



**TRT TRASPORTI E TERRITORIO SRL**

# **Sustainable Transport Infrastructure Charging and Internalisation of Transport Externalities**

**Study for the European Commission, DG MOVE**

**Marco Brambilla, TRT**

**5<sup>th</sup> Florence Intermodal Forum**

**Internalising the External Costs of transports**

**Florence, May 20<sup>th</sup>, 2019**



*\*Only for Milano  
headquarters*



# Preamble

- **This presentation shows the main finding of the study *Sustainable Transport Infrastructure Charging and Internalisation of Transport Externalities***
- **Project consortium:**
  - **CE-Delft (NL) Team Leader**
  - **TRT (IT)**
  - **Ricardo (UK),**
  - **INFRAS (CH),**
  - **Planco (DE),**
  - **ISL (DE)**
  - **PMR (PL)**

# Preamble

- **Project timeline: September 2017 – May 2019**
- **Main Deliverables:**
  1. **Overview of transport infrastructure expenditures costs**
  2. **Handbook on the external costs of transport: version 2019**
  3. **Transport taxes and charges in Europe: an overview study of economic internalisation measures applied in Europe**
  4. **State of Play of Internalisation in the European Transport Sector**
  5. **Final report: Sustainable Transport Infrastructure charging and internalisation of Transport Externalities**

# Outline of the presentation

- **Objectives**
- **Scope**
- **Approach**
- **Methodology**
- **Infrastructure cost**
- **External costs**
- **Transport taxes and charges**
- **State of play of internalisation**
- **Conclusions**
- **Policy applications**

# Objectives of the study

- **Provide a very comprehensive overview of external costs, infrastructure costs and transport related taxes and charges**
  - **Total, average and marginal figures presented (the first two were missing in previous studies)**
  - **Assess to what extent transport infrastructure and external costs are internalised**
  - **Investigate options for further internalisation of transport infrastructure and external costs**
- (\*) the study does not consider transport subsidies and public service obligations, with the exception of tax/charge breaks or exemptions. Subsidies for infrastructure (e.g. CEF funding) are fully accounted.**

# Scope of the study

- **Transport modes and vehicles**

Road	Rail	IWT	Maritime	Aviation
<ul style="list-style-type: none"><li>▪ <b>Passenger car</b></li><li>▪ <b>Motorcycle</b></li><li>▪ <b>Bus</b></li><li>▪ <b>Coach</b></li><li>▪ <b>Van</b></li><li>▪ <b>Heavy Goods Vehicle</b></li></ul>	<ul style="list-style-type: none"><li>▪ <b>High speed train</b></li><li>▪ <b>Passenger train electric</b></li><li>▪ <b>Passenger train diesel</b></li><li>▪ <b>Freight train electric</b></li><li>▪ <b>Freight train diesel</b></li></ul>	<ul style="list-style-type: none"><li>▪ <b>Inland vessel</b></li></ul>	<ul style="list-style-type: none"><li>▪ <b>Freight vessel</b></li></ul>	<ul style="list-style-type: none"><li>▪ <b>Passenger aircraft</b></li></ul>

- **Geographical coverage**

- **Road, rail and IWT for the EU28**
- **Maritime 33 selected EU ports**
- **Aviation 34 selected EU airports**
- **Specific results for NO, CH, US, CA, JP**

# Methodology for assessing the internalisation level

## For each transport mode and vehicle

- **Elaboration of consistent transport performance dataset (i.e., v-km, p-km and t-km)**
- **Estimation of infrastructure and external costs**
- **Identification and measurement of taxes and charges**
- **Assessment of the extent to which external and infrastructure costs are internalised by current taxes and charges (i.e., cost-coverage ratio)**
- **Base year for costs, taxes and charges 2016**
- **Purchase Power Standard (PPS) adjustments**

# Infrastructure costs

## Infrastructure cost categories:

- **Construction and enhancement (fixed)**
- **Operational (fixed)**
- **Maintenance and renewal (partly variable and partly fixed)**

