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**The perspectives of development of high-speed rail network in the European Union till the year 2050**

**Abstract:** The aim of the article is indication of basic development projects of high-speed rail network in the European Union. Beginning with the analysis of the length of high speed railways exploited in the 9 countries of the UE in the years 1985-2017, further there were presented the current projects of building and modernization of high-speed railways within the 2014-2020 budget perspective. Therefore there were pointed out the projects of building and modernization of high speed rail in the EU declared by the particular member states for the years 2021-2030 within TEN-T network, established in 2013. Further, the projects of building high-speed railways planned for the years 2030-2050 within the complex TEN-T network. As an outcome of the analyses presented in the article there emerged a complete vision of planned development of high-speed rail network in the European Union, which length in 2030 could be estimated for approximately 16,5 thousand kilometers.

**Keywords:** High-speed rail; European Union

At the initial stage of development of high-speed railway lines, they were not formally defined in the legal system of the then European Economic Community (EEC). The first definition of the high-speed rail system, already within the European Union, was adopted in 1996. Then the definition of high-speed rail lines appeared in 2010 (Decision of the European Parliament and of the Council No. 661/2010 / EU of 7 July 2010 on EU guidelines for the development of the trans-European transport network, Official Journal of the European Commission 2010, L 204/1), according to which they are:

- specially built high-speed lines with equipment enabling driving at speeds equal to or exceeding 250 km/h;
- specially modernized conventional lines with equipment enabling driving at speeds of the order of 200 km/h;
- specially upgraded high-speed lines, which have special characteristics due to conditions related to topography, topography or urban considerations, on which lines the speed must be adapted to the individual case. This category also includes lines connecting high-speed networks with conventional networks, lines running through stations, access to terminals and depots, etc., which are used by high-speed rolling stock running at conventional speed.

The above definition is repeated by the currently binding Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on EU guidelines for the development of the trans-European transport network and repealing Decision No 661/2010 / EU - Official Journal of the European Union 2013, L 348/1. The manifestation of this success was the constantly growing number of passengers resigning from journeys with their own cars, planes or buses and the phenomenon of generating additional new demand for transport by the new transport offer.

The construction of the first high-speed railway line (KDP) adapted to the speed of 250 km/h in Europe and within the borders of today's European Union was started in 1970. It was the Italian Rome - Florence line known as "Direttissima". The main works on this line were completed in 1981 - 1984, commissioning sections with a length of 150 km and 74 km, respectively. Parallel to the Italian projects, the construction of a new high-speed railway was considered in France. After a lot of preparatory work, in 1976 the final decision was made in France to build a new high-speed railway Paris - Lyon, about 420 km long, adapted to a maximum speed of 300 km/h. The investment was carried out in a record time of 5 years. 1981, when the commercial operation of the KDP Paris-Lyon line began, as well as the operation of the first section of the Italian "Direttissima", entered the history of European railways, as the beginning of the high-speed rail era on this continent, and the abbreviation TGV (from the French name for high-speed trains à Grande Vitesse), has become a commonly used name for this type of train, manufactured for the first time on the European market by Alstom. Since the first years of operation of the KDP Paris-Lyon line and the Italian "Direttissima" were a great market, marketing and image success of the French (SNCF) and Italian (FS) railways, there was soon a strong interest in building new KDP lines in several other Western European countries in especially in Germany and Spain. The manifestation of this success was the constantly growing number of passengers resigning from journeys with their own cars, planes or buses and the phenomenon of generating additional new demand for transport by the new transport offer.

