D.T2.4.1 - KNOWLEDGE TOOL FOR PILOTS/ACTION PLANS IN THE FIELD OF ALTERNATIVE FUEL DEPLOYMENT IN NODES/TERMINALS

Alternative Fuels Deployment

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1. Executive summary

Within the TalkNET project, five knowledge tools have been developed in order to make available a review of best practices and relevant knowledge in the two macro fields of action of the project, that is to say Multimodality and Eco-innovation, and the related five identified sub-topics:

1	LAST MILE CONNECTIONS OF MULTIMODAL NODES	MULTIMODALITY
2	NODE MANAGEMENT OPTIMIZATION	
3	ASSESSMENT OF MULTIMODAL SERVICES	
4	ALTERNATIVE FUELS DEPLOYMENT	ECO-INNOVATION
5	ENERGY EFFICIENCY SOLUTIONS	

The objective of the TalkNET project is to improve the coordination among freight transport stakeholders for increasing multimodal environmentally-friendly freight solutions. Within the project framework, stakeholders have been included in defined project clusters (five project clusters) that correspond to the five identified sub-topics and that allow to gathered actors with common interest for cooperation.
Within this goal TalkNET partners are involved in a continuous transnational consultation process with the stakeholders in order to define how to deal with the above mentioned fields of action.
The knowledge tools delivered are the results of this process: it deals with the collection of the relevant knowledge in these fields both from inside and outside the partnership. Therefore, the knowledge tools will include both the significant experiences of the project partners and those gathered outside at EU level from other actors and operators.

More in details, the use of the knowledge tool allows to focus on a specific issue considering the following logical steps:

1. needs identified as relevant for the partner or/and the stakeholders expressing an interest for the issue;
2. problems deriving from non-satisfaction of the needs preliminary identified, hampering the optimization of a specific process or/and situation;
3. identification (if any), of past attempts to remove, mitigate or solve the problems above-mentioned, offering suitable solutions;
4. identification of the weakness affecting the past attempts;
5. mapping of feasible good practices implemented in order to give answer to the same or similar needs in a comparable context. Good practices identified can refer not only to cases implemented within the Interreg CENTRAL EUROPE Programme area but in general,

provided that the needs and the context can be brought back and then compared to the punctual situation under analysis;

6. systematization in order to achieve a clear overview of the elements characterizing the good practices identified and their analysis in order to find out key elements or/and processes that can be adapted to the specific situation in order to provide feasible solutions.

For needs, it is meant the necessities identified internally or externally, by the stakeholders, to which it is not possible to provide a credible answer without implementing a series of actions aiming at solving weakness or/and obstacles.

A good practice can be seen as an example of someone with the same needs that was able to satisfy them. Accordingly, it is a method, model or technique that has been accepted as superior to several alternatives because it produces results that are superior to those achieved by other means or because it has become a standard way of acting.

The points mentioned above correspond to the approached adopted by the TalkNET project when dealing with knowledge management and review of best practices. This is demonstrated within the "Summary report of the inputs collected from the stakeholders and tools development" (D.T 1.4.4-2.4.4), that is strictly linked to the best practices collection as the step before to the development of the knowledge tools. In fact, stakeholders were involved in the preparation of the knowledge tools as partners took part in and/or organized meetings with relevant stakeholders to collect their inputs that are functional to the elaboration of these outputs. They allowed to investigate those best practices that can be possible answer to the stakeholder's needs.

Therefore a review of the current/up-to-date knowledge in the sub-topics identified by the project will be delivered and the knowledge available will help project partners in the implementation of the project activities. In particular, this benchmark will be useful and necessary to develop the project action plans (A.T1.5-2.5 – planning phase of the project activities) and the pilot actions (A.T 3.2 – testing phase of the project activities).

Anyway, TalkNET thematic knowledge tools will offer knowledge and best practices review that will be available not only to project partners but also to the operators acting in the fields of multimodality and eco-innovation. In particular, this knowledge tool is focused on the best practices gathered in the fourth field of alternative fuels deployment in nodes/terminals.

The structure of the document is the following: in chapter 2 it is given an overview of the TalkNET project; in chapter 3 it is given an introduction to the best practices that this documents propose, focusing on the EU and then the TalkNET approach about of alternative fuels deployment; chapter 4 is the most relevant part of this document giving the collection of best practices and knowledge both from inside and outside the partnership; chapter 5 gives main conclusions of this work.

2. About TalkNET project

The aim of TalkNET is to improve the coordination among freight transport stakeholders for efficient and environmentally- friendly multimodal transport solutions in central Europe.

TalkNET involves sea and river ports, inland terminals, rail operators, logistic service providers, regional authorities and development agencies:

8 CORE PORTS	3 CE REGIONS	OPERATORS/PRIVATE
Port of Venice (IT) Port of Trieste (IT) Port of Koper (SI) Port of Budapest (HU) Public ports of Slovakia (SLO) Port of Rijeka (HR) Szczecin & Swinousce Seaports Authority (PL) Inland Port of Verona (IT)	Veneto Region/Veneto Strade (IT) West Pomeranian Region (PL) Usti Region dev. Agency (CZ)	Lokomotion (GER) Rail Cargo Hungaria (HU) Codognotto Poland (PL) Italian-German Chamber of Commerce, Munich (GER)

The project results will be achieved focusing on the following fields of action:

1: Last mile connections of multimodal nodes → INFRASTRUCTURES

It deals with the optimization of the links of the terminal/node with last mile connections. It is focused on the improvement of the links to the main transport networks node-to-node, in particular core and comprehensive TEN-T networks.

2: Improvement of multimodal terminals efficiency and optimization → MANAGEMENT EFFICIENCY

It deals with the optimization of the internal dimension of the terminal/node and it involves the improvement of its efficiency. It is focused on the improvement of the terminal operative and logistics management systems.

