D.T.5.4 – ACTION PLANS ON ECO-SOLUTIONS DEPLOYMENT – LUKA KOPER (NAPA)

Energy efficiency	Final Version 09/2019

Tabl of comntents

Executive summary

This document represents the deliverable »Action plans on eco-solutions deployment – Luka Koper (NAPA)« developed within the TalkNET proejct.

The content for the action plan follows the »Methodology for action plans development (Final version 09/ 2019) « and reports the actions planned for each project clusters (sub-topics). In particular, this action plan will focus on the eco-innovation sub-topics – Alternative fuels solutions - Energy efficiency.

Luka Koper has recognised energy efficiency as one of the key measures to improve company performance and enhance its competitiveness. The port acknowledges that energy efficiency improvements make a significant contribution to security of supply, lower environmental impacts, and more cost-effective business operations.

To understand the current state and the situation to be, we have used the SWOT analysis.

STRENGHTS	WEAKNESESS
• Lowering operational costs and increasing competitiveness • Improving working conditions even beyond legislative requirements • Advanced monitoring and control of new lighting system with the potential to improve the overall performance of a proposed energy-efficient lighting system and to enable achieving even greater energy savings • Maintaining energy and environmental excellence for gaining support from the local communities for future development projects	• High investment costs are necessary for upgrading electrical installations • Very complex monitoring system which requires expert consultants and training of staff • Long payback period for upgrade of performance monitoring system at the bulk cargo warehouse
OPPORTUNITIES	**THREATS**
• Pilot projects and EU funding • New services and jobs, strong push for local SMEs dealing with electrical lighting and control systems, with performace monitoring systems, increasing competences of warehouse operators • High replicability potential and opportunity to export local knowledge and experiences to other ports in Central Europe	• Unsecure future development and cargo (load factor and operating hours) • Unsecure electricity prices which means that payback period maybe even longer • Unclear national energy strategies (constant changes of strategies, programs and legislation) • Economics of renewable energies without subsidies • Potentially low interest by the warehouse operators due to the lack of knowledge for dealing with energy problems

One of the action proposed was improvement of energy efficiency in the selected cargo warehouse. The proposed action will be tested in one of the general cargo warehouse as a pilot action. With investing in more energy-efficient lighting in the warehouses of general cargo terminal (pilot action) the expected result is the reduction of energy consumption and consequently the reduction of environmental impacts.

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

The aim of the Port of Koper is to reduce the electricity consumption. Part of the rationalization of electricity consumption in the port area is the reduction of electricity consumption in the warehouses for bulk and general cargo (indoor and outdoor lighting, electrical equipment which is used for cargo handling operations).
Luka Koper has recognised energy efficiency as one of the key measures to improve company performance and enhance its competitiveness. The port acknowledges that energy efficiency improvements make a significant contribution to security of supply, lower environmental impacts, and more cost-effective business operations.

The rationalization in energy efficiency is investigating to reduce the environmental impacts of the general cargo handling operations in the warehouse no. 33 and in the silo and T-hall warehouses for bulk cargo.

Good practice: The analysis for the pilot action D.T 3.2.10 provides an objective evaluation of potentials for energy efficiency improvement of indoor electrical lighting at the selected general cargo warehouse no. 33 at the Port of Koper. Within the document potential technical solution for improvement of indoor electrical lighting at the selected general cargo warehouse no. 33 is evaluated in more details. Sensitivity analysis revealed strength of impacts of selected influencing parameters like price of electricity, level of investment subsidy and costs of installation. Results and recommendations from the presented analysis will be used during implementation phase and during the monitoring and verification of savings enabled by pilot activity at the Port of Koper.
The analysis contains chapters addressing the following topics:

- Description of addressed processes and current energy and environmental footprint,
- Evaluation of energy efficiency potentials, design constrains and replicability potential
- SWOT analysis, implementation approach and identified challenges.

