Connact
Mobility & Logistics

Consiglio Nazionale delle Ricerche
STEMS
Istituto di Scienze e Tecnologie per l'Energia e la Mobilità Sostenibili

SUSTAINABLE MOBILITY

Brussels, 4 February 2026

Connact
Annual Meeting

IL SISTEMA ITALIA E LE PRIORITÀ DELL'UNIONE EUROPEA

WHAT IS SUSTAINABLE MOBILITY?

THE UNITED NATIONS DEFINITION

According to the UN, it is a system of services and infrastructure for the mobility of people and goods:

- It promotes economic and social development
- It protects future generations
- It's safe, accessible, efficient, and resilient
- It reduces emissions and environmental impacts

THE THREE PILLARS OF SUSTAINABILITY

Economy

- Fosters economic growth and employment
- Requires fair tariffs
- Importance of accessible public transport

Society

- It must bring social benefits
- It must be safe
- Guarantee fair access to goods and services

Environment

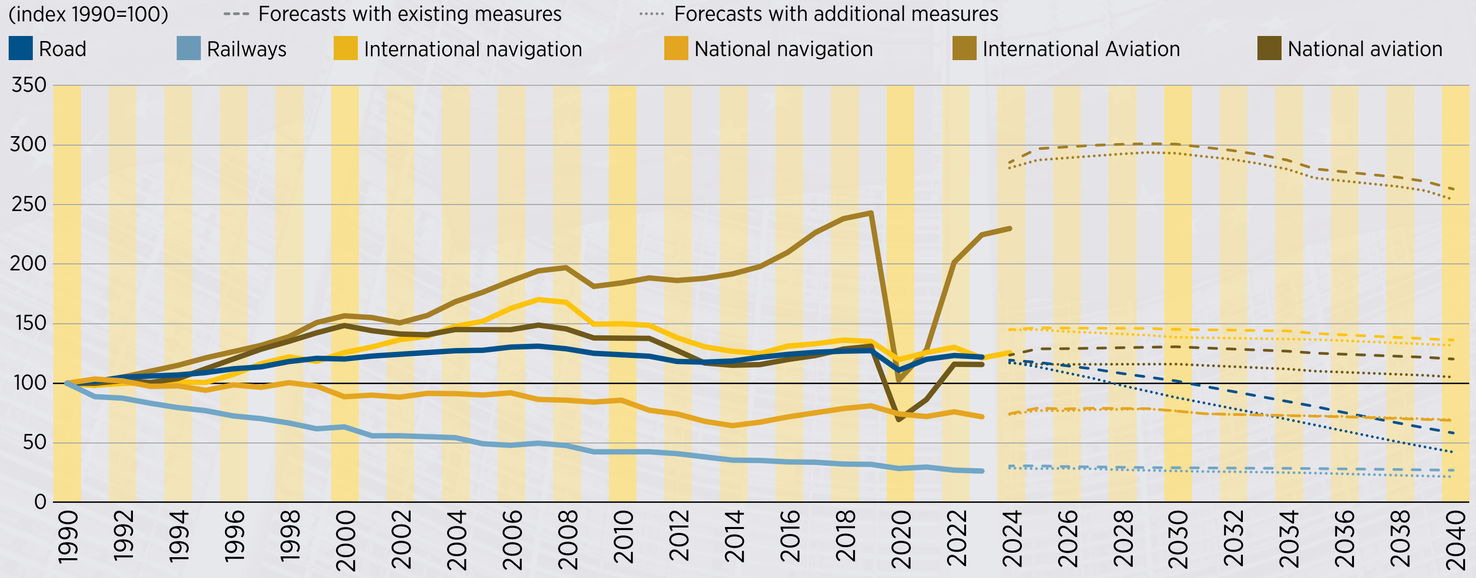
- It must reduce environmental impact
- It must limit carbon emissions
- It must be "green"

THE STATE OF THE ART

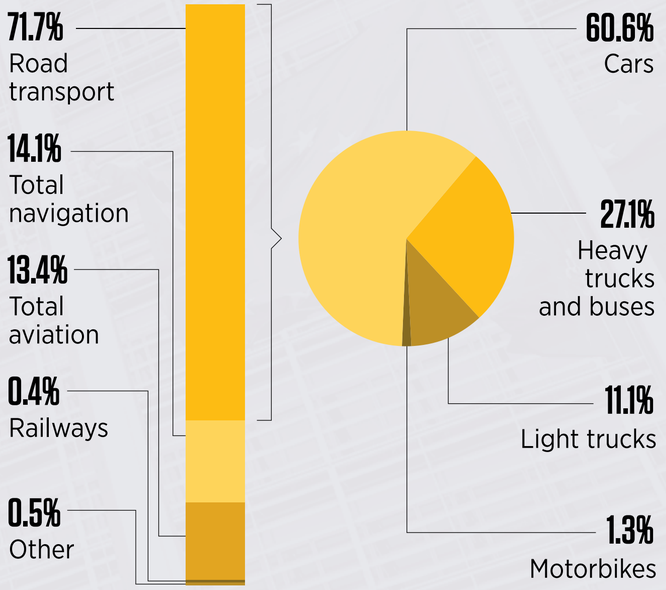
GREENHOUSE GAS EMISSIONS IN THE EUROPEAN UNION

