D.T2.5.8 – ACTION PLANS ON ECO-SOLUTIONS DEPLOYMENT – BUDAPEST

Alternative fuels deployment
Energy efficiency solutions

Final version
09/2019

1. Figure - Arial picture of FBL
SOURCE: HTTPS://TERVLAP.HU/CIKK/SHOW/ID/6340#PID=5)

A PROJEKT AZ INTERREG CENTRAL EUROPE PROGRAMBÓL, AZ EURÓPAI REGIONÁLIS FEJLESZTÉSI ALAP TÁMOGATÁSÁVAL, AZ EURÓPAI UNIÓ ÉS MAGYAR ÁLLAM TÁRSFINANSZÍROZÁSÁVAL VALÓSUL MEG.

TABLE OF CONTENTS

List of Figures

List of Tables

Executive summary

Over recent years, the global port industry has changed significantly. Ports are becoming increasingly dependent on technological innovations across the entire logistics chain. 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.

In the TalkNET project, there were Pilot Actions identified to improve coordination among freight transport stakeholders (ports, inland terminals, transport operators and policy makers) for efficient and environmentally friendly multimodal transport solutions in Central Europe.

This framework of analyses introduces the project plan of deployment of alternative fuels for last mile city logistic in the entire Budapest region with a base in the Freeport of Budapest (FBL).

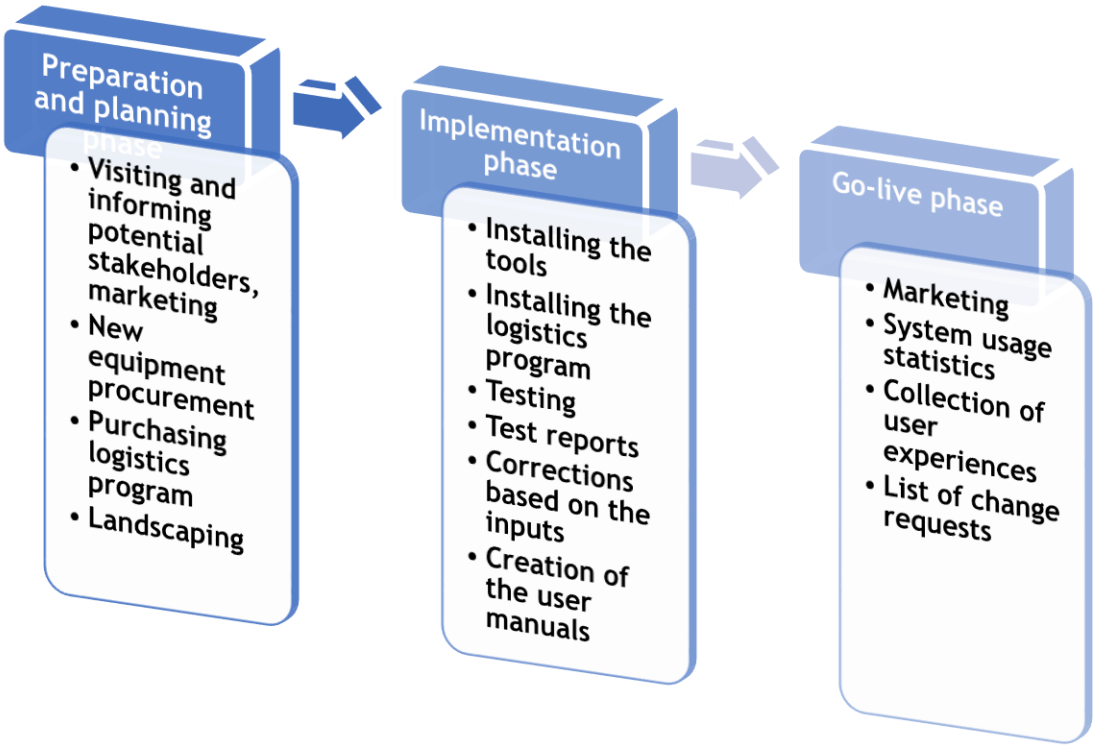
At the knowledge tool section, the relevant best practices were acquired by a desk analysis, which provide useful suggestions for solutions. However, the best solution could be due to a synthetisation of them and working out a Freeport-specific solution.

This document will present the “Action Plans on eco-solutions deployment - Budapest” that will focus on the ECO-solutions deployment in freight transport, one of the sub-topics dealt with the TalkNET project in the field of Multimodality.

Starting point to present the actions that are planned is the “Analysis on eco-solutions deployment - Budapest” developed within the project, that reports the main challenges that Freeport of Budapest has to face in order to improve its efficiency, that is related mainly to the upgrading of the port logistics.

In fact, the actions that will be presented in details in this document are the answers to the problems, needs and challenges identified within the first step of the project activities, that is to say the analysis phase of the TalkNET nodes’ regions, both for Multimodality and Eco-innovation as the two main fields of action of the whole project.

In the next subsection, the answers to the challenges appear step by step, so that the logistics base which is based on electricity can be realised.



2. Figure Phases related to this action plan
Source: Own editing

The analysis has foreseen the assessment of the alternative fuels deployment and the energy efficiency solutions, to understand how is the state of art (AS-IS analysis) and what are the methods to improve the situation (TO-BE) that will be performed in the following stages of TalkNET implementation. The tool chosen to achieve these aims is the S.W.O.T. analysis.
At the same time, the actions presented will support and will be the ground for the implementation of the pilot actions that will be carried out within the project. In particular, Freeport of Budapest will carry out one pilot actions in the topic of eco-innovations on alternative fuels deployment:

1) D.T 3.2.8 – Pre-feasibility study to develop new e-mobility services in the Freeport of Budapest

Therefore, the core intervention logic of the project is the following:

1) to detect the problems affecting the nodes (analysis phase)
2) to find solutions through specific actions planned (planning phase)
3) to test and implement the solutions presented (testing phase)

Moreover, the document will offer also a brief overview of the best practices that can offer good solutions to better plan actions and the pilot action foreseen in the project (the complete collection of best practices is available in the knowledge management activity of the project: Outputs Knowledge tools).

In the following paragraphs, a summary of the action included in this document will be presented, clearly linking problems/needs/challenges and actions/solutions that will be illustrated through the support of the results of the SWOT analysis.

The action plan involves three phases. The first phase focuses on the preparation and planning. So, during this period, purchasing of the needed equipment and system happens and also the developing of the necessary space in the Freeport of Budapest. After these important starting actions, the implementation begins. The pilot operation is designed to install all tools and to test the operation in a demo mode, to see if there is any mistake in the planned operation or if we should recalculate, correct something.

Based on the results of Phase 2, the third phase can be initiated targeting a widespread introduction of the proposed solution with the help of marketing tools in the region of Budapest and the collection, analysation of the users' experiences.

A GANTT was created to illustrate the planned timeframe of the actions which will be finished until the end of June 2021.

The main stakeholder groups (businesses, public and private organisations, etc.) or players that have a real or potential interest in the TalkNET networking and in the proposed project ideas and in their context were also identified in another subchapter.

These actors will potentially be affected by the outcomes of the TalkNET project related to deployment of alternative fuels in the FBL.

Internal stakeholders are as follows:

- The port owner of Freeport of Budapest (MAHART Freeport Plc.);
- The port manager organisation (FBL);
- The tenants, which are port operator companies with real logistic activities and services.

External actors outside the Freeport of Budapest are:

- Freight forwarders;
- Passenger companies that might have the intention to carry also goods in the future.

As a main conclusion of this action plan is that an alternative fuel is soon in present in the Port which is an LNG terminal. Therefore it is unnecessary to investigate the feasibility of an LNG terminal as it will start its operation in 2020 – investment funded by CEF. Therefore the Port reconsidered its pilot action content and its pilot action will be concentrated on e-mobility.

Action 1- Alternative fuel based recharging stations

SWOT ANALYSIS - RESULTS:

STRENGTHS	WEAKNESSES
- appropriate infrastructure in the city - people's attitude towards environmental awareness - good practices all around the world - a lot of advantages of EVs by city logistic (e.g. due to quiet operations night deliveries) - Freeport of Budapest as a logistic basis in the e-city logistic	- low feasibility of plans and policies - the low number of available EV types in Hungary - battery autonomy which causes range limitation - long charging times
OPPORTUNITIES	**THREATS**
- new policy measures connected to decarbonizing - increase of the number of EVs used for last mile logistic - establishing an ideal fleet mix applying EVs - finding the ideal solution for e-charging solutions at the logistics base - low operational costs from EV fleets	- the huge number of negative externalities due to last mile logistic - the low level of government subsidies (high purchase costs) - transport's effect on human health, on the infrastructure

Freeport of Budapest will further examine – in the framework of a a pre-feasibility study – the development of new e-mobility services in the port area.

The objective of this action is to prepare new measures (investments) which can serve the e-mobility (city logistics, last mile logistics etc) needs of the capital town of Hungary: Budapest and its surrounding area. Implementation of this action requires careful planning and a constant coordination of cooperation with stakeholders as there are a lot of external factors beyond the control of the port (such as regulatory, policy, technical limitation etc).

4. Cluster - Alternative fuels deployment: overview of needs and best practices in cooperation with stakeholders to develop the action plan

Last mile transportation is in most cases uncoordinated which causes for example higher traffic volume and noise emission in the urban area. For companies as logistics service providers, the lack of coordination brings *low load factor of vehicles*, a *large number of routes*, high externalities and *wide system costs*.

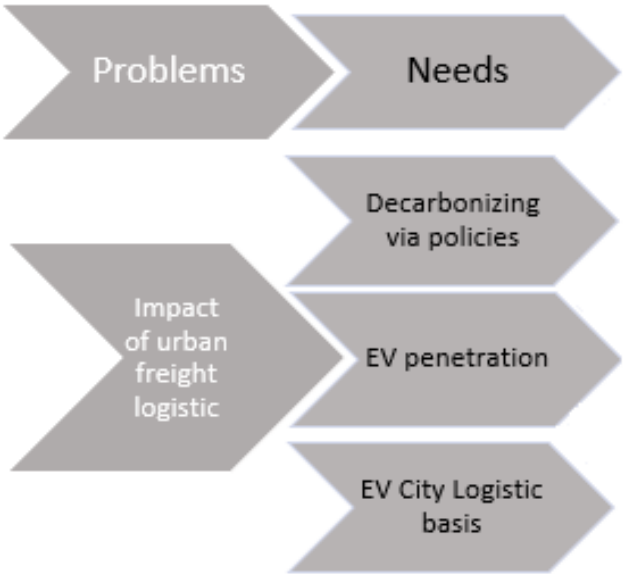
From the aspect of **citizens,** the main externalities are air pollution, climate change, noise pollution, congestion, accidents and infrastructure wear and tear.

It is well visible on the basis of the situation analysis, that Budapest is in a bad situation from the view of air pollution because the capital is very polluted which can affect badly on human health and causes climate change which is nowadays an important topic in connection with sustainable development. But the introduction of the EVs could release this state too, like by noise pollution because the pollutant emissions from electric cars are a fraction of conventional freight vehicles.

Needs

This calls for a need to decarbonise the last mile of urban freight transportation: to reduce the share of gasoline powered vehicles and promote low emission solutions. The three pillars to achieve are:

- Decarbonising via policies: introduce local regulations, incentives and other policy tools influencing the fuel choice of market players;
- Growth in the penetration of EVs: there must be enough vehicles;
- Providing logistic bases for e-city-logistics: the logistic centres serving urban freight distribution must be made ready to serve EVs.



3. Figure Three identified pillars of needs
Source: Own editing

Decarbonising via policy measures

Policy measures play an important role in influencing the choices and behaviour of market plyers of city logistics. Introducing emission-based limitations, establishing low or zero emission zones (LEZ/ZEZ), financial incentives such as grants, tax reductions promoting the use of EVs are all part of the palette of the different policy actions that can speed up the shift towards e-mobility in urban freight transportation.

But it can be stated that although policy objectives are targeting ambitious goals towards e-mobility, there are only few measures are actually in place to really influence market players in Hungary. The use of gasoline-powered trucks is practically not limited, while the shift to EVs is not sufficiently supported to achieve a real change in the vehicle choice.

EV penetration

There will likely be many more commercial vehicles on the road, given economic growth and the expansion of e-commerce. But the goal should be to increase the amount of EVs on roads instead of other types of vehicles.

In addition, EV penetration shall also be observed from the perspective of the different target groups, the different types of market players potentially using EV fleet. There are significant differences in the way and the likelihood of shifting to EVs.

1. Table Target groups and their relationship with EV using

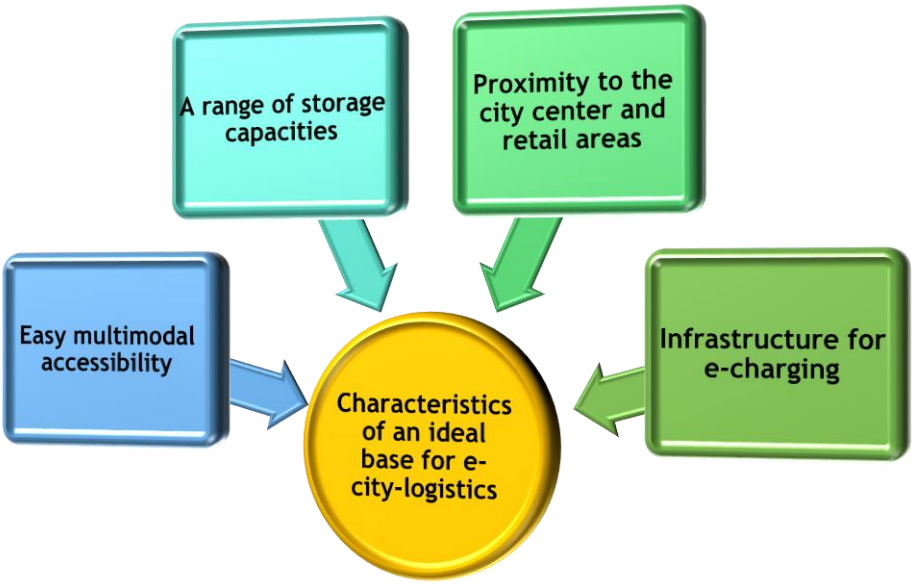
Target groups	**Current state of EV use**	**Likelihood to shift to EV**
Passenger services - Taxi	Taxi companies has several years of positive experiences with the use of hybrid vehicles. Since 2016, some companies	Taxis are very likely to shift to EVs. Both the daily mileage and the adaptability of the business model helps the penetration of EVs. However,

Target groups	**Current state of EV use**	**Likelihood to shift to EV**
	(e.g. Főtaxi) started to build their fully EV fleet.	without policy incentives, the shift will remain slow.
Post services	The Hungarian Post has started to build a fully EV fleet.	Being a state-owned company, CSR policies also supports a faster shift to EV use, making the Hungarian Post one of the forerunners of e-mobility in city logistics.
Parcel companies	No EV use is documented.	Parcel delivery services are less likely to to use EVs, because of the limitations of range. Parcel delivery requires 150-200 km daily, a level that most of the lightweight e-trucks cannot meet at the moment.
Companies with own fleet	Some of the companies have already started to pilot the use of EVs: e.g. Bárdi Autó, a car part vendor company, or JCDecaux, an outdoor advertising company.	The likelihood is very much depending on the CSR policies of the given company. The shift to EVs are currently much more driven by these policies rather than economic rationale.
Small freighters	No EV use is documented.	Microenterprises using 1-3 vehicles play a very important role in the city logistics of Budapest. Most of them are using old vehicles of low technology level. However, the probability of their shift to EVs is very low: most of them simply cannot afford to invest in a new EV.

