57 contributions received from companies, business associations, NGOs and public authorities. These, complemented by further exchanges with Member States and stakeholders during the first half of 2022, have led to the identification of three additional key elements:

1. The bicycle industry is an integral part of the mobility ecosystem and must be addressed as such.
2. Regions and local authorities are primarily responsible to manage the transition on the ground and their involvement in the transition pathway process is key.
3. The mobility ecosystem is huge and diverse, with many cross-cutting synergies across 4 main sectors. Still each sector remains very specific.

To streamline the process and to prepare the next steps, **an event** was organized in November 2022 with a view to discuss the three following themes:

- **the role of regions as catalysers** for the transition of the mobility ecosystem;
- **the social dimension of the transition**: ensuring a just transition for all;
- **accelerating the twin transition**: towards a smart, sustainable, and resilient mobility ecosystem, with specific focuses on infrastructure, dependencies and digitalisation.

The **survey** that followed the event helped to identify the topics that needed further analysis and that were subsequently addressed in a number of roundtables. **Seven such roundtables** co-chaired by main stakeholders and the Commission were launched. One for each of four mobility sectors, i.e. automotive, co-chaired by **ACEA (European Automobile Manufacturers Association)**, rail co-chaired by **UNIFE (European Rail Supply Industry Association)**, waterborne co-chaired by **SEA Europe (European Shipbuilding and Maritime Equipment Association)**, and cycling cochaired by **CONEBI (Confederation of the European Bicycle Industry)**. The remaining three were based on main horizontal topics that emerged from previous contributions: i.e. the social dimension, co-chaired by

²² A more detailed description of the mobility ecosystem - except for the cycling industry - is contained in the Annual Single Market Report 2021, SWD(2021) 351.

IndustriALL (European Trade Union) and **CEEMET (Council of European Employers of the Metal, Engineering and Technology-based Industries)**, R&I co-chaired by the **German Federal Ministry for Economic Affairs and Climate Action** and regional issues cochaired by **CLEPA (European Association of Automotive Suppliers)** and the **State Ministry of Baden-Württemberg**. Several sessions were held during the first half of 2023.

Remaining faithful to the bottom-up approach of the Staff Working Document for this co-creation exercise - with the European Commission having a role of facilitator, while the external stakeholders playing a more central role of protagonists - the present report summarizes the point of view of those many relevant stakeholders who play an essential role in the EU mobility ecosystem and took part to the exercise²³. It identifies action fields for each area of the transition. These actions are presented in more detail in the **building blocks**²⁴ section of the report and summarized in Annex 1. For each action, the list of the main actors (EU, Member states, including their regions and cities, industry, social partners) has been identified and each action item has been categorised either as a short-term (S - indicates activities that should start as soon as possible), a medium-term (M - indicates activities that should start in the medium-term (i.e. by 2030)) or a long-term (L - activities that should be launched and completed by 2050) priority.

²³ A comprehensive list of all the stakeholders who took part to the co-creation process can be found in the ANNEX 3

²⁴ The building blocks' structure was discussed and agreed in the context of the Industrial Forum and can be found in the "Blueprint for the development of transition pathways for industrial ecosystems" <https://ec.europa.eu/docsroom/documents/49407>.

IV/ BUILDING BLOCKS

1) SUSTAINABLE COMPETITIVENESS

With the automotive industry at its core, the EU mobility ecosystem has been traditionally a driver of competitiveness, innovation and growth for the whole EU manufacturing industry.

The stakeholders acknowledged that the EU mobility ecosystem is being radically transformed due to the twin transition.

From a policy perspective, the ongoing transformation is driven and accompanied by two flagship EU policy initiatives: the **European Green Deal**²⁵ on one hand and the **European Digital Decade**²⁶ on the other. The Commission presented a concrete plan for green, smart and affordable mobility in its Sustainable and Smart-Strategy with an Action Plan²⁷ including 82 initiatives.

Beyond the twin transition, industrial stakeholders also pointed out a limited control over the value chain, particularly in terms of access to critical raw materials and essential components. In the same way, high energy prices have significantly impacted the manufacturing industry in the EU mobility ecosystem.

The EU has already acted to mitigate the risks related to strategic dependencies. It adopted the **Critical Raw Materials Act**²⁸, a comprehensive set of actions to ensure the EU's access to a secure, diversified, affordable and sustainable supply of critical raw materials. Furthermore, the proposed **Net-Zero Industry Act**²⁹ aims at reducing barriers and speeding up and strengthening the European manufacturing capacity of net-zero technologies in Europe.

In the Sustainable and Smart Strategy, the Commission made proposals to strengthen the resilience of the mobility ecosystem, for example by reinforcing the single market³⁰.

Additionally, **international competition can be distorted** by subsidies and tax incentives promoting production and exports. The **Foreign Subsidies Regulation**³¹ supports the efforts to ensure a level playing field in so far as it also tackles potential distortions in the internal market caused by foreign subsidies in the specific context of public procurement. The Commission has also initiated an anti-subsidy investigation into battery electric vehicles (EV) in 2023³². Moreover, while the EU procurement market is open for foreign competition, procurement markets in some third countries have become increasingly inaccessible to EU

²⁵ COM(2019) 640 final

²⁶ COM(2021) 118 final

²⁷ COM(2020) 789 final

²⁸ Political agreement has been reached by the co-legislators, but the final document has not been published yet.

COM(2023) 160 final, COM(2023) 165 final

²⁹ COM(2023) 161 final

³⁰ For instance through reinforcing efforts and investments to complete the Trans-European Transport Network (TEN-T) by 2030 and support the sector to build back better through increased investments, both public and private, in the modernisation of fleets in all modes.

³¹ REGULATION (EU) 2022/2560 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 December 2022 on foreign subsidies distorting the internal market

³² https://ec.europa.eu/commission/presscorner/detail/en/ip_23_4752

companies. The new **International Procurement Instrument (IPI)**³³ has received a strong support from stakeholders, as promoting reciprocity in access to international public procurement markets, including of China. Overall, the EU is firmly determined to work to ensure the long-term competitiveness and productivity of European businesses, and it is monitoring and increasing its efforts in this direction with the **Long-term competitiveness Communication**³⁴, or the upcoming **report on the future of European competitiveness**³⁵.

Topic 1: Resilience and sustainable competitiveness		
Actions	Actors	Timeframe
1.1. Supply chains		
Contribute to the implementation of Critical Raw Material Act ³⁶ objectives relevant for the mobility ecosystem	Industry	S/M
Map the industrial needs for raw materials and streamline R&D workstreams that could mitigate those dependencies (recycling, substitutive materials, ...)	Industry/MS/EU	S
Support de-risking strategies (e.g. by facilitating offtake agreements and engagement between raw materials suppliers and EU mobility industries)	Industry/MS/EU	M
Attract investments strengthening the EU supply chains	MS	S/M
Promote recycling and circularity to reduce the environmental/social footprint and increase resilience of the EU supply chain for critical raw materials	Industry/MS/EU	M
1.2 Level the playing field		
Provide information and concrete cases that support the activation of mechanisms with a view to ensure the level-playing field, including in the framework of trade defense instruments, the anti-subsidy regulation and the foreign subsidies regulation	Industry	S/M

Automotive industry

³³ REGULATION (EU) 2022/1031 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 June 2022 on the access of third-country economic operators, goods and services to the Union's public procurement and concession markets and procedures supporting negotiations on access of Union economic operators, goods and services to the public procurement and concession markets of third countries

³⁴ COM (2023) 168 final

³⁵ Announced by the President of the European Commission during the 2023 State of the Union Speech https://state-of-the-union.ec.europa.eu/state-union-2023_en

³⁶ COM(2023) 160 final

The recent introduction of new **CO2 emission standards for cars and vans** (requiring all new cars sold from 2035 to have zero CO2 tailpipe emissions)³⁷ has **reinforced the level of the EU ambition** in terms of decarbonisation of road transport and allowed the EU vehicle **manufacturers to set their industrial agenda** accordingly.

This sets clear objectives and the Commission aims at ensuring that all enabling conditions will be on track for the successful production and roll-out of zero-emission vehicles. In this context, in December 2022, Commissioner Breton launched **the #Route 35 platform**³⁸ with a view to monitor and support the transformation of the automotive industry towards its electrification goals. This should help refine the roadmap hand in hand with the work done under the transition pathway.

The switch to electro-mobility has revealed significant differences between the EU, the US and China regarding deployment of EV/battery technology, its supply-chain and associated new business models. Those new business models go beyond electro-mobility and involve also smart factories or connected, autonomous and shared driving³⁹.

EU trade balance with US or China is still positive (in 2022 a surplus of EUR 27.6 and EUR 13.8 bn, respectively). However, this **position of leadership is currently being challenged** as new entrants, especially from China, gain traction on the electric and software-defined vehicles' market.

Vehicle manufacturers and large tier 1 suppliers can more easily adjust to this new competitive landscape. However, while **SMEs involved in the EV value chain are thriving**, many **tier 2 and tier 3 suppliers** in the automotive value chain, continue to be **over-reliant on supplying internal combustion engine-based parts and components** and find it extremely difficult to reallocate resources from the core traditional business towards the development of innovative products/services that fit into the needs of the green and digital mobility. On the demand side, some stakeholders consider that the transition can be accelerated by having electrification commitments, targets or even mandates for large operators of automotive fleets. In early 2024, the Commission will launch a public consultation on this topic.

Topic 2: Sustainable competitiveness of the automotive industry		
Actions	Actors	Timeframe
Accelerate diversification of value chain beyond manufacturing of internal combustion engine (ICE)-related components and related services	Industry	S
Accelerate the development of software-defined vehicle technologies (e.g. automated driving, in-vehicle digital services)	Industry	S

³⁷ Regulation (EU) 2023/851 of the European Parliament and of the Council of 19 April 2023 amending Regulation (EU) 2019/631 as regards strengthening the CO2 emission performance standards for new passenger cars and new light commercial vehicles in line with the Union's increased climate ambition.

³⁸ https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_22_7785

³⁹ European Commission, Joint Research Centre, Nindl, E., Confraria, H., Rentocchini, F. et al., The 2023 EU industrial R&D investment scoreboard, Publications Office of the European Union, 2023, <https://data.europa.eu/doi/10.2760/506189> -December 2023

Accelerate the deployment of connected and automated vehicles	Industry, MS, EU	M
Monitor closely the EU-China competition (and EU-US in the light of Inflation Reduction Act) in partnership between EU, MS and stakeholders	Industry/MS/EU	S
In the context of the #Route 35 platform, set milestones (incl. key performance indicators) for the transformation of the automotive industry and take further action as needed	Industry/MS/EU	S
Stimulate the demand for zero emission vehicles with incentives conditioned by sustainability and resilience criteria	MS	S/M

Waterborne industry

The stakeholders have pointed at the continuing **decline in the competitiveness of the European shipbuilding industry**. Whereas in the 1950s the combined production of eleven Member States accounted for 64% of global shipbuilding, this market share started to decline from 1980 onwards. Since 2000, China and South Korea have become important players and **shipbuilding aid in Europe was abolished in 2003**. Europe is still leading in areas of high added-value segments, such as cruise ships, yachts and recreational boats, although competitors start entering these niches as well. **The Korean and Chinese portfolio is more diverse and, therefore, more resilient**. EU shipowners are currently mainly ordering outside of Europe, where they can find cheaper solutions. The EU shipbuilding sector is challenged by **massive State aid in third countries, subsidized steel, easier access to finance** but also **local content requirements** favouring domestic production and other forms of protectionism.

The stakeholders highlighted that the WTO framework and trade defence tools (such as anti-dumping measures) are not effective in the context of shipbuilding⁴⁰ due to the specificities of the sector (e.g. ships are generally not considered as imported goods from a customs perspective). According to stakeholders, this has encouraged Asian competitors to continue with distortive practices, which may have been a key factor leading to **price differences of 30 to 40% between a European and an Asian ship**. Stakeholders call for an effective EU maritime strategy to address the competitiveness challenges of the waterborne industry.

⁴⁰ In this regard, recital 3 of Regulation (EU) 2016/1035 of the European Parliament and of the Council of 8 June 2016 on protection against injurious pricing of vessels notes that “the special characteristics of ship-purchase transactions have made it impractical to apply countervailing and anti-dumping duties, as provided for under Article VI of the General Agreement on Tariffs and Trade, the Agreement on Subsidies and Countervailing Measures, and the Agreement on Implementation of Article VI of the General Agreement on Tariffs and Trade 1994 (‘the 1994 Anti-Dumping Agreement’) annexed to the Agreement establishing the World Trade Organisation.”

