

Draft orientations towards the work programme 2026-2027

Cluster 5 – Climate, Energy and Mobility

Please note that:

- All elements included in this document are preliminary and only serve the purpose of discussing possible priorities for WP 2026-2027.
- Not all elements may be included in WP 2026-2027 and new elements may be included at a later stage.
- The number of expected outcomes and impacts contained in this document is not an indicator for the number of topics to be included in the first draft WP, nor for the budget to be allocated to the different areas.

Introduction

Research and Innovation has a great potential to develop solutions for global and European challenges like mitigation and adaptation to climate change, increasing the competitiveness and resilience of European industry and improving the quality of life of citizens. To be more impactful in this endeavour, the new Commission (in line with the recommendations of the Draghi and Heitor reports) intends the programme to be more selective and strategic when setting priorities and to ease access to the programme. In this context, business as usual is not an option. The cluster 5 work programme (WP) 2026-2027 will need to be shorter and simpler, as well as more focussed and impactful and better aligned with national R&I investments.

The work programme 2026-2027 will be a step-change in terms of **simplification**. It will include less prescriptive, more open and bottom-up topics, giving applicants more flexibility and creativity to tackle the challenges of the R&I actions, while allowing for a wide range of different pathways to achieve the envisaged expected outcomes. The number of topics will be reduced, focusing on a limited number of strategic priorities, while in order to generate critical mass, the number of projects funded per topic and the average grant size per project will increase.

This document outlines the main expected impacts and outcomes of possible actions in WP 2026-2027 and how they contribute to EU policy priorities. It is important to underline that the listed expected impacts and outcomes do not correspond to specific topics but should instead be achieved by the project portfolio resulting from the actions under the specific Destination (design and definition of topics is part of the work programme preparation).

Thematic priorities of WP 2026-2027 will be in line with the Strategic Plan 2025-2027 and the Political Guidelines of the Commission. They will also take into account previous EU R&I investments, as well as those made and planned by Member States and the private sector and seek for synergies within Horizon Europe and with other EU programmes.

WP 2026-2027 will include a **pilot call in support of the Clean Industrial Deal (CID)**. The aim of this call is to mobilise and valorise R&I investments in support of the competitive decarbonisation of European industry. It will strengthen value chains and accelerate the deployment of innovative solutions in clean tech and energy-intensive industries, with a focus on the operational demonstration of state-of-the-art decarbonisation technologies, and on ensuring that they are ready for market deployment and scale-up (including via deployment programmes such as the Innovation Fund). The pilot call will bring together actions from across Cluster 5 and other Horizon Europe Clusters, that all contribute to the strategic priorities of the CID in a holistic, multidisciplinary and joint approach (the setup of the call is still under discussion and potential contributions of various Destinations are not specified in this document). The call will also aim for stronger synergies between Horizon Europe and the Innovation Fund, to accelerate market deployment of mature demonstrators in clean energy and clean technologies, for use across industrial sectors.

1. Climate sciences and responses for the transformation towards climate neutrality

This Destination contributes directly to the Strategic Plan's Key Strategic Orientations '*Green transition*', '*Digital transition*' and '*A more resilient, competitive, inclusive and democratic Europe*'. In line with the Strategic Plan, the overall expected impact of this Destination is to contribute to "*Advancing science for a transition to a climate-neutral and resilient society*".

Addressing main policy priorities

Activities in this Destination contribute to **EU climate policy objectives** by **strengthening the evidence base**:

1. Globally, supporting the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement.
2. Contributing to the EU objective of achieving climate neutrality by 2050, and the intermediate targets, emphasising synergies between ambitious climate action and safeguarding prosperity and competitiveness, and leaving no one behind.
3. Strengthening resilience to climate change, by informing the European Climate Adaptation Plan and its implementation (in synergy with the Mission on Adaptation to Climate Change).
4. Supporting early warning and disaster risk reduction efforts, including in the context of the EU Preparedness Union Strategy and international cooperation with the African Union.
5. Supporting the EU commitments to biodiversity protection, natural resources conservation, and pollution reduction.
6. Supporting international scientific co-operation on climate, notably the assessments by the Intergovernmental Panel on Climate Change (IPCC), the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), the International Resource panel (IRP) and others, promoting interdisciplinarity.

