ACTIVITY 3.2 Pilot actions implementation

D.T 3.2.11 - PA for ECO-innovations on energy efficiency deployment: tests on transport operations

PILOT ACTION FINAL REPORT

Lokomotion

Draft Version
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1. BACKGROUND

Introduction

Technical Work Package 3 includes pilot actions and trainings for cooperation in multimodal transport chains and business activation. Within this WP, activity 3.2 involves the implementation of the pilot actions.

Each partner shall carry out its pilot (as it is specified in the application form) and prepare its pilot report. In all cases other partners are involved, too (assessment, capitalization etc).

Purpose of this document

In order to have a same quality level of pilot report, PP8 Freeport of Budapest as WP leader provides a series of reporting templates, including:

- the pilot action inception report,
- the pilot action mid-term report,
- and the pilot action final report.

This document – the template of the pilot action final report - is the third and last element of this series. The aim of this document is to provide methodological support to be used to summarise the implementation of each pilot action.

Which project partners are involved?

Each project partner who has a pilot is involved. The following table summarises the pilot actions and the responsible PPs.

Topic	Pilot action - Deliverable	Partner responsible
Last mile connections of multimodal nodes	D 3.2.1. PA for last mile connectivity of multimodal nodes: Feasibility Study for a new rail terminal	PP4 - ZAILOG
Multimodal terminals efficiency and optimisation	D 3.2.2. PA for multimodal nodes/terminals efficiency and optimization: innovative control shunting system	LP - NASPA

Topic	Pilot action - Deliverable	Partner responsible
Multimodal terminals efficiency and optimisation	D 3.2.3. PA for multimodal nodes/terminals efficiency and optimization: ICT/ITS tools for rail traffic	LP - NASPA
Multimodal terminals efficiency and optimisation	D 3.2.4. PA for multimodal nodes/terminals efficiency and optimization: ICT/ITS tools for rail traffic	PP6 – Port of Rijeka
Multimodal terminals efficiency and optimisation	D 3.2.5. PA for multimodal nodes/terminals efficiency and optimization: new WMS (warehouse management system) model	PP16 - CODOGNOTTO POLAND
Assessment of market opportunities to reinforce or activate new multimodal services	D 3.2.6. PA for activation/optimization of multimodal services: new services port gateway/freight village	PP4 – ZAILOG AND LP - NASPA
Assessment of market opportunities to reinforce or activate new multimodal services	D 3.2.7. PA for activation/optimization of multimodal services: modal shift form road to rail	PP16 - CODOGNOTTO POLAND AND LP - NASPA
Alternative fuels deployment	D 3.2.8. PA for ECO-innovations on alternative fuels deployment: development of new e-mobility	PP8 – FREEPORT OF BUDAPEST (WITH PP9 – PUBLIC PORTS JSC INVOLVEMENT)
Alternative fuels deployment	D 3.2.9. PA for ECO-innovations on LNG deployment as alternative fuels: logistic model for LNG	PP16- CODOGNOTTO POLAND
Energy efficiency solutions	D 3.2.10.	PP5 – LUKA KOPER

Topic	Pilot action - Deliverable	Partner responsible
	PA for ECO-innovations on energy efficiency deployment: test of energy efficiency in cargo handling	
Energy efficiency solutions	D 3.2.11. PA for ECO-innovations on energy efficiency deployment: tests on transport operations	PP13- LOKOMOTION (assessment by PP7 – RCH)
Trainings	D 3.2.12. Testing of training pathways for energy efficiency deployment in the rail sector – RCH (report is not needed)	PP7 – RAIL CARGO HUNGARY
Trainings	D 3.2.13. Testing of training pathways for energy efficiency deployment in the rail sector – Lokomotion (report is not needed)	PP13- LOKOMOTION

Why do you have to do it?

The main important findings of the pilot actions are recorded and organized in specific documents in order to support the transferability process. It means that we have to prepare a summary assessment report of all pilot actions – which is the responsibility of WP responsible partner (Freeport of Budapest – PP8). The summary report will be based on the inputs you provide in your inception, mid-term and final reports about your pilot actions. Inputs from you are provided for the final report in the format specified by this document.