Driven by recent progress at the International Maritime Organization (IMO)⁴¹ and the adoption of several measures at EU level to reduce shipping emissions⁴², the necessary transition to clean shipping is an opportunity for the EU waterborne industry to regain sustainable competitiveness. It will notably require significant investments in new technology development in a market where the EU already plays a frontrunner role in RD&I. It will also lead to new opportunities in terms of fleet renewal and retrofitting activities (i.e. energy efficiency improvements, conversion of ships to alternative fuels).

The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships⁴³ adopted under the International Maritime Organisation that will enter into force in June 2025, aiming at making ship recycling safer and more environmentally friendly could represent a viable business for Europe. However, the facilities needed for ship recycling are different from those used for ship building, and therefore a thorough preparation is needed before the new convention enters into force .

For the boating industry, recycling and end-of-life of boats are critical and the sector has developed a roadmap together with the European Commission on this matter with concrete recommendations⁴⁴.

Topic 3: Sustainable competitiveness of the waterborne industry		
Actions	Actors	Timeframe
Develop new circular and sustainable business models and seizing the opportunities of the green maritime transition (e.g. fleet renewal investments and technology development)	Industry	M
Improve manufacturing and operational efficiency through digitalisation, automation, and re-skilling	Industry	S
Follow up dialogue with stakeholders to address the specific industrial competitiveness challenges and continue exploring new instruments for a level playing field and other appropriate sector-specific initiatives	Industry/MS/EU	S
Support the introduction of sustainable and resilient requirements in public procurement but also in private procurement for fleets that are strategic for Europe, such as cabotage, shortsea shipping, passenger transport, fishing fleets, inland navigation, offshore renewable energy and Blue Economy	MS/EU	S

⁴¹ RESOLUTION MEPC.377(80) (adopted on 7 July 2023) 2023 IMO STRATEGY ON REDUCTION OF GHG EMISSIONS FROM SHIPS <https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/annex/MEPC%2080/Annex%2015.pdf>

⁴² See, the extension of the Emission Trading System (ETS) to the maritime transport, DIRECTIVE (EU) 2023/959 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 10 May 2023 amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading system; see also the FuelEU maritime regulation, Regulation (EU) 2023/1805 of the European Parliament and of the Council of 13 September 2023 on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC

⁴³ The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (imo.org) <https://www.imo.org/en/about/Conventions/pages/the-hong-kong-international-convention-for-the-safe-and-environmentally-sound-recycling-of-ships.aspx>

⁴⁴<https://europeanboatingindustry.eu/images/EOL%20roadmap/Roadmap%20on%20the%20implementation%20of%20circular%20economy%20-%20EOL%20recreational%20boats.pdf? t=1681202198>

Support the European waterborne industry preparation to the entry into force of the Hong-Kong Convention	MS/EU	S
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Rail supply industry

While the European rail supply industry (RSI) has been historically a **world-leader**, it has seen its position **challenged by Asian competitors**. Apart from the challenges that are common to the entire mobility sector (e.g. difficult access to critical raw materials, price inflation of energy and commodities) and beyond the actions taken to address the recommendations of the final report of the expert group on competitiveness of the European rail supply industry (October 2019)⁴⁵, the stakeholders in particular expressed concerns about the complexity of **EU regulatory framework**, the increasing **shortage of skilled workers** in the EU and the **access to the procurement markets**, especially given the increasing competition from Asian bidders. Stakeholders continue to be vocal on the need to use the MEAT⁴⁶ award method (best-price quality ratio) and to be used instead of the “lowest price” award method in public procurement. The **European RSI market remains fragmented due to the slow progress in the past of EU specifications replacing national rules governing markets and infrastructures**. However, a Single European Railway Area (SERA) is developing not only in respect of market opening, but also at the technical and operating levels with European rules applying across EU Member States’ rail networks. Previously, the industry was designed to manage a high level of engineering activities in each project, which provided it with great expertise, with technical specifications varying from one project to another, and to adapt and propose tailor-made solutions also to international markets. Today however, this same approach risks to become detrimental because of the comparably high costs. Further on, it weighs negatively on project delivery time and on the prospects to unleash the benefits of economies of scale and standardization.

Moreover, the long life span of vehicles (used for 30 to 40 years) and rail products (e.g. rails, signaling, energy supply, switches and crossings), delays incorporating innovation into the existing rolling stock and rail infrastructure.

Rail is the greenest mode of mass transportation available, and accounts for less than 0.5% of transport-related greenhouse gas emissions. The European RSI is a high-quality industry, and the demand is expected to remain solid due to decarbonisation needs, provided that global level-playing field remains ensured.

Topic 4: Sustainable Competitiveness of the rail industry		
Actions	Actors	Timeframe
Support and accelerate the shift to a Single European Railway Area (SERA), in particular by accelerating the deployment of the European Rail Traffic Management System (ERTMS), by	MS/EU	S/M

⁴⁵ Report of the expert group on competitiveness of the European rail supply industry <https://ec.europa.eu/docsroom/documents/37829>

⁴⁶ The most economically advantageous tender (MEAT) – use of criteria taking account of qualitative, technical and sustainable aspects of the tender, next to price, when deciding on a contract award.

eliminating national technical rules and by simplifying and reducing costs for vehicle authorisation		
Accelerate the deployment of connected and automated rolling stock	Industry	S
Work towards the harmonisation of operational rules and more standardized technical interfaces	Industry	M
Adapt to technological shifts, for example through retrofitting	Industry	M
Promote the use of the quality criteria in the award of rail public and private procurement projects in the EU	Industry/MS/EU	S

Bicycle industry

The bicycle industry is **competitive in the upper-middle and higher-end consumer markets** where there is more emphasis on product quality based on ISO standards, skilled workforce, and innovation. Its competitiveness has also been enhanced by a **strong overall support for cycling mobility by Member States** (e.g. through the European Structural and Investment Funds), with investments in infrastructure and associated fiscal incentives that have strengthened demand for European brands.

The **production of electric bikes (e-bikes) is becoming increasingly a “European business”**. Out of the total of approximately 5.5 million e-bikes sold in 2022, 80% were assembled in the EU with 45-50% of all components manufactured in Europe, while for regular bikes out of the approximately 14.6 million sold in 2022, 65% were assembled in the EU with 30-35% of the components manufactured in Europe⁴⁷.

Another sign of this leadership is the emergence of a European EPAC (Electrically Pedal Assisted Cycles) standard^{48,49}. Finally, **Europe leads in developing the wider cycling services** (ridesharing, subscription services, repairing or cyclo-tourism)

However, according to the stakeholders, challenges arise in the lower to middle market segments where Asian producers benefit from subsidies and important price differences stemming from lower labour costs. **Bikes and e-bikes manufactured in non-EU countries can be from 30% to 70% cheaper**. The cycling industry also anticipates a risk of competition with other larger EU industrial sectors on supply of strategic inputs (e.g. batteries, aluminium, microchips) with consequences on prices.

The use of **EU trade defence instruments** (i.e. anti-dumping, anti-subsidy, and anti-circumvention) on both complete bicycles and complete e-bikes **has helped protect the EU industry**⁵⁰ from unfair trade practices and unfair competition. The European bike industry estimates that thanks to trade defence instruments, it has already re-shored 80% of e-bike assembly.

The stakeholders recalled that complementary demand measures for bicycles across the EU could further reinforce the business case for the production of bicycles in the EU. The

⁴⁷2023 CONEBI Bicycle Industry and Market Report (BIMP) <https://www.conebi.eu/industry-market-reports/>

⁴⁸ EN 15194 - Electrically power assisted cycles - EPAC Bicycles

⁴⁹ Singapore makes direct referencing to the European standard in its own laws.

⁵⁰ Illustrated by comparisons with the US and Japan bike industry who did not adopt such measures

Commission has recently proposed a European Declaration on Cycling⁵¹ to encourage the uptake of cycling, signalling a strong support and commitment for this mean of transport.

Topic 5: Sustainable Competitiveness of the bicycle industry		
Actions	Actors	Timeframe
Strengthen market surveillance in the bike industry, aiming at a level playing field with international competitors and compliance with the EU regulations ⁵²	MS/EU	M
Support reshoring opportunities for bicycle components, for example through further development of automated production	Industry/MS/EU	M
Support the development of the battery value-chain for eBikes	Industry/MS/EU	S/M
Support the implementation of the European Commission proposal for a European Declaration on Cycling ⁵³	Industry/MS/EU	M
Increase investments and production capacity for a broader range of bicycles and their components in the EU	Industry	S/M

2) REGULATION AND PUBLIC GOVERNANCE

Regulation

The stakeholders were unanimous in recalling the need for the industry to continue benefiting from **a robust and effective regulatory framework in the EU**. Regulation should support and ensure enabling conditions for the twin transition and leading to an improved resilience of the EU economy.

Increased predictability of regulation, a simplified regulatory approach and better recognition of industrial competitiveness impacts, were identified as key areas requiring further attention.

As regards predictability, stakeholders emphasized in particular the need for a more **effective implementation of legislation**, better **targeted upcoming secondary legislation**, and a **sufficient lead time** for the industry to adapt to the changes. For example, the rail industry called for a lengthier staging of the applicable sectoral rules, balancing legal certainty on one hand with the need to implement innovations on the other hand. The rail supply industry also highlighted the need for sector-specific regulations in certain cases rather than horizontal regulations, particularly when it comes to digitalisation and cybersecurity, due to its specific characteristics (B2B nature, public procurement, long life-cycles).

Stakeholders also indicated that Member States sometimes **overregulate by exceeding the requirements** in the EU directives, which results in the **fragmentation of the European**

⁵¹ COM (2023) 566 final

⁵² For example regarding electromagnetic field standards

⁵³ COM(2023) 566 final

Single Market. Product design rules and end-of-life treatment requirements in relation to reparability indices⁵⁴ were mentioned as examples.

While the stakeholders acknowledged the importance of the level of ambition of the EU political agenda, in particular, on delivering on the European Green Deal and on the European Pillar on Social Rights, they emphasized the importance of the principles of **better regulation**. In this context, better aligning different regulatory paths to **avoid conflicting legislation, regular fitness checks** and **evaluation of legislation** were mentioned as key. The need to **respect the proportionality principle, especially for SMEs** remains high on the list of the industry's concerns.

The stakeholders expressed particularly concerns about:

- the impact of the reformed **EU Emission Trading System (EU ETS)**⁵⁵ and of the **Carbon Border Adjustment Mechanism (CBAM)**⁵⁶ on the international level playing field for the downstream mobility industries.
- the possible ban on use of **per- and polyfluoroalkyl substances (PFAS)** in the absence of any alternatives impacting Automotive, Cycling, Rail and Waterborne industry components.

There is also room for some legislative enablers of the twin transition for the mobility ecosystem. For instance, the increased electricity demand brought by a higher number of electric vehicles poses a challenge for the electricity grids, on one hand, while being a so far – untapped tool to bring flexibility to both power demand and supply (including through Vehicle-to-Grid or “V2G” technologies – bi-directional charging). Stakeholders believe that one of the possible solutions to address this physical constraint could be through the **introduction of more flexibility in the electricity generation and distribution markets** so they provide the necessary price signals for a better use of the infrastructure, allocation of resources and necessary changes in consumer charging patterns. This is already being addressed by the **Electricity Directive**, which provides a framework for increased flexibility of the markets, through dynamic and time of use tariffs among other things⁵⁷. Uniform transposition by Member States is a key element to make these principles applicable throughout the entire single market. The existing legislation already allows EVs to participate in the bidirectional charging (as part of the flexibility and balancing services), but there are still several barriers to achieve this (e.g. delays in the implementation of such rules at the national level). Other barriers include a lack of interoperability of recharging infrastructure, obstacles in the access to vehicle data by charging point operators and energy providers, and the fact that not all vehicles are equipped with the needed technology.

Stakeholders identified **standardisation as a key enabler of competitiveness** at the global level, especially in relation to new technologies (e.g. cybersecurity, alternative

⁵⁴ Loi n° 2021-1485 du 15 novembre 2021 visant à réduire l’empreinte environnementale du numérique en France (REEN)

⁵⁵ Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023 amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading system

⁵⁶ REGULATION (EU) 2023/956 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 10 May 2023 establishing a carbon border adjustment mechanism

⁵⁷ In the meantime, energy poverty is a reality in the EU and the energy crisis has shown the need to better protect consumers, especially vulnerable households, from excessive energy price volatility.

propulsion, data). The need for standards has proven critical in situations when large operators from outside the traditional value chain start imposing their own standards (e.g. in digital domain), placing many mobility SMEs under severe duress. On the other hand, ISO certifications in particular have been identified as too burdensome for SMEs. Last but not least, the stakeholders pointed out that the industry, if it is to remain the global leader, could benefit from a higher level of involvement in international standard setting and a better coordination between the **European and international standardisation organisations** following the last EU standardisation strategy⁵⁸ released in 2022.