3: Market opportunities to reinforce or activate new multimodal services → SERVICES

It deals with market analyses to improve intermodal connections and existing/new logistics services and solutions. It is focused on the creation of new multimodal services to tackle bottlenecks affecting the several transport routes (rail, road, sea).

4: Alternative fuels deployment → ALTERNATIVE FUELS

It deals with the increasing use of transport means supplied by alternative fuels instead of fossil fuels. It is focused on the potential deployment of alternative fuels for ports/inland terminals and logistics operators (e.g. LNG demand analysis) to understand what is the real consumption of these type of fuels in the transport network.

5: Deployment of energy efficiency in transport operations → ENERGY EFFICIENCY
It deals with the research of the best tailor-made solutions to manage the partners' project logistics chains aiming to reduce the use of energy. It is focused on the creation of management solutions with a high level of efficiency to reduce the waste of energy during all transport/handling operations.

TalkNET project is developed in three macro Work Packages: WPT1 Multimodality, WPT2 Eco-Innovation and WPT3 Pilot Actions. Before implementing the pilot actions four main activities are implemented.
The first activity (AT1.2 - A.T2.2) includes the analysis phase focused at regional level. It aims to assess problems, needs and challenges of the identified project nodes' regions and measure the impacts of the stakeholders business activities on the five sub-topics previously defined. In this phase, the stakeholders are involved at a territorial level. The analysis will end with a further step that is the mapping of stakeholders.
The second activity (A.T1.3 - A.T 2.3) is about the identification of the clusters according to the results of the previous analysis. In this phase, the stakeholders are involved at cluster level.
The third activity (A.T1.4 - A.T2.4) develops the knowledge tools, which collect the knowledge from within and beyond the partnership on the five project sub-topics. The involvement of the stakeholders in this phase is at the transnational level. The thematic tools are developed and define the connection between the three work packages.
The fourth activity (A.T1.5 – A.T2.5) concerns the planning phase. Here the actions plans are implemented and they will be more suited to tackle problems and needs founded in the previous phases. Stakeholders are involved at node level.
The following step is to plan how to respond at problems/needs previously identified by the project: it is the testing phase, the core part of the TalkNET with the pilot actions (A.T3.2), with the cooperation of the stakeholders form the design to the evaluation of the final results of the pilot actions.

2.1 Overview of action plans and pilot actions

After the analysis phase, through the action plans project partners will implement the planning phase on the five project priorities: last mile connections, node management optimization, assessment of multimodal services, alternative fuels deployment and energy efficiency solutions. They are set up in cooperation with the relevant stakeholders.

The following partners focus their action plans on the field/cluster of alternative fuels deployment:

D.T 2.5.6 – Action plans on eco-solutions deployment – VERONA FREIGHT VILLAGE	**ZAILOG**
D.T 2.5.8 – Action plans on eco-solutions deployment – BUDAPEST	**FREEPORT OF BUDAPEST**

D.T 2.5.9 – Action plans on eco-solutions deployment – SZCZECIN	**SZCZECIN AND SWINOUJSCIE PORT AUTHORITY**
D.T 2.5.11 – Action plans on eco-solutions deployment – USTI NAD LABEM	**REGIONAL DEVELOPMENT AGENCY OF USTI REGION**

Eleven pilot actions will test:

- the links to the main transport networks node-to-node;
- terminals' operative and logistics management systems;
- the creation of new multimodal services to tackle bottlenecks affecting the several transport routes (rail, road, sea);
- the potential deployment of alternative fuels for ports/inland terminals and logistics operators;
- the creation of management solutions with a high level of efficiency to reduce the waste of energy during all transport/handling operations.

The following partners focus carry out pilot actions in the field/cluster of alternative fuels deployment:

PILOT ACTION FOR ECO-INNOVATIONS ON ALTERNATIVE FUELS SOLUTIONS

D.T 3.2.8 - Feasibility study for the development of new e-mobility services	**FREEPORT OF BUDAPEST**
D.T 3.2.9 - Logistic model for LNG deployments	**CODOGNOTTO POLAND**

3. Introduction to best practices in the field of alternative fuels deployment in nodes/terminals

In accordance with its peculiarities and role (maritime ports, fluvial ports, inland interports, public administrations, …), each Project Partner involved in the TalkNET consortium has analysed in depth the current situation in its nodes of interest in order to identify, study and point out effective and feasible eco-innovative solutions to tackle the environmental impact of the transport and logistics operations managed.

In this section, the reader will be informed on the results of these analyses from the point of view of the alternative fuels deployment compared to standard fossil fuels.

Proposed analyses' outcomes and relating solutions range from "soft" to "hard", where for "soft" is intended the re-thinking and progressive adaptation of the procedures and processes

used by the Partners and their stakeholders in daily routinely operations, along with the awareness and behaviour.

On the other side, for "hard" is meant the investments in upgrading, re-thinking or building new infrastructures, so as to deploy specific alternative fuels or, alternatively, the purchase and use of vehicles powered by alternative fuels.

Four main typologies of solutions result as interesting, taking into account evidences coming from the analyses: CNG or LNG (and Bio-LNG), electric mobility for last mile and re-use of waste as raw material to produces electricity.

Identified needs have to be analysed taking into account the nature of the Partner and its geographical context of reference. Nevertheless, main common points across the Central Europe macro-region can be pointed out. These needs are at the basis of the subsequent best practices' analysis and the detailed designing of the pilot actions. At large, the identification of best practices for each Partner as represented a useful benchmarking opportunity in order to became more aware of the current needs to be approached by further TalkNET activities.

Applying this methodology, two paramount outcomes have been identified:

- the request of infrastructure interventions, both in terms of retrofitting and upgrading or designing and building of new ones in the nodes under review;
- a changing in the vision of key local and regional players, both public and private, towards the deployment of alternative fuels solutions, which reflects, in general terms, not fully-aligned public supporting policy measures, such as dedicated legislations and incentives or grants.

