

Railway to a green future

As the world strives to keep global warming below 1.5°C all means of transport must decarbonise. The decarbonisation of transport however lags behind that of other economic sectors. As the greenest mode of land transport, railways are well positioned to support the green transition.

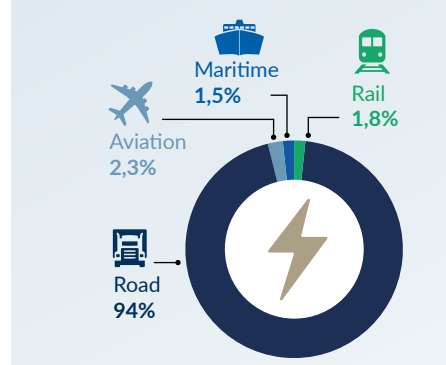
- Rail is well equipped to remain the greenest mode of transport
- Rail reduces the EU's carbon footprint and energy bill: lowest emissions and energy consumption
- Rail gives back to society: lowest external costs and best cost-coverage
- Rail is at the forefront of the green recovery: rail system fully included in the EU Taxonomy

Rail contributes to major energy savings

More freight and passengers on rail will improve the EU's energy balance. This is important with the ongoing energy crisis and the EU's energy dependency rate for imported fossil fuels.

- Rail accounts for **1.8% of EU transport's energy consumption**, while it carried 17% of freight and around 8% of passengers of EU27 inland transport in 2019.
- Rail is **7x more energy-efficient than road** and 15x more than air transport.¹
- Energy efficiency of rail**
Distance per energy unit consumed

Transport represents **31% of the EU's final energy consumption**



- How?**
- Rail is already an electric mode.
 - Rail benefits from physical advantages such as lower rolling and air resistance.

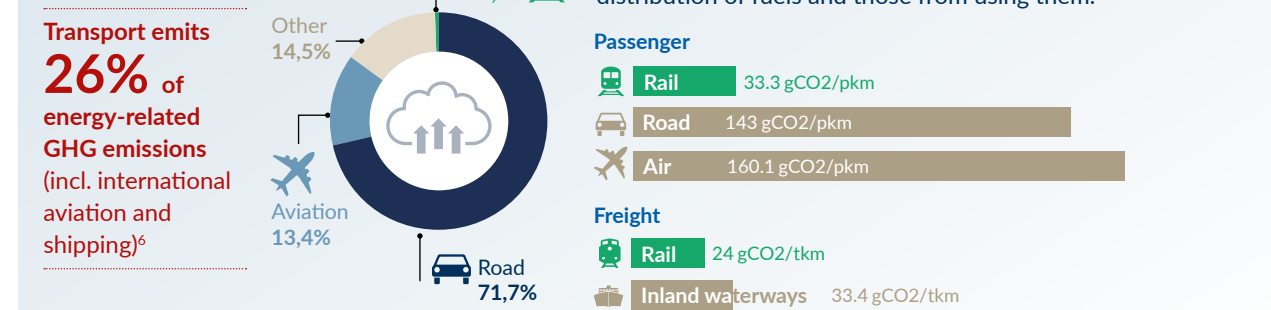
- DYK**
- Railways are ready for automated train operations, which are expected to reduce rail's energy consumption by at least 12%.²
 - Regenerative braking in trains helps recover at least 8% of electricity.³
 - The railway system allows powering trains directly by renewable energy such as solar power.

Rail reduces the EU's carbon footprint

Most sectors have reduced their emissions significantly since 1990, while transport emissions have risen by 33.5%.⁴ According to UN chief Antonio Guterres, current efforts in transport are inadequate for a 1.5°C pathway.⁵

- Rail's direct emissions account for **less than 0.4% of transport emissions**. This is less than half the GHG emissions of Cyprus, whereas road generates more than the total emissions of France and Spain combined. Aviation emissions grew the most during the last decades and now surpass the total GHG emissions of Romania.
- Rail is the **closest mode to net zero**. Rail is the most efficient form of passenger and freight transport in the EU27. Rail's well-to-wheel GHG intensity improved by more than 10% between 2014 and 2018.

