

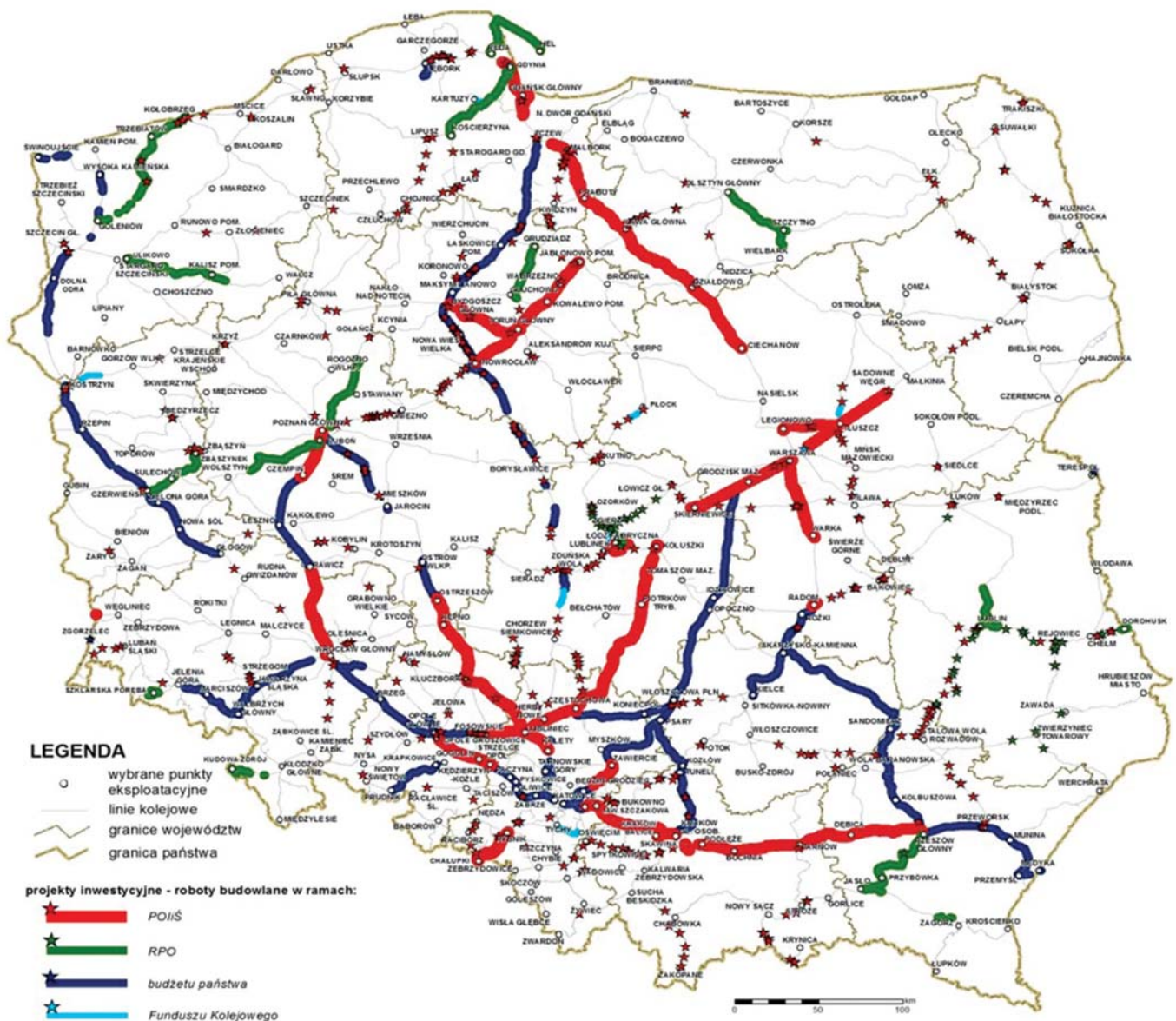
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# Improvement of railway infrastructure in Poland

The current condition of the rail network in Poland doesn't suit needs of passenger and freight train operating companies. That makes it impossible to offer competitive services towards other means of transport what results in constantly decreasing share of railways in the transit market. The poor condition of the infrastructure is an effect of about 20 years of backlog in maintenance and renewals, growing since 1990. In the nineties a modernization of the E20 line at Warsaw - Poznań - Kunowice section was the only bigger railway investment in Poland. At the same time, in spite of the difficulties, a road infrastructure

was developing what had a big impact on changes in the modal-split in transport.

