

D.T3.3.2

CAPITALIZATION OF THE SINGLE CLUSTERS

EXPERIENCE

FREEPORT OF BUDAPEST LOGISTICS LTD. (FBL)



Figure 1: Freeport of Budapest Logistics Ltd.

Source: <https://tervlap.hu/cikk-nezet/nem-vart-kihivással-szembesultek-a-csepeli-szabadjikoto-első-irodahazanak-tervezői>

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1. Executive summary

This capitalization report has been created with the aim of summarizing and making the results of TalkNET (Transport and Logistics Stakeholders Network) project pilots and trainings available for the wider public. The project itself was called into life with the objective to achieve a better integration between ports, inland terminals and transport operators, and to ensure more efficient management of terminals and last mile connections enhancing multimodal freight transport solutions.

The project has a special focus on the improvement of coordination among stakeholders to support the abovementioned integration of different actors. Besides, project objectives are supported by the development and implementation of common knowledge tools, the concerned pilot actions and trainings.

The basis of the project is the cooperation of 15 project partners and 12 associated partners lead by the North Adriatic Sea Port Authority (NASPA). The project includes 11 pilot actions (1 of which was an investment), 9 action plans, 2 trainings and 5 knowledge-tools. The project contains 3 thematic work packages out of which the 3rd one contains the pilot actions and trainings.

The pilots described in the report are part of the 3rd thematic work package of the project and focus on testing the most promising initiatives including verification from financial and large-scale deployment point of view. The main strength of this work package containing the pilots is its ability to induce behavioural change by the target groups via testing the theoretical phases of the project. In case of positive results partnerships can support these initiatives financially and large private players can guarantee a quick decision-making process.

Information used in the report is mainly based on the individual reports provided by the project partners like output factsheets and self-assessments.

The capitalization activity in the project approach, according to the INTERREG guidelines is the gathering, organizing and building upon existing projects results, within the field of transport and logistics stakeholders' network. Consequently, capitalization of TalkNET project results builds upon the outputs gained within the project in the above-mentioned thematic fields with the objective to obtain additional improved outcomes, boost performance and multiply the effects of the project's achievements.

Upon completion of the pilots it can be concluded that 3 of the pilot actions and trainings have already been capitalized. These are the pilot of Freeport of Budapest (FBL), the training of Rail Cargo Hungaria (RCL) and one pilot of Codognotto Poland as summarized in the table below. The other 9 pilots and trainings also have a great perspective for future capitalization, especially when taking into consideration the feedbacks received during stakeholder consultations.

Initial pilot results, knowledge gained and their capitalization result and outlooks are described in detail in this report that can serve as a basis for future communication and dissemination activities of TalkNET project. Besides, main target groups/receivers of the pilot results have also been identified.

Table 1.: Summarizing table on realized TalkNET pilots/ trainings

Source: own editing

Responsible partner	Pilot/ training	Capitalization results and perspectives
Freeport of Budapest (FBL) ¹	Development of new e-mobility service	Project partner RCH (Rail Cargo Hungaria) has already made a pre-feasibility study on e-mobility services based on the results of FBL during the pilot execution phase
Rail Cargo Hungaria (RCH)	2-days eco-driving training	The pilot has already been capitalized by the Institute of Transport Sciences that has embraced this training initiative and is planning to launch similar courses for engine driver instructors
Lokomotion	3-days eco-driving training	Lokomotion has a partnership with the local chamber of commerce to share this program with their industrial training partners. These partners gave positive feedback on the training.
Codognotto Poland	Modal shift from road to rail	The results of the pilot action have been assessed and the lessons learnt capitalised by project partners Rail Cargo Hungaria, Lokomotion, Codognotto Poland and Zailog in their line of business. The service can be adopted by other European operators to increase their railway loading capacity; by either short haul rail services or shippers with an eco-friendlier approach.
Codognotto Poland	Feasibility study on deploying LNG Heavy Duty Vehicles (HDVs)	The feasibility study has already been capitalized by Codognotto Italia that has acquired 70 LNG trucks so far investing 10 million euros. Besides, some Polish transport operators have installed their own LNG refuelling station and started to change to LNG. MAHART Freeport Budapest has also capitalized the pilot results when establishing its new LNG terminal by making it compatible for LNG trucks also.
Codognotto Poland	New WMS (warehouse management) model	The new WMS concept can easily be applied to different frameworks in the digital connections between hubs and stakeholders, especially by European intermodal terminals. Besides it will be applied in all warehouses of Codognotto and promoted as a benchmark in the framework of DTLF. Project partners FBL, Zailog, Rail Cargo Hungaria, Luka Koper and the Port of Rijeka have already assessed the possible application of the system.

¹ Originally a pre-feasibility investment analysis for an LNG fuel station was planned that was changed during the implementation of TalkNET

Responsible partner	Pilot/ training	Capitalization results and perspectives
Luka Koper	New LED lightning system	Following the results of this pilot action the Port of Koper will continue to implement this new and energy efficient LED lightning system in its warehouses with similar lamps in the port. This solution can be adapted in all kinds of warehouses in other terminals by stakeholders in the logistic area throughout the CE region. Besides, project partners FBL, Zailog, Rail Cargo Hungaria and NASPA have already assessed the possible implementation of a similar LED lightning solution in their warehouses.
Port of Rijeka	Cargo loading web application	Pilot results has already been assessed by project partners Rail Cargo Hungaria, Codognotto Poland, FBL and Zailog. Findings of the application and the creator algorithm can be further transferred and publicated on logistics conferences EU-wide and can be adopted for use by further railway operators' within the EU. ERP systems with adjustments and keeping in mind, that many hubs already use their own handling IT systems.
Zailog	Feasibility Study for a new rail terminal	Based on the results of the feasibility study Zailog plans to complete the described terminal extension by 2027 as a prime capitalisation activity. Besides, all European nodes can implement such a terminal extension to adjust their railway standards to European directives if enough land is available. The fourth railway module will represent a guideline for other hubs (ports and freight villages) operating in the Central European area.
Zailog	New railway shuttle	Although market conditions have prevented the realization of this shuttle train, the service described could be introduced in any port/inland terminal connection aiming to link the maritime European routes across Europe by rail and connecting southern and northern ports in a more sustainable way. Nevertheless, public incentives are crucial to start this shuttle service. Project partners Rail Cargo Hungaria, Zailog and Codognotto have already learnt that such shuttle service is hardly profitable without state or EU level subsidies- so by using the gained knowledge they could eliminate this potential growth possibility from their business strategies.

Responsible partner	Pilot/ training	Capitalization results and perspectives
North Adriatic Sea Port Authority (Ports of Venice and Chioggia) -NASPA	ICT/ITS tools for rail traffic: Integrated System for the Management of the Railway Shunting - SIMA2 software application	<p>A new software SIMA2 has been implemented for the rail shunting management at the port of Venice and new functionalities allow the interfacing among SIMA2 and some IT systems used by other players involved into the process, such as the Infrastructure Manager, Railway Undertakings and Terminals.</p> <p>Due to the COVID situation affecting Italy the capitalization process of the implemented pilot action has been delayed. Anyway, SIMA2 can be considered a best practice as rail software and could be capitalised in all terminals with notable shunting inefficiencies.</p>
North Adriatic Sea Port Authority (Ports of Venice and Chioggia) -NASPA	Innovative control shunting system: data warehouse functional to reporting and data analysis - Railway DATAMART	<p>A data warehouse has been implemented called Rail DATAMART for the organization of different datasets allowing integrated queries and researches, based on data arising from different data sources and different data types.</p> <p>Due to the COVID situation affecting Italy the capitalization process of the implemented pilot action has been delayed. Anyway, The transferability of this system allows an organization to acquire data from different sources (other organizations that use data in different forms), to exchange them each other without forcing those who provide these data to change their data management and storage methods. The added value of Datamart is a technological upgrade allowing a related upgrade on the quantity of information gathered and available to be analysed.</p>

2. Introduction

This report has been made with the objective to summarize all information deemed necessary and useful for the long-term capitalization of the pilot and training initiatives of TalkNET (Transport and Logistics Stakeholders Network) project as described in its 3rd thematic work package. Completion of the pilots and trainings have been driven by a demand-based approach putting emphasis on the needs and the target groups to be influenced via capitalization.

The main reason for initiating this program was the lack of necessary coordination and dialogue among freight transport stakeholders in Central Europe with the aim of improving integration between ports and inland terminals and transport operators. Besides, the enhancement of environmentally friendly multimodal freight transport solutions is also of major concern.

The main challenges targeted are the optimization of terminal management and last mile connections to strengthen the efficiency of the logistic nodes, their hinterland connections and related logistics services, and the improvement of environmental performance of logistics nodes through the deployment of alternative fuels and energy efficient solutions to reach EU low-carbon targets.

The work package containing these pilots and trainings is the “Pilot actions and trainings for cooperation in multimodal transport chains and business activation” (WPT3).

The assessment of the pilots includes transferability indications spread public and targeted events in compliance with the communication strategy. Specific bilateral meetings are organized and meeting occasions as international fairs are exploited to collect feedbacks for a better improvement of the designed pilot actions and trainings. It is expected that the implementation of related activities improves dialogue and coordination among stakeholders through a consultation and validation process. Besides, trainings are tested with experts and validated thereafter.

Pilots had a special devotion to stakeholder consultations as these innovations have a direct effect on traditional logistics systems. Thus, ensuring a wider support and understanding among the key players represents a crucial element for the starting phase of the capitalisation process.

The pilot phase focused on testing the most promising initiatives verifying them both from financial and large-scale deployment point of view. In case of positive results of innovations and improvements, partnerships can support these initiatives financially and large private players can guarantee a quick decision-making process.

The main strength of the 3rd thematic work package through the implementation of the described pilot actions is the capability to initiate behavioural change amongst the target group by testing the theoretical phases.

The capitalization report mainly relied upon the following documents as information resources: Output factsheets and final reports of the completed pilot actions, (pre)-feasibility studies prepared in the framework of the pilots, self-assessments of the pilots and summary report on the stakeholder meetings. Besides, project partners were also contacted for additional information when considered necessary. In case of the chapter on methodological context and guidance for capitalization presentation on Guidelines on project sustainability and capitalisation presented on 27-28 May 2020 by Freeport of Budapest (FBL) on the online steering committee meeting and the capitalization manual from Action Contra la Faim International (ACF) were used as their approach was considered as a very useful best practice.

3. Overview of the TalkNET project and the pilot actions

3.1 About the TalkNET project

TalkNET project was initiated with the aim to strengthen environmentally friendly multimodal transport in Central Europe to develop harmonized mechanisms of cooperation among freight transport stakeholders. The project has a focus on the improvement of coordination among stakeholders to foster the integration between ports, inland terminals and transport operators and enhance efficient and sustainable multimodal logistics nodes. The main objective of the project is to achieve a better integration between ports, inland terminals and transport operators and to ensure more efficient management of terminals and last mile connections enhancing multimodal freight transport solutions.

The following results are expected from the project:

- establishment of transnational coordination and
- stakeholder networks for freight transport
- effective integration among port, inland terminals, transport operators and the
- enhancement and optimization of multimodal logistics nodes management and connections.

These results are achieved through the development and implementation of common knowledge tools, pilot actions and trainings to support investments on terminal management efficiency, new intermodal services, last mile connections and on the deployment of alternative fuels and energy efficiency solutions. TalkNET follows an innovative approach focusing on optimizing existing infrastructures (not planning new ones) and on developing common solutions in strong cooperation with stakeholders of the transport industry. It follows a learning loop approach starting with the definition of five knowledge tools that will be improved at the end of the project building upon the acquired experience.

The main objectives of the project can only be targeted via transnational cooperative approaches because the area is crossed by international freight traffic flows including many regions that have not reached the same level of efficiency and coordination in available infrastructure and services so far. The abundance of actors involved in the decision-making process makes it difficult to elaborate policies valuable for the whole CE area. It means transnational cooperation is the only platform that can ensure effective integration of transport modes and promote viable multimodal freight transport connections. This transnational added value is enhanced through a transnational thematic clusters dimension linked to eco-innovation and the improvement of multimodal nodes.

There is an emphasis on the involvement of key players of the transport sector from almost all CE countries as it is necessary to improve the cooperation of stakeholders requiring main hubs and logistics nodes to harmonize their operation. Relevant stakeholders were included in all project phases during the implementation of the project. All project partners shared information on the implementation process aiming the improvement of multimodal logistics nodes efficiency throughout the whole project lifecycle, added value of transnational cooperation can be taken for granted. Besides, all local actions were based on the international framework being part of the five common knowledge tools that were to assure the capitalization and follow up procedure.

