Final pilot action report

Ports of Brindisi and Barletta

PP8, deliverable no. D.4.2.7

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1. Ex-ante situation

From the analysis of the equivalent CO_2 emissions emitted within the AdSP areas it is pointed out that:

- the greatest contribution in GHG emissions in the terrestrial sector comes from heavy vehicles and electric energy (respectively 81% and 14%);
- the greatest contribution in GHG emissions in the maritime sector comes from moored ships (98%);
- the greatest contribution in the overall GHG emissions comes from moored ships and heavy vehicles (respectively 67% and 26%).

So, the planned actions for the environmental sustainability and port energy efficiency are:

	Progress			
Planned action	**Design**	**In progress**	**Expected deadline**	**Finished**
Cold Ironing for one pier in port of Bari and one pier in port of Brindisi	X (executive)		End 2024	
Cold ironing for other different piers in the same ports or other ports	X (conceptual)			
Construction of structures and infrastructures for the use of alternative and non-polluting fuels by ships		X In the authorization phase by a third party investor in port areas (LNG tank)	End 2024	
Incentives to use of hydrogen/electric vehicles in port areas	X (conceptual)			
Definition of a disincentive system for the use of polluting vehicles	X (conceptual)			
Energy production from RES:				
- Photovoltaic system (Port of Brindisi)		X	End 2021	
- Photovoltaic systems (Port of Bari and Brindisi connected to the intervention on cold ironing)	X (executive)		End 2024	
- Photovoltaic systems (different Ports)	X (conceptual)			
- Wind system (Port of Bari)		X	End 2021	
- Wind systems (different Ports)	X (conceptual)			
- Wave energy production		X (experimentation)	End 2023	
- Use of geothermal energy	X (conceptual)			
Energy efficiency interventions:				
- Building		X	End 2021	
- Buildings (different Ports)	X (conceptual)			
- Public lighting (Port of Bari, Brindisi, Barletta and Monopoli - replacement of public lighting with LED)		X	End 2021	
- Public lighting (Port of Manfredonia - replacement of public lighting with LED)		X	End 2022	

These are weakness and threats of the SWOT analysis in the document "Inventory of Greenhouse Gases (GHG) emissions for AdSP MAM":

- Weaknesses:
  - Definition of guidelines of the Green Public Procurement for AdSP
  - Existing constraints, in particular for the port of Brindisi

- Awareness, at all levels of AdSP, of the principles of sustainability

- Threats:
- Delays in the authorization process for the realization of new investment
- Risk of impact of the energy transition and decarbonisation on port traffic
- High political/social conflict in the territories on environmental issues
- Impact of the COVID-19 pandemic on port traffic
- Difficulty in directing the activity of port operators towards sustainable development

2. Pilot action description

The Southern Adriatic Sea Port System Authority has strengthened its environmental protection action in its ports with the VEGA system which was developed as part of the activities envisaged by the "SUSPORT - SUStainable PORTs" project, with the aim of improving the energy sustainability of maritime and multimodal transport in the ports of Bari, Brindisi, Barletta, Monopoli and Manfredonia, through the development of joint action plans aimed at coordinating all the main stakeholders in the maritime transport sector.