The opportunity for the railway transport was the accession of Poland to the European Union. EU transport policy underlines importance of balancing the transport system, including particularly revival of railways. Soon after that, in 2007-2008, the Master plan for the railway transport in Poland by 2030 was drawn up as action programme for promoting the reinstatement of the railway transport a greater role in the country transport system, adopted by a Government decision in December 2008 [3].



The fundamental assumption of the Master plan is absorption of the European Union funds needed to co-finance the infrastructure modernization and development program (Cohesion Fund within the Operational Programme Infrastructure and Environment and the European Regional Development Fund).

Fundamentally implementation the Master plan was hindered by postulate that EU co-financing could be granted only for the comprehensive modernizations of lines within the TEN-T network. There were also problems with funding of the national contribution, since the maximum rate of funding for rail projects was set on the level of the 70%, while in the road projects the same indicator was accepted on maximum level for the Cohesion Fund, that is 85%. During preparation of applications for co-financing projects, a need to take into account the financial gap individually for each project determined further complications. Difficulties in preparation of railway investments caused a threat of not-exploiting the EU funds within 7 priority axis of Operational Programme Infrastructure and Environment.

At the same time, in spite of initiating large modernization investments, a deterioration of the infrastructure condition in the network scale was progressing. A negative speed balance was confirmation of this deterioration year by year. For example at implementing the timetable in December 2009 the speed was reduced at the section with total length of 1477 km, whereas increased – only on 638 km line. One year later – at the timetable change in December 2010 the situation was even worse.

As the most representative examples of degradation the coal trunk line, the Wrocław – Szczecin line (Nadodrzancka), and line No. 274 at Wrocław – Jelenia Góra section can be shown. Infrastructure deterioration resulted in longer journey times (comparing 1990 to 2010) at the following sections:

- Bydgoszcz – Gdańsk – from 1 hour 46 minutes to 3 hours 12 minutes,
- Zielona Góra – Wrocław – from 2 hours 12 minutes to 3 hours 18 minutes,
- Jelenia Góra – Wrocław – from 2 hours 11 minutes to 3 hours 20 minutes.

The state of affairs increasingly threatened the competitive position of the railway transport. In a critical situation a need of extraordinary action arose.

### Actions undertaken to improve the infrastructure condition

Not to deny the necessity of carry on begun modernization plans, in 2011 a decision to increase the scale of rehabilitation (revitalization) investments was made in the Ministry of Infrastructure. A feature of this investment group is concentration on renewals of tracks and turnouts, which condition is a main cause of the speed restrictions. Only in the essential scope associated works concerning signaling (including particularly an improvement of safety on level crossings) and power supply systems are performed. Main activities within a few current years are mainly directed to eliminate great number of "bottlenecks"



Line No. E65, modernized station Gdynia Główna

on the rail network, including particularly sections on main and trunk lines on the PLK network with the speed reduced even up to 20–40 km/h.

Railway lines revitalizations are financed from the state budget funds, according to the Long-Term Railway Investments Programme (LTRIP) by 2013 with 2015 perspective, adopted by the Government decision of November 7, 2011.

Additional funds of 200 million zloty were provided for the most urgent investments like finishing the Gdańsk – Poznań – Wrocław section – crucial for the preparation of the European Football Championships Euro 2012. In particular these funds were used for track renewals at the line No. 131 Inowrocław – Bydgoszcz – Tczew sections. This allowed for restoring the trains speed to 120 km/h almost on the entire section just before the beginning of championships.

