

*Received: 06 May 2017**Accepted: 19 May 2017*

ENVIRONMENTAL SAFETY TRANSPORT OF HAZARDOUS GOODS BY RAILWAY

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Keywords: environmental risk assessment, hazardous goods, wagon

Abstract: Transport of hazardous goods by railway is not only particularly more sustainable, but is also faster than shipping and cheaper than air operations. But it is not always possible to use rail transport for the complete journey. The goal of big railway transportations companies is handle the pick-up and final delivery runs for customers and combine several means of transport to form multi-modal transport chains. Special case are hazardous goods, they are substances and articles that pose an acute risk to people, property and the environment due to their chemical or physical properties.

1 Introduction

European railway (Figure 1) markets have opened up a wide variety of prospects. As a result, it operates with individual wagon and block train services between all the countries in Western and Eastern Europe – and beyond the European Union too [1]. Railway transport is often the most sensible solution outside the EU. Shipments can often be handled faster by rail because customs clearance takes place during the journey; as a result, there are no waiting times at border crossings [2]. Mineral oil, gas, sulphur, carbonates and other chemical and fertilizer industry products are in safe hands with human life. This is because the project is specializing in transporting hazardous products by rail for the chemical industry, esp. wagon parking [2], [3]. Chemical goods are transported in single wagons, groups of wagons and block trains in strict compliance with domestic and international safety regulations. Many companies choose the important ports of the Europe (esp. Port in Antwerp) as their European

distribution hub for their packed chemicals because of these five assets:

- customised logistics services,
- broad range of services,
- customer-oriented and cost-efficient customs procedures,
- transparent logistics chains,
- extensive transport network to foreland and hinterland [4].

The hazardous goods in the Port of Antwerp, esp. cargo handling, industry and logistics go hand in hand. The high level of integration and diversity throughout the value chain in Antwerp is unique in the world.

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Lucia Knapčíková; Michal Balog

Rail Freight Corridors (RFCs) map 2015

Including extensions expected in 2016 as indicated by the RFCs:

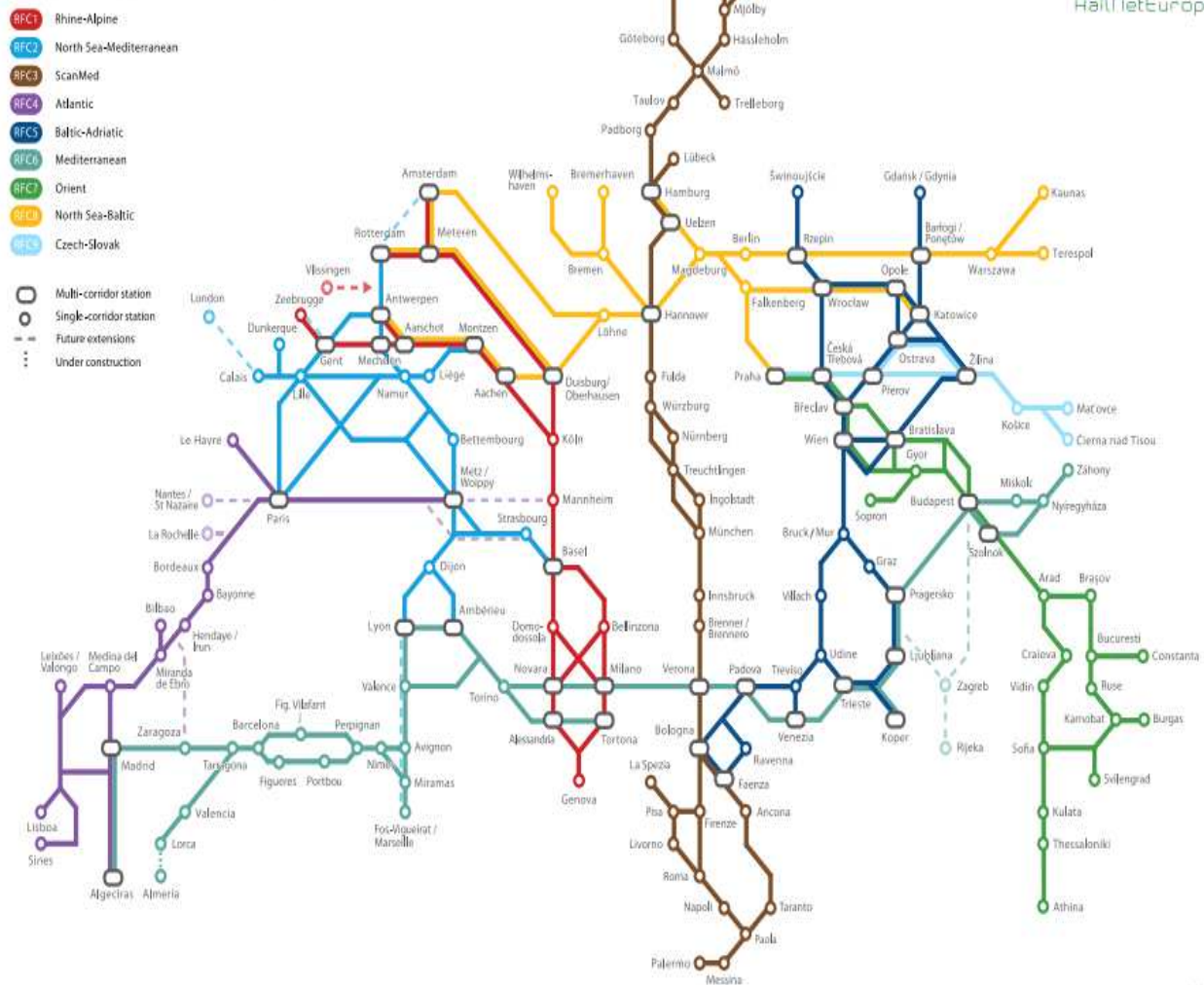


Figure 1 European rail freight corridors[3]

