July 2024. Technology snapshot.

Blue Economy Technologies in Catalonia



ACCIÓ Government of Catalonia



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Carried out by

Strategy and Competitive Intelligence Unit of ACCIÓ

Barcelona, July 2024



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Object of the report

The aim of this report is to analyze the most relevant technologies that have an impact on the blue economy.

The global trends, potential and opportunities have been studied and a mapping was created of the ecosystem of blue economy technologies in Catalonia.

This does not intend to be an exhaustive document, as we already have reports on the blue economy, such as:

<u>The EU Blue Economy Report 2023</u>, by the European Commission, Directorate General of Fisheries and Maritime Affairs with the Joint Research Center (JRC)

L'economia blava a Catalunya [The Blue Economy in Catalonia], from the Department of Climate Action, Food and Rural Agenda of the Generalitat of Catalonia

Economia blava [Blue economy], from the Barcelona City Council

In this report we aim to emphasize technologies, their role in the sustainable transformation and conservation of the oceans and seas, and the state of the situation and the opportunities afforded in Catalonia.





Blue economy-linked technologies analyzed

For this report, the following blue economy technologies have been analyzed (in purple):





Blue economy technologies in Catalonia

1. Definition and magnitudes





Definition

The blue economy encompasses all activities related to the waters of the sea, ocean and coast, emphasizing their sustainable use for economic development and the preservation of ecosystems and the natural environment.



The blue economy comprises a variety of sectors and related policies, which together determine the sustainable use of marine and ocean resources. A major challenge of the blue economy is to better understand and manage many aspects of ocean sustainability, from fisheries to ecosystem health and prevention of pollution. In addition, managing it involves cross-border collaboration.

Generalitat de Catalunya

The blue economy is "the economy that recognizes the importance of the seas and oceans as drivers of the economy for their great potential for innovation and growth".



In general, the blue economy must be understood as the economic field that encompasses all activities related to aquatic ecosystems that encourage social development and the good state of the ecosystems where they take place, with the aim that these natural resources remain an economic, cultural and recreational engine.

THE WORLD BANK

The blue economy refers to integrating sustainability and development in economic sectors for healthy oceans.



The blue economy is the sum of economic activities of ocean industries and the assets, goods and services of marine ecosystems. Alternatively, the blue economy/ocean economy refers to "the sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and the ocean's ecosystem health".



Sources: United Nations, World Economic Forum, European Commission, General Directorate of Fisheries and Maritime Affairs, Department of Climate Action, Food and Rural Agenda of the Government of Catalunya and Barcelona City Council



Blue economy in the world

The blue economy is globally valued at around USD 1.5 trillion annually, making it the seventh largest economy in the world. It is expected to double to USD 3 trillion by 2030.

The total value of ocean assets (natural capital) has been estimated at USD 24 trillion.

Approximately 71% of the Earth's surface is covered by water, 96.5% of which is concentrated in the oceans

80% of world trade by volume is done by sea

40% of the world's population lives near coastal areas, with more than 3 billion people depending on the oceans for a living



Source: United Nations, World Bank and Commonwealth Blue Charter

The established sectors of the European blue economy generated 624 billion euros of revenue in 2021, growing by 21% compared to 2020; the GVA shows an increase of 35%, reaching 171 billion euros.

The stable sectors of the blue economy in Europe directly employ 3.34 million people, which represents an increase of 17% compared to 2020

Tourism is the most important segment both in economic terms (29% of the total) and in employment (54%). Tourism, maritime transport, marine renewable energy and living resources are the sectors with the greatest economic impact

Renewable marine energies continue to play a fundamental role in achieving the objectives of the European Green Deal

Sectors such as ocean energy, blue biotechnology, and desalination are identified as key drivers of growth, creating new business opportunities

Coastal communities are highly vulnerable to climate change. There is the need to improve coastal protection to mitigate potential economic damages, which could range between 137 billion and 814 billion euros by the year 2100

Source: The EU blue economy report 2023, European Commission





Blue economy technologies in Catalonia

2. Selected technologies





Selected technologies

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Water sports

Definition

Includes products designed for various water-related activities such as swimming, diving, sailing, surfing or kayaking. Advances in technology, growing interest in water sports and increasing popularity of beach tourism are some of the factors driving water sports.



