

FEASIBILITY STUDY FOR PESCARA AIRPORT PILOT ACTION

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I. EXECUTIVE SUMMARY

According to application form of Adrigreen project, Pescara Airport should implement its pilot action covering one of the four main pilot action goals identified:

- Adoption of smart solutions to reduce energy consumption in small-medium regional Airports.

Main deliverables of pilot action implementation should be Feasibility study of implemented action as well as testing report of implemented action, which will be basis for further project steps, especially in conducting Capitalisation manual on identified and tested solutions within Adrigreen projects.

Therefore, this document should evaluate pilot action implemented with clear conclusion regarding its feasibility and transferability to other regions or airports, contributing to project transnational approach conclusion which shall be summarised in Capitalisation manual.

Testing results of implemented pilot action in Pescara Airport should demonstrate its advantages from process optimisation point of view as well as from feasibility (cost-effectiveness) and environmental perspective.

In addition, Pescara Airport has presented pilot action implementation plan covering all implementation process phases, from appointing project team, through identifying risks and risk mitigation procedures, conducting public procurement process and, in the end, implementation of equipment and monitoring of its performance.

Also, to have adequate knowledge on impact and in order to ensure durability of similar pilot actions implemented, it is essential that company implements environmental management system process in place, as an integrated tool for planning, implementation and monitoring of environmentally friendly activities.

II. BACKGROUND OF THE PROJECT

Green and intermodal solutions for Adriatic ports and airports - Adrigreen is a project approved under the INTERREG V-A Italy Croatia CBC Programme 2014-2020. The programme is funded by the European Regional Development Fund under the European Territorial Cooperation objective during the programming period 2014- 2020.

The managing body of the Cooperation Program is the Veneto Region, Italy. The national body of the Republic of Croatia coordinating the implementation of the joint programme with other participating countries is the Ministry of Regional Development and European Union funds.

The project has started in January 2019 and it is expected to end by January 2022. The total budget approved for the project amounts to 2.104.217,00 EUR, 85% of which is co-financed through the ERDF fund (European Regional Development Fund). The project will be implemented by 10 project partners.

Project description:

One of the main problems that characterize the Adriatic coastal area is the imbalance in the development of infrastructures and modes of transport, caused by low level of investments and insufficient approach to innovation. In Italy and Croatia there are many maritime cities, which have to deal with a very high number of passengers, especially during the peak season. Even though the road transportation is still predominant, the number of people that are reaching Adriatic cities by ferries and airplanes is significantly increasing year by year. However, most of Adriatic ports and airports are suffering from lack of integration with various modes of transportation, causing serious traffic congestion problems during the summer season.

The aim of the project is to improve the integration of Adriatic ports and airports with other modes of transportation by testing several intermodal operational and technological solutions. By identifying and analysing already existing procedures, the project partners will test a number of intermodal practices in order to evaluate their adaptability and transferability into the Programme area.

Also, it is very important to create more environmental-friendly and less polluting transport between ports (cities) and airports by reducing CO₂ emissions. This can be achieved by purchasing electric vehicles for transport routes between ports and airports, or for use in port/airport premises.

III. PROJECT OBJECTIVES, PROJECT APPROACH, COOPERATION NEEDED

Project objectives

Low level of integration among different modes of transportation and insufficient investments in sustainable and low-carbon transportation technologies are characterizing several regions in the Adriatic area. The Croatian and Italian Adriatic coasts are rich of touristic destinations, which are reached by millions of tourists every year. Even though the road transportation is still predominant, the number of tourists that are reaching Adriatic towns and cities by ferries and airplanes is significantly increasing. Unfortunately, most of Adriatic ports and airports are suffering from lack of connections with other modes of transportation, causing serious traffic congestions problems, especially during the summer seasons. In addition, the majority of ports and airports facilities are lagging behind the EU average when it comes to sustainable environmental performances.

The main objective of Adrigreen project is to improve the integration of Croatian and Italian ports and airports with other modes of transportation in order to enhance the processing of passengers during the summer seasons and to improve environmental performances of the Adriatic maritime and aviation systems.