Source: Own editing

EV City Logistic base

There is a need to have a big base in Budapest for EV-based fleets where they could charge their vehicles and complete their routes connected to last mile delivery. An ideal base for e-city-logistics must have the following features:



4. Figure Characteristics of an e-city-logistics centre
Source: Own editing

The Freeport of Budapest perfectly meets all these requirements. The port saw this untapped potential, which could seriously ease transportation, reduce negative externalities and contribute to the spread of intermodal transport. The Talknet project offered an opportunity to have an in-depth analysis of the current situation (location, accessibility).

Best practices

Different solutions, best practices are emerging that could relieve the pressure. In the following section, we present a variety of best practices that can stand as an example to follow due to their different characteristics.

LEFV-LOGIC project in Netherlands

The publication (link by references) presents the results of the LEFV-LOGIC project which was a two-year research into the use of light electric freight vehicles (LEFV) for city logistics. In this project Amsterdam University of Applied Sciences, Rotterdam University of Applied Sciences and HAN University of Applied Sciences, together with logistics operators, shippers, vehicle suppliers, network organisations, knowledge institutions and municipalities have developed new knowledge about logistics concepts and business models for the deployment of LEFVs.

The reason why we have chosen this as a good practice is that this project is a good example to show which type of electric vehicles can be used in city logistics.

A LEFV is a bike, moped or compact vehicle with electric assistance or drive mechanism, designed for the distribution of goods in public space with limited speed. LEFVs are quiet, agile and emission-free

and take up less space than conventional vans and trucks. In the project, they distinguish between three types of LEFVs:

- Electric cargo bike;
- Electric cargo moped;
- Small electric distribution vehicle.

5. Figure Type of LEFVs analysed in the study
Source: http://www.citylogistics.info/research/city-logistics-light-and-electric/

The Netherlands has almost one million vans, the majority of which are owned by small businesses. From them 25-25% is used for construction and for food delivery or for service logistics, and from the total amount 0,8% is electric.

After decades of absence, LEFVs are returning to the streets in Netherland. Parcel and local retail deliveries, and smaller shipments in food, construction and service logistics.

The Figure below summarises the pros and cons of LEFVs.

Temperature	+ Non-refrigerated products, or products that are cooled via the load carrier are suitable for LEFVs + For temperature controlled products (hot or cold) fast transport is is important; LEFVs can offer an advantage → See Access and speed of cars - There are not currently any (or many) LEFVs for transporting frozen goods
Weight	+ Limited weight tranpsorted per trip (see Chapter 2) - Excess weight does not fit into a LEVF
Volume	+ Limited transport volume per trip (see Chapter 2) - Too much volume does not fit into a LEFV
Access and speed of cars	+ Where the speed of access of motorised traffic is limited, the benefit of using LEFVs increases (for example in congested areas) -In areas where motorised traffic is allowed to drive at high speed, LEFVs lose their advantage
Number of stops	+ LEFVs are easier to park. The more stops, the more benefit LEFVs offer during parking and loading / unloading - The more stops on a route, the greater the volume → See volume / For routes with many stops, a LEFV may need to shorten its routes by using a hub → See Costs of a hub
Distance and stops	- For long distances between stops (or from starting location), in areas where vehicle speed is high, LEFVs lose their advantage → See Access and speed of cars
Costs of a hub	+ If a hub is affordable, it is possible to split routes and load goods so that the volume per route decreases - The more shipments that are bundled together at a hub, the greater the volume → See Volume"
Parking space / time	+ When a good parking place is important (nearby location), using a LEFV is beneficial - The longer you are parked at a customer's premises, the less stops are possible per trip → See Number of stops

6. Figure Advantages and disadvantages of LEFVs
Source: http://www.citylogistics.info/research/city-logistics-light-and-electric/

The LEFV-LOGIC project made some main conclusions at the end of the analysis:

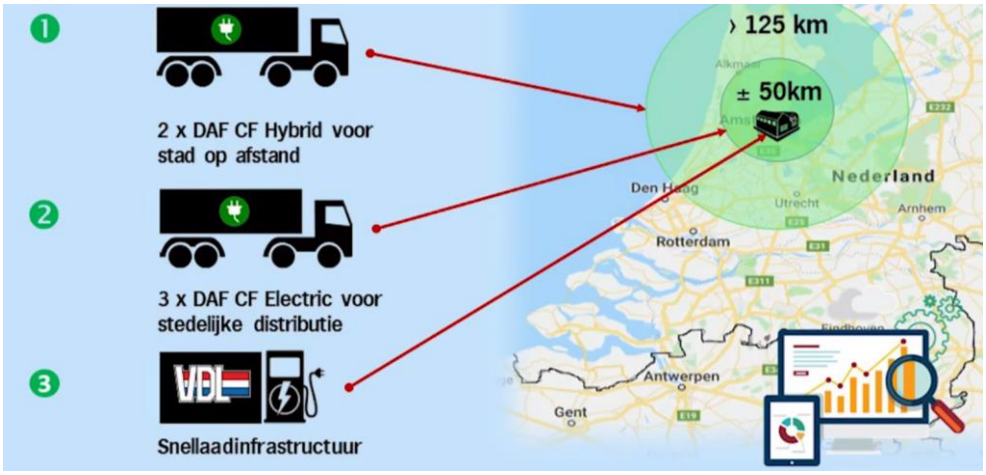
- LEFVs could replace 10-15% of delivery vehicle movements;
- LEFVs demand a different logistics concept;
- The technology must be developed further;
- Policy is still unclear, but can stimulate the adoption of LEFVs;
- The growth of LEFV use requires a scalable business model.

(REMARK However, its adaptability in our case is limited because there is no such infrastructure already built up and adequate amount of human resources available in Hungary. In addition, there are only few urban areas in Hungary where only bicycles can be used).

Testing of Ahold Delhaize in Netherlands

The reason why the second good practice (link by the references) was chosen that it has got the widest range of transported goods. These products are in most of the cases related to supermarkets which have special transportation needs. This proves that the electrical solution works also with special goods.

In Netherlands, Ahold Delhaize tested electric trucks for supermarket deliveries. It cooperated with Albert Heijn, DAF Trucks, Simon Loos, Peter Appel Transport and TNO. They have tested three battery-electric (DAF CF Electric) and two plug-in-hybrid truck-trailer combinations (DAF CF Hybrid). The range of these electronic and hybrid vehicles is shown in the Figure below.



7. Figure Delivery range of the trucks
Source: https://www.youtube.com/watch?v=7gPIT_cg1os

Since 2014, when Albert Heijn signed the Green Deal Zero Emission, the 90% of the deliveries is carried out with this type of vehicle to the supermarkets. The most important reason behind their change was that they wanted to be more environmentally conscious. This had only an additional effect on cost efficiency.

They have a fast charging system which is provided by the VDL. In addition, VDL has also developed and built the electric powertrain of the DAFs.

The companies involved are investigating electric vehicles over the entire distance which mainly concerns trips from Zaandam to Amsterdam. With plug-in hybrid trucks, Zaandam can also supply stores further away, for example in Utrecht, without any emissions. The batteries of the vehicles will

be recharged between journeys on a specially laid-out fast loading square at the Albert Heijn distribution center in Zaandam.

This testing project will last 2 years. After that, on the basis of analyses by TNO, it will be determined which functional and operational requirements the resources and organisation must meet in order to supply supermarkets in inner cities with emission-free equipment in the near future.

Deliveries of IKEA in Shanghai

The third good practice (link by references) was chosen because it has installed the same system that we would like to design in the harbour. The similarity is that they have also a base, which is Ikea's warehouse, from which a permanently available electric fleet delivers the ordered goods. They also operate in a B2C (Business-to-Customer) system, which is one of our goals. However, it is important to emphasise that the Shanghai-based IKEA only covers a particular product type, which is a serious difference compared to the previous good practice and to our case.

The background of this case is, that company plans to fully decarbonise its delivery fleet in New York, Los Angeles, Paris, Amsterdam, and Shanghai by 2020 (and its entire fleet by 2025). But they reached their goal earlier in Shanghai, because of which they can be now a good practice for every company who is planning to decarbonise its system.

In the Figure below, the fleet of IKEA is shown.

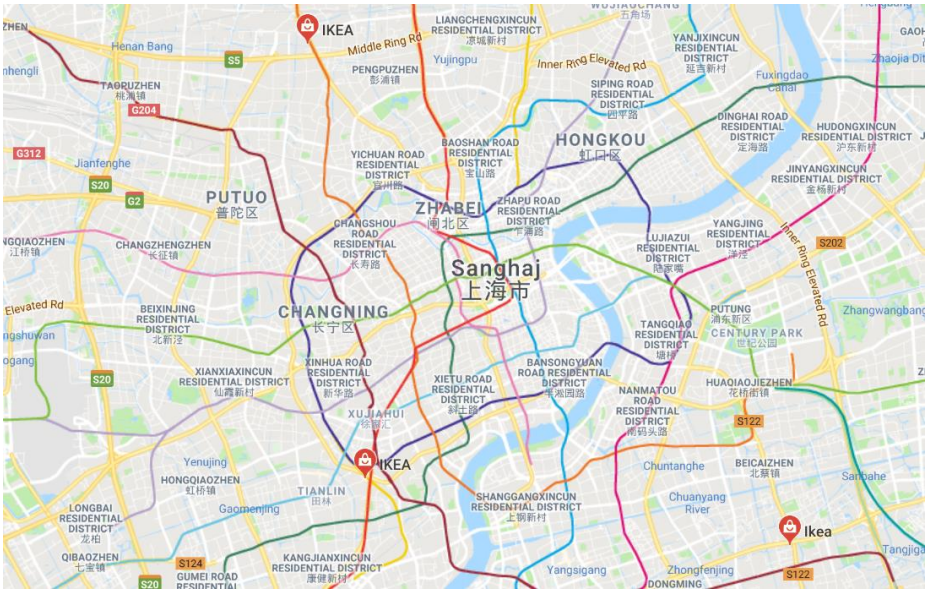
8. Figure The outlook of the fleet of IKEA
Source: https://www.fastcompany.com/90297201/in-shanghai-every-ikea-delivery-is-now-made-with-an-electric-vehicle

The company announced in end of January 2019 that in the inner city of Shanghai, all home deliveries are carried out by electric vehicle. Shanghai is one of the biggest cities in the world and it suffers very much from air pollution, so it is a big result from the view of electric transport and environment.

They have built out partnerships to source vehicles and charging infrastructure to make the shift possible. DST is the company who leases out electric trucks and vans. New Brother, Ikea’s logistics

partner in China, also has purchased a handful of electric delivery trucks (those are the Ikea-branded vehicles pictured above).

The following Figure illustrates the store chain's warehouse and stores.



9. Figure Warehouse and stores of IKEA in Shanghai
Source: Own editing based on Google Maps

In other above-mentioned cities, IKEA will establish first a powerful EV-sharing network and after that it will cooperate with other stakeholders and discover other electric cargo vehicles e.g. bicycle or utility tricycle.

The company tries also to convince its users to be eco-friendlier in everyday life. For example, to use public transport, bike or just go on foot to its stores which will be helped by IKEA by opening more small businesses instead of big giants.

All in all, these serve the reducing the overall carbon footprint of each of the company's products by 70% by 2030. This can serve as an example to follow for many businesses to reduce our overall ecological footprint.

Paris, PSA Group - "VULe Partagés"

The fourth good practice was chosen because it 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. 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. The following Figure shows the outlook of the electric vehicle.

10. Figure The outlook of the PSA Group's car
Source: https://media.groupe-psa.com/en/psa-peugeot-citro%C3%ABn/press-releases/group/psa-group-makes-electric-commercial-vehicles-available-for-car-sharing

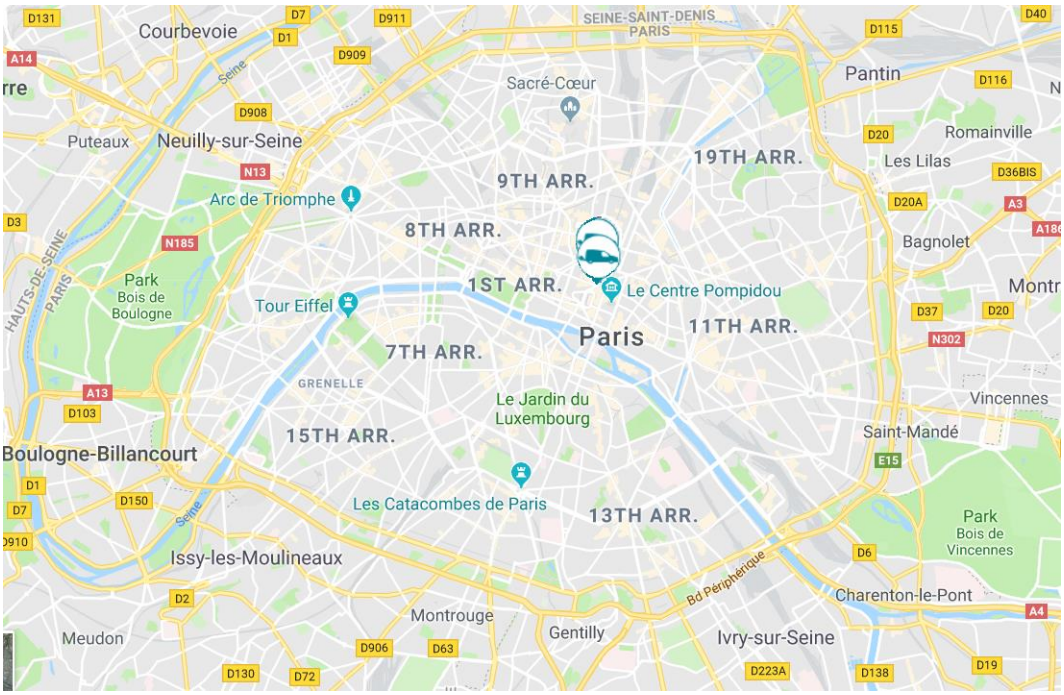
Some rules of use:

- 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;
- Ability to register multiple drivers on a single account.

The Figure below shows the access points of the vehicles:



11. Figure The access points of the vehicles
Source: www.vulepartages.fr

However, the best solution could be due to a synthetisation of all four best practices and working out a Freeport-specific solution.

4.1 Action: Alternative fuel based recharging stations

This action plan details the problems, needs and challenges of FBL as a multimodal terminal. It presents the systems currently in use and the realistic needs and challenges to face with while establishing an alternative fuel-based recharging station.

In the last mile of the supply chain is the distribution process - the most critical because lots of difficult operational decisions are made during this part of the transportation which have a huge effect on the whole system (causes up to 28% of the total delivery cost). For example, they can affect the quality of services, the length of delivery routes and the contact with the final costumer. In this segment they can cause a lot of positive and negative externalities too.

In the last mile delivery, the most widespread transport mode is road although according to the cities' feature, they could choose rail or even waterway transportation. Because of this fact, the road freight transport is the most responsible for the externalities related to the delivery. The reduce of these can be reached only by increasing the efficiency of delivery logistics and/or reducing the negative externalities. This can be the main challenge for the last mile delivery which will end in a smart city conception where they will build up an efficient and sustainable system in the future.