The transport sector is a major source of greenhouse gas emissions and plays a key role in achieving climate targets. An analysis of the trend over time and the breakdown by mode of transport highlights the critical points on which action needs to be taken.

Emissions by means of transport



The focus on transport



Source: European Environment Agency

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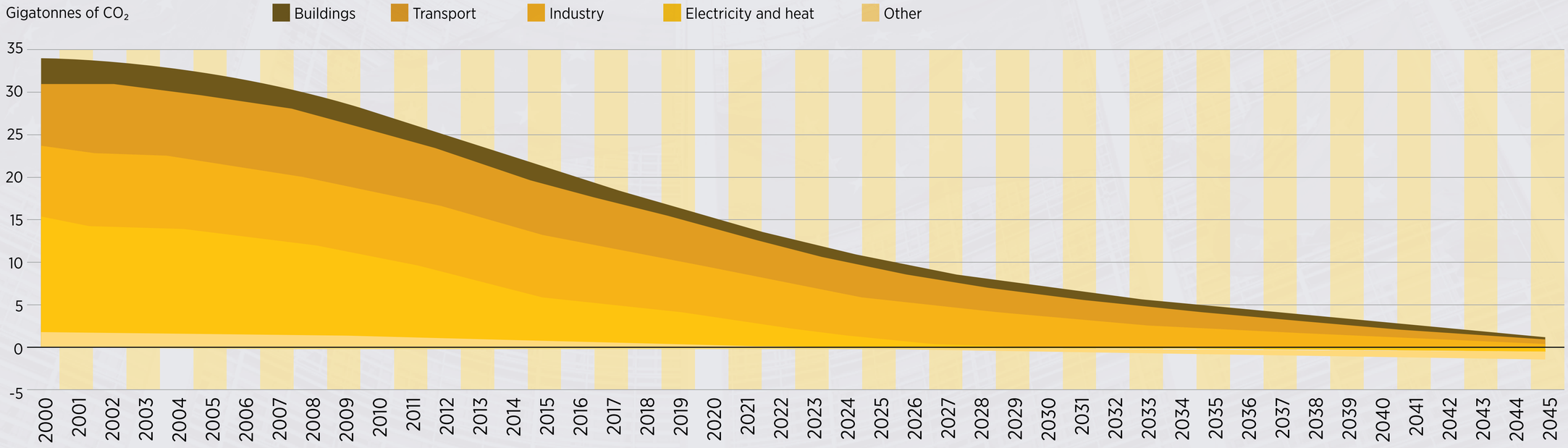
04 February 2026

THE ROADMAP TO 2050

THE MAIN STEPS TO ACHIEVE NET-ZERO

The EU's emissions roadmap is based on the European Climate Law (EU Regulation 2021/1119), which sets a binding objective of climate neutrality (net-zero emissions) by 2050, with an intermediate target of a 55% reduction by 2030 compared to 1990 levels.

The trend



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THE ROADMAP TO 2050

THE MAIN STEPS TO ACHIEVE NET-ZERO

2021-2025

- Stop the approval of new coal-fired power plants without emission abatement
- Stop sales of fossil fuel boilers
- Stop approval of new oil and gas fields

2030

- Universal energy access
- Strong expansion of solar and wind power
- Electric cars 60% of global sales

2035

- Stop the sale of new cars with internal combustion engines
- Electric heavy trucks 50% of sales
- Net-zero-emission electricity in advanced economies

2040

- Net-zero-emission electricity globally
- 50% of existing buildings upgraded to zero emission standard
- 50% of aviation fuels with low emissions

2050

- Achieving zero net emissions
- Over 90% of heavy industrial production with low emissions
- Almost 70% of electricity generated by solar and wind power

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THE FIVE GOALS FOR THE FUTURE

THE SCENARIOS

Safe and efficient transport systems
Reducing consumption and emissions throughout the life cycle of transport systems, improving safety and reliability.

Interconnection of modes and means
Integration of different transport systems to ensure continuity, accessibility and efficiency, in the movement of people and goods.

Intelligent transport infrastructure
Digitised and resilient networks and nodes, capable of managing traffic, vehicles, and services in a secure and interoperable way.

