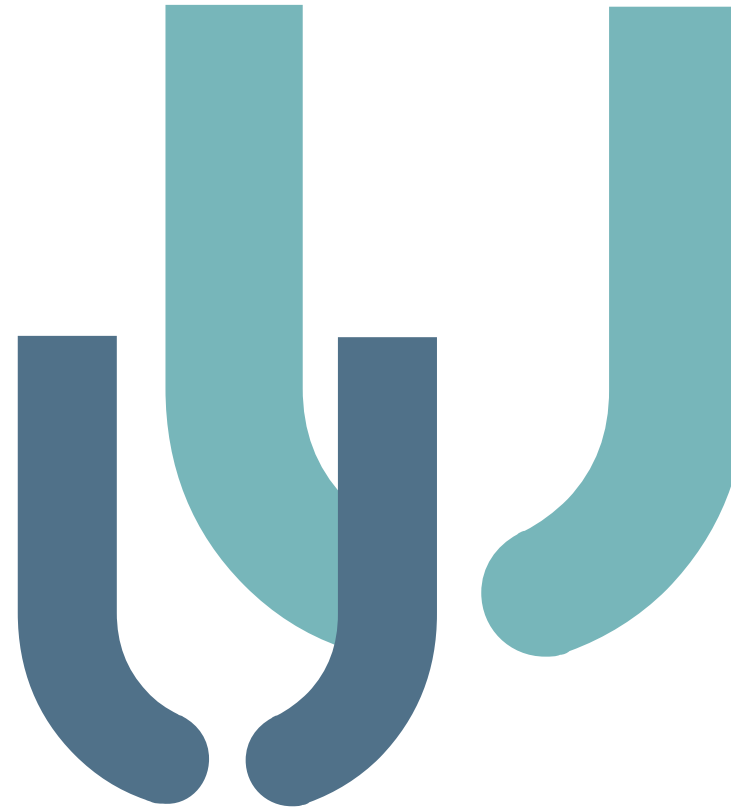


Systems Engineering and Sustainability in Commercial Vehicle Technology

Subtopic: Integration of Intelligent Transportation Systems for
Optimizing Sustainability and Efficiency in Commercial Vehicle
Operations

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31.01.2024, Kaiserslautern



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Graduate School
Commercial Vehicle Technology



AGENDA

Integration of Intelligent Transportation Systems for Optimizing Sustainability and Efficiency in Commercial Vehicle Operations

1. Introduction to Intelligent Transportation Systems and ITS/CVO
2. Intelligent Infrastructure and Vehicle Systems
3. Evaluation of the Impacts of ITS Technologies on Safety and Sustainability
4. Challenges and Future Scope

Introduction to Intelligent Transportation Systems and ITS/CVO

Systems Engineering for ITS Projects

- > Systems that integrate information processing and communication technologies with Transportation Infrastructure, Vehicles, and Users
- > Systems Engineering for complex systems
- > Collaboration among diverse stakeholders- ERTICO (European Road Transport Telematics Implementation Coordination)
- > Defining roles and responsibilities of agencies

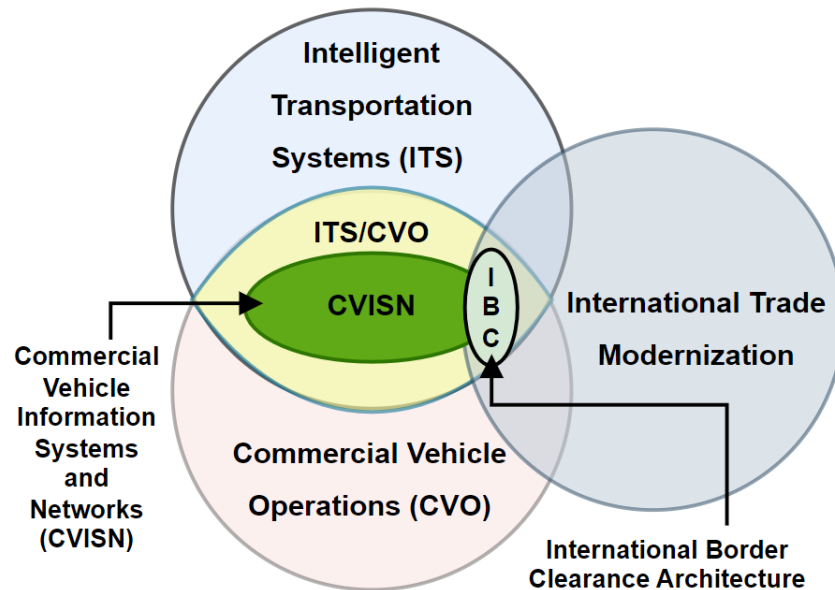


Source: Conceptual design of the ITS Project-Case in Gui'an New District, doi: 10.22617/tcs190561-2, (Nov. 2019)