We would also like to establish a commercial electric vehicle system in the Freeport of Budapest which could be used by everyone like in this good practice example. But in our case, the main profile would be the usage of the charging station and only with the cooperation of MOL Plc. could be achieved the operation of an electric vans fleet (link by references).

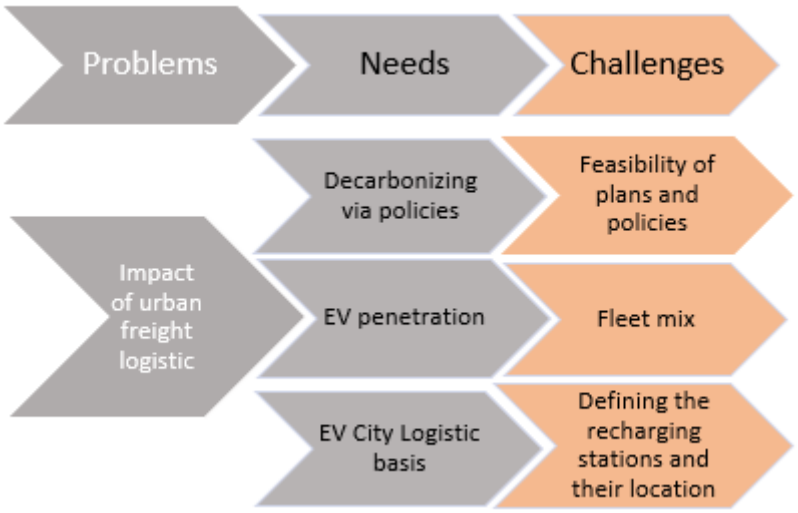
The company, MOL Plc. has already an operating carsharing system including 100 electric and 300 gas-powered white Volkswagen Up! or eUp! and 50 Mercedes-Benz A-Class cars for the luxury enjoyment. The following system operates within the boundaries of Budapest. In addition, it is important that the company operates a refinery in the port of Csepel, which means that it already has a corporate site there.

4.2 Main challenges tackled

The previous chapters have revived the needs to decarbonise the last mile distribution in the urban freight transport systems of the Budapest regions and introduced some best practices to easy the adaptation of this new transportation method. The most important challenges are examined along the identified needs:

- The challenges related to the feasibility of plans and policies;
- The challenges of establishing an ideal fleet mix applying EVs;
- The challenges of finding the ideal solution for e-charging solutions at the logistics base;
- The challenges related to the identify the ideal location of the e-city-logistics base.

These challenges combined with the relevant needs are shown in the Figure below.



12. Figure Summary of AS-IS analysis
Source: Own editing

Feasibility of plans and policies

As discussed in the previous chapter, in order to achieve a shift to e-mobility in city logistics, there is a clear need for supporting policy measures. When it comes to realisation, the major question becomes the feasibility of these plans and policies.

A multicriteria analysis of policy measures supporting the adoption of electric vehicles in urban road freight transport carried out by the Hamburg University of Applied Sciences in 2015 (link by the references), collected the opinions of policy makers and EV users in German cities. (The research has been analysed more deeply in the situation analyses.)

The research promotes seven policy measures as recommended ones, based on the evaluation by the two target groups. The following table summarises the most recommended measures to support the use of EV in urban freight transport, and the current status of these policy measures in the Budapest region.

2. Table Recommended policy measures and their status in Budapest region

MOST RECOMMENDED POLICY MEASURES (TAEFI ET AL.)	CURRENT STATUS IN THE BUDAPEST REGION
1. TO SUPPORT PILOT PROJECTS WHICH SUBSIDISE THE PURCHASE PRICE OF THE FREIGHT EVS (PROJECTS).	Such subsidy schemes exist only for private owners (natural persons) to buy electronic passenger car, no subsidies are available for companies. The state as an owner promotes pilot projects focusing on the purchase of EV fleet in some state-owned companies (e.g. the Hungarian Post), therefore in this role, contributes to the financing of such pilots.
2. TO OFFER A FISCAL DEPRECIATION OF 50% IN THE FIRST YEAR AFTER PURCHASE (AFA).	No such measures are introduced in Hungary.
3. TO SUBSIDIZE THE IMPLEMENTATIONS OF FREIGHT	Companies purchasing freight EVs are offered different tax incentives. No car tax, no registration fee and no administration fee to be paid after these vehicles. The

	EVS BY OFFERING TAX INCENTIVES (TAXINCENT).	annual value of these tax incentives may reach EUR 1000 per vehicle.
4.	**TO REQUEST EMISSION-FREE FREIGHT VEHICLES IN FLEETS THAT OFFER A TRANSPORTATION SERVICE TO THE MUNICIPALITY (TENDERS).**	This measure is not applied in the Budapest region. However, it must be stated the currently such a requirement would strongly limit the competition as very few companies actually possess freight EVs. Therefore, this measure could only be introduced in a later stage of maturity.
5.	**TO ALLOW DRIVERS WITH A CLASS B LICENSE TO DRIVE FREIGHT EVS OVER 3.5 TONS (DRLICENSE), TO TRANSPORT A SIMILAR PAYLOAD TO DIESEL VEHICLES DESPITE THE HEAVY BATTERIES.**	No such measures are introduced in Hungary.
6.	**IN LONG-TERM, TO OFFER PURCHASE PRICE SUBSIDIES FOR FREIGHT EVS (CASH)**	No such subsidy schemes exist (see point 1. for more details).
7.	**IN THE LONG TERM, TI IMPLEMENT A CITY TOLL**	The introduction of a city toll (similar to the one used in London) is being discussed in Hungary for over a decade now. However, the city leader recognise that this measure cannot be feasible during the next years.

Source: Own editing based on the TAEFi et al. document

According to these results, it seems that the Budapest region is facing the challenge of not selecting an optimal policy mix to support the use of freight EVs in city logistics.

Fleet mix

Companies in most of the case are using EVs in delivery fleets with other kinds of vehicles. It is because they have to calculate with the high purchasing costs from EVs and their limited range, so in some cases where the target is too far, or the delivered package is too big and cannot managed with one EV route, then it is better from cost efficiency site not to operate with an EV. Reasons like this generate mix type of fleets.

A research was also carried out to show the current state (EV types and conditions) in the world and in Hungary. EVs are more widespread abroad than in our country. EVs are more widespread abroad than in our country, a lot of companies using these technologies to act more nature friendly and to reduce their negative externalities according to last mile transportation. The Table below shows the currently EV supply in Hungary.

3. Table EV supply in Hungary

		RANGE (KM)	**LOADING SPACE (M^3)**	**(~KG)**	**BATTERY (KWH)**	**CHARGING TIME (MIN)**
NISSAN	E-NV200	280	4,2	770	40	40
RENAULT	Master ZE	200	8-19 (3 sizes)	1000-1100	33	360
	KANGOO Z.E. 33	170	3-4	650-800	44	
PEUGEOT	Partner Electric	170	3,3-4,1	625-850	22,5	min. 510 (fast charger 80 % 30 min)

CITROEN	Berlingo Electric	170	3,7-4,1	636	22,5	min. 480 (fast charger 80 % 30 min)
MERCEDES-BENZ	Evito	150	6,6	1073	41,4	360
VOLKSWAGEN	e-Craft	160	10,7	1175	35,8	

Source: Own editing based on companies' website

Defining the recharging stations and their location

The limited driving range has to be mentioned by EVs as well. Unlike conventional vehicles, these have to be charged after a specified kilometre because of the short length of their batteries. In order not to be this fact for users a restriction there should be a wide range of uploading options so that the spread of this service will be insured. Because of this reason the following topics were analysed:

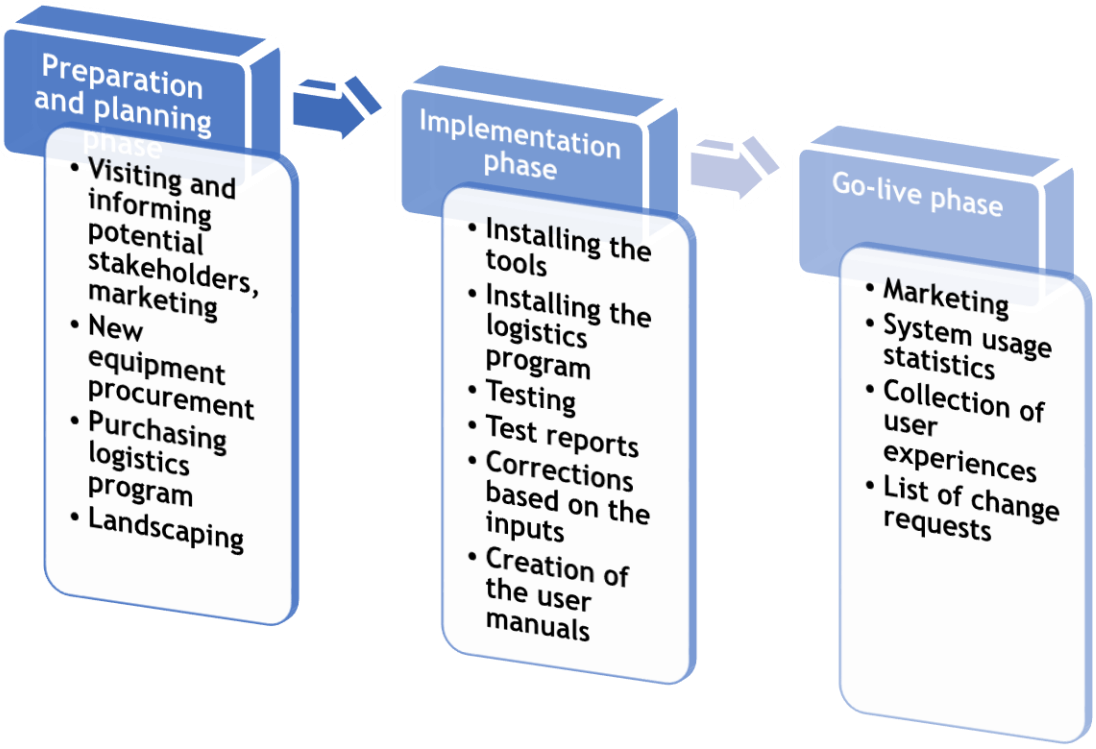
- the number and kind of refuelling stations to establish
- the location of these stations
- their optimal capacity

The results of these scenario and supply analysis clearly show that the Freeport of Budapest is an ideal location to become a base for e-city-logistics. Its proximity to the city centre and retail areas allow relatively low-range electric freight vehicles to take a full delivery round without a need to recharge during the route. This unique comparative advantage and the available infrastructure make the Freeport the number one potential location for e-city-logistics in the Budapest region.

4.3 Tasks to be performed

The goal of the actions is to introduce the establishment of a logistic base which is based on electricity in the Freeport of Budapest.

On the basis of preliminary consultations with the Freeport of Budapest and with NKM Mobili, the following steps which are shown in the following Figure should be taken in order to achieve this goal.



13. Figure Phases related to this action plan
Source: Own editing

The action plan involves three phases. The first phase focuses on the preparation and planning. So, during this period, purchasing of the needed equipment and system happens and also the developing of the necessary space in the Freeport of Budapest. After these important starting actions, the implementation begins, which is the Phase 2 of the action plan. The pilot operation is designed to install all tools and to test the operation in a demo mode, to see if there is any mistake in the planned operation or if we should recalculate, correct something.

Based on the results of Phase 2, the third phase can be initiated targeting a widespread introduction of the proposed solution with the help of marketing tools in the region of Budapest and the collection, analysation of the users' experiences.

In the following part of the action plan, we provide more detailed explanations about the goals and the content of each action.

Preparation and planning phase

The first phase is the preparation and planning phase. This is the most important phase, because it is necessary to determine at the beginning what the actual demand is for the planned system, and on this basis the purchasing-volume of the technical goods will be also decided.

Visiting and informing potential stakeholders, marketing

With the help of this action, the real need for a new system will be determined. Some in-depth interviews will take place and surveys, tests will be circulated among potential stakeholders. It is also a marketing tool to use for persuading them to join to systems providers or to group of users.

Business model development and assessing potential stakeholders

The main task of the prefeasibility study, which will be elaborated in the near future, is to develop the business model of this new system. The list of stakeholders will be also evaluated to see if they have enough commitment to use or to provide services.

Choosing the operator

The Freeport of Budapest has already visited businesses that could be involved in the system as an operator. The most likely of these is MOL Plc., which already operates a carsharing system and one of its subcontractors is located within the harbour. However, further discussions are also needed with him.

Finalising the technical content together with the operator

If we already have a concrete operator, we can finalise the technical parameters based on his needs. This is a very important action, because the next task can begin only after this.

New equipment procurement

Vehicles, chargers and their accessories will be purchased together. After analysing the finalised technical content and the business model, the well-considered procurement can begin.

Detailed technical requirement specification

Considering the project goals, a technical specification with detailed requirements for the solution to be procured must be developed.

The following topics should be included in the specification:

- A detailed description of the business model that the equipment has to support;
- Defining all kind of needed resources for each process e.g. vehicles, chargers;
- Defining the features of the equipment e.g. performance, availability and charging time, range;
- Quantity to be purchased.

It is important to involve experts in the specification period because they have the knowledge of the advantages, disadvantages in connection with these products and can also provide useful ideas for the new system to be developed.

Start of procurement

The next step is to start the procurement. With the help of a public procurement consultant we can collect the necessary information e.g. operational details of the procurement process and start the process through the official interface.

Purchasing documentation

In the case of public procurement, we must also specify what supporting documents we expect from the tenderers. For example:

- Technological characteristics;
- Proof of past performance or certain activities carried out;
- Signature specimen.

But also, we have to provide some essential documents. For example:

- Notice of initiation;
- Technical description;
- Tutorial;
- Additional information if there is a special request;
- Proposed contractual terms.

As contracting authority, we are also required to specify how the documents should be delivered to us:

- In an electronic way;
- By post;
- Personally.

Evaluation criteria system

The Purchasing Documentation must be compiled in such a way that it includes the selection criteria of the tenders.

From the technical side:

- The cheapest solution is usually not worthwhile in the long run, so more can be lost than saved on purchasing;
- Not the appearance of the system is important, but the services it provides;
- Own experience should be also obtained with the help of reference visits during the selection process;
- Multiple systems to compare, detailed analyses of their advantages and disadvantages performed.

From the supplier side:

- Offer from too many candidates (usually 3-5 competitors) should not be asked. Due to the large number of suppliers, the entire procurement process can disproportionately deplete resources and time. Market research should be conducted before starting the procurement and the potential participants filtered out;
- To get to know the experiences of previous system implementation projects carried out by applicants, request references, and if possible, the representatives of the companies listed in the references contacted;
- To ask key players to participate in the procurement negotiations.

The selection phase may consist of one or more rounds. In case of a higher number of applicants, it is advisable to choose multiple rounds. In this case, after getting to know the incoming applications, it is only worthwhile to negotiate deeper with those suppliers that have the best offers for the needs and opportunities. In all cases, the evaluation of bids should be carried out in a transparent and objective manner in order to prevent future disputes.