In order to do that, the project will implement a set of structured activities based on transnational and cooperative approach. The main idea is to identify and analyse a number of existing operational and technological solutions that can be easily transferred and adapted by involved ports and airports. The partners are not interested in inventing new solutions as there are a plenty successful models and schemes implemented in other parts of the world that can be replicable also in the Programme area. Once the solutions have been identified and analysed, the project partner will test the operational and technological models on their facilities so as to improve intermodal connections and to put in practices new schemes for a sustainable management of ports and airports. The objective of the testing phase will be to demonstrate the feasibility, the effectiveness and the replicability of the identified solutions. The last but not least intention of the project is to disseminate the results of tested solutions so as to explain also to other ports and airports how the operational procedures and technological innovation can be successfully transferred and used.

These objectives will be reached by producing several outputs:

- International investigation on best solutions to be transferred on Adriatic coasts;
- Environmental assessments of involved ports and airports;
- Joint Actions Plans: intermodal measures and green and sustainable actions to be implemented;
- Testing of innovative solutions in involved territories;
- Technical Manual on identified practices;
- Cross-Border Forum of Green and Intermodal Ports and Airports to present solutions, explain benefits and share recommendations for new strategies.

Project approach

Considering that all involved territories are facing similar problems (low integration between different modes of transportation and low environmental performances), the project will implement all activities with a participative and transnational approach.

The first step will be to perform a detailed and in-depth identification and analysis of existing solutions for lowering airports/ports environmental impacts and for intermodal connections of ports/airports with other modes of transportation and to identify a set of possible schemes to be easily adopted in territories involved in the project. It means that existing solutions, identified around the EU/world (mainly North Europe), will be the starting point of Adrigreen project. This activity will contribute to solve one of the main issues related to intermodal connections and low environmental performances: lack of knowledge regarding potential, smart and suitable solutions that could significantly improve the processing of passengers and decrease environmental impact of transport activities in Adriatic basin. The research will be followed by a deep environmental assessment and by realisation of specific Action Plans where all identified measures will be described.

The second step will be to test the adaptability and efficiency of identified solutions on ports and airports of Adrigreen project. Each partner already identified its major problems and a set of fields to be tackled by the testing phase: smart solutions to connect ports and airports to local public transportation systems; integrated timetabling and information for passengers; new services with public and private transportation services and reducing of energy consumption in airport/port facilities.

Each testing phase will strictly pursue a transnational perspective since the final aim is to test solutions, which could be easily adapted in each area involved in the project. In fact, the project will organize also 4 transnational trainings targeted to staff working on ports and airports (not only those involved as partner) to improve their knowledge on technological solutions and procedures for both lowering the environmental impacts and planning new intermodal connections.

The final step of the project will be to disseminate as much as possible the tested solutions to all ports and airports located in Adriatic area. The dissemination will be based on demonstrations how the situation could be improved once the solutions are adapted.

Cooperation needed

Considering the specific objectives of the project (identification of innovative solutions to be adopted in all Adriatic area, testing of their replicability on ports/airports and spreading out of new tested technological solutions and procedures for improving intermodality and lowering environmental impacts), the cooperation among ports, airports, public authorities and research institutions is indispensable.

The project intends to support partners to test some innovative schemes to speed up the transit of passengers and to make their facilities environmentally friendly with the purpose to adapt and replicate them, not only within the partnership but also in other Adriatic regions not directly involved in the project. This is the main reason why the project goal cannot be efficiently reached at local/regional level. The local single action can be of course meaningful, but the challenge of the project is to contribute in the creation of convincing conditions for making entire Adriatic area better connected and its transport system more environmentally friendly. This challenge can be addressed only if existing practices, operational and technological solutions, and awareness raising campaigns melt together and produce a capitalization effect.

The testing phase (WP4) is a very important part of this project and its implementation will be done with highly transnational approach in order to give the possibility to each partner to benefit from results achieved by other partners. Following pilot actions are identified for the implementation:

- implementation of low-cost and smart solutions to better connect airports and ports with local public transportation system, such as railways and public bus lines;
- implementation of integrated timetabling and information for passengers that shall continue their travel by other means of transportation;
- adoption of smart solutions to improve waste&water management and to reduce energy consumption in small-medium regional Airports (Pescara-Airport pilot action);
- new protocols with public and private transportation providers to experiment new services to speed up the process of passengers from/to touristic destinations which are not well-connected.

