



SUSPORT

Sustainable ports
of the Adriatic Sea



FINAL PUBLICATION



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Mr. Alberto Cozzi
Special Projects Unit Port Network
Authority of the Eastern Adriatic Sea



Foreword by the Lead partner

Over 36 months, the Port Management bodies of the ports of Bari, Ancona, Ravenna, Venezia, Porto Nogaro, Trieste, Rijeka, Zadar, Split, Dubrovnik and Ploče, supported by universities and research centres, closely cooperated to enhance the environmental sustainability and energy efficiency at cross-border level.

Commercial ports play an essential role in the transport logistics system, as they allow the connection between the maritime and land routes, and represent an important factor for the growth of the economy and jobs.

However, since they are located near cities, ports also have an impact on air quality and GHG emissions, contributing to climate change. Like other sectors, ports from Italy and Croatia are under increased pressure to achieve the EU decarbonisation targets – e.g. European Green Deal, Fit For 55.

Through SUSPORT, ports in Italy and Croatia created the basis for coordinated and permanent governance in the context of port environmental sustainability and energy efficiency, jointly developing action plans and a long-term strategy, increasing coordination and cooperation between ports to strengthen sustainability and competitiveness.

More specifically, SUSPORT managed:

1. to enhance the competences of involved ports on environmental sustainability and energy efficiency
2. to harmonize measures and policies on port environmental sustainability and energy efficiency
3. to provide a strategic framework for a long-lasting cross-border cooperation.

This publication summarises the results achieved during the project's lifetime. All in all, European Territorial Cooperation has proven essential for the exchange of good practices and mutual learning, allowing project beneficiaries to achieve the expected results and the respective territories to become greener and more resilient.

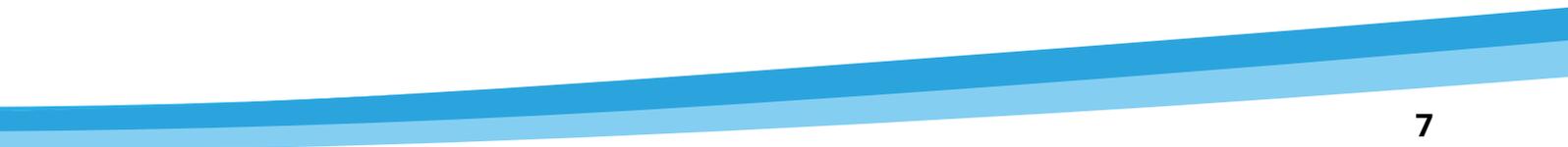
For my part, I can only congratulate the colleagues of the Port Network Authority of the Eastern Adriatic Sea and project partners for the excellent job, and thank the Interreg Italy-Croatia Programme Authorities for believing in and funding SUSPORT.

The main objective of SUSPORT is to enhance the environmental sustainability and energy efficiency of the ports in Italy and Croatia through increased institutional cooperation to create the basis for coordinated and permanent governance in the context of port environmental sustainability and energy efficiency at cross-border level, jointly developing action plans and a long-term strategy, increasing coordination and cooperation between ports to strengthen sustainability and competitiveness.

More specifically, SUSPORT aims:

1. to enhance the competences of involved ports on environmental sustainability and energy efficiency
2. to harmonize measures and policies on port environmental sustainability and energy efficiency
3. to provide a strategic framework for a long lasting cross-border cooperation

Through SUSPORT, ports of Italy and Croatia will be able to share best practices and develop common methodologies for environmental sustainability and energy efficiency, to be tested in concrete pilot actions significantly improving the environmental performance of maritime transport in the whole Programme Area.



2.1 Pilot action - Port of Ravenna

During the Susport Project period, the Port of Ravenna Authority has decided to turn in greener its environment starting from the normal habits, in order to reduce the pollution impact.

Keeping this objective in mind, different activities have been carried out.

Firstly, a photovoltaic system is being installed at the premises of the Port Authority, more specifically in the parking lot, (works will be completed within the end of the project) with the aim to increase its energetic independence, in addition to the already existing photovoltaic panels on the rooftop of the Port of Ravenna Authority headquarters.

Regarding the above-mentioned photovoltaic panels facilities, the tender was awarded on 27th January 2023, whereas the works started in February 2023 and will finish by the end of June 2023. The power of the new photovoltaic system is 122.208 kWh per year, which will add to the previous system on the roof top producing 38.602 kWh.

Indicator	Unit of measure	Value
Reduction in CO ₂ emissions – electric car	Tons per year	-2,499
Reduction in CO ₂ emissions – hybrid car	Tons per year	-1,6345
Increase in green energy production – photovoltaic panels in the yard	kWh per year	+122.208
Reduction in CO ₂ emissions – photovoltaic panels in the yard	Tons per year	-64,7702

Two green vehicles have been purchased: an electric one in December 2020 and a hybrid plug-in one in June 2021. These new cars are used by the Port of Ravenna Authority for its daily activities. The electric vehicle replaced an old gasoline car and in the first year this car covered 11.000 km, all these km were CO₂ free. The above-mentioned vehicles can be recharged using the photovoltaic system.



Indeed, the pilot action also included the installation of a wall box and an electric column for the two vehicles, which took place in June 2021 for recharging the vehicles within the parking lot of the Port of Ravenna Authority headquarters. These facilities will be powered by a photovoltaic system, also realized as part of the pilot action. With these activities the Port of Ravenna Authority hopes to set a valid example to the city port community and stakeholders.

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Indeed, the pilot action also included the installation of a wall box and an electric column for the two vehicles, which took place in June 2021 for recharging the vehicles within the parking lot of the Port of Ravenna Authority headquarters. These facilities will be powered by a photovoltaic system, also realized as part of the pilot action.