Receiving and processing bids

Incoming offers are processed based on the evaluation criteria system. In the event of a deficiency, documentation to close the offer should be asked. If the bidding phase allows, personal consultations should be conducted with the applicants to clarify the details.

Decision supporting material / Decision

In order to facilitate the decision about the finalist bidders, a decision-making material is prepared for the decision-makers. The decision-making material is based on the results of the evaluation criteria system.

Purchasing logistics program

There is also a need for a system for monitoring the arrival and departure of vehicles in order to ensure permanent service due to the forecasted-based planning.

Determining operating parameters

We should determine some parameters to be able to develop a s system-specific program by IT companies. For example, the followings:

- Maximal operational capacity e.g. number of charging places;
- Performance of chargers e.g. charging time, voltage;
- If human resource is needed or not;
- Non-technical information e.g. opening hours.

Purchase rights after designing an IT program

In order to have an operational program, we need to acquire the rights to it and then make it legal to use it exclusively for our logistic base.

Landscaping

The area has to be suitable for installing chargers as soon as the equipment are delivered. There landscaping in the Freeport of Budapest is necessarily.

Implementation phase

The second phase is related to the implementation. Six action should be done during this period.

Installing the tools

Firstly, the delivered tools have to be installed based on the previously prepared plans. There are some rules in connection with the installation. For example

- Minimum distance between charging stations;
- Set of steps for assembling;
- Background infrastructure needs of the system.

Installing the logistics program

Firstly, we have to install the required components using the installation tools of the program. The IT program may ask some specifying preferences such as:

- The installation location;

- Supplying passwords;
- Specific features.

In most of the cases they offer a wizard-based interface which eases the installation method.

Testing

The vehicles, chargers and IT system will be tested during operation in the Freeport of Budapest. This testing is crucial in order to be able to assess the applicability of the whole system in real life conditions.

During the tests, electric vehicles will be charged parallel and be loaded to transport the goods to their destinations. The tests will be implemented under different weather conditions and different quantity of goods and transport distance.

Test reports

During the tests, detailed measurements will take place in order to collect all relevant data on the operation of the logistic system. The data collected will be analysed and evaluated, to provide feedback for the further development (or full adequacy) of the system.

Corrections based on the inputs

Incorporating the results of the tests, a final term of use will be developed and if corrections are needed then they should be done before the next phase.

Creation of the user manuals

Once the final term of use is ready, handling manuals will be developed for all relevant users including logistic base operators, port maintenance staff and passenger and post service providers. The materials will be developed in at least two languages: Hungarian and English.

The handling manuals is developed in close cooperation with FBL and other experts.

Go-live phase

The third phase is the introduction of the service into the market which can start only after the first two phases. So, based on the results of the previous actions, the Go-live phase can begin.

Marketing

We provide information (as well as promotional materials if they ask) to all businesses to get to know about the availability of the electrical logistics base. As a result, we expect that the range of users will expand. Marketing tools could be:

- Personal contact;
- Social media;
- Online marketing;

- Exhibitions related to renewable energy sources;
- Local press.

System usage statistics

An indicator is a measurable or tangible (concrete) sign that something has been done. So, for example, an increase in the number of EVs on roads is an indicator of an improved, eco-friendly economy. Our statistics will also use indicators like this to identify trends in a larger and smaller area, based on which we can draw conclusions about the utilisation of the base and its demand.

Collection of user experiences

It is important to be aware of the impression that users have while using the system, so their experiences. For this reason, we should collect and analyse them to be able to quantify the user experience.

There are many ways to collect data from users and several different tools to help us with that. Here are a few options:

- User surveys;
- User interviews;
- Observation.

We can request information from users about the following system features:

- Efficiency;
- Speed of Performance;
- Time spent;
- Effectiveness;
- Errors;
- Safety;
- Satisfaction.

List of change requests

The change request feature allows users to suggest changes to existing operating conditions. For example, introducing a new feature or redesigning an existing one.

The list of modification requests contains all the details of the changes to the previous state, as well as requests of the changes awaiting approval, in order to manage them more efficiently. With the help of this list, we can see when a change was requested, who requested it, and even the change that they want to make.

Another prerequisite of successful implementation is the presence of an overall project management.

There are a number of project management activities that need to be continuously provided throughout the project life cycle to ensure the success of a system implementation project.

These are the following:

- Overall project management;
- Risk Management;
- Quality assurance;
- Change management.

4.4 Key actors

This chapter aims to identify the main stakeholder groups (businesses, public and private organisations, etc.) or players that have a real or potential interest in the TalkNET networking and in the proposed project ideas and in their context. These actors will potentially be affected by the outcomes of the TalkNET project related to deployment of alternative fuels in the FBL.

Internal actors within the Freeport of Budapest are those who determine the operational and management circumstances or provide different logistics services.

Internal stakeholders are as follows:

- The port owner of Freeport of Budapest (MAHART Freeport Plc.);
- The port manager organisation (FBL);
- The tenants, which are port operator companies with real logistic activities and services.

External actors outside the Freeport of Budapest are legislative or institutional public or private bodies, which are drivers or catalysts for regulating the operational framework of non-existing or spontaneous existing city logistics practice in Budapest and or in Freeport.

External actors outside the Freeport of Budapest:

- Freight forwarders;
- Passenger companies that might have the intention to carry also goods in the future.

The following table contains the most relevant or potential stakeholders in both internal and external level, by describing their activities, identifying their general needs or in some cases some special needs in terms of city logistics, and also their level of involvement is also defined below.

4. Table Key actors related to this action

STAKEHOLDER	LINKED PARTNERS	KIND OF ORGANISATION	DESCRIPTION	STAKEHOLDER'S NEEDS	LEVEL OF INVOLVEMENT
Ministry of Innovation and Technology	Freeport of Budapest Logistics Ltd. (FBL)	Public body/authority Responsible for national transport development	100% owner of the MAHART Freeport Plc.	Stable operation	Indirect involvement in project implementation.
MAHART Freeport Plc.	Freeport of Budapest Logistics Ltd. (FBL)	Port owner and port operator (public body)	Represents the owner rights	Stable operation	Direct involvement in project implementation.
Freeport of Budapest Logistics Ltd. (FBL)	-	Port manager	Responsible for running and maintaining the Freeport of Budapest. Maintenance: coordinated operation and development of the entire port by law. From 2005 FBL is the director of Freeport of Budapest. Main profile of the company is to operate and develop buildings in the area of the Freeport, renting treatment.	Attracting new clients and serve, the existing ones by providing appropriate infrastructure (e.g. for tenants' needs optimised buildings) and efficient marketing activity. Enhance the enabling of the technologies in the port to give better service and conditions for operation. Energy and maintenance cost saving operation and infrastructure development.	Direct involvement in project implementation.
Tenants (more than 60 different service providers) and potential tenants	Freeport of Budapest Logistics Ltd. (FBL)	Private companies	Dealing with different logistics and storage activities.	Interests in development of a wide range of services, enhancing networking among logistics	Indirect involvement in project implementation as user.

STAKEHOLDER	LINKED PARTNERS	KIND OF ORGANISATION	DESCRIPTION	STAKEHOLDER'S NEEDS	LEVEL OF INVOLVEMENT
				companies, freight transport operators.	
Freight forwarders	Freeport of Budapest Logistics Ltd. (FBL)	Private companies	Companies with storage and transhipment needs	Interests in development of combined freight transport, and cost-efficient transhipment	Indirect involvement in project implementation as user.
MLSZKSZ (Hungarian Association of Logistic Service Centers)	Freeport of Budapest Logistics Ltd. (FBL)	Association of private logistics operators	Interests in development of combined freight transport, increasing the inland and international competitiveness of its members.	-	Indirect involvement in project implementation.
MOL Limitless Mobility Ltd.	Freeport of Budapest Logistics Ltd. (FBL)	Private carsharing company	Dealing with carsharing service.	Interest in freight forwarding	Indirect involvement in project implementation as potential service provider.
Passenger services - Taxi	Freeport of Budapest Logistics Ltd. (FBL)	Private companies	Dealing with passenger transport.	Interest in developing charging stations	Indirect involvement in project implementation.
Post services	Freeport of Budapest Logistics Ltd. (FBL)	Private companies	Dealing with a variety of postal and financial services	Interest in developing charging stations	Indirect involvement in project implementation.
NKM Mobiliti	Freeport of Budapest Logistics Ltd. (FBL)	Private company	Dealing with establishing charging stations	Interest in selling chargers and giving information about charging systems	Direct involvement in project implementation.

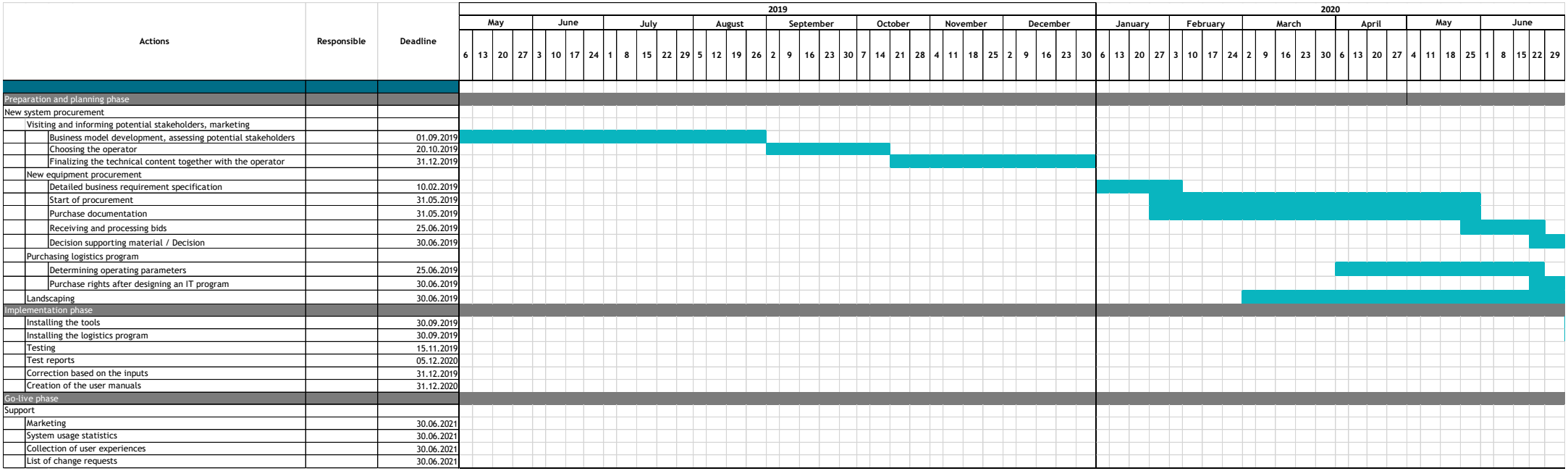
Source: Own editing

Besides the stakeholders, further key actors are:

- Development team of the logistic system;
- Overall project management team during the implementation.

4.5 Timeline and financial resources

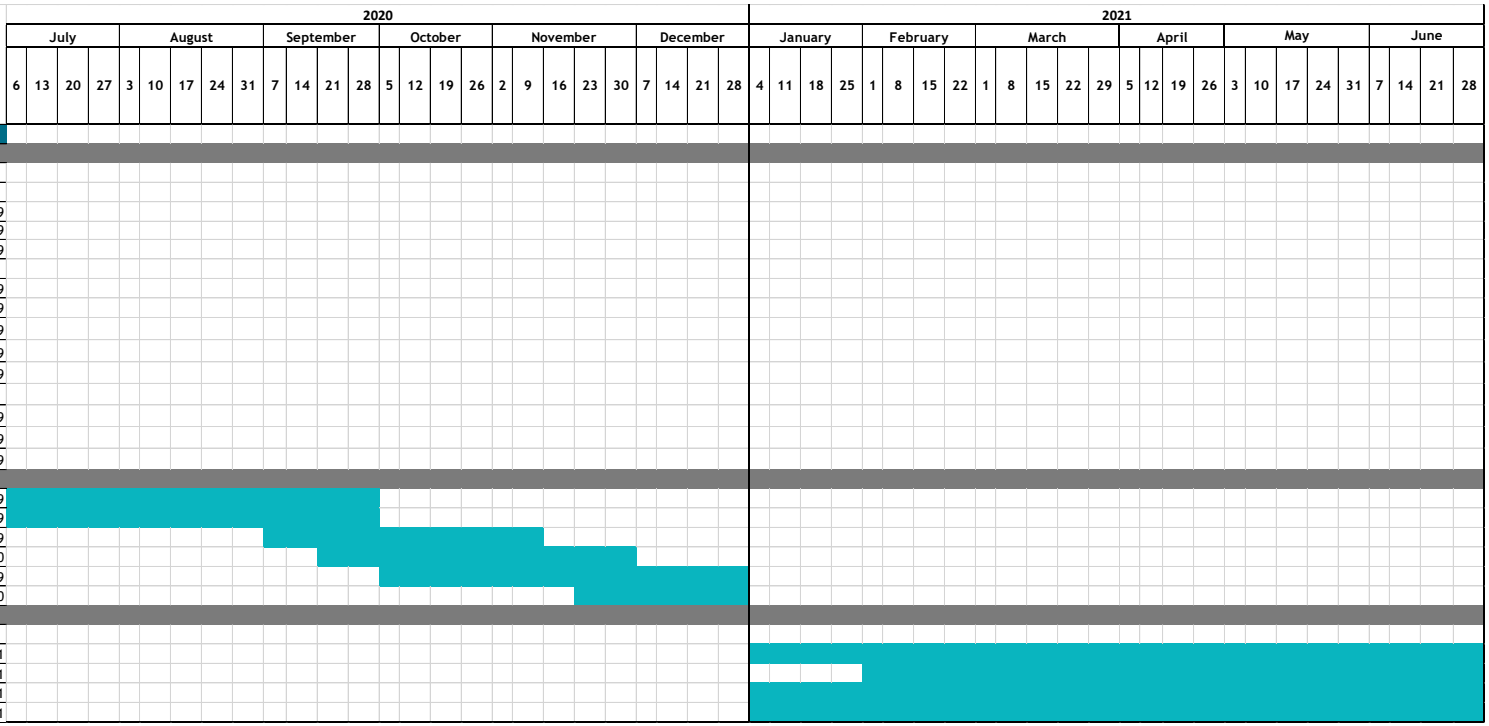
The Figures below show the planned timeframe of the action.



14. Figure GANTT for the period from May 2019 to Juky 2020

Source: Own editing

Actions	Responsible	Deadline
Preparation and planning phase		
New system procurement		
Visiting and informing potential stakeholders, marketing		
Business model development, assessing potential stakeholders		01.09.2019
Choosing the operator		20.10.2019
Finalizing the technical content together with the operator		31.12.2019
New equipment procurement		
Detailed business requirement specification		10.02.2019
Start of procurement		31.05.2019
Purchase documentation		31.05.2019
Receiving and processing bids		25.06.2019
Decision supporting material / Decision		30.06.2019
Purchasing logistics program		
Determining operating parameters		25.06.2019
Purchase rights after designing an IT program		30.06.2019
Landscaping		30.06.2019
Implementation phase		
Installing the tools		30.09.2019
Installing the logistics program		30.09.2019
Testing		15.11.2019
Test reports		05.12.2020
Correction based on the inputs		31.12.2019
Creation of the user manuals		31.12.2020
Go-live phase		
Support		
Marketing		30.06.2021
System usage statistics		30.06.2021
Collection of user experiences		30.06.2021
List of change requests		30.06.2021



15. Figure GANTT for the period from July 2020 to July 2021

Source: Own editing

4.6 Expected results

The main expected result is by this alternative fuel-based recharging station and government subsidies to reach fully EV-based fleets which are operating during the last mile logistic. These would cause a better environment quality and a lot of cost reductions for companies due to lower operational costs and for government as well due to lower mitigation and adaptation costs. So, this theme can be dealt only as a future investment with high starting 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 maybe higher level of coordination in the area of Budapest. Thus, the planned development has a clearly positive environmental effect contributing to the reduction of carbon dioxide emissions of the trucks entering into the area of Budapest.

