

Rapid services – the Czech high-speed rail project for Central Europe

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Abstract. In March 2017, the Czech parliament passed a resolution obliging the government to launch a high-speed line program. Government resolution on launching the program was adopted in May 2017. The High Speed Railway Development Program in Czech Republic is intended to target international connections in several axes: Dresden-Prague-Brno-Vienna/Bratislava/Budapest, Katowice-Ostrava-Brno-Vienna/Bratislava/Budapest, Wrocław-Prague-Munich. This network is supposed to improve Prague's accessibility to other cities in Czech Republic but also to major agglomerations of neighbouring states. This project is not only railway project but also a project of national development. One-day trip will include, among others, Dresden, Berlin, Vienna, Bratislava, Budapest and Warsaw together with other big cities in Poland. Since 2010 in Polish - Czech cooperation are being prepared studies on lines Wrocław - Praga and Katowice - Ostrava. The high-speed railway program implementation in Czech Republic and in Poland and Baltic Countries will result in an effective connection between Prague and Baltic Countries capitals. Creation of an international fast railway network in Central Europe is a part of the EU's transport policy framework for TEN-T network development and will contribute to the progress of economic links in the region. In addition, it is going to be involved in the European Union social and economic cohesion improvement.

1 Introduction

The construction of a high speed railway system in the Central Europe is very important for the the development of quality and competitiveness of rail transport in Europe. The analysis of the economic potential and transport network in the Czech Republic were the subject of UIC (International Railway Union, *fr. Union Internationale des Chemin de fer*) studies. Already in 1992, they assumed, as the best solution, the construction of high speed lines and their integration into a pan-European network [1]. In 2003, high potential for the development of passenger transport between the Czech Republic and Poland was indicated [2]. In 2006, a study was published regarding the analysis of economic potential and links in the countries of Central Europe indicating the legitimacy of fast construction of high speed lines in the Czech Republic [3].

The aim of the paper is analysing of the work progress in the Czech Republic and presenting them in the aspect of linking with neighbouring countries.

2 The decision on HSR in the Czech Republic

On May 22, 2017, the Government of the Czech Republic approved a key strategic document for the high-speed rail

(HSR) development in the Czech Republic, which gives a mandate to many participating stakeholder to work on the preparation of HSR project systematically further on. The name of this document is “Program for the Development of Rapid Services in the Czech Republic” (in Czech “*Program rozvoje rychlých železničních spojení v ČR*”). Its purpose was to decide at the government level on the framework conditions for a further preparation of the HSR project in the Czech Republic and to set out the basic conceptual background for the upcoming decisions and planning.

It should be noted that the HSR ideas have been (in the new socio-economic era) developed for more than twenty years, since mid of 90's, nevertheless the scope of works has been up to now put only on routing design and its optimization. By adopting this document the Government agreed on further preparation of the HSR in the Czech Republic and confirmed the possibility to launch other preparatory steps and processes necessary to implement this project which envisaged already the EU transport policy TEN-T in the Regulation 1315/2013/EU.

The basis for the decision of the Government was essentially twofold. How to strengthen the role of public transport for the future? In the best case in a sustainable and Fossil Free way. Secondly, how to ensure the further development of rail transport, which has been experiencing a significant increase in performance for almost a decade, or better specifying after the recent

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economic crisis? In this respect, the positive trend is facing a new challenge – lack of capacity – as the modernized backbone infrastructure does not allow to accommodate additional trains due to its heavy usage [4]. The lack of capacity on the most important parts of the conventional network is thus representing one of the most critical issues for the railway sector and its development and is becoming critical for its further growth and its further intermodal competitiveness.

In addition, the ambition to construct HSR system in the Czech Republic appears urgent regarding to the need of (i) reorganization of the railway network. This decision takes into account both, the internal requirements of the Czech Republic and the development of the infrastructure abroad and, at the same time, (ii) The objective is to optimize the transport flows in the coming decades, as well as to remedy some of the major deformations, which can be seen on the current network.

The most obvious example is the connection Dresden – Prague – Brno where trains compared to road transport have to travel 100 km longer route, instead of 350 km of “direct” motorway. This fact represents a nonnegligible handicap, which significantly influences competitiveness of the railway transport. Finally. The HRS project should be also seen as the second phase of the Czech railway system/network modernization process following its first part – modernization of the conventional network – which is still ongoing and is expected to be completed by the end of this EU programming period.