INTRODUCTION

Over the past few years, the Port Network Authority of the Eastern Adriatic Sea (PNAEAS), following a logic of integrated development and considering current and future needs, has worked hard to identify both infrastructural and organisational-managerial solutions that favour a more efficient transport system. Actions and strategies have thus been adopted to strengthen both the ability to monitor and manage the complex of port operations in a sustainable manner.

Within its pilot action, PNAEAS implemented the following activities :

- 1) EAS MONITORING : Implementation of the Integrated Monitoring Plan in the framework of the Port Regulatory Plan for the Port of Trieste - ante operam
- 2) COLD IRONING STUDY OF THE QUAYS OF PIER VII IN THE PORT OF TRIESTE
- 3) REPLACING OF THE LIGHTING SYSTEM WITH LED LIGHT BULBS
- 4) PURCHASING E-CARS

Pilot action no. 1 : EAS MONITORING

IMPLEMENTATION OF THE INTEGRATED MONITORING PLAN IN THE FRAMEWORK OF THE PORT REGULATORY PLAN FOR THE PORT OF TRIESTE - ante operam

PNAEAS has prepared the launch of the Integrated Monitoring Plan (IMP) produced within the framework of the Integrated Environmental Study (SAI) of the 2014 Update of the Trieste Port Regulatory Plan (PRP).

Environmental monitoring includes activities concerning the environmental components covered by the IMP (Atmosphere; Water Environment - Coastal Marine Waters and Marine Biocenosis; Terrestrial Fauna Environment; Noise; Landscape; Energy; Waste). PNAEAS implemented EAS ante operam monitoring of the environmental component 'atmosphere'.

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Environmental monitoring was arranged through two seasonal measurement campaigns (a summer campaign and a winter campaign) lasting no less than 30 effective days each.

Air quality measurements were performed through the use of a moving laboratory placed in addition to the stations belonging to the ARPA FVG (Regional Agency for Environmental Protection of Friuli Venezia Giulia) air quality monitoring network.



At the same time, the data acquired by the ARPA FVG station network were collected for analysis and comparison.

The environmental indicators involved in the monitoring are essentially those related to the significant environmental impacts of sources such as: vehicle traffic, ship traffic, shipbuilding activities, paying attention to the area's meteo-climatic parameters, which are fundamental for the diffusion of the pollutants themselves. In particular, the parameters relating to the atmospheric component, that are indicators of air quality, analysed during this monitoring campaign were:

- Sulphur dioxide (SO₂);
- Nitrogen dioxide (NO₂);
- Carbon monoxide (CO);
- Ozone (O₃);
- Benzene (C₆H₆);
- Benzo(a)pyrene (C₂₀H₁₂);
- Fine particles (PM₁₀ and PM_{2.5}).

Given the importance of meteorology on the dispersion of pollutants in the air, measurements of pollutants were recorded with data on wind speed and direction, temperature and relative air humidity, atmospheric pressure, solar radiation and precipitation in order to collect representative data.

The ante operam atmospheric monitoring, aimed at controlling the impact of diffuse emissions generated on the areas outside the future construction site, in the two seasonal campaigns carried out, made it possible to verify that the state of air quality at the point chosen is in line with that recorded by the ARPA FVG stations taken as reference. In fact, during both the summer and winter campaigns, values were recorded that were absolutely in line (if not even lower on some occasions).

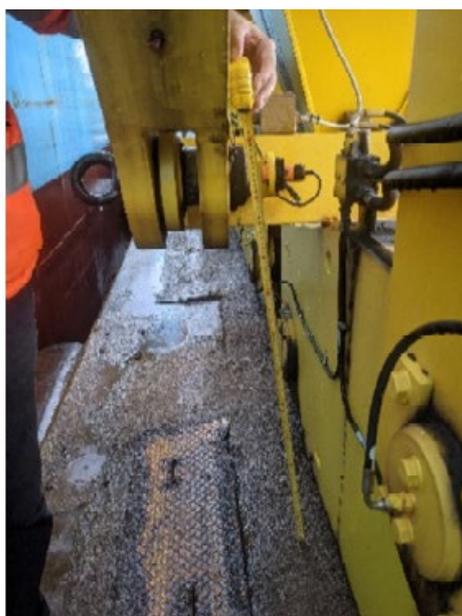
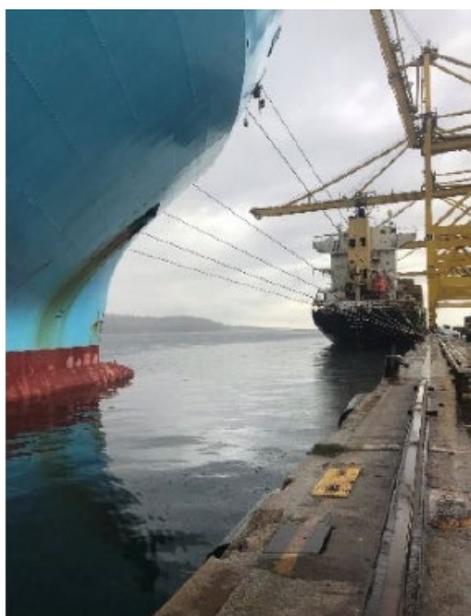
Pilot action no. 2 :

COLD IRONING STUDY OF THE QUAYS OF PIER VII IN THE PORT OF TRIESTE

Cold Ironing represents a very important intervention for the reduction of local emissions during the mooring of ships and is therefore particularly interesting for ports such as Trieste, which is an integral part of the urban context.