Previous experiences from renovation implementations of investment projects should be assessed very positively, mainly because of relatively short time of the works performance and achieving effects by shortening the journey times.

By December 2011 section total length of track sections with the maximum speed reduced to 30 km/h at the Wrocław – Szczecin trunk line was 118.2 km. After two years of revitalization investments, such a speed applies only on a 57,3 km length section.

It is very important, that on many sections after the revitalization and performing some extra works it was not possible to restore previous speeds, but also to increase them. Good examples are: the line No. 131 section between Bydgoszcz and Tczew and No. 353 between Poznań and Gniezno, where, depending on local conditions, the trains speed was increased from 120 up to 140, 150 or even 160 km/h. The trains speed increase translates into shortening of journey times. In this particular case great benefits are achieved in the long distance traffic, because journey time from Poznań to Gdańsk (313 km) shortened up to about 3 hours. The improvement took place also in the regional traffic, because after implementing the new rolling stock in December 2013, transfer time at Poznań – Gniezno section (51 km) is now about 30 minutes.

The obtained effects show that the revitalization is very effective action, even if in few years' time at some sections additional





Line No. 353, section Inowrocław – Więclawice

works will be necessary, for example replacement of overhead catenary lines or installation of new signaling systems.

Revitalization network effects were strengthened by the extension of the scope of repairs and maintenance works. The financing source of these works was the state budget, Railway Fund (part B) and the PKP PLK own funds. The great emphasis was put to obtain the greatest effect of additional resources directed into repair – maintenance works through their rational and economical planning.

For example track repairs with ballast cleaning and welding rails (to get CWR track) permitted to increase the speed in both tracks lines at Boguszów Górcze Zachód – Marciszów section, on line No. 274 Wrocław – Jelenia Góra – Zgorzelec from 30 km/h to 80 km/h. It was a big achievement as we consider that these tracks have been operated since 1980 (32 years). This line is a good example of achieving synergy effect of maintenance works (described higher) with the renewals carried out for a few years, including tracks and turnouts, repairs of bridges as well as the renewals of catenary. All these actions let to shorten the transfer time gradually on Wrocław – Jelenia Góra route. Now the fastest trains cover this section in just a few minutes more than 2 hours. Two years earlier a journey on this route lasted over an hour longer.

Mechanised track renewals using track machines from PKP PLK unit in Cracow turned out to be very effective. Very often materials (sleepers and rails) recovered from modernized lines are re-used. Such replacements on line No. 68 Lublin – Stalowa Wola Rozwadów section not only let to avoid introducing speed restrictions, but also increased the speed from 90–100 km/h up to 120 km/h. Repair of track on 227 Gdańsk Główny – Gdańsk Zaspas Towarowa line not only let to increase freight trains speed which are directed to the left-bank part of Gdańsk harbour, but also secured the rail access to the Baltic Arena Stadium.

Using old but still useful materials regards not only rails and sleepers, but also the signaling devices. For example automatic level crossing devices are re-installed. This helps to eliminate numerous spot speed restrictions and simultaneously improves the safety. It must be emphasized, that just a few years ago materials from modernized lines were mostly wasted or sold.

An important change in the investment programme was line revitalization co-financing from European Union funds within Operational Programme Infrastructure and Environment. The possibility to undertake such investment implementation was agreed with the European Commission. The first contract for such investment was signed in August 2012 for works on Toruń – Bydgoszcz (51 km long) section. The implementation of this particular investment was completed in the first quarter of 2014. Next revitalization projects concern the following sections:

- Częstochowa – Fosowskie,
- Koluszki – Częstochowa,
- Zawiercie – Dąbrowa Górnicza
- Ząbkowice – Jaworzno Szczakowa,
- Kalety – Lubliniec – Kluczbork,
- Błotnica Strzelecka – Opole Groszowice,
- Inowrocław – Toruń – Jabłonowo Pomorskie,

- Rybnik – Wodzisław Śląski – Chałupki, and
- Kluczbork – Ostrzeszów.