Expected impacts

Research should contribute to **closing major knowledge gaps** on the changing climate together with their associated impacts and risks, on both society and nature. It should also help to **developing tools to support decision-makers** in designing and implementing effective mitigation and adaptation actions at various time and spatial scales while properly accounting for synergies and trade-offs with other policy objectives, such as just transition and leaving no one behind.

1. The first objective is to **support climate action (both mitigation and adaptation) globally** and in Europe, through advancing climate science and the knowledge base underpinning actionable solutions, to accelerate the transition to a climate-neutral, climate-resilient and prosperous society.
2. The second objective is to **close key knowledge gaps related to climate change**, thereby contributing substantially to key European and international assessments such as IPCC, IPBES, EUCRA, and other initiatives such as the Coupled Model Intercomparison Project under the World Climate Research Programme.
3. The third objective is to **strengthen the European Research Area on climate change** by boosting scientific excellence and capacity in an inclusive manner across the participating countries.
4. The fourth objective is to **maximise synergies between mitigation and adaptation and with other policy priorities** such as biodiversity and ecosystem preservation and restoration, digitalisation, circular economy, prosperity and competitiveness, strategic autonomy, security and resilience, just transition, and the Sustainable Development Goals by exploring co-benefits, trade-offs and potential unintended consequences of climate strategies and policy interventions.

Main expected outcomes

1. Advanced understanding of the coupled Earth system, its monitoring and evolution, at global to local scales, and across timescales, exploiting synergies with Earth observations; and better informed assessments of different future development pathways.
2. Increased understanding of the interactions between climate, human and natural systems.
3. Advanced knowledge on climate change adaptation, generating new and consistent scientific evidence to support decision-making and to understand and prevent maladaptation.
4. Advanced knowledge in climate related risks and extremes and their interaction with other risks, generating new and consistent scientific evidence to support preparedness.
5. Improved climate literacy and communication, and increased acceptance and ownership of climate policies through their information and evaluation by political and social stakeholders.
6. Improved understanding of the climate-digital nexus, including Artificial Intelligence.
7. Enabling science-based implementation of the Paris Agreement in Third Countries, with particular emphasis on Africa and supporting the EU-AU R&I Partnership.

8. A significant contribution to the IPCC and other scientific assessments, as well as the UNFCCC and the global stocktake under the Paris Agreement.
9. The above outcomes should contribute to European prosperity, sustainable competitiveness and strategic autonomy, through an expanded knowledge base for climate policy, and strengthened resilience, adaptation capacity and preparedness to climate change impacts.

2. Cross-sectoral solutions for the climate transition

This Destination contributes directly to the Strategic Plan's Key Strategic Orientations '*Green transition*', '*Digital transition*' and '*A more resilient, competitive, inclusive and democratic Europe*'. In line with the Strategic Plan, the overall expected impact of this Destination is to contribute to the "*Facilitating a clean and sustainable transition of the energy and transport sectors towards climate neutrality through cross-cutting solutions*".

This Destination covers thematic areas which are cross-cutting by nature and can provide key solutions for climate, energy and mobility applications. The main focus of this Destination will be on batteries, but other cross-cutting issues may be covered as well. Actions on communities and cities will be addressed under the Cities Mission.

Addressing main policy priorities

Global demand for **batteries** is increasing rapidly and is currently expected to increase 14 times by 2030. To minimise the environmental impact of this exponential growth, and to promote the development of a competitive sustainable battery industry, the EU adopted the new Batteries Regulation in 2023. R&I actions will contribute to the targets and ambitions of the **Batteries Regulation**.

Increased circularity including recycling efforts for batteries are also imperative to ensure secure and sustainable supply of critical raw materials for Europe's industry and significantly lower the EU's dependency on imports from single country suppliers. The **European Critical Raw Materials Act**, adopted in 2023, sets recycling and dependencies targets to which also batteries must contribute, and that the WP will support.

The **Net-Zero Industry Act** finally provides incentives for faster scale-up of battery manufacturing in Europe and extraction of raw materials, as well as skills development. With increasing global competition, development of a competitive and strategically autonomous battery value chain is more important than ever.