Mobility as a service and last-mile logistics
Flexible and sustainable mobility and distribution services, user-oriented and supported by digital technologies.

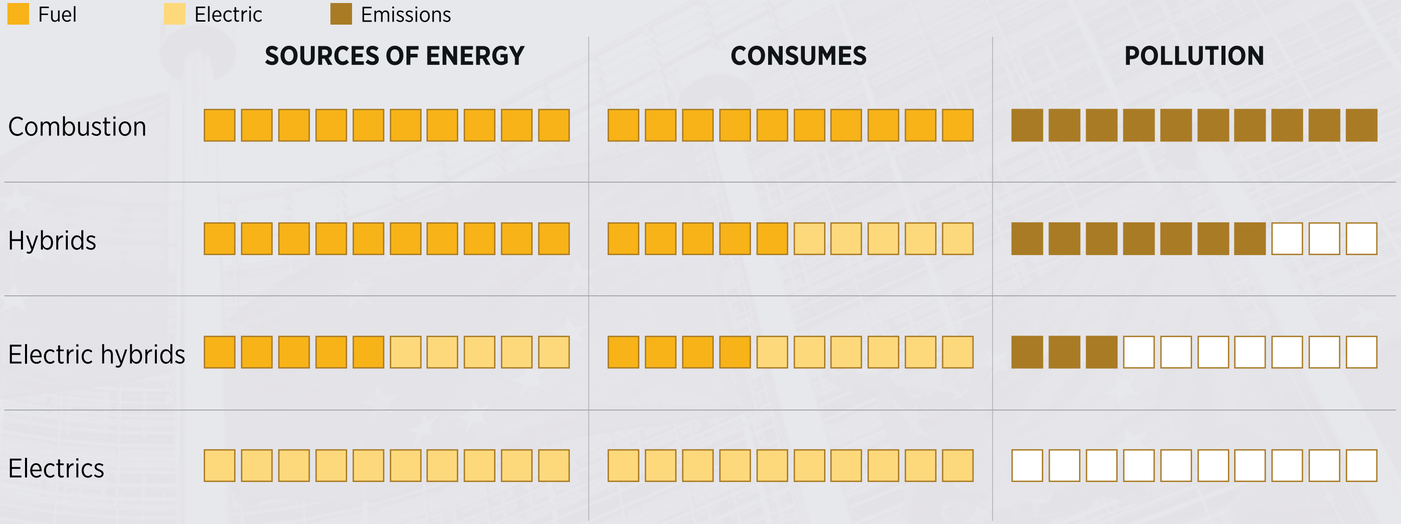
Connection and automation
Connected and automated technologies to increase safety, efficiency and acceptability of transport systems.

SAFE AND EFFICIENT TRANSPORT SYSTEMS

SOURCES AND EMISSIONS BY FUEL TYPE

The evolution of transport systems, from conventional to electric vehicles, shows a **progressive improvement in energy efficiency** and a reduction in tailpipe emissions (tank-to-wheel), to the point of zero emissions in fully electric vehicles.
This requires the re-conceptualisation and re-engineering of means of transport, together with a more efficient use of renewable energy, to reduce the environmental impact throughout the entire life cycle.