**Tab.1.** Length of high-speed railway lines operated in European Union countries in 1985 - 2017

Years	Belgium BE	Germany DE	Spain ES	France FR	Italy IT	Netherlands NL	Austria AT	Poland PL	United Kingdom UK	UE
1985	-	-	-	425	174	-	-	-	-	599
1990	-	90	-	717	194	-	-	-	-	1 001
1995	-	447	471	1 290	238	-	-	-	-	2 446
2000	72	636	471	1 290	238	-	-	-	-	2 707
2001	72	636	471	1 549	238	-	-	-	-	2 966
2002	137	820	471	1 549	238	-	-	-	-	3 215
2003	137	886	919	1 549	238	-	-	-	74	3 803
2004	137	1 183	919	1 549	238	-	-	-	74	4 100
2005	137	1 183	919	1 549	238	-	-	-	74	4 100
2006	137	1 272	1 112	1 549	324	-	-	-	74	4 468
2007	137	1 272	1 348	1 884	324	-	-	-	113	5 078
2008	137	1 272	1 448	1 884	535	-	-	-	113	5 389
2009	209	1 272	1 448	1 884	856	120	-	-	113	5 902
2010	209	1 272	1 866	1 912	856	120	-	-	113	6 348
2011	209	1 334	2 117	2 058	856	120	-	-	113	6 807
2012	209	1 352	2 117	2 058	856	120	-	-	113	6 825
2013	209	1 352	2 413	2 058	856	120	50	-	113	7 171
2014	209	1 352	2 413	2 058	856	120	50	-	113	7 171
2015	209	1 475	2 413	2 058	856	120	50	224*(89 )	113	7 518
2016	209	1 475	2 413	2 180	896	120	50	224*	113	7 680
2017	209	1 658	2 413	2 734	896	120	67	224*	113	8 434

Source: Statistical pocketbook 2018 - [www.ec.europa.eu/transport](http://www.ec.europa.eu/transport).

\*according to the cited source, the official website of the European Commission, in 2015 there were to be 224 km of high-speed lines in Poland. In fact, the section of the E-65 South line was in operation this year. Central Railway Main Line (CMK), Olszamowice - Zawiercie with a length of 89 km adapted to the maximum speed of 200 km/h trains, put into operation at the end of 2014.

Table 1 presents data on the quantitative development of high-speed railway lines operated in the European Union in the years 1985 - 2017. The presented statistical data related to railway lines with a maximum technical speed of at least 200 km/h and higher. These are, therefore, both newly built lines at a speed of at least 250 km/h, as well as conventional railway lines modernized to a technical speed of 200 - 230 km/h. As shown in the table, nine countries of the European Union operated KDP lines in 2017, with Poland being the last country to join this group in 2015. Poland has reported for inclusion in EU statistics, as KDP lines, sections of the E - 65 Gdynia - Warsaw - Warsaw - Zawiercie - Katowice railway line modernized to 200 km/h - border with the Czech Republic, after which ED 250 combined trains have been operating since December 2014 Pendolino.

In the eighties of the last century, KDP lines were operated only in France and Italy. Germany joined this group in 1990, and soon after them from 1992, Spain joined. The latter country already overtook Germany in 2007 in terms of the length of high-speed lines in service, and in 2011 France, which again in 2017 became the European Union leader in the field of high-speed lines in operation. In 2000, Belgium joined the group of countries operating high-speed lines, in Great Britain in 2003, followed by the Netherlands in 2009 and Austria in 2013. Summary data on the length of KDP lines in use in the whole European Union contained in the table indicate the dynamic development of this transport system. In the more than 25 years of 1990 - 2017, the length of the KDP line in the European Union increased from 1 thousand to the level of over 8.4 thousand km (dynamics of 842.6%). At the end of 2017, France had the longest KDP network in the European Union: over 2.7 thousand km, Spain - over 2.4 thousand km and Germany - approx. 1.7 thous. km.

#### **Current KDP projects - budget perspective 2014-2020**

The new list of priority corridors of the TEN - T network established in December 2013 and the new financing instruments for the further development of this network set out in Regulations 1315/2013 [1] and 1316/2013 [2] caused the period of the 2014-2020 budget perspective to be contractual the time gap for the next phase of the development of transport infrastructure throughout the European Union, including the high-speed rail network. In these years, important projects for the construction of further sections of high-speed lines in the European Union have already been completed or planned to be completed, although decisions on their commencement and financing structure were made before 2013, i.e. before the adoption of new spatial systems of the comprehensive and core TEN-T network, and a new financing instrument.