Furthermore, TalkNET had an aim to strengthen horizontal and vertical coordination of policy makers, economic players and logistics actors of various CE countries and can improve the competitiveness of freight transport by ensuring the conditions to attract international freight traffic flows and supporting public actors in the decision making processes.

The priority of the program is “Cooperating on transport to better connect Central Europe”, meanwhile its specific objective is “to improve coordination among freight transport stakeholders for increasing multimodal environmentally friendly freight solutions”. The program itself is based on the cooperation of 15 project partners and 12 associated partners led by the North Adriatic Sea Port Authority (Autorità di Sistema Portuale del Mare Adriatico Settentrionale) – NASPA.

Table 2: Project and associated partners of TalkNET:

Source: own editing

#	Name of the partner	Acronym	Project role
1	North Adriatic Sea Port Authority	NASPA	Lead partner
2	Port Network Authority of the Eastern Adriatic Sea	PNA_EAS	Project partner
3	Veneto Strade S.p.A.	VS	Project partner
4	Consorzio ZAILOG Quadrante Europa Freight Village	ZAILOG	Project partner
5	Luka Koper, port and logistic system, Plc.	Luka Koper	Project partner
6	Port of Rijeka Authority	PRA	Project partner
7	Rail Cargo Hungaria Goods Transport Private Limited Company	RCH	Project partner
8	Freeport of Budapest Logistics Ltd.	FBL	Project partner
9	Public ports, jsc.	VP,a.s.	Project partner
10	Westpomeranian Region	WZP	Project partner
11	Szczecin and Swinoujscie Seaports Authority S.A.	SSSA	Project partner
12	Regional Development Agency of Ústí Region, Plc.	RDA	Project partner
13	Lokomotion Gesellschaft für Schienentraktion mbH	LM	Project partner
14	Italian-German Chamber of Commerce in Munich	Italcam	Project partner
15	Codognotto Poland		Project partner
16	Terminali Italia srl Gruppo Ferrovie dello Stato Italiane	Terminali Italia	Associated partner
17	Ministry of Infrastructure of the Republic of Slovenia	Ministry of Infrastructure	Associated partner
18	Central European Transport Corridor Limited Liability European Grouping of Territorial Co-operation	CETC – EGTC Ltd.	Associated partner
19	Italian Association of Freight Villages		Associated partner
20	Adriatic Gate j.s.c.		Associated partner
21	HZ Cargo d.o.o.		Associated partner
22	Luka Rijeka d.d.		Associated partner
23	ČD Cargo a.s.		Associated partner
24	Fratelli Codognotto Snc Di Codognotto Gianfranco & C.		Associated partner
25	IKEA Italia Distribution		Associated partner
26	Consorzio ZAI Quadrante Europa Freight Village		Associated partner
27	Regional Development Agency of Ústí Region, Plc.		Associated partner

Altogether ten regions have been identified in the project, sharing the same end to improve connectivity, attractiveness and competitiveness in freight transport. The concerned territories in the project are represented by the followings:

- North Adriatic ports
- Danube ports
- Elbe ports in the Czech Republic
- Polish sea and river ports
- Railway/terminal operators of the CE area.

Main challenges of the concerned regions are the followings:

- North Adriatic ports do not completely exploit their geographical proximity to the Central European markets, so it would be necessary to strengthen market cooperation and coordination to develop strategies improving freight transport intermodal connections to the hinterland.
- Danube regions need better interconnections between their river basins modernising and extending multimodal infrastructures in inland ports.
- Baltic regions would need development of their services to improve accessibility.

Having a wider scope on the described territorial challenges it can also be concluded that these are fully compliant with macro area strategies like USAIR, EUSBSR and EUSDR.

3.2 Role and process of pilot projects and trainings in the project

On the basis of the main topics characterizing first and second thematic work packages of the project (WPT1: Common knowledge tools on multimodal nodes efficiency; WPT2: connections and common knowledge tools and training measures on eco-innovation deployment in freight transport) partners outlined specific pilot actions as driving innovative steps towards project specific objectives supported by knowledge tools collecting best practices inside and outside the partnership in the framework of the third thematic work package (WPT3). These achievements were supported by knowledge tools collecting best practices available inside and outside the partnership. Besides, results of the analysis phase managed in these 2 thematic work packages contributed to the more sophisticated definition of pilots and potential reorientation of their implementation phase.

In this context the first work package (WPT1, Common knowledge tools on multimodal nodes efficiency and connections) supports the following pilot initiatives of WPT3:

- Feasibility study on the implementation of a new rail terminal in Verona Freight Village to improve last mile connectivity (Zailog).
- Test of innovative control shunting systems in the port of Venice railway area to improve capacity and safety (NASPA).
- Development of the second phase of an integrated control shunting system (NASPA)
- Web application optimizing cargo loading (Port of Rijeka)
- New Warehouse Management System (WMS) model (Codognotto Poland)
- New railway shuttle (Zailog)
- Modal shift from road to rail (Codognotto Poland)

The second thematic work package (WPT2: Common knowledge tools and training measures on eco-innovation deployment in freight transport) supports the following initiatives of WPT3:

- Codognotto Poland: Feasibility study on deploying LNG Heavy Duty Vehicles (HDVs).
- Luka Koper: test of energy efficiency in cargo handling: New LED lightning system
- Freeport of Budapest: development of new e-mobility service
- Lokomotion: test on rail transport operations for energy efficiency

It is also important to mention that the study phase of the two work packages to the improvement of the knowledge base allowing the presentation of the pilot results to key players potentially affected by innovation deployments. Pilots are revised accordingly for these consultations until a final approbation.

Previous similar projects like Empiric and INWAPO emphasized the lack of quick decision-making processes directly involving key players of transport. TalkNET on the contrary involves relevant stakeholders in all project phases from the very beginning of outputs' preparation until their final implementation.

Besides, policy improvements determined by the projects were not always supported by complete learning loops before, that, especially for transport and logistics projects, resulted in the lack of tangible results. TalkNET though directly includes public decision makers and main private actors being able to assess the market applicability of the innovation. TalkNET lays down the basis of a possible transnational strategy and opens a new development process via analyses and testing.

This is the most suitable work package to determine behaviour change of the target groups. Besides, these pilots also enable specific testing of the theoretical phases. To get simple and more effective communication strategy, the pilot actions are linked to common knowledge tools outlined in the project. Furthermore, transferability process is supported by direct contacts on public events of the sector while specific pilot action visits are organised.

Target groups of the 3rd thematic work package containing the pilots are the followings:

- Local public authorities
- Regional public authorities
- National public authorities
- Sectoral agencies
- Infrastructure and (public) service providers
- Interest groups including NGOs
- Higher education and research institutions
- Education/training centres and schools
- Large enterprises
- SMEs
- Business support organisations
- International organisations, EEIGs (European Economic Interest Grouping) under national laws
- General public

The process of the pilots started with the development of an action plan (built upon 5 topics as described in the following chapter) and inception reports, followed by mid-term reports, stakeholder meetings and the implementation of the pilot actions. The process was closed with the final reports and output factsheets of the specific pilot. When evaluating the capitalization actions already

completed it should be taken into consideration that the global pandemic situation impeded the partners to disseminate pilot result as planned. Nevertheless, results are promising and can be utilized on a wide spectrum, so with the improvement of the global pandemic situation capitalization is to get into its stride.

3.3 Project fields of actions

TalkNET is developed on the basis of a cluster approach corresponding to five topics identified by the project:

1. Multimodality:
 - Last mile connections of multimodal nodes
Pilots included:
 - Zailog: Feasibility study for a new rail terminal
 - Improvement of multimodal terminals efficiency and optimisation:
Pilots included:
 - NASPA: ICT/ITS tools for rail traffic innovative control shunting system
 - NASPA: ICT/ITS tools for rail traffic: Data warehouse
 - Port of Rijeka: ICT/ITS tools for rail traffic: cargo loading web application
 - Codognotto Poland: new WMS (warehouse management system) model
 - Activation/optimization of multimodal services:
 - Zailog: new services port gateway/freight village: railway shuttle
 - Codognotto Poland: modal shift form road to rail

2. Eco innovation solutions:
 - Alternative fuels deployment
 - Freeport of Budapest: development of new e-mobility services in the Freeport of Budapest
 - Codognotto Poland: Feasibility study on deploying LNG Heavy Duty Vehicles (HDVs)
 - Energy efficiency solutions
 - Luka Koper: test of energy efficiency in cargo handling: installation of LED lighting system and automation of the lighting system
 - Lokomotio: test on rail transport operations for energy efficiency
 - Rail Cargo Hungaria (RCH): Testing of training pathways for energy efficiency deployment in the rail sector: 2 days eco-driving workshop for loco drivers
 - Lokomotio: Testing of training pathways for energy efficiency deployment in the rail sector: days eco-driving workshop for loco drivers

4. Methodological context and guidance for capitalization

Following the methodology of INTERREG the interpretation of capitalization in this program is the gathering, organizing, and building upon existing program and projects results, within specific fields (in our case transport and logistics stakeholders' network). As such, capitalization of results builds upon the outputs gained within projects of the above-mentioned thematic fields in order to obtain additional improved outcomes, boost performance and multiply the effects of the project's achievements.

In this context capitalization is a process based on the analysis of the needs, which slightly differs between cooperation strands. It is a structured process, which involves having a real capitalisation strategy as early as the beginning of the programming period, one which goes beyond the Interreg stakeholders and which creates a community gathering of interested stakeholders from various backgrounds/sectors. This process guarantees a re-use of the knowledge (and not only the enhancement of the knowledge) and makes a connection with the evaluation (evaluation of impact or evaluation of the implementation).

Capitalisation considers data about the implementation of programmes, projects, impacts and methods used to make this knowledge generated by Interreg (the capital) more accessible and usable for other programmes, projects or stakeholder groups. Thus, it should be considered as a knowledge management tool.

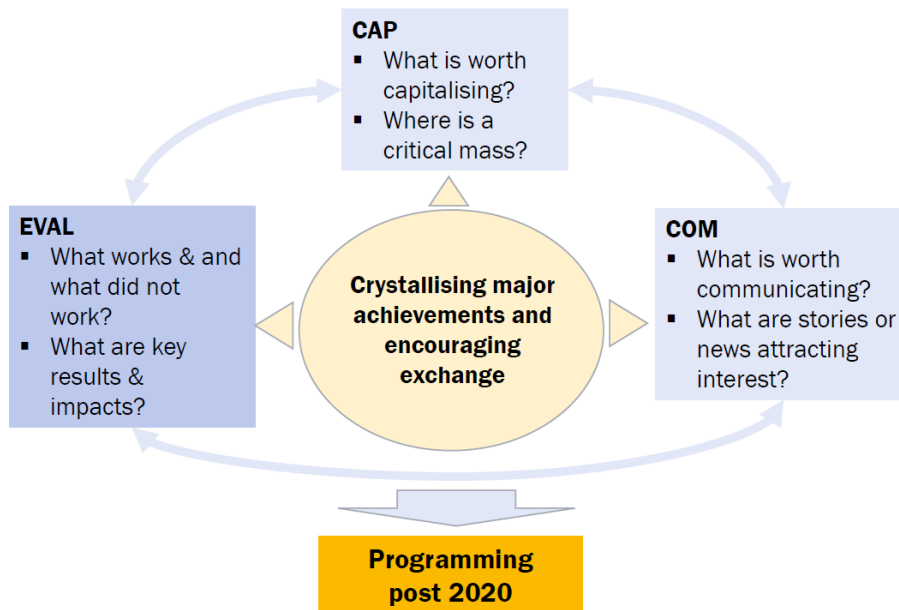
Generated knowledge can be both upstreamed for better policymaking or downstreamed for broader impacts in the area concerned.

In this approach capitalization is an immersive, long term analyses using well-processed information with many practical examples on what, how, and why should be applied. The emphases should be put on the number of good practices really re-used/transferred and the impact (in quantitative or qualitative terms) of this re-use/transfer during the process.

Capitalisation has a direct link to evaluation and communication. The emphasis should be put on the importance of increasing the awareness of more and various number of stakeholders, so not only the ones involved in project implementation and management.

Figure 2: Capitalization in the project cycle

Source: presentation by FBL on Guidelines on project sustainability and capitalisation



In this interpretation a more “demand-driven approach” should be taken on board: what are the needs, and who/what should be influenced. Capitalisation strategy should be part of the whole project cycle.

During the capitalization process the following questions are to be answered:

- What are the needs of the sector/stakeholders;
- What new knowledge is generated by the pilot actions;
- How this new knowledge is transferred to the stakeholders;
- How the knowledge is reused by them;
- How the generated knowledge is sustained by this re-use²?