The global water sports market will grow from a value of USD 10.71 billion in 2018 to USD 17.28 billion by 2027, with a cumulative growth of 61%.



Technologies

Boat design has been transformed thanks to technological evolution. Currently, the use of technologies such as artificial intelligence or digital twins are indispensable for the preliminary design. Research is also being conducted into the use of sustainable and frontier materials, while additive manufacturing is advancing with giant strides. Digital tools such as the cloud, connectivity or sensory tool are already fully integrated into the vessels.

Main companies worldwide ADUARCELUNG CONSTRUCTION COTAbata Mares EUCHAN Source: PRNewswire

Sustainable Development Goals covered





Offshore wind energy

Definition

Energy and technological area that makes it possible to harness of the power of the wind in marine environments. The existing wind resource at sea is superior in terms of average speed, energy density and regularity than on land. Recently, technological costs have dropped dramatically and it is now competitive with other energy generation technologies.



Asia will lead offshore wind power, with more than 60% of global facilities by 2050, followed by Europe (22%) and North America (16%).



Technologies

Fixed marine wind turbines: structures mounted on the sea floor. They are the most deployed today, mostly at shallow depth (maximum 60 meters).

Marine wind turbines on floating platforms: these adapt to the direction of the wind and open the door to new locations further from the coast.





Floating photovoltaic solar energy

Definition

Photovoltaic system installed in bodies of water such as lakes, reservoirs or the open sea (still in the experimental phase). The modules are usually mounted on a floating structure that is anchored and attached to a fixed point. Compared to traditional photovoltaics, shadows are reduced and it does not require altering the terrain; in addition, it helps to slow down water evaporation.



The market value of floating photovoltaic solar energy will grow at an annual rate of 40.2%, from USD 2.731 billion in 2022 to USD 40.767 billion in 2030.



Technologies

Pure floats: the main float holds the photovoltaic module with a certain inclination and the secondary float its attachment.

Floats with metal anchors: steel platforms that support the photovoltaic modules on floating pontoons.

Membrane floats: floating membranes on which the non-tilted modules are installed over fastening rails.





Sustainable Development Goals covered



Ocean energy

Definition

Exploitation of the energy resource that manifests itself in waves, tides, currents, in the difference in temperature between the surface and the seabed, and in the difference in salinity between fresh water and salt water in areas where they come into contact. This is a very interesting resource for islands.



The deployment of ocean energy is essential for the energy system to achieve decarbonization. It has a global market potential of 350 GW by 2050.



Technologies

The main technologies that exploit the energy of the seas and oceans are the **wave motion**, **tidal motion**, **thermal gradient** and **saline gradient**. Most of these technologies are in a very early stage and their deployment is still minimal.



Source: Fortune Business Insights

Sustainable Development Goals covered



Blue biotechnology and seaweed

Definition

Exploration of biological products from aquatic environments to create products for health, food, cosmetics, energy or the environment. Of all the marine resources, algae are the ones with the most potential since they cover a wide range of photosynthetic organisms with more than 72,500 species; 80% are microalgae (unicellular) and 20% are macroalgae (multicellular).



The global seaweed market has grown from USD 12.12 billion in 2022 to USD 13.19 billion in 2023, and is expected to reach USD 17.89 billion by 2027.



Technologies

It is a multidisciplinary technology, intensive in knowledge and capital. Blue biotechnology includes aquaculture, biomass production (cultivation and harvesting of algae and marine plants) and biochemical and genetic research of microalgae. All three areas are strongly intertwined and mutually benefit from the progress made in marine species research.



Maritime transport propulsion

Definition

Maritime transport is one of the pillars of the blue economy as propulsion generates a large carbon footprint. With increased regulation for more sustainable maritime transport, alternatives are being developed to incorporate the use of green fuel as a source of energy for boats, such as biofuels, hydrogen, ammonia, chemical alternatives and batteries.



The global marine propulsion engine market reached USD 36.7 billion in 2021, and is expected to exceed USD 42 billion by 2027.