Table 2 presents the list of the most important projects for the construction of high-speed railway lines in the European Union, which were completed or are planned to be completed in the years 2014 - 2020. By 2020, the network of KDP lines in the European Union should increase by over 5.4 thousand km and having approx. 7.2 thousand km of these lines operated in 2013, its total length will be over 12.6 thousand km. The presented data indicate that the countries in which the highest increases in the length of KDP lines will take place will be the current leaders in this field, i.e. Spain - over 1300 km of new lines built, France - over 930 km of new lines and Germany - about 500 km new lines and over 380 km modernized to 200 km/h - 230 km/h on the KDP line. In total, these three countries account for about 58% of the total increase in the length of high-speed lines in the European Union by 2020. The remaining 42%, i.e. approximately 2.3 thous. km of the EU increase in the KDP network in the 2020 perspective is distributed in such a way that about 630 km are in the countries of the "old" fifteen (Denmark - 210 km, Finland - 225 km, Greece - 138 km and Italy - 58 km), and somewhat over 1660 km to the countries of Central and Eastern Europe that joined the European Union in 2004 and Serbia. In the latter case, it is a project to modernize the Budapest-Belgrade railway line, 350 km long, to 200 km/h. In this group of

countries, projects of modernization of the E-65 line by 2020 reported by Poland should be considered real. On the other hand, the Baltic Countries project can be considered very ambitious to equip the currently constructed standard gauge track Tallinn - Riga - Kaunas - the border with Poland (Rail Baltica) with a maximum speed parameter of 240 km/h, however, taking into account the progress of works on this line this does not seem realistic until 2020.

### **2021-2030 perspective**

Table 3 lists the projects for the construction of high-speed railway lines in the European Union countries planned for implementation in the years 2021-2030. The probability of implementation of most of the projects listed in the table should be estimated quite high, as they have already been formally reported by the Member States to the TEN core network -T. So if the network of KDP lines in the European Union countries were extended to 2030 by another 3.9 thous. km, then it would reach a total length of about 16.5 thous. km. France and Spain, two countries with the longest KDP networks intend to continue to develop them at a high pace, building around 800 km of new high-speed lines in 2021-2030. Sweden has announced high aspirations in this area for the first time, declaring the construction of approximately 700 km of new KDP lines by 2030. By the same year, Germany declares the construction of over 300 km of new high-speed lines and modernization to the parameter of 200 km/h of the next section of its network with a length of over 100 km. We should also note the Austrian plans for the development of the high-speed rail network covering over 330 km by 2030 and the British investment intention consisting in the construction of the first section of the H 2 railway line, i.e. the London-Birmingham section with a length of about 190 km, with a maximum speed in the range of 360 km/h to 400 km/h.

Analyzing the tabular list of projects that are declaratively to be implemented by 2030, one can suppose that - for various reasons - not all projects of construction or modernization of high-speed lines will be implemented within the formally declared dates. In such cases, projects are usually carried out in the next planning periods. It is therefore very likely that this will happen with the aforementioned ambitious project of the Baltic States to adapt the Rail Baltica line to the speed of 240 km/h, or with the project of modernization to the speed of 200 km/h on the Budapest - Belgrade line. In addition, as part of the KDP network development plans, there is also a group of projects for the construction of new railway lines in individual countries of the European Union, which have already been reported in various international forums, such as the European Commission, the Community of European Railways and Infrastructure Managers, the International Union of Railways, but countries those submitting these projects did not specify specific deadlines for their implementation, which means that they can only be accepted for implementation in the 2030-2050 period, or even abandoned, if the country so decides

**Tab. 2.** Projects for the construction and modernization of high-speed railway lines in the European Union in the years 2014 - 2020