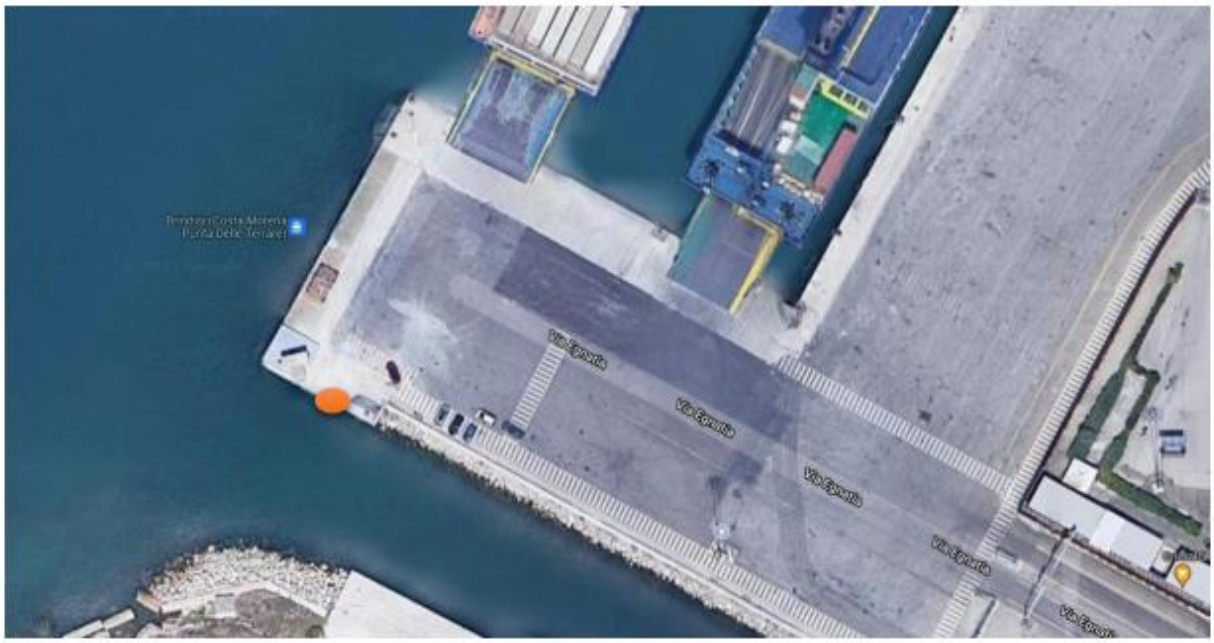
The system, designed and developed to be fully configurable with respect to monitoring needs (which may differ in each port of application), provides advanced consultation dashboards, through which heterogeneous data can be interpolated, such as the impact factor of infrastructure works on the main environmental monitoring benchmarks.
In fact, in addition to acquiring data from the main environmental monitoring devices, such as phonometers, air quality control units, meteorological stations, multi-parameter probes, current meters, wave meters and tide gauges, VEGA is able to manage and acquire data and information according to innovative paradigms such as the IoT (Internet of Things), enabling, through the use of integrated DSS (Decision Support System) functions, the effective planning of goods movement, the prevention of risks arising from traffic congestion, and the overall reduction of the environmental impact of activities.

All this is also made possible thanks to the real-time data exchange with the GAIA PCS system, which has been operating for years in all the ports of the network for port operations, transit and passenger and cargo control.

Through a powerful Rule Chain functionality, it is also possible to autonomously construct a series of chains of events and actions related to the acquisition of field data. For example, should signals

exceed certain alarm thresholds, the system itself would be able to autonomously send push notifications to those responsible for controls.
With the same application logic, moreover, the technological infrastructure is able to send commands to the integrated IoT devices.
As part of the assignment relating to the supply, installation and configuration of two systems of collection and sending of data for the monitoring of the physical-chemical parameters of Brindisi port water and Barletta, the following activities were implemented.

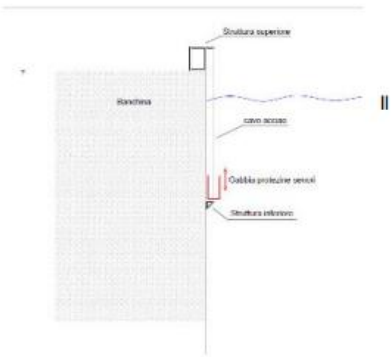
Brindisi:
The installation took place on 28th and 29th October 2021 in the area facing Via Egnatia, in position indicated on the map, and more precisely at the coordinates 40 ° 645395E 17.958522N.
Power supply and data collection system support structure:

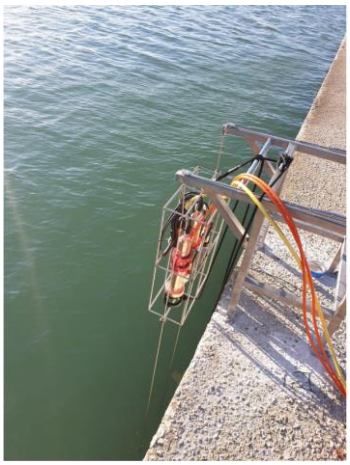


The supply is made up of the following systems / subsystems and components:
RBR Concerto3 CTD / UV (Temperature Conductivity Pressure)
RBR Concerto DO-TU-CLH (Dissolved Oxygen Turbidity Chlorophyll)
Wiper
Power system (Solar panels 2x165W Batteries 2x 95Ah Charge controller)
Data collection and transmission system (Datalogger - LTE Router - Management software)
Protection cage Stainless steel (INOX) 316 probe

Anchoring structure Stainless steel (INOX) 316 probe
Power supply and data collection system support structure