Technologies

The incorporation of electric propulsion is the main objective to mitigate GHG emissions, despite the autonomy limitations it presents. Batteries and green methanol are the ones with the furthest development as of yet. Electric-powered ferries are a viable, sustainable and effective solution for GHG reduction.



Sustainable Development Goals covered



Naval construction and maintenance

Definition

The shipbuilding industry includes the production of ships intended for the merchant fleet (cargo or passenger transport), vessels intended for the offshore energy industry, recreational and sports boats, vessels for military purposes and the construction of floating structures. It also includes maintenance products and services.

Technologies

The shipbuilding industry is already incorporating a wide range of technological innovations in the field of frontier materials, digitization, automation and advanced design and production technology incorporating artificial intelligence, sensors, additive manufacturing, AR and VR, digital twins or robotics, among others.



Source: Global Data

Sustainable Development Goals covered



CataloniaConnects



The global shipbuilding market has grown from USD 143 billion in 2020 to USD 157 billion in 2023, and is expected to reach USD 195 billion by 2030.



Ocean observation

Definition

Ocean observation consists of the collection of data from institutional surveys, monitoring campaigns or sampling programs to measure the state and dynamics of the oceans and their marine organisms. It includes measuring instruments on both fixed and mobile platforms, as well as samples taken from the sea and analyzed in laboratories. Collecting ocean data and knowledge is key to supporting the growth of blue economy sectors and the transition to sustainability.



Japan leads the ranking with the largest number of institutions, marine laboratories and field stations dedicated to ocean science R+D+I, followed by the USA, Belgium and Spain.



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Technologies

Observation technologies from space are essential to obtain geophysical parameters of the sea surface. In addition, underwater gliders, autonomous underwater vehicles, Argo buoys, moorings and research platforms provide significant data on the state of the oceans. Technological progress is mainly occurring in the improvement of ocean imaging and detection instruments (AI and M2M communication), the increased coverage of floating farms and fixed observation platforms, and automation.



Protection and regeneration of marine environments

Definition

Threats to the ocean, which include overfishing, waste, pollution and climate change, is forcing the reversal of the degradation of ecosystems to recover their ecological functionality. The regeneration of marine habitats such as marine plants, mangroves, kelp forests and coral reefs is possible through replanting, reforestation, the application of marine engineering and ecosystem management.



The High Level Panel for a Sustainable Ocean Economy, promoted by Norway and made up of 14 countries, has set the goal of protecting 30% of the oceans by 2030.



Technologies

New technologies are currently being explored including supporting reef conservation with coral farms, artificial reef creation, seagrass restoration, automated underwater drones and robots for reef protection, smart, interactive and sensorized substrates.

Main global agents



Source: Own production

Sustainable Development Goals covered



Desalination

Definition

Process that consists of removing salt from seawater or brackish water to make it suitable for various applications. This process is crucial to facing situations of severe water scarcity. The sector is experiencing a great pace of innovation to cope with what is expected to be a growing demand for water in the coming years and the necessary reduction in energy consumption.



Forecasts indicate that by 2025 14% of the world's population will depend on desalinated water to meet their daily needs.



Technologies

Electric drive technologies: water filtration with osmosis membranes that separate the salt from the water. The most commonly used technique is reverse osmosis, although mechanical vapor compression and electrodialysis are also included.

Thermally driven technologies: use of energy to evaporate the water and, subsequently, condense it again. Technologies include multistage flash distillation, multi-effect distillation, thermal vapor compression and membrane distillation.



Plastics and microplastics

Definition

Plastics or polymers are semi-organic materials that come from petroleum. They are used in a wide variety of products and have displaced other materials such as wood, metal and glass. Microplastics come from plastic that ends up in the oceans and tends to break into small pieces (less than 5mm). Plastics and microplastics represent a great challenge given their great environmental impact.

More than a third of microplastics in the oceans comes from synthetic fabrics derived from washing processes, 28% from car tires and 24% from dust generated in cities.



Technologies

The different technologies developed so far are adapted to the different solutions to mitigate marine waste. These consist of prevention, monitoring, sampling, detection, modeling and cleaning. The technique range from AI to drones, automated vehicles, filters, pumps, remote sensors, boats and aquatic robots, among others.