The design concerns a Cold Ironing system to be dedicated to Pier VII of the Port of Trieste. The preliminary project drawn up by the Port Network Authority of the Eastern Adriatic Sea (PNAEAS) envisaged the realisation of three connection points along the south quay.

The docking ships are container-cargo ships and, as foreseen by the project, the cold ironing systems serving these ships must meet the specific regulatory standard.



Quay edge with slot for tie-down connection

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The area for the realisation of the Cold Ironing system consists of a small portion of Pier VII of the Port of Trieste. In particular, it is the area close to the root and facing the south quay.

The area is supported by a deck system, consisting of piers on which pre-stressed reinforced concrete plates rest and on which the foundation of the roadway for the handling vehicles is built. On the quay, where the connection systems for cold ironing are located, the space available is limited by the presence of the bollards and the ground anchoring systems of the STS cranes in cases of strong winds (tie-down systems).

The project involves the electrification of a portion of the quay using a moving connection system. The planned cold ironing system will be powered by a 27.5kV line, which will be installed in a new electrical cabin named CEB1. Inside the new cabin there will be space for the transformation and energy conversion equipment for adaptation to the voltage and frequency levels required by the standard IEC 80005-1 which, for the specific case of container ships, requires vessels to be powered at 6.6kV and 60Hz. From the CEB1 cabin, a cable will be laid to reach the root of the Pier. Here will be positioned a technical room provided with the necessary equipment for the sectioning of the MT line and for the interconnection with the moving socket system.

The planned moving system will be of rail-type, with a moving capacity of up to 400m. The rail will be fixed to the on-board beam, will support the movable part of the system and will provide space for housing the power circuits of the system itself.

In the event of future extensions of the quay, which is planned to be extended in a westerly direction by approximately 100 m, on the basis of the pilot action implemented during SUSPORT, the use of a second moving system to cover the second half of the quay is envisaged in order to continue the process towards increasingly green and sustainable ports.

Pilot action no. 3:

REPLACING OF THE LIGHTING SYSTEM WITH LED LIGHT BULBS

Relamping is one of the key interventions when it comes to energy efficiency. As the word itself suggests, relamping consists of replacing traditional luminaires, such as halogen, incandescent or fluorescent lamps, with modern LED (Light Emitting Diode) lamps, in order to achieve a reduction in energy consumption.

PNAEAS has therefore carried out replacement of a total of 523 traditional lightings with LED technology.



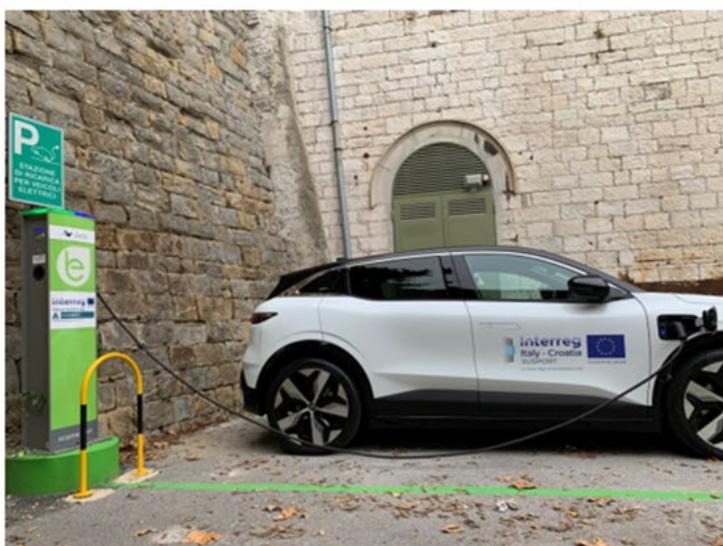
Pilot action no. 4: PURCHASING E - CARS

Thanks to SUSPORT, the Port of Trieste has purchased 2 new electric vehicles to serve its employees and implemented the number of environmentally friendly vehicles. The two purchased cars, which will further reduce pollution, are the following: RENAULT MEGANE E-TECH 100% ELECTRIC, TECHNO EV60 220CV OPTIMUM CHARGE.



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In this regard, it is important to emphasise the complementarity with the pilot action envisaged in the CLEAN BERTH project, Cross-border Institutional Cooperation for Environmental Sustainability and Energy Efficiency in Ports, co-financed by the Interreg Italy-Slovenia Programme, which envisages in 2022 the construction of three electric vehicle recharging stations, located at the Port's premises. Furthermore, PNAEAS also participates to the European Project "NOEMIX" (Project for the promotion of electric mobility in the Public Administration - Horizon 2020 Programme), which envisages the complete replacement of the current car fleet (with conventional engines), through the "leasing" formula, with "full electric" cars and the simultaneous installation of additional charging stations.



CONCLUSIONS

The realisation of the pilot actions within the SUSPORT project allowed PNAEAS to achieve significant green targets in terms of CO₂ emission reduction.

To achieve energy and operational sustainability of ports it is necessary for them to implement a mix of actions by exploiting new technologies and new sources of renewable energy, from cold ironing, to the purchase of electric vehicles, to the replacement of lighting systems with LED technology.

Thanks to SUSPORT the Port of Trieste will be able to reduce CO₂ emissions by a total of 12.548,34 t/year. This result together with those obtained by the other Ports in the Programme area will strengthen environmental protection and decreasing GHG emissions of the cross-border maritime transport.

This deliverable summarises the outcome of the pilot action implemented by PP7-ASVI in the framework of the SUSPORT – SUStainable PORTs project, co-funded by the Interreg Italy-Croatia Programme, consisting in replacement of port lighting systems with LEDs.

