Study on Weights and Dimensions

Impacts of the Proposed Amendments to the Weights and Dimensions Directive on Combined Transport and Rail Freight Transport

CER The Voice of European Railways

INTERNATIONAL UNION OF RAILWAYS

UIRR INTERNATIONAL UNION FOR ROAD-RAIL COMBINED TRANSPORT

ERFA European Rail Freight Association

UIP

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d-fine

analytical. quantitative. tech.

This study investigates the suitability of the proposed amendments to the Weights & Dimensions Directive for Combined Transport and rail transport

In 2023, the EU Commission proposed a revision of the Weights and Dimensions Directive (WDD).

Aims of the revision

Catalysing the introduction of ZEVs

Weight incentive of +4 tonnes for ZEVs (and fossil-powered vehicles during a transition period until 2035)

Harmonised rules for longer and/or heavier trucks in cross-border operations

European Modular System (EMS) for cross-border transport without bilateral agreements

Facilitation of intermodal operations

+4 tonnes incentive for non-containerised CT (trucks, semi-trailers)

+30cm height for vehicles carrying high-cube containers on CT road legs

Which aspects need to be analysed?

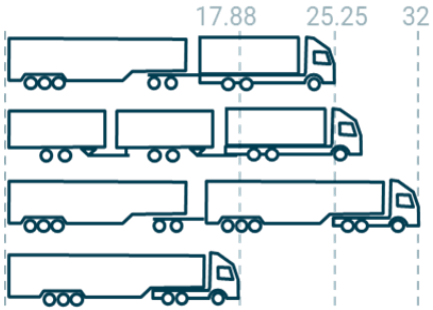
- What is the **impact** of longer and/or heavier vehicles on **road infrastructure**?
- Are **transport assets** in rail freight and CT suitable for **heavier loading units**?
- Are **EMS** modules and vehicle combinations generally **compatible with CT**?
- Are **extra height allowances needed** or are there already working solutions in place?
- Which market segments of rail freight transport and CT are **susceptible to a reverse modal shift**?

The proposed measures harbour the risk of undermining standards and of reverse modal shift – the suitability for CT and conventional rail transport is evaluated in this study

The effects of the proposed measures are evaluated for CT, unimodal rail and road transport and analysis of the reverse modal shift potential

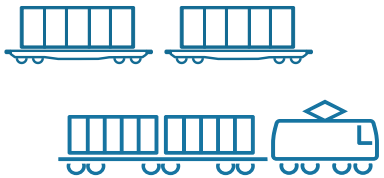
Structure of the study

01 Compatibility assessment with CT



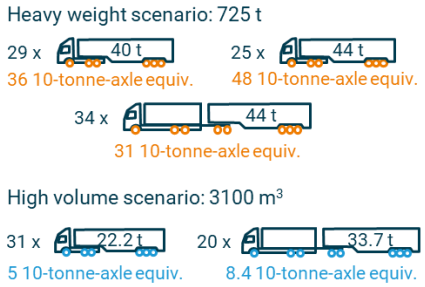
- Compatibility assessment of EMS with CT
- Compliance check for additional weight
- Potential of high-cube containers
- Potential and risk of the measures for CT

02 Impact on rail freight transport



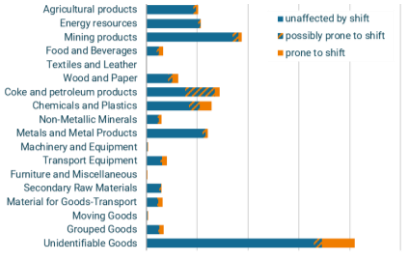
- Impact of measures on rail products SWL, FTL
- Analysis of market segments at risk

03 Impact on road freight transport



- Energy efficiency and decarbonisation impact
- Economics savings potential
- Impact on road infrastructure
- Development of market segments of road freight transport

04 Reverse modal shift



- Reverse modal shift risk
- Effects of modal shift on emissions and energy efficiency

The longer and heavier vehicle combinations according to the European Modular System are a challenge for CT operations

01

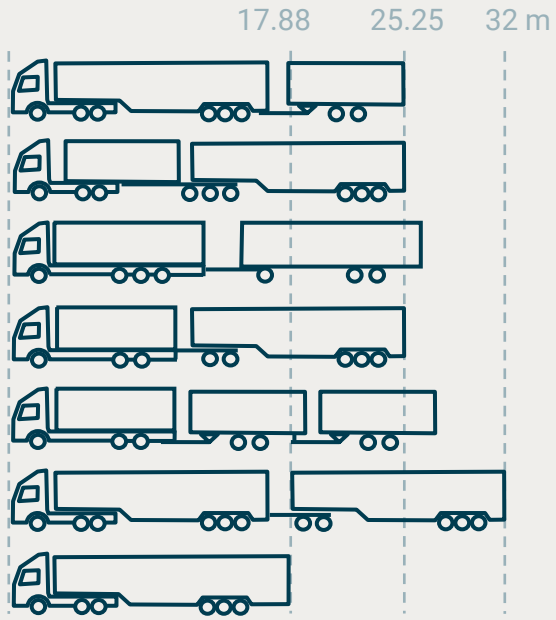
EMS combinations consist of common units and offer more volume for the transport of goods.