In WP4 the partners will have the possibility to identify some possible solutions and to test concretely their efficiency. Each partner will consequently benefit from testing solutions carried out in other partners' areas. During the testing phase, the partners will have the opportunity to evaluate together the feasibility and effectiveness of identified solutions in order to know how to act in case of further investments to be done in this sector.

Through the transnational approach, the definition of both Joint Action Plans and of the Manual on identified solutions and practices will ensure the comparability of data and also the complementarity of the work.

IV. NEEDS ANALYSIS PESCARA AIRPORT

SAGA, an acronym for the Abruzzo Airport Management Company, was commissioned in 1981 with the task of managing the Abruzzo airport. 99.99% of the shareholder structure is made up of public bodies. The participation of the Abruzzo Region in the share capital of Thesaga is almost totalitarian, only a symbolic share is held by the company Lss consulting S.R.L.S. The Ministry of Transport, in concert with the Ministry of Economy and Finance, on June 14, 2007 entrusted the company with the thirty-year concession, according to the terms indicated in the Convention stipulated with ENAC, for the planning, the development, the realization, the adjustment, management, maintenance and use of the systems and airport infrastructure.

The presence in the territory of a properly sized and interconnected airport is able to produce a significant benefit in terms of development of the Abruzzo Brand, growth of added value and employment in the Region. In fact, the presence of efficient air connections allow a greater integration of Abruzzo businesses with the main international trade markets and promote the development of tourism demand. The policy indicates the priority objectives for the development of international traffic and in particular the incoming segment also through the leverage of charter carriers and criteria for the evaluation of offers by the carriers.

Abruzzo Airport's main objective is to stimulate the development of air traffic by encouraging carriers to operate new routes and upgrade existing ones, in order to implement a continuous development of the airport and to promote economic growth of the Region of Abruzzo.

Abruzzo is located in central Italy and stretches from the heart of the Apennines to the Adriatic Sea, on a mostly mountainous and wild terrain. In the mountains, tourist resorts and well-equipped facilities for skiing and winter sports rise among unpolluted peaks and rocky walls: among them are Pescasseroli, Rivisondoli and Roccaraso. The natural landscape of the high and steep peaks of the Gran Sasso, Laga Mountains, and Mount Majella slopes down to a wide range of hills, until it finally reaches the Adriatic coast.

The route that spans from the Gran Sasso down to the sea crosses territories that are rich in history, traditions and art that never cease to surprise visitors.

Narrow valleys and impressive, natural paths thrust their way into the mountains and hills, as does the amazing and fascinating Aterno Valley, crawling with ancient villages. Natural reserves, like the National Park of Abruzzo, the Park of Gran Sasso and the Laga Mountains, or that of Mount Majella, protect the typical vegetable and animal species of the area, including the golden eagle, the wolf and the Marsican brown bear.

The Adriatic coast is characterized by long and sandy beaches to the north and pebbly beaches to the south. Also, the small villages of the hinterland, as well as the monasteries and castles of the region, are very charming and part of many touristic routes in this the "greenest region" in Italy.

The provinces of the region are: L'Aquila (regional capital), Pescara, Teramo and Chieti.

The main benefit for Abruzzo Airport will be to identify a set of innovative solutions for lowering airport environmental impact and for better connection of the airport with city centre of Pescara and with rail station and the port terminal. The testing action will improve the current situation and lay the ground for further investments and activities coherent with Airport multiannual strategy. The project will also strengthen the collaboration with local private and public companies and stakeholders such as public transportation companies, tourist operators and private transportation companies. In addition, the training activities will significantly improve the knowledge of employees in relations to technological solutions and procedures for more sustainable management of the airport facility

The Airport of Abruzzo is not using any electrical devices and this is causing considerable air pollution. It has been proved that Electrical Ground Power Unit could considerably improve the environmental performances of the airport. This is just the first step for Pescara Airport to increase the level of environmental performance at the airport through number of dedicated projects, as photovoltaic solutions, electrical vehicles and led pannels, to decrease carbon footprint of airport.

The Adrigreen Project represents a unique opportunity for Pescara Airport to continue its development toward an environmentally friendly airport.