EU countries	Type of project	Name of the line/section	Maximum speed	Line length	The end of project
Denmark	Construction	Kopenhagen - Ringsted	200 – 250 km/h	60 km	2018
	Modernization	Aalborg - Hobro	200 km/h - partly	50 km	2018
	Modernization	Ringsted - Odense	200 km/h	100 km	2020
<b>Total</b>				<b>210 km</b>	
Germany	Construction	Erfurt -Leipzig/Halle	300 km/h	123 km	2015
	Modernization	Neuoffingen - Neu-Ulm	200 km/h	27 km	2015
	Construction	Brannenburg - Kundl	220 km/h	25 km	2015
	Construction	Ebensfeld - Erfurt	300 km/h	107 km	2017
	Modernization	Nuremberg-- Ebensfeld	230 km/h	83 km	2017
	Modernization	Eisenach - Erfurt	200 km/h	54 km	2017
	Modernization	Riesa - Dresden	200 km/h	54 km	2018
	Modernization	Berlin - Dreden	200 km/h	193 km	2018
	Modernization	Saarbrücken - Ludwigshafen	200 km/h	127 km	2019
	Construction	Frankfurt - Mannheim	300 km/h	85 km	2019
<b>Total</b>				<b>878 km</b>	
Finland	Modernization	Ylivieska - Liminka (Oulu)	200 km/h	123 km	2015
	Modernization	Seinäjäjoki - Lapua	200 km/h	23 km	2016
	Modernizacja	Kokkola - Ylivieska	200 km/h	79 km	2018
<b>Total</b>				<b>225 km</b>	
France	Construction	LGV Est européenne, section: Baudrecourt -Vendenheim	350 km/h	106 km	2016
	Construction	LGV Bretagne - Pays de la Loire, section Le Mans - Rennes	350 km/h	214 km	2016
	Construction	LGV Sud Europe Atlantique, section Tours-- Bordeaux	350 km/h	341 km	2017
	Construction	Obwodnica Nîmes i Montpellier, section Nîmes - Montpellier	220 km/h - II et.350 km/h	80 km	2017
	Construction	LGV Rhin - Rhône, East section, Petit - Croix - Lutterbach	350 km/h	35 km	2018
	Construction	LGV Rhin - Rhône, East section, Genlis - Villers - les - Pots	350 km/h	15 km	2018
	Construction	LGV Rhin-Rhône, South section, Auxonne - Bourg - en - Bresse	350 km/h	140 km	2020
<b>Total</b>				<b>931 km</b>	
Greece	Modernization	Athens - Patras, section Kiato - Likoporia	200 km/h	32 km	2014
	Modernization	Athens – Thessaloniki, section Tithorea - Domokos	250/200/160 km/h	106 km	2017
<b>Total</b>				<b>138 km</b>	
Italy	Modernization	Treviglio - Brescia	300 km/h	58 km	2016

Total				<b>58 km</b>	
Poland	Modernization	E 65 South, section Olszamowice - Zawiercie	200 km/h	89 km	2014
	Modernization	E 65 South, section Idzikowice - Olszamowice	200 km/h	44 km	2017
	Modernization	E 65 South, section Grodzisk Mazowiecki - Idzikowice	200 km/h - 220 km/h	74 km	2018
	Modernization	E 65 North, Warsaw - Gdynia, partly	220 km/h	145 km	2018
Total				<b>352 km</b>	
Latvia, Lithuania, Estonia	Construction	Tallin - Riga - Kaunas – border from PL (to Suwałki)	240 km/h	740 km	2020
Total				<b>740 km</b>	
Romania	Modernization	Bucharest - Comstance	200 km/h	220 km	2020
Total				<b>220 km</b>	
Serbia* - Hungary	Modernization	Budapest - Belgrad, Serbian section	200 km/h	184 km	2017
	Modernization	Budapest - Belgrad, Hungarian section	200 km/h	166 km	2017
Total				<b>350 km</b>	
Spain	Construction	Santiago de Compostela - Vigo		94 km	2014
	Construction	Variante de Pajares	250 km/h	50 km	2014
	Construction	Olmedo - Zamora	350 km/h	107 km	2014
	Construction	Monforte del Cid - Murcia		150 km	2014
	Construction	Venta de Baños - Burgos	350 km/h	91 km	2014
	Construction	Valladolid - Palencia - León	350 km/h	163 km	2015
	Construction	Sevilla - Cádiz	250 km/h	123 km	2016
	Construction	Valencia - Castellón de la Plana	-	55 km	2016
	Construction	Xátiva - Silla	-	59 km	2016
	Construction	Zamora - Ourense	350 km/h	241 km	2019
	Construction	Vitoria - Bilbao	230 km/h	91 km	2019
	Construction	Bergara - San Sebastian – border with France	230 km/h	90 km	2019
Total				<b>1314 km</b>	
<b>OVERALL</b>				<b>5416 km</b>	

Source: International Union of Railways website (UIC) - [www.uic.asso.fr](http://www.uic.asso.fr) and website: [www.de.wikipedia.org/wiki/Schnellfahrstrecke](http://www.de.wikipedia.org/wiki/Schnellfahrstrecke) - information documented by sources from professional national and international publications.