Focusing on the first pivotal outcome pointed out above - Infrastructure Interventions, a set of common actions are shared by Partners, considering their nature. Accordingly, within this overview three different typologies have been addressed:

- costal ports;
- dry ports;
- operators.

Costal ports involved, Port of Venice, Port of Trieste, Port of Koper, Port of Rijeka and Port of Szczecin expressed similar requests in relation to the drafting and setting-up of strategic plans and guidelines with specific KPIs and relating actions to improve the energy usage and to promote the use of renewable energy in the port areas.

Two main areas have to be considered: the Adriatic and the Baltic Sea Region (BSR), which are crossed by the TEN-T Baltic-Adriatic Corridor. More in detail, Ports of the Northern Adriatic highlighted the need to upgrade their refueling and bunkering infrastructures in order to be able to manage CNG and LNG offer.

The Polish sections of the TEN-T Baltic - Adriatic Corridor and the North Sea - Baltic Corridor play an integral role in the transportation of LNG. On this corridor LNG can be transported to other European countries by train (e. g. with a VTG LNG tank car) or by truck. As an example, LNG transports coming in from Swinoujscie could be brought by train using the existing sections of the Baltic - Adriatic corridor to Poznan and transfer to the North Sea - Baltic corridor going into Germany.

Considering the Italian ports involved, Port of Venice and Port of Trieste, the analysis carried out through the project will support the Partners 'alignment to the Leg. Decree 169/2016 and

subsequent Guidelines for Ports' Energy Masterplan issued on December 2018 by the Italian Ministry of Environment.

Moreover, by way of example, regarding "hard" interventions, Port of Rijeka is involved in the building of an LNG terminal located in Omišalj municipality on the island of Krk, with the aim of securing energy needs and reducing operating costs through gas supply for a growing number of emerging energy markets throughout Europe. The built terminal will be managed by state-owned company LNG Hrvatska Ltd.

The project, called LNG terminal (construction of a liquefied natural gas terminal on the island of Krk), was included in the list of strategic investment projects of importance for the Republic of Croatia and the Law on Strategic Investment Projects enabled all official procedures to become urgent and to have the highest priority.

Another example of "soft" intervention is the implementation of a set of measures in order to gain energy saving, with a specific focus on electricity consumption in all its main areas by Port of Koper. In line with this commitment for a seamless updating towards sustainability, Port of Koper has already established its quality management system according to EN ISO 9001:2008 and environmental management system according to EN ISO 14001:2004. Environmental efforts were upgraded in 2010 with the implementation of EMAS certificate. In this sense Port of Koper has taken the commitment to actively support the introduction of the most modern and cleanest technologies that enable environmental protection at the highest achievable level.

More in detail, Port of Koper has already introduced, tested and implemented:

- electricity powered machineries within the terminals;
- upgrading of cold ironing infrastructure for the use of shore side electricity supply, along with vessels installation requirements;
- the replacement of fossil fuels boiler for heating with ones using biomass deriving from waste wood;
- the replacement of lighting in general cargo warehouse with LED spotlights activated by remote automatic remote controls.

A second group of partners is represented by the dry ports (i.e. Verona freight village, Freeport of Budapest and the Chamber of Commerce of Munich since it described the activities of the two German freight villages Nuremberg and Hof).

All the dry ports under review are developing a set of initiatives in order to shift from fossils fuels to both electric and LNG. In that terms, the LNG market context highly impact on alternative fuels orientation. By way of example, the Verona Freight Village look at LNG as the most ready and best performing solution currently available on the market. At the present, the market situation is rapidly changing pushed by both:

- the increasing demand from the private market of LNG vehicles which allows the creation of a completer and more pervasive refueling network in the Northern area of Italy and in the node of Verona;
- the awareness of PAs at all level in order to incentive the market operators and all the stakeholders along the whole supply chain to study and effectively put in place more sustainable solutions.

The synergy between carriers, PAs, Oil companies and energy market operators appears as crucial to correctly collect, understand and support the market requirements. Moreover,

considering the whole supply chain, the awareness and knowledge of shippers is essential to foster this process.

Other market contexts, such us the German or the Hungarian ones appear as more focused on electric mobility. The Bayernhafen of Nuremberg developed a partially electrified port rail infrastructure for a total of 54 km. along with the use of hybrid locomotives in the last-mile connection. Similar solutions towards a progressive electrification of the port operations are undergoing in the port of Hof.

Moreover, the German ports and the Freeport of Budapest have put in place a complex city-logistics system in order to avoid the use of fossils fuels to supply local depots. Looking at the Hungarian example, Due to its nature of city logistics port and hub, the partner focused on its potential role in deploying alternative fuel transport solutions in city logistics with a focus on electro-mobility, applied in the context of the Budapest region. The potential role of the Freeport is examined, identifying the problems, needs and challenges of e-city-logistics, according to the state-of-the-art. The last mile transport impacts for an average of 28% on the transport total costs affecting the quality of services, the length of delivery routes and the contact with the final costumer. Therefore, in this segment they can cause a lot of positive and negative externalities. It is necessary here to highlight the impact in terms of acceleration and facilitation that the policies implemented at public level, from regional to national, prove to have in order to address the market orientation. By way of example, in Hungary, the very high initial investment costs remain a strong burden for enterprises. Meanwhile, from the point of operating costs electric vehicles have a definite advantage compared to carbon fossils ones.

Transport and Logistics operators, such as the Codognotto Group, Lokomotion or Rail Cargo Hungary expressed specific needs and expectations in relation to alternative fuels deployment in the short/mid-term. Their pushing on port authorities and terminals, along with other market stakeholders consistently impact on the whole market context and evolutions. Their needs can be summed up in two main stream: infrastructure upgrading and technological development.