Introduction to Intelligent Transportation Systems and ITS/CVO

ITS/CVO and ITS User services

- > **ITS/CVO** - Aims to enhance Safety, Mobility, Efficiency, Productivity, Energy, and Sustainability in CVO
- > Part of the National ITS program- 8 main applications and 28 sub-system user services
- > **CVISN** – Exchange of information and conducting business transactions electronically



Travel and Traffic Management
Public Transportation Operations
Electronic Payment
Advanced Vehicle Control and Safety Systems
Emergency Management, Information Management
Maintenance and Construction Management
Commercial Vehicle Operations
<ul style="list-style-type: none"> > Commercial vehicle electronic clearance > Automated roadside safety inspection > On-board safety monitoring > Commercial vehicle administrative process > Hazardous materials incident response > Freight mobility

Source: The opportunities and challenges of applying intelligent transport systems (May 2017)

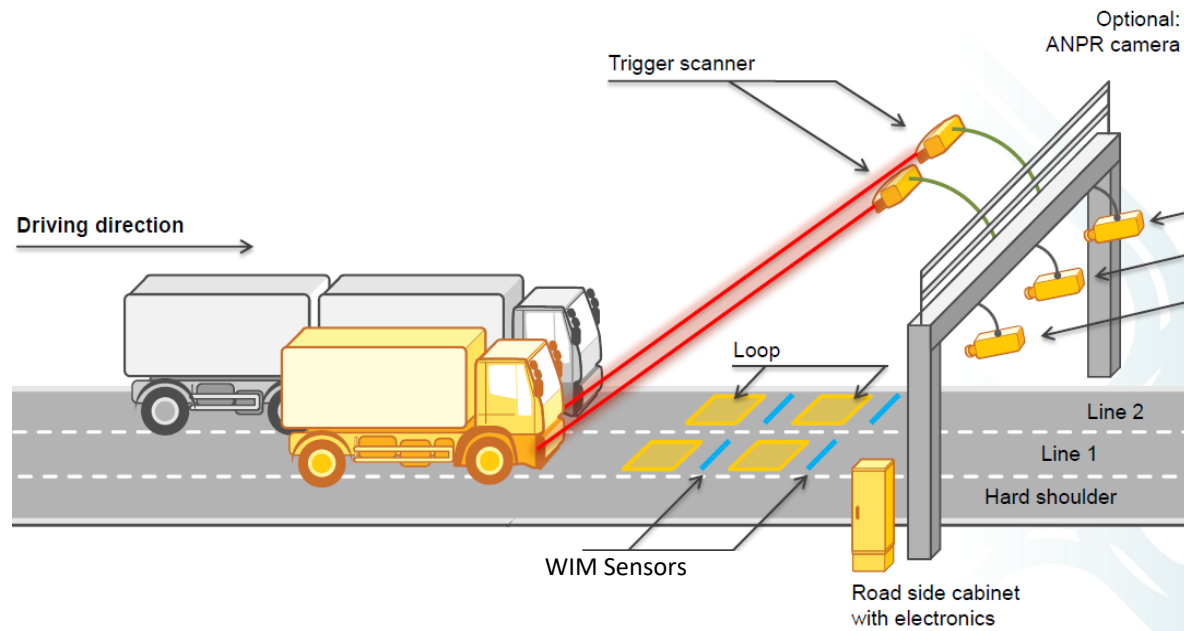
Intelligent Infrastructure and Vehicle Systems

ITS/CVO Technologies

Intelligent Infrastructure Systems

Intelligent Vehicle Systems

Co-operative ITS



Automatic Equipment Identification (RFID systems, barcodes)