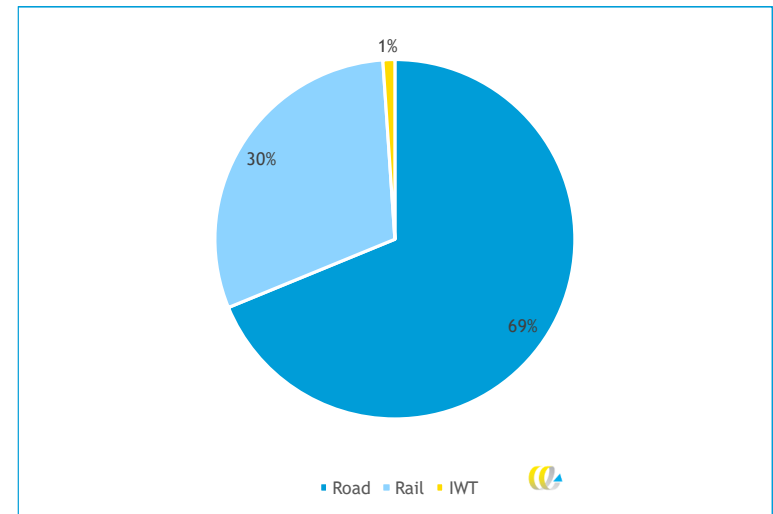
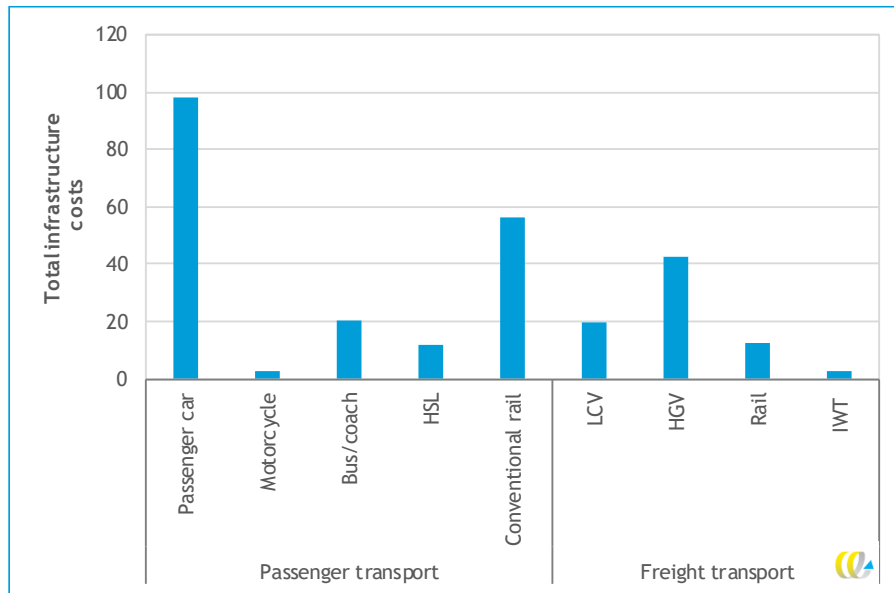
## Majority of infrastructure costs are fixed

Transport mode	Share of fixed costs
<b>Road</b>	83%
<b>Rail</b>	87%
<b>IWT</b>	93%
<b>Aviation</b>	67%
<b>Maritime</b>	97%



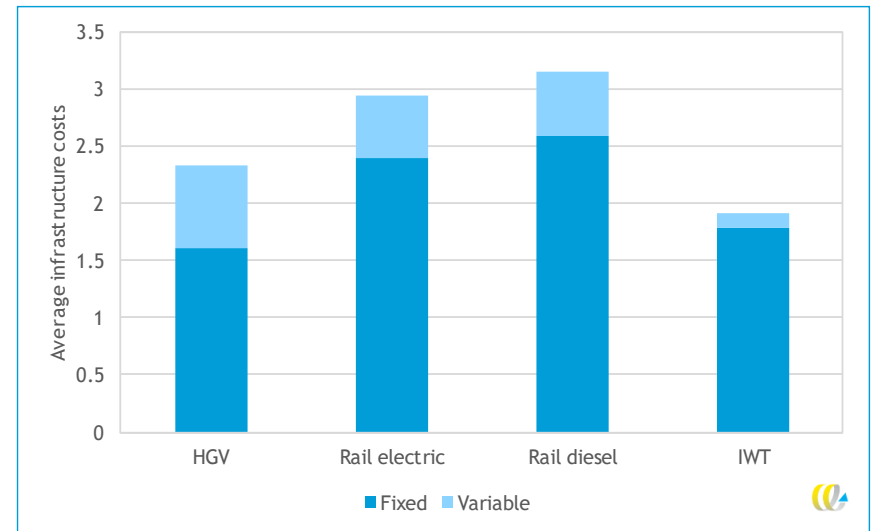
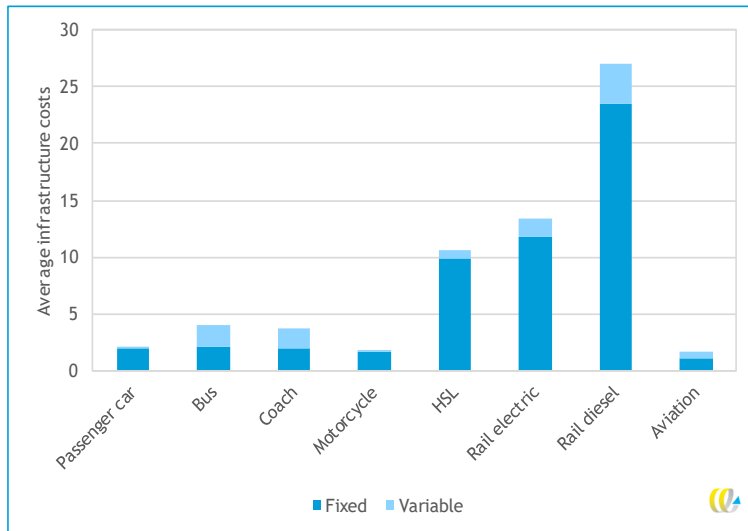
# Infrastructure costs

