# Study on the Effects of the Introduction of LHVs on Combined Road-Rail Transport and Single Wagonload Rail Freight Traffic

## – Executive Summary –

**In co-operation with**

Fraunhofer ISI

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K+P Transport Consultants H-P Kienzler ■ Ginsterweg 6 ■ D - 79194 Gundelfingen ■ Hans-Paul Kienzler ■ Telefon ++49(0)761-150 63 64-0 ■ ■ e-mail: info@kp-transport-consultants.com

# Executive Summary

*Objectives and scope of the study*

This study was commissioned by the Community of European Railway and Infrastructure Companies (CER) and conducted by K+P Transport Consultants (Freiburg) and the Fraunhofer-Institute for Systems and Innovation Research (ISI), Karlsruhe, between June 2010 and August 2011. Its core objective is to quantify the potential range and impact of modal shifts of rail freight to road due to the introduction of longer and / or heavier trucks (LHV). The two relevant rail markets "single wagonload" and "combined road-rail transport (CT)" are distinguished. For both markets the potential shifts by goods category and LHV setting are analysed in the short, medium and long run and including entailed shifts by the economic downward spiral.

For each of the selected European corridors

- Corridor 1: German North – Sea Ports – Czech Republic
- Corridor 2: Belgian and Dutch sea ports (Antwerp, Rotterdam) – Ile de France – Spain (Barcelona)
- Corridor 3a: Scandinavia (Malmö) – Denmark – Germany (Ruhr area)
- Corridor 3b: Germany (Ruhr area) – Switzerland/Austria – Northern Italy
- Corridor 4: South East Germany (Munich) – Austria – Hungary (Budapest)

and market segments, the study analyses the development of traffic volumes shifted to road by different LHV settings. Cost structures and the economic viability of road hauliers and rail carriers are approached by taking a rough look at network utilisation and infrastructure investments required. As concerns social impacts the study includes the latest knowledge on current and future levels of the classical externalities, including greenhouse gas emissions, local air pollution, accidents and noise.

The study focuses on intermodal back-shift effects. Road sector internal processes, in particular intramodal shifts and congestion effects, are addressed in less detail.

The following LHV configurations were considered in the study

- 14.92m semi-trailer
- 44t/25.25m LHV
- 60t/25.25m LHV

According to the technical characteristics, in particular weight/volume ratios, different commodities relevant for modal shift were selected for each LHV type.

*Key conclusions*

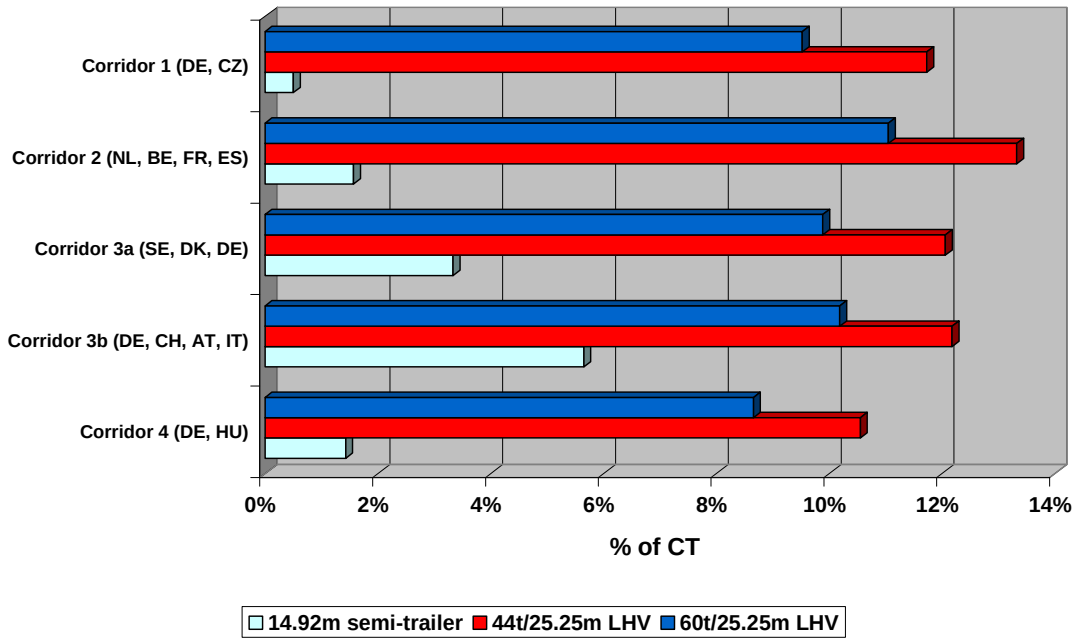
The study has found much stronger effects for single wagonload transport than for Combined Transport services. **Although both are considerable, the intensity of the downward spiral in single wagonload markets could lead to their complete or partial breakdown in specific regions or countries.** The introduction of LHVs would then sharpen the discussion on single wagonload services that is already now ongoing in some EU Member States.

