



Innovation in Railways – contribution to decarbonisation

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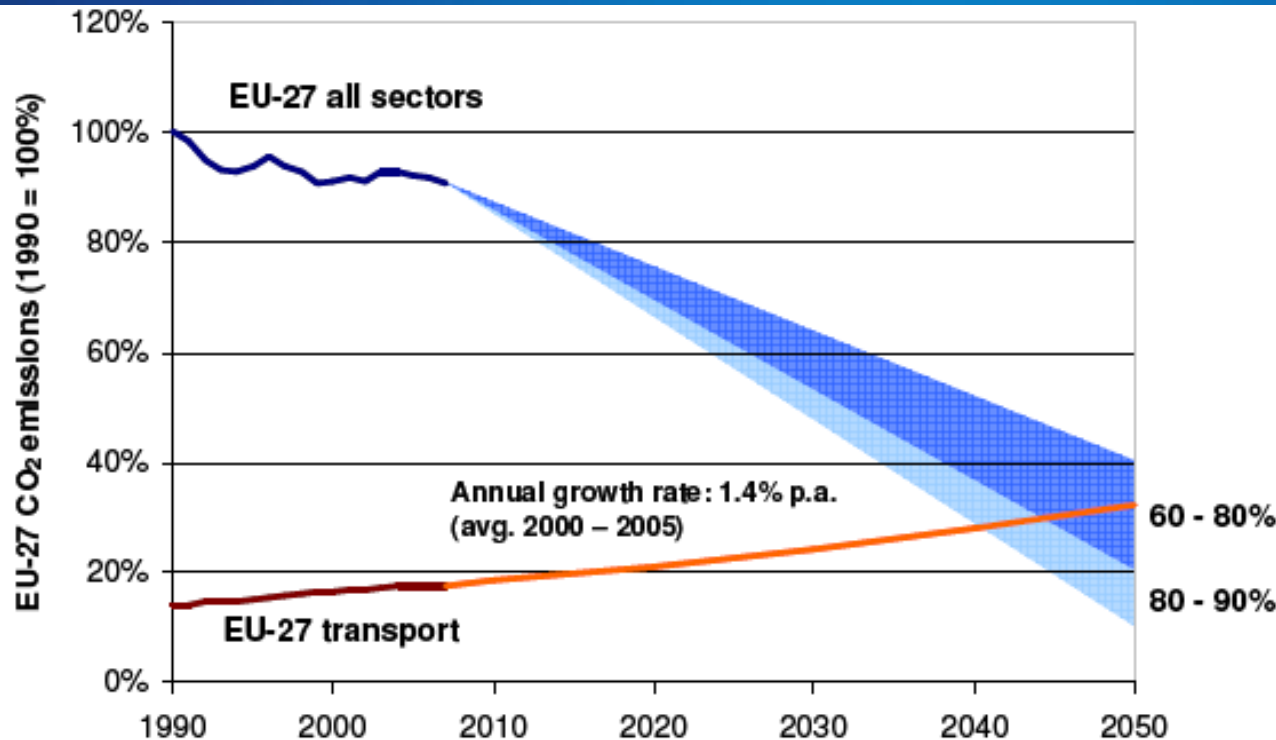


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White paper strategic objective:



First and foremost, modal shift – a different impact WTW (from Well to wheel) – sources EEA – EC.DG MOVE:

•Railways vs. Road transport: - 65-80% GHG emissions (freight transport – EU energy mix and share of diesel / electrified tracks)



Rails Role

On Energy & Sustainability the role of Railways is wide:

Rail - **least energy intensive**, widely electrified inland transport mode

→ **maximise its modal share, so far too low:**

- 11.2% for Freight ,
- ~6.5% for passengers

Rail for energy efficiency

Through:

A. Increase rail transport capacity

B. Deploy energy efficient solutions



Main drivers for capacity increase/1

A. For increasing rail capacity in the current constrained networks we have three options:

- Capacity increase at infrastructure level
- Capacity increase at train level
- Higher load factors (integration/systemic)

Main drivers for capacity increase/2

- Capacity increase at **infrastructure level**: advanced ERTMS (Level 2/3): +25-35% trains per track
- Capacity increase at **train level**: 740-m long freight trains: +27% capacity in most networks, up to 1300 pax/trains (doble-module)

Main drivers for capacity increase/3

Higher **load factors** through

- single e-freight document from the entry point of the EU, inland (e-consignment note) or ports (Maritime Single Window), smart contracts, etc.
- rail services with flexible capacity, such as blocktrains
- automation of the logistic chain including at rail terminals



Main drivers for energy efficient

B. Energy systems – innovation is proceeding at high speed in this sector, favoring clean, electric solutions:

- Electrification (higher impact with > RES)
- Hybrid Electric - Batteries
- Hybrid H2 - Electric
- H2 – FC (goal 50% efficiency)



Main drivers for energy efficient solutions/2

C. Higher efficiency (Tank-To-Wheel) – *Shift2Rail*

- Lighter weight (body / Running gear / converter)
- Higher Electricity converters efficiency
- Ancillary systems (passive cooling, etc.)
- Brakes (enhanced regenerative brakings)
- ATO impact : -10-30% of energy consumption



Main drivers for energy efficient solutions/3

D. Energy Management Systems

- On-board Energy metering and consumption-based payments: railways to pay on the actual consumption incentivizing savings.
- Real-time energy pricing and incentives for re-use of braking power injected in the system
- Energy storage and re-use in nodes and stations is the next frontier



Thanks for your attention!



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