- **Total infrastructure costs for road, rail and IWT € 267 billion**
- **Estimates for selected:**
  - **34 EU ports € 1.4 billion**
  - **33 EU airports € 14 billion**



# Infrastructure costs

- **Average infrastructure costs of passenger transport significantly higher for rail than for road: (i) higher fixed costs (construction) and (ii) (on average) lower utilisation rate (fixed costs allocated to less p-km)**
- **Average infrastructure costs of freight modes, as for passenger transport, main part are fixed costs and highest average found for rail**



# External costs

## External costs considered(\*)

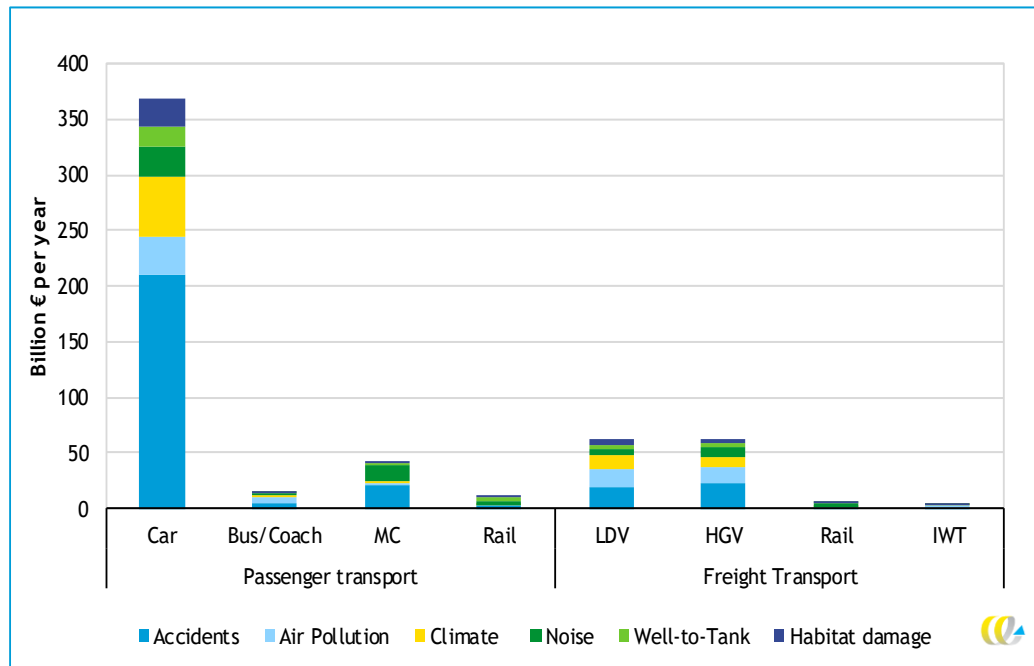
External cost	Road	Rail	IWT	Maritime	Aviation
Accidents	✓	✓	✓	✓	✓
Air pollution	✓	✓	✓	✓	✓
Climate change	✓	✓	✓	✓	✓
Noise	✓	✓			✓
Congestion	✓				
Well-to-tank emissions	✓	✓	✓	✓	✓
Habitat damage	✓	✓	✓		✓

**(\*) other externalities caused by transport can be identified, including soil and water pollution, up- and down-stream emissions, separation impacts in urban areas, etc.**