V. SAFETY AND INDUSTRY REGULATIONS

The airports are highly regulated and standardised environments due to specifics of global international air transportation system. There are a number of international organizations, standards, regulations and agreements that regulate airport performance in any fields. Beside the international regulations, all countries have their own national legislations dedicated to regulate air transportation in general and airports in specific. In addition, there are different industry standards from non-governmental organizations that are widely accepted as norms by government bodies.

In general, airport regulations can be divided in two major groups: airside and landside. The landside area is open to the public, while access to the airside area is tightly controlled. The airside area includes all parts of the airport around the aircraft, and the parts of the buildings that are accessible only to passengers and staff.

The most significant regulatory body is the International Civil Aviation Organization (ICAO), an UN specialized agency, which manages the administration and the governance of the Convention on International Civil Aviation (Chicago Convention). ICAO works within the Convention's UN Member States and industry groups to reach consensus on international civil aviation Standards and Recommended Practices (SARPs) and policies for civil aviation sector. These SARPs and policies are used by UN Member States to ensure that their local civil aviation operations and regulations conform to global norms.

For the EU Member States there is the European Union Aviation Safety Agency (EASA). The EASA is an agency of the EU with responsibility for civil aviation safety. Each State has its own Civil Aviation Agency (CAA) that is responsible to enforce international aviation regulations (ICAO SARPs and EU Directives) at national level. The CAA are regulated and appointed by national legislation and respective governments. CAA is responsible for safety performance of all national air transportation subjects, including airports of the particular state. From industry standards most significant are those issued by the International Air Transport Association (IATA). The IATA is the trade association for the world's airlines which significantly influence airport performance as standards of this organization are widely recognized and enforced by national civil aviation agencies.

Both technology systems and vehicles at the airport landside or airside need to follow the basic national regulations for the specific field, such as work safety bylaw commercial vehicle bylaws. Beside those there are same general airport standards that need to be followed at the airports, such as ICAO Annex 14 (airport infrastructure) and ICAO Annex 17 (airport security). For the airport airside there are additional safety regulations and standards that need to be followed. Those specific standards are based on ICAO Annex 14, and additionally defined by the CAA in form of national legislation such as Ordinance on airports, Ordinance on ground handling, and Ordinance on airport rescue and firefighting.

Equipment purchased within Adrigreen project is implemented in airport processes and put in use obeying all mentioned standards. Additionally, Pescara Airport safety manager is continuously controlling processes from safety point of view with regular reporting process implemented.

VI. DESCRIPTION OF PILOT ACTION IMPLEMENTED

Pescara Airport pilot action implemented is in compliance to third main pilot action field identified within the project: *“adoption of smart solutions to improve waste & water management and to reduce energy consumption in small-medium regional Airports”*. The focus of the Pescara airport is to reduce energy carbon emissions, the proposed intervention is:

Replacement of diesel GPU (Ground Power Unit) with a new full electric version used for grounded aircraft activities (handling)
The Electrical Ground Power Unit (E-GPU) is small engine which produce power for the aircraft when it is on the ground, able to save tonnes of CO₂ per year. The estimated costs is 140.000

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According to the need's analysis performed, Pescara Airport has identified following fields for improvement in airside area:

- energy efficiency improvements within airport processes,
- cost effective optimisation of business processes.
- reduction of CO₂ emissions.

Purchase and implementation of the electric equipment for handling process will significantly lower CO2 emission and it will reduce energy consumption in performing daily processes within Pescara Airport premises since old diesel vehicle is replaced and put out of the function.

Also, since this vehicle is used on the airside area, it will be visible to the airlines company and general public contributing to the airport green field policy and zero emission strategy adopted within Pescara Airport and presented to the public.