Cross-industry technologies in ships



Green transformation

Catalonia o Trade & Investment

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Cross-industry technologies in water sports

Catalonia o Trade & Investment



Cross-industry technologies in commercial and freight ports

Advanced industry

- Robotics •
- Additive manufacturing ٠
- Simulation/Digital twin •
- Automation ٠

Mobility of the Future

- Electric vehicle
- Connected vehicle
- Drones .

Materials

- Frontier materials ٠
- Sustainable materials •

Water

- Water cycle ٠ technologies
- Industrial resilience

Digital society

Green transformation



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- Supercomputing
- Photonics



Energy

- Hydrogen
- Batteries and storage
- Clean energy
- Energy harvesting
- Distributed networks

Circularity

- CO₂ capture
- Urban mining
- Recycling and recovery
- Smart city

Source: prepared by the authors based on the ACCIÓ report Technology Trends Analysis

Cross-industry technologies in seas and oceans

Advanced industry

- Robotics
- Additive manufacturing
- Simulation/Digital twin
- Automation

Mobility of the Future

- Electric vehicle
- Drones

Materials

- Frontier materials
- Sustainable materials

Industrial resilience

- Digital society
- Green transformation

Health





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Emerging therapies

- Biotechnology
- Design of new drugs

Source: prepared by the authors based on the ACCIÓ report Technology Trends Analysis

Nutrition of the Future

Agritech

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CataloniaConnects



- IoT/sensors
- Big Data + Al
- Immersive technologies
- Cloud
- Cybersecurity
- Supercomputing
- Photonics
- Quantum
- New space
- DLT/Blockchain
- Energy

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- Hydrogen
- Batteries and storage
- Clean energy

Climate resilience

- Bioeconomy
- Nature-Based Solutions

Blue economy technologies in Catalonia

3. Blue economy in Catalonia

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Blue economy technologies in Catalonia: mapping



For verticals^{*}, 47.1% of companies are dedicated to the transport of people and goods, the 29.6% to fishing and aquaculture and the 15.2% to the propulsion and construction of maritime transport

* Companies can be classified in more than one vertical



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Highlighted blue economy technology companies in Catalonia 29 Mitigation of man-made effects **Renewable energy** Water sports iqua indra GEM 💿 WEES 🏷 AMBESK 🚺 PFISTERER No Sener Jumcab RIA ems C.P.V.B CLUB PATI VELA BARCELONA PLOATECH Lobelia. BEAMAGINE NEL SATES CARBON CAR Hydro TURBO isardSAT CKAICYCLES eolos #iseabots /ubman small) Costructures & COMPANY 🖢 Plàncton ^eSea TURTL PROJECT 条 Erasp SOFTWARINE GOOD KARMA PROJECTS 🚵 anèl·lides 🛛 Palamós ocean (52) NORMAWIND BRASTAINABLE] SCHWARIZ SOFTWARINE inbeat **QUANTUM**SAILS Gacciona (POLTANK aqualia FCC G CHAMPIONCHIP VEOLIA 🌒 chemipul prescad sorique DNV.GL SOVM BayWa r.e. SUD 🛠 MARNATON 🔊 Ateknea 😰 Agbar meloptics 🚄 BIG BLUE 👩 poligal VEnvirotech 🎉 IRIS Blue biotechnology and seaweed SEA25EE pescaNeta Dan*np Secosianta a Shane Secostructures Requalia 准 IRIS ъD Amapex 1 GATBIO algabrava Corbion B'ZEOS Greenaltech (5) bicosome* シミピ Aaritime transport MMAR8 V CUBIQ FUTURECO TRADEBE 5 KOA BIOTECH Ateknea KEEP BOAT AFLOAT boundybue Fishing RIR VOLTA OKAICYCLES Sde Dievel ŧ MASAMARINE NUVA Eorlep al / BlackCat succrystres NORSEU tangar 1 Marina Muscleres Prats *∉*ZEPHYR N1foils DEOLO Magonis C.P.V.B BARCELONA 🕼 draulic marine 🚺 🚺 AMBESK SEMPRECALMA deltimusse vachtwerft C BRUKS Siwertell Calafat **KANFA** NICEWIND PITAYACHTS meyer or Kügel EMPORDA MAR MetalWorks SOFTWARINE М 🕒 noatum Pride AKERBOOM M Applus[®] National nautiel NGCIX DIADA Marisc delta de l'Ebre RAPPEIONA Ibérica **ACUI>ELTA** cenavisa Fepromode Palamós bcircular Maritima TRADEBE JOTUN ZAL Port O QUANTUM SAILS DNV-GL popnàutica Note: partial illustrative image. Generalitat de Catalunya