**They are discussed, but not monetised, in this study**

# External costs

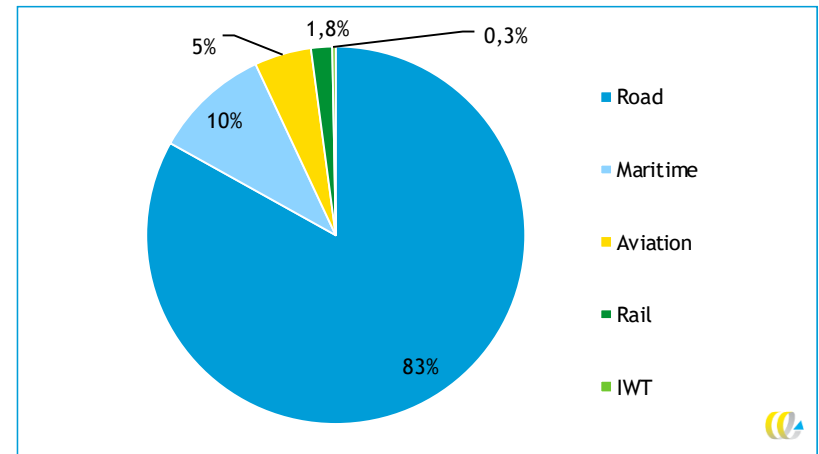
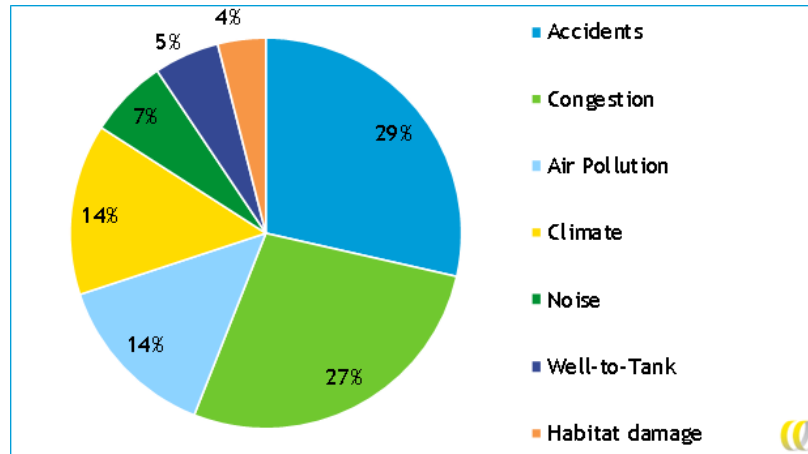
- **Total annual external costs for road, rail, IWT, aviation and maritime € 716 billion (i.e., 4.8% EU28 GDP) (excluding congestion)**
- **Congestion cost for road modes, another € 271 billion (delay costs)**



- **Total annual external costs almost € 1,000 billion**
  - **of which road transport € 800 billion**
  - **of which passenger road transport € 600 billion**

# External costs

- **Total annual external costs by category and mode**

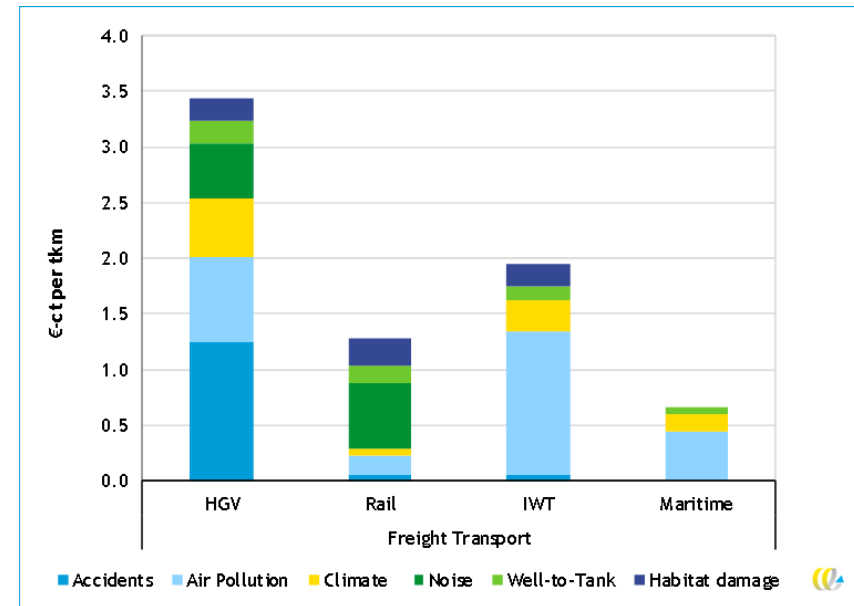
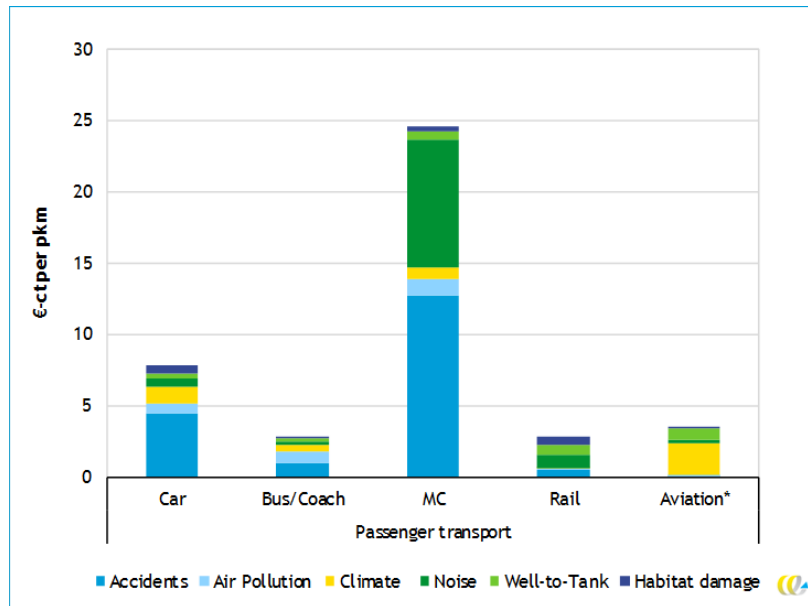