Transponder for Automatic toll collection

Tyre Pressure Monitoring System

Electronic Scales

Driver Drowsiness Detection

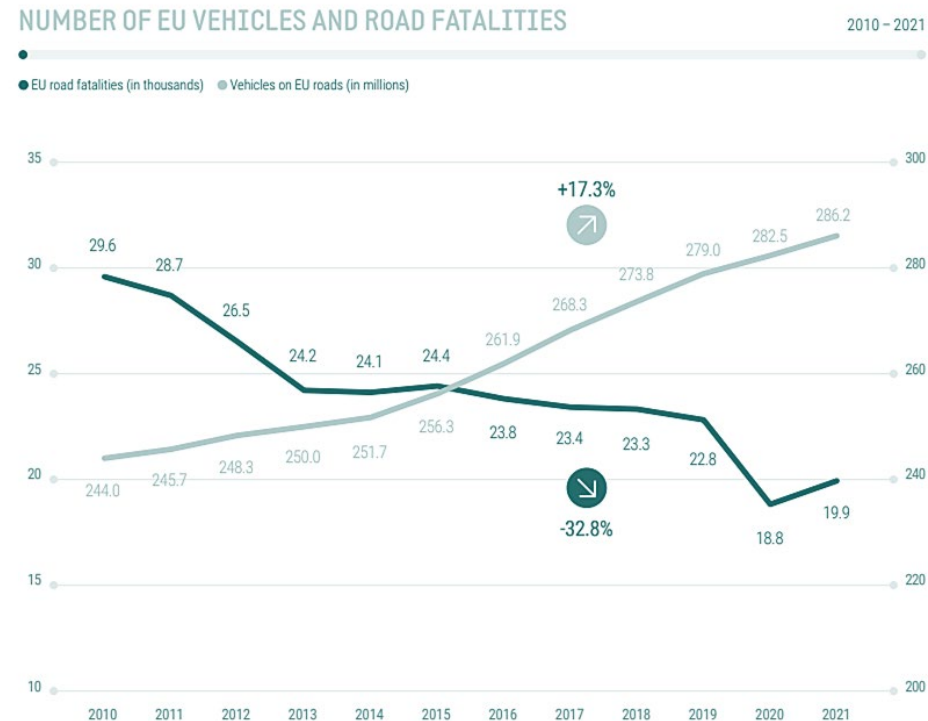
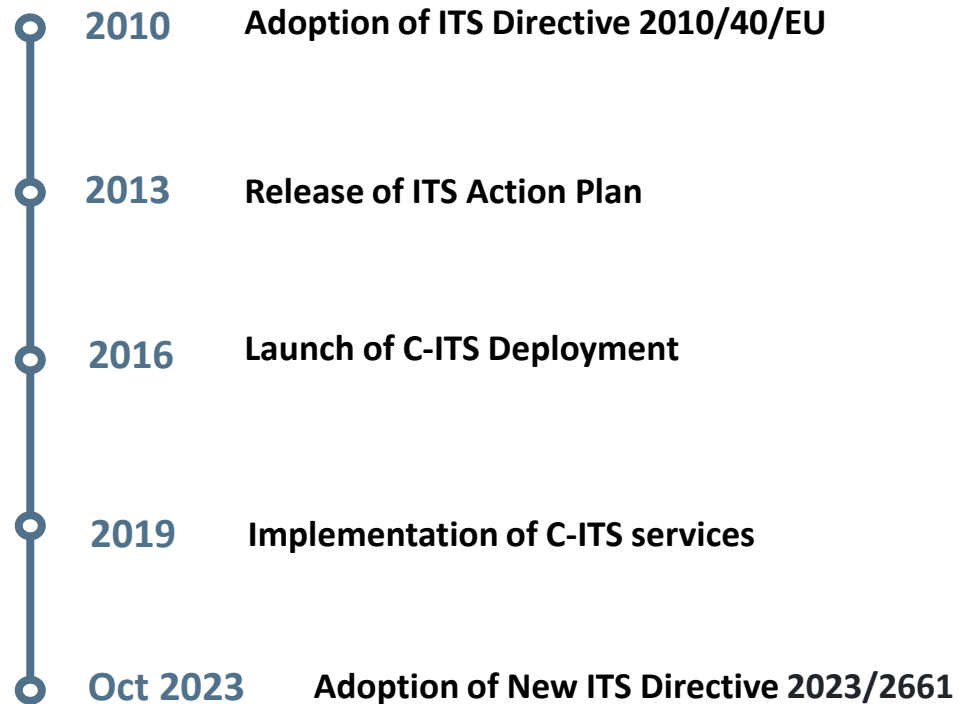
On Board Computers