On the other hand, it should be mentioned, that the ambition of the Ministry of Transport was not only to discuss different aspects and solutions for the development of railway transport. The approach defining the best possible option for the future is much broader and more complex. The analysis went beyond railway system itself and took into consideration other alternatives, which might have come, at least theoretically, into account e.g. new innovative technologies. Nevertheless, as the only realistic alternative to HSR Rapid Services proposal has been identified further development of conventional railway, covering additional electrification of existing railway lines, their doubletracking etc. with estimated investment of 250-300 billions CZK. Other alternatives (all innovative transport technologies, development of road transport using electric vehicles) have not been found feasible [5, pp 49-55]. For this reason, the development of Rapid Services, including the construction of 700 – 800 km of new high-speed lines was recommended as the most suitable solution.

Finally, an important aspect supporting the governmental decision on the high-speed project in the Czech Republic was influenced by a wider European context (see figure 1). The implementation of the high-speed railway has become a standard not only in EU countries but is getting an important part of railway policy worldwide. Central Europe, including the Czech Republic and Poland, thus might get a new impulse for its development enabling to exploit the geo-economical potential of its location between the West and the East.

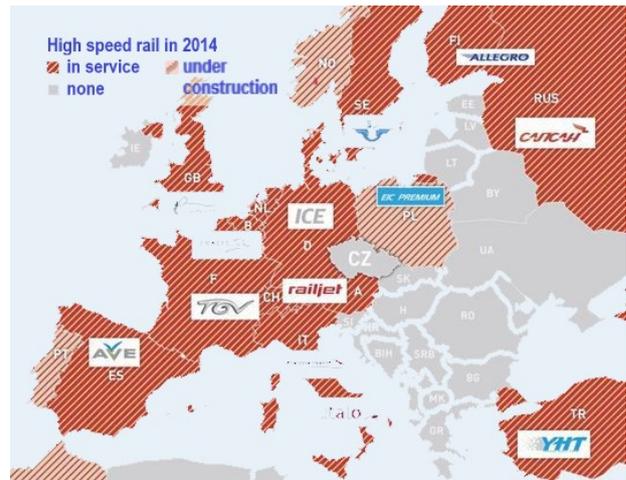


Fig. 1. Present status of implementation of HSR system in Europe. [Source: Ministry of Transport in Czech Republic]

3 Rapid Services

Altogether, the analysis identified the development of HSR system as an optimal solution for the future, which can bring significant socio-economic benefits, which seems to be feasible and include low technological risks [5, pp 75-83]. The solution based on the implementation of new high-speed lines and Rapid Services concept reflects the geographic context of the Czech Republic and Central Europe, their settlement system and density of the railway and other networks, availability of technologies and know-how, costs, spatial planning processes, protection and tradition, legal framework, socio-economic trends and their mutual synergies, dependencies and risks.

Significant factor contributing to the decision in favour of Rapid Services were positive gains for freight transport. Freight transport will get additional capacity on the conventional network and will also be partly able to use some sections (mostly cross-border sections) of the new HS infrastructure, which is going to be designed for mix use. This is not only a case of cross border tunnel sections as e.g. 26 km long tunnel proposed on the line between Prague and Dresden.

Moreover, the concept of Rapid Services does not identify the needs related to infrastructure development only, but also sets up a suitable operational model for the entire future system. Therefore, the whole project is called Rapid Services - reflecting to the real purpose of its building and construction of new HS lines – fast, accessible and high quality connection between major centres within the Czech Republic and abroad. In this regards it must be said that the RS system will not only consist of lines in high-speed parameters (above 250 km/h), which will form its backbone, but we do expect, that many conventional lines modernized for the speed up to 200 km/h will be a part of the system. We do believe this concept will make the whole system very flexible, accessible and primarily attractive because it will allow covering also those regions without direct link to newly constructed high-speed lines [6]

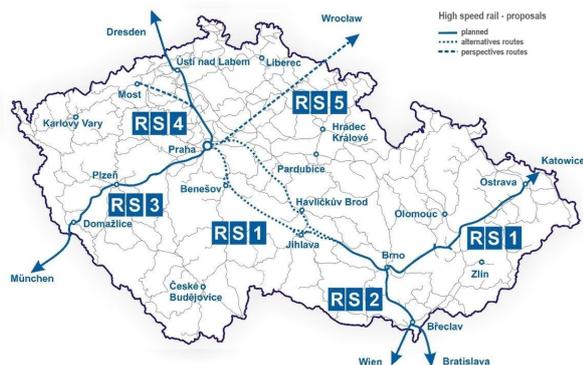


Fig. 2. Proposed routing of the newly build HS lines (line RS1 Prague – Brno in variants). [5, p. 39]

In line with the TEN-T policy in the Czech Republic plans following structure of backbone HSR infrastructure: RS 1: Prague – Brno – Ostrava – Katowice – Warszawa / - Žilina (- Košice), RS 2: Brno – Břeclav – Wien – Graz / - Bratislava – Budapest, RS 3: Prague – Plzeň – Regensburg – Munich / - Nuremberg, RS 4: Prague – Ústí nad Labem – Dresden – Berlin – Hamburg / - Leipzig – Frankfurt, RS 5: Prague – Wrocław – Warszawa (- Rail Baltica).