In all of mentioned sections the works are already well advanced. Moreover, apart from linear projects additionally two projects of the improvement in safety on level crossings and so called turnout programme were prepared.

The railway investments list extension within The Operational Programme Infrastructure and Environment was included at the amendment of the Long-Term Railway Investments Program by 2015, adopted by a Government resolution on November 5, 2013 [4].

We should emphasize that revitalization investments financed from budget and investments co-financed by EU are treated complementary, so that it's possible to shorten the journey time on longer distances. A special example of such a synergy is forming the transit route from Warsaw to Wrocław through Opole using the following investments:

- ◆ Modernization of Warszawa – Łódź route at Warszawa – Grodzisk Mazowiecki section within POiiŚ,
- ◆ Modernization of Central Railway Main Line up to 200–230 km/h from the budget funds,
- ◆ Revitalization of Włoszczowa Północ – Koniecpol – Częstochowa Stradom section financed from the budget funds,

**Table 1. Collective evaluations of the infrastructure in individual branches for years 2010-2012**

Branch	Period of time	Good condition [%]	Satisfactory condition [%]	Unsatisfactory condition [%]
Road	2010	36,0	35,0	29,0
	2011	40,0	32,0	28,0
	2012	43,0	30,0	27,0
Energy	2010	20,2	52,1	27,7
	2011	20,4	52,4	27,2
	2012	22,1	51,5	26,4
Automated technology	2010	24,0	72,0	4,0
	2011	25,0	71,0	4,0
	2012	26,2	70,8	3,0

- ◆ Revitalization of Częstochowa – Fosowskie section within POIiŚ,
- ◆ Revitalization of Fosowskie – Opole Główne section finance from the budget funds.

Moreover trains from Warsaw to Wrocław will be using the E30 line Opole – Wrocław modernised in previous years. In this way, in very short time (2012–2014) the fastest possible connection between Warsaw and Wrocław will be provided, with the transfer time of about 3 hours 40 minutes (target time less than 3½ hours). Starting this service to be operated by PKP Intercity Pendolino trains is anticipated for December 2014. It is also worth mentioning that, revitalization of this rail link doesn't close the possibility of creating the brand new connection between these cities within high speed railway through Łódź in the future. However during the period of preparation, and then investment implementation the possibility of travelling by rail in the competitive time in relation to the car ride will be provided.

In years 2011 and 2012 it was managed to carry renewals of tracks at accumulated length of 1060 km and 1063 km, respectively. In the rail network scale, as a result of putting all together – the effects of modernization, revitalization, repairs and maintenance works it was possible to reverse the negative trend of the train infrastructure. Collective evaluations of the infrastructure condition in individual branches for years 2010–2012 are illustrated below [...].

According to the presented data the biggest change regards the tracks where the share of infrastructure participation in good condition increased from 36% in 2010 to 43% in 2012. It can be



*Train Elf produced by PESA Bydgoszcz in Warsaw Chopin Airport*

attributed to the fact, that revitalization investments include mainly the replacement of tracks and turnouts what transparently results in their condition improvement. Also performed maintenance works, such as tracks tamping and ballast cleaning contributed to the improvement of indicators describing infrastructure condition.

Due to implemented modernization investments, revitalisation investments and the repair – maintenance works, it was possible to increase the train speed on the railway network, which was confirmed by positive speed balance at three consecutive changes of the timetable in December 2011, 2012 and of 2013:

- ◆ in timetable 2011 / 2012 increasing the speed on length of 1409 km, reducing the speed on length 745 km (+664 km balance),
- ◆ in timetable 2012/2013 increasing speed on the km 1701 long, reducing the speed on the length of 637 km (+1064 km balance),
- ◆ in timetable 2013/2014 increasing speed on the length of 1375 km, reducing the speed on length 533 km (+842 km balance).

