

SUNSET DOCK PROJECT

Living Port

Located on the bay “*Ría de Vigo*”, NW coast of Spain, Port of Vigo is an excellent natural port sheltered from the ocean. The Ría de Vigo has an exceptional landscape and natural values and is one of the main attractions of the Galician Coast. The bay is surrounded by the National Park “*Illas Atlánticas*” and other natural areas protected by Natura 2000 Network. The situation and his natural resources make of this Atlantic location an extremely important zone for artesian fishing and aquaculture. Both economic activities play a significant role for local community.

In this context, Port of Vigo works on promoting the ecological and cultural conservation of the Ría. The compatibility of industrial activity and a high environmental status area are a priority for the organization. Port of Vigo tries to be ensured it.

Port of Vigo has been pioneered in Europe the integral implementation of Blue Growth strategy. An innovative methodology has been developed based on a bottom-up approach. Under this framework, the port has designed a specific Plan for Vigo based on Blue Economy with its stakeholders. Efforts are conducted to promote competitiveness, efficiency and sustainability in all the activities, installation and services. Actions and projects are defined by Blue Growth members to be executed on the 2022 horizon. This plan has established a new and innovative model of dialogue and collaboration between the port and the city where more than 300 stakeholders are involved.

Related to Blue Growth strategy, the Blue growth objectives are grouped in four priority areas: innovative, connected, inclusive and green port. The “green” objective of the Port is an integral programme that includes environmental actions and considers social inclusion. Participatory activities with citizens are being developed in order to grow up awareness about the environment protection. In short, the “green goal” is focused on improving the quality life of citizens who live in a city with a Port, as the case of Vigo.

The Port of Vigo seeks to improve the competitiveness of the maritime-port sector, but also to boost the local economy and to generate social prosperity, while working to conserve and protect the environment at the same time. In this regard, Port of Vigo aligned its strategy with several international commitments and agendas as The New European Green Deal, The Sustainable Development Goals or Our Ocean Commitment which contributes to achieve the goals proposed in his hinterland and follows to be an international reference Port in environment sustainable practices.

**BLUE GROWTH VIGO
OBJECTIVES**

**SUSTAINABLE
DEVELOPMENT GOALS**



Contribution of Blue Growth Port of Vigo to Sustainable Development Goals

One of the most representative projects of the *green* working line is “Sunset Dock”. This project includes a set of actions to develop innovative practices that allow to achieve **sustainable ports**. The creation of a marine natural ecosystem in port area is being studied. The experience tries to protect and increase the biodiversity in the port and pretends to create a fixation CO2 system.

“Sunset Dock” aims to set up synergies between companies, research institutions and technological centres in order to generate knowledge and to promote new environmental technologies to get better sustainable practices in Port area. The project, which is planned on several phases, includes the design and installation of structures for the colonization species of fauna and flora. The structures are made up of ropes that are hanging in a dock on a selected area of the port.

On the other hand, the project includes a program of environmental awareness activities about port marine ecosystems and his integration with industrial activities. All the actions are addressed to emphasise the importance of conserving and recovering altered coastal ecosystems.



Project dissemination and awareness of climate change on the occasion of the Christmas Market in the city of Vigo

The communication plan is designed as a monitoring-dissemination plan. Several informative materials and activities are being designed. It wants to show the citizens a live experience where the audience can follow up the process of marine habitats colonization and restoration.

Additionally, this project is complementary to the actions derived from the ML-Style project, also belonging to the Blue Growth strategy of the Port of Vigo. The main goal is the collection of marine litter in the Galician's Coast contributing to improve the state of port and marine ecosystems in the Bays, also helping the achievement of Sunset Dock goals. Both initiatives contribute to the green objective and both are being carried out in parallel, enhancing the results achieved. To date, about 123 tonnes of marine litter have been removed with the collaboration of local fishermen's organizations (see section on impact measurement)

Sunset Dock is a pioneer worldwide project. His complexity and innovative nature make it necessary to be executed in **four sequential stages**:

