Ministerie van Infrastructuur
en Waterstaat

Social relevance of rail freight transport

Netherlands Institute for Transport Policy Analysis | KiM

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Summary

The rail freight transport sector is a small player in the freight transport market. Rail freight transport is particularly important for international transport, in which it has a share of 9%, but also for the position of our seaports and as a location factor. This type of transport also helps reduce road congestion.

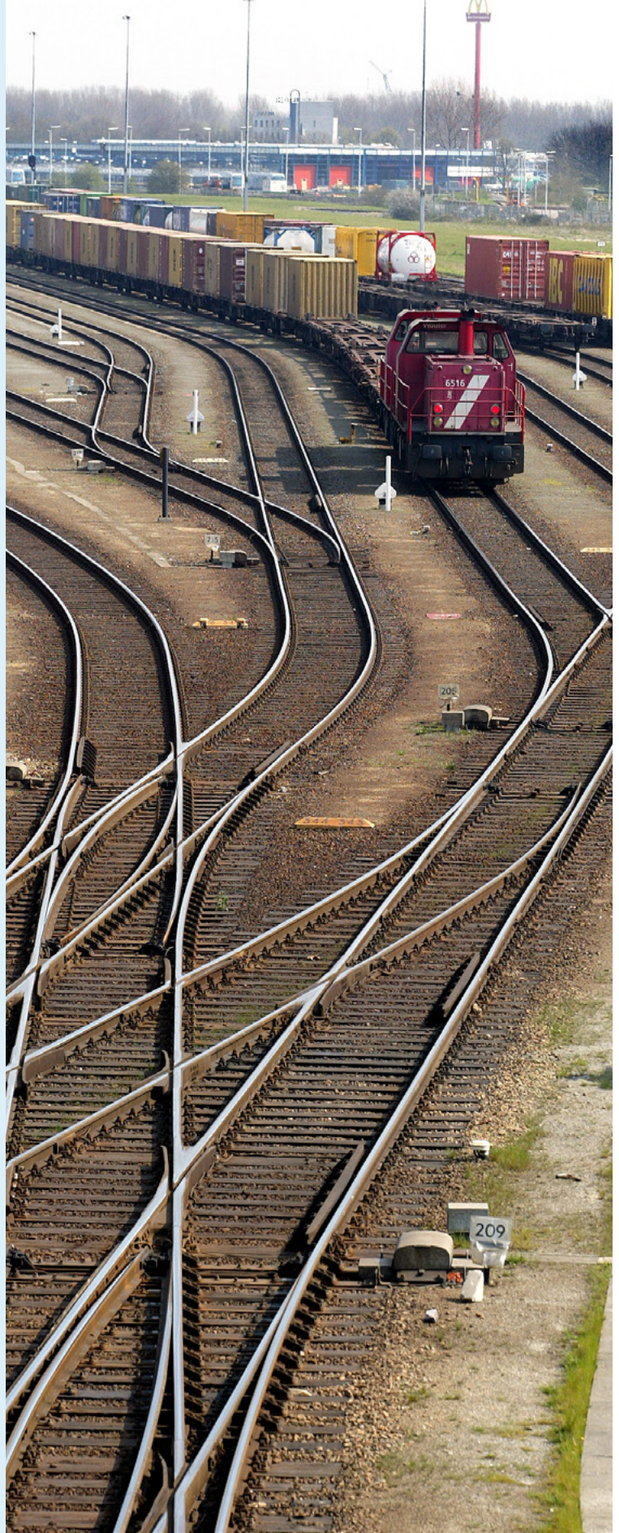
In this study, the Netherlands Institute for Transport Policy Analysis (KiM) finds that the economic functioning of the rail freight transport sector shows an ever-changing and incomplete picture. The increase of the number of carriers shows that there is a commercial interest in rail freight transport. At the same time, the market is highly concentrated, with one rail carrier – DB Cargo Nederland – having a significant market share. Furthermore, there are many international players. The turnover of rail freight transport did not increase between 2012 and 2022. No public information is available on profitability and number of employees.

Effects to be expected from modal shift to rail

We make the social relevance of rail freight transport visible by determining the effects of freight transport's modal shift to rail. This shift aligns with a vision on the future of rail freight transport that the government is currently developing. In addition to the economic effects of a modal shift, other social interests also play a role, such as the costs of the infrastructure and the external effects (emissions of CO_2 and air pollutants, noise, vibrations and safety). Based on the current valuation figures, we expect the following effects from a modal shift:

- A shift of freight transport to rail reduces both road congestion costs and road infrastructure costs.
- Rail freight transport is more expensive than inland shipping and cheaper than road transport. A modal shift from road to rail makes freight transport cheaper.
- A modal shift from road to rail reduces climate and environmental damage caused by transport. Due to regulations (such as the European Emissions Trading System, ETS) and technological developments in road freight transport, rail transport may lose some of its climate advantage over road transport in the future. Having said that, the stricter regulations may lead to an increase in the business costs of road transport and inland shipping.
- A modal shift from road to rail increases the safety of freight transport as a whole.
- More rail freight transport leads to conflicting interests with housing construction and urban densification, and to a greater feeling of unsafety amongst people living along the railway.
- A modal shift from road to rail means that more people will experience serous nuisance from vibrations caused by freight transport. The social costs of vibration nuisance are unknown. In this context, it is important to know where the extra trains are running.

