ROADMAP "NEW RAIL INFRASTRUCTURE/SERVICES 2030" – D.T3.2.7

Work paper

Version 1.0
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1. Introduction

This document represents the "Final Roadmap for the launch of new rail infrastructures and sevices" (D.T3.2.7) written by the Intermodal Transport Cluster in cooperation with the REIF regional advisory board of Croatia. It describes how the previously identified interventions are planned to be realised for the future development of the railway transport system in Croatia. According to the priority list of action, the following improvements are essential for the railway system in Croatia:

- Reconstruction and renewal of the railway line on the section Dugo Selo – Novska
- Reconstruction of the existing and construction of the second track on the section Hrvatski Leskovac – Karlovac on the railway line M202 Zagreb GK – Rijeka
- Modernization of the railway line M202 Zagreb GK – Rijeka, on the part Oštarije – Škrljevo

The second section of the Draft Roadmap focuses on lessons learnt from the studies and other documentation in WPT 1, the third section focuses on main challenges recognised for the implementation of planned actions, and the fourth section identifies and describes the foreseen actions and the expected results in detail.

2. Lessons learned from WP.T1 and WP.T2

As the Intermodal Transport Cluster didn't perform any pilot actions within the REIF project on Croatian territory, it is impossible to learn any lessons or have any findings from that work package. This section of the document will therefore focus on the first thematic work package (WP.T1) and the documents and studies within it.

The baseline study (D.T1.1.5) presented the current situation of railway sector in Croatia, including the state of railway infrastructure. The main findings of this deliverable are:

- Part of the Croatian railways belong to the TEN-T Mediterranean corridor and represent two core network nodes with Zagreb and Rijeka.
- The railway network is connected to the ports, enabling efficient intermodal transport and better connections with further destinations.
- Around 90% of the rail infrastructure in Croatia are single track railways (2363 kilometres out of 2617 total kilometres)
- Around 20% of total freight transported in Croatia is by railway, with road transport being very dominant at 73,6%
- Around 37% of the railway is electrified (980 kilometres out of 2617 total kilometres)
- Most of the electrified railways are located on the main railway connections with neighbouring countries and pass through Zagreb and Rijeka. This includes:
    - Pivka (Slovenia) – Rijeka line
    - Rijeka – Zagreb line
    - Ljubljana (Slovenia) – Zagreb line
    - Belgrade (Serbia) – Zagreb line
    - Budapest (Hungary) - Zagreb line

The market potential analysis (D.T1.2.3) gave a comprehensive and extensive view into the opportunities for freight transport in Croatia. The following are some of the most important conclusions:

- The single state operator of Croatian railways is HŽ Holding L.T.D., which is further divided into HŽ Passenger Transport L.T.D., HŽ Cargo L.T.D. and HŽ Infrastructure L.T.D.
- Railway infrastructure management is an activity of public interest, the performance of which requires a license for railway infrastructure management and a safety decision for railway infrastructure management.
- In 2018, Croatian railway system consisted of 135 electric and 165 diesel locomotives, 5326 wagons with a total capacity of 285,788 tonnes
- Croatia's railway system lacked infrastructural investments and maintenance in the past. Despite some more recent improvements in the railway sector, restrictive regulations and policies are still prevalent in the sector.
- As of now, investments with a total worth of 3,5 billion € are planned for the Croatian railway infrastructure. The possibility of realization of the planned works will depend on the amount of financial resources allocated by the Republic of Croatia each year from the state budget and on other sources of financing.

- The Transport Development Strategy of the Republic of Croatia 2017-2030 states that there is considerable potential for increasing freight transport on the Zagreb –Rijeka railway line. Along with that, the strategy states that a logistics concept for the railway sector will be developed, relying heavily on the existing Croatian network, and cooperation with neighbouring countries, primarily Hungary, Bosnia and Herzegovina, Slovakia, Italy and Serbia.
- Croatia has several main industry branches which include the following: tourism, shipbuilding, construction, manufacturing of machinery and equipment, petrochemicals, food processing and wood industry. Most of these industries are year-round, except for tourism.