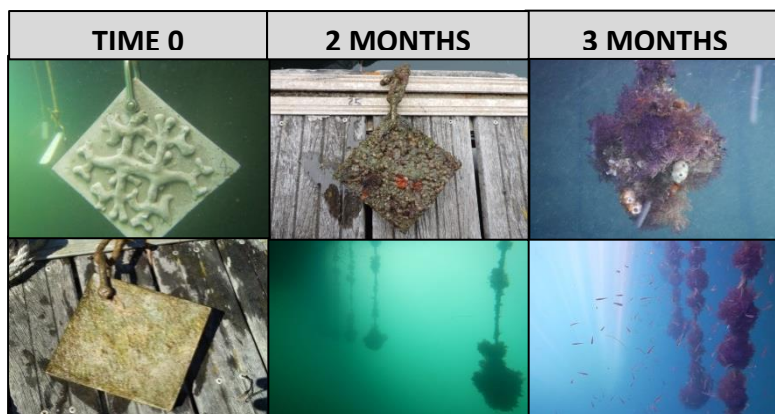
Stage I. PuertAlMar “Door to the sea” (pilot study)

The first action in this phase is to develop systems that serve as support for marine life. The purpose is the recolonization of coastal areas that have been affected by the industrial activities in the port environment.

A pilot study has been designed. It includes the installation of hanging structures that are located under floating docks and that are designed to maximize the fixation of marine organisms. All the experience is monitoring throughout a year in order to characterize the created biology community. An evaluation of CO₂ capture by the system is being carried out too. All this experience is used for promoting sustainability practices in port areas and grow up awareness about ecological values in the society.

Summarizing of Phase I actions:

- Design of structures adapted to existing floating docks in the Port of Vigo, as artificial reefs.
- The better system for rapid colonization of macro algae and sessile organisms will be determined.
- Impact analysis - quantitative and qualitative quantification - on biodiversity, CO₂ capture and impact on commercial fish communities.
- It will serve as an element of dissemination of ecological values to society. For which the design and installation of teaching panels and teaching materials will be carried out, and awareness workshops will be developed.



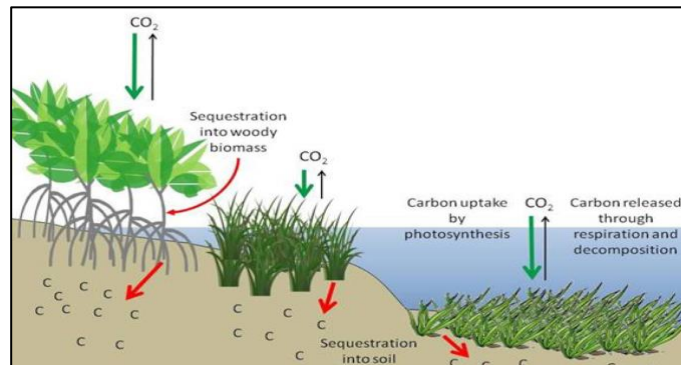
Stage II. Blue Ports Ecosystem



The second stage includes the development of applied research actions in different pilot projects located in Mediterranean and Atlantic ports. This action wants to explore the development of a new eco-innovation environmental product that facilitates ports to improve their sustainable practices. The product is based on the use of ecosystem services created in the pilot experiences to reduce the ports carbon footprint.

Gradually, **the value of carbon in coastal ecosystems is being integrated into conservation and restoration programs**. Some projects have been developed until the date to demonstrate best practices through field projects and by working with global experts to develop the standards and tools needed on the ground.

The Project will provide adequate solutions to minimize CO₂ emissions, as well as increase biodiversity making compatible port activities with a high ecosystem quality. The overall objective of the project is to reduce the environmental impact of port activities by developing Best



Practices Guidelines tested during the project in the topic of Carbon Management Strategies and develop an innovative methodology on Port Environmental Impact assessments, while developing an innovative subsea carbon capture and biodiversity protection biotechnology to be tested through different pilot projects in both Atlantic and Mediterranean Maritime Ports.