Relamping consists of replacing traditional lighting fixtures, such as halogen, incandescent or fluorescent lamps, with modern LED lamps (Light Emitting Diode), in order to achieve a decrease in energy consumption.

Today it is one of the key interventions when it comes to energy efficiency.

Very important in an intervention of LED relamping is the lighting design phase that must take into account some specific activities such as the maintenance of the system over time, as well as extreme operating conditions, the quality of light to ensure the highest levels of visibility, safety and comfort and, of course, replacing the lighting fixtures.

Relamping led interventions can be of two different types.

The relamping led plug & play, is the simplest one and consists of the simple replacement of traditional lamps with LED lamps that share the same type of connection. This type of intervention is also cheaper, since it does not involve any structural intervention on the existing lighting system. A greater effectiveness of the replacement is achieved by increasing the complexity of the intervention through the replacement of the entire lighting system and the redesign of the fitting in a given environment of light sources and light spots.

The realisation of the pilot actions within the SUSPORT project allowed ASVI to achieve specific green targets in terms of CO₂ emission reduction in line with expected results.

Thanks to the pilot action the Port of Ortona moved his first step on the way to achieve energy and operational sustainability of ports being fully aware that it is necessary for them to implement a mix of actions by exploiting other new technologies and new sources of renewable energy from cold ironing, to the purchase of electric vehicles beside the replacement of lighting systems with LED technology.

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The following table summarises the results achieved by the pilot action in reducing CO₂ emissions

ex ante	ex post
57 250 W SAP armors Annual consumption in kWh with operating life of 8 hours $57 \times 250 \times 8 \times 365 = 41.610 \text{ kWh}$ CO ₂ emissions in one year $41.610 \times 0.483 = 20.098 \text{ kg}$	57 75 W LED armors Annual consumption in kWh with operating life of 8 hours $57 \times 75 \times 8 \times 365 = 12.483 \text{ kWh}$ CO ₂ emissions in one year $12.483 \times 0.483 = 6.029 \text{ kg}$
CO ₂ emissions in one year reduced of 14.069 kg	

Thanks to SUSPORT the Port of Ortona will be able to reduce CO₂ emissions by a total of 41,430 t/year.

This result together with those obtained by the other Ports in the Programme area will strengthen environmental protection and decreasing GHG emissions of the cross-border maritime transport.



Pilot action no. 1 & 2:**Purchase of a hybrid car.****1. Ex-ante situation**

DNR owns several cars for internal use. These cars are traditional, combustion-engine vehicles. The purpose of the pilot action was to reduce the carbon footprint of DNR by purchasing a plug-in electric vehicles (PHEV), considered as the most suitable solution for daily use.

2. Pilot action description

In accordance with the planned project activities, DNR bought a mid-range hybrid car from the Skoda brand on 29th March 2021. The second hybrid car was bought by DNR from Toyota brand on March 2nd, 2023. These types of vehicles are often used for the DNR transportation purposes throughout the region. Thus, between our using type cars, it is one of the largest consumers of fuel and also a major polluter of the air and the environment. We believe, thanks to this project pilot action by purchasing these vehicles we have reduced the harmful effects of the CO₂.

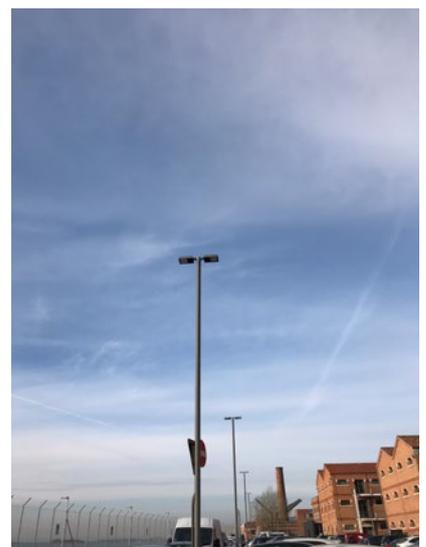


Thanks to the SUSPORT project, the North Adriatic Sea Port Authority has started the renewal of its fleet of vehicles with an increasingly zero environmental impact and now a new plug-in hybrid car came into operation to support the operational and institutional activities of the Authority, after two full electric cars purchased in total respect of the environment with SUSPORT funds in 2021.

The Volkswagen Multivan plug-in hybrid is available to the employees of the Authority, allowing significant savings in terms of CO₂, and to further accomplish the objective to enhance the sustainability and energy efficiency in port areas through concrete actions, marking a turning point for the ports of Venice and Chioggia.

This confirms the provisions of the Energy and Environmental Planning Document approved by the Authority and this operation represents one of the elements of its strategy to improve environmental sustainability and energy saving towards decarbonisation. It should be also underlined that well one-third of the European projects in which the Authority is involved are strongly geared towards a sustainable development of the Venetian ports. Moreover, other projects financed by the NRRP foresee actions aimed at reducing emissions produced by the fleet of vehicles.

Within the SUSPORT project, the North Adriatic Sea Port Authority has a total budget of over half a million euros (572.000,00 Euro) and in addition to the purchase of green vehicles, it also includes the installation of a new lighting system with LED, an intervention that, alone, allows to avoid emissions into the atmosphere of about 125 tons of CO₂ every year.