Government of Catalonia

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Agents of the blue economy technology ecosystem in Catalonia

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Government of Catalonia

Water sports: Catalonia

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Promotion of water sports

Promotion of technological capabilities

Offshore wind energy: Catalonia

Catalonia o Trade O Investment



Floating solar photovoltaic energy: Catalonia

Catalonia o Trade O Investment



Ocean energy: Catalonia 34 **Business mapping** Featured company Featured Agents ECNOAMBIENTE Generalitat de Catalunya Institut Català d'Energia company A TRADEBE COMPANY UNIVERSITAT POLITÈCNICA -----**DE CATALUNYA** BARCELONATECH Capacities Opportunities Due to the climatological and oceanographic conditions of the Mediterranean, the energy potential of International collaboration the sea in Catalonia is mainly focused on the generation of wave power. The characteristics of the Catalan coast and the Mediterranean Sea make it difficult to explore any Decarbonization other technology linked to ocean energy. Promotion of technological capabilities



Blue biotechnology and seaweed: Catalonia

Catalonia o Trade O Investment



Marine transport propulsion: Catalonia

Catalonia o Trade O Investment



Shipbuilding and maintenance: Catalonia



Ocean observation: Catalonia



C BEAMAGINE Starlab THE

Startups.



Capacities

The implementation of the first HF Radar at Cap de Creus in 2022 is the first step in the deployment of the 7 radars of the Catalan Network of HF Radars, which will end in 2024 and will allow ICATMAR to measure the sea currents and waves in real time

With a 2030 horizon, the Maritime Strategy of Catalonia (2018-2021) has the primary goal to promote a sustainable blue economy, while guaranteeing social and territorial balance and the sustainability of ecosystems.

The Barcelona International Convention Center (CCIB) will host the 2024 UN Decade of the Ocean Conference, an event that will bring together the community and partners of the Decade to celebrate achievements and set joint priorities for the future.



Opportunities

Management of marine resources

Protection of the marine environment

Prevention of natural disasters

Protection and regeneration of marine environments: Catalonia

Catalonia o Trade O Investment



Desalination: Catalonia



Plastics and microplastics: Catalonia



Capacities

Catalonia's draft law on waste prevention and resource management aims to increase restrictions on biodegradable products in order to prevent the spread of microplastics into the environment.

Technological empowerment of the circular economy in the field of waste management through R&D Green centers, consisting of aid to develop innovative and sustainable projects. Initiative in collaboration with the Waste Agency of Catalonia (ARC)

The first milestones have been reached with the first Strategic Plan (2018-2021) of the 2030 Maritime Strategy of Catalonia, which notably include the compensation of fishermen who collect waste at sea and the promotion for the removal of disused fishing nets.





Featured Companies*





Success stories in Catalonia (I)



PAVELLÓ BLAU is a leading sports center on Barcelona's seafront. It will feature 17 educational centers and 46 spaces, plus marine areas and sports equipment.



X1 WIND proposes a revolutionary floating wind system. Their X30 prototype, installed in the Canary Islands, has already produced its first kWh.



EOLOS FLOATING LIDAR SOLUTIONS provides LiDAR platforms that can collect marine and meteorological data.



SUD RENOVABLES has installed the first floating photovoltaic plant in Catalonia. The 195 panels installed will reach a production of 139,920 kWh/year.



ORGANA grows and markets fresh spirulina. It is the only Catalan and European company that goes beyond dried seaweed and markets it fresh.



KOA BIOTECH has developed a solution to anticipate the onset of infections in fish farms and achieve a stable, antibiotic-free production.







BOUND4BLUE develops rigid, foldable and autonomous sails for various vessels that reduce fuel consumption and emissions by up to 40%.

ZEPHYR BOATS has built the Zephyr 800 ECO, a 100%

EZEPHYR electric boat, 8 meters in length with electric outboard

MB92/

motors.