Building on the results of a previous pilot deployment project in the Mediterranean port of Melilla port (Spain), the project aims to upscale, improve and optimize the designed pilot deployment of the NEREIDAS CO₂ - capture biotechnology, as well as develop alternatively artificial reefs of seabed regeneration specially designed to promote the recolonization of autochthonous organisms with high rates of carbon sequestration. The project will include pilot deployments in the Atlantic ports of Vigo (Spain), Portugal (Aveiro), Cantabric ports (Santander) and Mediterranean Port of France (Leucate) and Spain (Melilla), testing and adapting the support structures and species if necessary to different marine environments.

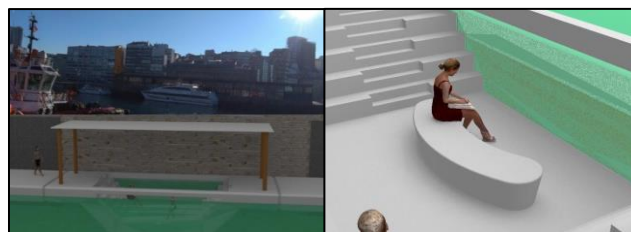
The results of the pilot deployments will be used to develop the Carbon Management Strategy for Ports and the Carbon Capture Biotechnology Procedure Manual, including the protocol to implement the reef structures.

Stage III. ECO Pontoon Living Ports

The third stage of the project is designed to increase biodiversity in port areas, favour the capture of CO₂ as well as disclose to the citizens the ecological values of the port environment.

It contemplates the construction of a floating dock in the vicinity of Portocultura (a Port of Vigo area) with several structures that will facilitate the observation of fauna and flora (see the images).

The construction of the dock will use innovative materials: environmentally sensitive materials that enhance the ecological value of the intertidal. The colonization of fauna and flora provide greater resistance and durability to the built structures.



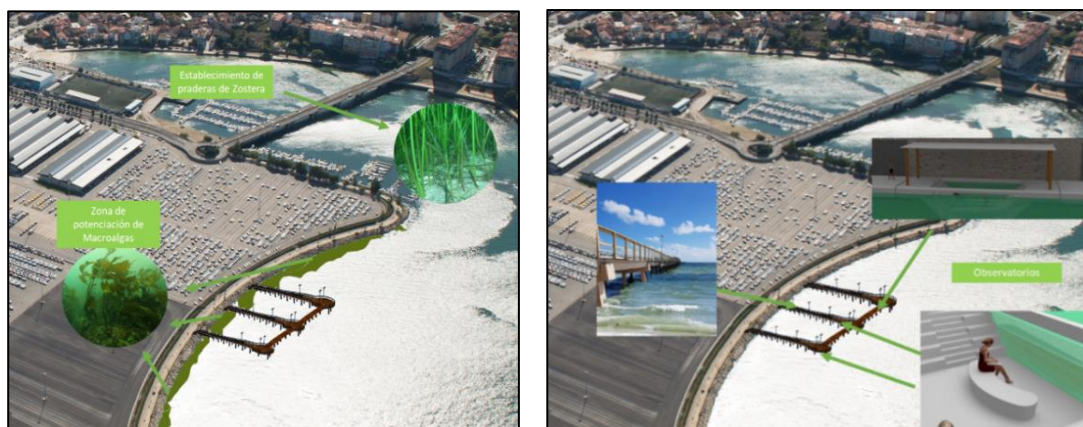
Stage IV. Sunset Dock

In the last stage, a dock for recreational use is planned in which the technologies and designs developed in the previous phases are integrated.

The large-scale implementation of all phases and their monitoring will demonstrate the significant carbon offset in the port infrastructure and the compatibility of the port activity with the high quality of the marine ecosystem.

Integrating the technologies developed in the previous phases is intended to create an eco-reserve of the Port of Vigo.

Thus, a “walk” on the docks will be created with elements that favour biodiversity resulting from the previous phases, a seabed area will be regenerated with sea grass beds and a zone will be established where the proliferation of laminaria forests in areas of breakwater will be enhanced.