Expected impacts

1. Increased **competitiveness and strategic autonomy** of a complete EU value chain while maximizing sustainability.
2. **Reducing dependency on raw materials** and upscaling processing capacity, also for recycled materials.
3. Creating an integrated European battery sector for **next generation batteries**, from design to manufacturing and all the way to end of life, reducing environmental impact.

4. **Improving energy storage technologies** to enhance the resilience of EU's energy system, facilitating integration of renewable energy sources.

Main expected outcomes

1. Development and upscaling of **manufacturing technology** to deliver sustainable battery systems, addressing the mobility and stationary sectors.
2. Development of **battery systems based on solid-state or chemistries other than Li-ion**, targeting higher performance, cost reduction, or increased resilience and autonomy of the EU's battery value chain.
3. Increasing the flexibility and efficiency of **recycling and materials processing technologies** to deal with a variety of primary and secondary material streams, reducing dependence on single sources.
4. A better understanding of battery chemistry and processes to accelerate **breakthrough discoveries**.

3. Sustainable, secure and competitive energy supply

This Destination contributes directly to the Strategic Plan's Key Strategic Orientations '*Green transition*', '*Digital transition*' and '*A more resilient, competitive, inclusive and democratic Europe*'. In line with the Strategic Plan, the overall expected impact of this Destination is to contribute to the '*Ensuring more sustainable, secure and competitive energy supply through solutions for smart energy systems based on renewable energy solutions*'.

This destination contributes to the activities of the Strategic Energy Technology Plan (SET Plan) and its implementation working groups.

To deliver on this Destination, actions will be programmed in the areas of renewable energy; energy systems, grid and storage; as well as carbon capture, use and storage (CCUS) and carbon dioxide removal (CDR).

Addressing main policy priorities

The EU has developed a comprehensive and ambitious legislative and policy framework for the sustainable and digital energy transition, underpinning the EU's greenhouse gas emission reduction targets (55% for 2030; proposal of 90% for 2040, and climate neutrality for 2050). This transition is based on a smart, resilient and integrated energy system, which is capable of integrating unprecedented shares of renewables in the energy mix. The EU is working towards policies to increase EU competitiveness, resilience and energy security.

Key components of this framework are the EU's energy, industrial, climate, environmental and digital policy framework, as well as the SET Plan.

The EU will also cooperate with international partners in existing and emerging clean energy technologies, creating opportunities for EU actors and supporting the security of energy technology value chains through Global Gateway, Mission Innovation, International Energy Agency, International Renewable

Energy Agency and the AU-EU Research and Innovation Partnership on Climate. Specific co-funding of EU with national funds will be addressed to leverage on synergies between SET Plan countries to deliver innovative projects of cross-border relevance.

Expected impacts

As regards **renewable energy**:

1. **Energy producers** have access to efficient and competitive European renewable energy and renewable fuel technologies with a solid knowledge base and are able to deploy them to enhance the EU's energy security and reach its climate neutrality objectives, in a sustainable way in environmental (e.g., biodiversity, multiple uses of land and water, natural resources, pollution) and socioeconomic terms, and in line with the Sustainable Development Goals.
2. **Technology providers** have access to European, competitive, resilient, reliable, sustainable, and affordable value chains of renewable energy and renewable fuel technologies including emerging ones, and with strong export potential to supply both the EU internal and global markets. They benefit also from circular renewable energy technologies that are safe and sustainable by design with reduced and diversified external dependence on critical raw materials.
3. **Economic sectors** benefit from better integration of renewable energy and renewable fuel-based solutions that are, among others, competitive, cost-effective, efficient, flexible, reliable, and sustainable. Such integration is facilitated through digitalisation and integration of artificial intelligence of renewable energy technologies that provide network stability and reliability.
4. **European industries** benefit from a reinforced export potential of renewable energy and renewable fuel technologies, also through international partnerships, and become more competitive in innovative renewable energy technologies in Europe and globally.
5. **European researchers** benefit from a stronger community and from a reinforced scientific basis on renewable energy and renewable fuel technologies, also through international collaborations.
6. **European citizens** have access to an energy market that is fair and equitable, more resilient, uses all different types of local renewable energy resources, and is less dependent on fossil fuels imports. Citizens experience less fuel and energy poverty, and also benefit from new employment and upskilling opportunities. Local communities benefit from a more decentralized, affordable, and secure energy system and from multiple uses of land and water.