Another positive effect of these actions is the solution to the earlier mentioned needs and challenges related to the use of electric vehicles. The following challenges will be answered:

- *Feasibility of plans and policies*: If the government has got a higher pressure due to the increasing number of EVs then it will be more likely the creation of plans and policies to regulate the operation of EVs;
- *Establishing an ideal fleet mix applying EVs*: The charging station itself already has an incentive role and can facilitate the deployment of electric vehicles by providing them a central charging option that extends the available coverage area for transporting. In addition, if the port successfully negotiates with MOL Plc., then an alternative fuel-based fleet will also be established.;
- *Finding the ideal solution for e-charging solutions at the logistics base*: The chosen logistics base is the Freeport of Budapest which enables to freight forwarders and other logistic service providers to charge their electric vehicles in an appropriate environment (located in the city center, brand new equipment, contact with other potential companies etc.);
- *Identifying the ideal location of the e-city-logistics base*: The Freeport of Budapest is an ideal location to become a base for e-city-logistics based on its proximity to the city centre and retail areas which allows relatively low-range electric freight vehicles to take a full delivery round without a need to recharge during the route. Available infrastructure is also in the FBL.

All in all, the Freeport of Budapest will achieve a sustainable economic growth and maximum benefit for its customers and the people who are affected of urban freight transport's externalities. Because this new system will also help to minimise the environmental impact of the port and its vehicles to be a good example for other logistic service provider companies in the future.

To reach these goals, 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.

4.7 References

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5. Cluster - Energy efficiency solutions: overview of needs and practices in cooperation with stakeholders to develop the action plan

16. Figure - Arial picture of FBL
SOURCE: HTTPS://TERVLAP.HU/CIKK/SHOW/ID/6340#PID=5)

Freeport of Budapest is the biggest multimodal terminal of Hungary, connecting road, rail and inland waterway transportation routes. As one of the most significant Central European intermodal transportation hubs, FBL's imperative need is finding an alternative transhipment method to support the modal switch from road to rail and barge.

It is a common European aim to increase the volume of combined transport routes (where the delivery of freight is completed by rail or waterway between the point of delivery and the origin; only the first/last mile is taken on road). This could be one of the key factors in the efficiency improvement of European freight transportation.

The average share of rail within European freight transport modes is lower than 18 %, barge is below 6%. The rest of the share is taken up by road transportation. To reach a significant change in the freight modal split, the White Paper on Transport (link by the references) initiates that 30% of road freight over 300 kilometres should be shifted to other modes such as rail or waterborne transport by 2030 and over 50% by 2050.

To serve this need **FBL is searching for a transhipment method to be utilized in a wide range**. It should not require large investment and maintenance costs and should be handled easily.

Vast majority of semi-trailers used in freight transport are non-cranable curtainsider trailers. In order to redirect the most possible vehicles from road to rail, FBL **needs to find a solution that is applicable to non-cranable semi-trailers.**

Both the occupancy of the port and the transport load are increasing year by year, and the tendency is expected to continue to do so in the future. There are three potential sites where the planned transhipment facility could take place. (See figure below.)

17. Figure Suitable areas in the port for the new transhipment method
SOURCE: FBL

Problems deriving from the non-satisfaction of the need:

Combined transport routes are cost effective, safer and more predictable compared to road transport. Traffic congestions and transport restrictions are also less likely to occur on road. By 2030 freight transport is expected to grow by 30% with all its negative effects. Between 2005 and 2013 combined transport has increased by 41% and this growth must be supported further as rail freight transport emits 9 times less CO2 and uses 6 times less energy than road freight transport (link by references). Steps must be taken to swap as much traffic off motor roads as possible and transfer it to less emissive transport methods such as rail and waterways.

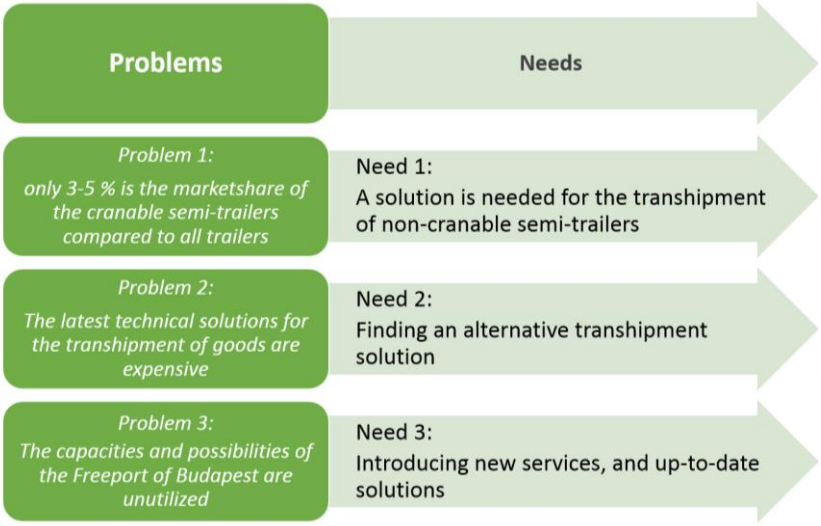
The important rail/road intermodal hubs are getting more and more saturated. Cranable trailers are much cheaper and easier to transport, but they are more expensive and get worn out faster than non-cranable ones. This is the reason for their significant share of the market which is over 95%.

Unfortunately, because the lack of capacities and transmission systems within multimodal hubs non-cranable semi-trailers are not welcomed to be transferred to rail – therefore they stay on the roads. The establishment of such transhipment solution would drive further trailers to rail instead of communal roads leading to CO2, energy and noise emission reduction, cost savings and use of less manpower and paperwork.

Needs

FBL needs to find a solution for its compelling need to transfer non-cranable semi-trailers from road to rail. The following steps are to be taken in order to comply with the initiatives of the White Paper on Transport:

- Finding an alternative transhipment solution: an easily maintained, cost effective transhipment solution for the alternative trailers;
- Solving the problem of transhipment of non-cranable semi-trailers: need to find an economic viable solution for the transhipment of non-cranable semi-trailers;
- Introducing new services: establishing up to date technical solutions for customer's needs, introducing high frequency direction trains towards Western Europe after the establishment of a CEE based combined terminal.



18. Figure Three identified pillars of needs
SOURCE: OWN EDITING

Cost effective transhipment solution for the alternative trailers

An altering point in the contribution of the port to the White Paper on Transport would be the establishment of a cost effective solution for non-cranable trailers taking up the vast majority of semi-trailers.

Only 6% of the trailers on the road are compatible with container cranes according to the Swiss Transit Traffic Gotthard Analysis (link by references). FBL's transhipment volume is increasing. The terminal needs to establish a wider range of facilities to serve further customers. A system capable of

transmitting approx. 95% of semi-trailers on the market with a flexible method would mean significant increase in the handled volume and it would contribute to CO2 noise, cost and road traffic reduction.

Transhipment of non-cranable semi-trailers

The majority of semi-trailers are non cranable curtainsiders. 445.000 trailers entered the terminal in 2018. Relying on the above statistics potentially 400.000 trailers entered the terminal that could have been transferred to rail, if FBL had the necessary facilities. FBL is directly linked to the Marshalling yard of Soroksár, handling freight traveling to or through Budapest being the intersection of three TEN-T lines.

The railroad track leading to the FBL terminal from the marshalling yard is used by various logistics companies located within its territory. Having a solution for the transition of non-cranable semi-trailers would result in significant increase in the handled and transmitted freight volume. This technical possibility shall give flexibility to the terminal when planning the loading units and it would also reduce the negative effects of road transport.

Introducing new services and establishing high frequency direction trains

Handling an increased freight volume and having the technical possibilities to handle different types of semi-trailers would mean that the terminal is flexible and saturated enough to schedule high frequency direction trains. This would result in significant contribution to the initiatives of the White Paper on Transport as it would take a foreseeable number of semi-trailers off the road and tranship them to rail for longer distances.

Best practices

Other logistics centres and transportation terminals gave various answers to the transition of road freight to railways and the linked services. Here is an overview of the findings based on the Analysis on Eco-solutions deployment, based on the results of the first phase of the TalkNET project.

Vertical loading solutions

NIKRASA

The semi-trailer is driven to a mobile platform, the crane grabs the grab points of the mobile platform and lifts the semi-trailer to the wagon. The disadvantages of this solution are that the loading process is quite slow because of the mobile platform. It also reduces the possible carried freight weight.

19. Figure Loading a non-cranable semi-trailer with the NIKRASA system
SOURCE: HTTP://WWW.NIKRASA.EU/DE/STARTSEITE.HTML

Horizontal wagon-based solutions

FlexiWaggon

It is a Scandinavian system for the transition of complete trailers to railway. It is fast and easy to operate, the semi-trailers are not detached from the trailer. Its main strength is flexibility. The disadvantage is that the purchase and the operation of the wagons are expensive.

20. Figure Flexiwaggon system
SOURCE: HTTP://FLICKRHIVEMIND.NET/TAGS/MEGASWING

Horizontal systems, special wagons and infrastructure

CargoBeamer

This system consists of a terminal and of special mobile platforms with sidewalls covering the tires. The semi-trailers have to be driven on the platforms than a container crane or a reach stacker can lift the mobile platform with the semi-trailer on to the train. The loading of a 700 m long train with 36 semi-trailers can be done simultaneously within 15 minutes according to the company. The disadvantages are the high investment costs, as both the cranes and the mobile platforms are very

expensive. Other disadvantage is that continuous and balanced traffic volumes are necessary to keep the operations profitable as otherwise the utilisation of the terminal is extremely difficult.

21. Figure Loading/unloading with the CargoBeamer system
SOURCE: HTTP://WWW.CARGOBEAMER.FR

LOHR Systems

This system consists of a hydraulic ground platform that turns the wagons of the train by 30 degrees to upload and download the semi-trailers. Its benefits are that no cranes are necessary, the upload and download of the semi-trailers can be done simultaneously within 1,5 hours on a 700 m long railway track. The positivity of this system is that its size can vary up to the implementer's needs and possibilities. There is also a possibility to develop a "plug-and-play" platform above existing railway tracks without the need of engineering or ground works. This gives the opportunity to download and reload a 700 m long train within a day by opening the pockets of 1 or 2 LOHR wagons at a time by streaming the train through the LOHR terminal.

There is the further possibility to establish a small or medium sized terminal. This results in opening 1 to 4 LOHR wagons at once or a 300 m long section of a train at the same time - than the rest after streaming the other side of the train through the terminal.

22. LOHR Platform
SOURCE: HTTPS://LOHR.FR/LOHRUPLOADS/2016/03/LES-SYSTEEMES-AU-SOL.JPG

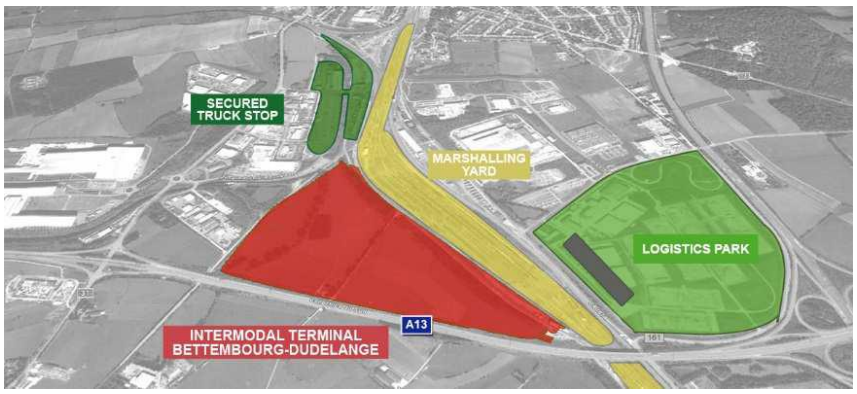
Best practice found: CFL Intermodal terminal in Luxembourg, Dudenlange

The CFL logistics centre lies on the TEN-T motorway line connecting the North-Sea and the Mediterranean, it is situated next to the marshalling yard of Bettembourg being the main freight

terminal of Luxembourg. The logistics centre became saturated in 2014 and after a two and a half year long construction it has opened a new container and combined terminal of 33 hectares.

It is open 24/7, provides intermodal connection mostly between road, rail, waterways (towards the North and the Baltic Sea) and air. It also provides regional last mile and industrial site rail services.

Combined transport in general is more efficient: rail freight transport emits 9 times less CO2 and uses 6 times less energy than road freight transport. Unfortunately no specific information or analysis is available on the operation of this specific terminal in terms of CO2 reduction and energy savings (rail vs road).



23. Figure Map of the CFL Intermodal terminal

SOURCE: PRESENTATION OF DR. IMAD YENAYEH, MLSZKSZ INTERNATIONAL TRANSPORT LOGISTICS CONFERENCE, 1ST FEBRUARY 2019.

The new terminal is directly connected to the Bettembourg marshalling yard on a side track that opens into a fan of six tracks within the terminal. Two of the tracks are used by the combined terminal. The other four tracks are used by the container terminal.

24. Figure Image of the new CFL Intermodal terminal

SOURCE: HTTP://WWW.CFL.LU/ESPACES/INFRASTRUCTURE/EN/LES-GRANDS-PROJETS/DESCRIPTIF-DES-PROJETS/LA-NOUVELLE-PLATEFORME-INTERMODALE

The newly built container terminal has a capacity of 300.000 containers /year. It operates with 2 gantry cranes and 2 reach stackers. On the side of the container terminal is a parking place for 840 semi-trailers and also a storage unit with a capacity of 3.425 TEU.

Both the container and the combined terminals are equipped with electronic weighing system and the latest security and surveillance systems. Each trailer entering the facility is photographed from all sides, the licence plates are read with an optical recognition system.

CFL also provides warehousing cross docking and commissioning, customs services and further services in the logistics chain.

25. Figure Lohr platform
SOURCE: HTTPS://LOHR.FR/LOHR-RAILWAY-SYSTEM/THE-LOHR-SYSTEM-TERMINALS/

The combined terminal operates two full pneumatic LOHR platforms of 700 meters. The core of the platform is a pneumatic system that lifts and turns the wagons by 30 degrees, containing the semi-trailers (detached from their carriers). The wagons are uploaded and downloaded in this rotated position with 6 jockey tractors simultaneously then secured by the personnel of the terminal. One full loaded train takes 40 semi-trailers loaded on 20 wagons. The capacity of the combined terminal is 300.000 trailers/ year. The terminal offers train connections towards France, Italy and Belgium and Spain. The company has ambitious plans on the extension of the cowered routes in the future. Taking into consideration that combined transport has increased +41% between 2005 and 2013 it is reasonable to expect rapid further growth in this sector.