The external effects of rail freight transport may change in the future due to regulations and technological developments. These may make inland shipping and road transport cleaner, which would mean that rail freight transport loses its current advantage in terms of external environmental and climate costs. This is offset by additional business costs for road transport and inland shipping.



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1 Rail freight transport in the Netherlands

Freight transport exists because goods are more valuable at the place of destination, where they are used, than at the place of origin, where they are made. Rail freight transport, like road transport, inland shipping and pipeline transport, is an important condition for the functioning of our economy. As the old adage goes: "Without transport, everything comes to a standstill." How much is transported using the 3,200 km of railway tracks in the Netherlands? Where do these goods go? And what goods does it concern?

Increasing volumes

Measured in transported weight, rail freight transport went up by 8% between 2009 and 2022. In 2022, 44.5 million tonnes of cargo were transported on the Dutch railroads (see Figure 1). During the economic crisis in 2008 and – particularly 2009 – there was a sharp decline. In the period before the economic crisis, rail freight transport grew by an average of 8% per year between 2000 and 2007. Between 2009 and 2022, that growth was 0.8% per year (expressed in transported weight).

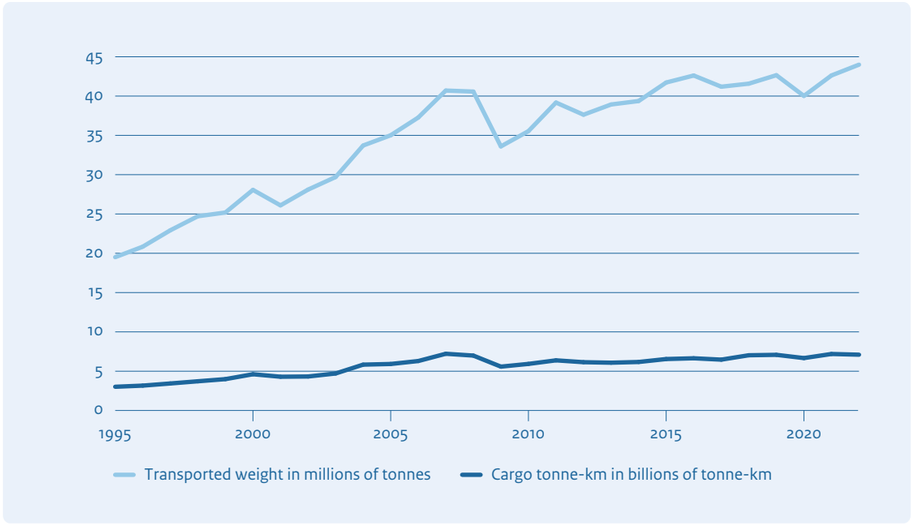


Figure 1 Development of transported weight and transport performance [in millions of tonnes and billions of tonne-km] 1995-2022. Source: Statistics Netherlands (CBS), 2023.

Transport performance, measured in tonne-kilometres (tonne-km), has been between 6 and 7 billion tonne-km in the past 10 years (see Figure 1). In 2022, transport performance was 7.2 billion tonne-km. 6 billion tonne-km of this amount was accounted for by international freight transport. With this type of transport, the cargo is loaded in the Netherlands and unloaded abroad or vice versa. Domestic transport only has a small share in transport performance (0.6 billion tonne-km). There is also a small share of trains that cross the Netherlands by rail, but do not stop anywhere to load or unload. These transit trains also had a transport performance of 0.6 billion tonne-km in 2022.

Dominance of containers and dry bulk

In freight transport, we distinguish between different types of cargo: liquid bulk (e.g. oil and oil products and chemicals), dry bulk (e.g. coal, ores and grains), general cargo (e.g. cars) and containers. Rail freight transport in the Netherlands mainly concerns containers (20.6 million tonnes in 2021) and dry bulk (15.4 million tonnes in 2021); see Figure 2.