4 Future position of railway transport

The task of design speeds was not the crucial issue for the document because each of the RS branches will be considered separately in detail. Line speeds are going to be tested and verified for different variants researched, within particular feasibility studies of each RS branches. This means that different directions or even sections might have different speeds. The document only sets the framework, that the newly constructed lines should be designed for speeds of 250, 300 and 350 km/h. Nevertheless, there should be also stated several important facts. Firstly, a homogeneity of speed profile for the whole system must be considered to avoid the situation of excessive variety. Secondly, operational speed is expected to be between 250 – 300 km/h. Nevertheless, the line design should allow including some reserves for the future. The line should accommodate very HS trains as well as slower “IC” trains (e.g. railjet) running at speed 200 – 230 km/h. Finally, the system of clock face timetable between the most important nodes must be also considered.

Another issue discussed in the document was the schedule of works for the preparation and implementation of the whole project. Although the TEN-T policy prescribes the inauguration of several sections of new HS lines by 2030, namely Prague – Litoměřice/Lovosice on Prague – Dresden line, the whole line between Brno and Přerov and the stretch between Brno and Vranovice heading to Austrian and Slovak borders, the document took into consideration the current legal framework and

particular procedures given and stated there can be many difficulties caused by this complicated and time consuming procedures given by this legal environment. Therefore, the document concludes that without legislative changes – in particular the acquisition of permitting processes – it will be hardly possible to accelerate the preparation of the whole project (as well as other transport infrastructure development projects). This in other words means only a minimal possibility to start the operation of the new lines before 2030 (except for modernized ones) This reason might place the whole project at risk. The discussion about possible legislative adjustments (e.g. a new act about line constructions), which is now considered to accelerate and make transport infrastructure implementation easier was not taken into consideration due to the fact of uncertainty of its final wording and legal power. Nevertheless, this topic of legal environment has been classified as the top priority to be solved.

5 State of play

As already mentioned, the next steps include elaboration of feasibility studies for individual HS lines in order to assess their economic efficiency depending on proposed routings, speed and territorial throughput. The positive economic evaluation for at least one routing option will be a basic precondition for its further project development.

The key priority represents the most traditional transport axis along the TEN-T Orient/East-Med Corridor, which crosses the Czech Republic from NW to SE and connect (Berlin –) Dresden – Ústí nad Labem – Prague – Brno – Břeclav with Vienna, Bratislava and Budapest. This fact reflects the feasibility studies (FS) ongoing. Both of them – FS for the new HS line Praha – Dresden as well as FS Praha – Brno – Břeclav, which is now going to be contracted, will be finished by 2019. Because of the fact that the new infrastructure can bring significant effects on environment, part of the FSs will be an environmental analysis according to SEA rules and standards. Originally, EIA was considered, but due to the uncertainty of routings, this very detailed assessment has been postponed to a latter preparatory phase. Nevertheless, we do believe that SEA outputs will make the decision-making procedures easier and will contribute to a smoother protection of HSR corridors in spatial planning procedures because many of them need modifications.

Another important sections, which are going to be prepared in a short time, are Brno – Přerov and Přerov – Ostrava, where the latter represents one of the most critical sections on CZ network, especially in terms of capacity. Both stretches are also very important for international interconnection, not only between the Czech Republic and Poland/Slovakia, but also for the relation between Poland and Austria or countries that are even more distant.