The **Strategic Energy Technology Plan (SET Plan)** implementation working groups on renewable energy and renewable fuels technologies benefit from a reinforced scientific basis and collaboration towards meeting the ambitious targets of the European Energy and Climate policies.

As regards **energy systems, grids and storage**:

7. R&I actions will support the just digital and green transformation of the energy system through **advanced solutions** for accelerating the **energy systems integration and decarbonisation**. The developed clean, sustainable solutions will contribute to making the energy system **work better for consumers** and supply **more reliable, resilient and secure energy** – even under increasingly more frequent extreme climate events.

8. The solutions developed will contribute to **increase flexibility and grid hosting capacity for renewables** through optimizing cross sector integration and grid scale storage as well as cover off-grid situations. They will improve the preparedness of the electricity system to support the EU's binding target for 2030 of minimum of 42.5% renewables in the gross final energy consumption (with the aspiration to reach 45%), and full decarbonisation by 2050. They will **enable further electrification of demand** and will enhance the **competitiveness of the European value chain**, reduce pressure on resources (also by making technologies 'circular by design') and decrease dependencies. Such solutions would also enable a better EU resilience to climate risks.
9. The solutions will **improve consumer awareness and engagement** in the energy transition, via innovative offers and services (e.g. demand response, energy communities) and will target different types of consumers, including "hard to reach" population groups (such as energy poor or low-income households). This will result in increased trust in, and uptake of the new products and services entering the energy system.

As regards **Carbon capture, use and storage (CCUS) and carbon dioxide removal (CDR)**:

10. Accelerated deployment of carbon capture, use and storage (CCUS) as a CO₂ emission mitigation option in electricity generation and/or in industry applications, as well as carbon dioxide removal for negative emissions.

Main expected outcomes

As regards **renewable energy**:

1. **Energy producers, clean tech manufacturing industries and consumers** benefit from improved efficiency and flexibility, reduced cost, improved reliability, resilience, competitiveness and security of a portfolio of renewable energy and renewable fuel technologies, compared to existing ones.
2. **Technology providers** profit from emerging technology development that is more based on circularity (including of raw materials), that is safe and sustainable by design, less polluting and less impactful on human health, nature and biodiversity. Furthermore, they will benefit from successful demonstration and de-risking of a portfolio of renewable energy and renewable fuel technologies resulting in improved access to financing through better understanding of the bankability of this portfolio. They will also be better placed to request support from other funding schemes closer to market and exploit synergies across such schemes with a view to achieve more effective market uptake, business models, increased competitiveness and commercialization avenues.
3. **Researchers, industry, public authorities, and citizens** have access to increased knowledge, assessment methods and tools on the environmental (both positive and negative) and socio-economic impacts of the different renewable energy and renewable fuel technologies along their lifecycle and value chains.
4. Better alignment of public and private R&I priorities and of funding mechanisms through the **implementation of the Strategic Energy Technology Plan (SET Plan)**, supported and facilitated by science-based evidence.
5. Collaboration and knowledge exchange through the implementation of the missions and innovation communities of **Mission Innovation** and the **African Union – European Union**

Climate Change and Sustainable Energy partnership, supported and facilitated by joint research and demonstration activities with international and African partners, and the IEA Technology Collaboration Platforms, in alignment with the external dimension of the European Green Deal and the Global Gateway Strategy.

6. **Policy makers and regulators** are provided with evidence to accelerate permitting procedures, harvest benefits from multiple uses of land and water, and increase the public acceptance of innovative and sustainable renewable energy projects, minimizing negative environmental impacts and improving the regulatory framework.

Priority will be given to those R&I needs having high contribution to the competitiveness of the EU industries and the EU energy security, to long-term EU targets of renewable energy technologies, and the diversification of member state's needs.