Proposed amendments to promote EMS

- Cross-border circulation between Member States that authorise EMS is possible **without additional bilateral agreements**
- Max. weight and dimension **subject to national regulation**

EMS combinations

- Max. gross weight: subject to nat. rules (trials conducted with up to 72 t)
- Length: Up to **32 meters**
- Combination formed from **common modules**
- Volume gain of **+50%**



Typical Goods

- Transport of high-volume, palletised goods

Opportunities and risks for CT

Longer EMS combinations may enhance the efficiency of CT road legs when transporting low-density, high-volume cargo

Many **extended-length semi-trailers are incompatible with CT assets** and for those that are, only half of the existing pocket wagon fleet is suited

Extended-length semi trailers and heavier loading units **undermine the prevailing technical standards**

EMS combinations lead to **greater complexity for the operation** of rail-road CT

For high-volume goods, pure road transport becomes lucrative – posing the **risk of reverse modal shift** and threatening climate targets

Possible opportunities for CT due to increased weight and dimensions are outweighed by compatibility risks, an undermining of standards and greater complexity

The initiatives intended to promote intermodal transport comprise weight incentives and extra height for the transport of HC containers

01

Weight incentives for CT

Proposed revision

- Weight allowance of **+4 tonnes** for ZEVs and conventional trucks

  → **48 t for trucks on CT road legs**
- +4 tonnes incentive for **non-containerised CT**
- Option to allow **weights exceeding 48 t** for intermodal transport

Impact on terminals and loading units

- Access roads may **not permit heavier trucks**
- **Equipment** in every fourth terminal is **unsuited** for units >40t, while more than 80% cannot handle > 45 t
- **Existing loading units reach maximum capacity**:
  semi-trailers: 35 - 39 t
  containers & swap bodies: 30 - 36 t

Impact on trains and wagons

- **Permissible axle loads** of rail wagons at risk of being exceeded
- A long train of heavy units is **operationally not feasible** with one locomotive on the current network

HC containers on road legs

Proposed revision

- **+30 cm** height allowance for vehicle (combinations) carrying high cube containers on intermodal road legs

  → **4.30 m height for trucks with HC containers on road legs**

Proliferation of high cube containers in CT

- Share of HC containers between **30% to > 50%** among CT operators
- **Relations with almost 100%** HC containers exist
- **C45 codification** accommodated by almost the entire rail network

Road transport of high cube containers

- Widespread use of **gooseneck trailers** allows road transport within 4m height limit already today
- **Large portion of trailers manufactured** today are gooseneck trailers
- Road network in 21 Member States allows a **lower max. vehicle height**

The authorisation of extra weight and/or additional height is either not compatible with the existing road infrastructure or their necessity is questionable as suitable technical solutions exist already today.

The introduction of LHVs bears the risk of a reverse modal shift, especially for single wagon load – this contradicts climate objectives

02

Impact of longer and heavier vehicles (LHVs) on rail products

Effect of the introduction of LHVs

Single Wagon Load (SWL)

Status-quo

- About **27 % of total rail freight** transport
- Cost structure **dominated by fixed costs**

Segments at risk

- **Low-density cargo**
- Price elasticities make **SWL vulnerable to transport in LHVs** due to their flexibility and significantly lower operating costs

Lower-risk segments

- **Heavy bulk cargo**
- **Captive markets** where rail is the only option
- Partially: **hazardous** material

Overall effect

- **Market share of SWL may decrease though reverse shift** due to the introduction of EMS

Full Train Load (FTL)

Status-quo

- Transport of **high volumes of bulk goods**
- Block trains have **cost advantages over road**

Segments at risk

- Low-density cargo like finished consumer goods, agricultural and food products and semi-finished goods

Lower-risk segments

- **Bulk commodities** (coal, ores, oil, timber)
- Advantage due to **scale and efficiency** of full trains

Overall effect

- Less affected by reverse modal shift risk **due to overall cost competitiveness**
- Indirect losses due to **lower network utilisation**

The use of longer and heavier vehicles has an impact on costs, emissions and externalities in road transport

03

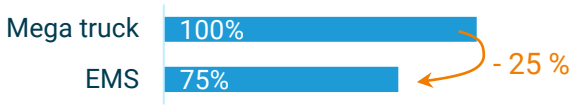
The advantages of LHVs are frequently advertised: cost efficiency, energy efficiency and less congestion.