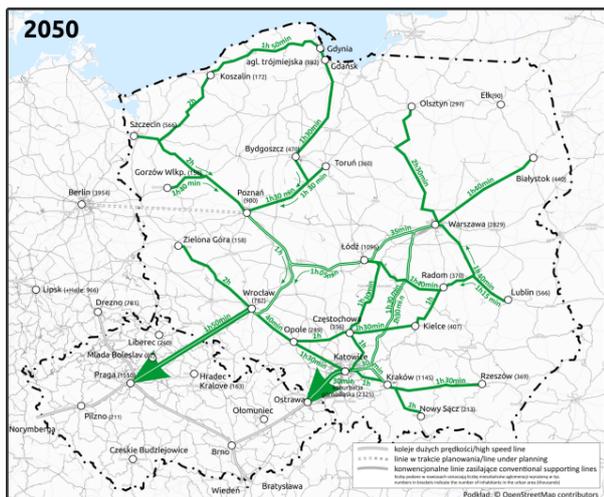


Fig. 5. Times of transit from Polish cities to Prague and Ostrava after implementation of the program of building high speed lines in Poland. [9, p. 29]

Following Poland's effort to describe all relevant features of such a connection in the pre-feasibility study the Czech Republic launched the routing study recently to identify possible variants on the Czech territory. Generally there are two basic routings possible – via Liberec (with a continuation to Jelenia Gora) and via Hradec Králové and Wałbrzych. This study should be handed over by the end of 2017. This means the discussions about the further steps on Prague – Wrocław connection can start in 2018.

7 Munich/Nuremberg - Praha - Warsaw - Tallin (Helsinki) Corridor

Currently implemented Rail Baltica project, which assumes connecting Tallinn with Warsaw through Riga and Kaunas by a railway line of 1435 mm track, is a part of the implementation of the European cohesion policy. It is also planned to build a branch from Kaunas Airport (KUN) to Vilnius via Vilnius Airport (VNO) (102 km), also as a new high speed line [10,11].

Thanks to this project, the Baltic countries will be integrated into the European high-speed network. A corridor will be created to connect the countries of Southern and Western Europe with the Baltic States and Scandinavia [12].

It is assumed, that the new line will accommodate both fast passenger traffic and freight traffic. Prospective plans are to lengthen this line from Tallinn to Helsinki by constructing a submarine tunnel. The tunnel project is of great economic uncertainty due to its very high cost and is currently undergoing in-depth economic analysis. The construction of the high-speed line Rail Baltica creates a good opportunity for fast railway connections from Estonia, Latvia, Lithuania to Poland and Czech Republic.

The transit time between Riga and Tallinn will be reduced to 1 hour 55 minutes, between Riga and Kaunas to 1 hour 25 minutes and Kaunas and the Polish-Lithuanian border to about 25 minutes. However, the low

technical parameters of the line on the Polish side will be a barrier to the development of these connections. The maximum speed of 160 km/h on the Warsaw - Bialystok line can only be satisfactory for linked of these cities and not as a national connections, or international connections. In this context, it is necessary to analyse the increase of the maximum speed on the Warsaw - Bialystok line to 200/230 km/h, which is technically and economically feasible while leaving the 3 kV direct current supply system. The section from Białystok to Elk is planned to upgrade to 160 km/h and from Elk to the border with Lithuania will be made feasibility study for a new line in the range of up to 230 km/h. With such a real program, it would be time to travel from Warsaw to the border at about 3 hours. For international relations it would be possible to reach the time of transit from Warsaw to Vilnius about 4 hours, to Riga 4 hours 20 minutes and Tallinn 6 hours 15 minutes and if a tunnel was built to Helsinki it would take 7 hours to travel to this city from Warsaw.

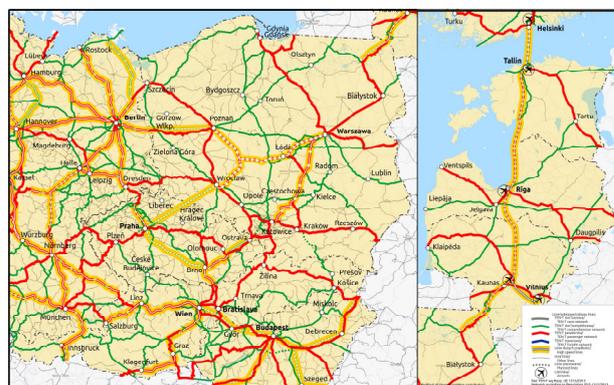


Fig. 6. TEN-T core passenger in Central- East Europe. [6, p.25]

8 Institutional support

It must be clear that such an intensive preparation and huge effort would not be possible without institutional background and funding. In order to ensure the continuation of the work on the HS project a top-level working group in Czech Republic was set up under the direction of the Minister of Transport, Mr. Dan Ťok. The aim of this group is to share information on the status of HS project and to ensure that all the stakeholders have been invited into the process and all of them have information available. This working group consists of representatives of Ministry of Transport, Ministry of Environment, Ministry for Regional Development, Ministry of Industry and Trade, Ministry of Finance, Ministry of Agriculture, State Transport Infrastructure Fund, SŽDC, Association of Regions of the Czech Republic, Economic Committee of the Chamber of the Parliament and Association for Infrastructure Development. Similarly, the Czech infrastructure manager SŽDC established a special HS working group responsible for the further preparation of the project, especially for commission of all the feasibility studies. Moreover, the State Fund for Transport Infrastructure (SFDI) made a special budget chapter available for financing of studies and the whole HS project. This

financial guaranty thus represents very important feature, which brings needed stability into all running and prepared processes.