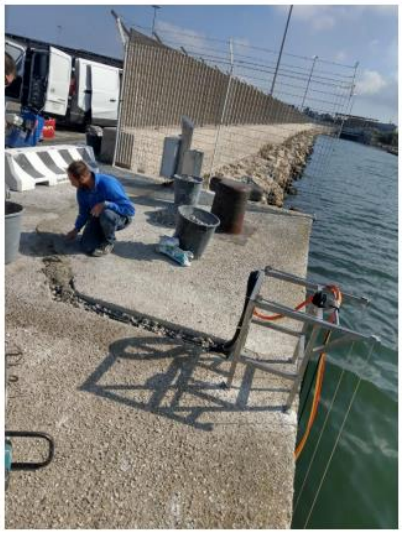
INSTALLATION
The probes and sensors, protected by a 316 stainless steel cage, were installed vertically of the quay wall, in the position indicated, at a depth of about 2.5m.
The anchoring structure of the probes, also made entirely of 316 stainless steel is composed of an underwater structure and a surface structure connected by two steel cables.
The system allows the recovery of the probe without the need for the intervention of divers.



The power system, collecting and sending data was installed in the immediate vicinity of the probe. It is composed of a support structure built in 316 stainless steel on which they are located housing all the components necessary for the stowage of the batteries and subsystems related to the data collection and transmission system.

The probes and the power supply and data collection system are connected by 3 multi-conductor cables reinforced in kevlar, inserted in underground corrugations



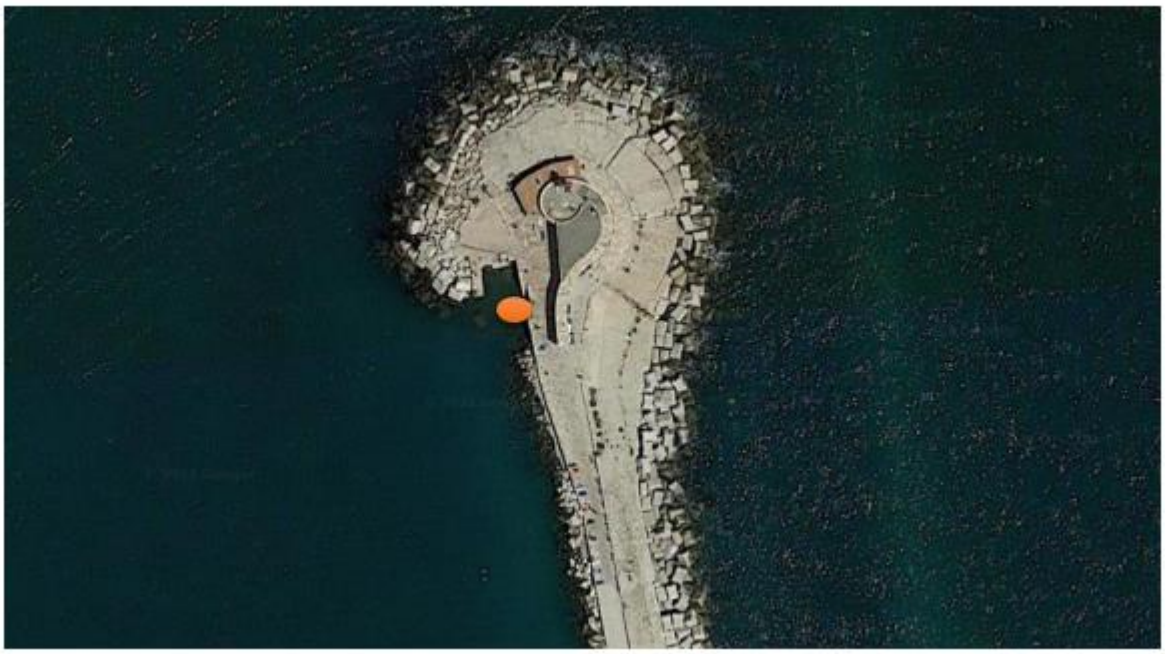
The system is currently configured to collect data relating to pressure, conductivity, temperature, dissolved oxygen, turbidity and chlorophyll at frequencies of 2Hz for 1 minute every 30 minutes.