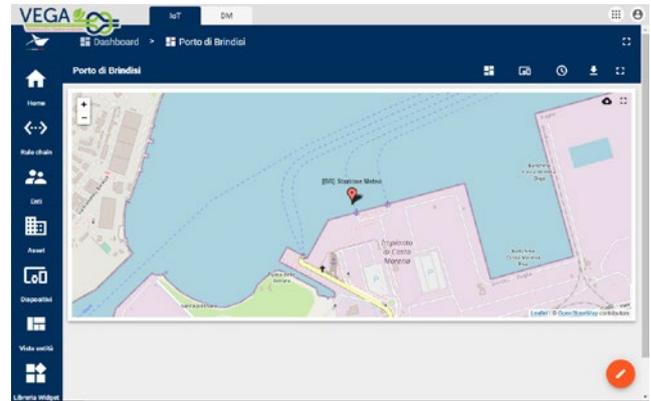
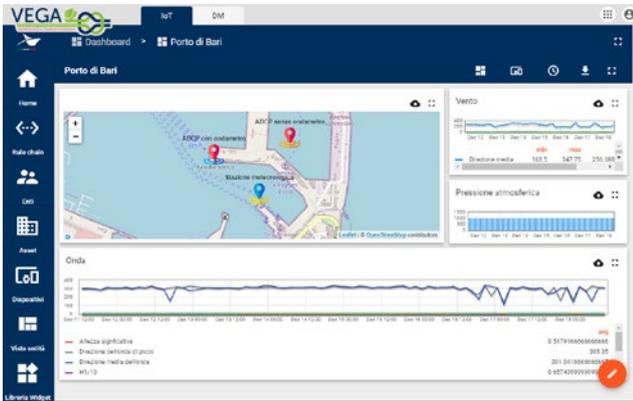


The Southern Adriatic Sea Port System Authority - AdSPMAM has strengthened its environmental protection action with the VEGA system, which was developed as part of the activities envisaged by the "SUSPORT - SUSTainable PORTs" project.

The aim of the pilot action was to improve the maritime environmental & energy sustainability into the ports of Bari, Brindisi, Manfredonia, Barletta and Monopoli, through the development of joint action plans aimed at coordinating all the main stakeholders in the maritime transport sector.

In order to continue the virtuous path of reuse of the Authority's IT architecture and with a view to harmonizing those processes that are transversal to port procedures, VEGA has also been integrated into the application architecture of the Port Community System GAIA, a system that today it governs all the information concerning the transport of people and goods, through the interoperability between systems managed by other bodies and shared among all subjects belonging to the port community. VEGA, in addition to acquiring data from the main environmental monitoring devices such as sound level meters, air quality control units, meteorological stations, multi-parameter probes, current meters, wave meters and tide gauges, is able to manage and acquire data and information according to innovative paradigms such as the IoT (Internet of Things), allowing the main players, through the use of the integrated DSS (Decision Support System) functions, to effectively plan the movement of goods, prevent risks deriving from traffic congestion, reduce the overall the environmental impact deriving from the activities. All this will be made possible also thanks to the real-time data exchange with the PCS GAIA system, which has been operating for years in all the ports of the network for port operations for the transit and control of passengers and goods. The system, designed and developed to be fully configurable on the basis of monitoring needs that may differ from each port of application, provides advanced consultation dashboards through which heterogeneous data can be interpolated, such as the impact factor of infrastructural works on the main environmental monitoring benchmarks.

Through a powerful Rule Chain function, it is also possible to autonomously build chains of events and actions connected to the acquisition of field data, for which, for example, when certain alarm



thresholds are exceeded, the system is able to autonomously send notifications push to the subjects responsible for the controls. Furthermore, the system, with the same application logic, is able to send commands to the IoT devices integrated in the system.



Through the functionality of the VEGA system and future investments to make the physical port infrastructures “intelligent”, the Authority will continue the process of improving the efficiency of energy resources with the aim of being among the first Italian ports able to manage public infrastructure services, based on the real need for use.

VEGA will facilitate the process of upgrading infrastructure and energy efficiency in AdSP ports through technological innovation and environmental protection, objectives outlined by the Port Authority Reform Law.

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Supply, installation and configuration of two environmental monitoring systems

The two environmental monitoring devices allow the import of physical and chemical port water data into Vega system.

Brindisi: The installation took place in 2021 in the area facing Via Egnatia. The probes and sensors, protected by a 316 stainless steel cage, were installed vertically on the quay wall, in the position indicated, at a depth of approximately 2.5m.

The system is currently configured to collect pressure, conductivity, temperature, dissolved oxygen, turbidity and chlorophyll data at frequencies of 2Hz for 1 minute every 30 minutes.

The mediated and formatted data is sent to the Port Authority's FTP as soon as it is available via LTE connection with the following format.

Barletta: The installation took place in 2021 in the terminal area of the eastern breakwater of the port of Barletta. The probes and sensors, protected by a 316 stainless steel cage, were installed vertically on the quay wall, in the position indicated, at a depth of approximately 1.4m. The system is currently configured to collect pressure, conductivity, temperature, dissolved oxygen, turbidity and chlorophyll data at frequencies of 2Hz for 1 minute every 30 minutes.