The **innovation** of the project is addressed from three perspectives:

- The development of a new environmental product for the Ports designed to improve and recover marine ecosystems by integrating biodiversity and nature protection into port development plans
- The development of an innovative method: the project will validate and standardize the reef framework for port environment, adapted to specific restoration requirements. Different approaches from both engineering and science-based practices in ecological restoration and valorisation will be combined to design an ecological biotechnological tool.
- The development and creation of a port-city infrastructure: effective structures designed will rehabilitate the ecosystem lost due to port development activities that would take centuries to re-form without human intervention. Some of these structures (see phase 4) are designed to make society an observer of the recovery of ecosystems, as well as to raise awareness about the importance of these natural habitats.

Lastly, as a result of the development of this project, a spin-off has been established in November 2019 from a research group from the University of Vigo - **BLUE STRUCTURES S.L.** Its main objective is to create ecological engineering solutions, which allows facing the challenge of minimizing the effect of the construction of marine infrastructure, as well as fighting against climate change.

In summary, Sunset Dock aims to:

- Recover the good state of the marine ecosystems of the port area of Vigo, as well as the improvement of the growth of plant and animal species typical of the area.
- Promote awareness and awareness of the importance of the conservation of ecosystems in the port area.
- Reduce carbon emissions through CO₂ capture technology as a valid tool to offset emissions and contribute to sustainable ports.

These results will be intensified thanks to the results of the collection of marine litter from the sea bottom in this area, which contributes directly to the improvement of ecosystems and to the improvement of society's perception too. In addition to increasing cooperation between several entities, including society organizations such as fishermen's associations that collaborate with both initiatives by supporting litter collection campaigns.


IMPACT ASSESSMENT OF BLUE GROWTH STRATEGY AND PROJECTS

In order to measure the impact of the Blue Growth Plan and its projects, a series of indicators were defined. These indicators allow quantifying the degree of compliance with objectives set during its execution. This is necessary to demonstrate the cumulative social, economic or environmental changes of its performance. In addition, these indicators are aligned with the Blue Growth Objectives Port of Vigo 2022 and therefore with the Europe 2020 Strategy.

E X P E C T E D I M P A C T	INNOVATIVE PORT	Innovation is an essential concept of the Blue Growth Strategy and, therefore, of the Port of Vigo. In order to become an innovative port, we promote the development of more efficient technologies; we offer improved services to our users; we encourage an open innovation, by integrating private sector with research institutions, technological centers and universities.	40% 86%	60% 14%	23 17	20 9	10 3	STATUS OF IMPLEMENTATION
	EXPECTED IMPACT		Public investment mobilized in Innovative Projects	Private investment mobilized in Innovative Projects	Number of Innovation Projects Executed	Private-Public Innovation Collaborative Projects	Number of prototypes	
	ACTUAL MEASURE							
G R E E N P O R T	GREEN PORT	In the Port of Vigo we work to become the green port of reference in the south Europe, through actions and projects enforced to recover zones where the industrial and urban activity has left his footprint; promoting the use of clean energy technologies; and implementing more environmental-friendly processes.	25% -10%	3% 2.0%	30% 8%	100 mil 1.0 mil	230 123.0	€ 207.307.000 Total Budget
	EXPECTED IMPACT		Reduction of energy consumption in port facilities	Clean self-generated energy	Reduction of emissions of Greenhouse Gases	Surface of seabed regenerated (Sq. Feet)	Tones of marine litter gathered	€ 37.287.803 Approved Public Investment
	ACTUAL MEASURE							€ 5.936.064 Approved Private Investment
								13.650.136 € Grants
								25 Projects in Progress
C O N N E C T E D P O R T	CONNECTED PORT	A connected port is synonymous of competitiveness, reason why, in the Port of Vigo we work to digitalize the administrative processes and multiply the maritime lines; we support digital transformation and the use of ICT tools in communication.	30 8	10 1	10 7	550 mil 74 mil	12% 6%	46 Total nº of Projects
	EXPECTED IMPACT		Digitalized procedures	Number of improved operational and logistics processes	Number of new lines of maritime traffic	Port area created, freed up or applied to other uses	Tones traffic growth	47 Actions
	ACTUAL MEASURE							
I N C L U S I V E P O R T	INCLUSIVE PORT	People are the center of an Inclusive Port, that is why from the Port of Vigo we bet on: the design of training programs to meet the needs of the current market; the integration of traditional sectors in the new concept of the Blue Economy; social innovation, favoring the interaction between all agents linked to the sea.	3000 750	1000 355	20 5	7 8	120 106	
	EXPECTED IMPACT		Number of new jobs created	Number of people trained	Number of social innovation actions	User satisfaction	Collaborations	
	ACTUAL MEASURE							

