



# Life 15 | Marina Plan Plus

Reliable and innovative technology for the realization of a sustainable **MARINE** And coastal seabed management **PLAN**

## COORDINATORE



Trevi is a company specialized in the field of special foundations and soil consolidation works and belongs to Trevi Group, a worldwide leader in foundation engineering and in the design and production of rigs and special equipment.

Trevi was established in Cesena in 1957; it acquired a wide and long-term experience in the sector of foundation engineering and its leadership is acknowledged worldwide; a transversal competence finding application in a wide spectrum of activities all over the world. Trevi operates in more than 40 countries with its wholly owned subsidiaries. Among its main activities, these are the ones worth being mentioned: special foundations, tunnel excavation and consolidation, marine works, repair works for dams, soil consolidation, remediation of polluted sites, construction of automated underground car parks, foundation works for private households. In all these sectors, Trevi showed off its ability to solve any problems related to subsoil engineering.

trevispa.com

## PARTNERS



COMUNE  
DI CERVIA

Cervia Municipality has around 30.000 inhabitants and is located in the Emilia Romagna Region, on the Adriatic coast. It belongs to Ravenna Province and consists of an urban centre and of different localities situated across a vast territory covering 82,19 km<sup>2</sup>.

The Municipality is in charge of harbour management. Marina di Cervia is located on the NE side of the old harbour, an area intended to host recreational craft, made up of a dock with 8 piers. The harbour can accommodate 300 boats with a maximum length of 22 m.

Cervia Harbour is cyclically affected by silting phenomena. The technological solutions adopted until now, including seasonal dredging and/or sand handling through barche a elica as well as docks' lengthening (completed in 2009), didn't solve the problem and caused both sea pollution and financial strain.

comunecervia.it



Bologna University (Unibo), founded in 1088, is the oldest University in Western Europe. Nowadays, it still remains one of the most important Higher Education Institutions across Europe with 11 Schools, 33 Departments and about 87.000 students within a multi-campus structure.

Unibo places special emphasis on achieving Excellence in Education and Research: the Teacher, Technical and Administrative Staff Community is made up of about 6000 people; activities include 212 Degree Programs, 40 International Degree Programs, 53 PhD Programs, 50 Specialised Schools, 61 first-level and second-level Master's Degree Programs

Activities related to European Funding Programs are supported by the European Research and Innovation Office, with more than 10-year experience in European projects, assisting Research Groups during the project "lifecycle": networking and lobbying, establishment of Consortia, drawing up of proposals, negotiation and project management. In Europe, Unibo is a member of the major European Networks involved in Research and Innovation initiatives, such as ETP Suschem, PPP Spire, ECRA and obtained 91 million Euros from the Seventh Framework Programme and other EU-funded programs (from 2007 to September, 2013).

unibo.it



ICOMIA

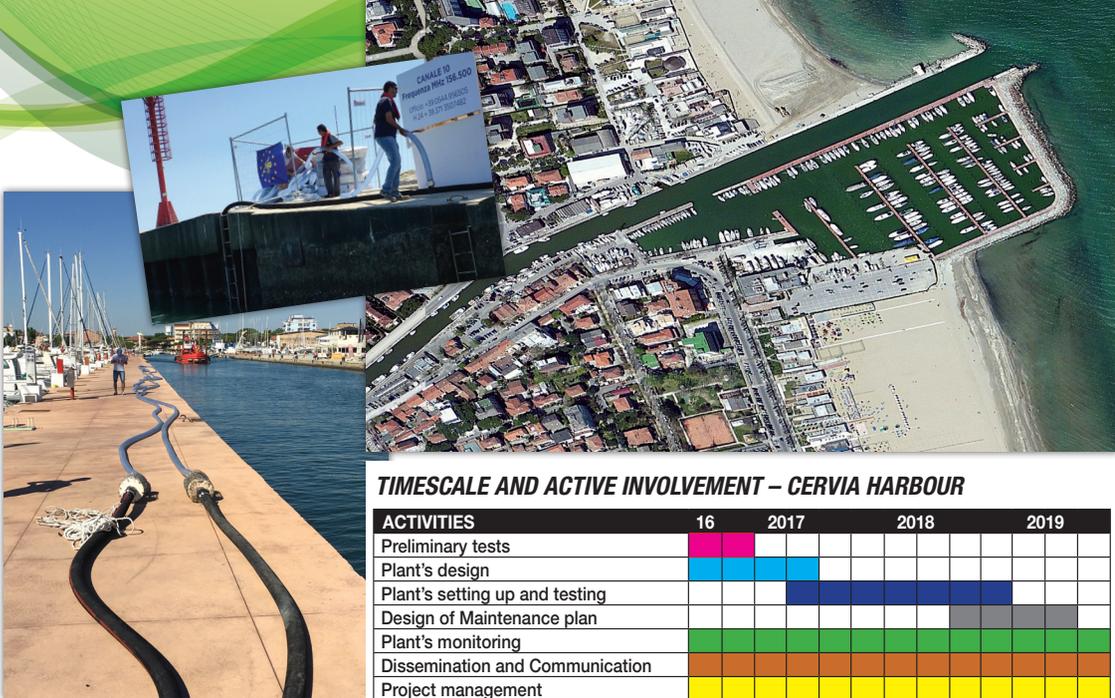
icomia.com

The International Council of Marine Industry Associations (ICOMIA) is the International Trade Association whose members have been representing the global Maritime Industry since 1966.