Topic 6: Regulation		
Actions	Actors	Timeframe
6.1. Legislative framework		
Conduct comprehensive reviews of relevant legislation, with a view of ensuring the mobility ecosystem's green transition while protecting its competitiveness	EU/MS	S/M
6.2 Standards		
Get more involved and better coordinated at European level in the work of the international standardisation organizations following the last EC standardisation strategy	Industry/MS/EU	S
Simplify the audit-led system ISO certification	EU/MS/Industry	M
Set the standards for direct communication between connected vehicles and the grid ⁵⁹	Industry	S
Promote the establishment of standardized data sets in manufacturing and supply value chain and ensure equal access to them	Industry	M

Private - Public governance

The stakeholders acknowledged the potential of cluster cooperation (organized in the European Cluster Collaboration Platform, ECCP). Clusters are especially useful for SMEs, hence helping clusters is an indirect way of supporting them. Concretely, they facilitate access to public funding programs, foster research and development collaborations with academia, support investments in production facilities, promote the development of well-connected commercial areas, streamline application processes for manufacturing sites, ensure proximity to suppliers, and enable the amplification of SMEs' voices within the industry.

The European Cluster Collaboration Platform mainly aims at helping existing clusters but does not provide the **structured support to set up new clusters or incorporate new**

⁵⁸ COM(2022) 31 final

⁵⁹ The recently revised Renewable Energy Directive (Art. 20a) has introduced some general principles requiring vehicle manufacturers to provide access to basic battery data. The identification of a common standard for the format/frequency of these battery data is going to be addressed in the proposal on Access to Vehicle Data, Functions and Resources in the context of the Type Approval Regulation.

companies into existing clusters specialized in broader or related topics (e.g. light mobility, battery production, raw material expertise).

The stakeholders acknowledged the **significance of industrial alliances and partnerships**, which have emerged as a new format of institutionalised collaboration between the political level, industry, research, academia, employer associations, trade unions, and civil society (e. g. consumer or environmental organisations). They focus on maximising the **synergies across the sectors, reduce the cost and accelerate the twin transition**. An example for such an institutionalised and cross-sectoral collaboration format is the Strategic Dialogue for the Automotive Sector in Baden-Württemberg⁶⁰.

Public-private collaboration has taken different forms depending on the objective and the nature of the organization platform. There are **research and innovation partnerships under Horizon Europe** like the Connected Cooperative and Automated Mobility (CCAM), the Joint Undertakings for clean hydrogen and Europe’s Rail, Chips, Zero Emission Waterborne Transport, 2ZERO⁶¹ or Batt4EU⁶², **skills alliances** like ASA⁶³ or STAFFER⁶⁴; or **industrial alliances** to coordinate the work between the industry and the administration like the European Battery Alliance or the European Clean Hydrogen Alliance. Another form of public-private partnership is that of **multistakeholder cooperatives** particularly in public transport sector, meaning that all the concerned stakeholders, such as workers, users and the community (i.e. municipalities, regions, national level public authorities etc..), contribute jointly to the capital and to the governance. This are some examples of the multiple cooperation frameworks that could help the twin transition and enhance the resilience of the mobility ecosystem⁶⁵.

Nonetheless, there remain a few areas with potential for further cross-sectoral collaboration, for instance between the **energy operators, suppliers, regulators, energy management companies, e-mobility service providers, automotive/battery manufacturers, digital technology providers, public authorities and consumer and standardisation organisations**. The deployment of **vehicle2grid technology** and **data-driven service economy** are examples of areas with potential for cooperation.

Topic 7: Private-public governance		
Actions	Actors	Timeframe
7.1. Governance and collaboration		
Map and clarify the role of existing partnerships and alliances relevant for the mobility ecosystem	EU/MS/Industry	S

⁶⁰ <https://stm.baden-wuerttemberg.de/de/themen/unsere-strategiedialoge/strategiedialog-automobilwirtschaft/>; https://stm.baden-wuerttemberg.de/fileadmin/redaktion/dateien/PDF/SDA_BW/221116_SDA_Fifth-progress_report_October-2022_EN_Web.pdf;

<https://sda.e-mobilbw.de/en/projects>

⁶¹ Partnership Towards Zero Emission Road Transport

⁶² Partnership on research and innovation in the field of battery technology.

⁶³ Automotive Skills Alliance

⁶⁴ Skill Training Alliance For the Future European Rail system

⁶⁵ The European Mobility Week, with more towns and cities joining every year, and with its huge media appeal, is yet another opportunity of collaboration between public and private entities to promote behavioural change in favour of active mobility, public transport, and other clean, intelligent transport solutions. <https://mobilityweek.eu/home/>

Provide support through the European Cluster Collaboration Platform, to set up new clusters or incorporate new companies into existing clusters specialized in broader or related topics	EU/MS	S/M
Review the structure and the results delivered by the already existing clusters in line with global technological and industrial developments	Industry/MS	S
Identify new areas where a collaboration between different players is needed to speed up the twin transition and enhance resilience (e.g. mobility industry and grid operators or infrastructure managers)	Industry	S
Support cross-sectoral initiatives on intermodality.	EU/MS/Industry	M

3) SOCIAL DIMENSION

The discussions confirmed that the twin transition has important implications for certain regions, industries, workers, households, consumers and society, and that they require to be addressed based on the principles of fairness and solidarity set out by the European Green Deal and the Sustainable and Smart Mobility Strategy.

The stakeholders confirmed that the main social challenge for the mobility ecosystem is the **scale of adaptation affecting current jobs⁶⁶ and production processes within companies introduced by the green and digital transition**, as well as by international competition. The ecosystem is also marked by an **ageing workforce**: in the automotive industry, 25% of the workforce is over 50 years old. In the rail supply industry, around 30% of the workforce is expected to retire in the next 10 years, while for the shipbuilding industry this percentage is around 40% of the workforce. As a result, many jobs and businesses, especially within SMEs, may face shortages in the years ahead, and require targeted support measures⁶⁷.

Geographically, the social risks of the mobility ecosystem transition are also not evenly distributed. Risks are far more acute for **geographical areas with higher levels of concentration** of a certain economic activity. The automotive sector in some Member States is a major employer representing around 15% of all national industrial jobs, and at the regional level the concentration is even starker. Peripheral and maritime regions are also highly dependent on the maritime industries. Failing to adapt and ease the transition could put at risk not only the specific industry, but entire local economies.

There is a widespread concern among stakeholders that jobs in the mobility ecosystem are perceived as **unattractive** by young engineers and skilled workers. This is compounded with the fact that females are underrepresented in most of the industries of the mobility ecosystem

⁶⁶ At the same time, the EV charging point operators, for instance, expect to add 15,000 new jobs every year through 2030. A +268% employment growth between 2022 and 2030. Source ChargeUp Europe.

⁶⁷ See in particular the Council Recommendation of 16 June 2022 on ensuring a fair transition towards climate neutrality, 2022/C 243/04, and the Staff Working Document accompanying the proposal for a ensuring a fair transition towards climate neutrality, COM(2021) 801 and SWD(2021) 452 of 14 December 2021.

(below 22% in the case of transport services, shipbuilding, rail supply and automotive manufacturing).

The stakeholders nevertheless pointed out that **precarious work has been proportionally less prevalent** in the mobility ecosystem despite cases of social dumping and problematic subcontracting in parts of the mobility ecosystem⁶⁸. It is also an ecosystem that provides **access to the labour market for disadvantaged groups, including workers with a migration background**, who represent an increasing share of the workforce in these industries. As an example, the integration of skilled Ukrainian refugees into the sectors has been a key development, particularly in Central and Eastern Europe.

Despite the possible changes brought about by robotics and automation, some parts of the ecosystem will still include labour intensive activities due to the complexity of products manufactured and the level of personalisation required, especially in the shipbuilding and rail supply industries. The introduction of new technologies, automation, digital twins or the “internet of things” is expected to replace some of the riskiest, most repetitive or lowest value-added jobs. The shift to intermodality, e-commerce logistics and mobility as a service will also create new job opportunities within the ecosystem, although according to certain stakeholders some of these **new business models** have shown **poorer performance** when it comes to the provision of **adequate working conditions and wages**.

The stakeholders pointed out that the strong historical culture of organising, negotiating, and managing change within traditional manufacturing and the transport sector are the biggest assets of the ecosystem. **Social dialogue, collective bargaining** and ensuring workers’ **participation** in the definition and implementation of the industrial transformation are considered important. However, geographical discrepancies remain, with social dialogue not working effectively in all EU Member States, with very tangible differences among Member States even within the same manufacturing company. In those Member States where social dialogue is not working effectively, workers representatives indicate there is often **resistance to negotiate or engage with workers on topics such as corporate or industrial strategies, including decarbonisation and just transition strategies when relevant**.

The Just Transition Fund criteria for the selection of eligible territories (territorial just transition plans⁶⁹) is mostly based on fossil fuel production areas and those with high greenhouse gas emissions industries. The regional roundtable, and more particularly automotive regions, asked for the creation of a **Just Transition Fund 2.0** for the workers and regions that are most affected by the twin transition to bridge possible funding gaps.

A common and clear diagnosis and a mapping exercise is a prerequisite to adopt well-adapted measures to coordinate policy action following a whole-of-economy approach. Therefore, the availability of **data metrics and the strengthening of evidence-based methodologies are key to monitor the situation and intervene efficiently**, having comparable data stemming from the main transition regions with special focus given on the impact of transformation on local and regional economies (e.g. GDP, employment, tax revenues). EU better regulation tools have a key role to play in monitoring the social and employment impact

⁶⁸ As an example of social dumping in the road transport sector, see the Popescu vs Essers case in Belgium, <https://www.rechtbanken-tribunaux.be/sites/default/files/media/ahct/antwerpen/files/2021ah125.pdf>

⁶⁹ Territorial just transition plans define the territories in which the Just Transition Fund will be used. The identification of these territories is carried out through a dialogue with the Commission. These plans set out the challenges in each territory, as well as the development needs and objectives to be met by 2030. They identify the types of operations envisaged and specify governance mechanisms.

of new legislation and to propose corrective measures when needed. Under the regulation setting CO2 standards for cars and vans⁷⁰, the European Commission is required to publish by the end of 2025 a progress report that should monitor and assess the need for possible additional measures to facilitate a just transition, including through financial means.

Topic 8: Just transition		
Actions	Actors	Timeframe
8.1. Social Dialogue		
Communicate and regularly inform the public about the impacts, risks and opportunities linked to the transition, to reduce existing uncertainties, and help stakeholders embrace the transformation and take action to adapt	Social partners/Industry/MS/EU	S/M
Address the challenges of the transition through Social Dialogue (including the European Works Councils) with specific dialogues/working groups – at sectoral, company and regional levels - aimed at collectively defining and implementing the necessary actions for an effective and just twin transition	Social partners	S
Incentivise transition projects that contribute to the involvement of workers and their representatives, for instance through socially responsible public procurement practices making use of social award criteria	MS	S
Continue to support sectoral social dialogue at European level	Social partners/MS/EU	S/M
Ensure relevant laws and guidelines are properly implemented (mainly the ILO Fundamental Principles and Rights at Work, Council recommendations on social dialogue, on fair transition, and Commission Recommendation [C(2023) 8067] on means to address the impact of automation and digitalisation on the transport workforce)	Social partners/MS/EU	S
8.2. Regional Transition		
Contribute to the development of a common monitoring data dashboard for all regions affected by the twin transition, to measure the impacts and ensure the updated data is available (measure changes in the value chain,	Industry/MS/Regions/EU	S

⁷⁰ See Recital 16 and Article 15 of Regulation (EU) 2019/631 as recently amended by Regulation (EU) 2023/851

employment, GDP or tax revenues in the regions...).		
Develop, with all relevant stakeholders (regional authorities, business owners, workers, academia and citizens), regional transition strategy for the mobility ecosystems.	Industry/MS/Regions	S/M

Affordability

The stakeholders concurred that the affordability of mobility has an important social dimension. Over the course of the last decade, there has been a significant increase in the **cost of vehicle ownership**, with energy, fuel and vehicle prices primarily driving this trend. For cars, the price surge can be partially attributed to the lower availability and transformation of small cars segments. As a result, some consumers have been compelled to hold onto their old vehicles longer, thus delaying the necessary transition of the mobility ecosystem. The stakeholders recalled that this situation nevertheless presents an opportunity for the automotive industry and that measures must be taken to ensure **access and availability of quality sustainable mobility options, including reasonably priced zero-emission vehicles**, for both consumers and fleet operators. In addition, strengthening public transport must complement initiatives to make mobility affordable to all.