3 categories have been defined to classify the potential levels of capitalization:

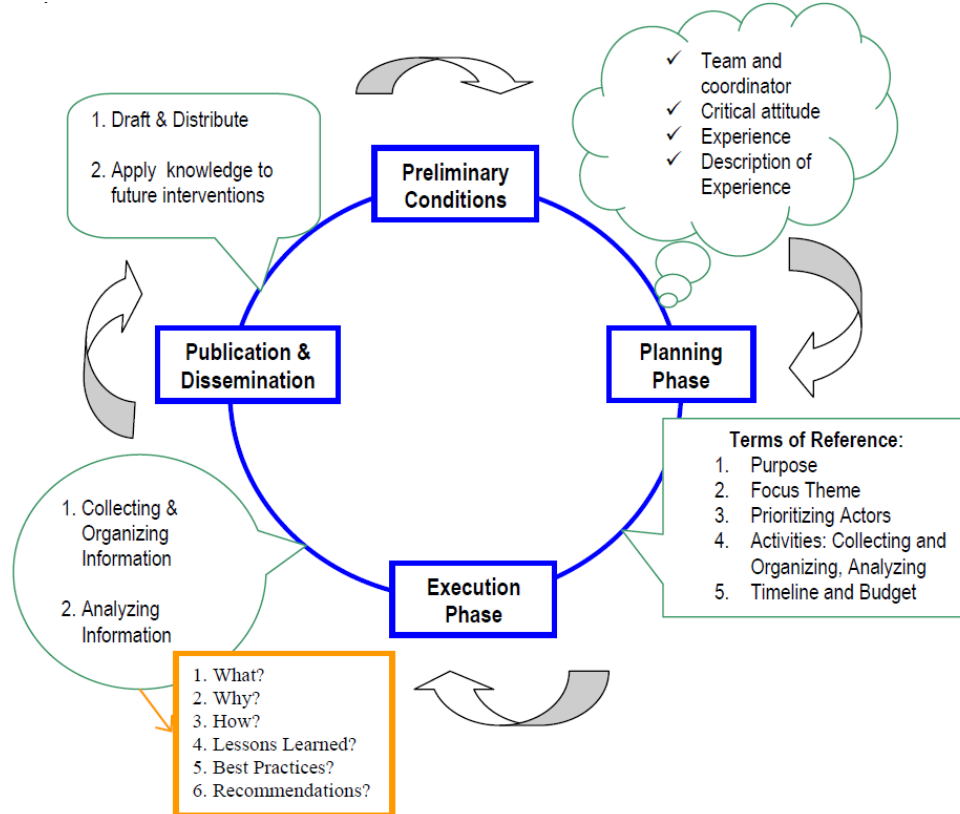
- Level 1: Capitalization of project results by the entity (project partner in this case) itself: it contains actions when an entity uses its own pilot result to implement a project assessed in a (pre)-feasibility study or upscale/ replicate development tested during the pilot phase.
- Level 2. Capitalization actions in the framework of the project carried out by other project partners: it covers actions when other entities of a project partnership use the results of a pilot that can happen either during the project phase or later.
- Level 3: Capitalization of the project outputs by stakeholders outside the project partnership: it is about reuse of pilot result by entities not directly involved in the project partnership.

The methodology implemented within the project follows an international best practice in capitalization the “Learning from Experience and Sharing Knowledge: A Capitalization Manual” from Action Contra la Faim International (ACF). It should be taken into consideration though that detailed description of the last step of the process shown on the following figure is not included in this capitalization report.

² Source: presentation on Guidelines on project sustainability and capitalisation presented on 27-28 May 2020 by Freeport of Budapest (FBL) on the online steering committee meeting

Figure 3: Process of basic capitalization method

Source: *Learning from Experience and Sharing Knowledge: A Capitalization Manual from Action Contra la Faim International (ACF).*



STEP 1: Following the process of this method the capitalization started by taking care of the following preliminary conditions:

- A capitalization team and its coordinator: Capitalization process has been led by four project partners: FBL, NASPA, Codognotto Poland and Zailog. The coordination, including the completion of this report has been assigned to FBL (Freeport of Budapest).
- An attitude geared towards critical analysis and a desire to improve: All pilot participants were encouraged to continuously report on the progress of their initiative (including an inception and mid-term report) and to indicate any deviation from the original concept if considered to be necessary. Besides, capitalization has already happened during the implementation phase when one of the partners (RCH) used the results of the pilot of another partner (FBL) and prepared a similar pre-feasibility study on e-mobility.
- An experience to be capitalized: Following the main objective of the project the main experience to be capitalized is the integration between ports, inland terminals and transport operators and the efficient management of terminals and last mile connections to enhance multimodal freight transport solutions. Of course, as part of efficiency management environmental issues (especially CO2 reduction) have received special attention.
- The documentation and a reconstruction of events: as described in chapter 3.2. the whole process has been thoroughly documented including events like stakeholder consultations. The delivered documents were the followings:
 - a. Inception reports
 - b. Mid-term reports
 - c. Summary on stakeholder consultations
 - d. Output factsheets
 - e. Self-assessments
 - f. Final reports

STEP 2: The second phase of the process was about planning. Here the following interrelated issues were considered to be able to plan capitalization process in advance:

- a) The purpose of our capitalization project: In case of TalkNET pilots the main reason for capitalization is the dissemination and the same time reuse of pilot results contributing to the integration between ports, inland terminals and transport operators and the efficient management of terminals and last mile connections. These objectives contribute to the decarbonisation of transport towards the target of a 60% reduction of CO2 emissions from transport by 2050 as indicated in the 2011 EU White Paper on Transport, and the establishment of long lasting connections between policy makers, transport operators, inland ports and logistic players.
- b) The focus theme: In case of TalkNET pilots we have been looking for the answer to the following question: Have the actions described in the pilots contributed to the better integration of actors and improvement in their efficiency and thus their environmental impact?
- c) Prioritizing the actors: In accordance with the objective of TalkNET actors of the project are the 15 project partners and the 12 associated partners. Besides, all involved stakeholders and organisations included in the capitalisation process have been considered here.
The following 8 project partners conducting their own pilot projects have been treated with higher priority:
 - Freeport of Budapest (FBL)
 - Rail Cargo Hungaria (RCH)
 - Lokomotion
 - Codognotto Poland
 - Luka Koper
 - Port of Rijeka
 - Zailog
 - NASPA
- d) Activities for collecting and organizing information: The most important activities regarding collecting information were planned to be the stakeholder meetings organized by each partner. These meetings to share the design and development of the pilot actions were planned to be one of the most important project activities from the beginning, as the planned outcome of TalkNET project is the establishment of a transnational coordination of stakeholder network for freight transport.
- e) Activities for analysing the information: Results of the pilots were planned to be analysed while compiling this capitalization report using documentation described above.
- f) Publishing and disseminating the results: This capitalization does not include these activities
- g) The timetable and the budget of the project have been thoroughly planned. Timetable of the project has been divided into 6 periods starting from January 1st 2015 and ending by August 31st 2020. Budget has been planned for all project partners allocated to different work packages.

STEP 3: Execution covering the following issues:

- a) Gathering and organizing the information about the experience: This process is the implementation of the relevant plan of step 2 (d) by compiling and collecting relevant documents. Besides, stakeholder meetings were supported by a series of logbook templates, and instructions that could also be gathered:

- a. Stakeholder engagement process logbook: the aim of this document was to guide the stakeholders through a participative process to explore and collect all questions and proposals related to the development of the TalkNET project.
It contains lists and reminders of the following items:
 - i. action objective;
 - ii. list of possible methods to manage the stakeholder workshop;
 - iii. list of the documents that have to be prepared or kept at hand during the engagement process;
 - iv. categorisation of the invited possible stakeholders;
 - v. documentation the development, results and the effectiveness of the process;
- b. Stakeholder involvement logbook: The purpose of this document was to provide a methodological support on:
 - how to organize and document stakeholder involvement;
 - how to report it to the partner responsible for this activity (Freeport of Budapest);
 It contains a detailed list of potential stakeholder institutions based on the type of project partner and the planned pilot action, and a list of obligatory and optional additional attachments to be sent to the responsible partner.
- c. Stakeholder involvement logbook agenda: this is a template sent to the project partners to be filled out before organising a stakeholder meeting.
- d. Stakeholder involvement logbook attendance sheet: list of attendants who participated on the meetings in fact.
- e. Stakeholder involvement logbook minutes of meeting: reminder of the stakeholder meetings.

- b) Analysing the gathered information: This is about the realization of the relevant plan of step 2 (e) by getting use of all the information from documents provided by the partners. Besides, involved project partners were also contacted in case more explanation was necessary.

STEP 4: Publication and dissemination:

This phase includes the publication and dissemination of this capitalization report but does not confine to it as this very important step of capitalization should last much longer than the project itself and should have a widespread geographic coverage penetrating the whole transport industry as much as possible. Due to the global pandemic situation this phase of capitalization could not gain full speed by the completion of this report. Nevertheless, with the improvement of the circumstances dissemination of the results is expected to gain momentum.

5. Report on each pilot action

5.1 Freeport of Budapest (FBL): Development of new e-mobility service

5.1.1 Identification of the knowledge gained (to be capitalized) and the target groups/receivers

As a result of the pilot action an environmentally friendly development plan of FBL has been created³ in the form of a pre-feasibility study that focuses on two main areas:

- Developing an intermodal logistics centre to host low-emission delivery in the Freeport of Budapest: there is a need for a number of logistics centres in Budapest being able to host electric vehicle fleets where the vehicles can be charged and the logistics centres are close enough to the city centre to complete efficient, low-emission last mile deliveries. Being an optimally located hub, the Freeport of Budapest is a potential logistics centre for low-emission deliveries.
- Introducing a zero-emission cargo zone in downtown Budapest: the city centre suffers from the negative effects of road transport including freight delivery. A possible solution for reducing these negative impacts is controlling the access of delivery vehicles.

As part of the study a thorough analysis has been carried out on the current city logistics situation of Budapest and the port within, including a description of the investment costs and financing of the planned upgrade and the detection of possible financial sources and calculation of the future operating costs. The importance of last mile connections has been emphasized.

The demand and supply side has been observed and described in detail. A technical documentation has been drawn up of the currently available electric infrastructure within the port. Measurements have been made on the actual technical conditions and possibilities for future developments. A stakeholder analysis has been carried out to identify potential port operators and market influencers for precise definition of market needs and also to create better communication with the surrounding public authorities and involved local governments to be able to meet public demand in city logistics.

An impact analysis defined the policy measures encouraging the shift towards e-mobility in city logistics.

As a result of the pre-feasibility study it has been concluded that Freeport of Budapest is indeed an ideal location to become an e-city-logistics base in Budapest. Its proximity to the city centre and retail areas allows relatively low-range electric freight vehicles to take a full delivery round without a need to recharge during the route. It is also possible to create a zero emission zone for the downtown of Budapest (North: Szent István krt., East: Bajcsy-Zsilinszky út, Károly krt., South: Kossuth Lajos utca, West: Danube) that can be accessed from the Freeport of Budapest by car within 15-30 minutes depending on traffic. The distance between FBL and the above downtown area is about 8 kms.

After analysing the installation possibilities of freestanding and building-integrated photovoltaic systems it has been concluded that a total of 830 KWP nominal output power (650 in open areas, 180 on the buildings) can be installed that, considering different scenarios, could not cover the electricity consumption of the chargers and further electricity should be bought from the grid.