Vehicle performance

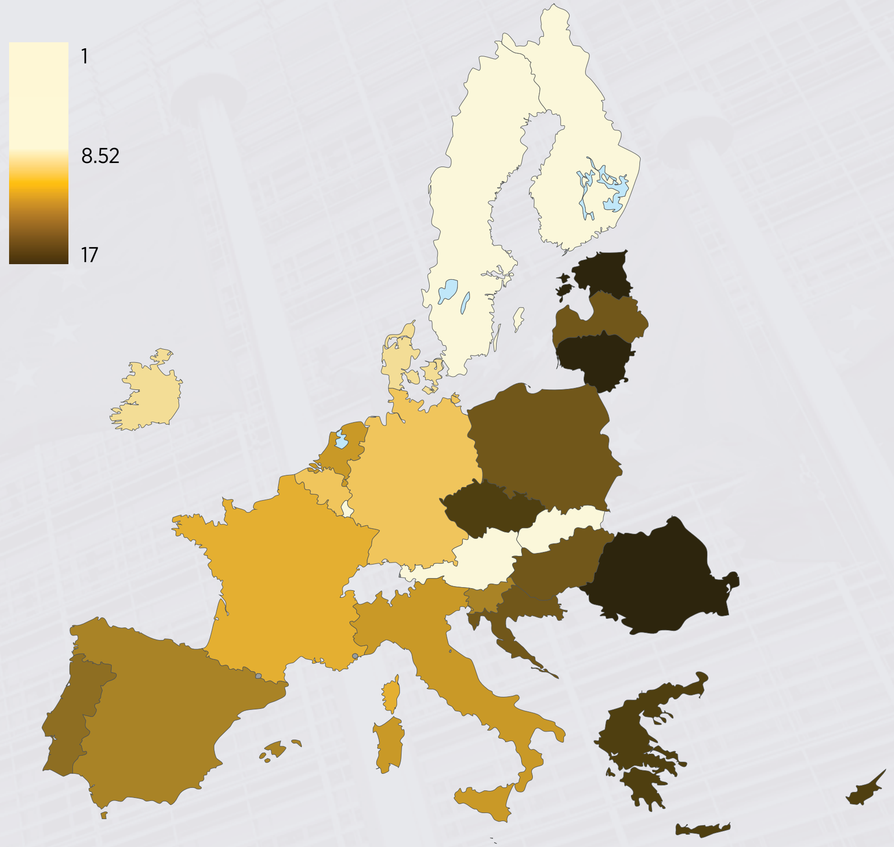


SAFE AND EFFICIENT TRANSPORT SYSTEMS

THE CURRENT SITUATION

The EU vehicle fleet is on average **old**, with an average age of almost **12 years** for cars and even higher values for **vans, trucks, and buses**.
There are big differences between countries, but in many cases the oldest vehicles are precisely the commercial and public transport ones, i.e. the most polluting.

The average age of European cars



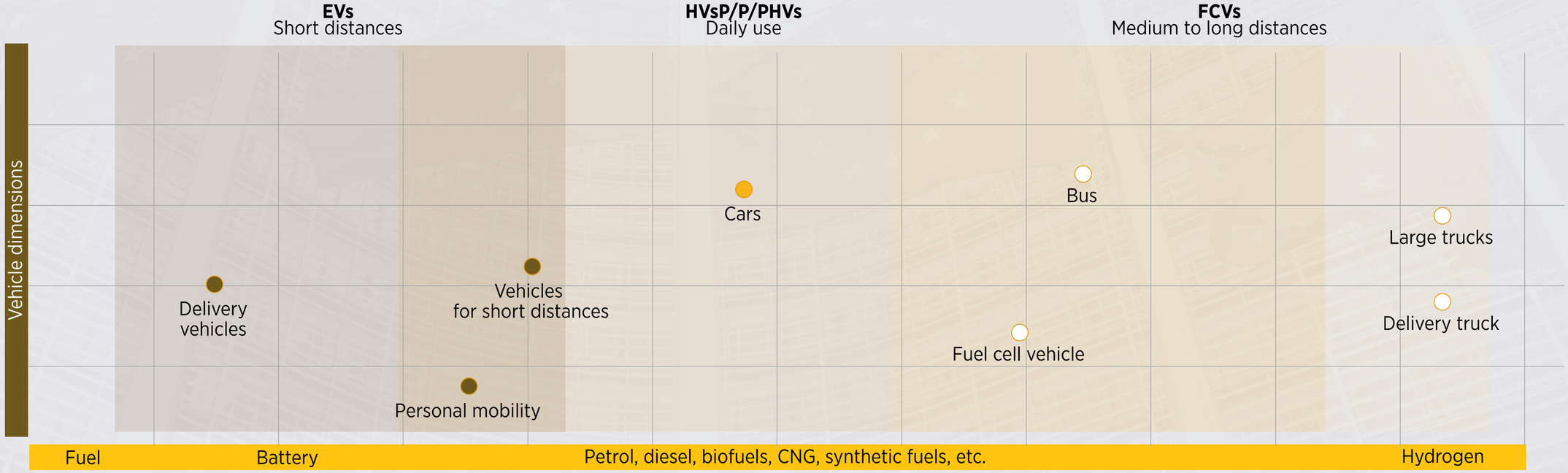
SAFE AND EFFICIENT TRANSPORT SYSTEMS

UNDERSTANDING HOW TO INNOVATE

The transition to low-emission mobility is not based on a single technological solution, but on diversification according to distance travelled, vehicle type, and intended use