But also the future of Combined Transport will, at least in parts, be subject to the introduction of LHVs. Given that a particular share of terminals is not able to accommodate LHVs and due to the increasing relevance of transhipment costs as soon as road haulage gets more cost efficient, **Combined Transport will certainly lose market share. In the light of the huge investment programmes already made to establish Combined Transport in Europe, this effect needs to be carefully considered.**

*Shifted volumes per corridor*

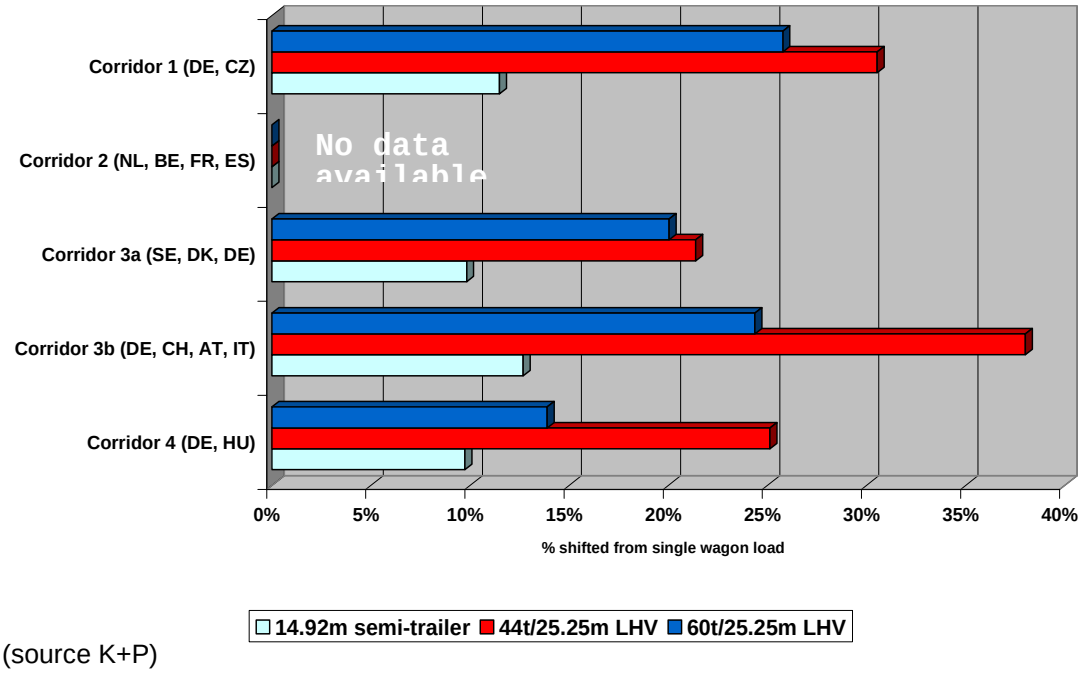
The cost advantages of the different LHV configurations are up to more than 22% compared to the standard HGV for the 44t/25.25m LHV, leading to a modal back-shift from rail to road. Figure 1 presents the results of the model runs for Combined Transport in 2020, whereas figure 2 presents the results for single wagonload traffic.

**Figure 1: Relative modal back-shift from Combined Transport to road per corridor and LHV scenario in 2020 (base: tonne-kilometres)**




(source K+P)

**Figure 2: Relative modal back-shift from single wagonload to road per corridor and LHV scenario in 2020 (base tonne-kilometres)**




(source K+P)

From both figures one can draw the following general findings:

- **The 44t/25.25m LHV causes the highest back shift for Combined Transport as well as for single wagonload due to its cost advantage.**
- **Single wagonload is more affected than Combined Transport, which results from the high share of fixed costs.**
- **Corridor 2 is the most affected for Combined Transport with more than 13% losses.**
- **On Corridor 3b more than 35% of its single wagonload traffic is back-shifted to the road, despite the LHV ban in Switzerland.**

Given these results one has to keep in mind that railway traffic in general and single wagonload in particular can be characterised by a very low economic threshold, which in turn means that they are very sensitive to even slight decrease of volumes.

This was considered in the “downward spiral” effect, where decreasing transport volumes lead to higher costs per unit, which again results in a competitive disadvantage for rail, consequently leading to even higher losses of market shares. Finally, it is highly probable that decreasing volumes would end up with a complete withdrawal of the service. This context is obvious for single wagonload, as the experience in many European countries has proven.