### Higher impact of investment

The first large-scale modernization investments on Polish Railways concerned corridor lines in the latitudinal arrangement, at first of E20 line and then E30. As a result of such an attempt was generating great disproportions of the railway condition, and therefore – in the accessibility of the individual regions. Now the implementation of investment programme includes both comprehensive modernizations of corridor lines, revitali-



*Line No. 353, section Inowrocław – Więclawice*



zations of lines financed from the state budget, revitalizations co-financed within EU programmes, as well as modernization and revitalisation investments within the regional operational programmes (RPO). Attention needs to be paid on this last group of investments carried out by the PKP PLK, within which financing from the European Regional Development Fund is guaranteed by regional governments, and the domestic contribution comes from the state budget or from the Railway Fund.

The significance of RPO projects exceeds their financial value, in amount of about 1.443 bn. zloty in entire Long-Term Railway Investments Program. It is due to the fact, that the voivodships by pointing on specific priorities are determining the target transport system in their regions. The following examples of particularly effective regional investments should be pointed out: the modernization of the line No. 356 at Poznań – Wągrowiec – Gołańcz section and modernization of the line No. 402 at Kołobrzeg – Goleniów section. The first of them improved the transport service in Poznań agglomeration, the second one – provided the efficient access from Kołobrzeg, Trzebiatów, Gryfice and Nowogard to Szczecin. The impact of some investments considerably goes beyond the region concerned. For example building a new rail link in Czerwieńsk (around 2 km long) allowed to avoid the reversal for trains from Poznań towards Zielona Góra and in the other direction. This rail link, together with the modernization (as a matter of fact very limited) of line No. 358 between Zbąszynek and Czerwieńsk allowed for significant shortening the journey time between Poznań – Zielona Góra (in case of TLK trains from about 2 hours 10 minutes to 1 hour 40 minutes).

## Summary

Improvement of the railway infrastructure condition in Poland is necessary to increase the share of the rail transport in passenger and goods transport. Impact on the state of affairs have 20-years of accumulated backlog in maintenance and renewals of the key elements of infrastructure like tracks and turnouts. Therefore in 2011 an essential change in the investment programme of the national infrastructure manager (PKP PLK) was absolutely necessary. It was extended by revitalisation investments (renovation) financed both from the state budget, and from European Union funds as part of the Operational Pro-

gramme Infrastructure and Environment. At the initial period of time this change was followed by introducing the special type of action managing committing certain analogies to principles of crisis management – rapid decision-making was necessary in the most obvious cases. After some time the new approach was formalized by accepting the Long-Term Railway Investments Program. Essential features of the approach developed together by the Ministry and PLK Polish State Railways was:

- ❑ implementation of revitalisation investment projects including mainly tracks and turnouts replacement,
- ❑ concentration of works mainly at these sections (altogether with big traffic load and the significant reduction of the maximum speeds,
- ❑ complementary character of investment and maintenance activities,
- ❑ maximization of the performed work effect – where it is possible not only restoring “historical” speed profiles, but also determining them again, fully making use of the existing alignment,
- ❑ accepting the principle of the management by objectives – the goals set to the PKP PLK management for 2013 included indicators related to infrastructure condition improvement, like reaching positive speeds balance, reduction in the number of restrictions, shortening the transfer time of trains in chosen destinations.

An improvement of the railway infrastructure condition (the share of the infrastructure in the good condition grew from 36% up to 43%) and obtaining positive speed balance at three consecutive changes of the timetable – in December 2011, 2012 and of 2013 were those effects achieved in years 2011–2013 .

The process of railway infrastructure condition improvement, must be continued also in the following years, because backlogs in renewals and maintenance are still quite big. With time (within a few years) a stronger emphasis can be put also for the restoration of the electrical power supply, the overhead catenary lines and signaling systems. The chance for continuation of the positive trends in the rail network gives the investment programme for 2014–2020 UE funding period.

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Revitalised section of line No 61 at Koniecpol



Linie No 274 section Boguszow Gorce – Sedzislaw – speed increased from 30 to 80 kmh