Innovative propulsion and alternative to full electrification

Diversity and uses of fuels

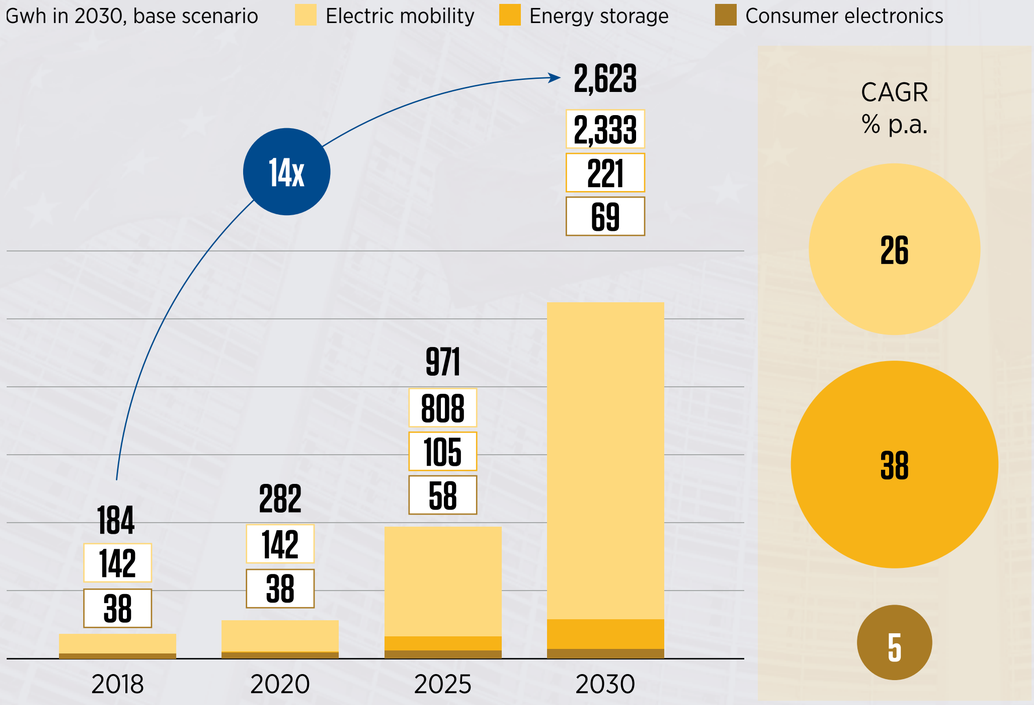


SAFE AND EFFICIENT TRANSPORT SYSTEMS

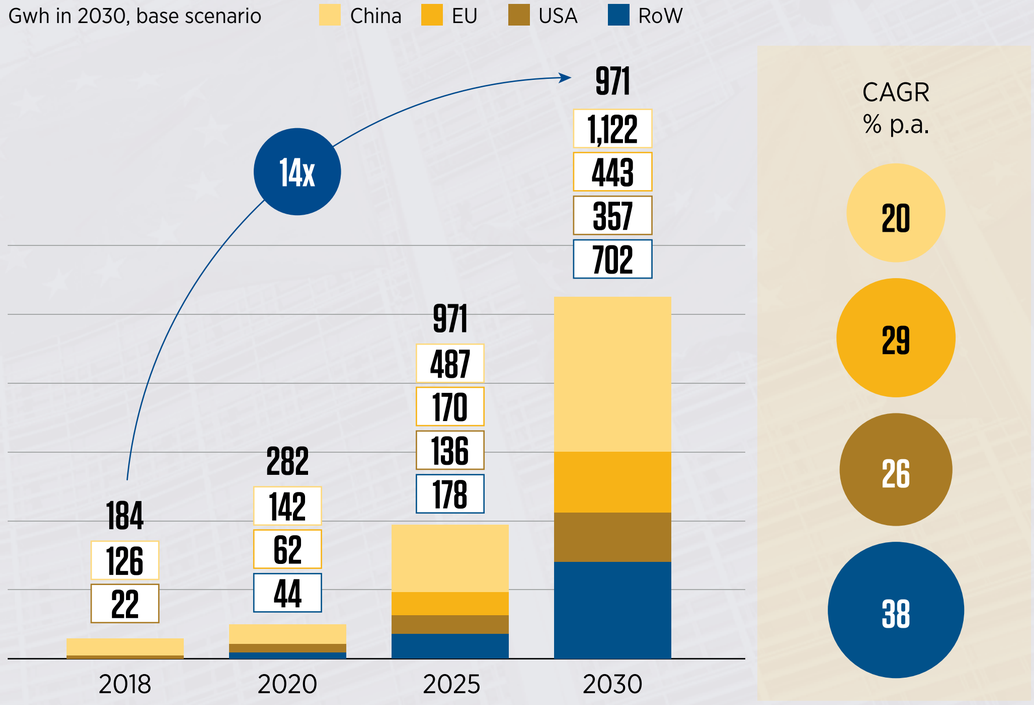
THE BATTERY PROBLEM

Global demand for batteries is set to grow rapidly by 2030, driven mainly by electric mobility.
The market today is dominated by lithium-ion batteries, a technology that is now close to its performance limits.