³ Originally a pre-feasibility investment analysis for an LNG fuel station was planned that has been allowed to be changed during the project phase

Table 3: Freestanding photovoltaic systems to be implemented in open areas of the port

Source: Pre-feasibility study of FBL

Location	Output power (AC, KVA)	Nominal output power (DC, KWP)	Initial investment cost (HUF)	Energy saving (KWh/ year)	Financial saving (HUF/ year)	Payback time (year)
Area 1	180	210	58,800,000	217,612	6,093,136	10.7
Area 2	250	300	82,500,000	302,222	8,462,216	10.8
Area 3	120	140	41,300,000	145,065	4,061,820	11.3
Total			182,600,000	664,899	186,17,172	

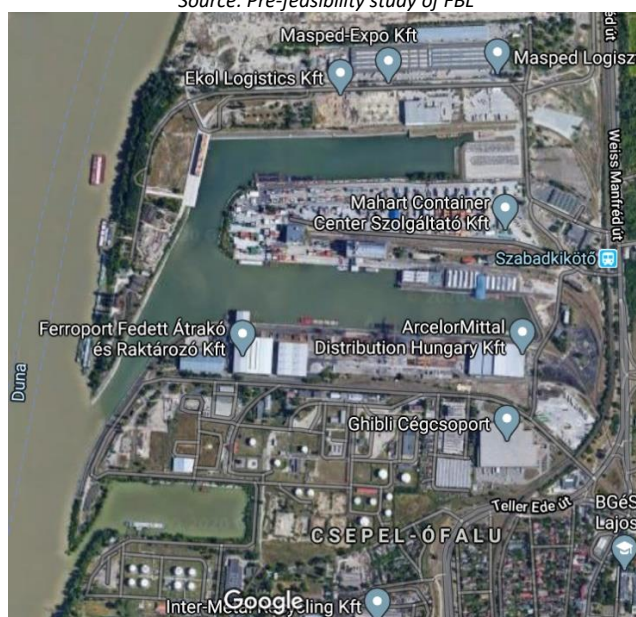
Table 4: Building-integrated photovoltaic systems to be implemented on the buildings of the port

Source: Pre-feasibility study of FBL

Location	Output power (AC, KVA)	Nominal output power (DC, KWP)	Initial investment cost (HUF)	Energy saving (KWh/ year)	Financial saving (HUF/ year)	Payback time (year)
Building C1	50	60	19,500,000	58,252	1,631,056	13.6
Building C3	50	60	19,500,000	58,286	1,632,008	13.6
Building D3	50	60	19,500,000	58,286	1,632,008	13.6
Total			58,500,000	174,824	4,895,072	

Figure 4: Area of the FBL pilot development

Source: Pre-feasibility study of FBL



The financial sources for developing solar panels and electric chargers were also assessed. Even though these sources are limited, the Hungarian taxation system includes an incentive for companies deploying electric charging stations. Due to 'Act LXXXI of 1996 on Corporate Tax and Dividend Tax', the basis of taxation can be decreased with the investment costs of electric charging stations under several conditions. The maximum value of the decrease cannot exceed the difference of the investment costs of the electric charging stations and the expected positive operating results in the 3-year period after implementation. Financial incentives for developing solar panels were not available on the area during this pilot.

It has also been learnt that an ideal base for e-city-logistics must fulfil all the following required features. The center must have easy multimodal accessibility to receive goods from long distance transports and to allow an efficient movement of lightweight EVs serving last mile distribution. A broad range of storage capacities is required to meet the multi-layered needs to store different goods. Proximity to the typical destinations, especially the city center and the retail zones is a must to keep the destinations accessible for low-range EVs. Finally, the infrastructure and necessary power supply capacity is required for charging EVs.

The limited driving range of EVs should be considered as well. Unlike conventional vehicles, EVs must be charged for longer time. Considering the limited range of electric vehicles, an analysis was carried out on the topics as follows:

- number of types of charging stations available and to be implemented
- location of these charging stations and
- their optimal capacity.

The pilot has received positive feedback from the municipality as it results in immediate positive effects for the municipality and especially its mobility. The ten years period that has been calculated can also be considered financially positive, especially when taking the comprehensive approach of electricity generation by renewable resources and the associated positive impact from environmental and noise point of view into consideration. Furthermore, the development also means additional service in the portfolio of the port.

Among weaknesses of the program the followings should be mentioned based on the self-assessment report:

- Necessity of a direct support and modification of regulatory framework at local and national level;
- Necessity to establish a strong network of commercial partners;
- Technological aspects are still a difficult issue for commercial vehicles;
- Direct shippers shall be involved;
- Time span for a practical implementation of the service is still 5 years;
- Diesel market share change is still far away.

In the framework of the pre-feasibility study other potential logistics centres have also been identified who could be receivers of the capitalisation:

- BILK Logisztikai Nyrt.
- Airport of Budapest
- Tesco Gyál
- Tesco Herceghalom

They have also been compared to FBL based on delivery time and distance to different destinations on round trips from each chosen logistics hub.

Table 5: Comparing delivery times and distances to malls

Source: Pre-feasibility study of FBL

Logistics Centre	Delivery time [hour:minute]	Distance [km]
Freeport of Budapest	4:04	124.1
BILK	4:27	148.5
Airport of Budapest	4:34	150.5
Tesco, Gyál	4:37	158.7

Table 6: Comparing delivery times and distances to Burger King restaurants

Source: Pre-feasibility study of FBL

Logistics Centre	Delivery time [hour:minute]	Distance [km]
Freeport of Budapest	3:17	82.1
BILK	3:38	108.6
Airport of Budapest	3:46	109.1
Tesco, Gyál	3:44	112.5
Tesco, Herceghalom	3:46	123.7

Table 7: Comparing delivery times and distances to Hotels

Source: Pre-feasibility study of FBL

Logistics Centre	Delivery time [hour:minute]	Distance [km]
Freeport of Budapest	2:37	55
Airport of Budapest	2:07	82.5
BILK	2:42	87
Tesco, Herceghalom	2:54	90.8

Table 8: Comparing delivery times and distances to Media Markt stores

Source: Pre-feasibility study of FBL

Logistics Centre	Delivery time [hour:minute]	Distance [km]
Freeport of Budapest	2:48	91.5
BILK	2:51	96.4
Airport of Budapest	3:12	103.0
Tesco, Herceghalom	3:00	120.3

5.1.2 Description and categorisation of the capitalisation actions happened already

Upon completion of the pre-feasibility study prepared for the Freeport of Budapest Rail Cargo Hungaria's (RCH) BILK logistic centre (Rail Cargo Terminal) used FBL's market study and methodology when making their own pre-feasibility study on an e-city-logistics base. In this case knowledge transfer happened inside the project, results of the initiative have been capitalized by another project partner. Added value of this knowledge transfer can be further increased, as these two hubs could both become efficient centres for eco-friendly last-mile delivery in and around Budapest by complementing each other's services and service areas.

Following the same end as FBL two potential developments were analysed in the pre-feasibility study prepared for RCH:

- Developing an intermodal logistics centre for low-emission delivery within the BILK logistic centre besides the FBL terminal. Located in the surroundings South-East of Budapest, the terminal could serve as the last-mile delivery centre within the radius of the used e-mobility vehicles.
- Introducing photovoltaic panels in the territory of the Rail Cargo Terminal (BILK) or deploying electric chargers for electric vehicles partly supplied by the photovoltaic panels to be implemented.

Furthermore, similar concept has been developed and deepened by other ports such as Trieste and Venice (green port concept application). A similar analysis was also conducted by Verona Freight Village due to the environmental advantages, but associated cost deterred them from further steps.

In general, it can be concluded that port and terminal operators have a positive attitude to e-vehicles but the payback time would be longer than the concession, that implicates the need of action on the regulatory side.

5.1.3 Outlook for future capitalisation perspectives

In Budapest, there are several brownfield areas in the suburbs where results of the pre-feasibility studies of FBL and BILK could be capitalized. These areas are the following: Ferencvárosi rendező, Angyalföld, Kőbánya, Kaszásdűlő. Besides so-called brownfield action plans are to be initiated by the Hungarian government with the objective to utilize the economic potential of these areas.

Furthermore, based on the experiences of the stakeholder meeting organised by FBL in April 2020, logistics service providers, parcel delivery firms, local authorities and organizations dealing with city traffic are also interested in the content of the pilot. The latter entities, including NGOs are especially motivated to help capitalizing result, as 10% of all vehicles on the city roads are delivery ones and there are no regulations for delivery vehicles under 3.5 tones accounting for about 90% of total freight traffic. Their commitment to the pilot objectives guarantees sustainable dissemination of the results through their own national and international network. It can include either direct contacts to possible interested parties or presentation of pilot results to a broader audience on conferences, thematic working groups and other professional meetings. Besides, participants of the stakeholder meetings insisted to continue meetings with a possible extension of participants giving further impetus to capitalization.

Current trends also stress the need of capitalization: Parcel delivery sector grow by 30% in 2019, and during the Covid pandemic situation in spring 2020 number of deliveries increased by further 70%.

Besides, Sustainable Urban Logistics Plan (SULP) of Budapest also needs environmentally friendly solutions presented in the pilot for replication.

Even though cost of such e-mobility solutions may be higher than traditional delivery methods, it is promising that based on the stakeholder analysis carried out within TalkNET project, majority of the stakeholders like delivery companies and residents support low-emission city logistics solutions and many of them are also willing to pay more for low-emission technologies.

5.2 Rail Cargo Hungaria (RCH): Testing of training pathways for energy efficiency deployment in the rail sector: eco-driving training

5.2.1 Identification of the knowledge gained (to be capitalized) and the target groups/receivers

Rail Cargo Hungaria has developed a methodology for eco-driving training of engine drivers in cooperation with Lokomotion to make energy conscious driving behavior a general habit at the companies. Based on this, a 2-days training for 20 Hungarian engine drivers have been organized.

The program also involved engine drivers of other rail companies (competitors) from Hungary. Altogether there were 3 participants from RCH and 17 from other market players.

To organize it in a competition-neutral way the training was supported by Railway Examination Centre of the Institute of Transport Sciences. The advertisement for the training was published and the application process managed on their website.

The program was organized with a “train the instructor!” approach meaning training the applicants to become practical instructors themselves as well. This way it could be ensured that they would be able to pass on the gained knowledge to their colleagues not participating on the training.

The training can be considered successful among participants with a 4.29 overall satisfaction score on content, 4.65 on the depth of the explanations given during the theoretical training and 4.24 on simulator trainings out of 5. 94% of the participants found the amount of theoretical training sufficient, meanwhile 71% thought the same about simulator trainings.

Participants highlighted that simulators enabled them to practice multiple driving styles on the same rail track, driving in such a way they would not do in real life. They could gain experience, help each other with the experience gained and could also advice each other.

It is important to emphasize that at the time of the training only 3 engine drivers drove locomotives equipped with energy consumption meter.

For 82% of the participants environmental protection was an important factor in driving, meanwhile only 41% indicated that they would apply the knowledge they have learned in this workshop in order to contribute to the reduction of costs of their railway company.

Based on the feedback of the participants it can be concluded that one training has not satisfied the participants’ interest, they are eager to participate on more eco-driving trainings and especially to practice further on the simulator.

Participants praised the atmosphere of the training, highlighting that compared to their previous trainings it had a more intimate atmosphere (as a result of working in small groups and the time spent

on introduction and common dining). In their opinion personal, tailor-made solutions should be followed, giving the impression to participants, that not only teaching training curriculum, but also the audience is important.

Besides the participants, the training was also praised by the lecturers, the staff of the MÁV Training Centre and by the Institute of Transport Sciences. In their consideration it was an innovative initiative, enabling them to get some new idea. They requested and received the prepared handouts.

As strength of the pilot it can be concluded that eco-driving can have an immediate and direct impact on costs and emissions (and thus on environmental impact) as payback time is quite short and the effects of the saving are immediate. It was an innovative initiative in Hungary that has received positive feedbacks from many different stakeholders. It also of advantage that the results can be easily monitored. Finally, the positive impact on transit time can also be mentioned.

Some weaknesses of the project are the followings:

- Necessity to have specific equipment for training;
- Lack of a common regulation among the different countries on energy calculation;
- Missing EU regulation that could foster the capitalisation of this pilot.

Using the result of this pilot basically all loco drivers could be trained this way taking into consideration the technical and regulatory specifications.

5.2.2. Description and categorisation of the capitalisation actions happened already

The Railway Examination Centre of the Institute of Transport Sciences has embraced the initiative and based on the experience gained in course of this two-day workshop it is planning to launch similar optional training courses for engine driver instructors. A solution has been found to provide a training with a slightly reduced theoretical curriculum, aiming at energy awareness, based on exercises on simulators and at the same time also enabling the participants to have an assertive communication (engine drivers training other train drivers) by striving for traffic safety.

The participants have also shared their good impressions and experience with their colleges gained during the course of the training. As a result of that they are also planning to launch similar advanced trainings for instructors to be organised by the Institute of Transport Sciences.

Besides, the Institute has also capitalized the above pilot result in another development programme: based on the experiences and positive feedback on simulator use they have initiated the digital mapping of sections of the Hungarian railways to use them on railway specific exams. This way locomotive drivers will be able to practice for these exams on simulators instead of actually sitting in the locomotive (one person at a time) the compulsory 3 times.

5.2.3. Outlook for future capitalisation perspectives

This training program can serve as a best practice not only for all Hungarian, but also for all European railway companies, being involved either in passenger or freight transport. Using data on realized energy (and cost) saving by comparing average energy consumption of trains driven by loco drivers participating on the course with those not participating could show the profitability of the training and make the business case for further dissemination. Realized savings can ensure the financial sustainability of a widespread application of the training covering whole railway companies and countries. Besides, this methodology may also be utilized in other sectors when developing eco-driving

trainings (like public transport companies using undergrounds). Last but not at least further railway companies outside Europe may also capitalize these results. Of course, technical differences have to be taken into consideration and adjustments have to be done when necessary.