## Key message

- **Congestion safety and environmental costs all play a significant part**
- **Road is the mode causing the biggest external costs (total and average)**

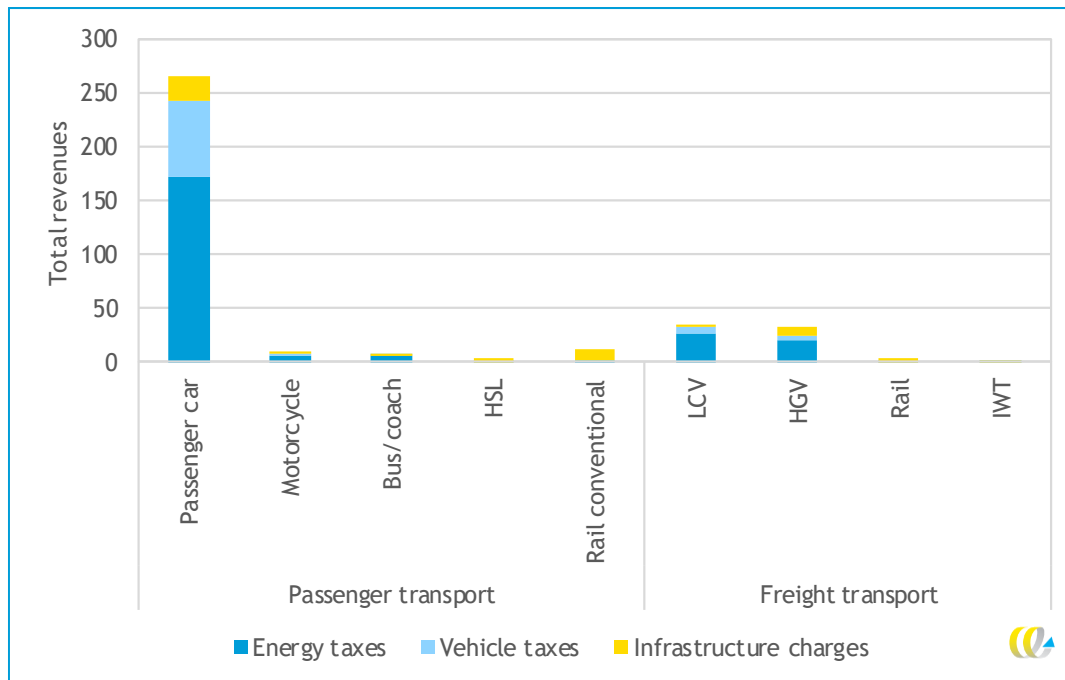
# External costs

- **Average external costs of passenger and freight transport (excluding congestion)**



# Transport taxes and charges

- **Total taxes and charges for road, rail and IWT € 370 billion (i.e., 2,5% EU28 GDP)**
- **Estimates for selected:**
  - **34 EU ports € 1.8 billion**
  - **33 EU airports € 13.5 billion**

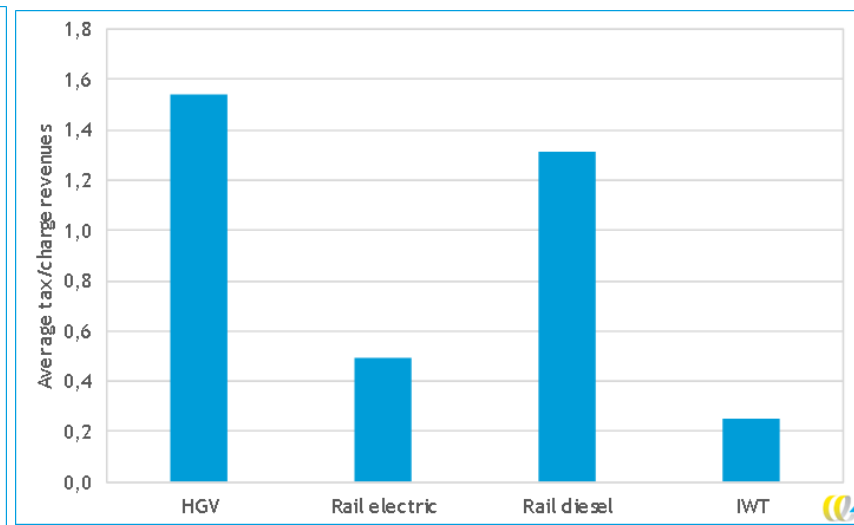
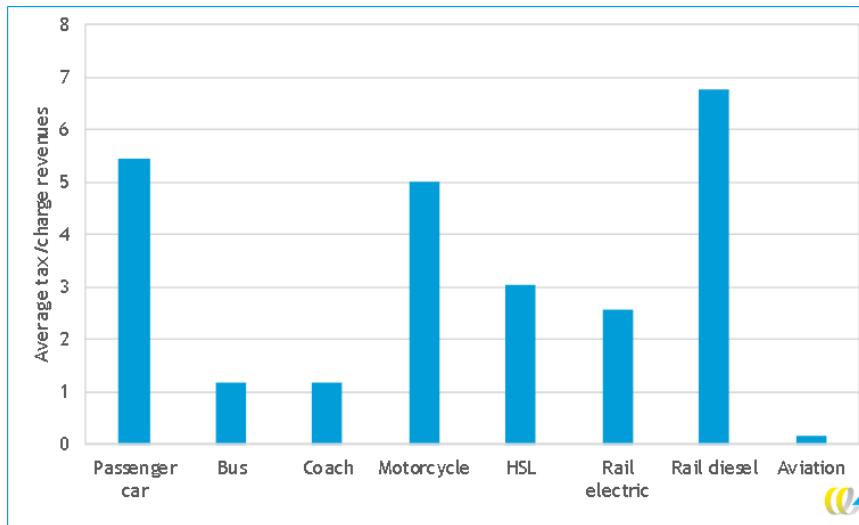