Global demand for batteries by application



Global demand for batteries by region



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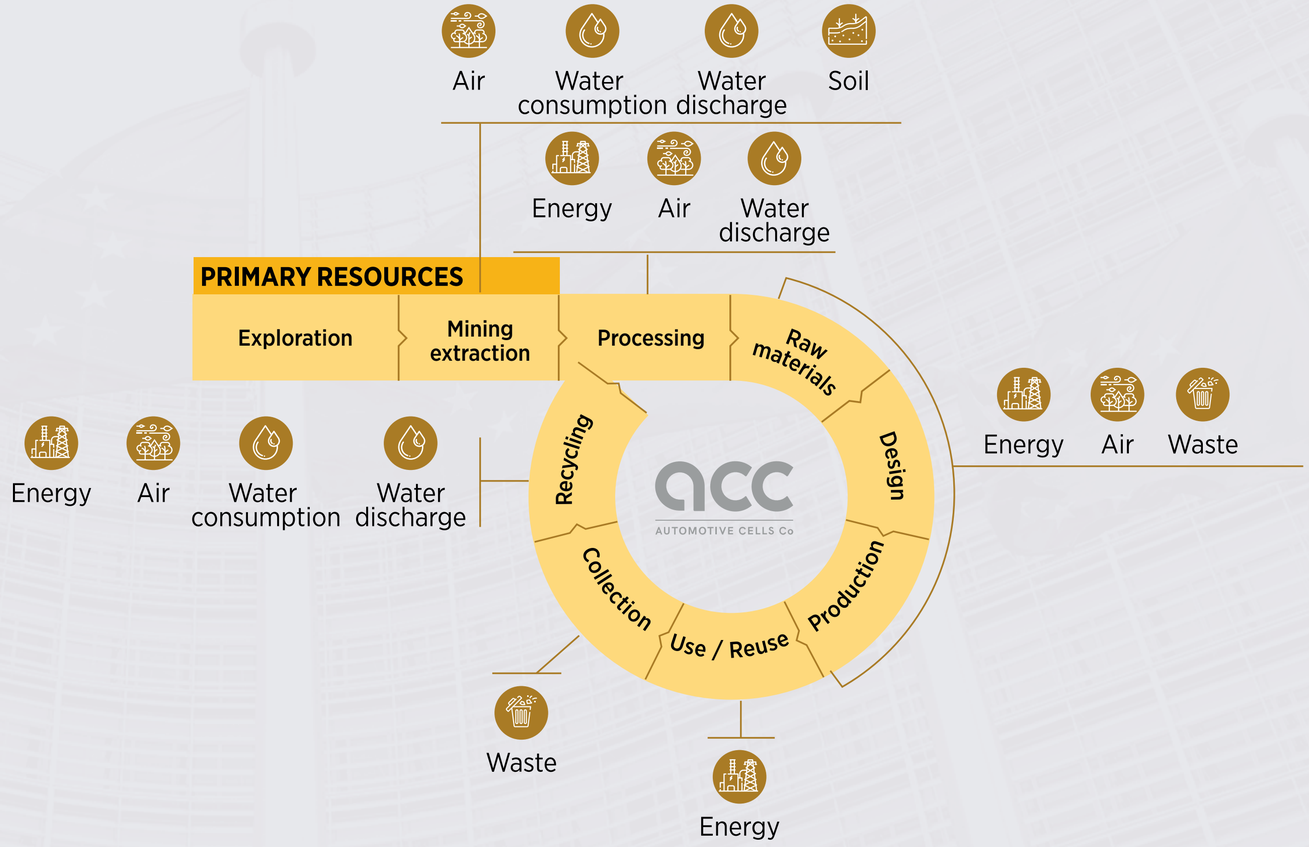
SAFE AND EFFICIENT TRANSPORT SYSTEMS

THE BATTERY PROBLEM

The production of batteries for electric vehicles requires large amounts of natural resources and energy. The extraction, processing, and production stages have a significant environmental impact.

The impact of production



INTERCONNECTION OF MODES AND MEANS

TYING THE DIFFERENT MODES OF TRANSPORT TOGETHER

The integration of air, sea, rail, and road transport, supported by intermodal hubs and terminals, optimises flows, accessibility, and continuity of travel.