The solution identified by Lokomotion represents a concrete mix of both the two aspects. In detail, the partner analyzed the possibility to introduce and test hydrogen propulsion on the "Zillertal Railway". The reason behind the analysis is the fact that there is significant proportion of non-electrified line sections nowadays, some of which run along or supplement internationally important corridors. Here, diesel traction continues to be used. In addition to the impasses in terms of environmental pollution (noise, CO2 emissions), this form of production continues to be important due to the lack of alternatives. five hydrogen-powered railcars whose use is planned for 2022. Approximately 800,000 liters of diesel or 2,160 tons of CO2 are to be saved annually. Should be also taken into account that it makes sense to generate the electrical energy required for the production of hydrogen through the regional hydroelectric power plants and reservoirs. These measures are expected to increase acceptance among the population with the extended goal of more modern mobility and sustainable tourism.

On the other side, from the perspective of a road and intermodal transport company such Codognotto, the gradual (and still ongoing), improvement of the environmental conditions on Alternative Fuels for road haulage at general EU level and in Central Europe has offered in the recent years the possibility to verify and test the usage of LNG/CNG for heavy-duty vehicles not only for short-range flows. The full electric or hybrid solutions still appears limited to short-range flows.

Other two aspects have to be taken into account looking at the operators' point of view. The dialogue with the public administrations and the customers. As previously highlighted for the ports, the sensitivity to the topic by the public decision maker is crucial in order to accelerate the market uptake of brand-new green technologies. In addition, decision on infrastructure development and legislative facilitation foster the creating of a positive market context.

According to the examples provided for different partners' typologies and market segments, the analyses confirm the possibility to group different topics addressed in the two paramount outcomes and requests previously listed.

4. Best practices collected in the field of alternative fuels deployment in nodes/terminals

The best practices presented in this document would like to offer good solutions tested and experienced in the field of alternative fuels deployment in nodes/terminals.

These good practices have been collected following the criteria of the project field of action and, when possible, of the pilot action foreseen in the related field (2.1 Overview of pilot actions).

Specifically, it deals with solutions tested and proposed by TalkNET project partners and other selected from external operators and actors that partners have deemed to be significant for their activities and business.

Nevertheless, not only good solutions are proposed, but in some cases also the relevant up-to-date knowledge in the thematic field of alternative fuels deployment in nodes/terminals, as guidelines to support activities in this specific field.

The selection of the best practices has been strictly influenced by the needs of partners' stakeholders that have been detected from the project activities and the various contacts that the partners had working with them.

Moreover, the variety of the TalkNET project partners has represented an added value for the knowledge management of the project, allowing to gather in turn different stakeholders good solutions adopted.

Title
Alternative fuel solutions – cold ironing in the Port of Koper
Players included and contacts (if available)
▪ Supplier of electricity ▪ Ministry of infrastructure (Slovenian Maritime Administration, 2 Municipalities) ▪ Institutes, companies – logistic area, traffic and transport
Location
Area of the Port of Koper www.luka-kp.si
Summary
The analysis represents an evaluation of needs related with the shore side electricity supply (Cold Ironing) of ships while berthing at the Port of Koper Parts of the analysis: regulatory framework, environmental footprint of the Port of Koper, use of shore side electricity supply for ships and shipping electrification. Port of Koper already provides shore-side electricity supply (cold ironing) for the berthed Slovenian Army vessels and tug boats. In this way on board of the Army vessels and tug boats the auxiliary power units don't use diesel fuel and would not generate emissions such a pollution and noise. The solution implemented in the port of Koper came out from the experience of the Port of Hamburg with the Siemens solution-SIHARBOUR (passenger terminal Altona), which was only the conceptual basis to start the activities in the port of Koper.
Overview
One of the strategic goals of the port for the protection of health and environment is the rationalization of energy consumption with the change of the source of energy with the use of renewable energy sources or with the use of waste material. Luka Koper has committed itself to the management system according to the EN ISO 9001:2008 and environmental management system according to EN ISO 14001:2004 to actively support the introduction of the most modern and cleanest technologies that enable environmental protection at the highest achievable level. One of the cases is the shore power, shore side electricity, alternative maritime power or onshore power supply known as Cold Ironing. Cold Ironing is used for powering the on-board consumers while vessel is alongside, thus on-board auxiliary power units with the use of the diesel fuel would not generate emissions such as pollution and noise. Required electrical power is supplied from shore. With hybrid power systems on the market, there are tendencies to evolve cold ironing further as a new term, to electric bunkering. To assure the Cold Ironing, significant infrastructure investment is required. Port of Koper started to provide shore-side electricity supply for the berthed Slovenian Army vessels and tug boats. In this way on board of the Army vessels and tug boats the auxiliary power units don't use diesel fuel and would not generate emissions such a pollution and noise. Total available power for above mentioned vessels is around 300 kW.
Results and experience collected
With providing shore-side electricity supply for the berthed Slovenian Army vessels and tug

boats on board of the Army vessels and tug boats the auxiliary power units don't use diesel fuel and would not generate emissions such a pollution and noise. It is a start of electrification of a port – to use shore side electricity in order to contribute to clean environment.

Added value for TalkNET project

Above described improvements (alternative fuel ECO solution) is in use in the port of Koper and exist the possibility to transfer it to other ports. The solution is acceptable and from the environmental aspect and should be furtherly promoted. Results and recommendations regarding the electricity supply to small ships and tug boats will be used in the detailed design and future development of the Cold Ironing infrastructure.

Title

Alternative fuel solutions – wood biomass in the Port of Koper

Players included and contacts (if available)

- Ministry of infrastructure (Slovenian Maritime Administration, 2 Municipalities)
- Institutes, companies – logistic area, traffic and transport

Location

Area of the Port of Koper
www.luka-kp.si

Summary

In Luka Koper, fossil fuels (extra light heating oil) were traditionally used as a source of energy for district heating for port facilities, while legislative demand for lowering emissions is more and more strict. In the port waste wood is generated during the process of handling, processing and storage of timber. This wood is used as a wood biomass (wood chips) for energy purposes, which affects economy - reducing the consumption of fossil fuels (heating oil). The result is two and a half times lower costs for heating and preparation of the sanitary water. Modern technologies for converting internal energy (wood) biomass into heat are completely automated, energy-efficient and environmentally friendly. The idea for this solution implementation came from the district heating system for wood biomass on Rogla (Pohorje – Slovenia) and it was adapted and implemented successfully to meet the needs of port of Koper.