## By transport mode

- **95% road**
- **5% rail**
- **and 0.1% IWT**
  
- **81% from passenger transport, and**
- **remaining from freight transport**

# Transport taxes and charges

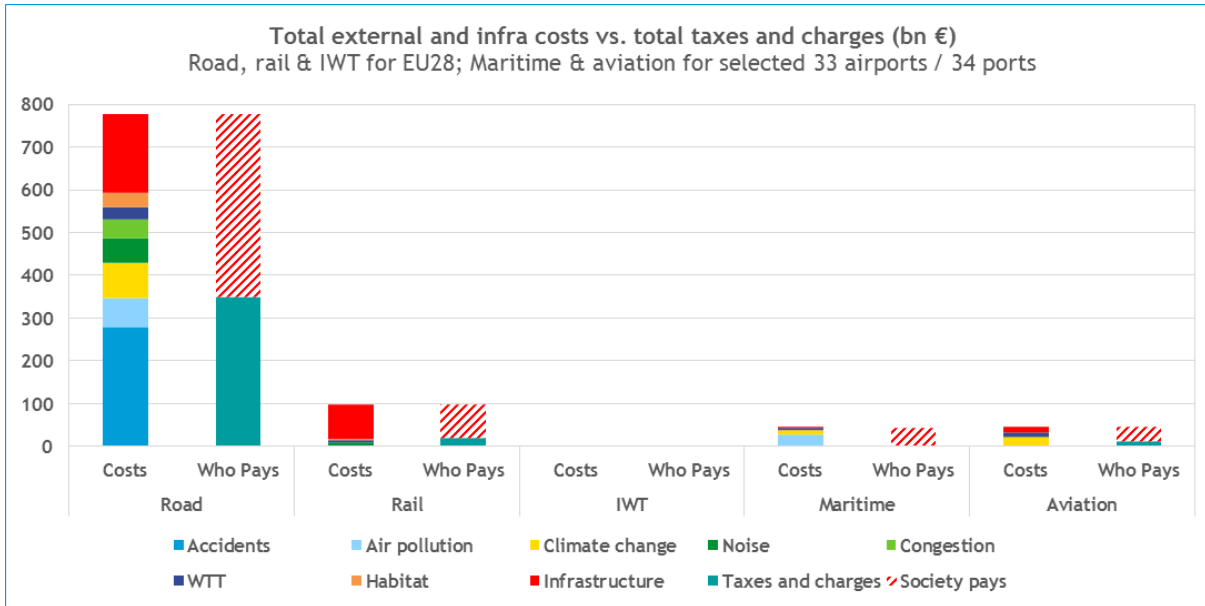
- **Average taxes and charges of passenger and freight transport**