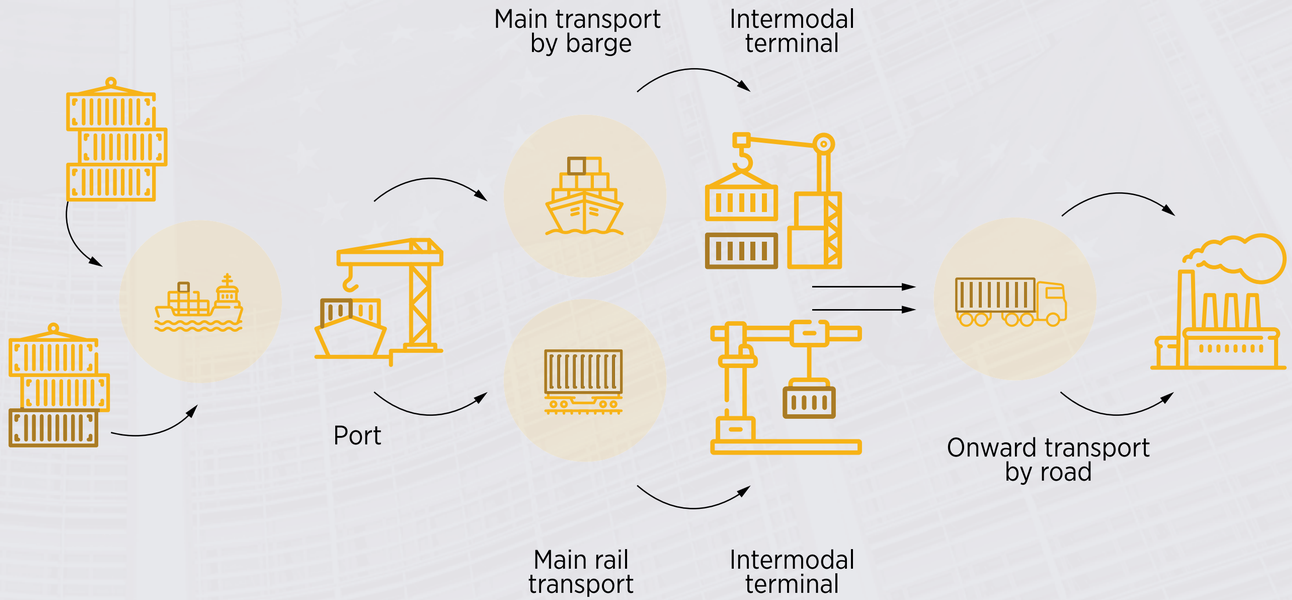
Current critical issues in the EU

- Lack of competitive parity with road transport
- Regulatory inconsistencies and shortcomings in the EU objectives on intermodality
- Insufficiency of terminals and dedicated linear infrastructure

Priority lines of action

- Modal rebalancing in favour of less impactful carriers
- Elimination of bottlenecks in major network infrastructures
- Single planning and regulatory framework, with targeted incentives

Interconnection of modes and means



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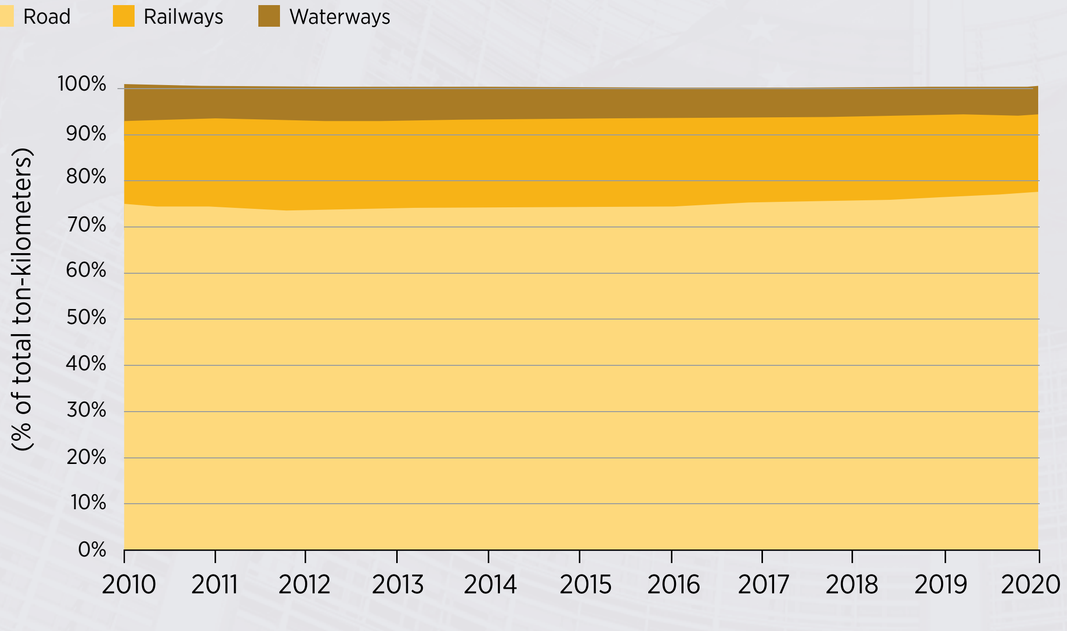
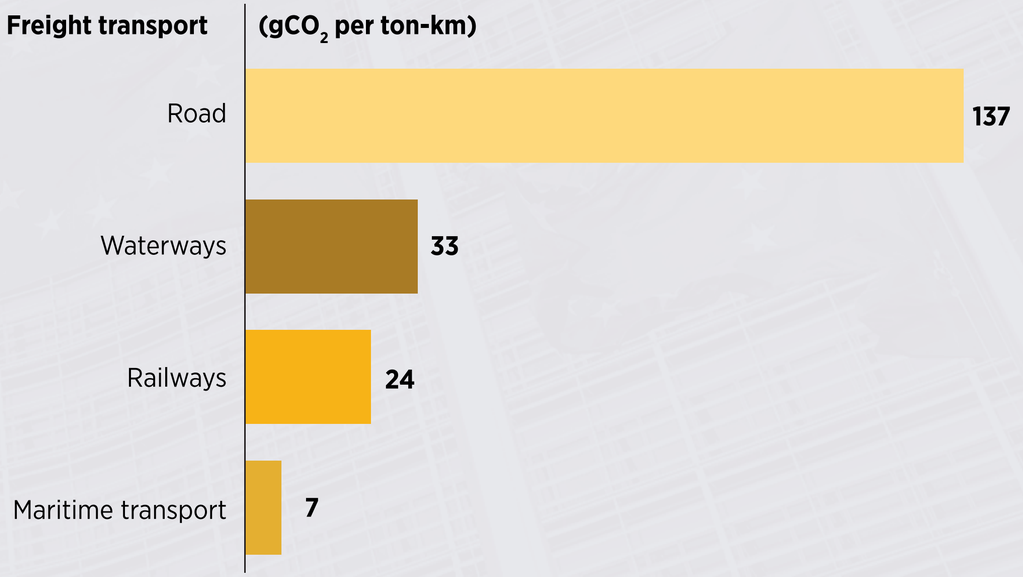
INTERCONNECTION OF MODES AND MEANS