The conclusion of the analysis gives an insight into how the key findings will be used in the project's next steps towards the implementation of proposed solution and for monitoring and verification of savings at the Port of Koper.
The content of the action plan is replacement of lighting in general cargo warehouse with one that ensures lower consumption, which is automated and where continuous control of the effects of replacing existing lighting (savings) is carried out. The detailed engineering design of proposed solution for upgrade of electrical lighting at the selected general cargo warehouse no. 33 is available in Luka Koper (the title "Energy efficiency solutions – general cargo warehouse 33").

The aim of the realization of the pilot action is to improve the efficient use of electric energy in the warehouses for general cargo. The output will be the report regarding the activity with the result of the monitoring of consumption of electric energy.

5.1 Action: Improvement of energy efficiency in the selected cargo warehouse (general cargo)

In the analysed case of selected general cargo warehouse no.33 the new lighting system must be based on a LED lighting sources and must have a powerful monitoring and control capabilities. It should provide a flexible and open concept for upgrading electrical lighting installations and it must be capable to operate in a standalone mode or integrated in a future smart grid. Monitored energy consumption, enriched with information about its context, can be the basis for the identification of energy profiles and optimisation. Therefore, it is proposed that modern monitoring and control module should be implemented to minimize the importance of human factor in achieving best operational practice. Existing metering system should be upgraded and additional sub-meters for direct measuring of electricity consumption for indoor and outdoor lighting should be installed. Additionally, proposed solution must upgrade existing light level/illuminance and consequently improve working conditions in the selected general cargo warehouse no. 33. It is positive that proposed LED based solution will require less maintenance than existing, conventional high-pressure metal halide lamps.

5.2 Main challenges tackled

One of the challenges for better energy efficiency is to find an economically justifiable, environmentally acceptable replacement of existing lighting and equipment in the Port of Koper. This was done with the pilot action in with the change of lighting in one of the warehouses for general cargo and with the possibility of monitoring of the results of reduction of the consumption of electricity. The solution was developed to the point that can be adapted (exchanged) in this case in all kind of warehouses by all project partners and other stakeholders in the logistic area throughout the CE region.

5.3 Results to be achieved

The result after the realization of the pilot action: the change of the lighting in one of the warehouses like announced with the possibility of monitoring of the results of reduction of the consumption of electricity and consequently the possibility of

confirmation of the expected results of the pilot action. After testing the new lighting system and the confirmation of the expected results exist the possibility to transfer the solution in the port of Koper in other warehouses or in all kind of warehouses on other terminals - nodes in the project area.

The result of the change of the lighting system inside and outside of the warehouses with continuous monitoring and automation in the second phase is the reduction of electric consumption in the warehouses of the port (consequently the reduction of CO2 emissions) and the activation of the lighting system just during the operations inside and outside of the warehouse. The solution is trasferable in all other warehouses for general cargo or for bulk cargo in the port or other terminals.

Based on the performed analysis it is clear that upgrade of indoor electrical lighting has a potential to unlock significant energy and environmental benefits which presents a growing challenge for port infrastructure. The policy level EU must formulate appropriate regulations or provide incentive measures in order to encourage ports to upgrade existing systems and implement modern and energy efficient solutions. It has to be aware that annual operating load factor significantly influences economics of any energy efficiency project which is related with the upgrade of electrical lighting. In this particular case of selected general cargo warehouse no. 33 at the Port of Koper, it is clear that energy costs saving potential is in favourable relation with the load factor which makes proposed energy efficiency project economically very interesting for the implementation. Proposed solution is based on a LED lighting sources and has powerful monitoring and control capabilities. It provides a flexible and open concept for upgrading electrical lighting installations and it is capable to operate in a standalone mode or integrated in a future smart grid. The solution of the pilot action will upgrade existing light level/illuminance and consequently improve working conditions in the selected general cargo warehouse no. 33. The proposed solution will require less maintenance than existing, conventional high pressure metal halide lamps.