Automatic Vehicle Identification (AVI tag)

Source: Weigh-in-Motion (WIM) in Czech ETS, Kapsch Cz

Evaluation of the Impacts of ITS Technologies on Safety & Sustainability

EU Progress in Transportation Sector after ITS Implementation (Data till 2023)



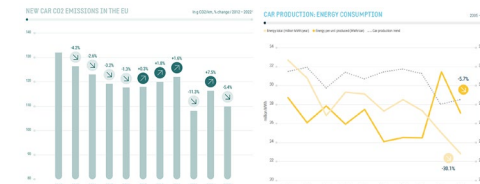
ROAD SAFETY

Road fatalities have fallen significantly since 2010 despite an increase in the number of cars on EU roads

ENVIRONMENT

CO2 emissions from new cars are down by almost 17% since 2012

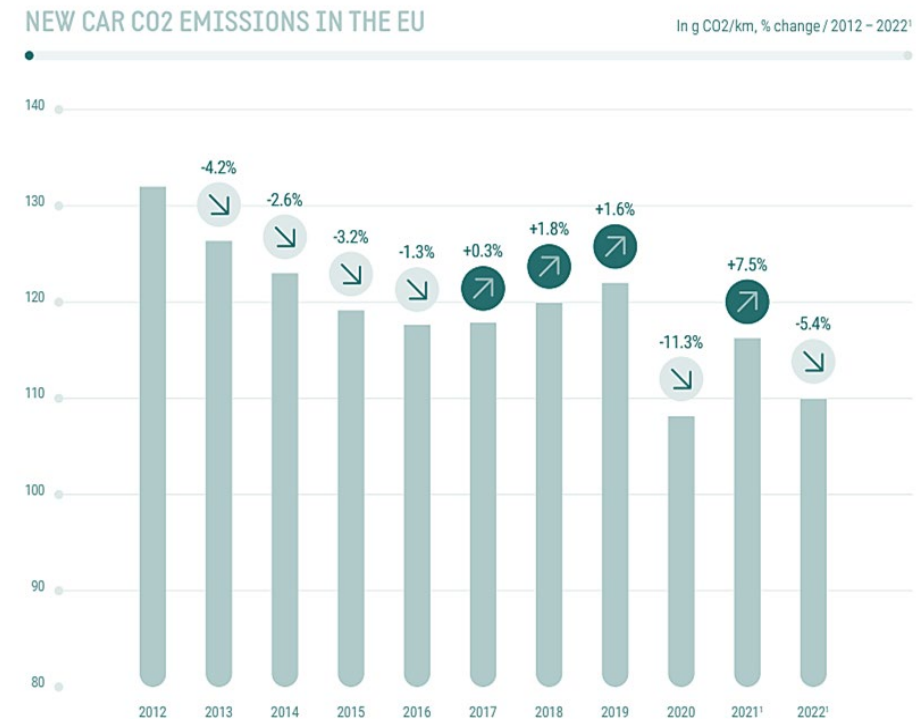
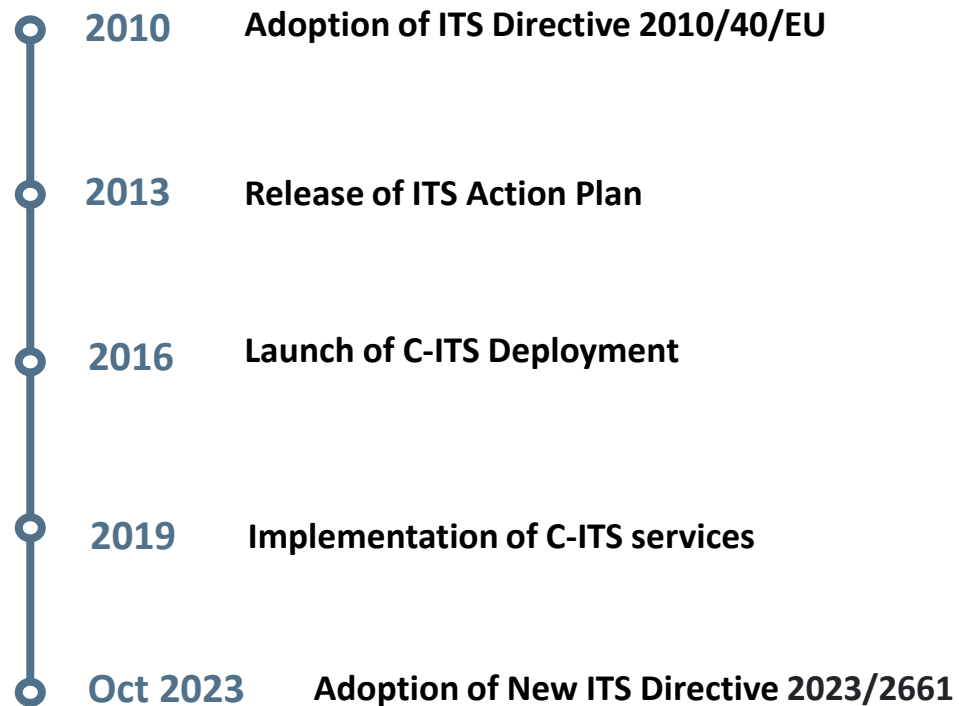
Car manufacturers have slashed energy use from production by 30% since 2005