\* Serbia is not a member of the European Union - since 2012, the country has the formal status of an EU member candidate.

**Tab. 3.** Projects for the construction and modernization of high-speed railway lines in the European Union in the years 2021-2030 (TEN-T core network)<sup>1</sup>

EU countries	Type of project	Name of the line/section	Maximum speed	Line length	The end of project
<b>Austria</b>	Modernization	Vienna - Wiener Neustadt	200 km/h	54 km	2022
	Construction	Graz - Klagenfurt	230 km/h - 250 km/h	125 km	2023
	Construction	Gloggnitz - Mürzzuschlag	230 km/h	27 km	2025
	Construction	Innsbruck - Franzensfeste	230 km/h - 250 km/h	55 km	2025
	Construction	Kundl - Brannenburg	220 km/h	25 km	2030
	Construction	Linz - Wels	230 km/h - 250 km/h	30 km	After 2025
	Construction	Salzburg - Köstendorf	230 km/h - 250 km/h	20 km	2030
<b>Total</b>				<b>336 km</b>	
<b>Denmark</b>	Modernization	Ringsted - Fehmarnbelt	200 km/h -partly	119 km	2021
	Construction	Odense - Fredericia	200 - 250 km/h	50 km	2023
	Construction	Fredericia - Aarhus	200 km/h	40 km	2025
	Modernization	Fredericia - Aarhus	200 km/h	50 km	2025
<b>Total</b>				<b>259 km</b>	
<b>Germany</b>	Construction	Wendlingen - Ulm	250 km/h	58 km	2021
	Construction	Stuttgart - Wendlingen	250 km/h	25 km	2021
	Construction	Basheide - Rastatt (Karlsruhe - Basel)	250 km/h	117 km	2022
	Construction	Hannover - Hamburg/Brema	250 - 300 km/h	114 km	After 2020
	Modernization	Frankfurt - Fulda	200 km/h	103 km	After 2020
<b>Total</b>				<b>417 km</b>	
<b>France</b>	Construction	LGV Bordeaux - Toulouse	360 km/h	200 km	2024
	Construction	LGV Bordeaux, section. Bordeaux - Irun (border with Spain)	-	-	2027 - 2032
	Construction	LGV Languedoc - Roussillon: section Montpellier - Perpignan	-	135 km	After 2020
	Construction	LGV Picardie	-	-	After 2020
	Construction	LGV Provence - Côte d'Azur: section Marseille - Toulon - Nice	-	-	2024 -2025
	Construction	LGV Centre France: Paris Austerlitz - Clermont - Lion	360 km/h	480 km	Until 2022
	Construction	LGV Lion - Turin with Basis Mont Cenis tunnel	-	142 km	2025
<b>Total</b>				<b>957 km</b>	
<b>Italy</b>	Construction	Turin - Lion with Mont Cenis tunnel	300 km/h	57 km	2025

	Construction	Franzensfeste - Innsbruck with Brenner tunnel	250 km/h	55 km	2025
<b>Total</b>				<b>112 km</b>	
<b>Croatia</b>	Construction	Zagreb - Rijeka	200 km/h	165 km	2025
<b>Total</b>				<b>165 km</b>	
<b>Sweden</b>	Construction	Göteborg - Borås	250 - 320 km/h	70 km	2020 - 2025
	Construction	Linköping - Järna	250 - 320 km/h	150 km	2020 - 2025
	Construction	Umeå - Luleå	250 km/h	270 km	2025 - 2030
	Construction	Borås - Linköping	320 km/h	200 km	2030
<b>Total</b>				<b>690 km</b>	
<b>Spain</b>	Construction	Burgos - Vitoria	350 km/h	109 km	After 2020
	Construction	Murcia - Almeria	300 km/h	184 km	After 2020
	Construction	Madrid - Badajoz – border with Portugal	300 km/h	508 km	After 2020
<b>Total</b>				<b>801 km</b>	
<b>The UK</b>	Construction	H 2 London - Birmingham – first section	360 km/h - 400 km/h	191 km	2026
<b>Total</b>				<b>191 km</b>	
<b>OVERALL</b>				<b>3928 km</b>	