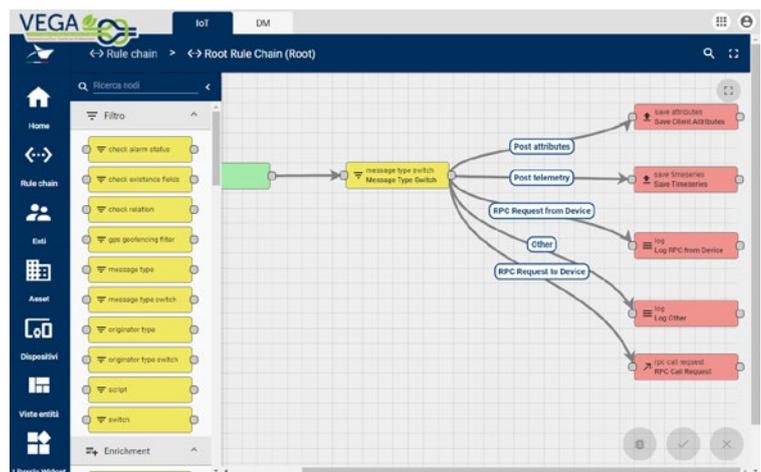
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2022 Autorità di Sistema Portuale del Mare Adriatico Meridionale gis.susport@stpmam.it
Sistema di monitoraggio ambientale porti di Bari, Brindisi, Manfredonia, Barletta e Monopoli



Project co-funded by the European Regional Development Fund - Interreg Italy-Croatia Support Project



Thanks to SUSPORT project, ADSPMAC could renovate the public lightning system of the operative sites of the Port of Ancona by substituting the traditional lighting technology with energy saving LED lamps of 4 high mast lights of the commercial dock (Nuova Darsena). This pilot action allowed to reduce the energy consumption by 44% corresponding to 11 tons per year.

Moreover, ADSPMAC implemented the technical and economic feasibility studies needed for the introduction of the onshore power supply in the ferry quays at the port of Ancona. Finally, two hybrid plug-in vehicles were purchased with aim to improve the sustainability impact of the daily activities in the whole port system.

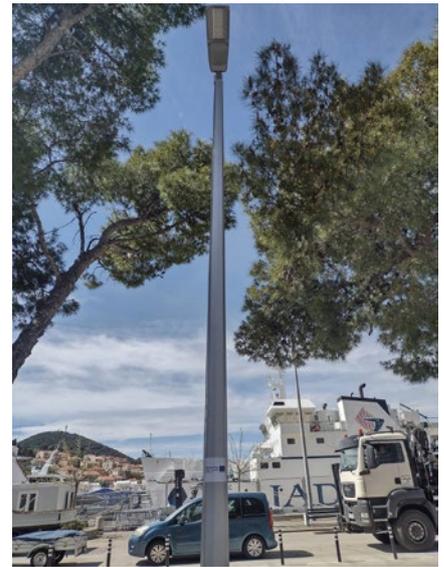


The Dubrovnik port Authority manages the area of the passenger port open to public traffic of international economic interest to the Republic of Croatia. In its operation and consideration of the future of the port of Dubrovnik, special attention is paid to environmental protection and ecology. The Dubrovnik port Authority manages the area both at sea and on land in accordance with the principles of sustainable development and rational use of natural resources. With this pilot action, we intend to reduce the inefficient use of electricity in the port's public lighting, improve light technical parameters and traffic safety conditions, reduce potential risks of environmental pollution due to the use of environmentally unacceptable lighting fixtures, and prevent light pollution.



In order to achieve a higher level of energy efficiency of the outdoor lighting system, it is necessary to replace the existing lighting fixtures, i.e. lamps and reflectors with new and more efficient LED light sources, and to introduce control with the possibility of reducing the level of illumination according to needs. Replacement lamps and reflectors must also meet ecological criteria. Reconstruction of the exterior of lighting includes only the replacement of lighting fixtures

with more efficient lighting fixtures with LED light sources, while maintaining all existing lighting columns of lamps and reflectors. This is to avoid problems that could arise if a completely new lighting project were to be undertaken, as well as an increase in investment costs. The pilot action would reduce electricity costs, improve lighting parameters and traffic safety conditions, and align public lighting bodies with the Law on Protection from Light Pollution and the Ordinance on Illumination Zones.



The total installed power of all 122 pieces of LED lamps and reflectors after the planned reconstruction is 36.86 kW, which is a decrease of 38.82 kW compared to the total installed power of all 161 pieces of existing lamps and reflectors, which is 75.68 kW. Therefore, by replacing the existing lighting fixtures with LED lighting fixtures, the installed power will be reduced by approx. 51%. The projected consumption of the old lighting for 4100 operating hours per year is 310,288 kWh. New lighting should consume 151,130 kWh for the same time period. This results in savings in electricity consumption for a period of one year of 159,158 kWh. Additional savings will also be achieved by installing a public lighting management system.

Pilot action - Port of Rijeka

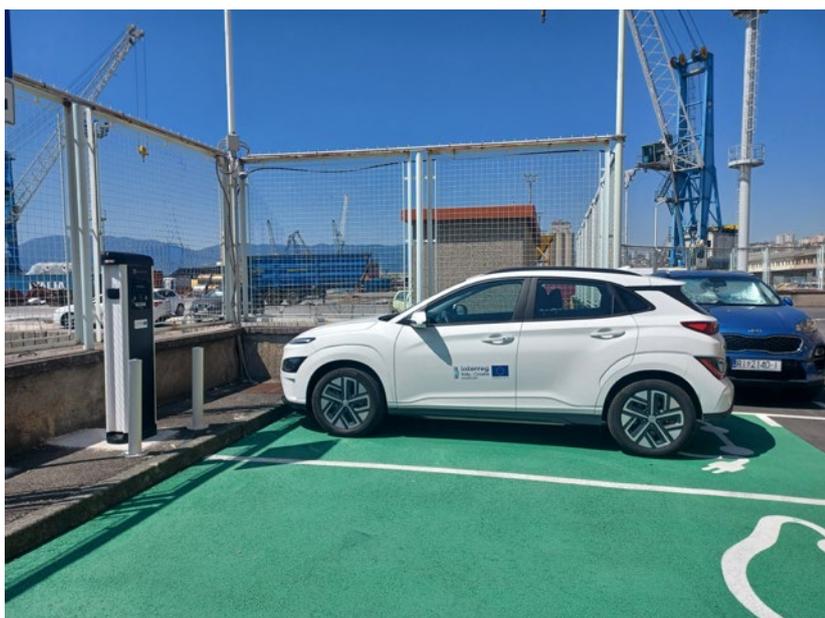
Project SUSPORT is one of the Port of Rijeka Authority's projects that is co-financed by EU funds within the Interreg Italy – Croatia program 2014 – 2020.