Source: ACEA-Pocket-Guide-Report 2023-2024

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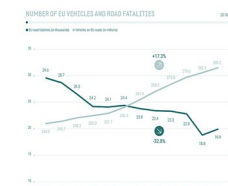
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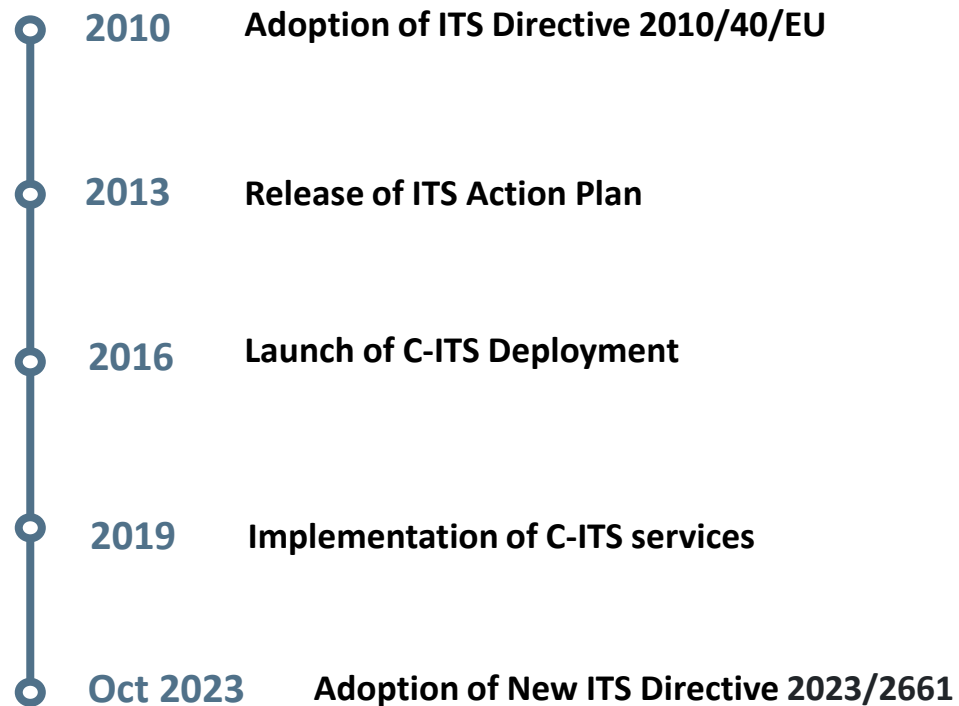
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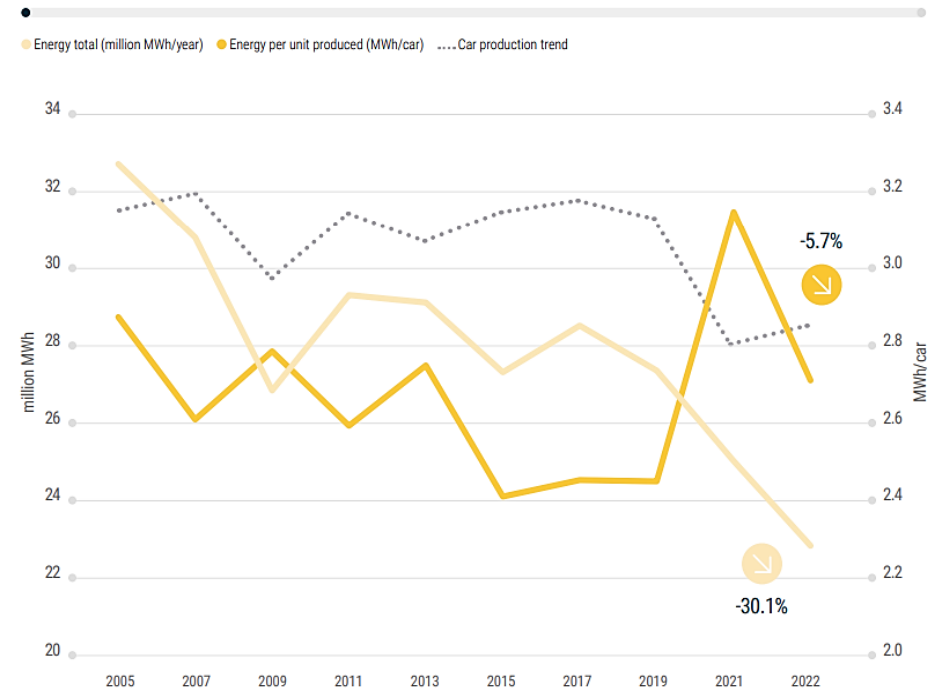
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CAR PRODUCTION: ENERGY CONSUMPTION