VII. FINANCIAL AND ENVIROMENTAL ANALYSIS

Financial analysis

Pescara Airport has performed financial analysis of equipment purchased and used. In conducting financial analysis following assumptions were taken into the consideration:

- purchase price of new vehicle (electric);
- For electric tractors, the replacement of a battery every 5 years (€ 5.600) is considered, while for diesel tractors an extraordinary maintenance for engine and traction system rectification is estimated around the 8th and 9th year (5,000 €).
- economic life usage period of vehicles (10 years).
- In 2019 the diesel GPU used for the handling activities inside the Pescara Airport were used for a total of about 1.000 hours, and a consumption of 13.500 liters of fuel, for a total fuel cost of about € 14.000.
- From the data provided by the supplier, electric GPU has an estimated consume of 26.3 kw /h
- The GPU will be used for aircraft handling operations, therefore the evaluations of use over the ten years are made through the use of traffic forecasts.

Other information:

- electric equipment will be put in use in August/September 2021.

Environmental analysis

At this stage, environmental analysis performed relates to basic calculation of CO₂ emissions according to technical specifications of equipment purchased compared to the one replaced. In further steps of the pilot action testing, evaluation grid will be developed in order to assess action performance and to show how the environment and transit of passengers benefited from pilot actions. Also, it is important to specify that it is not yet fully investigated the impact of changing electric battery each five years on environment in respect of battery production and battery disposal.

1. VEHICLE ANALYSIS

Table 3.1. Description of equipment to replace	Type of vehicle	Manufacturer	Year of production	Utilization (km/year)	Utilization (hour/year)	Fuel/Energy consumption [l/year]	Engine, power/displacement, fuel, emission standard	Average utilization/fuel consumption per tractor, [l/h]	Average fuel consumption, [l/tractor]	Additional info.
Ates 690	GPU	HOUCHIN	2004	NA	1000	13/14.000	Diesel	13/14		

Table 3.2. Description of new equipment	Type of vehicle	Manufacturer	Year of production	Utilization (km/year)	Utilization (hour/year)	Fuel/Energy consumption [l/year]	Engine, power/displacement, fuel, emission standard	Average utilization/fuel consumption per tractor, [l/h]	Average fuel consumption, [l/tractor]	Additional info.
	e-GPU		2021	NA	1.825 (est.)	48.000 KWh	ELECTRIC - BATTERY POWERED		NA	

						Emission factor	Emission factor	Emission factor		Emission	Emission	Emission		Emission [kg]	Emission [kg]	Emission [kg]
Diesel-fueled ground power unit			Fuel consumption [l]	Desità gasolio [kg/l]	fuel consumption, [t]	CO2 [kg/ t fuel]	NOx [g/t fuel]	PM10 [g/t fuel]		CO2 kg	Nox g	PM10 g		CO2	NOx	PM10
1		Range min	13000	0,835	10,855	3160	32629	2104		34301,80	354187,80	22838,92	Range min	34301,8	354,2	22,8
		Range Max	14000		11,690					36940,40	381433,01	24595,76	Range Max	36940,4	381,4	24,6
Confronto: diesel/elect GPU																
CO2	NOx	PM10														
1,8																
1,9																

VIII. RISK ANALYSIS

Risk identification

Pescara Airport has participated on several project meetings in order to discuss project implementation and to coordinate project activities.

In addition, Pescara Airport has performed qualitative risk analysis for different stages of feasibility study (FS) and Action plan implementation as follows:

- Preparation phase – includes steps that are to be fulfilled prior to developing of FS and Action plan
- Implementation phase – includes steps that are to be taken for purchase of equipment or software necessary for testing pilot action
- Testing phase – includes steps that are to be undertaken during the testing phase of the Action plan and producing FS.

Per each phase of the Action plan lifecycle, engaged partners will perform following activities:

- Risk identification – all types of risks that can occur needs to be identified and addressed,
- Risk assessment – based on prescribed methodology, each risk shall be measured and assessed based on the probability of occurrence and impact on the project objectives achievement,
- Corrective measures and mitigation measures – measures prescribed by engaged parties in order to mitigate risk to acceptable level. Acceptable levels of risks are moderate or below, other risk levels should be addressed by appropriate measures.

Methodology for risk assessment

The qualitative risk analysis is based upon a combination of impact and probability and is evaluated according to the below risk matrix.