On closer inspection, it becomes clear that the **situation is more complex**.

Costs

Weight-limited case: cost index per tonne

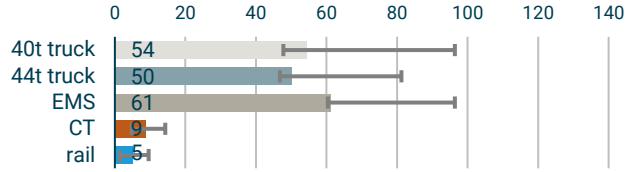
Volume-limited case: cost index per m³



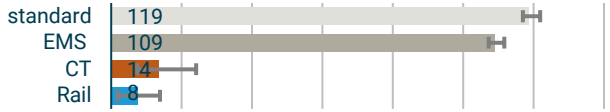
- **Operational and capital costs do not increase** proportionally with vehicle volume or max. allowed gross weight
- **Highest impact for transport of low-density cargo in EMS**

Emissions

Weight-limited case: CO_2e [g/tkm]



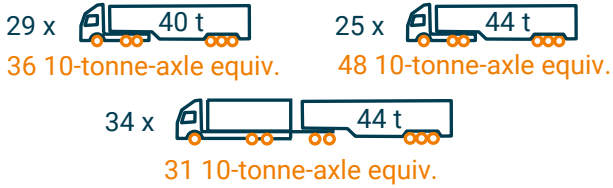
Volume-limited case



- Optimal road vehicle combination offers emission savings **potential of up to 10%**
- Door-to-door CT and unimodal rail transport offer **75% to 90%** savings potential vs. road transport

Other Externalities

Heavy weight scenario: 725 t



High volume scenario: 3100 m³

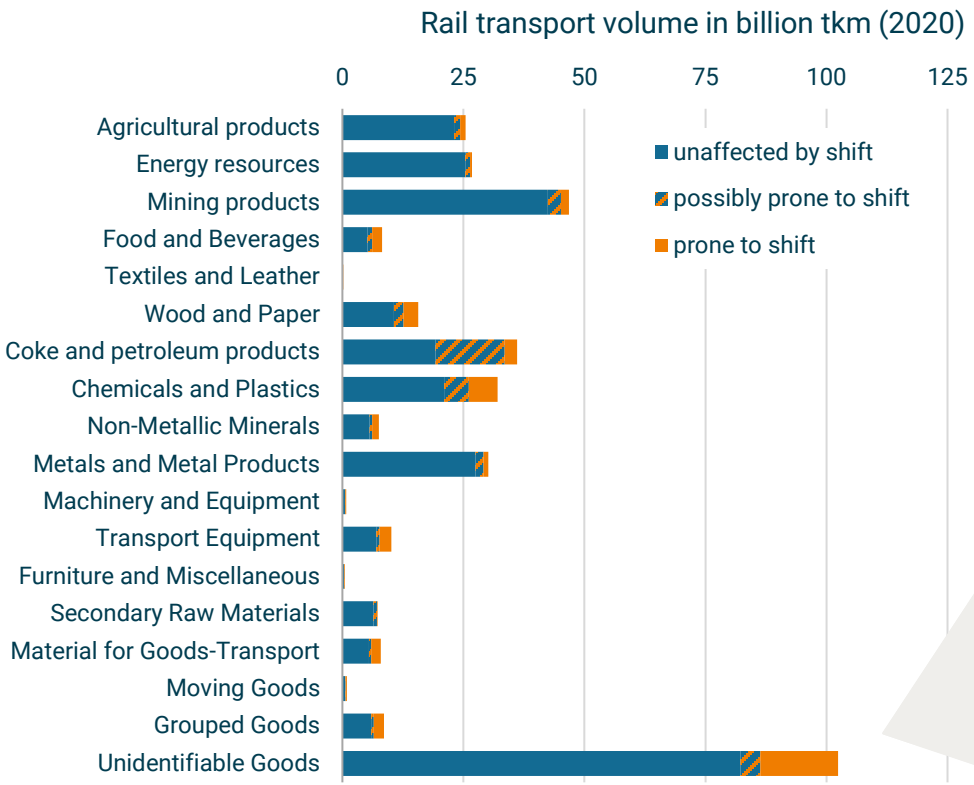
- Stress on road infrastructure increases with the **fourth power of the axle load**
- More axles reduce the overall stress
- Higher weight allowance **bears the risk of exceeding axle load limits**

While EMS offers reduced operating costs for transport companies, its energy efficiency gains are marginal compared to door-to-door CT and rail freight transport and poses risks of road degradation and more severe accidents.