# State of play of internalisation

## All taxes and charges vs all external and all infrastructure costs



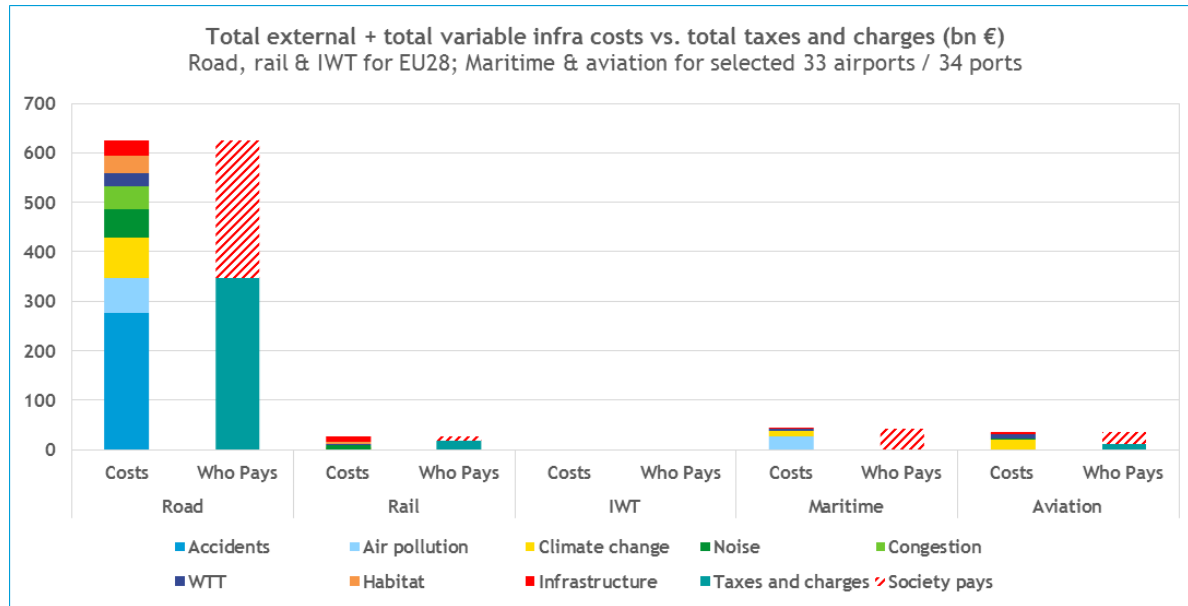
Transport mode	Cost coverage ratio
Road	45%
Rail	20%
IWT	6%
Aviation	29%
Maritime	4%

- **Road is the mode paying back the most as share of total external and infrastructure costs. But it is also the mode where society pays the most in absolute terms.**

(\* ) road congestion costs consider deadweight loss cost (1/6 of delay cost)

# State of play of internalisation

## All taxes and charges vs all external and variable infrastructure costs

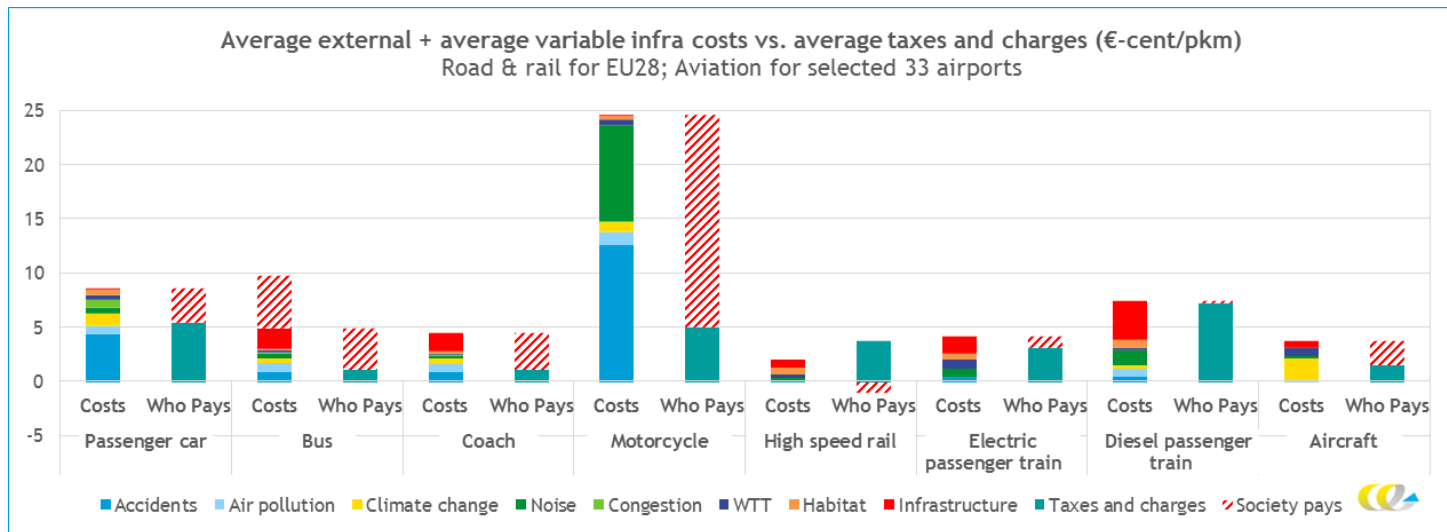


Transport mode	Cost coverage ratio
Road	56%
Rail	69%
IWT	12%
Aviation	37%
Maritime	4%

- **There are good reasons for which the users should pay only for the direct costs (wear and tear)**
- **Excluding fixed infrastructure costs, rail pays back the most**