EU energy-related GHG emissions from transport



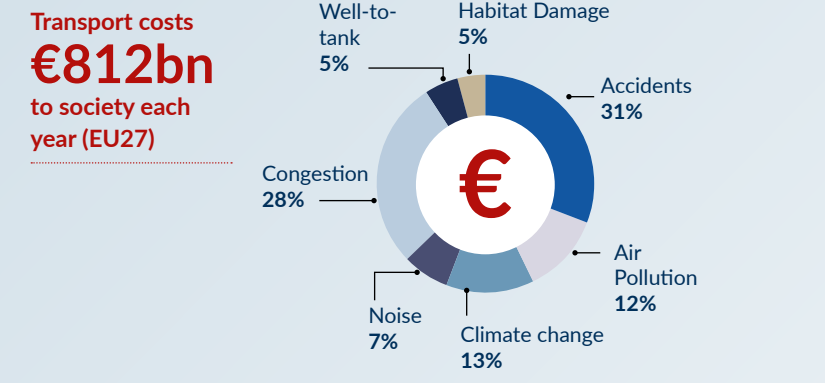
Transport emits **26% of energy-related GHG emissions (incl. international aviation and shipping)**⁶

- How?**
- 4/5 trains already run on electricity and there are plans to phase out the remaining diesel trains from 2030.
 - The EU electricity mix continues towards decarbonisation thanks to the carbon price under the ETS.
 - 1/3 of the energy consumed by rail already comes from renewables. Under the IEA Net Zero Scenario, electricity and hydrogen will sustain almost 100% of total passenger rail activity as soon as 2030.⁸
- Well-to-Wheel**
includes both the GHG emissions from the production and distribution of fuels and those from using them.⁷
- Passenger**
- Rail 33.3 gCO₂/pkm
 - Road 143 gCO₂/pkm
 - Air 160.1 gCO₂/pkm
- Freight**
- Rail 24 gCO₂/tkm
 - Inland waterways 33.4 gCO₂/tkm
 - Road 136.9 gCO₂/tkm
- DYK**
- Massive rail electrification is underway in accordance with the proposed TEN-T milestones of 2030 for the completion of the core network and of 2040 for the extended core network.
 - Railway companies already run emission-free rolling stock like battery and hydrogen fuel cell trains since 2018.
 - According to the EEA direct emissions from railways are projected to further decline by 22% between 2019 and 2040.

Rail externalities cost the least to society

Transport activity generates so-called 'external costs' that have real life consequences on society. This is why each transport mode should strive to reduce and cover all such costs.

Transport's 'External Costs' include accidents, congestion and environmental impact such as climate change, air pollution, noise, well-to-tank and habitat damage.