In case of Hungary railway companies MÁV and GySEV cover the whole train transport of the country, making the proliferation phase quite straightforward, meanwhile in other countries like in Germany, Italy or Poland this number can go up to dozens requiring more effort on capitalization.

5.3 Lokomotion: Testing of training pathways for energy efficiency deployment in the rail sector: eco-driving training

5.3.1 Identification of the knowledge gained (to be capitalized) and the target groups/receivers

Lokomotion has developed a locomotive driver education system with energy-efficiency education tools. This includes the gradient ratios of the different railway lines, the rules of acceleration, braking and coasting. The education content has been included in the theoretical and practical part of basic and advanced education programs of Lokomotion drivers' school, which is open to all interested parties of railway undertakings and institutions across EU and neighbouring countries. A 3-days workshop on eco-driving solutions in the rail sector was organized in the framework of the pilot. Participants included engine drivers from 3 countries (Germany, Austria and Italy).

Figure 5: Lokomotion's state of art train driver simulator

Source: Lokomotion's final report on its pilot



As a result of the training the following outcomes are expected:

- The railway company will benefit from efficient train driving education on the short term as significant cost reduction can be achieved by applying proper driving behaviour.
- The successful eco-driving program results in energy conscious driving behaviour which can become a general habit at the company. This also means that by time the majority of the personnel will feel it a natural behaviour and thus propagate this among other drivers.
- Clearly distinguishing the railway company on the market with the energy conscious behaviour of train drivers and the associated environmental benefits and its PR and marketing effects.
- Upgrading job profiles to gain more applicants for locomotive driver positions
- Supporting the model shift from road to railway in intermodal connections by improving efficiency and thus saving costs
- Direct CO2 emission reduction due to reduced energy consumption as a result of driving more energy-efficiently

Practically all locomotive drivers could be trained in such an eco-conscious way capitalizing results of this pilot taking into consideration the technical and regulatory specifications of different locations that may be different.

5.3.2. Description and categorisation of the capitalisation actions happened already

Lokomotion had a partnership with the local chamber of commerce to share this program with their industrial training partners. These partners gave positive feedback on the training that indicates positive perspective for the capitalization of the results as described in the following chapter.

5.3.3. Outlook for future capitalisation perspectives

This training program could be disseminated among all rail companies with the same type of standard interoperable locomotives of main European manufacturers.

Other interested parties, like universities, scientists may also be interested in the knowledge gained, as they could use it in their studies aiming to further improve energy efficiency of railway transport.

Using data on realized energy (and cost) savings by comparing average energy consumption of trains driven by loco drivers participating on the course with those not participating could show the profitability of the training and make the business case for further dissemination. Realized savings can ensure the financial sustainability of a widespread application of the training covering whole railway companies and countries. Besides, this methodology may also be utilized in other sectors when developing eco-driving trainings (like public transport companies using undergrounds). Last but not at least further railway companies outside Europe may also capitalize these results. Of course, technical differences have to be taken into consideration and adjustments have to be done when necessary.

In case of Germany there are dozens of railway companies, that means, more resources have to be devoted to dissemination of pilot results and capitalization. Nevertheless, industry specific international logistics fairs may be perfect locations for capitalization at a larger scale.

Transport institutions of different German provinces should be involved in the capitalization beforehand as they are motivated in pursuing environmental goals associated with energy consumption decrease result of the pilot. This way a relatively modest capitalization effort of Lokomotion can be multiplied and reach many potential beneficiaries.

5.4 Codognotto Poland: modal shift from road to rail

5.4.1 Identification of the knowledge gained (to be capitalized) and the target groups/receivers

Codognotto Polska has investigated the possibility of setting up a short/medium range intermodal service in North Italy considering market opportunities and potential customer expectations by testing round-trip railway services connecting Central Europe to North Adriatic area.

The company tested a service that could rely on different assets involving other players such as Codognotto Italy, PKP, Mercitalia and IKEA. Codognotto regularly managed four block trains in the Adriatic Baltic corridor connecting Gliwice with Piacenza that could not count on a full exploitation of its capacity. Furthermore, there is a potential need for a railway service connecting North-East and

North-West Italy. The general idea was to exploit the service already ongoing to design a new railway service and allow a modal shift from road to rail.

The new service tested has been executed as follows:

- The train was loaded in Gliwice and unloaded in Pordenone;
- Three wagons transporting empty swap bodies were unhooked;
- Three prefilled swap bodies already on wagons were hooked in substitutions to the previous ones. The transported goods were produced in Pordenone area and needed to be transported to Piacenza area;
- The train stopped in Piacenza and was fully unloaded and partially loaded;
- When the train arrived in Pordenone the train stopped once again. Three wagons transporting goods directed from Piacenza to Pordenone where unhooked and new wagons hooked;
- One of the miles was successfully managed with LNG trucks in order to reduce the CO2 impact of the road transport necessary to reach the distribution points.

The potential flow selected for the field-test was the Northern Italian on the East-West Axis. The selection was based on the outcomes of a combined market and operational analysis providing evidence that these geographical area conditions are of potential interest of a detailed analysis of feasibility. Furthermore, the train loaded in Gliwice stops in Pordenone anyway, so it was not necessary to change the normal route to create the new service.

After completing the pilot, it can be concluded that there is an opportunity to extend the capacity of the train with a short stop, taking full advantage of the existing railway connections. As a result of the modal shift a significant improvement in environmental impact can be expected. Going through a practical example, comparing the best option in terms of sustainability for a load coming from the Trieste Port and being unloaded in Piacenza area (LNG+Intermodal+LNG) with the worst option (full diesel), the CO2 equivalent could be reduced by 49.1%.

Furthermore, deployment of alternative fuels can also be promoted this way. It is also of advantage that involvement of actual stakeholders and customers (IKEA, Electrolux) in the project pilot generate high demand for transport. Last but not at least, through this solution, a single wagon or a little wagon group can be transported to its destination, that is a new service in Italy (single wagon load traffic is not available in the country).

Weaknesses of the pilot are also to be taken into consideration:

- High rental costs for dedicated wagons;
- Increase in transport time due to additional stops; further costs for using the railway infrastructure and for changing the locomotives.

Due to these disadvantages it has been concluded that without public funding the service is not cost-effective. Planning a service over a short distance for the supply of several disconnected/connected wagons might have an impact on the long-distance intermodal delivery times that also has to be taken into consideration.

Even though the results and sustainability of the pilot could not be properly assessed due to the COVID crisis which limited the meeting opportunities with the stakeholders involved in the testing phase, it seems to be sustainable if a price increase can be realised by shippers interested in the modal shift.

The results show the feasibility of the idea from the operational point of view.

Possible target groups of capitalization of this pilot are European transport operators especially short haul rail service providers or shippers taking into consideration some specific conditions detailed in chapter 5.4.3.

5.4.2 Description and categorisation of the capitalisation actions happened already

Pilot results has already been assessed by project partners Rail Cargo Hungaria, Lokomotion, Codognotto Poland and Zailog, as they have the opportunity to apply a similar solution on the geographical area covered by their operation.

As part of the pilot process stakeholders of this initiative have been involved in the form of stakeholder consultations. Based on the outcomes of these meetings it can be concluded, that even though specific capitalization actions have not happened so far, there are excellent outlooks for future capitalization as described in the following chapter.

5.4.3 Outlook for future capitalisation perspectives

The service can be adopted by other European operators to increase their railway loading capacity however, this pilot has a very specific purpose serving the needs of Codognotto Poland and NASPA. Similar application of the service is possible under specific conditions, such as: disposability of an active railway service already sustainable, verification of potential short haul flows of goods along the train routes and available carriers with LNG trucks.

The result of this pilot can be capitalized by either short haul rail services or shippers with an eco-friendlier approach.

To be capitalized by other target groups, special conditions have to be present:

- The availability of an existing long haul service;
- Shippers accept a price increase for the adoption of this new multimodal solution;
- High level coordination at terminal level;
- High volume of goods transferable from road to rail along the rail route.

A possible direction of capitalization is via main railway companies of European countries with cargo services and widespread network on the market. Railway companies of Poland and Italy could be contacted first considering the above-mentioned preconditions. As there are dozens of railway companies both in Poland and Italy, and presence of these conditions have to be checked, more resources have to be devoted to capitalization.

Besides, in some countries the regulatory circumstances can impede the replication of this pilot limiting the possible geographical locations for capitalization. In order to overcome this barrier, project partner FBL initiates the necessary regulatory changes by the responsible Hungarian body, the Ministry for Innovation and Technology.

5.5 Codognotto Poland: Feasibility study on deploying LNG Heavy Duty Vehicles (HDVs).

5.5.1 Identification of the knowledge gained (to be capitalized) and the target groups/receivers

In the framework of the project different alternative fuels already on the market or ready to come to the market have been analysed and a pilot test has been defined with the use of LNG, the most ready to be used technology in 2017 for road haulage in the Central Europe macro-area using LNG Heavy Duty Vehicles (HDVs).

This attempt resulted in a challenge due to several pivotal reasons:

- alternative fuels' market was still blocked in the Central European area due to the lack of technological and commercial development, the lack of acceptance by consumers and the lack of adequate infrastructure;
- difference between distribution and availability related to infrastructure effecting operability;
- lack of a clear and harmonized EU level policies;
- higher costs of a modern EURO VI LNG HDV compared to a standard EURO VI Diesel truck available on the market.

Codognotto Poland involved key players such as IVECO, SCANIA and UNILEVER in testing LNG vehicles in Poland and Germany. The test was conducted successfully from operation point of view. It was the first project in testing alternative fuels for long haul transport in Poland.

The main purpose of the pilot was to demonstrate in practice, that there is a specific and real alternative to diesel. It was Italy in the programme area that invested in LNG technology with a mix of private and public initiatives. Poland stressed the need to speed up the conversion to EURO6 trucks and was not ready yet to apply an alternative to diesel. On the other hand, other countries outside the programme area such as Spain and France could overcome these difficulties.

The pilot showed a positive environmental impact with a 12% decrease of CO₂ equivalent. Nonetheless, the impact of the pilot needs to be interpreted on a wider scope which was demonstrated by the actions taken during following years. Germany has started a strong investment in LNG refuelling stations, meanwhile Polish operators have started to build cooperation with EOMs to install their own refuelling stations.

The pilot could demonstrate the full usability of the trucks and has raised high level of interest of key players of the market.

Upon completion of the project it can be concluded that the following challenges are still to overcome to capitalize the results of the pilot:

- Lack of refuelling stations: in the programme area only North Italy is fully covered
- Cost savings coming from LNG usage is not enough to cover the price premium of an LNG truck over a Diesel truck. The lack of EOMs producing LNG trucks and the relatively new technology used results in a cost premium of 40.000 euros;
- Higher cost of transport;
- Lack of transport operators accepting a price increase for the use of this eco-friendlier transport solution;
- Lack of policy coordination for enhancing LNG usage in Central Europe.

All transport operators can capitalize the results of the pilot, especially when taking into consideration the increasing number of LNG refuelling stations.

5.5.2 Description and categorisation of the capitalisation actions happened already

The promotion of the initiative had a great visibility and the example was successfully followed by other operators in the months after the test implementation.

The knowledge acquired was crucial to Codognotto Group in assessing a potential deployment in other geographical areas. Codognotto Italia has so far acquired 70 LNG trucks for a total investment of 10 million of euro.

Furthermore, some Polish transport operators have installed their own LNG refuelling station and started the transition to LNG usage.

Besides, the results of the pilot have been capitalized by MAHART Freeport Budapest, who has received these results via project partner FBL: MAHART Freeport Budapest is currently active in an LNG terminal development on its own premises, and it concluded in the framework of MAHART CEF (PAN-LNG-4DANUBE) project, that the port can be successful if it can load not only ships but also trams and trucks. It also uses the results of the pilot in convincing Hungarian logistic companies to switch to LNG.

5.5.3 Outlook for future capitalisation perspectives

Transport operators of the Central European area may especially be interested in capitalization of this pilot, as most of the European fleet involved in the international transport comes from Eastern European countries with a specific reference to the CE area. Thus, providing a potential alternative to diesel will benefit the whole area.