Overview

One of the strategic goals of the port for the protection of health and environment is the rationalization of energy consumption with the change of the source of energy with the use of renewable energy sources or with the use of waste material.
Luka Koper has committed itself to the management system according to the EN ISO 9001:2008 and environmental management system according to EN ISO 14001:2004 to actively support the introduction of the most modern and cleanest technologies that enable environmental protection at the highest achievable level.

One of the cases is the use of wood chips for heating headquarters building instead using extra light heating oil. Wood chips are produced from the waste wood collected in the port. The Company's strategic orientation is to entirely replace extra light fuel oil with renewable

energy sources for heating and use of hot water inside the port. In Luka Koper, fossil fuels (extra light heating oil) are traditionally used as a source of energy for district heating for port facilities, while demand for emissions is becoming stricter. In the port, waste wood is generated during the process of handling, processing and storage of timber. This wood is used as a wood biomass for energy purposes, which affects economy - reducing the consumption of fossil fuels (heating oil). The result is two and a half times lower costs for heating and preparation of the sanitary water. Modern technologies for converting internal energy (wood) biomass into heat are completely automated, energy-efficient and environmentally friendly, as is shown below.

The carbon footprint was calculated for 2017, comprising emissions from fossil fuel combustion to power the port machinery and for the heating of buildings, and the emissions from the use of electricity in the area of the port.

	Total consumption [MWh/y]	Emission factor [kgCO2equiv/kWh]	Total emissions [kgCO2equiv/y]
Diesel	52,024	0.276	14,358,624
Electricity (indirect emissions)	25,481	0.378	9,631,818
Light fuel oil	479	0.268	128,372
Liquefied petroleum gas - LPG	242	0.228	55,176
Wood biomass	1,104	0.007	7,728
TOTAL	**79,330**		**24,181,718**

In 2014 Port of Koper has been awarded with ESPO (European Sea Ports Organisation) Award for the most environmentally friendly European port in recognition of its work in creating a sustainable future for the port and its surroundings. The award was given among other activities also for the best practice of using wood waste for heating in the port.

Results and experience collected

With the use of wood chips for heating administrative buildings in the port area instead of extra light heating oil the costs for heating and preparation of sanitary water are two and half times lower. This solution reduces the consumption of fossil fuels and contributes to more re-used materials (waste) in the port.

Added value for TalkNET project

The above described improvement (alternative fuel ECO solution) is in use in the port of Koper and exists the possibility to transfer it to other ports. The solution is acceptable from the environmental aspect and should be furtherly promoted.

Title
Alternative fuel-based recharging station - VUle Partagés (Paris - France), Mol Limo (Budapest - Hungary)
Players included and contacts (if available)
1.VULe Partagés . www.vulepartages.fr 2. MOL Limitless Mobility Ltd. https://www.mollimo.hu/en
Location
1.Municipality of Paris, France (VUle Partagés) 2.Municipality of Budapest, Hungary (Mol Limo)
Summary
The competitiveness of European ports will depend on their ability to innovate in terms of technology, organisation and management. Their critical roles as multi-modal hubs require innovative, eco-friendly and efficient ways of cross-modal connections and use of management tools in order to further boost their attractiveness.
Overview
1. The “VULe Partagés” is a system by which professionals can borrow electric cars for transporting. PSA Group offers 10 commercial electric vehicles in cooperation with the city government in Paris. Peugeot Partner and Citroën Berlingo types of Light Electric Utility Vehicles are made available to traders and craftspeople (as of July 2019). The cars have got 3 seats in the front and a fast charging, 80% within 30 minutes. The most important is that the vehicles are picked up at a station and brought back to the same station after transporting. If someone wants to use this system, then he has to register first on the webpage www.vulepartages.fr. Selected rules of use: • Ensure the cleanliness and hygiene of the vehicle; • Bring the vehicle back to its starting station after use; • Remember to reconnect the vehicle and check that the loading is well started; • Drive with a valid B license; • Respect the rules of the road. In case of an infraction, the driver remains responsible and the punishment will be automatically transmitted; • Restore the vehicle on time. In case of a problem causing a delay, it is imperative to contact the assistance. This initiative was launched within a project “Ile-de-France Region's call for projects on "Innovation to promote sustainable mobility". The benefits of this carsharing system next in addition to environmental awareness are as follows: • Vehicles access point is in the city center in district of Montorgueil (maximum 5 stations from the professionals’ workplace); • Some of the vehicles include a refrigerator to be able to deliver food under appropriate conditions; • Free access to the Rungis International Market;

- Free access to recharge on the entire Paris network (BeLib);
- First 2 hours of parking is free in Paris;
- 24/7 support in the event of a problem;

Results and experience collected

The implementation of the alternative fuel-based recharging station to serve fully EV-based fleet on last mile logistics cannot be implemented without government subsidies and/or the change of governmental or local regulations. Government subsidy (grant) shall cover at least partly the initial infrastructure investment cost. Such an EV fleet means improving environment quality, cost reduction for companies due to lower operational costs and for government as well due to lower mitigation and adaptation costs.

Regarding the impacts on the environment, the implementation of the recharging station will cause fewer negative externalities by last mile transportation, higher loading capacities and higher level of coordination. Thus, it has a clearly positive environmental effect contributing to the reduction of carbon dioxide emissions of the trucks entering into urban areas.

Added value for TalkNET project / Link to Pilot actions (D.T 3.2.8)

The Freeport of Budapest will achieve a sustainable economic growth and maximum benefit for its customers and the inhabitants effected of urban freight transport's negative externalities. The new system will also help to minimise the environmental impact of the port and its vehicles and serve as a good example for other logistic service provider companies in the future.