Source: International Union of Railways website (UIC) - [www.uic.asso.fr](http://www.uic.asso.fr) and website: [www.de.wikipedia.org/wiki/Schnellfahrstrecke](http://www.de.wikipedia.org/wiki/Schnellfahrstrecke) - information documented by sources from professional national and international publications.

1) the table shows the projects included in the TEN - T core network, whose geographical location is in accordance with the maps of the railway network, which are annexes to Regulation 1315/2013, op. cit.



**Tab. 4.** Projects for the construction of high-speed railway lines in the European Union to be implemented in the years 2030-2050 (TEN - T comprehensive network)<sup>1</sup>

EU countries	Name of the line/section	Maximum speed	Line length
Denmark	Helsingborg - Kopenhagen	-	60 km
Czech Republic	Brno – Prague - Lovisice – border with DE	350 km/h	300 km
	Brno - Varnovice - Breclav – border with SK and AT	200 km/h - 350 km/h	80 km
	Brno - Prerov - Ostrava – border with PL (to Katowice)	350 km/h	170 km
	Prague – border from PL (to Wrocław)	350 km/h	150 km
	Prague - Plzen – border with DE (to Nuremberg)	250 km/h - 350 km/h	130 km
Germany	Gelnhausen - Fulda	250 km/h - 300 km/h	70 km
	Dresden - Berlin - Rostock	-	-
	Berlin - Straslund	-	-
Poland	Warsaw- Łódź - Kalisz	360 km/h	230 km
	Kalisz - Wrocław	360 km/h	100 km
	Kalisz - Poznań	360 km/h	120 km
	Poznań – border with DE (to Berlin)	350 km/h	120 km
	Wrocław – border with CZ (to Prague)	250 km/h - 350 km/h	150 km
Italy	Brescia - Verona	300 km/h	53 km
	Verona - Padwa	-	80 km
	Turin - Bussoleno – border with FR	-	-
	Verona - Franzensfeste	-	-
	Mediolan- Genua - Ventimiglia	-	-
	Neapol - Foggia - Bari	-	-
Portugal	Lisboa - Evora - Elvas – border with ES (to Madrid)	350 km/h	-
	Lisboa - Porto	300 km/h	-
	Aveiro – border with ES (to Salamanca)	-	-
	Faro - Evora	-	-
	Porto – border with ES (to Vigo)	-	-
Spain	Venta de Baños - Burgos - Vitoria – border with FR	300 km/h	173 km
	Madrid - Navalmoral de la Mata	300 km/h	191 km
	Almeria - Murcia		190 km
	Valencia - Castellón		64 km
	Zamora - Orense	300 km/h	224 km
	Palencia - Santander	300 km/h	201 km
	Saragossa - Castejón	250 km/h	149 km
	Castejón - Pampeluna	300 km/h	75 km
	Orense - Vigo	250 km/h	60 km
Sweden	Jönköping - Helsingborg	320 km/h	220 km
The UK	H 2 London - Manchester /Leeds - second section	360 km/h	340 km
	H 2 Manchester - Glasgow	360 km/h	-

Source: Website of the International Union of Railways (UIC) - [www.uic.asso.fr](http://www.uic.asso.fr) and website [www.de.wikipedia.org/wiki/Schnellfahrstrecke](http://www.de.wikipedia.org/wiki/Schnellfahrstrecke) - information documented by sources from professional national and international publications.

1) the table shows the projects included in the comprehensive TEN - T network, whose geographical location is in accordance with the maps of the railway network, which are annexes to Regulation 1315/2013, op. cit.