During the creation of D.T.1.3.3 Bottleneck identification in infrastructure and services, several important weak points were found and analysed. Those bottlenecks included:

- Old railway infrastructure
- Old rolling stock
- Administrative bottleneck at the changing of locomotives in border areas (especially at the border with Bosnia and Herzegovina

3. Main challenges for the implementation of roadmap

In Croatia, there are many possibilities for improvements which would help solve the aforementioned bottlenecks and help realise the market potentials. A large number of these improvements are being considered and evaluated. Unfortunately, the resolution of these bottlenecks requires significant investments, and with limited funds it is an important challenge to correctly prioritize the most important activities for both the medium and long term. The prioritized actions must be of both domestic and international significance and must be located on railway lines which are frequently used, and are located on important rail corridors such as the TEN-T corridor.

The regional advisory board, set up in D.T3.2.2 has met up to discuss these issues and make contributions towards this prioritization, as well as contribute to the successful development of this draft roadmap, and eventually the final roadmap, intended for support in the decision-making process at the political level.

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4. Identification of the actions

ACTION/MEASURE	ESTIMATED COSTS	TIME HORIZON
A. TRANSPORT INFRASTRUCTURE		
A.1 Reconstruction and renewal of the railway line on the section Dugo Selo - Novska	572.500.000 €	Medium to long-term (3 - 5+ years)
A.2 Reconstruction of the existing and construction of the second track on the section Hrvatski Leskovac – Karlovac on the railway line M202 Zagreb GK - Rijeka	315.000.000 €	Short to medium-term (1 – 5 years)

A.3 Modernization of the railway line M202 Zagreb GK – Rijeka, on the part Oštarije - Škrljevo	270.000.000 €	Long-term (5+ years)
B. ROLLING STOCK / MACHINERY		
B.1 …	…	…
…	…	…
C. LEGISLATION/ADMINISTRATION		
C.1 …	…	…
…	…	…
D.		
D.1 …	…	…
…		

5. Detail description of priority actions/measures

Number and name of intervention: A.1 Reconstruction and renewal of the railway line on the section Dugo Selo - Novska	
Priority area *Indicate the priority area of the intervention*	**Transport infrastructure**
Description of action/measure *Describe the action foreseen and the expected results from its implementation*	**The action consists of constructing a two-track electrified railway, reconstruction of the stations and stops and dispatching the abolition of most railway-road crossings and construction of intersections in two levels.** **This intervention enables for increase of capacity on railways, as well as shorter travel time, due to trains being able to achieve higher speeds on the modernised railway, as well as being a two-track railway meaning trains could travel in both directions simultaneously.**
Description of the main steps for its implementation *List and describe in detail the main steps for the implementation of the action (i.e. planning phase, tender procedures, etc…)*	**1) Preparation of the project and project documentation - current step. The preliminary project design with location permit, feasibility study, cost-benefit analysis and study on environmental impact have all been performed. Currently, the updating of the project application, obtaining building permits, preparation of procurement documentation are all in progress.** **2) Apply the project for co-funding from the EU** **3) Implementing the project activities**
Stakeholders involved *List the stakeholders involved. What is their*	**HŽ Infrastructure, as the organisation responsible for**

role in the action? Will they be the direct beneficiaries?	**maintaining and building railway infrastructure, is the carrier of the project. The project is approved by the Ministry of the Sea, Transport and Infrastructure, and is performed with their supervision and support. The EU Commission is also an important stakeholder as they will most likely provide the majority of the project financing through CEF.**
Timeline *Indicate the time horizon for the implementation of the action*	**The timeframe defined for the implementation of this action has been labelled as medium to long-term, meaning it could take from three to five or even more years to be completed.**
Investment cost *How much will cost the construction/realization of the future initiative/action/technology?*	**The total cost for this project is estimated at 572.500.000€**
Sources of financing[1] *What are the sources of financing? Private capital, public capital, CEF, etc...* *How much is the share covered by each of them?*	**Project is expected to be funded by EU Funds, more specifically CEF, up to 85%, and the remaining 15% to be financed by HŽ Infrastructure.**
Impact of the initiative *Describe the expected future economic, social, environmental impacts of this initiative*	**This railway line is part of larger transnational railway corridors - TEN-T corridor and Pan-European X corridor, meaning that the infrastructural improvements will enable better, faster and greener railway services for both the freight and passenger rail transport.**
Compliance with the overall objectives of REIF project *Describe the expected contribution of the action/measure to the achievement of REIF project (e.g. connection to TEN-T corridor, ...)*	**Resolving a part of the infrastructural bottlenecks, enabling a higher quality rail connection in the TEN-T and Pan European X corridors.**
Compliance with guidelines of national and regional planning instruments *Describe the compliance with the aim of national and regional planning instruments*	**The project is in compliance with the aims of the Transport Development Strategy of the Republic of Croatia 2017-2030, the Territorial Development Strategy of the Republic of Croatia, and the Croatian Railway Law**