Topic 9: Affordability		
Actions	Actors	Timeframe
9.1. Affordable mobility		
Accelerate the development of more affordable, more efficient and light weight EV car models	Industry	S
Develop affordable shared mobility solutions	Industry/MS	S/M
Consider the extension of EV subsidies to second-hand and leasing vehicles	MS	S
Support the further development of mobility as a service	Industry/MS/EU	S/M
Consider reduced VAT on bikes sales, repairs and renting, to promote its uptake ⁷¹	MS	S/M
Promote long term rental, sharing, second-hand market and leasing for bikes and e-bikes	Industry/MS	S

Health and safety

⁷¹ VAT rates must be in line with the VAT Directive see Article 98(2) of the VAT Directive and Annex III.

The stakeholders shared the view that the twin transition will introduce **new occupational risks, related to health and safety**. New technologies such as ammonia or methanol in the maritime sector, or batteries in the automotive sector could potentially expose workers and consumers to toxic chemicals, fire risks from batteries or an electrocution hazard for the automotive maintenance sector. These new risks have been taken into account in the context of the strategic framework on health and safety at work 2021-2027⁷². Furthermore, the increased levels of automation, connectivity and data sharing brought by the digital transition will bring into question the prevalent algorithms applicable to traffic circulation and will require the ecosystem to put a stronger emphasis on **cybersecurity and data protection measures**.

Topic 10: Safety and Health		
Actions	Actors	Timeframe
10.1. Health and safety protocols		
Identify and foresee safety gaps in protocols and standards and introduce the necessary adaptations protocols ahead of the use of new technologies (battery repairs and handling, alternative fuels at ports, ...)	Industry/Unions/MS/EU	S
Reskill workers with the latest health and safety protocols and standards before handling new technologies. Ensure they get accredited, and the accreditation is recognised in every Member State	Social partners/Industry/MS/EU	S
Improve occupational health and safety to attract and retain skilled workers in the sector ⁷³	Social partners/Industry/MS	M/L
Ensure the correct implementation of data protection and cybersecurity in the mobility ecosystem	Industry/MS/EU	S
Ensure the protection of Vulnerable Road Users - such as cyclists and pedestrians, as well as users of powered two-wheelers - in technological deployment of those vehicles that are not covered by EU type approval framework	Industry/MS/EU	S

4) SKILLS

Human capital and its know-how, skills, and expertise are essential for the performance and competitiveness of businesses. They ensure the quality of the production and drive innovation and continuous improvement and adaptation of business processes. Therefore, comprehensive and targeted strategies and actions that **effectively reskill and upskill workers**, with special focus on those most impacted by the twin transition, including people

⁷² COM(2021) 323 final

⁷³ For example: workers of the metal industry are exposed to physical as well as psychosocial risks that lead to long term sick-leave and premature retirements

in vulnerable situations, **should represent a central element in the transformation of the industry** and its resilience.

The stakeholders recalled that the **lack of skilled workers, together with a decreasing attractiveness of the sector**, is already a challenge in parts of the mobility ecosystem, with **large-scale skills gaps** exacerbated by **skilled workers' geographical imbalances**. Skilled profiles in advanced technologies are scarce, with the mobility ecosystem facing strong competition by more mission-driven industries (e.g. renewables, big tech), higher income sectors (finance) and even self-employment, all of which attract some of the most valuable and needed engineering profiles. Moreover, highly-skilled workers also tend to be very mobile, and the competition for candidates is thus global.

The scale of the challenge of adapting the mobility workforce to the skills needed for the transition is considerable. In the passenger car industry alone, it is estimated that 2.4 million automotive workers will need to be retrained or upskilled by 2030⁷⁴. According to the European Battery Academy there is an estimated need for 800,000 skilled workers in the battery sector and as regards shipbuilding and maritime equipment, the Pact for Skills dedicated large-scale partnership estimated that there is a need for 234,000 new entrants in the sector by 2030.

The Automotive Skills Alliance (ASA) was one of the first partnerships organised within the Pact for Skills for the area of automotive and mobility and is the pioneering one up to now. It represents broad coalition of industry, education and regional stakeholders, including social partners. ASA represents a clear and coordinated movement in the skills agenda in the mobility ecosystem. It is crucial that the projects, initiatives and commitments undertaken under ASA are fully implemented.

To effectively pursue this endeavour the stakeholders argued that the industry might also need to **overcome some social barriers and cultural attitudes towards vocational training, and life-long learning** and ensure that the workforce is engaged and has enough capacity, opportunity and support to develop these skills and learn new techniques. The **average age** and **skill sets** of the workforce make re- and up-skilling particularly challenging, especially for SMEs.

Stakeholders agreed that in some countries **few workers have an effective access to Vocational Education and Training (VET)**. Reasons for this deficit include insufficient disposable income, lack of competence awareness, and in some cases company inadequate support or scarce VET providers.

In consequence, in those Member States it is equally important to first **reverse the decline of companies engaged in VET**. VET providers may themselves experience skills gaps, that could be limited if their links with industry were strengthened.

Jobs in the mobility ecosystem will increasingly require digital skills, from basic to complex: **IT/software experts, data analysts, and programming experts**. Digital expertise is also crucial in the production and operation of electric vehicles as well as the rest of the e-mobility value chain. For the rail supply industry, **engineering, cloud-based signalling, cybersecurity, and virtual reality simulators** are important skills needed. For the railway

⁷⁴ BCG study for the Platform for Electro-Mobility (2021) <https://web-assets.bcg.com/82/0a/17e745504e46b5981b74fadba825/is-e-mobility-a-green-boost.pdf>

operating community Information and Communications Technology (**ICT**) **skills, interoperability skills, and foreign languages** are also key.

Every retraining is an investment for both the employee and the employer and therefore there has to be a return on this investment for both. **Ensuring a solid business case for retraining schemes** requires **market-adaptation** and **adjustment to the employees' needs and capabilities**. Market adaptation is developed through **skills intelligence**, by continuously monitoring the market, identifying current gaps, anticipating future needs and developing agile and effective strategies to help adapt business models, the workforce and future employees. For market-adapted curricula **links between the mobility ecosystem and educational institutions and training providers will need to be reinforced** in some countries to reach a more integrated approach.

Career guidance could help employees identify their vocation and abilities, including prior learning and experience that can be recognised and validated. This guidance should focus on **the development of the workers' awareness regarding job options and training opportunities**, the identification of possible skills gaps and job upgradability prospects and advise on the available resources to build a successful career. Career guidance can be provided by private companies but also by public employment services.

Finally, a more **standardised, modular and transparent recognition of skills** would ease the burden and strengthen the confidence of businesses during the hiring process as well as increase the prospects of getting a job (or a better job) for the workers.

The industry can also develop strategies to improve the attractiveness of the jobs they propose, the transmission of knowledge and the retention of talent. **Maintaining good working conditions and job quality, and reinforcing the storytelling and the mission-driven narrative of the ecosystem**, with a long-term strategy that targets potential future employees at an early stage of education as well as follow-up actions at higher levels of education and training. The industry also needs to **counter some stereotypes to improve the participation of women in the mobility ecosystem**.

The stakeholders recalled that developing **internal training for current staff** and comprehensive **career plans** can raise attractiveness of the job, help improve retention and overall capabilities of the workforce. Reducing siloed workstreams, improving the exchange between workers and different actors of the value chain, engaging the ageing workforce in training activities or provide the workforce with long-term contracts that encourage them to invest in learning are part of the toolset necessary to guarantee the availability of an adequate workforce in the transition.

Clusters play a significant role in contributing to the skilling of the labour force in the mobility ecosystem. Clusters collaborate with stakeholders such as universities, workforce development agencies, and industry partners to expand the talent pool. By working together, they identify the skills needed in emerging industries and develop programmes to address those needs. Clusters help build a diverse talent pipeline by creating opportunities for all groups. They establish industry-led programmes that focus on developing the skills that employers demand. Clusters actively participate in curriculum design to ensure that the skills being taught are aligned with industry needs. They also provide mentorship opportunities to individuals, offering guidance and support as they develop their skills, and facilitate meaningful paid traineeships, allowing individuals to gain practical experience in their chosen field.

Some of these initiatives are costly, requiring time and resources to develop, and SMEs often have limited capacities to upskill and reskill their workforce. It is therefore essential to **provide, where necessary the financial support, the pooling of resources and the power of network**, to help them evolve at the same pace as the entire ecosystem.

Therefore, in stakeholders' views the transition of the mobility ecosystem and its workforce needs to be a collective endeavour. Collaboration is required through meaningful, effective and reinforced social dialogue and collaborative initiatives, looking for synergies within the ecosystem and even with other industrial ecosystems to facilitate the transition to a more sustainable, resilient and fair industrial Europe.

Topic 11: Future of the working force		
Actions	Actors	Timeframe
11.1. Skills		
Develop a continuous mapping of skills needs and shortages in the labour force, as well as skills intelligence including within the existing partnerships	Social partners/ Industry/MS	S/M/L
Ensure the availability of suitable VET providers for the mobility ecosystem twin transition	MS	M
Address the challenges and barriers related with the slow process of change/adaptation of curricula at VET and university level. Support a more agile and labour market oriented approach to educational and training institutions	MS	M/L
Reinforce coordination between the ongoing initiatives: the Pact for Skills and its different Large-Scale Partnerships (LSP), such as the Automotive Skills Alliance (ASA), the European Battery Alliance Academy (EBAA), the Net Zero Industry Academies, Centers of Vocational Excellence, and other cluster programmes on skills, to maximise their positive impact for the industry	VET providers/Academia/MS/EU	S
Develop follow-up actions to skill programmes for the rail industry (STAFFER)	VET providers/Academia/ Industry	S
Create a Cycling sectoral skills alliance, aiming to facilitate the transition of jobs into cycling manufacturing	Social partners/Industry/MS/EU	S/M
Promote the transparency of qualification requirements at European level. Reinforce mutual acceptance of the skills and competences	Social partners/Industry/MS/EU	M
Develop labour transition plans, especially for workers in the automotive sector to transition towards other adjacent sectors	Social partners/Industry	M

Raise awareness on how specific training programmes will contribute to personal development. Help identify skills gaps and job upgradability options. Advise on the available resources to build a successful career	Social partners/Industry/MS	S/M
Promote the creation of stronger ties between the mobility ecosystem and education and training institutions	Industry/MS/EU	M

11.2. Attractiveness

Initiate communication campaigns to highlight the mobility ecosystem commitment to sustainability and innovation	Social partners/Industry	S/M
Test different communication strategies and share best practices with the ecosystem	Industry	M
Improve working conditions, work environment and the quality of work to attract talent to the mobility ecosystem	Industry/Social partners	M
Promote the image of the sector through campaigns and events to increase its attractiveness in the long term. Develop campaigns especially for youth and women (e.g. social media, events at schools, site visits etc.)	Social partners/Industry	S/M

5) R&I AND TECHNOLOGICAL SOLUTIONS

Research, innovation and the development of new technologies, ICT tools, mobility solutions and efficient business models are key components of the green and digital transition and impact the overall competitiveness of the mobility ecosystem.

In these fields the EU remains strongly committed and has been taking a number of actions such as the adoption of **Horizon Europe**⁷⁵ and **Digital Europe**⁷⁶ funding programmes as well as initiatives like the **New European Innovation Agenda**⁷⁷, the **Data Act**⁷⁸ and the **common European mobility data space**⁷⁹.

Each segment in the mobility ecosystem has its particularities regarding trends, innovation, technological pathways, new techniques and business models. Nonetheless some actions can help reinforce the entire ecosystem.

The integration of data from different areas and businesses could, for example, help leverage the value of aggregated data, while improving products and generating business opportunities to the entire ecosystem.