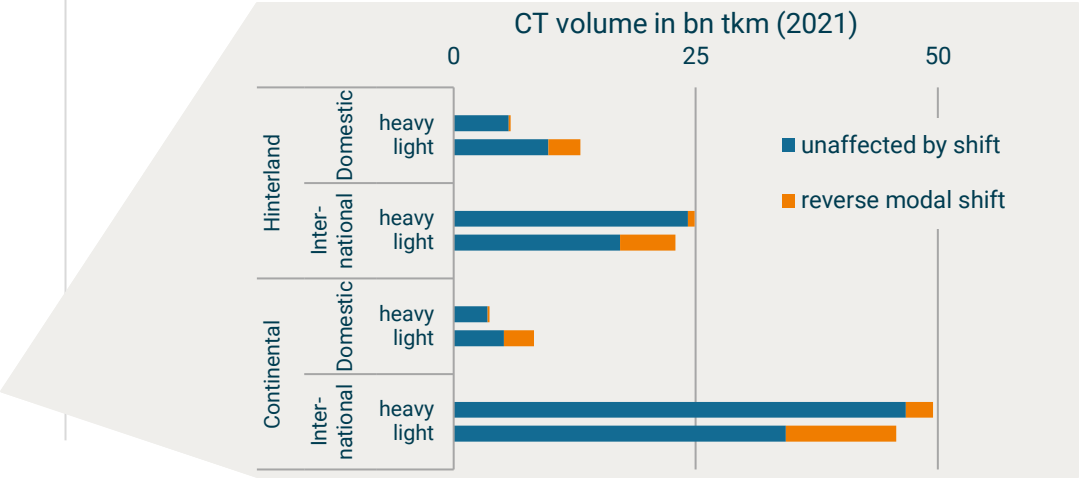
The increase in the permissible gross weight and the authorisation of EMS may lead to a reverse modal shift

04

The magnitude of reverse modal shift risk depends on the type of cargo carried – heavy or low-density



- The reverse modal shift potential is determined based on **cost savings potential and price elasticity**
- Depending on modelling and assumptions, the **literature values are slightly different**
- **CT as part of rail freight transport** is included in all freight categories, but especially in unidentifiable goods



The reverse modal shift means less rail freight and less Combined Transport.
The contraction will impact every cargo type transported. Door-to-door heavy-light CT will be strongly impacted.

A reverse modal shift is not without consequences – it causes additional truck journeys, emissions, and higher external costs

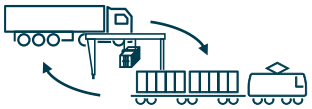
04

The externalities are an effect of the additional truck journeys instead of rail freight transport

Reverse modal shift effects

Rail Transport

- 21% transport volume over all goods categories



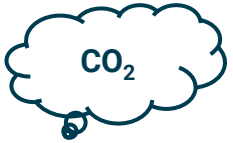
Combined Transport

- 16% transport volume for CT over all categories

Road Transport

+ 6.7 to + 13.3 million additional truck journeys

Externalities and indirect effects



+ 3.5 to + 6.6 million tonnes CO_2 emissions

x 3 higher external cost due to accidents, climate impact, noise and congestion

x 3 higher energy demand for transporting the same amount of goods on road instead of rail

+ € 1.15 bn additional costs per year for road infrastructure maintenance[01]

Energy efficiency gains achieved through road transport measures are partially cancelled out by additional truck journeys instead of much more energy-efficient rail freight transport and door-to-door Combined Transport.

01 Estimated additional road maintenance costs due to +3% additional wear and tear of road infrastructure; based on O&M costs given in the Overview of transport infrastructure expenditures and costs

The detailed analysis of the measures has revealed their effects and indicated recommendations to promote energy-efficient transport

Key findings

Aim of the revision

- Catalyse the proliferation of ZEVs
- Enable efficient road transport
- Promote intermodal transport

Results of the analysis

- EMS cannot be handled without increased operational complexity in CT
- Higher weights may breach transhipment and transport assets to the nominal limits
- + 30 cm increased height not necessary for extensive use of HC containers in CT
- The measures entail the risk of a reverse modal shift of about 20 % for overall rail freight transport

Target achievement

The amendment proposals are not optimally suited to promote intermodal transport and adequately improve energy efficiency

Recommendations

Energy efficiency along zero-emission targets

- Measures for promoting ZEVs that do not cannibalise energy-efficient rail freight transport

Consideration of external costs

- Consideration of external costs to fairly compare and balance operational cost advantages with external effects

Maintaining of standards for loading units

- Ensuring that the rail freight transport system (incl. wagons, terminal equipment, etc.), which is less flexible regarding altered weights and dimensions, remains compatible with all transport units

Maintaining height limits

- An increase in the permissible vehicle height is not necessary to promote the CT but could lead to challenges in routing

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