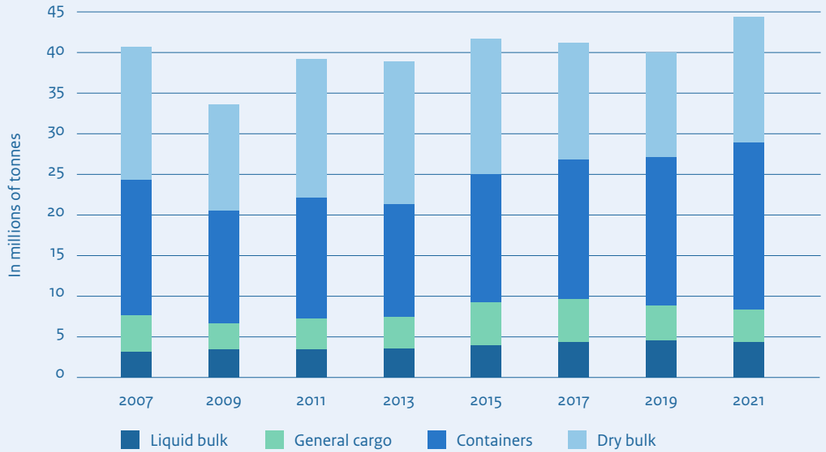


Figure 2 Development of transported weight by rail in the Netherlands by type of cargo [in millions of tonnes], 2007-2022. Source: Statistics Netherlands (CBS) 2023.

Within dry bulk transport, coal transport to Germany will decrease over the next 15 years due to the closure of coal-fired power stations. Due to the energy transition (the transition from the use of fossil energy to energy from renewable sources), more liquid bulk, such as hydrogen, may take its place. Rail freight transport of dry and liquid bulk is still fraught with uncertainty.

Germany remains most important origin and destination

In 2022, 63% of the transported weight (24 million tonnes) was loaded or unloaded in Germany. This country has always been the most important origin and destination for rail freight transport to and from the Netherlands (see Figure 3). Italy accounts for 15% of origins and destinations. This country is followed by Austria, the Czech Republic and Belgium.

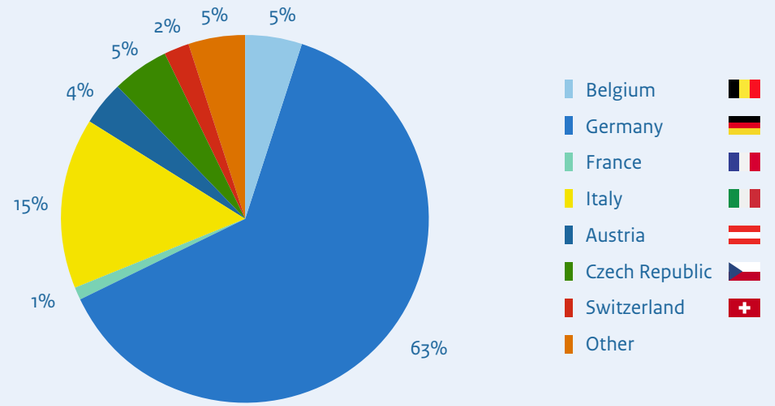
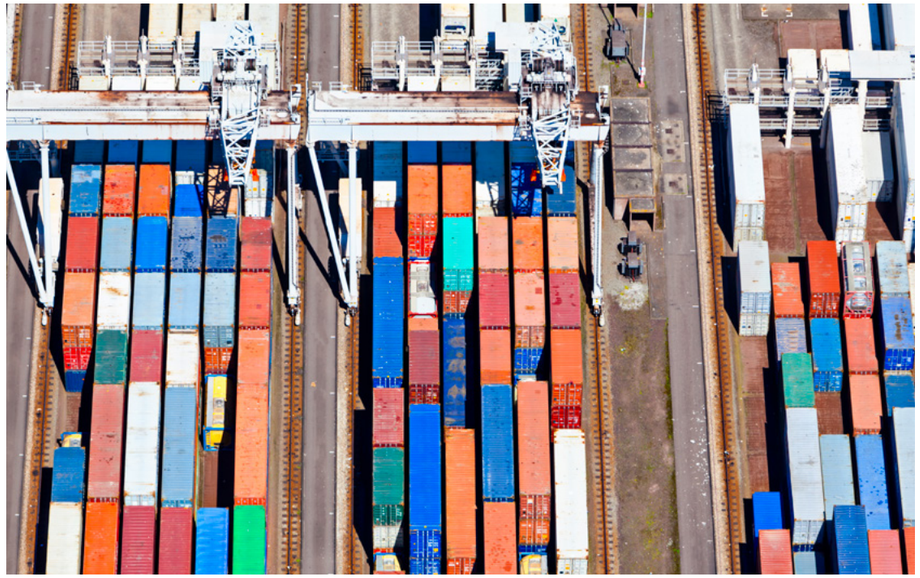


Figure 3 Country of origin/destination for international rail freight transport [in millions of tonnes] in 2022.

Germany is expected to remain the most important country of origin and destination for rail freight transport to and from the Netherlands until 2040. Transport to Northeast Germany, Poland and the Czech Republic will increase the most. For Poland and the Czech Republic, for example, the volume is expected to double. Transit transport from Belgium to Germany via the Netherlands is also expected to increase.