*Assessment of transport internal costs*

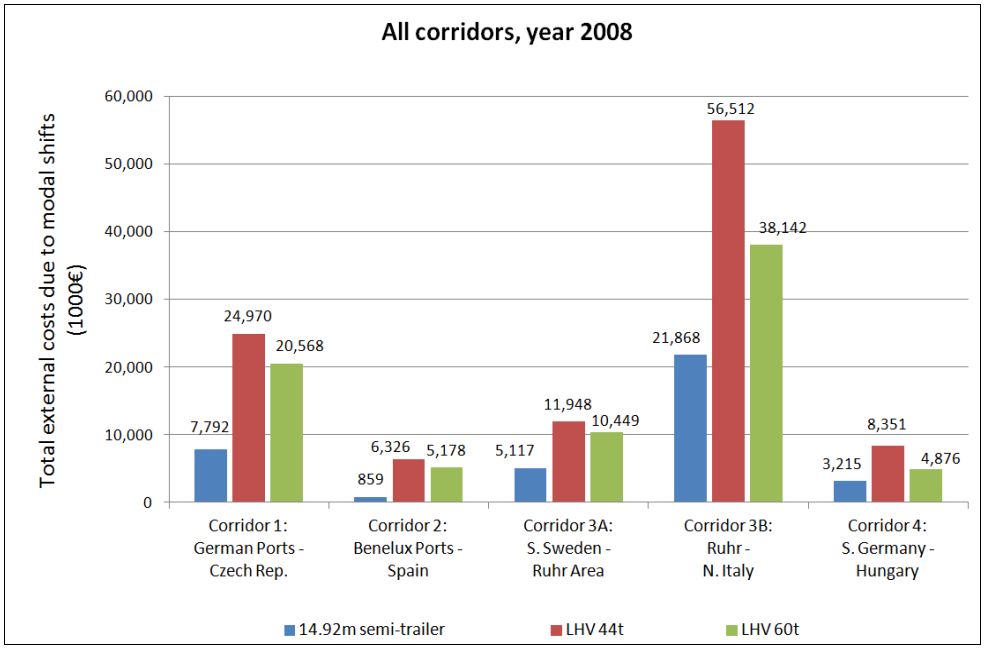
Average revenues of rail carriers can be roughly estimated between 30 and 40 € per 1,000tkm. When considering the 2008 base scenario, along the five corridors considered these lead to revenue losses of €484 million in Combined Transport and €504 million in single wagonload markets. In addition, the railway companies will face extra investment costs for some terminal enhancement to accommodate longer vehicles. For capital intensive undertakings, and in particular for Combined Transport system providers, these challenges may be difficult to compensate.

*Assessment of external costs*

For road and rail transport we considered the major components of external costs, i.e. greenhouse gas emissions, local air pollution, accidents and noise. Related per tonne kilometre, **the external costs of current standard HGVs are four times higher than in single wagonload and five times above Combined Transport**. Across all categories of externalities, the 14.92m semi-trailer concept shows about the same performance as HGVs, while LHVs of both weight classes perform up to 10% more efficiently per tonne-kilometre.

Due to improvements in safety and reductions in CO2 emissions, by 2030 we expect that road transport can reduce its external costs by 27%, while rail can achieve 30%. Accidents will dominate the picture in 2030, being responsible for 49% of total external costs, followed by global warming effects from direct combustion, fuel production and energy generation amounting to 39%. (The external costs of congestion are not included in these calculations.)

**Figure 3 Additional annual external costs by corridors and scenarios 2008**




Despite the higher accident and environmental costs of the 60t variant, the 44t/25.25m LHV appears to be the most harmful variant across all corridors (figure 3). From 2008 to 2030 we find growth of external costs of up to +130% related to the rail transport base case.

When considering the 2008 base scenario, taking basic assumptions on rail market shares and the uptake of LHVs in the road sector we arrive at increase in net external costs in total freight transport by road and rail after the introduction of LHVs of **+2.5% against total road and rail transport. In the context of the objectives of the European Commission's 2011 Transport White Paper, the unrestricted introduction of LHVs thus has to be regarded as problematic.**

*Conclusion summary*

- **Single wagonload markets are affected worst, with over 35% of rail freight back-shifted in one of the corridors considered by the study. The intensity of the downward spiral in single wagonload markets could lead to their complete or partial breakdown.**
- **Combined Transport will certainly lose market share as well: in the light of the huge investment programmes already made to establish Combined Transport in Europe, this effect needs to be carefully considered.**
- **The 44t/25.25m LHV, not the 60t/25.25m LHV, causes the highest back shift for Combined Transport as well as for single wagonload due to its cost advantage.**
- **Total external costs from freight transport by road and rail would increase following the introduction of LHVs, contrary to the objectives of the European Commission's 2011 Transport White Paper**