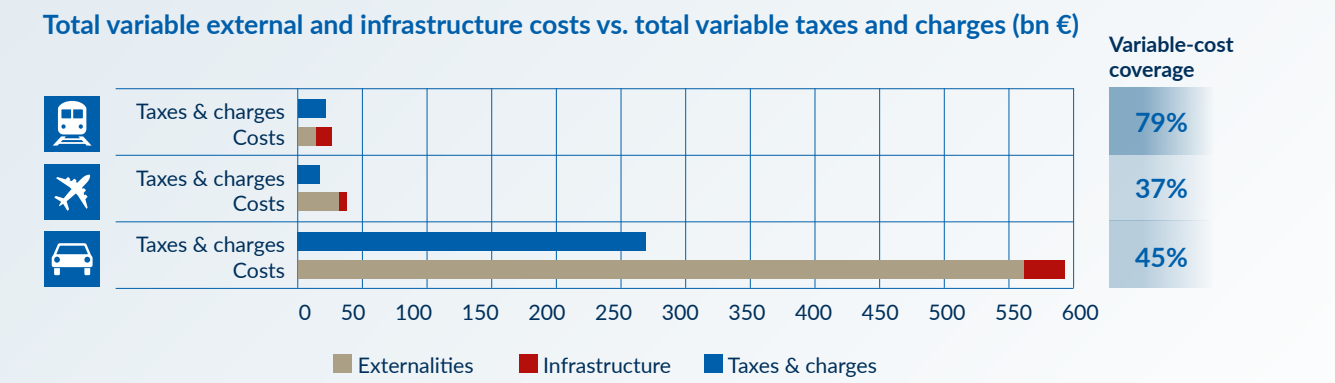


Transport costs to society each year (EU27) **€812bn**

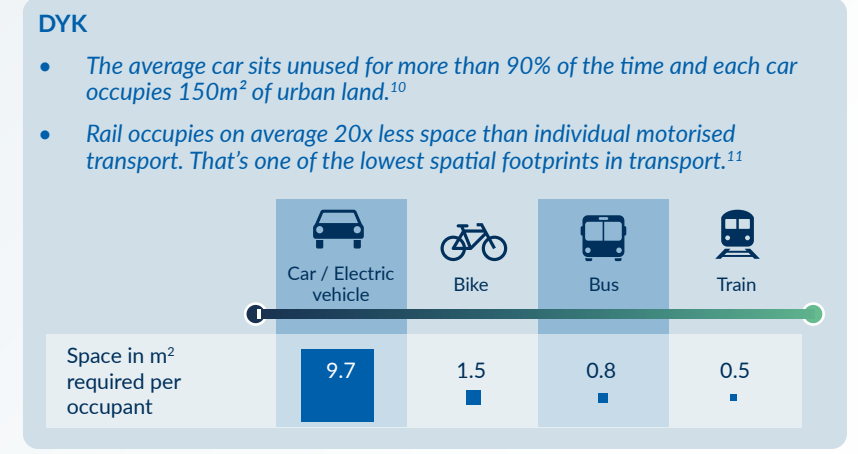
- DYK**
- In 2019, over 307,000 people died prematurely due to exposure to fine particulate matter pollution in the EU.
 - Environmental costs make up 42% of overall transport external costs.
 - Congestion alone generates €228 billion in delay costs.
 - Even with cleaner technologies to tackle climate change and air pollution, accident and congestion costs will remain the main externalities for road transport.

¹ EC Pocketbook 2021 + Eurostat energy (2019 data)
² https://www.railtech.com/digitalisation/2019/03/25/ato-is-most-profitable-innovation-to-reduce-energy-consumption
³ UN CTCTN: https://www.ctc-n.org/technologies/regenerative-braking-trains
⁴ EC Pocketbook 2021 (1990 vs 2019 data)
⁵ United Nations, 2021: https://www.un.org/sg/en/node/260099
⁶ EC Pocketbook 2021 (2019 data)
⁷ European Environment Agency, 2021: https://www.eea.europa.eu/publications/rail-and-waterborne-transport
⁸ International Energy Agency, 2021: https://www.iea.org/reports/rail
⁹ European Commission, 2019: https://transport.ec.europa.eu/transport-themes/sustainable-transport/internalisation-transport-external-costs_en
¹⁰ T&E, 2017: https://www.transportenvironment.org/discover/does-sharing-cars-really-reduce-car-use/
¹¹ The Institute for Sensible Transport, Capability Statement 2021: https://sensibletransport.org.uk/

- Rail leads transport in **variable-cost coverage**⁹
Rail covers most of its costs to society through the taxes and charges it pays. This is most visible when looking at variable costs (those increasing and decreasing according to the amount of trains, planes or trucks a company is running, as opposed to fixed costs), which are recognised as the most relevant when assessing the 'user pays' and 'polluter pays' principles.



- How?**
- As the safest and greenest motorised land transport mode, rail already has low externalities.
 - Rail's remaining major externality, noise, is being tackled with new measures and legislation.



Make green transport ambition a reality

Without rail, the EU's Green Deal ambition of 90% emissions reduction in transport by 2050 is not possible. The EU set clear targets with the Sustainable and Smart Mobility Strategy in December 2020. It is time now to act with the Fit for 55 and Efficient and Green Mobility Packages:

- Continue with the decarbonisation of railways:** Support electrification, fuel cells and hydrogen through Europe's Rail Joint Undertaking & the upcoming Alternative Fuels Infrastructure Regulation (AFIR).
- Keep infrastructure a priority:** Dedicate annual budgets for the next two decades and deliver the TEN-T milestones.
- Promote digital innovations:** Support railways in deploying the European Rail Traffic Management System (ERTMS) and Digital Automatic Coupling for even more efficient, smarter rail.
- Seek synergies with other sectors:** Guide railways to achieve energy system integration.
- Let transport modes compete in a fair regulatory environment:** Implement the 'user pays' and 'polluter pays' principles by making use of existing tools such as the EU ETS and road pricing.
- Use carbon pricing revenues to deliver sustainable mobility:** Make intelligent use of revenues to further develop the least polluting transport modes and protect the most vulnerable from transport poverty.