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

FORMAT
Br, yyyy-MM-ddThh: mm: ss, C, T, D, O, CL, NTU0x0d0x0a
Description and resolution:
Acronyms parameter
Date and Time yyyy-MM-ddThh: mm: ss
T separator character
Water conductivity C
Water temperature T
Water pressure D
Dissolved oxygen O
Chlorophyll CL
NTU turbidity

Barletta

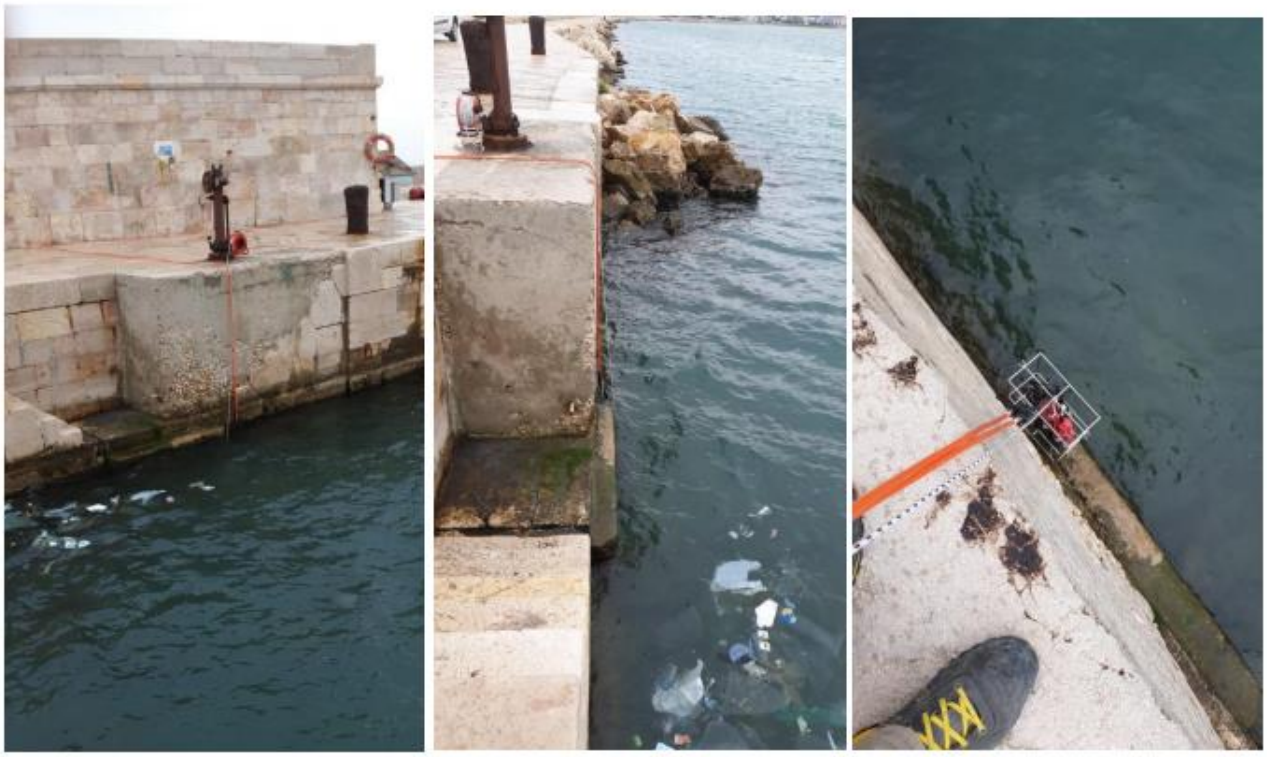
The installation took place on 3 and 4 November 2021 in the terminal area of the East breakwater pier
of the port of Barletta, in the position indicated on the map, and more precisely at the coordinates 41 ° 333407E 16.294714N.