Besides, experiencing the increasing number of refuelling stations and general acceptance of LNG a growing interest in the pilot's results can be expected. Global demand for LNG grew by 12.5% to 359 million tonnes in 2019 and Europe absorbed the majority of supply growth as competitively-priced LNG accelerated the switching from coal to gas in the power sector and replaced declining domestic gas production and pipeline gas imports. It is expected though that growth will slow down on the short term as major construction projects are to be completed by 2021. On the longer term though, LNG demand is to double by 2040⁴.

Considering LNG market growth being a prolonged process, it would make sense to plan capitalization activities for a longer period. It could also be planned to be a 2-phases process including a pre-programmed reminder round one or two years after the first round of capitalization activities. The exact timing of the second round should be determined by the actual level of LNG market and infrastructure development using pre-defined indicators like number of refuelling stations in CE area.

⁴ Source: Shell LNG Outlook 2020

5.6 Codognotto Poland: new WMS model

5.6.1 Identification of the knowledge gained (to be capitalized) and the target groups/receivers

The pilot is about reconsidering and optimizing the company's Warehouse Management System to exploit the advantages and benefits of digitalization of managed warehouses, enhancing co-modality solutions allowing a full exploitation of trucks' capacity managing correctly the two dimensions of weight and volumes. The company has raised the interest of BSH Hausgeräte GmbH, the largest manufacturer of home appliances in Europe designing and testing a new concept of WMS based on automatic communication between the logistics suppliers and shippers.

As a result of the pilot logistics nodes could be better exploited and optimised with more accurate analyses at process level and a proper standardisation and subsequent digitalisation of the hub operations. This way potential delays and errors can be avoided along the logistics chains and processes can be optimized.

The pilot was focused on data collection and exploitation from the staff working in the hub. Besides BSH, several SMEs were also involved in the data collection phase of the pilot. It was performed efficiently, and API connections were generated assuring data flows from Codognotto to BSH. The digital connection operated in the framework of TalkNET project allowed the creation of seamless connections among different players operating in the hub. It allowed the collection of orders in the Warehouse Management System and the transfer of the data to different TMSs (transport management systems) of carriers both for FTL (full truckload) and LTL (less than truckload) shipments.

As a result of the project it can be concluded, that a successful implementation is possible only in case the users of the application are committed, the level of data security is satisfactory and they can recognize their benefits resulting from its use, like obtaining a competitive position.

After the pilot the following advantages should be emphasized:

- Creation of an integrated management system is non-binding for the operators' software;
- Improvement of terminal efficiency;
- Increase of freight traffic;
- Consistent data sharing avoiding expensive delays and errors;
- Enhanced security;
- Improvement in customer relations;
- Better warehouse labour management;
- Enhanced cooperation of stakeholders in the supply chain creating synergies;
- Individualization for specific needs of customers/partners.

Nevertheless, the project has some weaknesses as well that should also be taken into consideration in case of capitalization:

- Potential risk of data leakage;
- Significant development and implementation costs with slow return. This problem can be solved with public support though;
- Necessity to individualize the service;
- Lack of trust of logistic chain participants in data security of such systems;
- Fear of losing valuable information, which would result in loss of customers and/or market position;
- Necessity of more maintenance and process discipline.

Taking into consideration that, compared to North European countries hubs of the programme area lag behind in ICT competences necessary to allow a real data sharing in the logistics chain, it can be concluded, that great majority of these hubs are potential targets of the capitalisation. The solution described in the pilot can be especially attractive to companies with higher environmental consciousness.

5.6.2 Description and categorisation of the capitalisation actions happened already

The result of the pilot has already been capitalized by project partners with warehouses, who assessed the possible application of the warehouse management system taking all strengths and weaknesses into consideration.

As part of the pilot process stakeholders of this initiative have been involved in the form of stakeholder consultations. Based on the outcomes of these meetings it can be concluded, that even though specific capitalization actions have not happened so far outside the project, there are excellent outlooks for future level 3 capitalization as described in the following chapter.

5.6.3 Outlook for future capitalisation perspectives

The new WMS concept can be easily applied to different frameworks in the digital connections between hubs and stakeholders, especially by European intermodal terminals. It enhances the idea of a connected logistics chain that needs to take place in B2B, A2A and B2A digital links.

The pilot model will be applied to all warehouses of Codognotto and promoted as a benchmark in the framework of DTLF (Digitalisation of Transport and Logistics and the Digital Transport and Logistics Forum). The idea can already count on the political support of the DTLF where Codognotto is already involved as expert. As DTLF is a group of experts bringing together stakeholders of transport and logistics sector their embracing the pilot ensures long term and sustainable capitalization of the results.

5.7 Luka Koper: test of energy efficiency in cargo handling: New LED lightning system

5.7.1 Identification of the knowledge gained (to be capitalized) and the target groups/receivers

In the selected general cargo warehouse of Luka Koper a new LED lighting system with powerful monitoring and control capabilities was implemented. It provides a flexible and open concept for upgrading electrical lighting installations and it is capable to operate either in a standalone mode or integrated into a future smart grid. It can operate fully automatic with remote control or in a standalone mode.

Time schedule of the pilot:

- Construction work: 30 days;
- Installation of lights and accessories: 30 days;
- Installation of switches and the SCADA system: 45 days;
- Telecommunication services: 30 days.

As a result of the pilot an existing metering system was upgraded and additional sub-meters for direct measurement of electricity consumption for indoor and outdoor lighting were installed. The proposed solution upgraded existing light level/illuminance and consequently improved working conditions in the selected general cargo warehouse in the port of Koper.

The knowledge gained during the project was mainly based on different KPIs monitored before and after implementation of the pilot action. The analysis of the KPIs shows that it has major positive effects. The electricity consumption has been significantly reduced and at the same time the luminosity in the warehouses has increased by 25%. Consequently, the cost of electricity consumption has been decreased up to 50%.

Table 9: Electricity consumption for indoor lighting of the warehouse before and after the pilot

Source: Output factsheet of Luka Loper

	BEFORE PA	AFTER PA
Ratio between total electricity consumption for indoor lighting and total number of cargo handling operational hours	11,89 kWh/op. h.	4,63 kWh/op. h.
Ratio between electricity consumption for indoor lighting and total mass of cargo stored in the warehouse	1,81 kWh/t	1,37 kWh/t
Ratio of electricity consumption for indoor lighting and total number of cargo units stored in the warehouse	12,43 kWh/TEU	6,88 kWh/TEU

Besides, the proposed LED based solution will require less maintenance than the existing, conventional high-pressure metal halide lamps, and it is expected that the electricity for port operations would come from renewable or at least low carbon energy sources.

Furthermore, the proposed solution has a potential to reduce peak power on port level.

As far as weaknesses of the project are concerned, the followings shall be mentioned:

- High investment cost;
- Long payback period;
- Necessity of a quite complex monitoring system;
- Necessity of training for correct implementation;
- Uncertainty in energy prices;
- Necessity to aggregate resources to come over the problem of long payback period;
- High cost of replacement;
- Renewable resources are still not supported enough.

Possible target groups of this pilot are all warehouses of the logistics industry in the Central European area (not only project partners).

5.7.2 Description and categorisation of the capitalisation actions happened already

The results of the pilot have already been capitalized by project partners with warehouses with less developed lightning systems, who assessed the possible implementation of a similar LED lightning solution.

As part of the pilot process stakeholders of this initiative have been involved in the form of stakeholder consultations and pilot site visits. Based on the outcomes of these meetings it can be concluded, that even though specific capitalization actions have not happened so far, there are excellent outlooks for future capitalization as described in the following chapter. Stakeholders could discuss energy cost saving outlooks and they agreed that this kind of solution can provide better working conditions via optimal lightning. They also discussed their options to implement such solutions into similar environments. Cross fertilisation among different projects is already ongoing and a pilot testing is already planned in Venice and Trieste.

Altogether 26 stakeholders participated on the site visit:

- several organizations from the field of transportation, logistics, research and port services;
- several TalkNET project partners (from Port of Trieste, Westpomeranian Region, Public Ports Slovakia and Rijeka Port Authority)

Figure 6: Pilot site visit for stakeholders in the warehouse of Luka Koper (February 2020)

Source: Presentation of pilot action on the online steering committee meeting on 27 May 2020



5.7.3 Outlook for future capitalisation perspectives

This project has high replicability potential since there are around 2,200 similar lamps installed in other warehouses in the Port of Koper that can be replaced with new and energy efficient lamps. Following the results of this pilot action the Port of Koper will continue to implement this new LED lightning system in these warehouses in the port, which will lead to even greater energy consumption and cost reductions.

Besides, stakeholders who participated on the stakeholder meetings have already indicated their interest in the project results emphasizing the benefits of the possibility to illuminate their site in time before the beginning of the terminal operations and activate the lighting system from the control centre.

The solution developed during the pilot can be adapted in all kinds of warehouses in other terminals by all project partners and other stakeholders in the logistic area throughout the CE region.

When planning the capitalization process similar ports in the vicinity (Croatia and Italy) and further countries showing interest during the stakeholder consultation phase (Poland, Slovakia) should be considered in the next phase. Port of Trieste, Westpomeranian Region, Public Ports Slovakia and Rijeka Port Authority should be contacted firsthand. It would also be useful if these stakeholders would give

direct feedback on their experiences capitalizing these pilots. This way further capitalization activities could be planned more accurately.

Considering the general technical condition of European ports countries of the Balkan have a great potential for capitalizing results of this pilot.

5.8 Port of Rijeka: ICT/ITS tools for rail traffic: cargo loading web app

5.8.1 Identification of the knowledge gained (to be capitalized) and the target groups/receivers

The result of the pilot is a web application with mobile phone and tablet compatibility optimizing cargo loading in relation to the wagon capacity, overall train composition and the state of railway legislation.

The aim of this initiative is to research the optimization of loading cargo containers on railway wagons during the formation of railway compositions, by matching technical limitations of the wagons, as required by the wagon engineering discipline (“wagon loading schema” including cargo position, weight and axle load among other parameters), limitations of the railway (maximum speed, railway class, axle load, cargo height etc.), and the commercial bill of lading. As a part of the research, a mobile Web application has been created and tested with the key pilot stakeholder, confirming the initial hypothesis that the optimization methodology can successfully be used in optimization of cargo container loading and placement on railway wagons, increasing efficiency (speeding up the loading process) and decreasing costs and harmful emissions. Ultimately it also contributes to increasing the competitiveness of the transport route.

The pilot activity refers to the identification of bottlenecks and the development of solutions on them. The solutions were found during consultations with key stakeholders who defined the outlines of a possible cargo loading optimization software. The pilot activity included software development, testing, education, and everyday use.

It is possible to create a fully dynamic loading scheme for the cargo wagons, that would make it possible for railway cargo operators themselves to set up a specific wagon (owned or leased).

The main initiators of this pilot are the ports of NASPA, the Danube and Elbe in Germany and the Czech Republic, sea and river ports in Poland and railway and terminal operators of the area.

Direct beneficiaries of the cargo optimization application are all railway cargo transport operators in the Republic of Croatia.

After the analysis in the nodes’ regions, the partners became more conscious about the logistics thematic affecting their area. Thanks to the implemented pilot action, participants can now focus on specific solutions related to their problems avoiding waste of resources to find the right solution.

As a result of the pilot it turned out, that by using the application many wagons that had been initially planned were in fact not necessary to transport pre-defined cargo list after applied optimizations, and could be excluded from the train composition.

Figure 7: An example of the cargo optimization result

Source: Output factsheet of Port of Rijeka



The achieved level of implementation and functionality has justified the project goals, as the container placement and loading are now not just reliant on operator’s experience and heuristics but are structured and algorithm supported. However, the application can be significantly upgraded. For example, now it focuses on the railway leading to port of Rijeka and its container terminals and railway rules are hardcoded in the system. Furthermore, it contains technical loading schemes for wagons types used by the key partner, but not for all possible wagons used by other rail cargo operators.

Considering the ongoing implementation of a Port Community System (PCS) in port of Rijeka, there is also a possibility of interfacing this application with the PCS railway module, to achieve additional synergies in the railway cargo optimization arena.

Additionally, the application could be upgraded to support other ways of exchanging data with the surrounding systems. Considering that PCS and container terminal operating systems typically use EDI and XML-format data exchange, such implementation is also recommended for railway cargo loading optimization application as a part of a possible future upgrade project.

Summarizing the advantages of this system the followings should be emphasized:

- Relevant savings in train composition;
- Reduction of useless handling operations;
- Shorter loading time;
- Opportunities to analyse data received to create trends and statistics;
- Improving the loading efficiency of the wagons enables the implementation of effective intermodal connections;
- Accessibility from various devices with either iOS or Android;
- User-friendly solution (for a mobile phone or tablet).