2005 – 2022



ROAD SAFETY

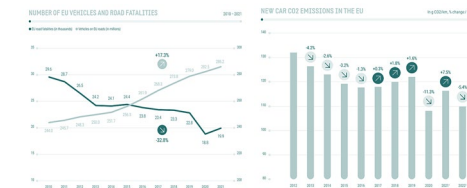
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Source: ACEA-Pocket-Guide-Report 2023-2024

Challenges and Future Scope

Challenges

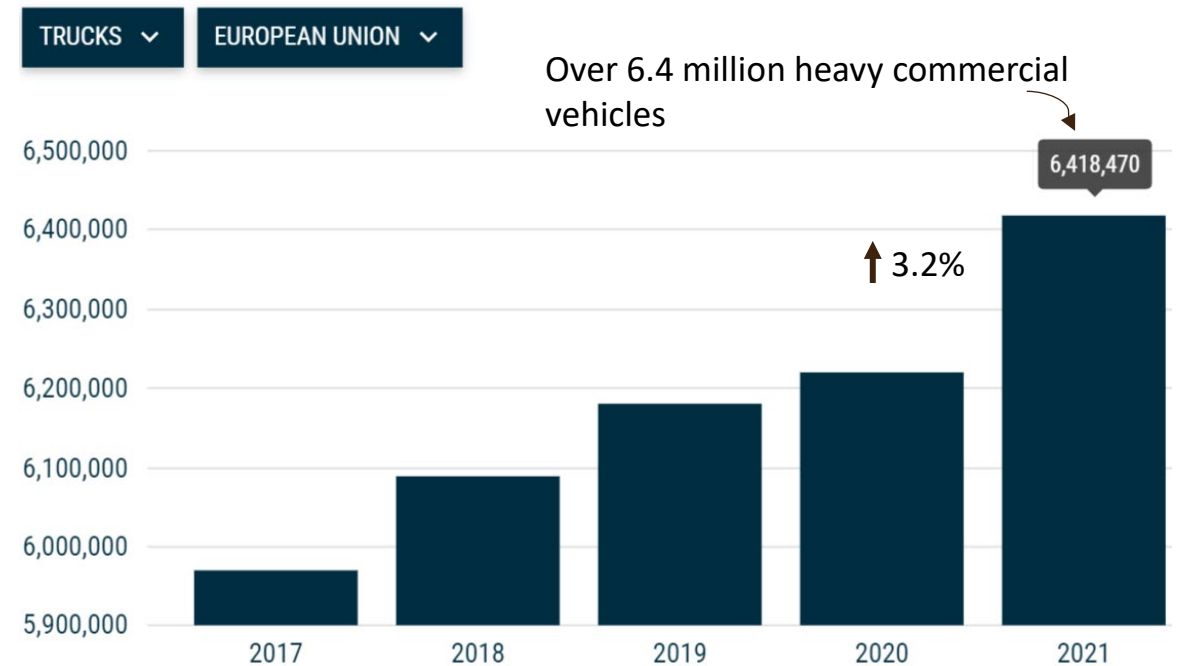
- > 15% Increase in Traffic Congestion due to Urbanization
- > Costs nearly 100 billion EUR, or 1 % of the EU's GDP
- > 96.4% trucks of EU - Diesel-powered