1 This information, if already available, could be assumed in the draft version and it has to be confirmed in the final one

Number and name of intervention: A.2 Reconstruction of the existing and construction of the second track on the section Hrvatski Leskovac – Karlovac on the railway line M202 Zagreb GK - Rijeka	
Priority area *Indicate the priority area of the intervention*	Transport infrastructure
Description of action/measure *Describe the action foreseen and the expected results from its implementation*	This action consists of reconstructing of the stations and stops along the line, as well as reconstructions of bridges and viaducts, railway/road crossings and the construction of intersection on two levels. Along with that, new electronic signalling, a new safety device ETCS level 1, and a new traffic control infrastructure subsystem with remote control of external elements will be introduced. The line will be electrified, and the electric traction substations Mrzlo Polje and Zdenčina will be reconstructed.
Description of the main steps for its implementation *List and describe in detail the main steps for the implementation of the action (i.e. planning phase, tender procedures, etc…)*	1) Preparation of the project and project documentation – current step. The preliminary project design with location permit, feasibility study, cost-benefit analysis and the revision of the study on environmental impact have all been performed, along with the main project design, draft project application for co-financing from EU funds and the draft procurement documentation. 2) Apply the project for co-funding from the EU 3) Implementing the project activities
Stakeholders involved *List the stakeholders involved. What is their role in the action? Will they be the direct beneficiaries?*	HŽ Infrastructure, as the organisation responsible for maintaining and building railway infrastructure, is the carrier of the project. The project is approved by the Ministry of the Sea, Transport and Infrastructure, and is performed with their supervision and support. The EU Commission is also an important stakeholder as they will most likely provide the majority of the project financing through CEF.
Timeline *Indicate the time horizon for the implementation of the action*	This project is short to medium-term, meaning it is expected to be completed in 1 to 5 years.
Investment cost *How much will cost the construction/realization of the future initiative/action/technology?*	The total cost for this project is estimated at 315.000.000€
Sources of financing[2] *What are the sources of financing? Private capital, public capital, CEF, etc...* *How much is the share covered by each of them?*	Project is expected to be funded by EU Funds, more specifically CEF, up to 85%, and the remaining 15% to be financed by HŽ Infrastructure.
Impact of the initiative *Describe the expected future economic, social, environmental impacts of this*	This project will increase the capacity limits of rail freight and passenger transport between these two stations. After

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initiative	**the construction of the second track, it is expected that the line will gain importance for freight transport, especially as it is part of the Pan-European Vb corridor and the TEN-T corridor**
Compliance with the overall objectives of REIF project *Describe the expected contribution of the action/measure to the achievement of REIF project (e.g. connection to TEN-T corridor, ...)*	**Resolving a part of the infrastructural bottlenecks, enabling better service on that railway segment, especially for cargo transport which could significantly increase on this line.**
Compliance with guidelines of national and regional planning instruments *Describe the compliance with the aim of national and regional planning instruments*	**The project is in compliance with the aims of the Transport Development Strategy of the Republic of Croatia 2017-2030, the Territorial Development Strategy of the Republic of Croatia, and the Croatian Railway Law**

Number and name of intervention: A.3 Modernization of the railway line M202 Zagreb GK - Rijeka, on the part Oštarije - Škrljevo	
Priority area *Indicate the priority area of the intervention*	**Transport infrastructure**
Description of action/measure *Describe the action foreseen and the expected results from its implementation*	**This action consists of construction of a secondary railway line between Oštarije and Škrljevo by offering a more direct route between the two stations intended mostly for cargo transport. The project consists of modernisation works along a 113,9 km route.**
Description of the main steps for its implementation *List and describe in detail the main steps for the implementation of the action (i.e. planning phase, tender procedures, etc…)*	**1) Preparation of the project and project documentation - current step. During this step, the study and project documentation will be prepared, concluding with obtaining a location permit as a prerequisite for continuing the phase of preparation of the main project with obtaining building permits and for applying the project for further EU fund co-financing.** **2) Apply the project for co-funding from the EU** **3) Implementing the project activities**
Stakeholders involved *List the stakeholders involved. What is their role in the action? Will they be the direct beneficiaries?*	**HŽ Infrastructure, as the organisation responsible for maintaining and building railway infrastructure, is the carrier of the project. The project is approved by the Ministry of the Sea, Transport and Infrastructure, and is performed with their supervision and support. The EU Commission is also an important stakeholder as they will most likely provide the majority of the project financing through CEF.**
Timeline *Indicate the time horizon for the implementation of the action*	**The project has been defined as long-term, meaning it will take more than five years to complete.**
Investment cost *How much will cost the construction/realization of the future initiative/action/technology?*	**The total cost for this project is estimated at 270.000.000€**