The new and innovative system which will be developed must be thoroughly designed and well tested with involvement of experts before installation phase to avoid potential problems during operation.

The main stakeholders are:

- Ministry of Innovation and Technology;
- MAHART Freeport Plc.
- Freeport of Budapest Logistics Ltd. (FBL)
- Tenants (more than 60 different service providers) and potential tenants
- Freight forwarders
- MLSZKSZ (Hungarian Association of Logistic Service Centres)
- MOL Limitless Mobility Ltd.
- Passenger services – Taxi
- Post services
- NKM Mobiliti

Title	
Electrification of port railway facilities - Nuremberg (Bavaria, Germany)	
Players included and contacts (if available)	
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Location	
Nuremberg (Bavaria, Germany)	
Summary	
a) The City of Nuremberg performs outstandingly in the production of electrical equipment, both compared to German and European standards b) City and Regional logistics have been optimized via inner-city micro-depots, electric vehicles as well as hybrid locomotives	
Overview	
While being a crucial commercial hub for trade in Central Europe, Nuremberg is moving forward in terms of optimization of operative and logistics management services. bayernhafen Nuremberg encompasses a total of 54 km platform length, of which 12.5 km are electrified. The main advantage of such infrastructure lays in its direct connection to both the Deutsche Bahn long-distance network and extension to the Port, allowing for a more straightforward freight transportation. bayernhafen Nuremberg introduced hybrid shunting locomotives, previously tested by the private railway transport company Gesellschaft für Eisenbahnverkehr GmbH, while shipping companies operating in Nuremberg are partially shifting towards electric equipment. This shift is clearly highlighted by the share of electronic equipment production among all industries of Nuremberg. The latter is in fact making up around 23% of total turnover, ranking first in the city while employing the highest relative share of personnel (26%, +21% with respect to national average). Data refers to the latest statistics available from September 2016. Recalling the main set of players involved in this process, such as • Infrastructure providers • Logistics and transport companies	

- Electric equipment producers

we can conclude that the major development trend in Nuremberg is focused on the electrification and digitization in their intermodal processes. The investments not only focus to increase capacity and new multimodal services but also to optimize the whole process through more ecological and sustainable ways. The development and location advantage of Nuremberg's Port can be of service and benefit to the development of the Northern Adriatic Sea Ports and their expected increase in transshipment and intent to find cargo consolidation for intermodal transport between Germany and its heterogeneous set of commercial partners.

Results and experience collected

- The city of Nuremberg had several reasons to engage in the electrification process given its geographical position and connections
- The strengthening of city logistics solution had an overall positive impact for environmental concerns and on last mile connections
- 20 e-scooters have been added to the fleet, with plans of further expansion

Added value for TalkNET project / Link to Pilot actions

The actions described focused to tackle bottlenecks affecting the several transport routes (rail, road, sea). This best practice can thus support the implementation of action plans (AT 1.5) and pilot actions expected in WPT3: more specifically, the assessment of multimodal services in bayernhafen Nuremberg can serve as a reference point for the improvement of last mile connections, node management optimisation, alternative fuels deployment and better energy efficiency solutions in other areas.

Following adequate market analyses to improve intermodal connections and logistics services and solutions, bayernhafen Nuremberg has taken the initiative to saving resources in its last mile connections through:

- Use of hybrid shunting locomotives between the marshalling yard of the DB and the harbour railways;
- City logistics via inner-city micro-depots and delivery with electric vehicles and cargo bicycles.

By May 2017, a hybrid locomotive manufactured by Alstom Lomotiven Service GmbH was tested by the private rail transport company Gesellschaft für Eisenbahnverkehr GmbH & Co KG (IGE) in bayernhafen Nuremberg. The hybrid locomotive will be used for shunting services for the length

of two days in bayernhafen Nuremberg as well as for the inner-city cargo transfer trips.

The city logistics featuring city micro-depots, electric vehicles and cargo bicycles aims on the other hand to develop solutions for the last mile connection.

Title
LNG deployment in the North of Italy
Contacts if available / Players included
▪ ENI as LNG provider ▪ IVECO as truck manufacturer ▪ Codognotto Italia S.p.A. and other logistics companies as buyers for new trucks ▪ Shippers with a particular interest on a sustainable supply chain ▪ Italian Ministry of Transport
Location
North of Italy
Summary
a. In the Central Europe area, North Italy is the most valuable example of LNG deployment b. In just three years the area goes from 1 LNG refuelling station to more than 30
Overview
Italy's LNG refuelling infrastructure is continuing to roll out with the recent opening of new refuelling stations covering the needs of the logistics operators in all north Italy. The case is particular interesting considering that in 2015 there was just one refuelling station available. Private and public players have worked together in order to support a real deployment of the technologies that were getting in the market. The players involved in the deployment process had different interests that needed to be match: ▪ Infrastructure providers (Port, inland terminals, road operators etc…) ▪ Logistics companies ▪ Transport companies ▪ LNG providers; ▪ Shippers ▪ Ministry of environmental policies ▪ Ministry of Transport & Infrastructure ▪ Truck manufacturer Defining a clear pathway to describe the Italian practice is very difficult but in general terms we could outline how different initiatives were able to build important synergies and to drive the conversion of a significant amount of trucks from Diesel towards LNG. It has to be mentioned that the growing of road demand is strictly connected to the growing of the demand of LNG for ships and locomotives since a proper demand creates the conditions for building bunkering stations. The first agreements included:

- ENI as LNG provider
- IVECO as truck manufactures
- Codognotto Italia S.p.A. and other logistics companies as buyers for new trucks
- Shippers with a particular interest on a sustainable supply chain

The potentialities expressed by the private players were properly supported by public bodies. In particular, the most relevant action taken was a decree of the Italian Ministry of transport which supported the purchasing of LNG trucks. The incentive allowed the growing of the demand and the consequence competition among fuels providers.