MODAL SPLIT OF FREIGHT TRANSPORT IN THE EU

In EU freight transport, the road mode clearly prevails, despite its greater environmental impact. Modal rebalancing towards rail and waterways is essential to reduce emissions, improve safety and increase the efficiency of the transport system.

Modal split of freight transport in the EU





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INTELLIGENT TRANSPORT INFRASTRUCTURE

THE BENEFITS AND TECHNOLOGIES

Modern, digitised and resilient transport infrastructures and nodes, capable of interoperating with vehicles and traffic management systems. Intelligent solutions that improve safety, operational efficiency, and user experience, supporting electrification and sustainable logistics.

Smart Port

- Intelligent traffic and operations management
- Automation of sea-land freight flows
- Optimisation of resources and energy

Smart Airport

- Automatic gates and biometric recognition
- Digital Management of luggage, cleanliness, and maintenance
- Remote infrastructure monitoring and means

Common benefits

- Increased efficiency and productivity
- Better safety and security
- Reduction of environmental impact
- Better quality of service
- Support to economic growth

Enabling technologies

- AI
- Big Data
- Internet of Things (IoT)
- Blockchain
- 5G Networks

MAAS PLATFORMS

TO INTEGRATE ALL MEANS OF TRANSPORT INTO ONE SERVICE

Digital systems that integrate all available public and private transport means into a single service allowing users to plan, book, and pay for end-to-end movements.

Essential requirements

- **Scalability**
  Growth of users, services, and coverage without continuous redesign.
- **Interoperability**
  Integration into a heterogeneous and dynamic mobility ecosystem
- **Security and Privacy**
  Data protection integrated by design

Mistakes to be avoided

- **Simplification**
  Consider MaaS as a simple app.
- **Dependency**
  Dependence on a single supplier.
- **Fragmentation**
  Poor integration with public transport.

CONNECTION AND AUTOMATION

INCREASINGLY AUTONOMOUS VEHICLES

Autonomous vehicles represent one of the most advanced developments in intelligent mobility and a key indicator of technological evolution. The integration of automation, artificial intelligence, and advanced connectivity promises to improve road safety, efficiency, and mobility quality.

ENABLING TECHNOLOGIES FOR AUTONOMOUS VEHICLES

- IoT / IoV / IoAV
- Artificial and Edge Intelligence
- Edge Computing
- 5G and 6G
- Blockchain

THE SIX LEVELS OF VEHICLE AUTOMATION

Level 0 – No Automation
The driver has complete control of the vehicle in every situation.

Level 1 – Driving Assistance
The system supports the driver in individual functions (e.g. adaptive cruise control).

Level 2 – Partial Automation
The vehicle controls steering and acceleration/ braking, but the driver must constantly monitor.

Level 3 – Automation Conditioning
The system handles most of the driving, but requires driver intervention in specific cases.

Level 4 – High Automation
The vehicle can drive autonomously under certain conditions or in specific areas without human intervention.

Level 5 – Full Automation
No driver required: the vehicle is fully autonomous in all conditions.