MB92 has developed a sustainability plan to neutralize 100% of the carbon emitted before 2050 and offers sustainable repairs of large yachts.



SYM NAVAL has started the project of the first 100% electric and zero-emission ship for port uses built in Europe.



DEEPSEA NUMERICAL is a spin-off from the URV that specializes in monitoring the seabed and collects data that it then analyzes and uses to offer services and applications.

Success stories in Catalonia (II)

The PLATFORM FOR LONG-LASTING Universitat de Girona OBSERVATION OF MARINE ECOSYSTEMS will monitor marine ecosystems in real time.



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UNDERWATER GARDENS has developed software which makes it possible to respond intelligently to the regeneration needs of an ecosystem.



PORTS4ALL is a European project that aims to transform gray marine infrastructure into blue infrastructure.



The CATALAN INSTITUTE FOR WATER RESEARCH develops quality multidisciplinary research in the field of water use.



The **SEA4VALUE** project designs technologies for the recovery of minerals and metals from brines resulting from seawater desalination.



LEITAT participates in a project to offer technological solutions related to the elimination and recovery of plastics and microplastics.







SEA2SEE designs and produces optical frames
 and sunglasses exclusively using recycled marine plastic waste.



OCEAN ECOSTRUCTURES has developed a biomaterial derived from by-products for marine ecosystem regeneration structures.



CARBUROS METÁLICOS will be the hydrogen supplier of the 37th America's Cup in Barcelona, the first edition in which hydrogen will be used.



FROM SEA TO FORK is a project that aims to implement blockchain to improve transparency in the fishing industry.



The CHARACTERIZATION AND PROCESSES IN MATERIALS SCIENCE GROUP will be developing a new water decontaminating catalyst.



Featured agents and initiatives



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Collaboration agreement ACCIÓ – America's Cup

BARCELONA Generalitat de Catalunya

America's Cup Event (ACE) Barcelona and the ACCIÓ agency of the Department of Business and Employment have signed an agreement to promote the use of green hydrogen in the Catalan nautical sector and facilitate the contracting of products and services to Catalan companies.



- The Minister of Business and Employment, Roger Torrent, and the top executive responsible for the America's Cup, Grant Dalton, have pledged to maintain "the technological and industrial legacy" of the sailing competition in Catalonia by signing an collaboration agreement.
- The agreement includes the use of green hydrogen in boats, the transfer of industrial knowledge between organizations, the hiring of Catalan companies by the America's Cup and the development of a video game.
- According to the Minister of Business and Employment, the agreement responds to the government's interest that the America's Sailing Cup results in the creation of jobs and the promotion of research and industrial development projects, as well as opportunities for SMEs and the growth of the nautical sector and the blue economy.
- The commitment of the America's Cup is to transfer to ACCIÓ the technological knowledge generated for this competition in the field of hydrogen to promote the industrialization of this technology in Catalonia.

Source: Government of Catalonia/ACCIÓ



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Outstanding regional initiatives in the blue economy in Catalonia



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Blue economy technologies in Catalonia

4. America's Cup





2024 America's Cup

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In 2024, Barcelona will host the 37th edition of the America's Cup, the most important sailing competition in the world



The America's Cup is not just a sailing competition, as technology and innovation play a fundamental role.

- Over the past 30 years, the performance of sailing vessels has improved considerably through rapid technological advances in aerodynamics, fluid dynamics, advanced design tools, materials science, shipbuilding technology and onboard navigation systems.
- Design modifications that used to be done on a boat, directly at sea, are now tried and tested in a virtual simulator, where sea and wind conditions are input and the data is analyzed with artificial intelligence to study the behavior and improve designs.
- Many of the technologies developed for the America's Cup are later applied to the sector, as is the case of the composites used in the 1987 regatta by the New Zealand team, now a common construction technique for racing boats. Currently, the incorporation of foils on passenger ferries is being studied, as they help minimize emissions by reducing fuel consumption.

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Catalonia o Trade O Investment In the Barcelona competition, all teams will have a support boat. The novelty of this edition is that these ships will be powered by hydrogen. The New Zealand team, winner of the last edition, has established this in the protocol of the regatta. The engine is powered by two 80KW Toyota hydrogen cells. The official hydrogen supplier is Carburos Metálicos/Air Products.