26. Figure Existing and planned combined transportation routes of CFL
SOURCE: HTTP://WWW.CFL.LU/ESPACES/FRET/EN/RAIL/COMBINED-TRANSPORT

Through the implementation of the same system FBL could become a combined transport terminal within Central Eastern Europe. The Hungarian logistics terminal has the capacities and ideal geographical conditions for the implementation of this project.

The road freight traffic within the port has been 445.000 trailers at the freight entrance in 2018 and a little short of 30.000 wagons have entered the terminal. The number of wagons are expected to exceed 30.000 in 2019. When looking at the statistics there has been a relapse in 2017 because METRANS has opened a new container terminal South of FBL using its own railroad track from now on. Even with this loss the number of wagons almost doubled compared to 2012 and are expected to increase further with the coming years.

Year:	2012	2013	2014	2015	2016	2017	2018
Wagons:	15 974	20 494	21 259	22 981	23 921	19 752	28 725

27. Figure Number of wagons entering BFL in the last years

SOURCE: FEASIBILITY STUDY ON THE GUBACSI BRIDGE

The new container terminal established South of FBL lays on 14 ha with an added 12 ha storage area. It operates 2 gantry cranes. The incoming main track from the Soroksár marshalling yard fans out to 6 inside railroad tracks of 650 m. The container terminal deals with approx. 40.000 containers/year and this is expected to double by 2030.

The Freeport of Budapest is at the intersection of three TEN-T corridors. Through the fulfilment of above listed needs it shall become an ideal place to support and realise combined transport.

It is at an ideal location to become a Central Eastern European transportation centre. The direct connection to the Soroksár marshalling yard and the establishment of horizontal transition platform such as the one at CFL Multimodal would make BFL a significant CEE stakeholder in combined transport.

Carrying out the below detailed action plan(s) would assist the port in the transmission of semi-trailers from road to rail. One of the biggest challenges of freight transportation.

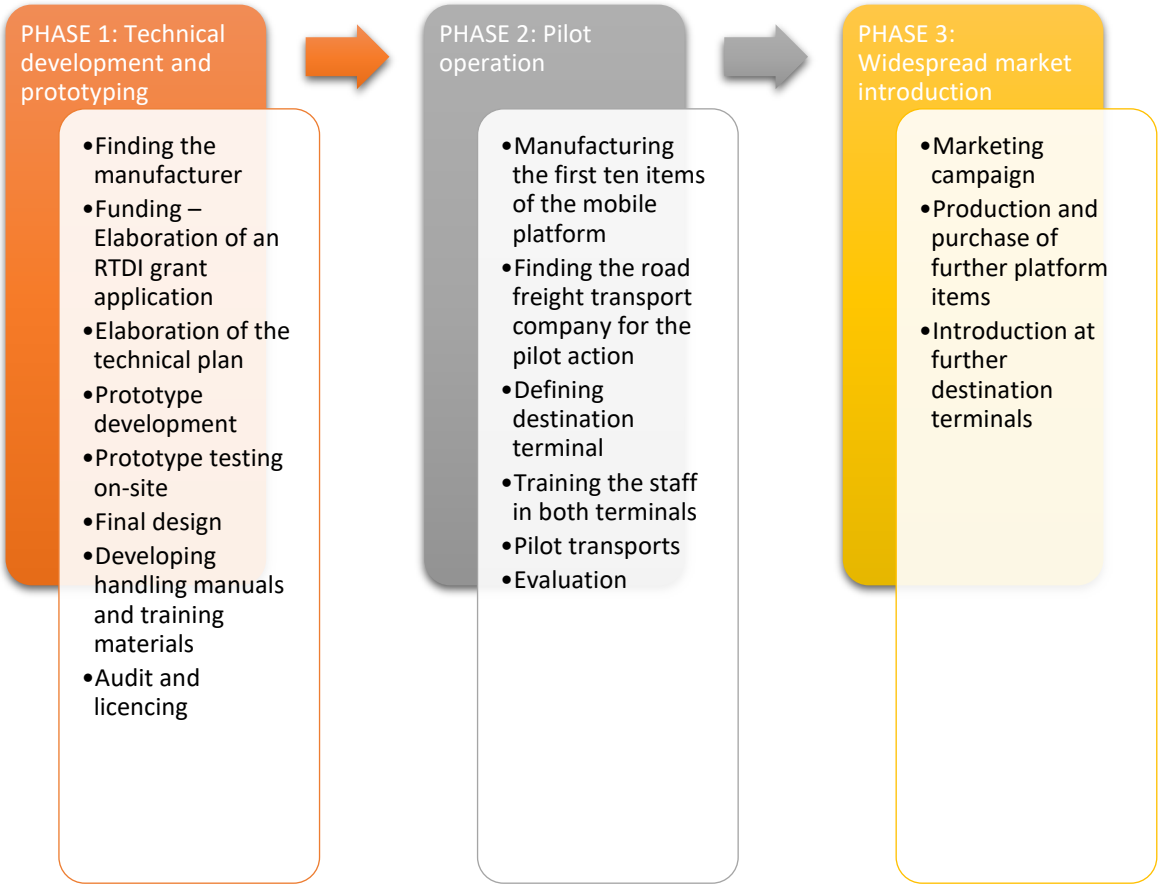
5.1 Action: Energy efficiency solutions - cranable mobile platform

This action plan of the TalkNET project refers to the problems, needs and challenges identified for Freeport of Budapest Logistics (FBL) as a multimodal terminal. It presents the knowledge tools that can be used to meet these needs and overcome the problems and details the required actions that are planned to be carried out.

FBL is searching for an intermodal transhipment method to be utilized in a wide range, more specifically, FBL needs to find a solution that is applicable to non-cranable semi-trailers.

The action plan is based on knowledge tools, involving several international best practices in this professional field. Several exiting solutions were analysed: the NIKRASA vertical loading solution, the FlexiWaggon, CargoBeamer and LOHR horizontal solutions. The latter was deeply analysed assessing its application at the CFL intermodal terminal in Luxemburg.

The actions were designed in a way to provide an adequate answer to the respective challenges, namely to create conditions for the device and to set up and advertise a new intermodal solution and service. For this purpose, the following actions were identified and designed:



28. Figure Actions of the introduction of the system of cranable mobile platforms
Source: own edition

The implementation of the action plan requires the involvement of several stakeholder and key actors, respectively:

- Ministry of National Development
- MAHART Freeport Plc.
- Freeport of Budapest Logistics Ltd. (FBL)
- ArcelorMittal Distribution Hungary Ltd.
- Ekol Logistics Szolgáltató Ltd.
- Ferroport Ltd.
- Ghibli Ltd.
- Kelet-Trans 2000 Ltd.
- MASPED Logisztika Ltd.
- MLSZKSZ (Hungarian Association of Logistic Service Centers)
- Varga Kreatív Mérnöki Iroda Kft.

- Brezovits Mérnökiroda Kft.
- Metallurgy manufacturing companies
- Waberers Intertrans Nyrt.
- RÉVÉSZ Trans Kft.
- Horváth Rudolf Intertransport Kft.
- Road freight transport companies
- Intermodal logistics hubs

The implementation period covers three years, starting from May 2019.

The main expected result is to reach a significant modal shift from road to rail of the cargo transported in non-cranable semitrailers using an innovative cranable mobile platform.
In order to achieve this result, the following outcomes are expected from the action plan:

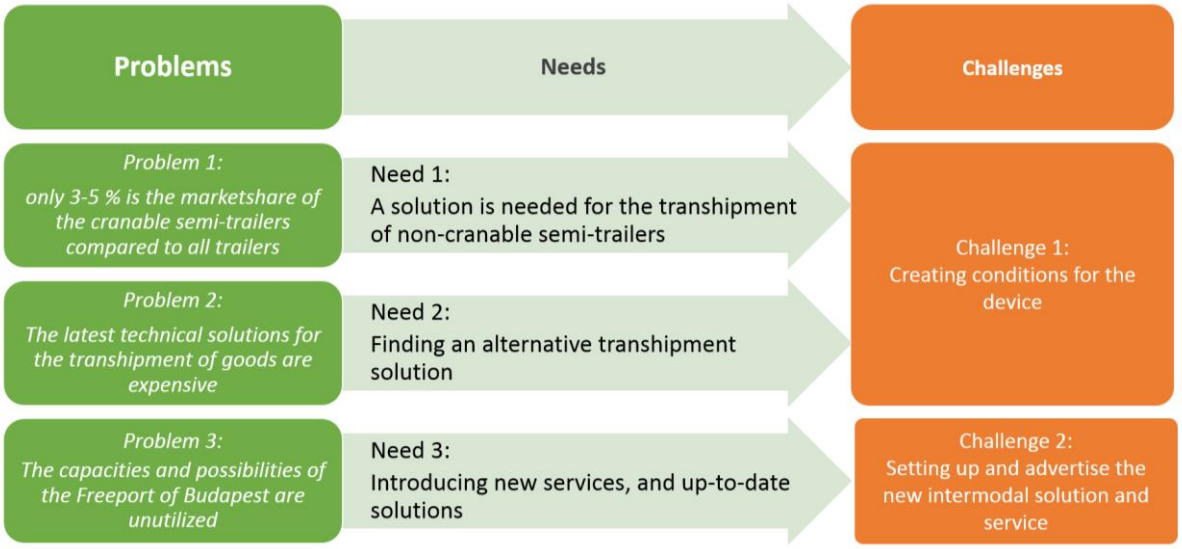
- a cranable mobile platform developed, tested and certified,
- a manufacturer for the mobile platform identified and contracted for cooperation,
- a road transport company and a destination terminal successfully involved in the pilot operation as cooperation partner,
- and the successful market introduction of the cranable mobile platform as a product.

After the successful market introduction, it is expected that the users and the transhipment volume of non-cranable semitrailers using the new mobile platform will gradually grow over the coming years. Through these achievements, a much better situation can be reached regarding the energy efficiency and consequently, the cost efficiency of the combined transportation system between the Freeport of Budapest and various destinations in the Central Europe region.

5.2 Main challenges tackled

The first phase of the TalkNET project identified the needs and challenges for the energy efficiency solutions, as it is summarised in the following chart.

The problems, needs and challenges altogether are the AS-IS analysis. The results of the analysis can be seen in the following figure.



29. Problems, needs and challenges for energy efficiency solutions at FBL
Source: Own editing

The first identified challenge is to set the technical basis for the development of new services. Namely:

- defining the possible area of the utilization of the new method, without interfering the daily routine of the port;
- defining the area dedicated to the storage of the cranable mobile platforms;
- securing the capacity of the cranes needed for operation and handling the platforms;
- securing the capacity of the gates and the road network to handle the increasing truck traffic in the surrounding of the port;
- securing the increasing need for shunting in the private railway network, inside the port.

According to the first assessment, there are suitable areas in the port which are (already or would be) able to handle this new transhipment method – as it was presented in Chapter 3.

The second challenge identified in the first phase of the TalkNET project was to set up and advertise the new intermodal solution and service. The new service is: high capacity and high frequency direct trains heading to several Western European cities. For the successful introduction of the new service it is necessary to advertise it between the regional freight forwarders and terminal owners.

According to the result of the Line No. 80 Masterplan the freight forwarders are making decisions with taking account the following circumstances, the order is the order of importance for them:

1. Punctuality
2. Price

3. Reliability
4. Transport time
5. Flexibility
6. Cargo security

The key for the economically viable operation is the high utilization of the capacities. The service will be popular among the forwarding companies if the service has good price, high frequency and the trains always in time.

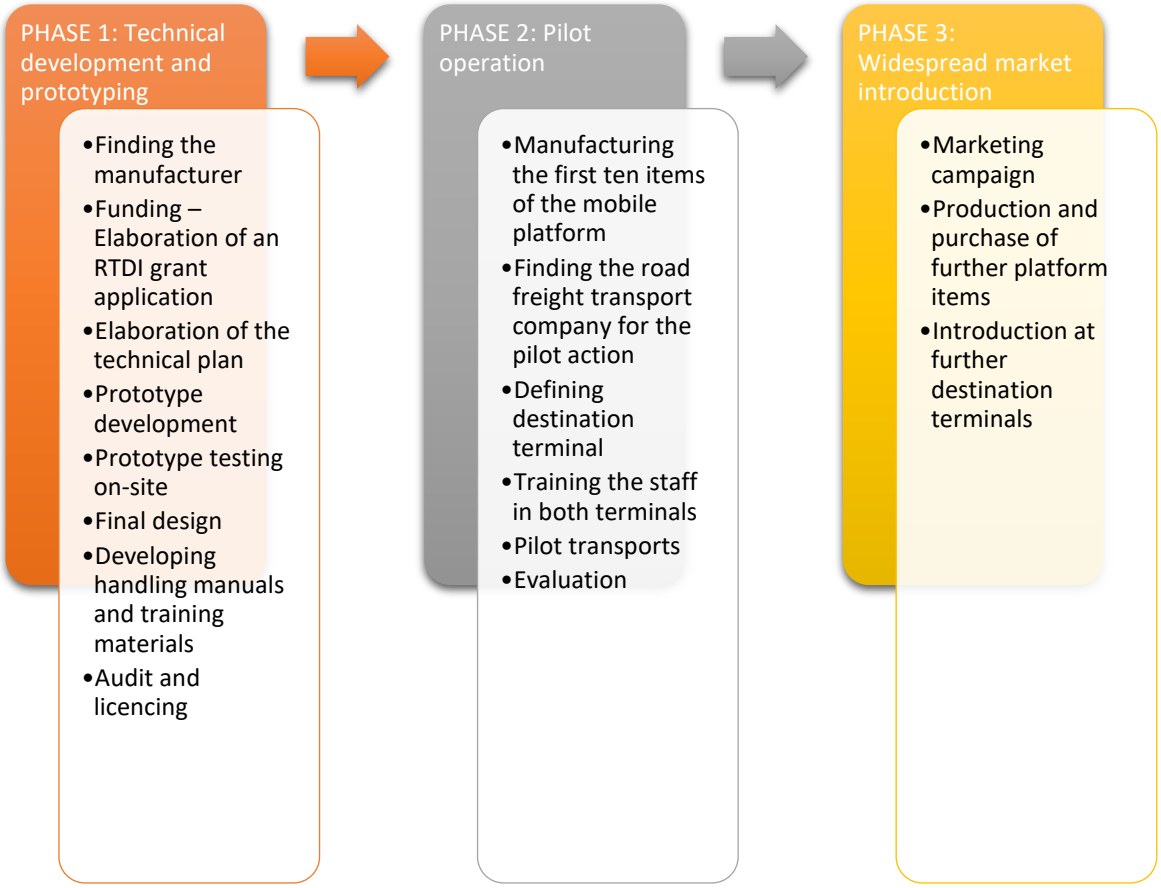
The current action plan is designed to provide adequate answers to the above challenges. The action plan involves the full process of introducing a new solution for the rail-road transhipment of non-cranable semitrailers, in order to serve as the technological basis for regular freight trains to Western European destinations.

5.3 Tasks to be performed

The actions designed are targeting the introduction of a newly developed system of cranable mobile platforms into the daily operation of the Freeport of Budapest as an intermodal logistics hub.

Based on the proposal from MLSZKSZ (Hungarian Logistic Operators Association), a simple system of rail-road transhipment consists only of a mobile platform for the non-cranable semi-trailers. The mobile platform (with the trailer) can be easily laid into the pocket of the standard sdggmrss wagon.

