Dear Madame, Dear Sir,
Dear Colleagues,
Dear Friends,

For the Danube River Basin Management Plan, also as national member of EUSDR PA6, please let me kindly call your attention to the latest researches on different modes of transport. I think this basic fact may reorganize priorities among transport modes in the Danube Valley.

Shortly:
Inland navigation causes almost one and a half times the greenhouse gas load of railways.

Detailed:

A new study commissioned by the European Environment Agency presents a clear hierarchy of passenger and freight transport modes in terms of greenhouse gas (GHG) emissions. The issue becomes particularly important in achieving climate neutrality by 2050 (see for example Hungarian Act XLIV of 2020 on Climate Protection). The relevant report is summarized below.

Key messages

• There are big differences in the GHG efficiency of motorised transport modes in Europe and, consequently, their contributions to global warming. This confirms the importance of shifting transport to the most efficient modes.

• Rail and waterborne transport are much more GHG efficient than road transport and aviation, both for passengers and for freight.

• While the efficiency of rail transport and aviation improved markedly during the 5-year period covered by the study, the efficiency of other modes appears to have stagnated or even declined.

• Geography, distance, journeys that are time critical and the need for door-to-door mobility set limits on the shift from one transport mode to another. Hence, improving the GHG efficiency of all modes of transport remains vital.

The decarbonization of transport is slow compared with that of other economic sectors such as energy supply and industry. Most other sectors have reduced their emissions significantly since 1990, while transport emissions have risen and gained in relative importance. It is, therefore, imperative to make both passenger and freight transport in Europe more efficient and less dependent on fossil fuels. Facilitating a shift towards the lowest-emission transport modes is an important part of this effort. But how do the different modes of transport in the EU (i.e. road, rail, aviation, inland waterway transport and maritime shipping) stack up in terms of their greenhouse gas (GHG) emissions per unit transported? This briefing seeks to answer the question. The results presented here are from a recent study commissioned by the ***EEA*** (https://www.eea.europa.eu/). The study was conducted by *Fraunhofer ISI* (https://www.isi.fraunhofer.de/en.html) and *CE Delft* (https://cedelft.eu/), which had the task of developing a method for reporting on the GHG efficiency of the main modes of transport in Europe.

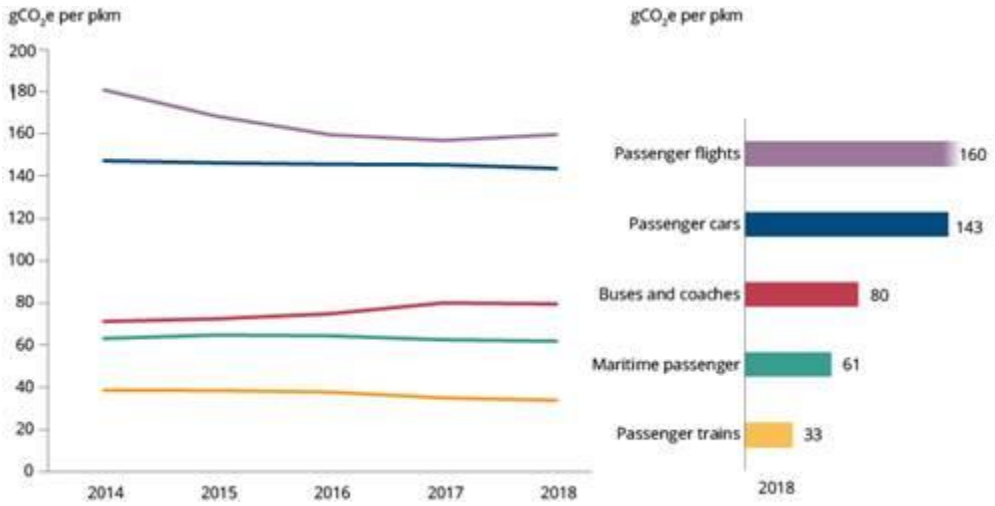
One objective of the EU and its Member States is to drastically reduce GHG emissions to achieve the objectives of the **Paris agreement** (https://unfccc.int/process-and-meetings/the-

paris-agreement/the-paris-agreement). This is expressed in the **European Green Deal** (https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en) , which sets the ambition to achieve climate neutrality by 2050. For transport, which currently accounts for 24.6% of the EU's total emissions, the European Green Deal calls for a 90% reduction by 2050 compared with 1990. The European Commission's **Sustainable and Smart Mobility Strategy** (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0789), published in December 2020, calls for 'decisive action to shift more activity towards more sustainable transport modes'. The strategy identifies a doubling of high-speed rail traffic in Europe by 2030 and a tripling by 2050 as milestones for passenger transport. For rail freight transport, it aims at a 50% increase by 2030 and a doubling by 2050. Freight transport by inland waterways and short-distance sea shipping should increase by 25% by 2030 and 50% by 2050. Reaching these milestones is expected to contribute to a reduction in the environmental pressures from the mobility system. This approach reflects the fact that some forms of motorised transport are more energy efficient and less GHG intensive than others.

All values presented here are 'well-to-wheel'. This means that both the emissions from the production and distribution of fuels and those from using them are accounted for. As a next step, it would be desirable to also include the emissions from vehicle manufacturing, maintenance and recycling, as well as those related to the construction and maintenance of transport infrastructure. However, for the time being, such a life-cycle analysis is still hampered by a lack of data at European level.