Modest share in modal split

In this study, we look at the relevance of rail freight transport and analyse the effects of freight transport's modal shift to rail. The share of rail freight transport in the modal split is modest compared to the share of road transport and inland shipping (see Figure 4). In 2022, total traffic performance for inland shipping and road, rail and pipeline transport on Dutch territory was over 132 million tonne-km. Transport performance by road had the highest share in this: over 64 million tonne-km. This was followed by inland shipping and pipeline transport. A good 7 million tonne-km went by rail. This is a share of 5.5% in the modal split.



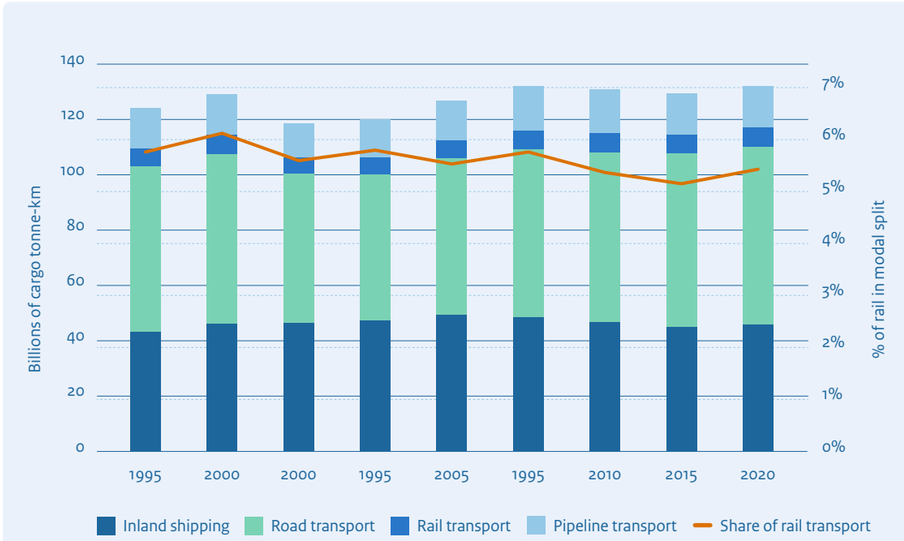


Figure 4 The share in transport performance [in tonne-km] of the modes of transport inland shipping, road transport (excluding vans), rail transport and pipeline transport on Dutch territory, 2005-2022. Sources: Statistics Netherland (CBS), compiled by KiM.

This share has not changed much in the past years. The share of rail freight transport in the modal split on Dutch territory has been hovering between 5 and 6% for years.

2 Economic relevance

Rail freight transport has specific qualities and is important for the competitive position of seaports and as a location factor. But what does the rail freight transport market look like? What is the economic importance of the sector itself, in terms of turnover, added value and profit?

Competitive market?

The question of whether rail freight transport operates in a competitive market has an ever-changing answer. Recent years have seen an increase in the number of rail freight carriers. From the liberalisation in the early 1990s, the number of rail freight carriers in the Netherlands rose to 14 in 2010, 17 in 2019 and 19 in 2022. This increase shows there is a commercial interest in the market. This interest often comes from abroad. 6 rail freight carriers operating in the Netherlands have their origins in a former foreign state railway company. These are DB Cargo (Germany), Lineas (Belgium), SBB (Switzerland), PKP (Poland) and Railtraxx and Captrain (France). The parent companies of rail freight carriers in the Netherlands have been making large losses in recent years.

The majority of rail freight carriers in the Netherlands originate from Germany. This includes DB Cargo, the rail freight carrier that has a market share of 45 to 50% in the Netherlands. If there is a single market player with such a large share, it means the market is strongly concentrated. This has negative effects for both new market entrants (high barriers of entry) and customers of rail freight transport (less innovation, lower quality, higher prices).

Table 1 Market shares of rail freight carriers in the Netherlands in 2019. Source: Dutch Authority for Consumers and Markets (2021).

Market share < 1%	Market share 1-5%	Market share 5-10%	Market share >10%
Rail Transport Service GmbH	Crossrail Benelux N.V.	Captrain Netherlands B.V.	DB Cargo Nederland N.V.
TX Logistik AG	RheinCargo GmbH & Co KG	LTE Netherlands B.V	
Bentheimer Eisenbahn AG	Kombirail Europe B.V	Rotterdam Rail Feeding B.V.	
HSL Netherlands	SBB Cargo Deutschland GmbH	Lineas Group N.V	
Railtraxx N.V	Rail2U B.V	RTB Cargo Netherlands B.V.	
	Rail Force One B.V.		
Jointly: 2%	**Jointly: 15%**	**Jointly: [35-40]%**	**Jointly: [45-50]%**

Stable turnover. No clear picture of profits and added value

Turnover development is an important indication of how rail freight transport is developing as an industry. The turnover did not increase between 2012 and 2022. Turnover development of rail freight transport fell by almost ¼ between 2015 and 2017, but stabilised between 2017 and 2022. The comparison with other modes of transport (Figure 5) shows that the turnover of rail freight transport decreased between 2015 and 2022, whereas that of other modes remained virtually the same or even increased.