Results and experience collected

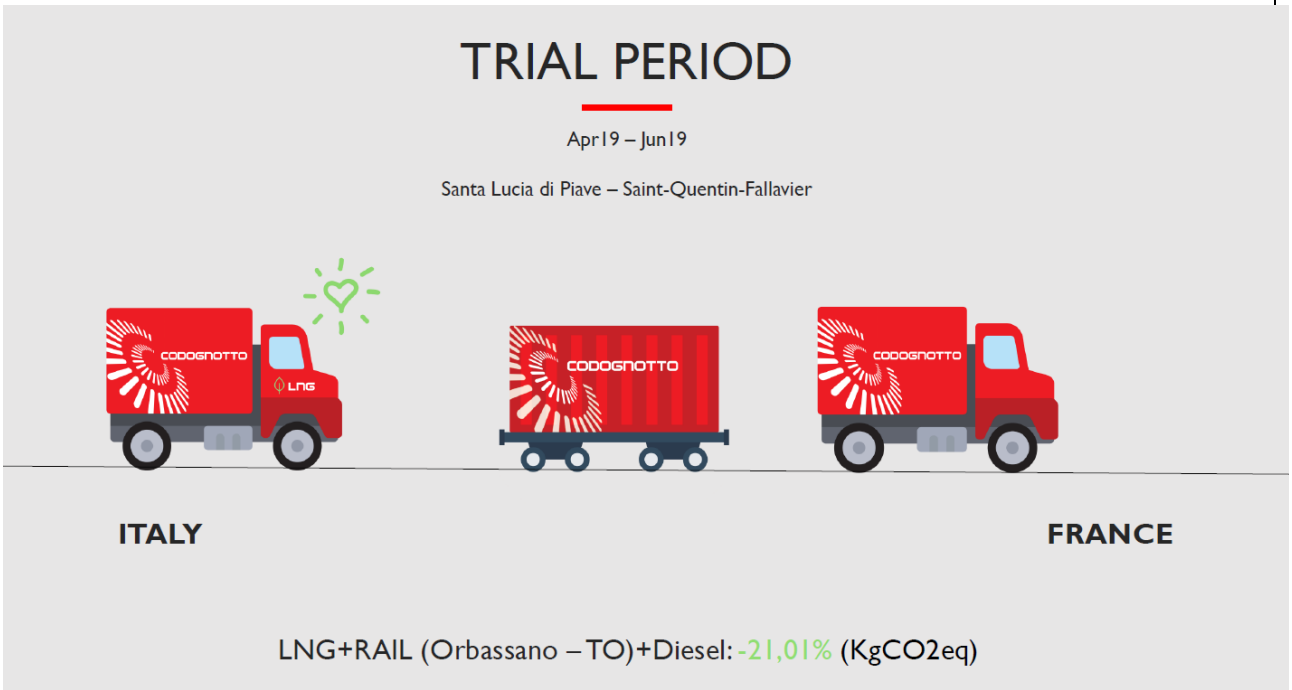
- The proper identification of private interest from the public sector determine the correct incentive to be applied;
- From one refuelling station based in Piacenza, Italy as a public and private system was able to reach the number of more than 30 refuelling stations;
- The marketing linked to LNG as alternative to diesel was the key element to raise the awareness of private actors on the matter

Link to Pilot actions (D.T 3.2.9)

In the programme area, Italy was the online country able to overcome the impasse.
Austria (1 refuelling stations), Germany (4 refuelling stations), Croatia (2 refuelling stations) Poland (2 refuelling stations) are trying to overcome the situation while the other countries are still blocked.
Promotional and demonstrative actions need to be implemented in order to show the reliability of the new technologies. Furthermore, public bodies need to be involved in order to understand how to react and delivered proper incentives.

Title
LNG+Intermodality: Corridor IT-UK
Players included and contacts (if available)
Electrolux Codognotto Italia S.p.A.
Location
Corridor UK-IT
Summary
Codognotto Italia and Electrolux has successfully tested a combination of LNG+Intermodal solution in the corridor IT-FR-IT from April till June 2019. The complex test was defined already in 2018 with the first shipment along the MED corridor including not just LNG but also the exploitation of the rail connections. LNG is still the unique solution ready for the deployment for the heavy duty vehicles. Furthermore, the test has confirmed its good performances in terms of environmental sustainability which has been further increased combining the solution with rail.
Overview
More and more when we refer to freight shipment we refer to intermodality. Intermodality is best defined as combining different modes of transport in a seamless transport mission such as road, rail and sea. As practical example, a good can be transported for the first mile by road, shifted on rail for the longest haul and then again to road. This means that from the production point to the final destination the goods will change two different modes of transport and possibly even three different organisations. If it is so complex, why there is such a high interest on intermodality? Why we do not continue to ship our freight just by road, a mode of transport more flexible and easier to use? Europe is seeing a dramatic driver's shortage which has highlighted even more the need to create a better life balance for the drivers and determined the need to find different transport solutions. The application of intermodality avoids to the drivers to drive for long period of time far from home being responsible just for the first mile or the last mile. Moreover, less Kms on the road means less congestions and accidents. Moreover, transport represents almost a quarter of Europe's greenhouse gas emissions and is the main cause of air pollution in cities. The transport sector has not seen the same gradual decline in emissions as other sectors: Within this sector, road transport is by far the biggest emitter accounting for more than 70% of all GHG emissions from transport. The application of intermodal solutions plus the application of alternative fuels for the first and last mile can reduce the CO2 emissions till the 70% creating an advantage for all. Nontheless, it is possible to move towards intemordality just through a better cooperation among the different players involved in the logistics chain. It is the example of Codognotto and Electrolux which have started to test LNG+Intermodal solutions in order to obtain better results in terms of saving.