2. PILOT ACTION IMPLEMENTATION

PROJECT PARTNER	Lokomotion PP13
PILOT PROJECT NAME:	D.T.3.2.11 PA for ECO-innovations on energy efficiency deployment: tests on transport operations
PILOT PROJECT ID:	O.T3.11

3. DESCRIPTION OF THE PILOT ACTION

NEEDS AND CHALLENGES ADDRESSED BY THE PILOT ACTION (max. 2000 characters)

Lokomotion and RTC operate a locomotive fleet which consists of several different types. Newer series (BR 185, BR 186, BR 187 BR 193, EU 43) from about year 2000 are largely compatible with each other, that is, several locomotives can be controlled by a locomotive driver from a driver cab.

As there are older locomotives from the 1950s in the inventory (BR 139), it was natural to establish their compatibility with the rest of the fleet.

In particular, the required investment level for vehicles that were around 60 years old was decisive. Not to be neglected, however, was the circumstance of the ever more difficult deployment possibilities without retrofitting taking place. Otherwise, these considerations could have ultimately led to the shutdown and scrapping of these locomotives. That is why the plans have been expanded to include energy efficiency and optimisation of human deployment.

A generally changed and quantitatively changed local service has to be co-ordinated in advance with all involved parties. Thus, the sum of the costs for expensive locomotive hours can be saved.

On the other hand, the reduced staffing requirements are, not least of all, socially more sensitive. It is not intended here to reduce the number of employees but rather a shift or cover of more than a few locomotive driver hours on new traffic from road to rail.

BEST PRACTICES AND ACTION PLANS SUPPORTING THE PILOT ACTION (max. 2000 characters)

We were motivated by another German railway undertaking, which took a similar approach with two former East German rear derailleur locomotives. This topic was well comparable in technical terms. Our locomotives were also rear derailleur locomotives with series-end collector motors from former state railway stock. These too were already capable of multiple traction with each other before but not with another vehicle series. Here the co-ordination in the technical synchronisation of the two regulations according to power of the transformer applied to each. The locomotives can

only deliver or withdraw power at the same time. In our project, however, there was also an addition to functions booster, monitoring, display, various switching functions and remote control operation with other, newer locomotive types.

PURPOSE OF THE PILOT ACTION (max. 1000 characters)

These are locomotives that are now 60 years old. Its technical status has been overhauled many times. However, they still have a market authorization and are often used by smaller RU's. The special feature is that technical upgrades can now be implemented by making these older series compatible with locomotives of more recent year of construction. At the same time, they also partially open up an economic advantage. In this way, price-sensitive traffic can be supported.

CONTENT AND OUTPUT OF THE PILOT ACTION – DESCRIPTION OF THE DELIVERABLE (max. 15000 characters)

The locomotives of the series were equipped with the ZMS / TMC components. This enables a more efficient use of these vehicles as they are compatible with other modern series. They can be controlled together by a driver's cab and a train driver. This enables the saving of personnel resources and a more energy-efficient driving style, since demand-based energy consumption is now possible. For this, the conversion had to be technically approved. There was a delay in this regard (see following paragraphs). Until the final acceptance by the supervisory authority EBA, a test run could be carried out on the Austrian infrastructure with a special permit. At the same time, a film was also made showing the technical implementation and operational use.

The approval process has the operational use of the ZMS / TMC function i.e. the simultaneous multiple control of different locomotive types is delayed by at least one year. Extensive training measures are required before active commissioning. On the one hand, drivers and workshop personnel must be trained in the new technology. In addition to the COVID-19 restrictions, the possibilities of e-learning must be considered. There is a cooperation with the University of Munich to develop a learning platform. This ensures that the necessary training courses can be implemented more flexibly and independently of location. On the one hand, they offer an economical solution and a replicable alternative for refreshing knowledge. In the first run, 20 train drivers are to be trained. After that, all other employees, including those of the cooperation partners (approx. 100 people in total), will be trained successively. As a result, an alternative test operation with a clearly defined route (on the level) and locomotive combination BR 139 + BR 139 (only a combination of old locomotives) is planned in the Danube region. This simplified route, in contrast to the difficult mountain operation (Alps), is intended to provide information on driving behavior and risk profiles. The aim here will be to increase the previous load limit of 1600t / train with 550m train length to 1800t / train and 700m train length. This corresponds to an efficiency gain of 12.5% when using a second locomotive with needs-based support (booster). The trial operation in the Alpine region (NAPA) will then take place afterwards. The original concept of the mixed multiple traction (combination of an old locomotive with a modern locomotive) is used