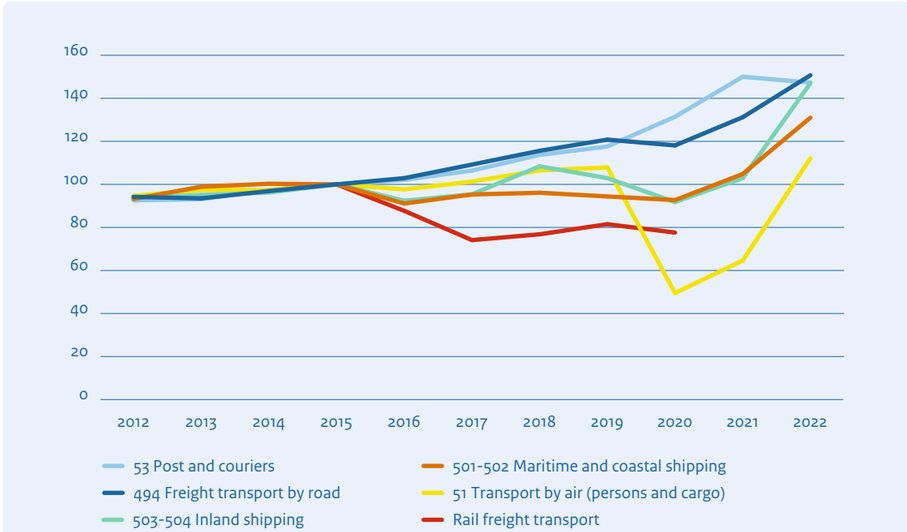


Figure 5 Turnover development of rail freight carriers compared to some other transport sectors in the Netherlands 2015-2022 (Index 2015=100). Source: Statistics Netherlands (CBS)

No public information is available on the added value of the rail freight transport sector or the number of people working in the sector.

Rail transport slightly more expensive than inland shipping, but cheaper than road transport

Measured in €/tonne-km, rail transport is a bit more expensive than inland shipping, but cheaper than road transport. In Figure 6, we compare the economic costs per tonne-km of rail transport, inland shipping (large, medium-sized and small inland vessels) and road transport (Longer Heavier Vehicles (LHVs) and articulated vehicles). The figure is about the costs of container transport, as containers are the most important type of cargo transported by rail.

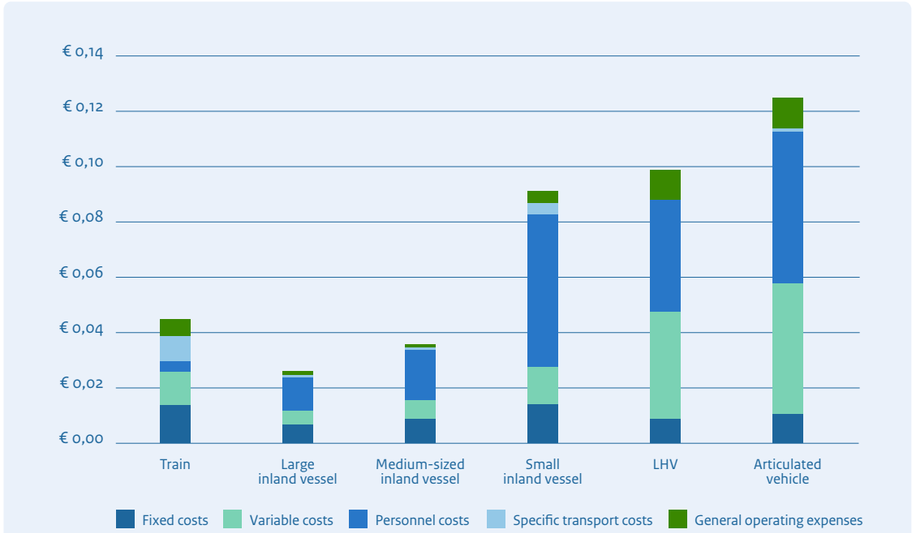


Figure 6 Costs of container transport [in €/tonne-km] per mode of transport in 2021. Source: Visser (2020), updated for 2021 by KiM

In terms of cost structure, rail freight transport has relatively high specific transport costs compared to road transport and inland shipping. This includes the compensation for using the rail infrastructure. On the other hand, personnel costs per tonne-km are much lower than for transport by inland vessel or road. In light of the ageing population and labour shortages in freight transport, this could be an advantage in the future.

Important for seaports and as a location factor

Railways also contribute to the accessibility of Dutch seaports. Rail freight transport is important for the competitive position of these seaports as a transhipment point and location for industry. Due to the economic relevance of the port of Rotterdam, investments have been and continue to be made in good multimodal hinterland connections, such as the Betuweroute. Good hinterland accessibility makes the Netherlands an attractive location for distribution activities.

In addition to the importance for the competitive position of seaports, the presence of rail freight transport is also an important location factor for shippers in the Netherlands. The concentration of distribution activities means that there may be advantages of scale in the logistics sector, as well as in production chains.