5.4 Tasks to be performed

The following measures will be implemented in the port for reducing the use of electricity and fuel:

- Documents will be acquired, and the procedures completed to obtain the ISO 50001 certification.
- A SDACA (Electrical Energy Efficiency software) system will be set up to monitor energy consumption on terminals.
- Filters will be installed to compensate the harmonic distortion in the power grid.
- LED lights and sensors will be installed, and a lighting control system set up in the storage facility for general cargoes.

- Interior and exterior lighting systems will be modified, and a data acquisition system set up to collect the data on power consumption in the cooling chambers
- The ENIS energy information system will be upgraded.

For the realization of the pilot action (PA) the following tasks were performed:
- Project definition of the content of the pilot action – January 2018
- Public procurement for the selection of the best proposal for the realization of the PA – april 2019 (for different segments needed to realize the PA) – February 2019
- Confirmation by the management board of the best proposal for each of the segments of the PA – March 2019
- Realization of the PA in accordance with the deadlines of the PA – august 2019
- Testing of the new lighting system in the warehouse nr.33 on the terminal for general cargo – October 2019

Inside the 5 months period of realization of the PA are included the following segments:
- construction work – 30 days of work
- installation of lights and accessories – 30 days of work for realization
- installation of lights and accessories – 30 days of work for realization
- installation of switches and the SCADA system – 45 days for the realization
- telecommunication services – 30 days of work for the realization

5.5 Key actors

The transport and logistic players included in the operations before and after the implementation of the investment:

- Forwarding agents (Port community - 46 members)
- Shipping agents (Port community – 20 members)
- Shipping companies

These players daily express their satisfaction with the solutions of the investments and the satisfaction with the realization of the ordered service.

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

are involved in the preparation of the investment documentation.

5.6 Timeline and financial resources

The rough overview of the realization of the action plan with the evaluation of the investment is:

Activitty/month of realization 2019	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Okt
Project definition	X									
Public procurement		X								
Choise and confirmation of the best offerers		X	x							
Realization of the PA					X	X	X	X	X	
Testing of the system										X

The approved value of the budget for the pilot action is 8.000,00 Euros for external experts and 30.974,32 Euros for equipment (both state aid).
The total investment in the lighting system in the plan of investments of Luka Koper is 80.000,00 Euros.

5.7 Expected results

Quantitative expexted results:
The expected results of the implementation of strategic energy efficiency (ECO) solutions for electricity are:

- replacement of lighting with LED lights with introduction of control systems for lighting and consuming electricity and fuel; use of LED lights to save up to 60% of electricity to illuminate storage areas and warehouses
- introduction of control systems for lighting and electricity and fuel consumption to identify in real time the deviation in energy consumption and take measures to eliminate the identified anomalies (reduction of energy consumption by up to 4%)

The following set of KPIs relevant for the addressed general cargo warehouse no. 33 will be used in which will be realized the pilot action has been proposed:

- Ratio between total electricity consumption for indoor lighting and total number of cargos handling operational hours,

- Ratio between electricity consumption for indoor lighting and total mass of cargo stored in the warehouse,
- Ratio of electricity consumption for indoor lighting and total number of cargo units stored in the warehouse.

The expected results is the improvements of each of the used KPIs (situation before the investment and situation after the realization of the investment).

Qualitative expected results:
With investing in more energy-efficient lighting in the warehouses of general cargo terminal (pilot action) the qualitative expected result is the reduction of energy consumption and with this reduction of environmental impacts.

5.8 References

The reference document is the report of the work package T2 (represent the summary of the clusters or sub-topics 4 and 5):

- D.T 2.2.3 Analysis on ECO-solutions deployment_Luka Koper_01-09-18
  and additional:
- PFI – Recovery of el.install.in the warehouse 33_LK_AVELIS_original_june 2018
- Plan of investments of Luka Koper for 2019
- Rack storage in Podgrad (Slovenia)
- Warehouse in Colussi-Fossano (Italy).