As regards **energy systems, grids and storage**:

7. **Grid operators, providers of energy technology and services, and researchers** benefit from Improved knowledge base used for the modernisation of energy networks and their operation, markets and services.
8. **Energy consumers and prosumers, and system operators** profit from the accelerated integration of the energy system and uptake of renewables, advanced electrification, and digitalisation, backed by an interoperable, flexible data ecosystem, artificial intelligence (AI) solutions, digital twins and a common European energy data space.
9. **Grid operators** have access to innovative digital solutions to enhance the observability, real-time situational awareness, controllability, resilience, cost effectiveness and flexibility of energy grids – even under increasingly more frequent extreme climate events.
10. **System operators** capitalize on improved system management practices, including through integrating real-time decision-making assisted by AI solutions.
11. **Providers of technology and services** have access to innovative and cost-effective energy storage (integration) solutions, that provide reliable flexibility to the energy system by interfacing with a variety of renewable energy sources, reduce total cost of grid operation and address off-grid situations.
12. **Technology providers** take advantage of minimised use of critical raw materials by ensuring, to the best extent possible, their reuse and recycling. They enjoy increased competitiveness across the whole of the value chain offering energy grids and storage applications.
13. **Technology providers, grid operators and consumers** reap the benefits of accelerated development of DC grids (including HVDC and LVDC systems) and hybrid AC-DC grids that are ready for the massive deployment of offshore energy, increased integration of renewables and increased electricity demand stemming from the electrification of building, mobility, and industry sectors. The energy players effectively manage the enhanced integration of power electronics at all system levels, supporting the development of more resilient, smart and flexible grids.
14. **Consumers and citizens**, including those on low income and affected by energy poverty, benefit from more innovative products and services, including energy sharing and services that monetise demand side flexibility.

As regards **Carbon capture, use and storage (CCUS) and carbon dioxide removal (CDR)**:

15. Improved technologies to capture CO₂ from powerplants and/or industrial installations at higher energy efficiency and CO₂ purity.
16. Improved technologies to remove carbon from the atmosphere (e.g. improving the feasibility, efficiency and cost performance of Direct Air Capture).
17. Planning and development of regional CCUS demonstration projects or clusters (with potential to scale-up through e.g. the Innovation Fund)

4. Efficient, sustainable and inclusive energy use

This Destination contributes directly to the Strategic Plan's Key Strategic Orientations '*Green transition*', '*Digital transition*' and '*A more resilient, competitive, inclusive and democratic Europe*'. In line with the Strategic Plan, the overall expected impact of this Destination is to contribute to the '*Using energy in buildings and industry in an efficient, affordable and sustainable way*'.

To deliver on the objectives of this Destination, actions will be programmed addressing buildings and industry.

Addressing main policy priorities

By making the energy use in buildings and industries more efficient, affordable and sustainable, this Destination contributes to the achievement of the **EU's climate and energy objectives** including long-term climate neutrality and the "energy efficiency first" principle.

The main political priority to which this destination contributes is the European Green Deal and the implementation of the "Fit for 55" package, notably the revised Energy Efficiency Directive, Energy Performance of Buildings Directive and the Renewable Energy Directive. At the same time, by boosting energy efficiency and lowering energy demand in buildings and the industry, it aims at reducing the EU energy dependencies, in line with the objectives of the REPowerEU communication, as well as contributing to higher EU competitiveness and the (upcoming) EU Clean Industrial Deal, Industrial Decarbonisation Accelerator Act and Electrification Action Plan.

This Destination contributes also to the EU Adaptation Strategy, the EU digital agenda and biodiversity targets (given the multiple impacts of the built environment on biodiversity), to EU policies for air quality and industrial emissions, and to the Clean Industrial Deal by contributing to creating lead markets for low-carbon materials and quality jobs in the green economy.

As regards **buildings**, this Destination will deliver the solutions that can contribute to **increased energy renovation rates** and **reduce energy consumption in buildings**, in line with the objectives of the Renovation Wave. By relying on the Built4People co-programmed partnership's broader actions, it will consider aspects such as health, comfort, safety, affordability, user-centricity and social innovation, accessibility, equity and inclusiveness, both at the level of individual buildings and at neighbourhood and district level. In doing so, this destination will also contribute to the European Commission priority on **affordable housing** and the upcoming **Citizens Energy Package** and to reducing energy poverty, as people will need to spend less money on keeping their homes at temperatures to ensure adequate comfort levels.

This Destination will strengthen synergies with other complementary initiatives, including the Driving Urban Transitions partnership, the Mission on Climate-neutral and Smart Cities, the New European Bauhaus facility as well as the Strategic Energy Technology Plan (SET Plan) and its implementation working group on buildings.