Some weaknesses of the project have also been identified that are the followings:

- Significant research and development costs;
- Necessity of high-skilled IT employees;
- Requirements of the carriage of dangerous goods (RID) are not always compatible with load optimisation;
- The software is very specific: regular updates are necessary;
- It can be difficult to convince the stakeholders to use this app.

Capitalization efforts of this project should target railway operators, who do not have their own handling IT systems yet or have a less developed or ill functioning one. It could mean that Central and Eastern European operators are more likely to be interested.

5.8.2 Description and categorisation of the capitalisation actions happened already

Project partners Rail Cargo Hungaria, Codognotto Poland and Zailog already assess the possible application of this cargo optimization solution. The promising results can ensure the fast dissemination on their area of operation.

As part of the pilot process stakeholders of this initiative have been involved in the form of stakeholder consultations. Based on the outcomes of these meetings it can be concluded, that even though specific capitalization actions have not happened so far outside the project, there are excellent outlooks for future level 3 capitalization as described in the following chapter.

5.8.3 Outlook for future capitalisation perspectives

As the project focuses on optimizing existing infrastructure rather than building new one, results are easier capitalized compared to new infrastructure developments. Findings of the application, and the creator algorithm can be further transferred within the territory, and can be adopted for use by various railway operators' ERP systems, but require adjustments according to business rules, types of used railway wagons and their technical loading schemas and other rules.

Nevertheless, many hubs already use their own handling IT systems that can limit the adaptation of this solution, meaning that Central and Eastern European operators may be more interested.

Based on experiences of stakeholder meetings participants agree on the necessity of such development and can be the first targets of capitalization by testing than using the software.

Taking into consideration the same language, regulations and culture, Croatian ports could be contacted than. Their capitalization experiences would mean a useful knowledge base for further international proliferation of the results. Given the cultural similarities, geographical vicinity, and relatively underdeveloped infrastructure, other countries on the Balkan could be targeted in the second phase of the capitalization.

5.9 Zailog: Feasibility Study for a new rail terminal

5.9.1 Identification of the knowledge gained (to be capitalized) and the target groups/receivers

In the framework of the pilot the feasibility has been assessed of the possible implementation of a 4th railway module on a current railway terminal in Verona. The new infrastructure will be capable of managing trains up to 750m (instead of 600m) and weighting up to 2,000 tons (rather than 1,400 tons), according to EU standards laid out in the recent Directives, which require trains to be longer and more loaded. The new module will be equipped with many technological advancements. The main benefits offered by these new machineries include considerable capacity strength, as they can lift even the heaviest loads, greater mobility compared to cranes and significant versatility as they have adjustable heights, spans or treads.

Figure 8: Location of the new railway terminal

Source: Presentation of pilot action on the online steering committee meeting on 27 May 2020



As a result of the project more of the freight village’s potentials can be unleashed, resulting in an estimated growth of 50 per cent in capacity. As a precondition it should be ensured that the cargo stays in the port as short as possible and is transferred to its hinterland as soon as possible.

The realization of this new railway module will mitigate the negative impact of the traffic in an area (Verona freight village one) being often crowded, especially during rush hours when trucks have to wait their turn in and out of the terminals. Moreover, there will be a positive impact not only around the Verona node but also along the corridors connecting the freight village to the transport network, especially on the Brenner axis on which the majority of the Verona inland terminal’s railway connections are currently managed. The new railway module facilitates and supports the intermodal transport resulting in lower carbon emissions and environmental impacts and less road congestion and acoustic pollution as well. Besides, safety level and the port’s competitiveness will also increase.

Furthermore, there are other advantages connected to the deployment of this innovative infrastructure. The Milan-Venice railway line is also strengthened that is to enable access to new markets not reached so far, creating new potentials for cooperation with maritime players like ports and shipping operators.

As a result of the pilot it is also to be mentioned that key stakeholders have been involved and activated, like RFI and the Municipality of Verona.

Among drawbacks of the project the followings can be mentioned:

- High investment costs;
- Prolonged authorization process;
- Temporary modifications, restrictions on operation to carry out physical works can cause temporary traffic congestions limiting the access to the terminal;
- Guarantees are necessary to secure project implementation.

Results of the pilot can be capitalized by all European nodes as they have to adjust their operation to EU standards described in recent Directives requiring trains to be longer and more loaded.

5.9.2 Description and categorisation of the capitalisation actions happened already

Based on the results of the feasibility study Zailog plans to complete the described terminal extension by 2027, when the Brenner Basis Tunnel (BBT) is scheduled to open, that is a level 1 capitalization of the pilot following methodology used described in chapter 4.

As part of the pilot process stakeholders of this initiative have been involved in the form of stakeholder consultations. Based on the outcomes of these meetings it can be concluded, that even though specific capitalization actions have not happened so far, there are excellent outlooks for future capitalization as described in the following chapter.

5.9.3 Outlook for future capitalisation perspectives

All European nodes can implement such a terminal extension to adjust their railway standards to European directives if enough land is available. Extension of the track length is feasible in all terminals where it is necessary and possible.

The fourth railway module will represent a sort of guideline for other hubs (ports and freight villages) operating in the Central European area. Many terminals will follow the example of Verona that, over the years, is to become a sort of benchmark in terms of handling performance.

Especially already overcrowded hubs could consider such expansion favourable, as the problem of delays during rush hours could be solved meaning valuable time gain by all parties involved in transport. Italian, especially overcrowded North Italian (+Rome) nodes should be involved in the capitalization process first given the same language, culture and geographical vicinity.

After starting the capitalization and receiving the first feedbacks international level capitalization could follow very soon, as many European nodes suffer from similar level of overcrowding and delays.

As such terminal expansion may require a significant level of investment, availability of own, country or EU level resources should also be considered when planning the capitalization. It could be more effective if the timing could be in line with appearance of new resources.

5.10 Zailog: new services port gateway/freight village: New railway shuttle

5.10.1 Identification of the knowledge gained (to be capitalized) and the target groups/receivers

The pilot was originally designed to implement a railway shuttle connecting the Verona freight village to the Fusina terminal in Venice. Even though market conditions have prevented the realization of this shuttle train service due to the lack of profitability, useful knowledge has been gained during the preparation phase.

After the preliminary assessments it has been concluded, that a shift from road to rail will contribute to a significant reduction in traffic congestions: assuming a minimum train filling rate of 85%, it has been estimated that a decrease of 8,424 trucks per year covering the distance between the two hubs can be expected.

As far as the environmental impact of the project is concerned it has been calculated that, while trucks produced 451 grams/km of CO₂ emissions on a given parameter on equal terms, trains emitted 102

grams/km of CO₂. The difference is valid for nitrogen oxide (NO_x) pollution as well: heavy vehicles emit 5.65 grams/km compared to the 1.01 gram/km value for trains. Investigating the route in concern (Venice – Verona) a truck produces on average 0.85 tons of CO₂ (source: EcoTransit). Considering the annual reduction of 8,424 trucks in traffic the decrease in environmental pollution would amount to 7,160.4 tons of CO₂ per year.

Besides, the importance of the rail connection between Fusina terminal in Venice and Verona in the future expansion of the Verona freight village has also been confirmed: in 2018, 26,495,278 tons of goods were moved through the port, indicating a 5.4% increase compared to the previous year. Therefore, the opportunity to carry more loading units on train than on trucks is also an advantage that should not be underestimated.

It was also concluded during the stakeholder meetings that at least 30 trailers have to depart every two days in both directions to make the service profitable.

Last but not at least, the entrepreneurial flexibility and quality of logistics services can also be improved as a result of such service.

Unfortunately, there are also disadvantages of the project that finally hindered the physical implementation:

- Costs are higher compared to road transport as the service is operated on a short stretch;
- As a result of financial obstacles, the service cannot be implemented in a profitable way, even by the reduction of partners' profits to the minimum level. A public incentive could help in overcoming this problem;
- The shuttle service on a short-distance journey cannot be viable without state support (financial and/or administrative);
- Transport time of the railway is longer compared to road (the average commercial speed of freight trains in Central and Eastern European Member States was between 20 and 30 km/h. in 2016)⁵;
- Truck operators resist to use rail transport due to the mentioned cost and time disadvantages.

The financial sustainability of the project could be solved by inserting this shuttle train into a longer train route to decrease the higher costs and longer time of the service compared to the road transport. Unfortunately, this solution has not been supported and accepted by the final users. It can be concluded that some national or regional level financial support is crucial to create a viable business plan.

As far as the endorsement of the project is concerned it is to be emphasized, that it has been supported on different levels. The pilot is part of an EU ambition to create longer European multimodal chains, shifting as much goods as possible from road to rail transport with all its associated benefits. As a result, the main bodies operating in the European area are promoting and fostering such type of transport.

Besides this EU level institutional support, the initiative has also been promoted on a more political level. The municipalities of Verona and Venice, as well as the Veneto region, have endorsed the implementation of this railway connection, as the main benefit is a significant reduction of traffic congestions along the A4 motorway, which connects the two cities and represents the main transport infrastructure of the region. Furthermore, as the A4 traverses North Italy from West to East, an

⁵ Special Report of the European Court of Auditors "Rail freight transport in the EU: still not on the right track - 2016"

improvement in traffic conditions will benefit the overall logistics flow in the most productive regions of the country.

This new service could be used for connecting port and inland terminals in Europe by train, so any similar initiative could capitalize the results of this pilot.

5.10.2 Description and categorisation of the capitalisation actions happened already

The main lesson learnt by project partners Rail Cargo Hungaria, Zailog and Codognotto is that such shuttle service is hardly profitable without state or EU level subsidies, so in case of contemplating the implementation of a similar railway connection financial incentive has to be ensured first. This way project partners could already capitalize pilot results.

As part of the pilot process stakeholders of this initiative have been involved in the form of stakeholder consultations. Based on the outcomes of these meetings it can be concluded, that even though specific capitalization actions have not happened outside the project so far, there are excellent outlooks for future capitalization as described in the following chapter.

5.10.3 Outlook for future capitalisation perspectives

Notwithstanding the fact that market conditions have prevented the realization of this shuttle train, the service described could be introduced in any port/inland terminal connection with the objective to link the maritime European routes across Europe by rail and connecting southern and northern ports in a more sustainable way.

Even though environmental advantages of the initiative are obvious, profitability and time issues should be solved to make this pilot an attractive capitalization perspective. Meanwhile profitability could be improved by public incentives, the problem of speed disadvantage is still to overcome. Chances for subsidiaries are higher on areas, where traffic related air pollution and noise is already a serious social and political issue.

5.11 NASPA: Innovative control shunting system

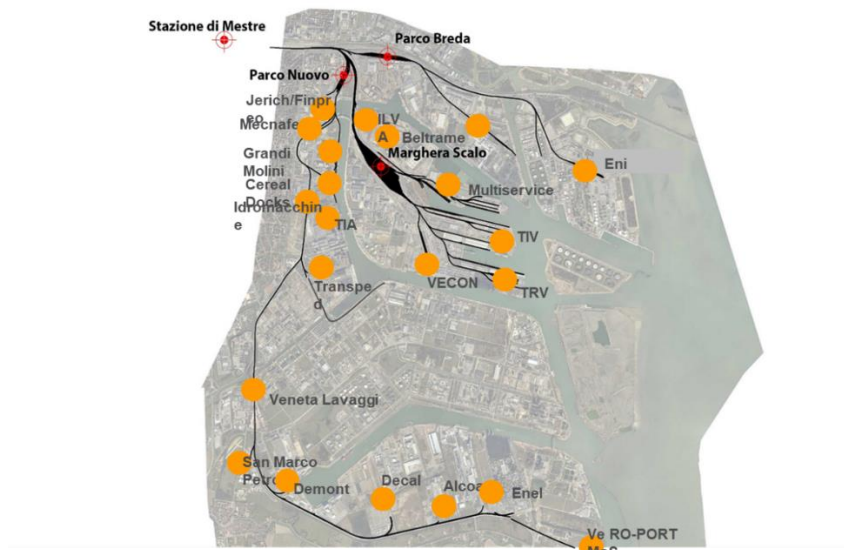
5.11.1 Identification of the knowledge gained (to be capitalized) and the target groups/receivers

In the framework of the pilot the second phase of the integrated software application system for the management of the shunting railway in Venice has been developed. SIMA2 system optimizes planning procedures' efficiency through an optimization of the trains' placement in the railway yard and their relative movements using machine-learning techniques and logistic algorithms (i.e. reduction of the "double" shunt or avoiding the need to shunt more than once a single convoy). It is used by ERF, the holder of the service of general interest of rail shunting at the Port of Venice. The new functionalities allow the interfacing among SIMA2 and some IT systems used by other players involved in the process like the infrastructure manager, railway undertakings and terminals.