The SUSPORT project aims to improve environmental sustainability and energy efficiency in Italian and Croatian ports as projects partners in the Interreg Italy – Croatia 2014-2020 program.

Within the project Susport , Port or Rijeka Authority have pilot projects which consist:

1. purchase an electric vehicle
2. installation of two charging station
3. purchase and installation of LED lighting at the Rijeka breakwater

On February 22nd 2022, Port of Rijeka Authority signed a contract with Hyundai Afro Ltd. for the purchase of an electric vehicle. The contract was signed by Mr. Denis Vukorepa, Executive Director of the Port of Rijeka Authority and Ms. Željka Afrić Jutriša, Director of Hyundai Afro Ltd.

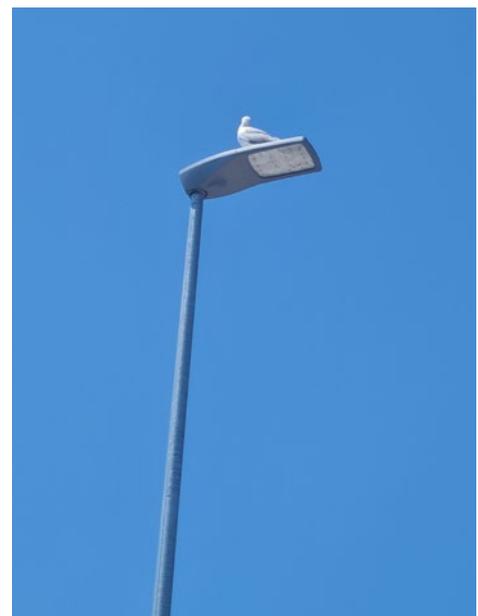


Two charging stations for electric vehicles have been installed on the Port Passenger Terminal at the entrance of the Rijeka breakwater and it is available free of charge and the second one is installed at a parking station near the Port of Authority headquarters.

A pilot activity of the project SUSPORT for the installation of LED lighting at the Rijeka breakwater was completed at the beginning of August 2022. The project is co-financed by the European Union funds from the SUSPORT project co-financed by 85% from the Interreg Italy - Croatia program, and 15% from the Port of Rijeka Authority's own budget.

The Port of Rijeka Authority signed the contract for the procurement and installation of LED lighting at the Rijeka Breakwater worth HRK 1,384,198.75 including VAT in February 7th, 2022 with the company Elektro-energetika Ltd, Zagreb. The works were carried out in several phases including the replacement of poles and the installation of LED lighting in a length of approx. 1700 meters.

The entire Rijeka breakwater is now equipped with ecologically sustainable and energy-efficient public lighting that ensures minimal electricity consumption, low maintenance costs and minimal CO₂ emissions. In addition, the favorite citizens' promenade is lit by the new glow in its entire length, and gives the passenger port and the center of Rijeka a new perspective from land and sea.

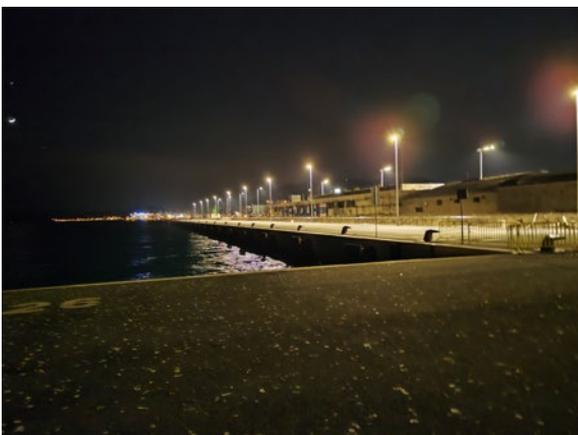


Pilot action - Port of Split

In the frame work of the SUSPORT project, Port of Split Authority implemented pilot action consisting of 3 main parts:

1. Modernzation of the public lightning in the City Port Split
2. Purchase of mobile station to monitor air quality
3. Purchase of hybrid vehicle

Thanks to the SUSPORT project, Port of Split Authority reduced CO₂ emissions for 11,61 t/year and ensured that the air in the port is regularly monitored.



Main pilot actions

A) Completed works of insulation of the building envelope:

1. Elimination of the external air conditioning units fixed to the perimeter walls. Preparation of the prefabricated panel for subsequent processing;
2. Realization of external thermal coat with application of glass wool panel (thickness 20 and thickness 12 cm) on all facades. In gray color in several shades;
3. Replacement of external windows for windows including windows with PVC products with thermal break and glazing with triple glazing and double air chamber: n. 107 linear elements partly openable and n. 14 round elements partly openable

B) Technological systems efficiency completed works:

1. Dismantling of the existing gas-fired boiler and all the equipment supplied inside the thermal power plant;
2. Dismantling of fan coils, radiators and air conditioning units located inside the service building;





3. Installation of the VRV system, consisting for winter and summer air conditioning. The system provides for the load distribution with two external condensing units for air conditioning with the respective power of 20 HP (56 kW in cooling and 63 kW in heating) and 14 HP (33.5 kW in cooling and 37.5 kW in heating) in order to guarantee greater flexibility of operation; the utilities consist of 38 VRV air units that produce heat in winter and cold in summer: the distribution network consists of copper pipes insulated anti-condensation with liquid consisting of inert gas. In addition, for heating the toilets were installed n. 7 electric radiators;
4. Installation of domestic hot water producer inside the technological plant consisting of a solar thermal system with 2,2 KW power, capacity 300 lt, with thermal panels installed on the roof of the external technical building;
5. Installation of the 14.85 kW photovoltaic system consisting of 54 photovoltaic modules of 275 Wp each. The system has a inverter with a nominal power of 15.0 kW;
6. Replacement of discharge lamps, inside the modules, of no. 36 IP 65 lamps with LED lamps of 80 W and 11174 lumens.