Sources of financing[3] *What are the sources of financing? Private capital, public capital, CEF, etc...* *How much is the share covered by each of them?*	**Project is expected to be funded by EU Funds, more specifically CEF, up to 85%, and the remaining 15% to be financed by HŽ Infrastructure.**
Impact of the initiative *Describe the expected future economic, social, environmental impacts of this initiative*	**This project will modernise the existing line, as well as adapt the line more for cargo transport by constructing a more direct line, as the current line is adapted for passenger transport and passes through a large number of settlements.**
Compliance with the overall objectives of REIF project *Describe the expected contribution of the action/measure to the achievement of REIF project (e.g. connection to TEN-T corridor, ...)*	**Resolving a part of the infrastructural bottlenecks, enabling a two-track connection, and a more direct route for freight transport on a route which currently passes through a large number of settlements.**
Compliance with guidelines of national and regional planning instruments *Describe the compliance with the aim of national and regional planning instruments*	**The project is in compliance with the aims of the Transport Development Strategy of the Republic of Croatia 2017-2030, the Territorial Development Strategy of the Republic of Croatia, and the Croatian Railway Law**

6. Conclusion

The three selected infrastructure projects are essential for the railway system in Croatia: Reconstruction and renewal of the railway line on the section Dugo Selo – Novska; Reconstruction of the existing and construction of the second track on the section Hrvatski Leskovac – Karlovac on the railway line M202 Zagreb GK – Rijeka; Modernization of the railway line M202 Zagreb GK – Rijeka, on the part Oštarije – Škrljevo.

The realisation of all three project would largely contribute to the quality of infrastructure on the Croatian part of the TEN-T Mediterranean corridor, and the reconstruction and modernisation would result in this part of the railway network reaching international standards in the long-term. These selected railway lines are not the only lines in Croatia in need of modernisation or reconstruction, but they have been selected as they are a part of the TEN-T corridor and are a priority for improving international rail from Slovenia, across Rijeka and Zagreb, to Hungary, and vice versa, as well as domestic rail transport.

During the Advisory board meetings, interest was expressed in modernising the railway line leading from Ploče towards the Bosnian border (part of the Pan European Vb corridor). Along with that, the construction of modern intermodal facilities in the port of Vukovar could enable an intermodal connection from Ploče to Budapest. The cargo would be loaded onto freight trains in Ploče, from where it would go north across Bosnia and Herzegovina, back into Croatia at Slavonski Šamac and towards Vukovar. In Vukovar, the cargo would be moved to ships which would use inland waterways to reach Budapest. The idea was conceived during the meeting while viewing the TEN-T interactive map and noticing that parts of the eastern Croatian rail infrastructure and a large percentage of Hungarian railway lines bordering with Croatia and leading towards Budapest are not up-to-standard regarding axle load, with only small parts of the Croatian rail infrastructure needing modifications, along with the construction of intermodal facilities in Vukovar needed to enable the creation of this intermodal line.

3 This information, if already available, could be assumed in the draft version and it has to be confirmed in the final one

Figure 1: TEN-T interactive map – railways in Croatia and Hungary – max axle load displayed. Source: https://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/map/maps.html

The advisory board members agreed that the three selected actions are of huge importance for the improvement of the current rail infrastructure in Croatia, both on the domestic and international level, but noted that a need exists for other rail infrastructure improvement projects. Having the responsible Authorities consider ideas such as the one mentioned above, along with others which would improve rail freight transport and intermodal cargo transport in Croatia, selecting and prioritizing ones which would bring the most benefit is of utmost importance not only for the railway operators in Croatia, but also for the development of railway hubs and intermodal hubs.