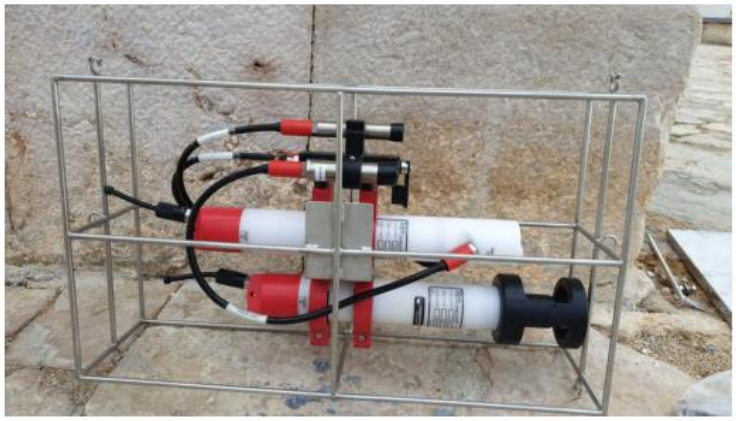


The supply is made up of the following systems / subsystems and components:
RBR Concerto3 CTD / UV (Temperature Conductivity Pressure)
RBR Concerto DO-TU-CLH (Dissolved Oxygen Turbidity Chlorophyll)
Wiper
Power system (Solar panels 2x165W Batteries 2x 95Ah Charge controller)
Data collection and transmission system (Datalogger - LTE Router - Management software)
Protection cage Stainless steel 316 probe protection cage
Anchoring structure 316 stainless steel probe anchoring structure
Support structure for the power supply and data collection system

INSTALLATION

The probes and sensors, protected by a 316 stainless steel cage, were installed vertically of the quay wall, in the position indicated, at a depth of approximately 1.4m. Given the depth and the type of quay, the cage containing the probes was positioned through ballast





The power system, collecting and sending data was installed in the immediate vicinity of the probe. It is composed of a support structure built in 316 stainless steel on which they are located housing

all the components necessary for the stowage of the batteries and subsystems relating to the data collection and transmission system as well as the solar panels.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The probes and the power supply and data collection system are connected by 3 Kevlar-reinforced multi-conductor cables.
The system is currently configured to collect data related to pressure, conductivity, temperature, dissolved oxygen, turbidity and chlorophyll 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 available via LTE connection with the following format.

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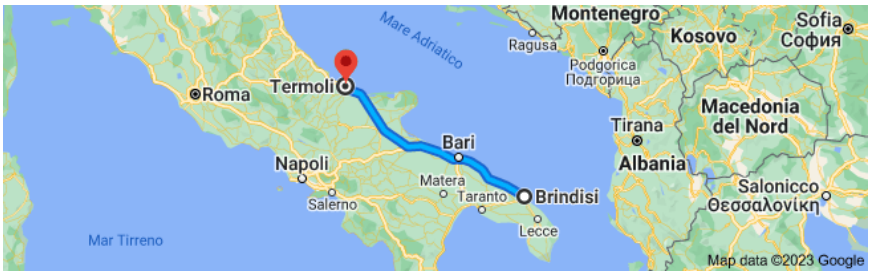
Ba, yyyy-MM-ddThh: mm: ss, C, T, D, O, CL, NTU0x0d0x0a
Description and resolution:
Acronyms parameter
Date and Time yyyy-MM-ddThh: mm: ss
T separator character
Water conductivity C
Water temperature T
Water pressure D
Dissolved oxygen O
Chlorophyll CL
NTU turbidity

In order to optimise the remaining budget and continue the environmental monitoring activities by reducing CO2 consumption, ADSPMAM chose to implement a second pilot action.
The second pilot action concerns the replacement of two cars owned by the organisation in use in the ports of Bari and Manfredonia, which have a Euro 4 emission class, with two (n.2) 100% electric cars.
After careful research, given the maximum autonomy of the battery (77kWh), a fundamental requirement for the use of the cars both for journeys within the ports and for round trips among the ports that are part of the Southern Adriatic Sea Port Authority. , and the other the longer distance that can reach about 400km covering the distance 324.0 km that divides the most distant ports, Brindisi and Termoli.



Also influencing the choice were the short delivery times of the cars and the availability of spare parts, and finally the size of the interior spaces to allow even five people to travel in a single vehicle, the choice of the car model to purchase was oriented towards the 100% electric Volkswagen ID4 model with a consumption of 181,456 wh/km.

3. Conclusions

The pilot action achieved the expected results. Thanks to the SUSPORT project, the Southern Adriatic Sea Port System Authority has strengthened its environmental protection action in its port through the acquisition and installation of sensors and stations to monitor noise, air (concentrations of PM, pollutant gases) and water quality (turbidity produced by excavations and ship traffic, solid and hydrodynamic transport to the port mouths), connected to the VEGA system.

Through the functions of the multiparametric probes and VEGA system, the ports belonging to the Southern Adriatic Sea Port System Authority will become “smarter”.

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

Southern Adriatic Sea Port Authority is committed to limiting the use of fossil fuels and will replace all cars under its ownership with electrically powered cars in order to reduce CO2 emissions as much as possible.

Over the next few years, the Authority will continue the process of making energy resources more efficient, with the goal of being among the first Italian ports able to manage public infrastructure services, based on the real need for use, also through future EU-funded projects.