Topic 12: Cross sectoral innovation		
Actions	Actors	Timeframe
12.1. Research and innovation in the mobility ecosystem		
Support the creation and successful implementation of the common European mobility data space	Industry/MS/EU	M
Promote broader demonstrations with a strong focus on technological readiness, assessing the social acceptance of new technologies and innovations ⁸⁰	Industry/MS/EU	S
Ease the conditions to obtain authorizations for experiments in operational environments. Ensure that the public and local	MS/EU	S

⁷⁵ Regulation (EU) 2021/695 establishing Horizon Europe — the framework programme for research and innovation, laying down its rules for participation and dissemination

⁷⁶ Regulation (EU) 2021/694 establishing the Digital Europe Programme

⁷⁷ COM(2022) 332 final

⁷⁸ Regulation (EU) 2023/2854 of the European Parliament and of the Council of 13 December 2023 on harmonised rules on fair access to and use of data and amending Regulation (EU) 2017/2394 and Directive (EU) 2020/1828 (Data Act)

⁷⁹ COM(2023) 751 final

⁸⁰ Example: the EIT Urban Mobility model is to have short and agile projects (six months to one year) that start from the specific need of a city. EIT Urban Mobility facilitates cooperation for testing and technology adoption by launching an open call for solutions. During six months the city works closely with the technology provider for piloting and demonstration. The focus here is on high Technology Readiness Level (TRL) solutions. Starting from very precise needs the local authority has for technology deployment. Examples from the 12 cities involved in the RAPTOR 2023 call: Den Haag wants to improve the journey to the beach to reduce congestion, Barcelona needs support for their city logistics operations to become more data driven, Munich needs more data to research new mobility patterns in the city and Helsingborg was in need of establishing a bicycle culture. You test what works or not on specific examples before scaling up.

governance play their role in terms of adoption of innovative technologies		
Accelerate the implementation of the recently adopted targets regarding the development of a European Hydrogen economy. This should provide a significant contribution in decarbonizing the mobility ecosystem during the manufacturing phase, and the use phase of maritime, rail or road transport	Industry/MS/EU	M
Develop a Mobility industrial technology roadmap ⁸¹ in the context of the European Research Area strategy	Industry/MS/EU	S
Promote cross-sectoral partnerships between industries that encourage the exchange of experience and expertise, easing the technical and technological transfer from industry to industry ⁸² (within the mobility ecosystem but also with other ecosystems and industries)	Industry	M

Automotive industry

The stakeholders recalled that electrification, new sustainable modes of transport, increased connectivity and an increased role of software and data sharing are all shaping how businesses and consumers will operate and behave in the future. With an **accelerated transition from ownership to usage**, business models such as **on-demand mobility** and **vehicle as a service** are transitioning the **asset ownership from private to corporate**. The sale distribution model is also changing with new brands opting for direct sales to consumers with an eCommerce approach. Additional services never explored before may appear with new patterns of mobility and increased data gathering like “**pay-how-you-drive**” and “**pay-when-you-drive**” **insurance** plans for car owners or usage-based products. The increased ownership of electric vehicles assets under single mobility providers also opens the door to alternative revenue streams with fleet management and **vehicle to grid technology**.

Data and particularly data-driven innovation are becoming increasingly important. The use of data across the entire value chain and life cycle of the vehicle, could have multiple benefits: it could, for example, **increase awareness of value chain constraints and performance**, allow the **optimization of processes and logistics**, carry out **predictive maintenance** with digital twins, provide **transparency and control at the end-of-life of the vehicles** or **create additional value for other sectors** like utility companies and retailers. Despite this significant potential, stakeholders believe that the current data landscape in the automotive value chain is highly complex, fragmented, and lacks sufficient transparency and interoperability.

The stakeholders emphasised that some of the biggest technological gaps in the sector mainly regard the **battery technology for electric vehicles**. Accordingly, Chinese manufacturers

⁸¹ The Industrial Technology Roadmaps are a core action in the new European Research Area strategy. They are a tool brought forward by the Commission to accelerate transfer of research and innovation results into the market for the green and digital transformation of industries across the EU. The roadmaps address the way forward for research and innovation in the industry in key areas at European and national level, with a particular focus on closing the innovation divide between EU countries and better valorising research and innovation results.

⁸² For example: the bicycle industry suggested the opportunity of learning from the automotive sector expertise on lean manufacturing techniques and mass scaling of the manufacturing process.

currently dominate the technology controlling **more than 60% of the production across the value chain** (from materials, components to final assembly of the modules). Also, the mainstream battery technology still relies on scarce and very geographically concentrated raw materials. Therefore, further **research and development in battery manufacturing methods, alternative battery composition and battery recycling** is necessary for a resilient and competitive EV industry.

Beyond battery technology, industrial investment in sustainable vehicle technology and energy carriers such as **hydrogen fuel cells** could reduce the over-reliance on a single technology.

The stakeholders have reminded that more effort is needed for the European industry to increase the scale of **software platform development for vehicles**, and avoid the risk of dependency from the Big Techs, in a context where software is playing an ever bigger role in consumers purchasing choices. **Autonomous readiness** should also be a key feature of future vehicle fleets, even when machine learning and AI models for autonomous driving are still far from ready for full adoption. **Securing the hardware technological readiness** would preserve the value of existing assets in the road, but more importantly will give the necessary means to collect and process real data for training and simulation of the AI models at scale, an indispensable step to achieve full self-driving capabilities. Reinforcing the EU semiconductor value chain is essential to secure supplies for the industry and enable its digitalisation and decarbonisation. Nowadays, the use of digital twins and metaverse for virtual testing with real data gathered in the roads, is already a mean for easing technology transfers and reducing the number of kilometres needed to test a new technology.

Another field of research and innovation is on the interaction between vehicles and the grid, further developments in the vehicle2grid technology, grid infrastructure and management systems need to be accomplished to tap the full potential of the batteries of vehicles.

Finally, around **60% of Europeans live outside big cities**. Sustainable rural mobility is an increasing challenge. Stakeholders believe that sharing a car between small villages, and other innovative road mobility services can significantly increase the connection between regions, but today this type of service are very poorly developed at village level.

Topic 13: Automotive innovation		
Actions	Actors	Timeframe
13.1. Research in automotive industry		
Support investments in R&D to develop new technologies that can reduce substantially the need of processing critical raw materials or even replace critical inputs with alternatives	Industry/MS/EU	S/M/L
Accelerate investments for the recycling of batteries and fuel-cells to recover strategic raw materials, in line with the targets of the Critical Raw Material Act	Industry/MS/EU	M/L
Contribute to the development of a stronger software-defined vehicle ecosystem by collaborating on non-differentiating software development.	Industry	M

13.2 New techniques and business models

Develop and share best practices on new business opportunities and efficiencies brought by the European mobility and industrial manufacturing data spaces	Industry	M
Work on the development and testing of fleet to grid management system and business models	Industry	M
Test and explore innovative models of mobility for rural areas.	Industry/MS	M

Waterborne industry

The role of the **Blue Economy** in making use of the resources of the ocean in a sustainable way from aquaculture to renewable energy or marine ecosystem services is increasing. The new economic activities in this area require **highly specialized vessels, innovative technologies and equipment**. This constitutes an important opportunity for the European industry, which remains a **global leader in complex shipbuilding and in advanced maritime equipment manufacturing**.

The maritime sector is involved in a complete transformation especially focusing on the **production and integration of innovative zero-emission, air pollution control, noise reduction, sustainable, digital, and automated/autonomous technologies** as the cornerstones of the industry's global competitiveness.

According to the stakeholders, there are **limited series effects** in the industry, as almost every ship, particularly the complex ships built in Europe, can be considered as a prototype designed according to the specific needs of the shipowners. The introduction of **advanced digital models and simulation** opens the floor for cheaper and less risky prototyping. Nevertheless, for market uptake, the **sea trial stage is mandatory** to convince shipowners and customers of performances and reliability at sea.

The high customisation level of many ships also represents an extremely challenging production environment in which innovative companies have started to integrate **flexible collaborative robotisation** (cobots⁸³) for the development of new manufacturing processes that reduce construction time and costs and enhance efficiencies.

The technological complexity linked to the diversification of ship types and ship trades increases with the adoption of the 2023 IMO Strategy on Reduction of GHG Emissions from Ships and the EU's FuelEU Maritime Initiative⁸⁴. Several fuels are likely to be used depending on the applications and operational models of the ships since there is **no specific fuel technology meeting all the economical, safety, environmental and operational**

⁸³ A cobot, or collaborative robot, is a robot intended for direct human-robot interaction within a shared space, or where humans and robots are in close proximity. Cobot applications contrast with traditional industrial robot applications in which robots are isolated from human contact. Cobot safety may rely on lightweight construction materials, rounded edges, and inherent limitation of speed and force, or on sensors and software that ensure a safe behavior.

⁸⁴ Regulation (EU) 2023/1805 of the European Parliament and of the Council of 13 September 2023 on the use of renewable and low-carbon fuels in maritime transport, and amending Directive 2009/16/EC

constraints. Therefore, **fuel flexibility** becomes essential, several fuels will serve different purposes, according to their end use in maritime application and their availability and cost.

The stakeholders recalled that ships are characterized by long lifespans (typically 30 years and even 80 years for inland boats, over 50 years for recreational boats). It also means the new designs of today will still be there in 2050. Currently, the world fleet of ocean going vessels alone comprises 108,155 ships (100+ GT)⁸⁵. Retrofitting will therefore remain an important activity to speed up the deployment of low emissions ships and to use rationally the existing assets in addition to the necessary R&I investments needed for new vessels. This implies **modular ship design and manufacturing open for retrofit and improvement of the performance**, but also **a life cycle approach from the design to the recycling**. The waterborne sector will also need to become circular, and recyclability will be important in view of competition for raw materials and the need to improve the environment.

Another important line of innovation in the sector is through the **digitalisation of ship and ship systems**. Some technologies are a **pre-requisite** to achieve valuable digitalisation, such as **connectivity between ships and ships/shore, cybersecurity, reference digital infrastructure and common standards to share data**. The lack of digital standards is a specific risk that the industry is facing.

Fully autonomous or remotely operated ships require validated technological solutions. **National and European virtual and physical test beds** are and will be critical to test at large-scale digital technologies applied in operational conditions. Both China and South Korea aim for global leadership in digital solutions for the maritime sector and have foreseen state subsidies to implement their goal. The industry believes that a **maritime digital transformation partnership** would help address some maritime specific aspects not covered by Horizon Europe programme cluster 4⁸⁶ such as, underwater drones, surface drones, autonomous ships for inland, coastal, offshore activities and short sea shipping and communication systems between autonomous ships and shore/authorities.

According to the stakeholders, the maritime technology industry should also exploit **synergies between commercial and naval segments**, either by leveraging on know-how cross-fertilisation between both segments, or by supplying maritime equipment to different sectors. This cross-fertilisation is a key feature of the European maritime technology industry.

Finally, it is worth underlying the track record of cruise ships in terms of research, development, and innovation while, at the same time, emphasizing that Europe will need the contribution of all ship types to make the twin transition of its waterborne industry a success.

Topic 14: Waterborne innovation		
Actions	Actors	Timeframe

14.1. Research in waterborne industry

⁸⁵ Clarkson Research Services Limited, World Fleet Monitor - December 2023 Issue <https://sin.clarksons.net/>

⁸⁶ Cluster 4 of the Horizon Europe programme is focused on building a competitive, digital, low-carbon and circular industry to ensure sustainable supply of raw materials, develop advanced materials and provide the basis for advances and innovation in global challenges to society.

Create further national and European virtual and physical test beds to test at large-scale digital technologies applied in operational conditions for new waterborne designs and technologies	Industry/MS/EU	M
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14.2. New techniques and business models

Promote and support the creation of a developed market and businesses on the retrofitting of long-life ships assets	Industry/MS/EU	L
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Rail supply industry

With the twin transition, rail mobility has benefited from a renewed interest, especially for middle & long-distance travels. This is due to its status of green mode of transport.

The main focus of the rail supply industry should be the **digital transformation**, enabling much greater levels of system optimisation, resilience and reliability. However, its impact has been limited by the very long asset life of rail (leading to slow incorporation of new technologies) and the need to interface digital solutions with legacy systems which are different in each national railway system. Much progress has been made in recent years in harmonising standards for technologies and processes, but the new digital technologies still need to be widely implemented before their benefits are realised. The **switch from condition-based maintenance to predictive maintenance** has however already allowed significant benefits. According to stakeholders, the digitalisation of rail freight (e.g. through Digital Automated Coupling) will increase the reliability and flexibility of the sector, through the optimisation of overall transport time. As a result, the average speed for rail freight operations can be increased and the handling and set up times be reduced at marshalling yards and in terminals.

To accelerate the transition and ease the dissemination of new technologies and tap into its full potential, the stakeholders argued that more focus could be placed on the most operational matters, such as the **full implementation of the European signalling and train protection system (European Rail Traffic Management System (ERTMS))** including Automatic Train Operation (ATO) and rapid deployment of the linked 5G-based rail telecommunications system (**Future Rail Mobility Communication System – FRMCS**), and the **Digital Automated Coupling (DAC)** for freight.

Rail would also benefit from circular economy practices such as retrofitting, trains end-of-life management and recycling.