Future Scope

- > Effective deployment of C-ITS projects with 5G and V2X Communication
- > Interoperability with EVs and Autonomous Vehicles

EU VEHICLE FLEET: SIZE AND DISTRIBUTION

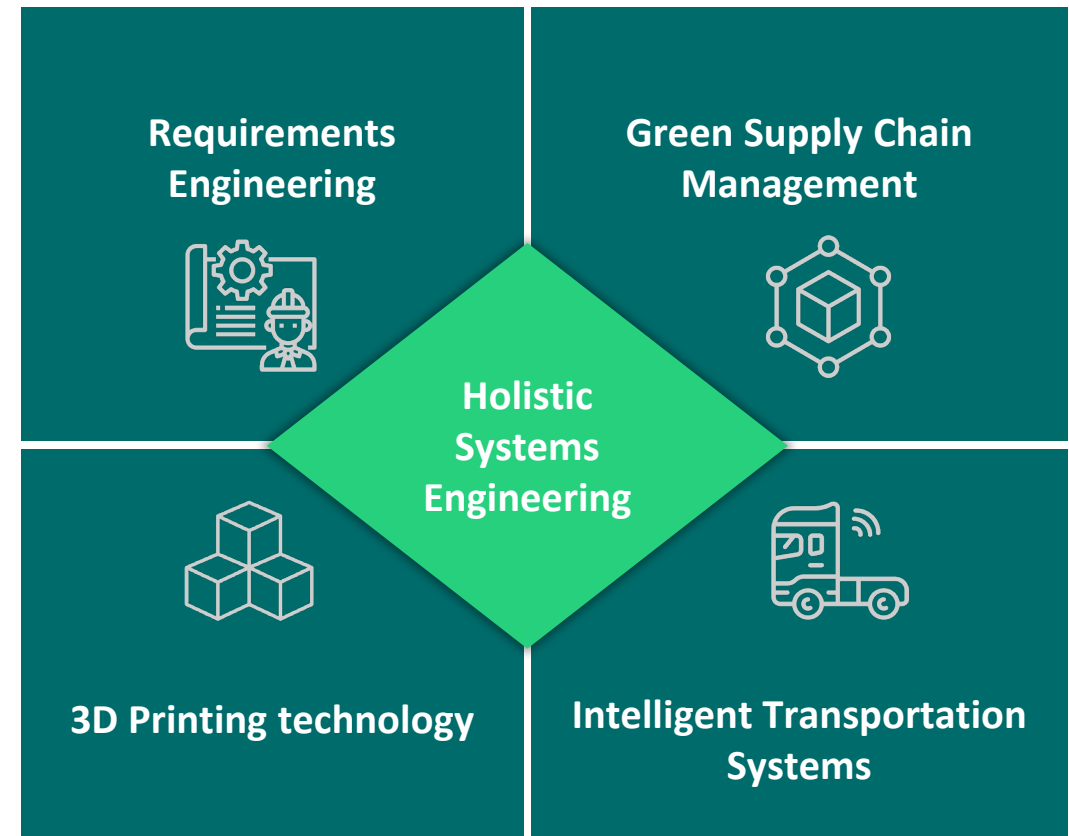
In units / 2017 – 2021

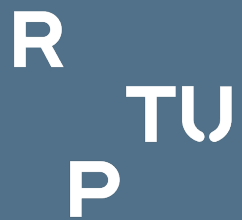


Source: ACEA Vehicles in Use Report 2023, INRIX Traffic congestion report 2023

Conclusion

- > Indispensable for a sustainable future in commercial vehicle technology
- > RE: Alignment with Overall System Goals
- > GSCM: Optimization of Entire Product Lifecycle with efficient Design, Sourcing, Manufacturing, and Distribution
- > 3D Printing: Cost-effective, Light weight solutions with customized component production
- > ITS/CVO: Optimized Safety, Traffic flow, Reduced congestion, enhanced mobility and sustainability





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Thank you!