Sunset Dock – Impact and application

The definition of a monitoring system to measure the impact of the actions and projects developed on the proposed objectives provides a solid basis for the evaluation of the implementation of the Plan and the degree of achievement of the agreed commitments. As part of the indicators related to the objectives of A Green Port, specific parameters have been included regarding the reduction of energy consumption, percentage of energy self-sufficiency, the reduction of emissions (CO₂, SO_x, NO_x), or the surface of regenerated funds, to those that Sunset Dock contributes.

Blue Growth Port of Vigo 2022 Objectives	Indicators	Challenge for 2022
 GREEN PORT	Percentage of self-sufficiency supported by renewable energies	3%
	Percentage of energy consumption reduction at the port facilities	25%
	Percentage of greenhouse gas emissions reduction	30%
	Area of recovered seabed	100.000 m ²
	Tonnes of marine litter gathered	230

30% | 8%
Reduction of emissions of Greenhouse Gases

100 mil | 1.0 mil
Surface of seabed regenerated (Sq. Feet)

230 | 122,9
Tonnes of marine litter gathered

Sustainability and Governance

The Blue Growth Vigo Plan is led and coordinated by the Port Authority of Vigo through a governance system designed and created specifically: **the shared Governance**. This means that the stakeholders involved participate actively through meetings and other ways of communication to propose improvements, projects, ideas and initiatives to foster the **Blue Growth Spirit** and jointly achieve the established objectives. One of the last steps in this “Shared Governance” has been the institutionalization of working groups through the creation of Permanent Commissions belong to Port of Vigo Governance Structure. Concretely, one of these Permanent Commissions is Biotechnology and Blue Energy, from this group the project “Sunset Dock” is developed.

The capitalization of the experience is realized through the **internationalization** of the Blue Growth strategy. The transfer and exchange of experience with other regions and / or entities favours continuous improvement and the possibility of establishing collaborations between them. So, internationalization is a key for the sustainability of Blue Growth Strategy and it is carried out through collaboration of international institutions. In the last year, the Port of Vigo has supported and coordinated, together with Unesco, FAO (United Nations) and DG Mare (European Commission) several working groups and international forums, which aim to share this knowledge and extend the same criteria of sustainability to other countries.

Currently, the Port of Vigo is working together with these institutions on the creation of an international Blue Ports Network. The objective is to **promote cooperation and knowledge management among international ports**, so environmental measures (i.e. knowledge from Sunset Dock implementation) as part of Blue Growth strategy are spread and implemented to achieve homogeneous and sustainable economic, social and environmental development with the involvement of all stakeholders from quadruple helix, taking into account the specific characteristics of each region. More than 20 countries around the world participated to define how fishing ports should be, based on sustainability criteria, environmental protection, fair employment and wealth creation.

Project partners and collaborators



Institutional collaborators:



Food and Agriculture Organization of the United Nations



Collaborators in ML-Style complementary initiative:

INDITEX

Textile Design Industry – Zara
Spain



Technological center of the sea
Spain



Federation of fishermen's associations of Pontevedra (10 fishermen's associations involved) - Spain



Spanish Institute of Oceanography
Spain



Marine Research Institute of Vigo
Spain