Topic 15: Rail innovation		
Actions	Actors	Timeframe
15.1. Research in rail industry		
Support fast deployment of the new European rail technologies delivered by European rail research programmes	Industry/MS/EU	S/M
Promote further synergies between Europe's Rail Joint Undertaking and other Joint Undertakings that already exist	Industry/MS/EU	S/M

15.2. New techniques and business models

Promote and support the creation of new businesses and a developed market for the retrofitting of long-life train assets

Industry/MS/EU

L

Bicycle industry

There are increasing synergies and parallel developments in R&D between the bicycle and automotive industries. Therefore, many of the innovation action points outlined above for the automotive industry also apply to the bicycle industry. In addition, the bicycle industry's innovation thrives thanks to the numerous SMEs and benefits from transfers of technological knowledge from other sectors, for example from the automotive industry in relation to automation of assembly lines, electronic, electric or data acquisition, and from the military and aeronautical industries for material composites. The bike industry also largely depends on scarce raw materials and it is essential that the sector increases R&I investments in R&I recycling and recovering parts.

In the last years, there has been an increase in the variety of options and business models in the sector, from **subscription models to ride-sharing schemes or the introduction of public bicycles as part of the public transport infrastructure**. The market has also experienced the popularization of new bike models, induced by the electrification of light vehicles, with a plethora of cargo bike designs and fast electric bikes. This development has helped to solve part of the problems with last mile trips and deliveries and has allowed municipalities to amplify their offer and cover some areas that were underserved by the traditional public transport network.

The digital transition in the bicycle sector will mainly impact the industry on the efficiency of its operations at the production stage with the introduction of **smart value chains or robotization**, and the **management of ride-sharing fleets**. The product itself is also impacted with some connectivity capabilities and features but the overall complexity of this developments compared to other sectors is minor.

Topic 16: Bike innovation

Actions

Actors

Timeframe

16.1. Research in bike industry

Develop smart value chains and share best practices emerging from the European mobility and industrial manufacturing data spaces

Industry

S/M

16.2. New techniques and business models

Further develop bike sharing fleets, bike subscription based or leasing services, refurbishment of bikes

Industry

S/M

6) INFRASTRUCTURE

The EU mobility ecosystem depends on modern, innovative, efficient and reliable infrastructures. As the ongoing transition is rapidly reshaping the traditional transport paradigm, it is essential to ensure that the European road, inland waterway, maritime, rail, and cycling infrastructures are deployed in parallel. This includes the urban dimension and its transition towards smart and sustainable delivery of urban mobility solutions. The EU's ageing transport infrastructure needs to be prepared for enabling cleaner and smarter operations. Therefore, it is important to strengthen the resilience of transport infrastructure to climate change impacts, by increasing its adaptation capacity and its efficiency, and reducing its vulnerabilities and at the same time improving safety across various modes of transport. It is also important that the infrastructure put in place relies on clean and decarbonised energy sources, notably renewable energy, as well as on a modernised grid to ensure achieving the decarbonisation of the transport sector in line with the European Green Deal. In this context it is important to emphasize the role of digital modeling technologies, data-centered modeling and simulation technologies such as Building Information Modelling (BIM) and digital twins enable to calculate the carbon footprint of infrastructure projects and optimize the design and choice of material to reduce this footprint.

Automotive industry

Stakeholders support the EU policy framework aimed at putting in place recharging and refuelling stations for alternative fuels in view of decarbonising the transport sector. In this context, the **Alternative Fuels Infrastructure Regulation (AFIR)**⁸⁷ sets mandatory deployment targets for publicly accessible electric recharging and hydrogen refuelling infrastructure and mandates price transparency and the availability of electronic payment methods. The regulation also provides a mandate to the Commission to adopt delegated acts to introduce technical specifications to ensure interoperability of connectors but also of charging protocols.

Also the **Energy Performance of Buildings Directive (EPBD)**⁸⁸ – currently being revised - will introduce new mandates for the roll-out of recharging infrastructure in residential and non-residential buildings, including smart and bi-directional charging.

Strict compliance with the AFIR provisions and a swift implementation of the EPBD's measures will help to further ramp-up massive deployment of electric/hydrogen fuelled vehicles. In this regard, stakeholders pointed out that **no EU Member State⁸⁹ should be lagging** behind in terms of deployment and availability of charging infrastructure.

Moreover, it should be highlighted that the recently revised **Renewable Energy Directive**⁹⁰ puts in place a strengthened framework to accelerate the deployment of renewables which is essential to achieve the decarbonisation of European economy. The revised RED provides an increased EU 2030 renewable energy target, of 42.5% with an aspiration to reach 45%, and

⁸⁷ Regulation (EU) 2023/1804, see also "European Green Deal: ambitious new law agreed to deploy sufficient alternative fuels infrastructure" https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1867

⁸⁸ COM(2021) 802 final

⁸⁹ European Alternative Fuels Observatory <https://alternative-fuels-observatory.ec.europa.eu/interactive-map>

See also, Interactive map – Correlation between electric car sales and charging point availability, ACEA, 2022

<https://www.acea.auto/figure/interactive-map-correlation-between-electric-car-sales-and-charging-point-availability-2022-data/>

⁹⁰ Proposal for revising the REDII was tabled by the Commission as part of the "Fit for 5"5 package in July 2021. The revised REDII was adopted by the European Parliament on 14 September and by Council on 9 October; entry into force in November 2023.

also includes new ambitious sub-targets for renewables in various sectors including the transport sector. It also puts in place enabling measures for promoting the uptake of renewables across sectors including through electrification from renewables, by putting focus on electric vehicles as important assets to contribute to the efficiency of the electricity grids and increasing synergies between the transport and energy sectors.

In addition, connected and automated transport has also implications on the infrastructure requirements, both in terms of road infrastructure and connectivity⁹¹.

Topic 17: Road infrastructure		
Actions	Actors	Timeframe
Ensure compliance with the price transparency and simplification of payment methods mandated under AFIR	Industry/MS/EU	S/M
Ensure maintenance of charging infrastructure	Industry/MS	S/M
Simplify procedures for connection of recharging points to the grid and, where needed, increase grid capacity	Industry/MS	M
Simplify licensing procedures for granting alternative charging/refuelling infrastructure permits	MS/EU	S/M
Designate parking/charging areas for e-HDVs, e-LCVs and e-L-category vehicles, as it is already for electric passenger cars	MS	M/L
Implement funding programs for charging and refuelling infrastructure	MS/EU	M
Improve road infrastructure resilience to climate change	Industry/MS/EU	S/M
Promote deployment of Vehicle to 'everything' (V2X) i.e. Vehicle-to-Vehicle (V2V), Vehicle-to-Infrastructure (V2I), Vehicle-to-Network (V2N) communication to improve safety and traffic conditions as well as increasing efficiency in the use of existing infrastructure	Industry/MS/EU	S/M

Waterborne industry

Stakeholders identified: bunkering facilities for sustainable alternative fuels in ports and shore-based electricity facilities⁹² as the two main infrastructural needs to be addressed for the green transition of the waterborne sector. The **Smart and Sustainable Mobility**

⁹¹ Since 2016, there has been a continuous upgrading and enabling of the European road infrastructure for the introduction of new intelligent mobility systems, through a large European initiative that promotes the harmonisation and implementation of C-ITS services to support and improve road traffic throughout Europe. The European Commission supports the coordinating C-Roads platform (www.c-roads.eu) and several national pilots (e.g. C-Roads Germany, www.c-roads-germany.de) since the beginning. The status of the upgrade is visible via the link: <https://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/map/maps.html?basemap=&layer=5,18>

⁹² According to a CLIA (Cruise Lines International Association) assessment, the cruise industry will need some eighty ports to be ready with shore-based electricity facilities in the EU by 2030-2035.

Strategy⁹³ stresses the importance of creating zero-emission ports – for instance through new initiatives to promote sustainable maritime fuels (e.g. FuelEU Maritime and the Alternative Fuels Infrastructure Regulation, AFIR). Moreover, AFIR mandates the deployment of shore side electricity for container and passenger vessels in all TEN-T maritime ports by 2030 and mandates at least one shore side electricity installation in each TEN-T inland waterway port. In addition, for the recreational boating industry, the provision of alternative fuels and charging infrastructure would equally need to be ensured in pleasure ports (marinas) to support the decarbonisation of both the existing fleet and future boats coming on the market.

Future ships will need to be hybrid to cope with various bunkering infrastructure across ports. This is all the more important as, in the future, the waterborne transport sector will be competing with other sectors to obtain fuel supplies.

Topic 18: Waterborne infrastructure		
Actions	Actors	Timeframe
Support the installation in EU ports of both bunkering facilities for sustainable and alternative fuels and shore-based electricity facilities in line with AFIR mandates	Industry/MS/EU	S/M
Promote the uptake of hybrid ships to accelerate demand for new alternative fuels infrastructure	Industry/MS/EU	M
Improve inland waterways infrastructure resilience to climate change	Industry/MS/EU	S/M

Rail supply industry

Stakeholders recalled that Europe needs more high-speed networks, better harmonised infrastructure, including for local trains, better intermodal connections and must accelerate the digital transformation while preserving cybersecurity. While electrification in terms of train kilometers is already high, the European railway network must be further electrified where justified (80% of train-kilometres run on electric energy today but only 54% of the European rail network is currently electrified). Moreover, the electrical grid capacity must be adjusted and the existing infrastructure must be regularly maintained and systematically upgraded to increase train capacity. At the same time, not all lines can be electrified for technical or cost-efficiency reasons; therefore, the rail supply industry has welcome the inclusion of rail in the Alternative Fuels Infrastructure Regulation – enabling it to proceed on a path towards full decarbonisation by gradually deploying alternative fuels infrastructures for rail.

As a result of these priorities the following streams of action have been identified.

⁹³ COM/2020/789 final

Topic 19: Railway infrastructure		
Actions	Actors	Timeframe
Accelerate the deployment of the European Rail Traffic Management System (ERTMS) ⁹⁴ and combine it with a high level of cybersecurity	Industry/MS/EU	M
Promote harmonisation of the rail infrastructure	MS/EU	M
Roll out Digital Automated Coupling (DAC) ⁹⁵	Industry/MS/EU	M
Deploy the Future Rail Mobility Communication System (FRMCS) ⁹⁶ as soon as the specifications are finalized	Industry/MS/EU	M/L
Address the obstacles of the intermodal connections (i.e. Greening Freight Transport package) to facilitate the modal shift in freight transport	Industry/MS/EU	S/M
Ensure that alternative fuel solutions for rail such as hydrogen and battery powered trains are properly assessed, considered and monitored during the elaboration and implementation of the National Policy Frameworks (as per AFIR obligations)	MS/EU	S/M
Promote the development and use of digital infrastructure monitoring solutions with a view to improve the availability of assets and reduce their maintenance costs	Industry	S/M
Increase adaptation of railway infrastructure to climate change	Industry/MS/EU	S/M

Bicycle industry

According to stakeholders, many **EU countries have increased their investment in cycling infrastructure in recent years** with dedicated national cycling strategies but there remain significant differences across the EU. However, **lack of safety in cycling infrastructure is still an important issue**, if not the main reason why consumers shy away from buying and using a bicycle. This issue has been tackled at EU level by the **Road**

⁹⁴ European Rail Traffic Management System (ERTMS) is a single European signalling and speed control system that ensures interoperability of the national railway systems, reducing the purchasing and maintenance costs of the signalling systems as well as increasing the speed of trains, the capacity of infrastructure and the level of safety in rail transport.

⁹⁵ Digital Automatic Coupling (DAC) – an innovative component that automatically couples and decouples the rolling stock in a freight train both physically (the mechanical connection and the air line for braking) as well as digitally (electric power and data connection). DAC, which is part of ERJU programme, is an opportunity for Europe to become the first region to introduce a digital automatic coupling system and enable the intelligent freight train and a highly innovative rail freight sector.

⁹⁶ Future Railway Mobile Communications System (FRMCS) is the future worldwide telecommunication system designed by the International Union of Railways (UIC), in collaboration with a variety of stakeholders from the rail sector, as not only the successor of the Global System for Mobile Communications – Railway (GSM-R), but also as a key enabler for rail transport digitalisation. <https://www.globalrailwayreview.com/topic/future-railway-mobile-communications-system-frmcs/>

Infrastructure Safety Management Directive (RISM)⁹⁷, which establishes guidelines for the quality standards and safety requirements of cycling infrastructure while mapping the existing cycling infrastructure in the Member States and categorizing according to safety levels, and by Chapter V of the EU proposed Cycling declaration on improving road safety and security and related proposed commitments.