The below chart summarises the series of actions to be taken in order to achieve this goal.



30. Figure Actions of the introduction of the system of cranable mobile platforms
Source: own edition

The action plan involves three phases. As the cranable mobile platform to be introduced is not yet existing as a commercial product, the first phase focuses on the technical development and prototyping of the platform. As result of this first phase, the platform as a product will be available for the daily operation of the intermodal logistic centre, therefore a pilot operation can be launched, introducing Phase 2 of the action plan. The pilot operation is designed to test the operation in real-life commercial context, to see the market viability of the proposed solution.

Based on the results of Phase 2, the third phase can be initiated targeting a widespread introduction of the proposed solution in the CE region.

In the following part of the action plan, we provide for a detailed explanation of the rationale, goals and the content of each actions.

Technical development and prototyping

Finding the manufacturer

As described earlier, the cranable mobile platform is a concept of yet non-existing product. FBL as a logistics service provider is not able to become the manufacturer of this platform, as it requires the necessary production capacities in metallurgy.

Therefore the first step of the series of actions must be to identify and find the innovative manufacturer that is capable and willing to cooperate during the product development phase and later on, to provide the logistics market with the ready-made platforms.

FBL in close cooperation with FBL will approach several potential manufacturers in the metallurgy industry, seeking cooperation. The potential candidates will be assessed based on their capacities and competences, and the most adequate one will be selected for further cooperation.

Funding – Elaboration of an RTDI grant application

The technical development and prototyping of the new cranable mobile platform requires significant investment. The prototype development and the costs of testing amounts to 2 million euros. Currently, no market player is dedicated to finance the full development costs. To overcome this market failure, it is necessary to involve external funding from state aid schemes.

Currently, there are several different grant schemes available for such purposes, including both national and European funds.

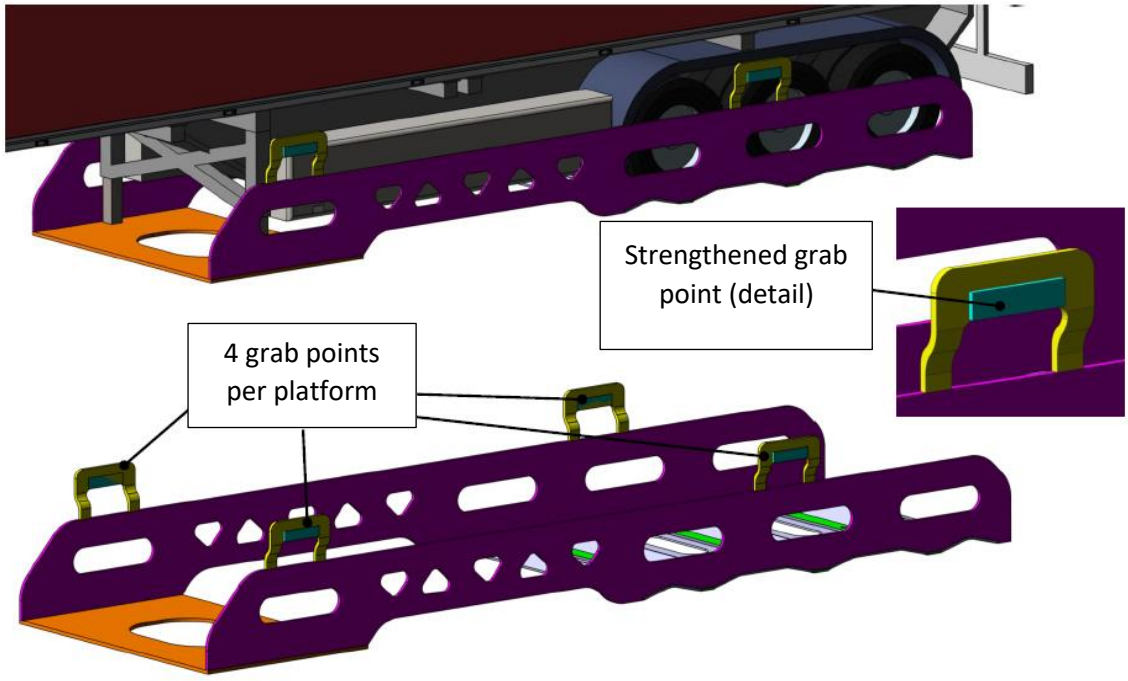
- The grant schemes offered by the Hungarian National Office for Research, Development and Innovation: the National Research, Development and Innovation Fund earmarked for RDI purposes, made up for balanced support of discovery research, targeted research and innovative businesses.
- The grant schemes offered by the Economic Development and Innovation Operational Programme (GINOP) in Hungary: there are several different ERDF-funded grant schemes targeting RTDI and prototyping projects from enterprises.
- The Horizon 2020 SME instrument: the SME instrument supports close-to-market activities, with the aim to give a strong boost to breakthrough innovation with a market-creating potential. Highly innovative SMEs with a clear commercial ambition and a potential for high growth and internationalisation are the prime target.

As a first action, an application will be elaborated and submitted, in order to gain the necessary funding for the technical development and prototyping phase. The application will be developed and the RTDI project implemented in close cooperation between the manufacturer and the Freeport of Budapest Logistics.

Elaboration of the technical plan

The technical design of the cranable mobile platform currently exists only in a form of a draft concept.

31. Figure The cranable mobile platform with the semi-trailer
Source: MLSZKSZ



32. Figure The cranable mobile platform with the grab points
Source: MLSZKSZ

The design concept must be developed into a detailed technical plan. This plan must describe the size, material, shape, durability and several other features of the mobile platform, in order to be able to launch the prototype production. The mobile platform shall be designed in a way to be fully compatible with both the non-cranable semitrailers and the different types of lifting devices (cranes, reachstackers) used in the port and in other intermodal logistic centres in the Central Europe region.

The design requirements will be defined by FBL and MLSZKSZ, and the effective designing to be done by the manufacturer, in a highly iterative process.

Prototype development

Once the technical plans are ready and available, the production of the first prototypes can be done. The action plan envisages the production of a total of three prototypes. The prototypes are not necessarily identical: the prototype development shall be done as a repetitively iterative process with the next action (on-site prototype testing), the test always giving feedback for further developments resulting in a new version of the prototype.

Prototype testing on-site

The prototypes produced will be tested in the Freeport of Budapest. This “in vivo” approach in testing is crucial, in order to be able to assess the applicability of the product in real life conditions.

During the tests, real, loaded non-cranable semitrailers will be used, placing them into real wagons using the very own lifting devices of FBL. The tests will be implemented under different weather conditions, using different types of semitrailers and a variety of lifting devices (cranes, reachstackers) available in the port.

However, the tests are carried out in a temporarily separated test site within the port, and the wagons with the prototype platforms on will not leave the territory of the port.

During the tests, detailed measurements will take place in order to collect all relevant data on the operation of the platform. The data collected will be analysed and evaluated, to provide feedback for the further development (or full adequacy) of the product.

Final design

Incorporating the results of the tests, a final design of the cranable mobile platfrom will be developed. This final plan will serve as a basis for the qualification of the product and also for the mass production.

The final design is done by the manufacturer.

Developing handling manuals and training materials

Once the final design of the product is ready, handling manuals and training materials will be developed for all relevant users including logistic centre operators, crane and reachstacker operators, truck drivers, railway staff, and port maintenance staff. The materials will be developed in at least three languages: Hungarian, German and English.

The handling manuals and training materials are developed by the manufacturer, in close cooperation with FBL and MLSZKSZ.

Audit and licencing

In order to be introduced into the market, the product needs to receive the necessary technical qualifications. Product approvals based on professional product audit carried out by certification institutes is a pre-requisite of placing the platform on the market.

For this purpose, the relevant certification bodies will be contacted by the manufacturer, and the product qualification and approval processes will be carried out. As a result, the cranable mobile platform as a product will gain all necessary licences to be used in the European market.

Pilot operation

Manufacturing the first ten items of the mobile platform

Based on the final design and product certification received, the manufacturer will be able to launch the regular production of the cranable mobile platforms. FBL will order and purchase the first ten items of the platform, to be used as the equipment to start the pilot operation of the system.

Finding the road freight transport company for the pilot action

Freeport of Budapest Logistics as an intermodal logistic centre is not directly involved in the international freight forwarding. To operate the cranable mobile platform system, a partner from the international road transport sector needs to be involved, who would actually provide the semitrailers and the respective cargo for the operation – while FBL is taking care about the modal shift process at the terminal.

The operation of the system is only economically viable if there a permanent, regular use in the required quantity (for the pilot operation ,at least ten semitrailers) to a fixed destination. Only the biggest road transportation companies are able to meet these requirements. Therefore the road transport partner for the pilot operation must be selected among the biggest players of the respective market.

	Name	Turnover	Op. profit	Net profit	Staff
1	Waberer's International Nyrt.	178 012 860 568	5 340 189 762	4 367 825 854	n.a
2	GARTNER INTERTRANS Kft.	41 811 921 359	-336 810 786	-312 397 104	1 726
3	DUVENBECK Logisztikai Kft.	24 936 877 896	31 412 398	54 275 478	389
4	Horváth Rudolf Intertransport Kft.	12 783 415 217	1 763 507 453	1 747 313 975	659
5	RÉVÉSZ TRANS Kft.	10 115 406 000	1 357 886 000	1 175 938 000	381
6	Lagermax Autótranszport Kft.	8 898 552 000	242 871 000	249 163 000	n.a
7	QUALITRANS-CARGO Kft.	8 398 129 000	1 015 379 000	870 684 000	220
8	PREVOST-HUNGÁRIA Kft.	7 613 105 000	184 846 000	9 685 000	264
9	TERRAVIA-TRANS Kft.	7 509 670 000	397 482 000	372 801 000	220
10	REINING TRANSPORT Kft.	7 414 616 000	18 779 000	8 038 000	327
11	Ekol Logistics Kft.	7 132 760 000	94 914 000	31 672 000	164
12	TRANSINTERTOP Kft.	7 015 988 000	693 166 000	692 337 000	225
13	Hunland Trans Kft.	6 896 227 329	313 081 056	266 648 447	n.a
14	HOPI Hungária Kft.	6 089 042 000	-102 581 000	-131 284 000	284
15	BHS Trans Kft.	6 048 807 000	1 472 864 000	1 417 311 000	151
16	K és V Kft.	5 357 533 000	475 990 000	461 343 000	263
17	MOLTRANS Kft.	5 202 438 000	45 001 000	-41 607 000	281
18	DOMINÓ TRANS Kft.	4 779 937 000	443 375 000	447 121 000	112
19	LERTON TRANS Kft.	4 715 784 000	550 163 000	482 970 000	163
20	TRÉLOG Kft.	4 618 857 000	177 682 000	221 943 000	150
21	WEST-BRIDGE Kft.	4 599 903 000	681 060 000	657 924 000	125
22	J. S. Logistics Kft.	4 439 788 199	133 045 652	117 962 733	131
23	T.O.M. Trans Duna Kft.	4 373 417 000	58 464 000	23 062 000	76
24	GELBMANN Kft.	4 351 003 000	227 417 000	133 229 000	174
25	GÁSZLER Kft.	4 265 609 000	306 997 000	278 062 000	179

33. Figure The most important Hungarian road transport companies based on 2016 data
Source: Közlekedésvilág.hu

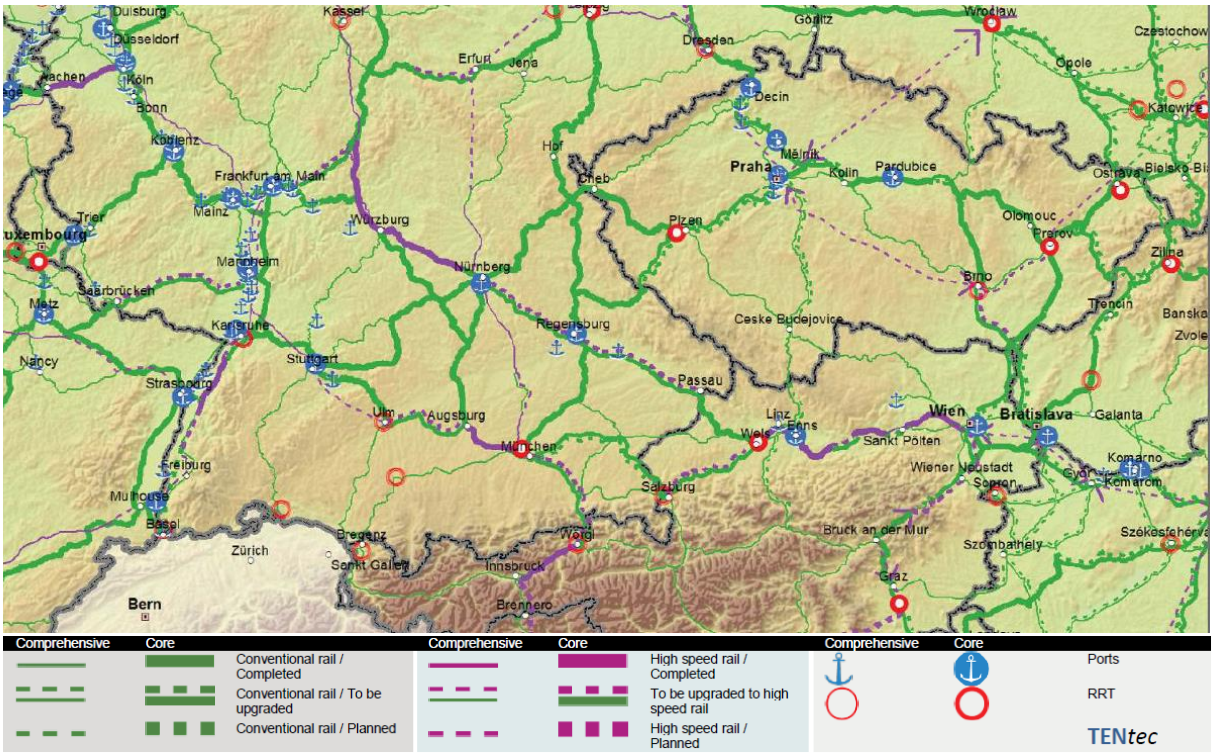
FBL and MLSZKSZ is currently in contact with several of the above companies. They will jointly approach these companies offering them partnership in the pilot operation. Based on the feedback from road transport companies, the cooperation partner will be selected and contracted for the pilot operation.

Defining destination terminal

The pilot operation needs to involve (at least) two intermodal railway hubs: the terminal where the cranable mobile platforms are loaded and a second one where they are unloaded (of course, in two way operation, both terminals are used both for loading and unloading). In order to launch the pilot operation, a destination terminal must be selected.

The selection of the terminal is done by the Freeport of Budapest and MLSZKSZ together with the selected road freight transport company. The selection of the terminal is based on the typical routes done by the road transport company: the destination terminal shall be a terminal where the company can unload the semitrailers and have the sufficient number of tractors to deliver the cargo in semitrailers to the final destination.

Considering the typical regular freight routes of the biggest Hungarian road transport companies, most probably an intermodal terminal in Southern Germany (e.g. Passau, Regensburg, München Augsburg, Stuttgart) will be an optimal choice for the purposes of the pilot operation.