		Impact				
Probability		I	II	III	IV	V
	1	Low	Low	Low	Low	Moderate
	2	Low	Low	Low	Moderate	High
	3	Low	Moderate	Moderate	High	High
	4	Low	Moderate	High	Very high	Very high
	5	Moderate	High	High	Very high	Very high

Table: Qualitative risk analysis per FS and Action plan phases

PREPARATION PHASE						
Type of risk	Risk description / Effect on the project	Prob.	Impact	Risk	Measures implemented / mitigation measures	Status after measures on 23.02.2021
Replacement of key personnel	Due to the envisioned timeframe of the project, key personnel may change positions within the Company or leave Company which can result in delays in closing the project. Information level of the person taking over the position will inevitably be lower than for the one leaving the position.	3	III	Moderate	Project procedures needs to include clear directions on what measures are to be taken to secure information hand-over when a key person is replaced. This includes e.g. a hand-over meeting and a hand-over memorandum. The hand-over process will be supervised to ensure that it is thoroughly executed.	Internal project procedures identifying hand over procedures are adopted. Internal project team has been named. Risk is mitigated to low level
Lack of sufficient communication between WP coordinator and partners	Not adequate communication between WP coordinator and partners in producing FS and AP may result in inadequate purchase, and difficult in successive fases.	4	IV	Very high	Frequent contact with partners and supervisors will mitigate the possibility of making bad purchases.	The team contacts the ARGO representative on a weekly basis. This ongoing communication lowers the level of risk.

IMPLEMENTATION PHASE						
Type of risk	Risk description / Effect on the project	Prob.	Impact	Risk	Measures implemented / mitigation measures	Status after measures on 23.02.2021
Equipment not compliance	The purchase of equipment that does not comply with the requirements may have repercussions for the reporting in the project budget.	3	III	Moderate	Continuous feedback with the team, comparison of various purchases and product evaluations by the team.	All the necessary assessments have been carried out, purchases are awaited for final assessments, but it is believed that the level of risk has decreased.
TESTING PHASES						
Type of risk	Risk description / Effect on the project	Prob.	Impact	Risk	Measures implemented / mitigation measures	Status after measures on 23.02.2021
Not adequate testing plan	If testing plan does not include all necessary details and testing timeline, testing results may not be in accordance to project needs and project outputs underlined. Also, if Methodology for evaluating environmental impact is not described, results may be misinterpreted.	3	IV	High	The partners in charge of the testing phase develop an appropriate test plan and methodology for the environmental impact solutions implemented on time.	The purchase of the tractor suffered a delay and consequently the adoption of testing plans and procedures. The risk remained at a high level. After the FS has been sent, information is awaited regarding the performance of the test phase.

Testing procedures not performed according to plan	If testing procedures are not performed according to prescribed plan, testing results will not be in line with project objectives and project outputs which can result in project funds decommitment.	3	///	Moderate	Testing procedures should be performed according to methods agreed and on representative sample to ensure adequate testing results.	N/A
Not adequate actions implemented	If Pescara Airport has not implemented adequate actions as prescribed by the AF, or actions are implemented in wrong manner, objectives and outputs of the project will not be reached.	3	///	Moderate	Pescara airport will purchase equipment according to AF specifications and put them into use in the first half of 2021. The results of the tests, carried out in accordance with the requirements of the partners, should confirm the improvement of the environmental impact solutions.	N/A

Identified risks shall be monitored and evaluated through entire Action plan and FS lifecycle.

IX. CONCLUSION

Pescara Airport has implemented process for monitoring and implementation of pilot action. Process consisted of following:

- identifying project team with clear responsibilities of each project team member,
- preparation of project implementation plan including pilot action implementation steps,
- identifying risks that can occur during pilot action implementation process with continuously monitoring and evaluation process,
- implementing purchased equipment in practice and measuring their performance,
- establishing monitoring system for environment analysis and process optimisation analysis for future benefits.

Finally, according to testing results of implemented actions, feasibility of each implemented action is demonstrated as well as their positive impact on environment, which clearly demonstrates transferability and applicability of implemented pilot action to other airports and regions. Also, implemented pilot action is in compliance to aviation safety and security standards.

In further steps of the pilot action testing, evaluation grid will be developed in order to assess action performance and to show how the environment benefited from pilot actions.

The Pescara airport, from the project aims to obtain a greener footprint of an airport under development that is important for the region. This can be considered as the first step towards a sustainable development for the environment, without neglecting the important economic developments that green solutions can propose.