3 Social costs

Freight transport not only makes an important contribution to the functioning of the economy, but also has all kinds of negative consequences for society. Freight transport pollutes the air, causes nuisance to the surroundings in the form of noise and vibrations, poses a risk of accidents and contributes to climate change. What are the costs of these negative consequences, also known as external costs, of rail freight transport? How do these costs compare to those of road transport and inland shipping? How do infrastructure costs and the extent to which they are taxed differ between modes of transport?

External costs for rail lower than for road and inland shipping, infrastructure costs higher

Measured on the basis of current valuation indices, the average external costs of rail freight transport are lower than those of road transport and inland shipping (Figure 8). Conversely, the average infrastructure costs of rail freight transport are higher than those of both freight transport by road and by inland vessel. If we combine infrastructure and external costs, rail transport is a lot cheaper per tonne-km than road transport but more expensive than inland shipping. For road transport, we do not look at the total but only at road transport via the motorway. This provides a better comparison with inland shipping and rail, which provide transport over longer distances.

The external cost benefits for rail may change over time, due to regulations such as the European Emissions Trading System (ETS) or to technological innovations, for example. The advantage that rail freight transport currently has in terms of external environmental and climate costs may come under pressure in the coming decades as road transport and inland shipping become cleaner. Having said that, the stricter regulations may also lead to an increase in the business costs of road transport and inland shipping.

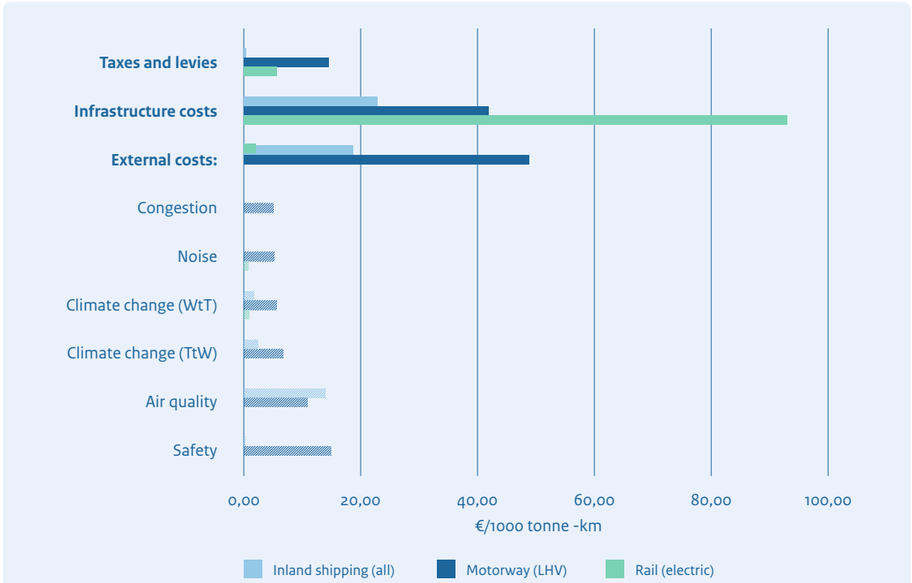


Figure 7 The average infrastructure costs, external costs and taxes and levies [in €/1,000 tonne-km] of rail transport, road (motorway) transport and inland shipping for the Netherlands in 2016. Source: CE Delft (2022) and own calculations.

Little known about the costs of vibration nuisance

Not a lot is known yet about the costs associated with vibration nuisance caused by rail freight transport. The same goes for measures to limit vibration nuisance. It is difficult to capture vibration nuisance in a broadly applicable valuation index.

Work is being done to gain more insight into this subject through the railway vibration policy intensification programme. Information on railway vibrations is frequently collected through surveys. To make a balanced decision about whether or not to expand rail freight transport, the disadvantages of vibration nuisance are a negative effect for a small group of people. This small group, however, does experience a great deal of nuisance.

In the future, a number of developments will play a role when it comes to vibration nuisance:

- More and longer freight trains will lead to more and more serious vibrations and, by extension, to more nuisance if the distribution across the various freight lines does not change. If the additional freight trains mainly run via the Betuweroute, the additional rail freight transport will lead to much less additional vibration nuisance. If the modal shift occurs mainly in container transport, this will have fewer consequences for vibration nuisance than if it occurs in dry or liquid bulk.
- More new housing developments along the railway track also means more nuisance.
- To prevent vibration nuisance, new-build homes can be made vibration-resistant. It is uncertain whether this measure will outweigh the effect of more freight trains in increasingly densely built-up railway areas.

Objectively safe, but does not feel safe

The transport of hazardous substances by rail is objectively very safe compared to road transport and inland shipping. This is also shown in Figure 8. However, rail freight transport is not entirely risk-free. There are risks for people living near the railway track due to the transport of hazardous goods and because homes are built close to the railway infrastructure.