As regards **industry**, this Destination will deliver the solutions that can contribute to reduce the GHG and other pollutants' emissions of the EU energy intensive industries; notably by switching to low-carbon non-fossil energy sources/carriers and improving energy efficiency, while preserving/improving EU industry competitiveness.

It should be noted that the bulk of R&I support related to energy-intensive industries is in Cluster 4 'Digital, Industry and Space', notably the Processes4Planet and Clean Steel partnerships, covering industry-related topics and complementing Cluster 5.

Expected impacts

As regards a **highly energy-efficient and climate neutral European building stock**:

1. The energy performance of the European building stock is improved at an accelerated pace, contributing to the EU's energy security, while the buildings and the built environment have reduced climate and environmental impact throughout their life cycle.
2. The energy renovation and construction of buildings are cost-efficient, affordable and less disruptive.
3. The buildings are increasingly interacting with the users, energy system and their environment while operating in an integrated, resilient, secure, smart and flexible manner.
4. The buildings and the built environment are more climate resilient, accessible, inclusive and delivers multiple benefits which improve the quality of life, health and well-being for all users.

As regards **industry**:

5. The energy efficiency of EU energy intensive industries is improved, their consumption of fossil fuel and their GHG and other pollutants emissions are drastically reduced, notably through cost-effective electrification, use of renewable energy, heat recovery, thereby preserving / enhancing their global competitiveness.

Main expected outcomes

As regards a **highly energy-efficient and climate neutral European building stock**:

1. Measurable reduction in the energy demand of buildings together with reduced related costs, and reduced energy performance gap between as-designed and as-built.
2. Quantifiable increase in the number of options for new zero-emission buildings and energy renovations with higher level of sustainability, whilst contributing to multiple co-benefits in the built environment.
3. Measurable increase in the use of digital tools, robotic and automated solutions for the design, construction, renovation, and maintenance of buildings.
4. Measurable improvements in the smart readiness of buildings, in the integration of renewable energy sources and energy storage solutions, and smart grid management, resulting in optimized building performance, energy efficiency, responsiveness to energy grid signals and increased flexibility in grid/network management and operations.
5. Measurable reduction in whole-life-cycle greenhouse gas emissions of buildings through the application of circular approaches, the use of low-carbon materials and construction products, and the availability of related standards.
6. Quantified impact of energy-related policies on housing supply and affordability and increased insight into alternative policy pathways for affordable housing.

7. Quantifiable increase in the options available for enabling a positive energy balance and carbon neutrality at neighbourhood and district level, and in municipal heating and cooling plans, with demonstrated replicability on a larger scale in different contexts.

As regards **industry**:

8. Measurable improvement of solutions for industrial excess/waste heat recovery, storage, upgrade and conversion to power, in terms of efficiency and cost.
9. Measurable improvement of flexible and hybrid high temperature furnaces, combining electricity (local PV, wind or via grid) and/or renewable (solar) heat with burners using (bio)gas, optimized for high efficiency, low emissions and low cost.

It will be a priority to create synergies and complementarity with topics of cluster 4, notably those of the notably the Processes4Planet partnership.

5: Clean and competitive solutions for all transport modes

This Destination contributes directly to the Strategic Plan's Key Strategic Orientations '*Green transition*', '*Digital transition*' and '*A more resilient, competitive, inclusive and democratic Europe*'. In line with the Strategic Plan, the overall expected impact of this Destination is to contribute to the '*Achieving sustainable and competitive transport modes*'.

To deliver on the objectives of this Destination, actions will be programmed in the areas of zero-emission road transport, aviation, waterborne transport as well as transport-related health and environment. The areas of rail and air traffic management will be addressed through dedicated Institutional European Partnerships and are therefore not included in this document.

Addressing main policy priorities

To support the 'irreversible shift towards zero emission mobility', an historic opportunity to make European transport and mobility more sustainable, more circular and more competitive globally. To support the Zero Pollution Action Plan, in particular with respect to the Clean air policy goals.