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2 Legal conditions about environmental safety transport by railway

Every day thousands of tonnes of goods (esp. hazardous goods) are transported across the EU to factories, warehouses or final customers. Rail freight (and combined rail-road transport) is in direct competition with road haulage, shippers regularly compare the two when deciding which mode of transport to use [3]. They naturally choose the one which best suits their needs, taking mainly into account: reliability, price, customer service, frequency and transport time. In other words shippers choose methods of transport on the basis of business criteria, and not on the basis of EU policy priorities [4]. The design of the unit, as well as its constituents shall take into account the environmental conditions to which this rolling stock will be subjected to.

For each environmental parameter, a nominal range is defined, which is the most commonly encountered in Europe, and is the basis for the interoperable unit. For certain environmental parameters ranges other than the nominal one are defined [1], [3]. In that case, a range shall be selected for the design of the unit.

Depending on the ranges selected and on provisions taken appropriate operating rules could be necessary when the unit designed for the nominal range is operated on a particular line where the nominal range is exceeded at certain periods of the year. According to European court of auditors (in the special report of Rail freight transport in the EU), the rail freight corridors regulation already attempted to increase the transparency of the performance of rail freight services on freight corridors [5]. According to the regulation, performance indicators should be set at the level of each corridor, monitored every year and the results should be published in the

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corridors’ annual reports. Moreover, the management board of each corridor is obliged to launch a satisfaction survey for the users of the freight corridor and to publish its results once a year [4]. However, our analysis shows that some limitations still persist.

3 Environmental railway safety control

The European Union Agency for Railways, formerly known as European Railway Agency (ERA), was established in 2004 to devise the technical and legal framework for creating a Single European Railway Area (SERA) as mandated under European Union law. ERA’s core activities are creating a harmonised approach to safety, removing technical barriers, advancing the single European Train Control and Communication System (ERTMS), and promoting simplified access for customers for the European rail sector. With the entry-into-force of the technical pillar of the 4th Railway Package in 2016, the mandate of the Agency has been extended to that of a European authority, issuing rail vehicle authorisations, safety certificates, and approval for ERTMS infrastructure [4], [5]. After a period of legal transposition into EU Member State law, these changes are expected to take effect by 2019/2020. As is known, rail play an important role in creating a sustainable future for transport in Europe – and there is broad consensus that this should be so [6]. Rail transport may help to achieve essential policy objectives such as tackling climate change, fighting congestion, creating economic growth, contributing to the re-industrialisation on the European continent, and providing mobility to citizens of all ages and social backgrounds. Transport is the backbone of economy, and rail should be the backbone of transport. In order to play this vital role for society – I have said this on many occasions this year – rail has to solve its problem of cost and scalability, and take on innovation to improve customer services on and off board [3],[4],[6].

3.1 Locomotive/wagon protection systems

Various types of train (locomotive with wagons) protection systems (TPSs) are installed across Europe offering different functionalities and consequently various level of safety assurance. Among them, the automatic train protection system (ATP) is the most advanced type of train protection systems (Fig.2). It is considered to be the most effective technical measure that infrastructure managers can implement to reduce the risk of collisions and derailment on mainline railways. It enforces obedience to signals and speed restrictions by speed supervision, including automatic stop at signal [5].

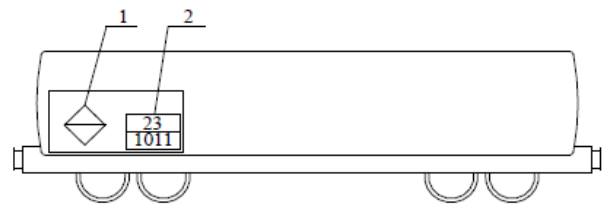


Figure 2 Chemical wagon (general scheme)

Legende:

- 1- alarm condition information,
- 2- security condition information

All Member States but three reported the presence of ATP systems on their railway network. However, the reported figures show a continuous problem of misclassification of different types of train protection systems. The Agency could verify the validity of reported figures in only a small number of them.[5] In these countries, the percentage of tracks equipped by ATP systems was generally under 20 %. Five Member States reported voluntarily a breakdown of figures for the different types of TPSs.[6] These figures suggest that TPSs with lower functionality (providing warning or warning and automatic stop only) are more common than ATP systems. In addition to reporting the percentage of ATP lines, almost all NSAs also reported the percentage of train kilometres on tracks with ATP in operation. This percentage is higher than the one of ATP lines, however for many countries there is surprisingly a relatively small difference, since one would expect intensive use of ATP equipped infrastructure, typically installed on lines with the highest traffic volumes [5], [6].

Conclusions

The rail network in the EU is generally designed for mixed traffic in other words, freight and passenger trains normally use the same tracks. For the rail network to operate, traffic management and managing procedures have to be in place for allocating and managing paths. This is done individually by each infrastructure manager. The procedures are generally not adapted to the specific needs of rail freight transport, which is cross-border in more than 50 % of cases, even within the rail freight corridors.

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Acknowledgement

This paper is part of a project that has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 723274.

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Review process

Single-blind peer reviewed process by two reviewers.