# State of play of internalisation

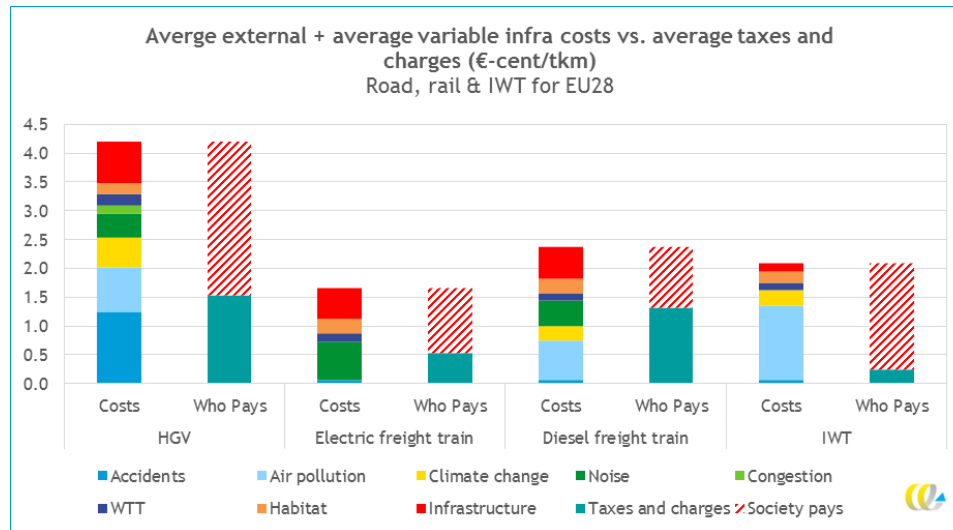
## Passenger average external and average variable infrastructure costs vs. average taxes and charges



- **Motorcycles show the highest average costs, but the total cost is limited**
- **Diesel passenger trains cost more than buses and coaches, but pay back more; HS exceeds full coverage**
- **Cost of coaches comparable to electric rail**

# State of play of internalisation

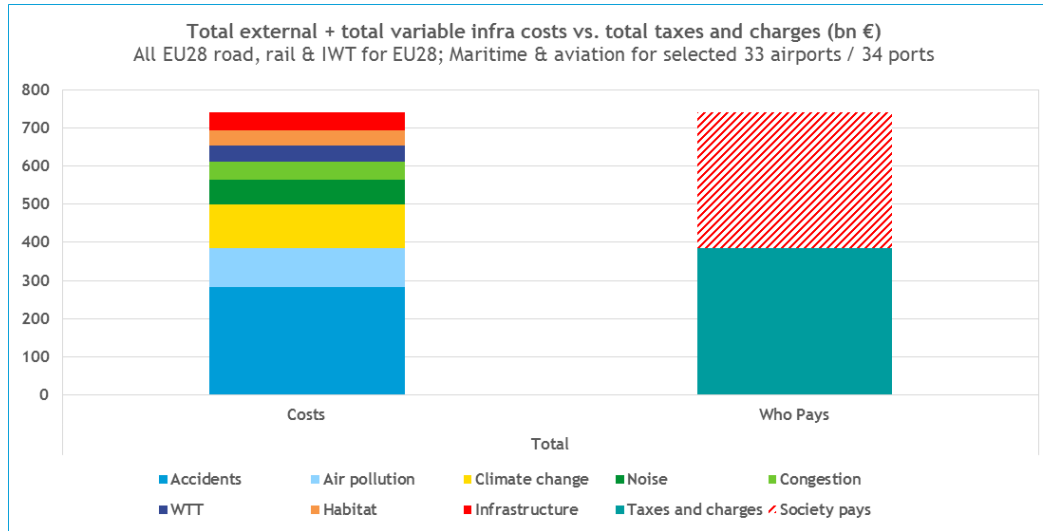
## **Freight average external and average variable infrastructure costs vs. average taxes and charges**



- **HGVs show the highest average costs**
- **Diesel trains cost more than electric ones, but pay back more**
- **IWT pays back very little**

# Conclusions

- **Total taxes and charges do not cover external and infrastructure costs**



- **Limited application of the “user pays” principle, as users pay back only half of the direct generated costs (excluding fixed infrastructure costs)**
- **Little evidence of marginal social cost pricing, as variable external and infrastructure costs generally not covered by variable taxes and charges**

# Policy applications

- **Road transport**

- **distance-based road charges differentiated to vehicle characteristics, location and/or time to increase the overall internalisation rate**
- **urban charging schemes to address relatively high external costs of urban transport**

- **Rail transport**

- **mark-ups on rail access charges to cover fixed infrastructure costs (although arguments exist for not internalising)**
- **introduction of noise-differentiated rail access charges to speed-up noise abatement measures**

# Policy applications

- **IWT**

- **appliance of fairway dues on a larger share of inland waterways, based on air pollutant emissions (most important for this mode) to complement new vessels emission standards**

- **Maritime**

- **environmentally differentiated port charges or fairway dues to further internalise air pollution and complement IMO emission standards for new vessels;**

- **global actions (with IMO) to reduce GHG emissions and climate change effects (intrinsically global character of shipping)**

- **Aviation**

- **environmentally differentiated airport charges or aviation taxes**



**Thank you for your attention**  
**Comments are welcome**

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