Trains are the best choice for passenger travel

Figure 1 shows a clear hierarchy for motorised passenger travel when it comes to GHG efficiency. The relevant unit is passenger-km (pkm), which means moving one passenger over one kilometre.



Average GHG emissions by motorised mode of passenger transport, EU-27, 2014-2018

Source: Fraunhofer ISI and CE Delft, 2020

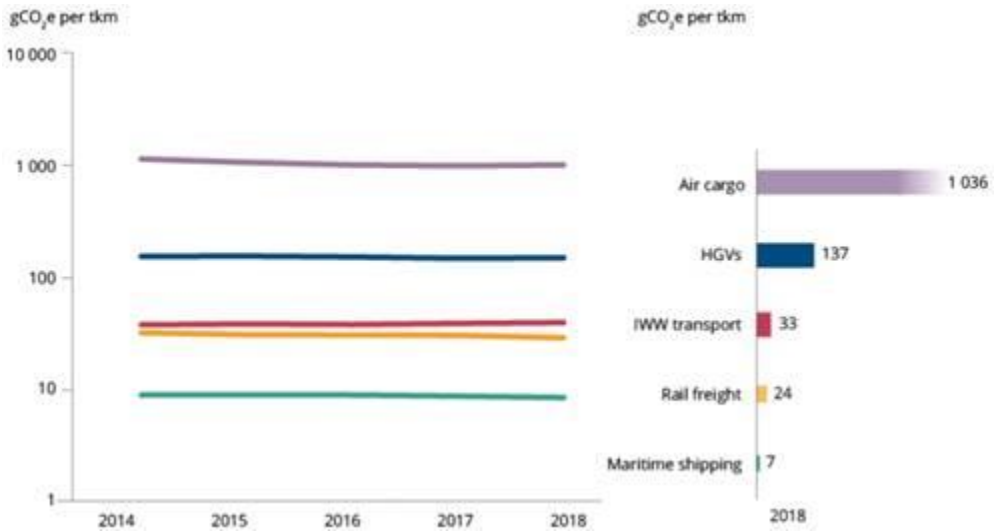
Notes: pkm = passenger kilometre; implied car occupancy rate: 1.6

Trains are the most efficient form of passenger transport in the EU, with GHG emissions per pkm that are only a fraction of most other modes. The second most efficient mode is maritime passenger transport. However, the value presented here mainly represents emissions from roll-on/roll-off ferries designed to carry both vehicles and passengers (RoPax). The detailed results show that emissions from other passenger vessel types, such as cruise ships, can be much higher. Taken together, buses and coaches are the most efficient form of road passenger transport. However, the uses of these vehicles vary significantly, which affects their emission performance. Passenger flights and cars are the least efficient forms of passenger transport and produce the highest emissions per pkm.

The results suggest that aviation and rail passenger transport efficiency improved by 12% and 13% respectively over the period from 2014 to 2018. For rail, this is mainly the result of the electrification of the rail network and the declining carbon intensity of the EU's electricity mix. For aviation, the gains owe largely to the uptake of more efficient aircraft. The GHG intensity of car travel only improved marginally over the period in question. For bus and coach travel, GHG efficiency appears to have declined.

Vast efficiency differences in freight transport

GHG efficiency rates for freight transport vary much more than those for passengers. So much so that a **logarithmic scale** was used in the left part of Figure 2. The relevant unit is tonne-km, which means moving the payload of one tonne over one kilometre.



Average GHG emissions by motorised mode of freight transport, EU-27, 2014-2018 on logarithmic scale

Source: Fraunhofer ISI and CE Delft, 2020

Note: logarithmic scale used in left chart; tkm = tonne kilometre; HGV = Heavy Goods Vehicle; IWW = Inland WaterWay

Emissions of goods transported by sea, rail and inland waterways are very low compared to those transported by heavy goods vehicles
(HGVs). **Inland navigation causes almost one and a half times the greenhouse gas load of railways.** Air freight is by far the most emitting mode of transport.

However, over the 2014-2018 period, air cargo saw the biggest GHG efficiency improvement (12%) followed by rail freight (11%). Similar to passenger transport by air and rail, more efficient aircraft and the electrification of railway lines are behind this trend. HGVs only showed a slight improvement of 3%.

The results presented above fully confirm the assumptions underpinning the EU's modal shift policy. However, not all modes are equally suited to all transport tasks. Therefore, it is not always possible to substitute one mode of transport for another. Issues related to geography (e.g. transport over water), the availability of infrastructure, as well as time criticality (e.g. for express delivery or perishable goods) limit what is possible. In addition, the most efficient motorised transport modes can only be used between transport hubs such as ports and rail freight terminals and, therefore, only function in combination with other modes.

More information on this topic:

• original English language article that introduces the report: https://www.eea.europa.eu/publications/rail-and-waterborne-transport/rail-and-waterborne-best

• Handbook on the external costs of transport. European Commission, Version 2019 https://ec.europa.eu/transport/sites/transport/files/studies/internalisation-handbook-isbn-978-92-79-96917-1.pdf

• Navigare necesse est? (English language article) https://eionet.kormany.hu/navugare-necesse-est

Miklós Marton
Councillor

AGRÁRMINISZTÉRIUM
Ministry of Agriculture
Department of Environment Development
Development Coordination and Strategy Unit
H-1052 Budapest,
Apáczai Csere János u. 9.
Phone: (+36-1) 795 3876
E-mail: miklos.marton@am.gov.hu