Expected impacts

As regards **zero-emission road transport**:

1. Accelerated uptake of a zero-tailpipe emission ecosystem, with interoperable technological solutions developed at system level (vehicles, infrastructure, user and energy grid) that support the global competitiveness of the EU transport and mobility system.
2. Zero-tailpipe emission mobility solutions developed that are affordable, efficient, user-friendly, inclusive, safe and circular with concepts and technologies that are easy to deploy, considering needs, behaviours and socio-economic conditions of all end-users.
3. Clean mobility solutions for a climate neutral and environmentally friendly and zero pollution mobility with a higher level of circularity;
4. Increased responsiveness of zero tailpipe emission vehicles and systems to diverse societal interests and concerns.

As regards **aviation**:

5. Enable breakthrough technologies and innovations that will contribute to the design (addressing also eco-design and circularity principles), manufacturing, maintenance and operations of new generation aircrafts, also powered by renewable energy and sustainable aviation fuels, for a competitive and clean EU aviation ecosystem (including airports).
6. Derisk and accelerate the introduction of new digital technologies (with emphasis on AI) at all levels in the industrial aviation ecosystem, while addressing all safety-related issues in collaboration with the European Union Aviation Safety Agency (EASA).

As regards **waterborne transport**:

7. Higher autonomy range in electric and hybrid vessels.
8. Uptake of renewable and low carbon fuels and improved knowledge on the suitability of innovative renewable and low carbon fuels and other energy carriers for waterborne transport.
9. Support the objectives of the European Port Strategy and Waterborne Industrial Strategy, contributing the role of ports as energy hubs, improving efficiency and safety through digitalization, improving the resilience and security of the transport network, as well as increasing the competitiveness of the industrial and technology EU capabilities.
10. Significant reduction of emissions from large vessels due to the merging of energy efficiency and renewable and low carbon fuels.
11. Sustainability of waterborne transport by design, considering air and water pollution, circularity and life-cycle assessments in shipbuilding.
12. Improved safety of seafarers, port workers and the environment.

As regards **transport-related environment and health**:

13. The better monitoring of the environmental performance and enforcement of emissions regulation and biodiversity protection in order to reduce the overall environmental impact of transport (e.g.: as regards biodiversity, noise, pollution and waste) on human health and ecosystems.

Main expected outcomes

As regards **zero-emission road transport**:

1. Heavy-Duty Battery Electric Vehicles and long distance zero-emission people mobility eco-systems with decreased investment and risks, and improved energy efficiency, affordability and global competitiveness, also balancing demand and supply of energy with improved energy efficiency.
2. Charging solutions for EV mass market supporting maximal flexibility, smart charging, affordability, energy efficiency, saving cost and time.
3. Software Defined EVs provide clear benefits in terms of users' value, cost, energy demand and ensuring users' acceptance.
4. Zero tailpipe emission vehicle solutions with higher level of circularity.
5. Efficient fire prevention and mitigation systems for all EVs.

As regards **aviation**:

6. Cost efficient design of new aircrafts through advanced materials and recyclability.
7. Increased safety through digital aviation technologies.

As regards **waterborne transport**:

8. Various ship types capable of reaching at least 150 nautical miles relying on battery energy storage systems alone.
9. Bunkering solutions for zero-emission shipping, supporting fuel flexibility and safety.
10. Higher levels of circularity and life cycle approaches in shipbuilding, design, retrofitting, operation and decommissioning of vessels.
11. Holistic ship design and retrofitting supporting several energy efficiency solutions.
12. Digital and secure solutions to improve the efficiency, safety and security (physical and cyber) of the waterborne transport network.
13. Identification of vessel water emissions harmful to the environment and developing innovative solutions and strategies to eliminate them.

As regards **transport-related environment and health**:

14. Advanced monitoring techniques under a broad range of operating conditions for regulated and non-regulated pollutants emanating from transport applications and their impact on human health and environment

6. Safe Resilient Transport and Smart Mobility services for passengers and goods

This Destination contributes directly to the Strategic Plan's Key Strategic Orientations '*Green transition*', '*Digital transition*' and '*A more resilient, competitive, inclusive and democratic Europe*'. In line with the Strategic Plan, the overall expected impact of this Destination is to contribute to the '*Multimodal systems and services for climate-neutral, smart and safe mobility*'. Actions under this destination will also contribute to implementing the Strategic Action Plan on Road Safety and the EU Road Safety Policy Framework 2021-2030 (next steps towards vision zero). To deliver on the objectives of this Destination, actions will be programmed addressing Connected, Cooperative and Automated Mobility (CCAM); Multimodal and sustainable transport systems for passengers and goods; as well as safety and resilience.

