

STRIA Roadmap on Transport Electrification (ELT)



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With the transport sector being the source of 25% of all CO₂ emissions, electrification can be expected to contribute significantly to greenhouse gas reductions because it is an energy efficient technology that at the same time enables the use of renewable energy sources for transport. The increasingly decarbonised electricity generation will provide cleaner electricity to propel electric vehicles. Electric vehicles will be able to provide storage services to the grid, favouring further expansion of renewables.

The development of energy storage technologies and devices remains the cornerstone of a fully electrified transport system integrated in a clean energy network. Decreasing battery costs while increasing their energy density and lifetime will speed up electrification of road transport. The deployment of a network of recharging points covering the whole European Union road network is another key enabling condition for transport electrification.

The Strategic Transport Research and Innovation Agenda (STRIA) Roadmap for Transport Electrification aims to bring forward the developments carried out in the framework of the European Green Vehicles Initiative and encourage multi-sectorial and multi-disciplinary research and innovation activities aiming, inter alia, at innovative powertrains, electric storage systems, electric components and systems and vehicle-infrastructure interfaces, while contributing to the improvement of the energy transport system efficiency.

These factsheets are available on the TRIMIS portal (<https://trimis.ec.europa.eu>), and aim at providing a summary of the main features and targets identified in each of the seven STRIA Roadmaps.



Current Developments



ROAD - The number of battery-electric and plug-in hybrid vehicles on the road is increasing. Vehicle manufacturers are launching dedicated models on the market, grid operators are installing public charging infrastructures and governments are funding multiple demonstrations and pilots, and creating framework conditions, regulations and incentives for the purchase and use of electric vehicles. In addition, electric bicycles and pedelecs are now more common. Electrification of road vehicles has been extended to delivery vans, light trucks and buses, and larger electrified trucks are being developed.



RAIL - On busy lines electrification makes economic sense. On low-density lines there is no proven cost-efficient solution to replace diesel-powered trains. Nonetheless, when return of investment for electric wiring is not possible due to the frequency and the usage of certain lines, hydrogen and fuel cells can be considered as an alternative.



AIRBORNE - The aviation sector is in the midst of a pioneering era with regard to electro-mobility. Currently, electro-mobility for aircraft only exists in the single/twinseater categories and consists of retrofits of existing conventional designs with reduced payload capability. Regarding fixed-wing commercial aviation, at current technology levels the development of even a hybrid-electric passenger aircraft appears challenging.



WATERBORNE - Ships use electrical power on board to support service and loads. This includes fans, pumps, compressors, cranes, lighting, heating, electronics and computing. On-board diesel generators are used to supply these loads in port, however to improve local air quality the use of shore based plug-in electrical supplies is being encouraged. Ships are propelled by mechanical and electrical means. Around 2,500 ships in the world are powered by electric propulsion including cruise liners, shuttle tankers, offshore support vessels, liquefied natural gas tankers and ferries. Electric propulsion offers advantages in performance and/or efficiency over traditional mechanical drives which are popular in vessels that operate over long distances. Integrated Full Electrical Propulsion systems are commonly found in ships from passenger vessels, liquefied natural gas tankers, shuttle tankers, cruise ships, ferries and offshore support vessels. All-electric battery powered ships are emerging for shorter ferry routes up to 50km.



Key Research and Innovation Pathways

The Roadmap sets out key priority research and innovation (R&I) actions for electric mobility in each transport mode until 2050. The scope of the activities in the area of transport electrification takes into account both advanced power-train technologies and new vehicle architectures, weight reduction, improved aerodynamics and rolling resistance and component development for alternative fuel vehicles. The following table highlights identified key R&I actions until 2050.

ROAD TRANSPORT



- Promote a low cost 400+ kilometre range for electric passenger cars
- Development of small and light smart electric vehicles
- Support performance improvement and cost reduction of urban bus electrification
- Promote public and commercial procurement of electric vehicles
- Support redevelopment of test/drive cycles and standardisation for electric vehicles
- Develop EU electro-chemical systems for future high-density electric vehicle batteries
- Support EU production of batteries, components and electric vehicles
- Demonstration of electrified road systems for heavy duty vehicles

RAIL TRANSPORT



- Electrification of secondary network to increase utilisation of electric motorisation
- Development of new motorisation
- Intensify electric freight rail transportation
- Develop intermodal hubs in cities
- Develop light vehicles
- Minimise the losses of electric railway infrastructure through smart power grids for rail
- Increase energy savings towards minimising fossil energy utilisation
- Regulation to harmonise energy characteristics for rails in the EU

WATERBORNE TRANSPORT



- Raise public awareness of benefits of electric vessels
- Deploy new materials and technologies to enhance battery safety and on-board energy optimisation
- Support innovative financing tools, while cutting the cost of large waterborne batteries
- Support education and training linked to new industries as in energy storage systems
- Research and development with focus on new materials
- New business models facilitating the deployment of new technologies such as multi MW shore side power supplies

AIRBORNE TRANSPORT



- Improvement of energy storage systems
- Achieve maturity in High Temperature Superconductors
- Electric aircraft design
- Airport electrification by electrified support vehicles and charging infrastructure deployment
- Develop skills and competences for a specialised interdisciplinary work force
- Regulation towards decreasing cost and increasing product development speed

Strategic Transport Research and Innovation Agenda



The Strategic Transport Research and Innovation Agenda (STRIA) outlines future transport research and innovation priorities to decarbonise the European transport sector.

STRIA is one of five interlocking dimensions set out in the Energy Union strategy that provides a framework to achieve EU energy and climate goals. It supports the vision of a clean, connected and competitive European transport system.

In coordination with Member States and transport stakeholders, STRIA aims to set out common priorities to support and speed-up the research, innovation and deployment process leading to radical technology changes in transport.

STRIA builds on and integrates seven thematic transport research areas:

- Connected and automated transport (CAT);
- Transport electrification (ELT);
- Vehicle design and manufacturing (VDM);
- Low-emission alternative energy for transport (ALT);
- Network and traffic management systems (NTM);
- Smart mobility and services (SMO); and
- Transport infrastructure (INF).

STRIA is also the interface between other relevant sectors such as energy and information and communication technology.

About TRIMIS



The Transport Research and Innovation Monitoring and Information System (TRIMIS) supports the implementation and monitoring of STRIA and its seven roadmaps.

TRIMIS is the analytical support tool for the establishment and implementation of STRIA, and the Commission's instrument for mapping technology trends and research and innovation capacities in the transport field, as well as monitoring progress against the targets set for all the transport sectors.

TRIMIS is an open-access information system to map and analyse technology trends, research and innovation capacities, as well as monitor progress in the transport sector.



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