Results and experience collected
The emissions have been calculated using ECO invent database which considers not just direct emissions but also the indirect ones different models can drive to different results, nonetheless, every credible model must consider direct and indirect emissions in its calculation. The assessment reveals extremely positive results in terms of environmental sustainability, comparable performances to the solution diesel+rail and slight cost increase. The cost increase is mainly related to the truck costs which are still considerable A gap variable from 40K to 50K do not allow a full independency to subsidies and common investments Elctrolux Codognotto.



Added value for TalkNET project
A potential deployment can be considered also in the Central Europe area exploiting the subsidies offered by the German government. Nonetheless it is has to be considered that such support does not cover the price gab and the lack of refuelling station in the eastern countries of Europe is far away to be solved.

Title
Decarbonisation solutions - ALICE (Logistics Innovation in Europe)
Players included and contacts (if available)
ALICE https://www.etp-logistics.eu/
Location
Involving players from all Europe

Summary

The European Technology Platform (ETP) Alliance for Logistics Innovation in Europe (ALICE) is set-up to develop a comprehensive strategy for research, innovation and market deployment of logistics and supply chain management innovation in Europe. The platform will support and assist the implementation of the EU Program for research: Horizon 2020 & Horizon Europe.

ALICE is based on the recognition of the need for an overarching view on logistics and supply chain planning and control, in which shippers and logistics service providers closely collaborate to reach efficient logistics and supply chain operations.

Overview

According to a stakeholder consultation through a survey with more than 40 respondents and three online consensus building workshops, five solutions areas need to be further investigated and considered when designing a decarbonization strategy.

These areas are:

- Sustainable, Safe and Secure Supply Chains;
- Corridors, Hubs and Synchromodality;
- Information Systems for Interconnected Logistics;
- Global Supply Network Coordination and Collaboration;
- Urban Logistics.

Reduce Freight Transport demand is seen as the solution area with slightly less potential while the other have similar weights. There is a strong consensus that there is no silver bullet and all of them are needed if we want to fulfil the ambition in regard to climate change (COP21 Paris agreement 2015) at the most reduced price for society. With regards to the specific solutions the top ranked ones are in order of potential (i.e. considering impact and feasibility):

1. Electrification and hybrids;
2. Multimodal Optimization;
3. Load Consolidation;
4. Transition towards hydrogen and hydrogen related fuels;
5. Use of efficient vehicles/vessels and fleets;
6. Load Optimization (adjust truck size to load, optimizing truck, mixed loads);
7. Synchromodality and flows synchronization;
8. Improve fleet operation;
9. Supply chain restructuring;
10. Consumer behaviour.

Overall, the development of green vehicles powered by low carbon energy: trucks, trains, barges and ships, and the transport fleet renewal is currently forecasted to be too slow to hit our climate change targets in the short term. Logistics companies, manufacturers and retailers are struggling to deliver emissions reduction whilst remaining competitive; low profit margins combined with the high cost of low emission technologies make investment challenging. While the end goal is to achieve Zero Emission Logistics, it is also clear that short term reductions

are key to keep alive the COP21 ambition.

Results and experience collected

ALICE understood that freight shipments transcends the influence sphere of individual countries and companies. Thus, individual businesses need support from the broader private sector, governments and civil society to take their efforts to the supply chain level and unlock the enormous potential for the freight sector to improve efficiency and reduce emissions. Therefore, coordinated efforts within industry, in partnership with government, research & development institutes and civil society, are key. We thus need leadership from all.
In response to the Paris Climate Agreement, governments, associations and businesses are looking for ways to turn promises into action. Many have started developing roadmaps towards low-emissions freight and logistics, with the ultimate vision of zero emissions by 2050. However, only 13% of Nationally Determined Contributions or NDCs by countries include freight, and many companies and organisations that use or provide freight services have yet to develop action plans.
ALICE represents a permanent collaboration and cooperation platform to support eco-innovation deployment on five key bullet points:

- Reduce Freight Transport Demand;
- Optimize Freight Transport Mode Utilization;
- Increasing asset utilization accommodates more transport demand with the same infrastructure;
- Reduce the carbon content of energy;
- Improve fleet energy efficiency.

In logistics, the Physical Internet is an open global logistics system founded on physical, digital, and operational interconnectivity, through encapsulation, interfaces and protocols. The Physical Internet is intended to replace current logistical models.

Added value for TalkNET project

Example of definition of shared goal and action plans among private and public institutions, shippers, research centres and logistics companies

5. Conclusions

Best practices collected in the field of alternative fuels deployment have highlighted different aspects about the approach and subsequent deployment of alternative fuels solutions in the central Europe area.
Since the positive growing trend of the freight traffic, the nodes' managers understood the importance to study, test and deploy alternative fuels options in order to reduce the negative impact of the externalities related to the pollutant emissions increase.
Proposed good solutions range from "soft" to "hard", where for "soft" is intended the re-thinking and adaptation of the procedures and processes, while for "hard" is meant the investments in upgrading or building infrastructures so as to deploy alternative fuels or the purchase and use of vehicles powered by alternative fuels.
More in detail, three main areas of best practices can be taken into consideration: LNG (and Bio-LNG), electric mobility for last mile and re-use of waste as raw materials to produces electricity.
Nowadays, this general framework is facing a growing request of reduction of pollutant emissions in road transport operations, maintaining or increasing the competitive level and being able to face the market evolution in the short-term.

6. Index

6.1 Collection of best practices

1) Alternative fuel solutions – cold ironing in the Port of Koper
2) Alternative fuel solutions – wood biomass in the Port of Koper
3) Alternative fuel-based recharging station - VUle Partagés (Paris - France), Mol Limo (Budapest - Hungary)
4) Electrification of port railway facilities - Nuremberg (Bavaria, Germany)
5) LNG deployment in the North of Italy
6) LNG+Intermodality: Corridor IT-UK
7) Decarbonisation solutions - ALICE (Logistics Innovation in Europe)