Additional pilot actions:

Following the change in the budget of the project, deriving from the savings reuse, COSEF proceeded with the internal design of the "Additional lighting works for the service building and port warehouses at Margreth port" signed by the head of Technical office Arch. Christina Marchesi. After completion of the tender procedures and approval of the executive project, these works were entrusted to the company Fitekno S.r.l. with headquarters in via Vittorio Bachelet, 5 Bagnaria Arsa (UD) for a contractual amount of € 29,093.88.=. Following further unforeseeable work during the design phase, COSEF approved a variant appraisal on 06/23/2023. The new final amount of



the work being equal to € 37,000.00. All the project, final accounting and as-built documents are available at the COSEF headquarters.

The works carried out, listed below, concerned the office building, the adjacent technical building and the port warehouses:

1. Supply and installation of Led Pannel 600x600 lighting fixtures, in the offices and common areas of the service building, in place of the 4-tube neon ceiling light;
2. Supply and installation on existing supports with Osram type LED tubes 120 - 150 cm 15W standard, inside the technical compartment and outside the service building, in place of the neon tube;
3. Supply and installation of a new IP65 watertight LED outdoor lighting fixture, with a power of 100 W, on the front side of service building;
4. Supply and installation on existing supports of Osram Parathom Classic A DIM 13W LED lamps, in the bathrooms and the technical compartment of the service buikding, in place of the incandescent socket;
5. Supply and installation on the outside of the service building of a new 1x18W watertight Led lighting fixture;
6. Supply and installation in some office on the first floor of the service buildding of a new 600x600 recessed Dark Light type LED lighting fixture with LED lamps;
7. Supply and installation of a new safety lighting fixture, complete with LED lamps, tin the service building and technical compartment;
8. Supply and installation at the port warehouses, to replace the metal halide bell, of a new watertight lighting fixture which have a suspended LED source type Tec-MAR mod. Spider led;
9. Supply and installation, in place of the halogen lights, on the exteriors and interiors of the port warehouses, of a new IP65 watertight 100W LED outdoor lighting fixture;

Replacement of the existing port lightning system with energy-efficient technology

The existing lighting was replaced with energy-efficient technology. A design solution for energy-efficient and ecological public lighting of the area inside the port of Ploče on sections:

- Section of the main port road no. 1 and 2,
- Shunting railway tracks of the bulk cargo terminal (TRT)
- Shunting railway tracks no. 1.

The technical solution is based on previous experiences and recommendations and budgets of manufacturers of lighting equipment for this type of building, as well as the typification of equipment, i.e. aesthetic and ecological requirements, related to the reduction of light pollution.

The main purpose of the installation of the road lighting system is the high-quality and safe development of road traffic of all categories of motor vehicles within the port area.

It is important to note that this project includes the replacement of dilapidated lighting based on the old technology of mercury light sources and high-pressure sodium in reflector units over 30 years old, with new lighting based on LED technology.



Final Conference entitled „Green and Smart Ports in the Adriatic-Ionian Region. The decarbonization and digitalisation of ports and freight transport: the contribution of European territorial cooperation“ was held in Trieste on June 21st, 2023 as a workshop with the objective to take stock of the state of the art of the inevitable processes of environmental sustainability and adoption of digital solutions between the ports of Italy, Slovenia and Croatia, analysing their challenges and possible joint strategies. Over the past few years, the ports of Italy, Slovenia and Croatia have been cooperating to improve their environmental performance and efficiency through telematic solutions, both within the North Adriatic Port Association and in the framework of several projects co-financed by European funds and led by the Port of Trieste. The knowledge developed within the framework of these projects was pooled by bringing together the experiences of more than thirty ports, freight villages and logistics operators from eleven European countries. The presence of SUSPORT at the event allowed to widen the scope of target groups to professionals and experts in the domain of sustainability and decarbonization. During the conference, the main results of these projects were illustrated and a joint protocol was signed between the representatives of the ports of Italy, Slovenia and Croatia for the creation of a system of cross-border cooperation in the field of decarbonization of the port sector.

In accordance with the principle of mutual benefit and common development and in order to reinforce and develop cross-border cooperation the Memorandum of Understanding was signed between the SUSPORT project partners, giving birth to a concrete long-term cross-border cooperation network for enhancing port environmental performance and energy efficiency in the Programme Area. The signatories committing to implement the principles of a cross-border strategy based on the SUSPORT project results, detailing priority measures, advice on technologies to be adopted, governance structures, timeframe and impacts.

The creation of a cross-border cooperation network for enhancing port environmental sustainability and energy efficiency in the Programme Area, through the Memorandum of Understanding, the strategy adopted by project partners, committing to mainstreaming its contents in the daily practice through creating a real long-term cross-border institutional cooperation. Lessons learned in the projects are conveyed to EUSALP, EUSAIR and EUSDR through ad hoc recommendations by SUSPORT outputs that will be transferred to them at a high political and European level.



MAIN CROSS-BORDER RESULT



expected
CO₂
reduction



-17,924 tons/year

Lead Partner

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Project Partner