Many freight trains carrying dangerous cargo pass through urban areas, create a balancing of interests between the desire for urban densification, with the aim of meeting the house construction challenge within existing city limits, and safety due to passing freight trains carrying hazardous substances.

Rail freight transport is objectively very safe. This does not mean that people who live along railways that are regularly used by freight trains transporting hazardous goods necessarily feel that way. Little research has been done into the feelings related to (un)safety caused by passing freight trains carrying hazardous goods.

4 Expectations of modal shift to rail

The government is developing a future vision on rail freight transport. This focusses on a modal shift from road to rail. Below we will outline the effects to be expected from such a modal shift. This is based on current valuation index, which are subject to change in the future.

Economic effects

- **Volume of rail freight transport.** A modal shift from road to rail further increases transported weight and transport performance of rail freight transport. This means that other modes of transport lose market share. If volume continues to grow, the majority of rail freight transport will still consist of international transport.
- **Market structure**. The question of whether the freight transport sector in the Netherlands provides its services in a well-functioning market has an ever-changing answer. Parent companies of rail freight carriers in the Netherlands have been making large losses in recent years. This raises the question of whether the market parties can bring about a modal shift themselves or whether they need government support to do so.
- **Business costs.** Rail freight transport is more expensive than inland shipping and cheaper than road transport. A modal shift from road to rail makes freight transport cheaper.
- **Turnover, added value and employment.** A modal shift to rail leads to a turnover increase in the rail freight transport sector. The number of people working in the sector will probably also increase. It is not clear whether added value will also grow.
- **Location factor.** Railways make the seaports in the Netherlands accessible and are a location factor for companies. A little more or a little less rail freight transport does not immediately change the attractiveness of the Netherlands as a location for port and shipping activities. Rail freight transport is an option alongside the other modes of transport, each of which has its own strengths and weaknesses. It can be, however, that a shift in freight flows to Eastern Europe will make the role of rail in the transport chain more important.

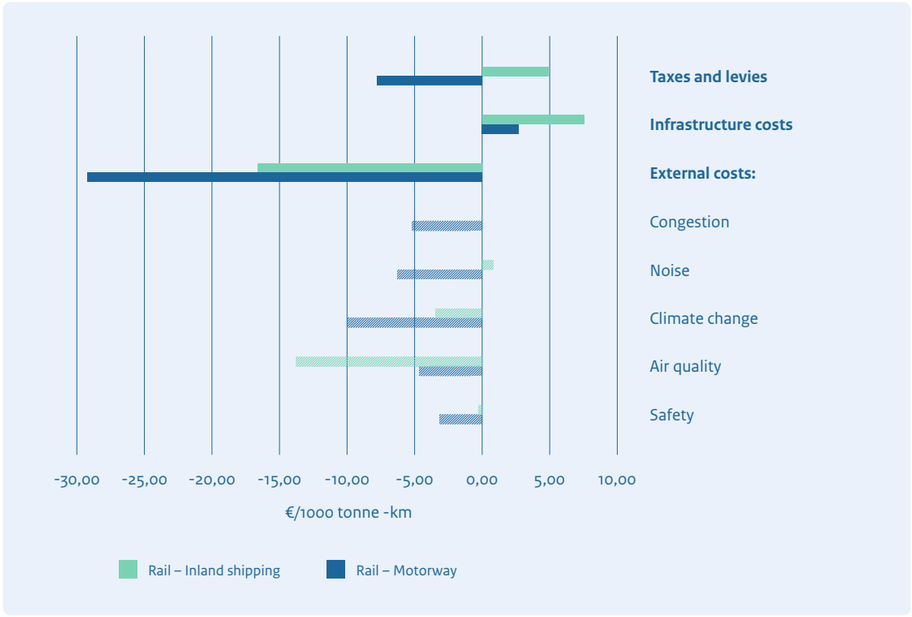
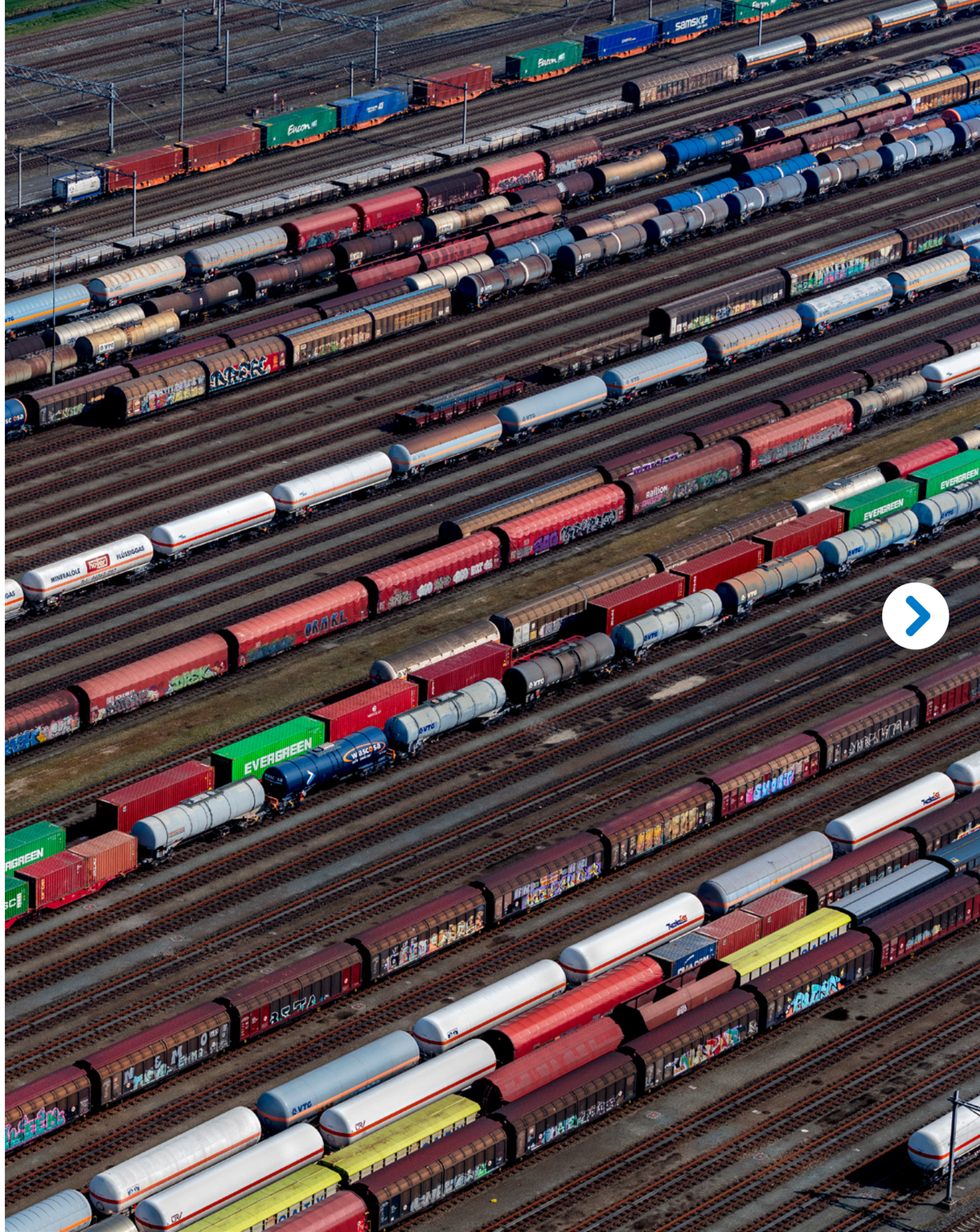