here. Initially, a second engine driver is planned as a fallback life on the train. This is only used as a precaution should a technical malfunction occur. Basically, the goal is that only one train driver controls all locomotives in master-slave mode. This form of control enables demand-based energy consumption. Taking into account changing framework conditions such as the construction of the new Brenner Base Tunnel BBT, the question of the future viability of this old locomotive is given. According to the current technical status of the BBT, this locomotive will not be able to be used. However, maintenance windows and high-speed passenger trains will push freight traffic on the BBT route. This means that the conventional mountain routes will continue to be used. This ensures the future viability of the locomotive, at least for the coming years. Another characteristic arises from the commercial market observation. The market situation is currently very difficult and under high cost pressure. In order to increase the modal shift, multimodal rail freight transport must remain competitive. This can only succeed in the future with the aid of efficiency increases and resource savings in this form. Closer cooperation with Stakeholder Rail Traction Company RTC is also being considered. The qualifications for interoperable train drivers (Italy-Austria) and for energy-efficient driving style implemented in connection with the D.T.3.2.13 training enable further synergies as locomotives and well-qualified drivers act as a flexible unit of resources.

WERE THERE ANY DEVIATIONS IN TERMS OF THE CONTENT OR PURPOSE OR ANY PART OF THE PILOT ACTION – IF YES, PLEASE DESCRIBE THE REASONS (max. 2000 characters)

Ongoing waiting for approval of German Rail Safety Authority (EBA) due to new formal rules and a gap of knowledge to upgrade an old locomotive with new digital functions on Lokomotion's (holder) and authority's side. From September 2020, the responsible authority will change from EBA to the European Rail Agency (ERA). If the project is not finished until this date, a new approval process has to be started. This will end in a completely new preparation of documents and tests, which is, under the aspect that the system is working well from the technical side, not acceptable. The final approval was conclude at 31.10.2020!

4. STAKEHOLDER'S INVOLVEMENT

HOW THE STAKEHOLDERS WERE INVOLVED (max 2000 characters)

The following stakeholders were involved in this project over the period up to approval: The railway supervisory authority EBA, EBC cert (experts), ERC Rail and Eisenbahnlaufwerke Halle (brakes expert), ÖBB Infra (testing), DB Fernverkehr (assembly plant), applied systems and industrial technology AAIT and Applied Railway Technology AEBT (Engineering) and a lawyer specializing in special conversions, Dr. Heyle.

The EBA is the testing authority for the new approval of vehicle technology that changes the original homologation. For this purpose, technical descriptions and security features must be submitted by the applicant. The review of these documents is accompanied in advance by certified experts. They are intended to facilitate the actual review process.

As part of the development, engineering offices were commissioned to provide the special expertise. The conversion of old vehicles is not common because the market for this is small. This is due to the fact that these types of locomotives are increasingly being taken out of service and scrapped.

The installation of the technical components was carried out by assembly plants.
In the final installed state, the components (brakes) and the general operability were tested in field trials on the Austrian infrastructure of the ÖBB.

Due to the delayed attitude of the supervisory authority and the recurring bureaucratization of the procedure, legal counsel was called in.

5. TRANSFEREBILITY OF PILOT ACTION RESULTS

TRANSFERABILITY OF THE PILOT ACTION RESULTS (max. 2000 characters)

PP ready to share know-how for approval processes. Involved stakeholders have acquired special technical know-how. Recommendation to set up a monitoring system for similar investments.

Overall, this PA has a unique selling point. The essential characteristics will be shown on special route sections (mountain routes; niche market). There is unlikely to be a broader application because the more modern locomotives can take advantage of their technical advantages. However, this type of upgrade is expected to result in greater acceptance among train drivers. Because this function forms a kind of qualification which is hardly imparted on the market by other RUs. This also helps to strengthen the professional profile. In addition, a gentle driving style can be assumed. The background to this are changed braking procedures. A driving style that is gentle on the material can also exist. This requires further training in advance, which is developed through cooperation with educational institutions. As a result, further media training content is to be created which can be conveyed by the in-house training center. The certification exists for the countries Germany and Austria.