Source: 37th America's Cup Barcelona, Barcelona City Council and Generalitat de Catalunya

The innovations. Television broadcast

The broadcasts of the America's Cup have also been characterized by the incorporation of technology in the monitoring of the competition.

- In 1992, 3D graphics and computer animations were introduced, which are still used to indicate distance from the leader, trajectories, finish lines, etc. The 1992 Cup also introduced the cameras that have made possible steady aerial filming from a helicopter.
- In subsequent competitions, virtual reality systems were improved, as were computing and graphics technologies.
- At the 34th America's Cup in 2013, mixed reality technology was applied that allowed graphics to be superimposed directly on the live footage from the helicopter and in a 3D perspective. This broadcast was deserving of an Emmy award.
- Mixed reality has continued to be used in subsequent competitions.

- For the Barcelona competition, more than 10 wireless cameras, a host of sensors and 12 water-resistant microphones will be used—for the first time capturing ambient sound—which will be placed on the boats and some will be worn by the sailors themselves.
- The onboard technology will be complemented by two helicopters, each with a gyroscopic camera, and two similarly equipped catamarans.
- The 37th America's Cup aims to draw an audience of one billion viewers from around the world in 2024, which would surpass the previous edition's figure of 942 million.



Source: 37th America's Cup Barcelona and AC Media



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Blue economy technologies in Catalonia

5. Opportunities of the blue economy

5.1. Opportunities in Catalonia

5.2. Opportunities in the world





Opportunities

- Pioneering industry and economic engine
- Powerful innovation and research ecosystem
- Dynamic hub for entrepreneurship and startup growth
- Strategic location to tap into connections with the rest of the world
- Passion for sport
- An expanding blue economy ecosystem
- Consolidated nautical cluster
- Great quality of life
- International opportunities



Source: 37th America's Cup Barcelona
CataloniaConnects



An expanding blue economy ecosystem

- The blue economy, which includes a variety of industries and aims to understand and improve the sustainability of seas and oceans, has great potential for growth and innovation through technological development. Some technologies are intrinsic, such as blue biotechnology and the use of seaweed for different applications, or fishing and aquaculture, but other, cross-industry technologies may also applied in this segment such as the observation of seas and oceans, artificial intelligence, sustainable materials, robotics, new propulsion systems, etc.
- In terms of traditional sectors, Catalonia enjoys a good position in industries such as ports, the bioeconomy and maritime transport.
- The emerging sectors with the most potential include renewable energies, biotechnology, desalination, underwater robotics and research.





Consolidated nautical industry with potential

The business make-up of the nautical industry in Catalonia is made up mainly of micro and small and mid-size enterprises. The Catalan Nautical Cluster is made up of more than a hundred Catalan companies and several sectoral associations based in Catalonia.



The recreational boating sector and, in particular, nautical tourism and beginner sailing have great development potential compared to other countries that do not have Catalonia's geographical or climate conditions. From January to June of this year, the nautical market has tallied 3,811 registrations in Spain. Jet skis, along with foldable inflatable boats, are the two segments that have seen growth in this period.

- The nautical charter market, with 1,473 vessel registrations intended for this use in the analyzed period, is up 12.79% compared to the same period of the previous year, with close to a 40% share of the national nautical market. Both national and international nautical tourists have made sailing a part of their holiday leisure
- Mooring reservations at ports, clubs and marinas on the Mediterranean coast were full during the 2023 summer season.

Source: Pleasure boat market report. January-June 2023, ANEN



Barcelona, blue capital

Home of the 37th edition of the America's Sailing Cup

10th best city in Europe and 26th in the world in blue economy potential for startups*

Headquarters of the World Conference on the Decade of the Oceans of the UN and the Sustainable Ocean Summit

New offices of the World Ocean Council, a major international maritime organization

Home of the SeaFood Expo, the largest and most diverse seafood fair in the world



*according to Startup Genome





International opportunities of the blue economy



Note: The opportunities of other sectors also related to the blue economy have been taken into account Source: Global map of international business opportunities 2023

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