Figure 8 Changes [in €/1,000 tonne-km] in infrastructure costs, external costs and taxes and levies in case of a modal shift, based on marginal costs. Source: CE Delft (2022) and own calculations.

Social effects

- **Infrastructure costs, taxes and levies.** A modal shift to rail freight transport leads to higher infrastructure costs. If 1,000 tonne-km shifts from motorway to railway, infrastructure costs increase by just under €3. A modal shift to rail freight transport also decreases taxes and levies by around €8. On balance, this means that shifting 1,000 tonne-km of freight from motorway to rail transport costs the government almost €11.
- **External costs.** A modal shift to rail makes total freight transport cleaner in terms of climate impact, even if diesel trains are used. Shifting 1,000 tonne-km of freight from motorway to rail transport can save €29 worth of external costs. This depends on which road hauls are replaced by rail hauls. Climate change is the largest component of external costs, but air quality, safety, noise nuisance and congestion also contribute. Due to regulations (such as the ETS) and technological developments, for example, it is possible that inland shipping and road transport will become less polluting in the future and that rail transport will lose part or all of its advantage in this area.
- **Safety.** Rail freight transport is safer than road transport. A modal shift to rail increases the safety of freight transport as a whole. Additional rail freight transport on the mixed network does make housing construction in railway zones more difficult for safety reasons. It can also lead to a greater feelings of unsafety amongst people living along the railway track. It is not known whether the sense of unsafety differs from objective safety.
- **Noise nuisance.** A modal shift to rail aggravates the vibration nuisance caused by freight transport. In this context, it matters a great deal where those extra freight trains will operate. If the additional rail freight transport mainly uses the Betuweroute, this nuisance will be significantly less than with the current routes on the mixed network.



About this study

Method

In this study, KiM uses recent and available data on rail freight transport from organisations such as Statistics Netherlands (CBS), ProRail and Rail Cargo Netherlands. The study is also based on desk research and interviews with various stakeholders and experts. The Integrated Mobility Analysis (IMA) functions as a point of departure. We analyse the effects of freight transport's modal shift to rail compared to the IMA outcomes.

Background report

For more information on the method used and the results, consult the background report that can be downloaded via the website www.kimnet.nl.

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