# Life 15 | Marina Plan Plus Project

## CERVIA project

Beginning:	October 3, 2016
Duration:	39 months
EC Funding:	1.452.807 Euros (57,7%)
Total amount	2.519.245 Euros



### TIMESCALE AND ACTIVE INVOLVEMENT – CERVIA HARBOUR

ACTIVITIES	16	2017	2018	2019
Preliminary tests	█	█		
Plant's design		█		
Plant's setting up and testing			█	█
Design of Maintenance plan				█
Plant's monitoring		█	█	█
Dissemination and Communication	█	█	█	█
Project management	█	█	█	█

The project consists of 8 “actions” which involve both technical and communication + management activities

To summarize, the project entails:

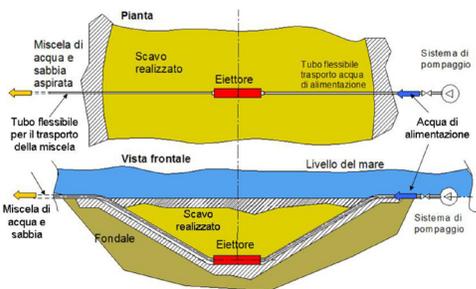
- Setting up of a preliminary test field
- Design, setting up and running of an innovative silting plant at the entrance of Cervia Canal Harbour
- Assessment of the technical-economical and environmental impact of the new tested technology

*Preliminary tests at the harbour will start in October 2016 and will be completed in March 2017, whereas activities concerning installation and continuous operation of the demonstration plant will start in September 2017 until March 2019. Moreover, monitoring activities (i.e. bathymetric measurements and collection and analysis of sediment samples) will also be carried out.*

## Life 15 | Marina Plan Plus Technology

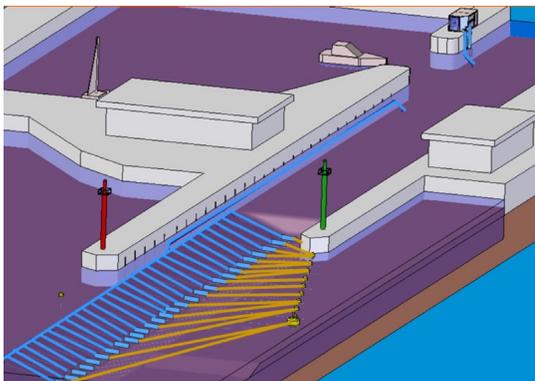
The innovative plant for seabed re-modelling consists of a set of devices, called ejectors, which constantly remove the sediments delivered to their operating area by transferring them to a nearby area where they do not impair navigation.

The withdrawal and subsequent transport of materials to be displaced takes place with no submersed moving equipment but with suitably oriented water jets that temporarily keep sediments suspended and convey them to the transportation and discharge pipeline. Ejectors are fixed to the seabed and do not impair navigation.

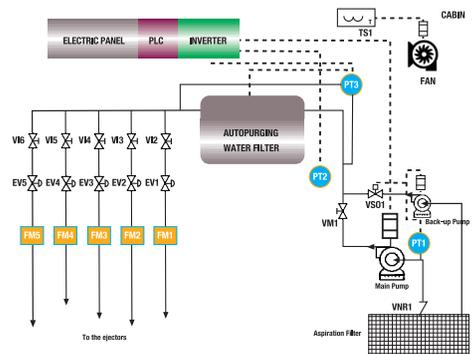


Views of the seabed re-modelling plant

Hence, the whole plant is made up of : 1) a water pumping station which is used to feed ejectors with water pressure; 2) feed and discharge pipelines, 3) adjustment and control devices (valves, instruments, etc...)



Installation example (Riccione plant)



5 ejectors pumping plant - P&I

By means of one or more grids of ejectors, it is possible to operate in the areas affected by silting phenomena, thus carrying out a continuous removal (24/7) of the materials transported by currents and keeping the seabed at a set constant level.

The plant's dimensioning and the choice of ejectors depend on the type of specific application and, in particular, on:

- The size of the area affected by silting phenomena (*it does affect the number of ejectors*)
- The type of sediments (*it affects the area where each single ejector operates*)
- The length of the discharge pipeline (*it determines the ejectors' minimum feed rate*)



Portoverde pumping station

## History

The ejectors' technology was first devised through laboratory trials in 2002 and, eventually, two experimental plants were developed, both of them receiving POR-FESR funding from Emilia Romagna.

The first plant was set up at Riccione's canal harbour; it started operating at the end of July 2005 and was kept running until November 2005. During that period, the plant allowed easy entry into the port, since the seabed was kept at a minimum level, from 3,5 to 5 metres.

The second plant was set up at Portoverde Dock in Misano Adriatico; it started operating, in its latest version, at the beginning of June 2012 and the experimental activities were completed in April 2014



Portoverde filtration system

## Distinctive Features

The plant's strong points are:



- Actions exerted on the seabed comply with the definition of "re-modelling" stated in DM. 173 of 2016; hence they are not regarded as dredging actions but, rather, as sediment management operations within the same basin.



- Reduced environmental impact: while sediments are managed, no turbidity or re-suspension of materials is detected; the only plant emissions are linked to the pumping station's electric energy consumption



- It can be automatically operated and a remote control can be used



- Certainty of seabed maintenance costs: installation of the plant allows for a precise planning of seabed maintenance costs, solely linked to the plant's operating costs, regarding dredging activities as extraordinary - and not ordinary! - maintenance interventions.



This project has received funding from the European Union's LIFE Programme under grant agreement No LIFE15 ENV/IT/000391

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