The main fields for improvement of the European cycling infrastructure include (i) cycle logistics infrastructure (e.g. micro hubs), (ii) safe bicycle parking solutions such as protected parking at train stations and cycling boxes in urban areas, (iii) charging infrastructure in buildings, at the workplace but also at important community hubs and often frequented places such as supermarket, (iv) Infrastructure to transport bikes by trains.

In the proposal for a recast Energy Performance of Buildings Directive, mandatory bicycle parking spaces in new buildings and buildings undergoing major renovation are introduced in order to remove barriers to cycling as a central element of sustainable, zero-emission mobility, in line with the European Green Deal and the new EU Urban mobility framework.

Topic 20: Cycling infrastructure		
Action	Actors	Timeframe
Develop of safe infrastructure for cycling (including for cargo bikes)	MS	M

⁹⁷ Directive (EU) 2019/1936 of the European Parliament and of the Council of 23 October 2019 amending Directive 2008/96/EC on road infrastructure safety management.

7) INVESTMENT AND FUNDING

The EU mobility ecosystem has seen **an increasing volume of venture capital investment**. The total investments in firms, which operate at late technological development stages, have **more than tripled since 2020** and reached a total **volume of over EUR 6 billion**. Investments in firms at earlier development stages and firms which are exiting the market have seen stagnating investment, with a volume of less than 1 billion each. By far the most venture capital went into later developed technologies⁹⁸.

Foreign direct investments of the EU mobility ecosystem **peaked in 2018** and declined until 2021. Since then, **EU27 investments abroad have been significantly below the level of the past ten years** and have not recovered yet⁹⁹.

The EU has various funding programmes in place which are relevant for the twin transition of the mobility ecosystem (e.g. **Horizon Europe**¹⁰⁰, **Innovation Fund**¹⁰¹, **Connected Europe Facility (CEF)**¹⁰²).

While the support from EU funds remains important for the twin transition of the mobility ecosystem, the stakeholders concurred that public funding alone is not sufficient to support the twin transition of the mobility ecosystem, they believe other mechanisms, especially private funding or other sources of funding, regulatory and tax incentives will have to be activated as well.

The stakeholders recalled the need for further simplification and adaptation of access to funding. Horizon Europe funding has recently been simplified with, among other evolutions, the **organisation of pitching events** to help potential beneficiaries better present their ideas to investors, the establishment of a **single funding point** and the **multiplication of national contact points**¹⁰³.

However, many companies (especially smaller ones) are not aware of all the available mechanisms (at the level of EIB, European Commission, Member States). Even if each programme and institutions have their "raison d'être"¹⁰⁴, **synergies and coordination could be improved**. It would help companies navigate their environment while at the same time improve the overall efficiency of the system. Simpler and less numerous programmes could, for example, make it easier to **ensure continuity in technology via smooth swap** from innovation funding to investment banking and to deployment phase. The **modularity of each programme** is also key to ensure that investments with a particular goal can easily be

⁹⁸ Monitoring the twin transition of industrial ecosystems – Mobility, transport and automotive; EC, Fraunhofer ISI, Technopolis Group; (2023); p. 47

⁹⁹ Idem; p. 47

¹⁰⁰ Horizon Europe is the main EU funding programme for research and innovation (budget of EUR 95.5 billion from 2021 to 2027)

¹⁰¹ Innovation Fund is the main EU funding programme for the deployment of net-zero and innovative technologies (Innovation Fund's total funding depends on the carbon price, and it may amount to about €40 billion from 2020 to 2030, calculated by using a carbon price of €75/tCO₂).

¹⁰² The Connecting Europe Facility is the main EU funding instrument to promote infrastructure investment (transport, energy and digital). 2021-2027 budget: EUR 33.71 billion

¹⁰³ The Commission explains the details of calls for proposals to national contact points that, in turn, can host events to spread and build consortia.

¹⁰⁴ For example, the split between EIT (European Institute of Innovation and Technology, 800 millions euros in 2023) and EIC (European Innovation Council, 1.6 billion euros for mobility projects in 2023) may be confusing.

isolated. This aspect is sometimes lacking today, even for such a huge field as mobility investments. In **EIT¹⁰⁵ fundings, mobility projects are indeed split between smart city, energy and construction.**

Despite this simplification, companies could still need support on specific issues, such as technical issues on the **model of Project development assistance (PDA)¹⁰⁶**, mainly for smaller companies, or on **legal ones**, which could benefit both smaller and bigger stakeholders as dealing with different frameworks and regulations remains an issue for all.

To ensure the project is implemented and the benefits of the funded research reach European citizens, requiring **an implementing partner as part of each consortium from the start could be an efficient strategy.**

On the other hand, the stakeholders see a need for an **adaptation of existing EU programmes and the EU State aid rules** to the new international context¹⁰⁷. The European mobility industry is part of an international and highly competitive market.

In addition, according to the stakeholders, it would be welcome to correct some inconsistencies, for example fossil fuels are in some instances still more subsidised than new fuels, which makes it more difficult to implement the technology switch. The June 2023 amendment to the Climate Delegated Act of the **EU Taxonomy¹⁰⁸** aims to provide an equal treatment of components provided by suppliers and zero-emission vehicles provided by manufacturers; however, according to the stakeholders, more guidance is needed for the industry, notably in context of the Do-No-Significant-Harm criterion related to chemical pollution (e.g. chemical risks).

Moreover, the ongoing revision of the **State aid Railway Guidelines** is aimed to adjust the existing rules to reflect the latest market and regulatory developments and enable the rail sector to embrace the green and digital transition in line with the Commission's priorities, in particular those of European Green Deal.¹⁰⁹ As announced in the roadmap of the initiative,¹¹⁰ the revision aims to extend the scope of the Railway Guidelines, in particular to include all relevant transport operators in the multimodal chain, which contribute to the modal shift from road to less polluting and more sustainable transport solutions. This approach will tackle the issue of the prevalence of sectoral and modal approach, which has led to gaps where e.g. no tailored approach exists at EU level for multimodal investment projects either as regards state aid or for project assessment¹¹¹. Furthermore, following the adoption of the enabling

¹⁰⁵ European Institute of Innovation and Technology

¹⁰⁶ Project Development Assistance (PDA) offers technical assistance to project developers to undertake energy efficiency and renewable energy investments of ambition and scale.

¹⁰⁷ An example of such adaptation of State aid rules to the new international context is represented by the Important Projects of Common European Interest (IPCEI). These are key industrial policy tools enabling Member States to pool resources and cooperate to support breakthrough innovations or large-scale infrastructure projects in key sectors and technologies. To date six integrated IPCEIs (including 2 in battery and 2 in hydrogen ecosystems) have been launched and approved. See also, https://competition-policy.ec.europa.eu/state-aid/ipcei_en

¹⁰⁸ Commission Delegated Regulation (EU) 2023/2485

¹⁰⁹ Press release "State aid: Commission invites comments on proposed revision of Guidelines on State aid for railway companies", IP 21/7049.

¹¹⁰ Inception Impact assessment published at the following link: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13154-Rail-transport-revision-of-State-aid-guidelines_en

¹¹¹ Commission SWD Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Sustainable and Smart Mobility Strategy – putting European transport on track for the future (COM(2020) 789 final), point 491.

regulation by the Council¹¹², the Commission is designing a new block exemption regulation to simplify procedures for those State aid measures that promote the modal shift to more sustainable transport solutions, which entail limited competition distortions.

Once fully designed and operational, **extensive communication** would be needed to ensure the best possible efficiency of the new State aid framework. This point is key and will align the State aid rules to the multimodal approach endorsed by the Commission in the Smart and Sustainable Mobility Strategy, whereby mobility in Europe should be based on an efficient and interconnected multimodal transport system, for both passengers and freight.¹¹³

Stakeholders also highlighted the need to **increase the amount invested in the twin transition**. Private funding will not be sufficient to finance the transition and other sources of funding will have to be leveraged. Blending facilities and other financial instruments¹¹⁴ could be a way to reach that goal.

Topic 21: Investment and funding		
Action	Actors	Timeframe
Consider potential improvements to the design of public funding schemes for the mobility ecosystem as appropriate	MS/EU	S/M
Support the development of blending facilities through further cooperation with National Promotional Banks and Institutions (NPBIs)	MS/EU	S/M
Ensure the Innovation Fund can support transport related projects without undermining its existing objectives	EU	S/M
Create grants for green transition to support SME acquisition of cargo bike for use in business deliveries	MS	M

¹¹² Council Regulation (EU) 2022/2586 of 19 December 2022 on the application of Articles 93, 107 and 108 of the Treaty on the Functioning of the European Union to certain categories of State aid in the rail, inland waterway and multimodal transport sector.

¹¹³ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Sustainable and Smart Mobility Strategy – putting European transport on track for the future, COM/2020/789 final, point 6.

¹¹⁴ Financial instruments (loans, guarantees, equity) have clear benefits compared to grants and allow to 1) support better quality of projects as investment must be repaid 2) leverage private and public resources increasing the impact of programmes and 3) generate reflows which become an additional source of revenues for the programme area to be used for similar objectives. Financial instruments can also bring in the expertise of financial institutions and co-investors to verify financial sustainability of final recipients and assist them in their growth.

V/ NEXT STEPS

The co-creation process yielded in getting input and created a community with several relevant stakeholders of the ecosystem. With the publication of this report the process continues with a co-implementation phase involving all interested stakeholders. The aim of the co-implementation phase is to foster the transition with concrete actions in the fields identified and monitor progress. All interested stakeholders are warmly encouraged to present their pledges accordingly.

VI/ MONITORING AND CO-IMPLEMENTATION

The co-creation process has shown how relevant is for ecosystem stakeholders to work together, with the view to support the twin transition and to strengthen its resilience and competitiveness of the mobility ecosystem.

Stakeholder engagement is indispensable also for the co-implementation of the transition pathway. The publication of the transition pathway report kick-starts the co-implementation process with a call for stakeholder pledges to underpin the actions of the transition pathway. The European Commission will facilitate the co-implementation, in cooperation with stakeholders, by taking stock of commitments and monitoring the progress made.

In order to ensure a continuous collaboration with stakeholders, the European Commission will establish a Transition Pathway Stakeholder Support Platform. It will be a user friendly, multilingual platform, to facilitate the collaboration among stakeholders coming from SMEs, larger companies, industry associations, trade unions, and public authorities.

The EU Industrial Forum oversees the transition pathways of all industrial ecosystems, and it will be regularly updated on the progress of this transition pathway. Assessing progress should be a collaborative process with the stakeholders of the ecosystem.

Annex 1 – Summary of the topics under each building block

Building Blocks	Topics
Sustainable Competitiveness	Topic 1: Competitiveness of the mobility ecosystem
	Topic 2: Competitiveness of the automotive industry
	Topic 3: Competitiveness of the waterborne industry
	Topic 4: Competitiveness of the rail industry
	Topic 5: Competitiveness of the bike industry
Regulation and Public Governance	Topic 6: Regulation
	Topic 7: Private-public governance
Social Dimension	Topic 8: Just transition
	Topic 9: Affordability
	Topic 10: Safety and Health
Skills	Topic 11: Future of the working force
R&I, Techniques and Technological Solutions	Topic 12: Cross sectoral innovation
	Topic 13: Automotive innovation
	Topic 14: Waterborne innovation
	Topic 15: Rail innovation
	Topic 16: Bike innovation
Infrastructure	Topic 17: Road infrastructure
	Topic 18: Waterborne infrastructure
	Topic 19: Railway infrastructure
	Topic 20: Cycling infrastructure
Investments and Funding	Topic 21: Investment and funding

Annex 2 – Existing clusters

From 1st September 2022, 30 **Euroclusters** have been launched by the European Commission to implement the EU Industrial Strategy. Euroclusters are cross-sectoral, interdisciplinary and trans-European strategic initiatives of industry clusters and other economic actors such as research organisations, companies, etc.

Of them, two Euroclusters are fully focused on the Mobility-Transport-Automotive ecosystem: RESIST and e-Boost.

Eurocluster RESIST (REsilience through Sustainable processes and production for the European automotive InduStry)

RESIST supports SMEs in their effort becoming more sustainable and resilient, through co-funding for innovation projects, coaching and mentoring services, networking, training, and internationalisation services. Companies also get access to key information and studies such as future challenges, opportunities and benefits from greening and digitizing production, internationalisation needs; and they meet potential business partners from an alternative ecosystem.