Addressing main policy priorities

Fostering a smarter, more efficient, safer, and climate-resilient transport network that maximises existing assets, minimises resource use, and reduces environmental impacts. The expected impacts would directly support key policy spending targets for climate action, digital transformation and inclusiveness by promoting the use of sustainable transport modes in logistics, leveraging digital solutions to enhance operational efficiency, transparency, resource optimisation across transport systems, and enhancing rural-urban connectivity.

Expected impacts

With regards to **Connected, Cooperative and Automated Mobility (CCAM)**:

1. Improved mobility for people and goods in all weather conditions, ensuring safe, shared, inclusive, affordable, attractive, and accessible door-to-door mobility, for private and public transport in mixed traffic and confined areas, as well as open roads.
2. Seamless integration of CCAM solutions into existing transport ecosystems to ensure interoperability, promote multimodality, enhance traffic safety, catering to diverse user needs and behaviors.
3. Resilient, climate-neutral, and sustainable mobility solutions with reduced carbon footprints, resulting in greener, less congested, cost-effective, and demand-responsive transport systems.
4. Increased competitiveness of the transport system using secure and hyper-advanced technologies such as real-time perception, situational awareness, and decision-making systems, based on Artificial Intelligence (including Edge and Generative AI), satellite navigation, smart traffic management, and tools for software development for CCAM applications.

With regards to **multimodal and sustainable transport systems for passengers and goods**:

5. Enhanced resilience of transport networks through improved operational efficiency for both passenger and intermodal freight transport, future-proofed mobility systems supporting EU competitiveness while ensuring affordable and accessible transport for all passengers.

With regards to **safety and resilience**:

6. Drastic reduction in road fatalities for all types of users, especially on rural areas
7. Improved resilience of the public transport system via the use of AI
8. Advanced technologies and methods for improved reliability in complex environments for aviation

Main expected outcomes

With regards to **Connected, Cooperative and Automated Mobility (CCAM)**:

1. Demonstration and validation of real-world CCAM scenarios and use cases, including remote operations, for mixed traffic environments, public transport, shared mobility, as well as freight logistics, on both open roads and confined areas, with high public acceptance of solutions.
2. Accelerate the advancement of safe and cybersecure key enabling technologies for resilient and robust CCAM solutions based on a software defined vehicle approach, safe and energy efficient real-time perception and decision-making systems, photonics and GenAI.
3. Integration of CCAM in multimodal transport ecosystems for safe and trustworthy interactions with all transport users, addressing critical scenarios such as emergencies and unplanned events, and providing recommendations for national road authorities, transport operators, service providers, local authorities towards a fast deployment in Europe.
4. Scale up of CCAM solutions through a dedicated European framework: expand the EU knowledge base on CCAM (collection and exchange of R&I insights, best practices, scenarios, CCAM testing and validation data), harmonise evaluation methods at EU and national level through the EU-CEM,

and align with European initiatives such as the European Data Spaces and Digital Vehicle Initiative to accelerate market uptake and boost the digital realm within the transport sector.

With regards to **multimodal and sustainable transport systems for passengers and goods**:

5. Enhance resilience of transport networks by increasing capacity through optimised use of existing infrastructure, intermodality, automation, multimodal hubs, etc.;
6. Reduce emissions and increase efficiency and competitiveness of long-haul and regional freight transport and logistics, including the supply chain optimisation;
7. Enhance affordable, reliable, and accessible multimodal transport for inclusive rural and urban connectivity.

With regards to **safety and resilience**:

8. Considerable improvements in road safety in rural areas for all users through the development and implementation of appropriate tools for the use of local and regional authorities
9. Guidelines and tools, derived from advanced technologies and AI, to support public transport operators to ensure minimal disruption in unexpected and critical situations
10. Enhancing Resilience and Accuracy in Positioning, Navigation, and Timing (PNT) Systems for aviation
11. Enhanced road safety analysis and data collection methods to support a pan-European information system for road safety indicators (e.g. fatalities, serious injuries)