34. Figure TEN-T core and comprehensive network hubs in the Southern part of Germany
Source: European Commission

The ideal situation is when a two-way operation can be organised. This requires cargo (semitrailers) travelling both from Hungary to Germany and back. However, if no such situation can be organised, the cranable mobile platforms can be transported back empty. In this case, only two sdggmrss wagons are needed, as the platforms can be piled onto each other, offering an efficient and space-saving solution for transportation.

FBL, MLSZKSZ and the selected road transport company will jointly approach the operators of the potential destination terminals, using the network connections established in the Talknet project, offering them partnership in the pilot operation. Based on the feedback from German terminal operators, the cooperation partner will be selected and contracted for the pilot operation.

Training the staff in both terminals

The pilot operation of the cranable mobile platform requires adequately trained staff (e.g. crane operators) in both terminals. Therefore, before launching the pilot operation, training sessions will be organised for the staff both at the Freeport of Budapest and at the destination terminal. The training will also involve, as needed, the truck drivers from the road transport company. To ensure smooth operation during the pilot phase, two operation teams will be trained at both locations.

For the purposes of these training sessions, the training materials and operating manuals developed in the technical development and prototyping phase will be used.

Pilot transports

After all the above preparatory tasks are completed, the effective pilot transport can be launched. Non-cranable semitrailers will be shift to rail using the cranable mobile platform, transported to the German destination terminal by rail, then unloaded there to complete their routes in road. As described above, the pilot operation will include vice versa routes and/or the return of the empty platforms.

A pilot operation phase of three months including at least ten transports is planned.

Evaluation

After the pilot operation phase, MLSZKSZ will organise an evaluation exercise to assess the experiences of real life operation. The evaluation will involve the staff and the decision makers of:

- the Freeport of Budapest,
- the operator of the destination terminal,
- and the road freight transport company.

The lessons learnt during the pilot operation phase will be analysed according to the following evaluation criteria:

technical experiences on the everyday use of the platform: easiness of the loading and unloading, errors experienced;

- loading and unloading times, compared to other solutions;
- quality of the mobile platform, usefulness and durability;
- costs of operation, economic viability.

Based on the evaluation results, the mobile platform as a product can be further developed, and a detailed business model for the application will be developed by MLSZKSZ. This will serve also as a basis for the decision on the widespread market introduction.

Widespread market introduction

Concluding the pilot operation phase, the widespread market introduction of the cranable mobile platform product can be launched.

Marketing campaign

A marketing campaign will be launched, targeting on the market players of the Central European logistics and freight transport market, including road and rail freight transport companies, operators of intermodal logistic hubs, experts and agents.

The marketing messages will focus on the applicability of the cranable mobile platform, its functions in easing the road-rail intermodal shift of the non-cranable semitrailers. The campaign will highlight its comparative advantages against other solutions regarding energy saving, time saving, cost efficiency, human resources used and reliability.

The marketing campaign will be organised by the producer of the mobile platforming close cooperation with MLSZKSZ.

The campaign will involve several tools:

- introduction the product at professional conferences and fairs;
- webpage and social media content (Youtube, LinkedIn);
- printed materials, brochures;
- demonstration seminars for logistic sector professionals,

Production and purchase of further platform items

The expected results of the marketing campaign is to convince a number of market players, rail and road freight forwarding companies will introduce the application of the cranable mobile platform into their daily operation. This is expected to boost the sales of the mobile platform as a product.

Therefore further platform items will be produced and purchased. According to market needs, further economic models of using the platform -other than the simple purchase – will be introduced, including rental and leasing solutions.

Introduction at further destination terminals

As more and more rail and road freight transportation companies commit themselves to the use of the cranable mobile platform, the need will emerge to involve more intermodal terminals in the Central Europe region as destination node points.

Further destination terminals will be approached by FBL and MLSZKSZ based on the needs of the mobile platform users. Staff at the selected terminals will be trained similarly to the original pilot terminals.

The terminals will enter the network of the user of the mobile platform. The transport market will be continuously informed via Internet-based interactive maps on the availability of the cranable mobile platform technology at various intermodal terminals. The Freeport of Budapest will remain the central terminal of the network.

5.4 Key actors

The FBL national public port has been operated by the FBL as of 2005. The company's main profile in the FBL is real estate development and operation, rental property but real logistics activities and services are provided by port operators.

The main roles in the FBL:

- port owner (MAHART Freeport Plc.)
- port manager (FBL)
- port operator/logistics service providers (tenants).

The term of port operator is used in a double sense. On the one hand, for the operator of the port, that FBL, and on the other hand for the tenants, who really carrying out the port activities.

35. Figure - Stakeholders mapping

STAKEHOLDER	LINKED PARTNERS	KIND OF ORGANISATION	DESCRIPTION	STAKEHOLDER'S NEEDS	LEVEL OF INVOLVEMENT
Ministry of National Development	Freeport of Budapest Logistics Ltd. (FBL)	Public body/authority Responsible for national transport development	100% owner of the MAHART Freeport Plc.	Stable operation	Indirect involvement in project implementation.
MAHART Freeport Plc.	Freeport of Budapest Logistics Ltd. (FBL)	Port owner and port operator (public body)	Represents the owner rights.	Stable operation, continuous development and innovation in the port	Direct involvement in project implementation: MAHART shall support and promote the RTDI project and the pilot operation
Freeport of Budapest Logistics Ltd. (FBL)	-	Port manager	Responsible for running and maintaining the Freeport of Budapest. Maintenance, coordinated operation	Attracting new clients and serve, the existing ones by providing appropriate infrastructure (e.g. for tenants' needs	Main actor of implementation

STAKEHOLDER	LINKED PARTNERS	KIND OF ORGANISATION	DESCRIPTION	STAKEHOLDER'S NEEDS	LEVEL OF INVOLVEMENT
			and development of the entire port by law. From 2005 FBL is the port manager company of the Freeport. Main profile of the company is to operate and develop buildings in the area of the Freeport, renting treatment.	optimized buildings) and efficient marketing activity. Need for developing strong networking within the port and within the country and abroad. Enhance the enabling of the technologies in the port to give better service and conditions for operation. Energy and maintenance cost saving operation and infrastructure development.	
ArcelorMittal Distribution Hungary Ltd.	Freeport of Budapest Logistics Ltd. (FBL)	Tenant – Port operator	Dealing with wholesale of steel products	Enhancing networking among logistics companies, freight transport operators.	Indirect involvement in project implementation as potential user
Ekol Logistics Szolgáltató Ltd.	Freeport of Budapest Logistics Ltd. (FBL)	Tenant – Port operator	Transport of medicines	Enhancing networking among logistics companies, freight transport operators.	Indirect involvement in project implementation as potential user
Ferroport Ltd.	Freeport of Budapest Logistics Ltd. (FBL)	Tenant – Port operator	Loading and storing products of agriculture	Enhancing networking among logistics companies, freight transport operators.	Indirect involvement in project implementation as potential user

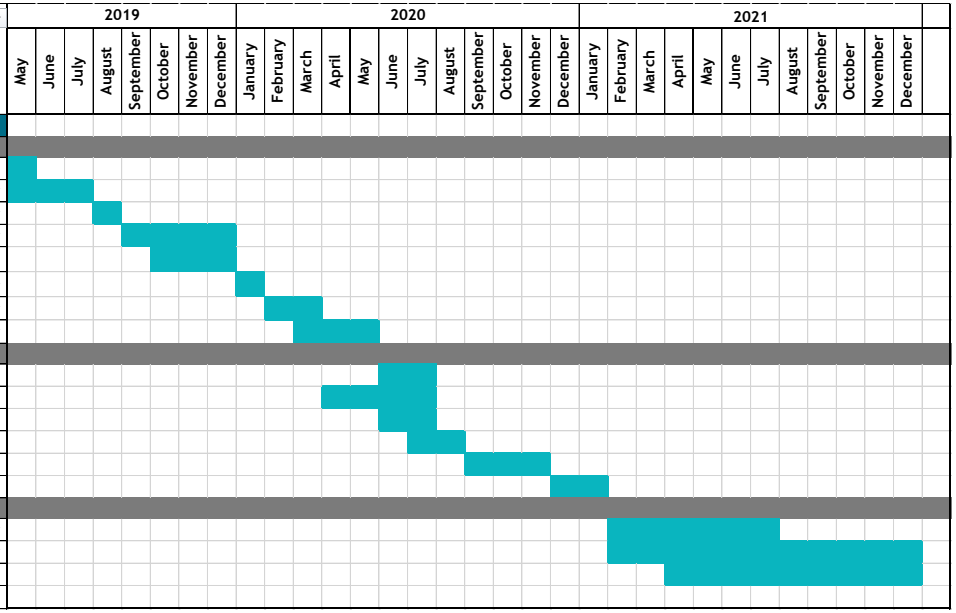
STAKEHOLDER	LINKED PARTNERS	KIND OF ORGANISATION	DESCRIPTION	STAKEHOLDER'S NEEDS	LEVEL OF INVOLVEMENT
Ghibli Ltd.	Freeport of Budapest Logistics Ltd. (FBL)	Tenant - Port operator	Dealing with freighting, warehousing	Enhancing networking among logistics companies, freight transport operators. Testing, implementing new services in terms of citylogistics.	Indirect involvement in project implementation as potential user
Kelet-Trans 2000 Ltd.	Freeport of Budapest Logistics Ltd. (FBL)	Tenant – Port operator	Storage, warehousing	Enhancing networking among logistics companies, freight transport operators.	Indirect involvement in project implementation as potential user
MASPED Logisztika Ltd.	Freeport of Budapest Logistics Ltd. (FBL)	Tenant – Port operator	Dealing with storage, warehousing	Enhancing networking among logistics companies, freight transport operators.	Indirect involvement in project implementation as potential user
MLSZKSZ (Hungarian Association of Logistic Service Centers)	Freeport of Budapest Logistics Ltd. (FBL)	Association of private logistics operators	Interests in development of combined freight transport, increasing the inland and international competitiveness of its members.	Introduction of new, innovative technologies and solutions to the Hungarian logistics market to boost competitiveness	Direct involvement in project implementation as the main partner for FBL
Varga Kreatív Mérnöki Iroda Kft.	MLSZKSZ	Private company	An innovative company specialized in metal product engineering and metallurgy manufacturing	To introduce new products and solutions to the logistics equipment market	Direct involvement as potential designer/manufacturer of the mobile platform
Brezovits Mérnökiroda Kft.	MLSZKSZ	Private company	An innovative company specialized in metal	To introduce new products and solutions	Direct involvement as potential

STAKEHOLDER	LINKED PARTNERS	KIND OF ORGANISATION	DESCRIPTION	STAKEHOLDER'S NEEDS	LEVEL OF INVOLVEMENT
			product engineering and metallurgy manufacturing	to the logistics equipment market	designer/manufacturer of the mobile platform
Metallurgy manufacturing companies	MLSZKSZ	Private company	An innovative company specialized in metal product engineering and metallurgy manufacturing	To introduce new products and solutions to the logistics equipment market	Direct involvement as potential designer/manufacturer of the mobile platform
Waberers Intertrans Nyrt.	MLSZKSZ	Private company	Road freight transport company active in international freight transport to various European destinations	Cost saving by introducing new technologies for better energy and HR efficiency	Direct involvement and potential road transport cooperation partner for the pilot operation
RÉVÉSZ Trans Kft.	MLSZKSZ	Private company	Road freight transport company active in international freight transport to various European destinations	Cost saving by introducing new technologies for better energy and HR efficiency	Direct involvement and potential road transport cooperation partner for the pilot operation
Horváth Rudolf Intertransport Kft.	MLSZKSZ	Private company	Road freight transport company active in international freight transport to various European destinations	Cost saving by introducing new technologies for better energy and HR efficiency	Direct involvement and potential road transport cooperation partner for the pilot operation
Road freight transport companies	MLSZKSZ	Private company	Road freight transport company active in international freight transport to various European destinations	Cost saving by introducing new technologies for better energy and HR efficiency	Direct involvement as potential road transport cooperation partner for the pilot operation
Intermodal logistics hubs	MLSZKSZ	Private companies	Operators of rail-road intermodal logistic hubs	Attracting new potential markets and	Direct involvement as potential destination

STAKEHOLDER	LINKED PARTNERS	KIND OF ORGANISATION	DESCRIPTION	STAKEHOLDER'S NEEDS	LEVEL OF INVOLVEMENT
			in the Southern part of Germany	clients for intermodal freight transshipment	terminal cooperation partner for the pilot operation

5.5 Timeline and financial resources

Subject	Actions	Responsible
Talknet - Energy efficiency solutions: cranable mobile platform for non-cranable semitrailers Freeport of Budapest Action Plan	PHASE 1: Technical development and prototyping	
	Finding the manufacturer	FBL/MLSZKSZ
	Funding - Elaboration of an RTDI grant application	MLSZKSZ/Manufacturer
	Elaboration of the technical plan	MLSZKSZ/Manufacturer
	Prototype development	MLSZKSZ/Manufacturer
	Prototype testing on-site	FBL/MLSZKSZ
	Final design	MLSZKSZ/Manufacturer
	Developing handling manuals and training materials	MLSZKSZ/Manufacturer
	Audit and licencing	MLSZKSZ/Manufacturer
	PHASE 2: Pilot operation	
	Manufacturing the first ten items of the mobile platform	FBL/Manufacturer
	Finding the road freight transport company for the pilot action	FBL/MLSZKSZ
	Defining destination terminal	FBL/MLSZKSZ
	Training the staff in both terminals	FBL/MLSZKSZ
	Pilot transports	FBL/MLSZKSZ
	Evaluation	MLSZKSZ
	PHASE 3: Widespread market introduction	
	Marketing campaign	MLSZKSZ/Manufacturer
	Production and purchase of further platform items	MLSZKSZ/Manufacturer
	Introduction at further destination terminals	FBL/MLSZKSZ



36. Figure - GANTT chart of the Action plan of implementation of an access control system at FBL

5.6 Expected results

The action plan was designed in a way to offer feasible and cost-effective solution for the promotion of combined transportation. The main expected result is to reach a significant modal shift from road to rail of the cargo transported in non-cranable semitrailers using an innovative cranable mobile platform.
In order to achieve this result, the following outcomes are expected from the action plan:

- a cranable mobile platform developed, tested and certified,
- a manufacturer for the mobile platform identified and contracted for cooperation,
- a road transport company and a destination terminal successfully involved in the pilot operation as cooperation partner,
- and the successful market introduction of the cranable mobile platform as a product.

After the successful market introduction, it is expected that the users and the transhipment volume of non-cranable semitrailers using the new mobile platform will gradually grow over the coming years. The logistics market success of the innovation can be measured during the operation years applying the following key performance indicators:

- Transhipped non-cranable semi-trailers to railways in FBL [pieces/year]
    - Starting value (2018): 0 piece/year;
    - Aim value can be defined during the detailed project development.
- Reached volume of environmental protection: annually decreased CO2 emission [tons/year]
    - Proposed measurement method for the externalises of freight forwarding: the decrease in the emission could be calculated from the shifted volumes of cargo from road to rail.
- Destination terminals involved in the freight transport network using the mobile platform
    - Starting value (2018): 0 terminals;
    - Aim value can be defined during the detailed project development.

Through these achievements, a much better situation can be reached regarding the energy efficiency and consequently, the cost efficiency of the combined transportation system between the Freeport of Budapest and various destinations in the Central Europe region.

5.7 References

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