RESIST is composed by the following clusters:

AUTOKLASTR: Moravskoslezský automobilový klastr z.s. is located in the Moravian-Silesian Region. It strives to build a common identity of companies in the cluster and establish trust and positive attitudes towards the automotive industry and the entire region. It develops R&D activities, promote business relationships and develop human potential

CEAGA: Is the automotive and mobility cluster in Galicia, it represents all the companies of the ecosystem in the region. CEAGA has more than 25 years of experience promoting collaborative projects between companies to ease their twin transition and increase their competitiveness. CEAGA puts an important focus on SMEs through cascade fundings. The collaborative projects are related to the five basic following priorities: increase of competitiveness, promotion of entrepreneurship and innovation, ease of the green transition for suppliers whose business model is linked to combustion vehicles, up-skilling and re-skilling of the workforce and cost-control. This latest priority aims at offsetting the rise in costs that the sector is currently suffering. For instance, a grouped negotiation of electricity is being negotiated and advise on how to optimize the electric supply contracting parameters, or information on regulatory changes in the electric market are provided. Work is also underway to search for a Power Purchase Agreement (PPA) for the supply of electricity from 2025.

IDiA: IDiA is a cluster born in Aragón (Spain) on 2004. Its focus are Information and Communication Technologies (ICT), joining both suppliers and final end companies. The promotion of cross-sectoral, horizontal projects is at the core of its activities. It counts currently with 81 members, with a grouped net billing of around 16,500 million euros. For many years, Opel has held its presidency. IDiA has a long and strong experience in Advance Manufacturing and the implementation of Artificial Intelligence to industrial environments.

Mechatronics Cluster @ Business Upper Austria - OÖ Wirtschaftsagentur: The Mechatronics Cluster (MC) is a cross-industry network for companies working in the fields of mechanical engineering and plant construction as well as related business sectors such as apparatus and equipment manufacturing, technology component supply, research and development as well

as educational institutions. Mechatronics - as an interdisciplinary subject combining mechanical engineering, electronics and information technology - has become an integral part of our daily lives with very strong roots in Upper Austria thanks to a number of pioneering firms and R&D facilities. The Mechatronics Cluster is an initiative of the countries Upper Austria and Lower Austria.

Pole Vehicule du Futur (PVF), France : The cluster Pole Vehicule du Futur (PVF) has been created in 2005 to stimulate the synergies between enterprises, education and research in the field of vehicles and mobility of the future. PVF aims at creating added value and employment and at enhancing competitiveness for companies in the French regions Grand-Est and Burgundy-Franche-Comté.

Eurocluster e-Boost (Electromobility for the recovery and internationalisation of Small enterprises)

The eurocluster focus on building a strong and dynamic platform for electromobility stakeholders to enhance cooperation among the whole electromobility value chain, thus strengthening EU resilience in the Mobility ecosystem (chosen strand).

e-Boost cluster members are:

CAAR: The Automotive Cluster of Aragon is the referring entity of the automotive sector in Aragon (Spain). CAAR brings together more than 120 partners in the automotive sector, an entire ecosystem that constitutes one of the largest concentrations of industrial capacity, knowledge and talent in southern Europe and employs 26,000 people in a wide range of companies with a turnover of 11,000 million euros per year, export a third of what they manufacture and invest each year more than 350 million euros in R&D.

CARA represents the mobility sector in the French industrial region Auvergne-Rhône-Alpes within six branches of transports: automotive, industrial vehicles, rail transport, river transport, cable transport and active mobility. It address the global challenges of urban mobility and vehicles of tomorrow, supporting the transformation of passengers and goods transport systems in urban environments.

DITECFER, District for Rail Technologies, High Speed, Networks Safety and Security, is the Rail Technologies Cluster based in Tuscany-Italy. DITECFER is member of the European Commission Expert Group on the Competitiveness of the Rail Supply Industry, where it mainly contributes to the topic of SMEs' market access.

RAI Automotive Industry NL is the leading authority in Dutch automotive manufacturing and supply chain industry, focusing on global automotive and mobility solutions by joining forces with industry members and stakeholders and acting as a catalyst in the fields of innovation and education.

Other automotive clusters

ACstyria: established as an automotive cluster in 1995, it was restructured as a mobility cluster in 2017, to mirror the mobility needs of society and to help members to diversify. ACstyria is working on automotive, rail systems, aerospace and mobility services. The core service of the cluster is the networking and support of Styrian companies along the entire value chain. The cluster draws links between business, industry, research and public

institutions. Its current key topics are: digitalisation & digital business models, innovative drive & vehicle concepts, autonomous systems, mobility services and decarbonized value chains.

Cluster Electric Mobility South-West: in Baden-Württemberg, offers its members the opportunity to exchange information and to network with one another within the framework of the annual complete team meetings. In addition to working on technological projects in the innovation fields of energy, production, vehicles, and digitalisation, the cluster members also cooperate closely in cross-sectional fields, such as internationalisation, knowledge transfer, training, and further education.

AMZ: Network of automotive suppliers in Saxony, the has been active in the transition to e-mobility for years, developing hydrogen drives, electric drives and automated driving functions with companies as part of cooperative development projects.

Automotive Cluster Bulgaria (ACB): founded in July 2012, ACB is a non-profit organization which represents the interests of automotive manufacturers, suppliers, and organizations that provide services for the automotive industry. It fosters synergies between the cluster members and supports their business growth and competitiveness through participation in international joint projects, case studies, and professional automotive qualification programs.

Cluster Mobility & Logistics: In the age of electromobility and IT logistics, the Mobility & Logistics cluster finds intelligent answers to upcoming social and technological challenges together with partners and members. The cluster supports the securing of existing competitive advantages and helps to create new ones. A special feature of the cluster is the interdisciplinary structure of its partners and members from the mobility and logistics sectors. Science and research are an essential part of this.

Autoregion e. V., Saarbrücken / Greater Region: autoregion e. V. is an independently working, complementary and additional organ to the existing automotive networks of the Greater Region, and operates decentrally in the regions of Saarland, Rhineland-Palatinate, Lorraine and Luxembourg. It is supported by companies, associations, research institutes and public authorities and works in a cross-border environment in which is currently the largest economic sector in the Greater Region. For its members, autoregion e.V. is a competence platform between industry, business and production, as well as the research institutes, colleges and universities in the region and beyond.

ITS mobility GmbH: Germany's largest cluster for Intelligent Transport Systems (ITS) with the focus area of automated and connected driving.

Luxembourg AutoMobility Cluster (LAC), Luxembourg: founded in 2014, the LAC managed by Luxinnovation, fosters innovation, business development and cross-sector cooperation by bringing together Luxembourg-based companies & startups active in the automotive industry & mobility sector.

MOBINOV, Portugal

Cycling

Portugal Bike Value: is a cluster in Agueda, which extended existing and established regional know-how in metal to bicycle production (including frame assembly) and has made

Portugal the leading producer of bicycles in Europe, accounting for more than 20% of total European bicycle production. Since 2004, industry turnover in the Portugal Bike Value cluster has increased sixfold, and exports multiplied by nearly 12.

Flanders' Bike valley: an established cluster in Belgium.

Other clusters specialized in specific topics in link with the transition:

European Digital Innovation Hubs (EDIH): coordinated programmes on European level (like the EDIH) can lead to more national and regional ones, e.g., EDIH HD-Motion – national network to promote digital and green mobility ecosystem in Italy.

Thuringian Innovation Centre for Mobility (ThIMo): In Thüringen connects the local industry with science institutions.

Different clusters in Baden Württemberg:

- Cluster Fuel Cell BW
- Platform H2BW for hydrogen
- Innovation Campus Mobility of the Future (ICM) ¹¹⁵

Different clusters in Saxony:

- CADA – Network for automated driving
- Hzwo – Hydrogen Cluster Saxony
- Smart Rail Connectivity Cluster
- Cycling Saxony (field of cargo bikes)

NEcOLEAP RDI project:, led by Turku Meyer shipyard in Finland, is an ecosystem for developing a climate-neutral cruise ship concept by 2035. It brings together representatives of companies, universities, and research institute.

¹¹⁵ Promotes knowledge cooperation and transfer and combines research strengths in the networks around the Karlsruhe Institute of Technology and Stuttgart university to develop new technologies, test innovative approaches and create the basis for leap innovations.

Annex 3 – List of stakeholders involved in the co-creation process

Name of the organisation	Industry/NGO/Public Authority/Academy
Acciona	Industry
ACEA - European Automobile Manufacturers Association	Business association
ACEM - European Association of Motorcycle Manufacturers	Business association
ADAC e.V.	NGO (Automobile club)
AECC - Association for Emissions Control by Catalyst aisbl	Business association
Alstom	Industry
Apetro	Industry
Arbeiterkammer	NGO (Trade union)
Austrian Federal Economic Chamber	Business association
Automotive Skills Alliance	NGO
AVERE - the European Association for Electromobility	Business association
BEUC - The European Consumer Organisation	NGO (Consumer association)
Brussels Representation Office of the Trnava Self-Governing Region	Public authority
Cassa Depositi e Prestiti (CDP) SpA	Public Authority
Castilla y Leon Permanent Delegation to the EU	Public authority
CCAM	Business association
CECOP	Business association
CECRA - European Council for Motor Trades and Repairers	Business association
Cedefop	Public authority
CEEMET - European Tech & Industry Employers	NGO (Employer association)
CETMAR	NGO (Environmental protection)
Chamber of Labour in Austria/Vienna	NGO (Trade union)
Charge Up Europe	Business association

CLEPA - European Association of Automotive Suppliers	Business association
CNA -Confederazione Nazionale dell'Artigianato e della piccola e media impresa	Business association
Committee of the Regions of the EU	Public authority
Community of European Railway and Infrastructure Companies (CER)	Business association
CONEBI	Business association
Cubic Transportation Systems	Industry
Cycling Industries Europe AISBL	Business association
Decathlon International	Industry
Délégation de la Région Auvergne-Rhône-Alpes auprès de l'UE	Public Authority
Deutscher Gewerkschaftsbund DGB	NGO (Trade Union)
Deutsches Zentrum für Luft- und Raumfahrt (DLR)	Public authority
Digital Europe	Business association
ECTRI	NGO (Research)
effiziente.st Energie- und Umweltconsulting e.U.	Industry
Eisenbahn- und Verkehrsgewerkschaft (EVG)	NGO (Trade union)
EIT Urban Mobility	Public Authority
Enagás	Industry
ETF	NGO (Trade union)
EUCAR	Business association
EUROBAT - Association of European Automotive and Industrial Battery Manufacturers	Business association
European Boating Industry	Business association
European Clusters Alliance	Business association
European Transport Workers' Federation (ETF)	NGO (Trade Union)
European Tyre & Rubber Manufacturers Association (ETRMA)	Business association
FAMN - French Automotive & Mobility Network	NGO

FIA - Fédération Internationale de l'Automobile	NGO (Automobile club)
FIGIEFA	Business association
FuelsEurope	Business association
German Environment Agency	Public Authority
GICAN	Business association
Huawei Technologies	Industry
IDDR1	NGO
IG Metall	NGO (Trade union)
IGAPE	Public Authority
IGAPE- GALICIAN INSTITUTE FOR ECONOMIC PROMOTION	Public Authority
IndustriAll Europe	NGO (Trade union)
Leaseurope	Business association
Micro-Mobility for Europe	Business association
Ministry of Economic Affairs and Climate Policy (NL)	Public Authority
Ministry of Economy of Luxembourg	Public authority
Ministry of Economy of Portugal	Public authority
Ministry of Industry and Trade (CZ)	Public Authority
Mnistry of Industry and Trade (CZ)	Public Authority
Ministry of Transport Baden-Wuerttemberg	Public Authority
Ministry of Transport of the (CZ)	Public Authority
NELA. Next Economy Lab	Industry
OZ KOVO	NGO (Trade union)
Platform for electromobility	Business association
POLIS	Public authority
Representation of the Government of Galicia to the EU	Public Authority
Representation of the State of Baden-Württemberg to the EU	Public authority
Robert Bosch GmbH	Industry
Rolls-Royce	Industry
Saxon Ministry for Regional Development	Public authority

SEA Europe	Business association
SMEunited	Business association
T&E - Transport & Environment	NGO
Teknikföretagen	Business association
Terna Spa	Industry
Thales	Industry
Trainline S.A.S.	Industry
Turku Science Park	Public Authority
UIMM	NGO (Employer association)
UITP	Business association
UNIFE	Business association
Utrecht University of Applied Sciences - Centre of Expertise Smart Sustainable Cities	Academy
Verband der Automobilindustrie (VDA); German Association of the Automotive Industry	Business association
VTT Technical research Centre of Finland	Public Authority
VTT Technical Research Centre of Finland	Public authority
Zentralverband des Deutschen Handwerks	Business association
Zentralverband Deutsches Kraftfahrzeuggewerbe e.V.	Business association

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