Table 4 summarizes, formally reported by individual countries to the comprehensive TEN-T network, projects for the construction of high-speed railway lines, which are expected to be implemented in the years 2030 - 2050. This table no longer includes French projects, which means that this country intends to complete the construction of its own high-speed rail network by 2030. On the other hand, numerous Spanish projects are numerous, which proves that Spain is consistently striving to cover the quite dense KDP network throughout the country, as well as to integrate this network with the French and Portuguese networks. Portugal notifies its future KDP network not only of its main north-south line, Porto-Lisbon-Faro but also three connections with the Spanish high-speed rail network. The United Kingdom intends to continue projects to build further sections of the high-speed H 2 lines until the middle of this century. Similarly, Sweden and Denmark will carry out one project by 2050. In turn, Germany and Italy, countries with a developed network of high-speed lines, intend to implement several projects linking their own network by 2050, but also to connect it with neighboring countries. In the case of Italy, but also France, it will be particularly important to complete the great trans-Alpine project KDP Lion - Turin with the Basis Mont Cenis and Basis Bussoleno tunnels.

The Lion - Turin high-speed line design is spectacular. This new transalpine railway connection, incidentally implemented in the geographical axis of the existing railway line connecting Lyon with Turin, passing through the Mont Cenis tunnel with a length of 12.7 km, built at the end of the nineteenth century, was divided into three sections. The French section from Lyon to Saint - Jean - de - Maurienne, the Italian section from Turin to Bruzolo and the French - Italian section, consisting of the 57 km Basis Mont Cenis tunnel, 12 km Basis Bussoleno tunnel and the Venaus viaduct connecting both tunnels in the region of the Franco-Italian border. The initially declared 2020 completion date of the Franco-Italian joint investment was not met, but in accordance with the political agreement between France and Italy from 2015, the project will continue to be implemented, with the fact that no completion date has been set. In addition, in the Italian part of this project, there is another long submontane tunnel (Collina Morenica) from Turin to Avigliana and the northern bypass of Turin, which means that the entire project of the KDP Lion - Turin line may end only in the middle of this century [3].

Table 4 also includes projects for the construction of new high-speed railway lines in Poland and the Czech Republic, and due to the lack of specific deadlines, it was considered that they could be implemented after 2030. In Poland, after performing preliminary study work in 2005, the concept of building a new 455 km high-speed railway line Warsaw - Łódź - Wrocław / Poznań was created (the so-called Y line due to its characteristic shape on the map of Poland). At the end of 2008, the government decided to build it, but at the end of 2011, the main preparatory work for the construction and commissioning of high-speed rail services in Poland was suspended. However, the project of construction of the Y line in Poland was submitted by the Polish government administration to the comprehensive TEN-T network as a project to be implemented for a further perspective. In some documents, there were declarations of implementation of some of the projects submitted by 2030, but this was never the official position of the state administration. It is worth noting that the five Polish sections of KDP included in the table contain the three-line Y line in its basic route, from Warsaw to Łódź and further to the fork near Kalisz towards Poznań and Wrocław, and two cross-border sections of KDP, from Poznań to the border with Germany and from Wrocław to the border with the Czech Republic. In the latter case, the Polish section submitted corresponds to the

Czech cross-border section of the high-speed line Prague - border with Poland. Germany, on the other hand, has not yet submitted the KDP Berlin - border with Poland project for the mid-century in the long-term perspective. However, it should be added that the section of the Berlin - border with Poland border is marked on the TEN - T network maps as part of the German comprehensive high speed rail network.

**Source materials**

- [1] Rozporządzenie 1315/2013 z dnia 11 grudnia 2013 r. w sprawie unijnych wytycznych dotyczących rozwoju transeuropejskiej sieci transportowej.
- [2] Rozporządzenie Parlamentu Europejskiego i Rady (UE) nr 1316/2013 z dnia 11 grudnia 2013 r. ustanawiające instrument „Łącząc Europę”, zmieniające rozporządzenie (UE) nr 913/2010 oraz uchylające rozporządzenia (WE) nr 680/2007 i (WE) nr 67/2010 - Dziennik Urzędowy Unii Europejskiej 2013, L 348/129.
- [3] [www.de.wikipedia.org/wiki/Schnellfahrstrecke](http://www.de.wikipedia.org/wiki/Schnellfahrstrecke)