In addition, the Baltic Countries have established RB Rail AS, joint venture company for coordinating the works of beneficiaries:

- Estonia's Ministry of Economic Affairs and Communications,
- Latvia's Ministry of Transport
- Lithuania's Ministry of Transport and Communication and Implementation Bodies;
- Rail Baltic Estonia OU,
- Estonian Technical Regulatory Authority,
- Eiropas Dzelzcela Līnijas SIA,
- Rail Baltica statyba UAB,
- Lietuvos geležinkeliai JSC

In Poland, in the period 2008-2013 Inter-ministerial Team was appointed to the government Program for the construction and start the operation of high speed railways system. In the 2008 - 2013 the preparatory works was supervised through PKP PLK S.A. by the special department (High Speed Railways Centre). After its dissolution, it only exists at PKP PLK - Infrastructure Manager - team dealing with technical issues of projects.

At present High Speed Project is waiting for further decisions in his realisation and there are no entity nominated for the high-speed rail project.

This investment will be coordinated with construction of the new airport near Warsaw.

9 Conclusions

The dynamics of the HS project preparation has increased dynamically in recent years. The reason to that was not only the revised TEN-T policy, which foresees the development of HSR for the first time also in post-socialist countries but also increasing capacity problems on conventional railway network. In 2017 the focus of studies and related documents left the optics of technical disciplines and was targeted into wider scope, which would offer important answers to politicians.

The team responsible for the HSR project in the Czech Republic believes, that the document approved by the Czech government put a cornerstone for a successful development of the whole project, in a first phase for necessary changes of legal framework, which might significantly help to ease and speed up its realization. For the first time in Czech Republic, the project has been understood as the development project of national importance highly exceeding the transport sector.

The parallel implementation of high-speed line construction projects in Poland and the Baltic States offers the opportunity to achieve a significant improvement in transport accessibility between and within these countries and will support the improvement of the European Union's cohesion. However, to take advantage of these opportunities and achieve synergy effects, it is necessary to coordinate and harmonize these projects across the region in both organizational and technical aspects.

References

1. M. Walrave: The development of high speed rail innovation and tradition. Prospects for the future. *Rivista Internazionale Di Scienze Sociali*, **101**, no. 3, 375-397 (1993) JSTOR, www.jstor.org/stable/41623791 [access: 28.03.2018]
2. UIC by Intraplan Consult GmbH, IMT Trans and INRETS, Passenger Traffic Study 2020 Poland and Czech Republic (2003)
3. UIC by CENIT Barcelona, Opportunities for high speed rail in Central and Eastern Europe (2006) [In French]
4. J. Ilík, Railway 21: opportunities-needs-outlook, *ERA 21*, **5**, 52-53, (2015) [In Czech]
5. Ministry of Transport of the Czech Republic., Program for the Development of Rapid Services in the Czech Republic, (2017) [In Czech]
6. J. Kušník, J. Ilík, Rapid Service as precondition of competitive railway, in: The Czech Railway in the year 2030, *Bulletin of Czech Railways fair and annex of Železniční magazin*, **5**, 3 (2013) [In Czech]
7. P. Sleszynski, Influence of the structure of the high-speed railway system in Poland to the mutual temporary-spatial availability of the most important urban centres. *Technika Transportu Szybowego, tts* **6**, 18-21 (2017) [In Polish]
8. Regulation (EU) No 1315/2013 of the European Parliament and of the Council on Union guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU, UE Journal L348, 20.12.2013
9. A. Massel, A. Pomykala, J. Raczynski, Prospects for the development of international passenger rail transport in Central-Eastern Europe in terms of high-speed line construction. *Technika Transportu Szybowego, tts*, **6**, 22-31(2017) [In Polish]
10. AECOM, Rail Baltica Feasibility Study (2011)
11. AECOM, Rail Baltica Feasibility Study. Amendment – Analysis of Vilnius Extension (2014)
12. A. Pomykala, Rail Baltica high speed line in the aspect of the development of railway connection in the Central Europe. *Technika Transportu Szybowego, tts*, **11**, 41-48(2017) [In Polish]