In particular, SIMA IT system retrieves, processes and stores data during the manoeuvring procedures and the wagons positioning operations inside the port area or a railway hub, aiming to support management and real time monitoring of the operations. SIMA2 comprehends the following functional modules: manoeuvres management, monitoring, reporting, account management, mobile and GPS infrastructure.

Figure 9: Venice port railway network

Source: Presentation of pilot action on the online steering committee meeting on 27 May 2020



During the pilot the following advantages have been identified:

- Decongestion of the internal railway system;
- Optimization of locomotives use;
- CO2 reduction;
- Increase of freight traffic by rail;
- Boosting further new investments in port facilities to increase the intermodal capacity.

Main strength of the pilot is the process itself that has changed from an AS IS to a defined TO BE conscious approach, that allows optimization and effective management of railway shunting operations.

Main strength of the pilot is the possible extension of train capacity with a short stop, taking full advantage of an already existing railway connection and resulting in significant carbon footprint reduction. It should be taken into consideration though that without public funding the service is not profitable due to high rental cost for dedicated additional wagons.

5.11.2 Description and categorisation of the capitalisation actions happened already

Due to the COVID situation affecting Italy the implementation of the pilot action and thus related capitalization process has been delayed. In fact, the pilot was completed only a few days before submitting this report. The results of the process are expected in the near future.

5.11.3 Outlook for future capitalisation perspectives

The service can be adopted by other European railway operators in order to increase their railway loading capacity. The pilot can especially be capitalised in terminals with notable shunting inefficiencies. In Italy it means ports that have the general holder of rail shunting operations. From a more general perspective, SIMA2 can be considered as a best practice in rail software. Project partners can capitalize result first-hand, as they already know the project and have received information on the knowledge gained during the pilot phase.

5.12 NASPA: ICT/ITS tools for rail traffic: Data warehouse

5.12.1 Identification of the knowledge gained (to be capitalized) and the target groups/receivers

As a result of the pilot a data warehouse (Railway Datamart) functional to reporting and data analysis has been created. Railway Datamart increases the possibility to correlate data from different sources enabling the generation of new information, improving process optimization and decision support, and performing more accurate processing on historical data. The main added value of Datamart is the cross-referencing and railway data query function with the other organizations of the port information system.

A great advantage of Datamart is the creation of an integrated management system that is non-binding for the operators' software. Besides, it enhances terminal efficiency, increases freight traffic, improves consistent data sharing opportunities and boosts the application of intermodal solutions. It should be noted though that there is a potential risk of data leakage, and implementation costs are significant.

The Railway Datamart allows the collection of the data from ERF (Esercizio Raccordi Ferroviari) - the holder of the service of general interest of rail shunting at the Port of Venice that arrives to the North Adriatic Sea Port Authority for data analysis.

5.12.2 Description and categorisation of the capitalisation actions happened already

Due to the COVID situation affecting Italy the implementation of the pilot action and thus related capitalisation process of the implemented pilot action has been delayed. In fact, the pilot was completed only a few days before submitting this report. The results of the process are expected in the near future.

5.12.3 Outlook for future capitalisation perspectives

This ICT tool could possibly be applied in all European terminals, especially intermodal ones. Project partners can capitalize result first-hand, as they already know the project and have received information on the knowledge gained during the pilot phase.

The transferability of the system created by the Port of Venice allows an organization to acquire data from different sources (other organizations that use data in different forms), to exchange them with each other without forcing those who provide these data to change their data management and storage methods.

Capitalisation perspectives can be considered in relation to the fact that the added value of Datamart is a technological upgrade allowing a related upgrade on the quantity of information gathered and available to be analysed.

6. Summary analysis of the capitalisation achievements

As these pilot projects have only been completed shortly before this capitalization report, the capitalisation process has just started yet. Beside global pandemic situation has also hampered dissemination of the results. It should be highlighted though that all pilots have a great potential for future capitalization opportunities.

Nevertheless, it can be considered as a quick win, that one of the project partners, RCH (Rail Cargo Hungaria) has already effectively capitalized the results of FBL's (Freeport Budapest) pilot results: RCH made a pre-feasibility study on e-mobility services using the methodology and market study of FBL.

As far as pilots with already realized level 3 capitalization are concerned it can be concluded, that

- The pilot of Rail Cargo Hungaria (RCH) has already been capitalized by the Institute of Transport Sciences that has embraced this training initiative and is planning to launch similar courses for engine driver instructors.
- Lokomotion: Industrial training partners of local chamber of commerce have already been contacted and the pilot have received a positive feedback from them. Besides, all rail companies with the same type of standard interoperable locomotives of main European manufacturers are likely to capitalize results of the loko driver eco-efficiency training program.
- BILK logistic centre (Rail Cargo Terminal) has developed a feasibility study for an e-city-logistics base using the results of Freeport Budapest (FBL) market study and its methodology as described above. These two hubs can also complement each other in services and service areas, because both can become efficient and eco-friendly centre for last-mile delivery in and around Budapest.
- Feasibility study of Codognotto Poland has already been capitalized by Codognotto Italia that has acquired 70 LNG trucks so far investing 10 million euro. Besides, some Polish transport operators have installed their own LNG refuelling station and started to change to LNG. Besides, Freeport MAHART has also capitalized the pilot results in its new LNG terminal development by making it compatible for LNG trucks.

Nevertheless, other pilots of the project also have a great perspective for future capitalization outside the project that has to be taken into consideration when evaluating the initiatives of the TalkNET project from capitalization point of view. Besides level 1 and 2 capitalization actions have already been completed that also have significant added value. It also means that an updated capitalization report in a one- or two-years perspective may be useful to have a better overview of the further level 3 capitalization effect of the following pilots:

- Codognotto's modal shift from road to rail could be capitalized by other European operators to increase their railway loading capacity under some specific circumstances like disposability of an active railway service being already sustainable, verification of potential short haul flows of goods along the train routes and available carriers with LNG trucks.
- Codognotto's warehouse management system concept also has the potential to be used for capitalization as it can be easily applied to different frameworks in the digital connections between hubs and different stakeholders especially in case of European intermodal terminals. As a more specific outlook for capitalization the model will be applied to all warehouses of Codognotto and promoted as a benchmark in the framework of DTLF (Digitalisation of Transport and Logistics and the Digital Transport and Logistics Forum) that has already ensured

its political support of this initiative. Project partners have already assessed the possible application of the system.

- In case of Luka Koper the new LED lighting system with powerful monitoring and control capabilities in the selected general cargo warehouse has turned out to be a successful pilot that is to be capitalized not only by the other warehouses of the company with similar lamps, but also by all kinds of warehouses in other terminals by all stakeholders in the logistic area throughout the whole CE region and even beyond. In fact, the results of the pilot have already been capitalized on level 2 by project partners with warehouses with less developed lightning systems, who assessed the possible implementation of a similar LED lightning solution.
- Port of Rijeka's web application optimizing cargo loading in relation to the wagon capacity, overall train composition and the state of railway legislation has already been assessed by project partners Rail Cargo Hungaria, Codognotto Poland and Zailog. It is most likely to attract the attention of various railway operators, taken into consideration, that results require adjustments according to different business rules, railway wagon types and their technical loading schemes and other specific rules. The high number of logistic hubs already using their own handling IT systems may limit the adaptation of this solution though.
- Based on the results of the feasibility study Zailog plans to complete the described terminal extension by 2027, when the Brenner Basis Tunnel (BBT) is scheduled to open. Besides, result could be capitalized by basically all European nodes adjusting their railway standards to European directives. A pre-requisite of this terminal extension is the availability of enough land. Extension of the track length is feasible in all terminals where it is necessary and possible. Especially the Central-Euro region is to be targeted.
- The knowledge gained during the preparatory works for the new railway shuttle connecting the Verona freight village to the Fusina terminal in Venice can also be capitalized. Project partners Rail Cargo Hungaria, Zailog and Codognotto have already learnt that such shuttle service is hardly profitable without state or EU level subsidies. Nevertheless, this shuttle service detailed in the pilot can be installed in any port-inland terminal connection linking the maritime European routes across the continent by rail and connecting southern and northern ports in a more sustainable way. It should be taken into consideration though, that based on the lessons learnt during this pilot, public incentives are crucial to start this shuttle service.
- The innovative control shunting system and the new ICT tools developed within the frame of the pilot actions of NASPA also have a great capitalisation possibility according to former enquiries.

Results of the pilots can also be summarized following the categorization of 3 levels described in chapter 4 (Methodological context). The objective is the extension of capitalization to level 3 by all pilots as soon and as widely as possible using stakeholders pursuing the same end as TalkNET.

These 3 categories as defined in chapter 4 are the followings:

- Level 1: Capitalization of project results by the entity (project partner in this case) itself: it contains actions when an entity inside the project used its own pilot result to implement a project assessed in a (pre)-feasibility study or upscale/ replicate its development tested during the pilot phase of TalkNET
- Level 2. Capitalization actions in the framework of the project carried out by other project partners: it covers actions when another project partner of TalkNET uses the results of a pilot that could happen either during the project phase as a result of SCOM meetings or later
- Level 3: Capitalization of the project outputs by stakeholders beyond the project partnership: it is about reuse of pilot results by entities not directly involved in TalkNET either contacted in the framework of the stakeholder consultations of the pilot or by being informed later, during the dissemination of the results, even years late.

Table 10: Level based categorization of capitalization results

Source: Own edition

Responsible partner	Pilot/ training	Level 1	Level 2	Level 3
Freeport of Budapest (FBL)	<i>Development of new e-mobility service</i>		RCH has used methodology and market study to make their own pre-feasibility study on e-mobility	Stakeholders consider the establishment of similar logistic hubs based on the findings of the PRE-FS prepared by FBL
Rail Cargo Hungaria (RCH)	<i>2-days eco-driving training</i>	RCH plans to complete the eco-driving training for further groups of locomotive drivers.		Institute of Transport Sciences has embraced it and is planning to launch similar courses for engine driver instructors
Lokomotion	<i>3-days eco-driving training</i>	Locomotion plans to complete the eco-driving training for further groups of locomotive drivers.		Local chamber of commerce to share this program with their industrial training partners.
Codognotto Poland	<i>Modal shift from road to rail</i>	Codognotto is ready to implement the pilot with further customers as it proved efficient on CO2 emission reduction.	Pilot results have already been assessed by project partners Rail Cargo Hungaria, Lokomotion, Codognotto Poland and Zailog.	
Codognotto Poland	<i>Feasibility study on deploying LNG Heavy Duty Vehicles (HDVs)</i>	Codognotto Italia has acquired 70 LNG trucks so far.		Some Polish transport operators have installed their own LNG refuelling station and started to change to LNG. Freeport MAHART has used the results in its new LNG terminal

Responsible partner	Pilot/ training	Level 1	Level 2	Level 3
				development by making it compatible for LNG trucks.
Codognotto Poland	<i>New WMS (warehouse management) model</i>	It will be applied in all warehouses of Codognotto	Project partners have already assessed the possible application of the system	Promoted as a benchmark in the framework of DTLF
Luka Koper	<i>New LED lightning system</i>	Port of Koper will continue to implement this LED lightning system in its warehouses with similar lamps	Project partners have already assessed the possible implementation of a similar LED lightning solution in their warehouses	
Port of Rijeka	<i>Cargo loading web application</i>		Pilot results have already been assessed by project partners Rail Cargo Hungaria, Codognotto Poland and Zailog	
Zailog	<i>Feasibility Study for a new rail terminal</i>	Zailog plans to complete the described terminal extension by 2027.		
Zailog	<i>New railway shuttle</i>		Project partners Rail Cargo Hungaria, Zailog and Codognotto have already learnt that such shuttle service is hardly profitable without state or EU level subsidies	

7. References

- Freeport of Budapest – FBL (27-28 May 2020): presentation on Guidelines on project sustainability and capitalisation presented on the online steering committee meeting
- Action Contra la Faim International– ACF, Kristin Lindell: Learning from Experience and Sharing Knowledge: Capitalization Manual:
https://www.actionagainsthunger.org/sites/default/files/publications/Learning_from_Experience_and_Sharing_Knowledge_A_Capitalization_Manual_08.2010.pdf
- TalkNET pilot documentation: Output factsheets and final reports of the completed pilot projects, (pre)-feasibility studies made in the framework of the pilots, self-assessments of the pilots and summary report on the stakeholder meetings
- Shell LNG Outlook 2020 (30 July 2020): <https://www.shell.com/energy-and-innovation/natural-gas/liquefied-natural-gas-lng/lng-outlook-2020.html#iframe=L3dIYmFwcHMvTE5HX291dGxvb2sv>