



Energy Observer

June 14, 2024



THE GREAT RETURN TO SAINT-MALO

Main partners



Official partners



With the official support of



Institutional partners

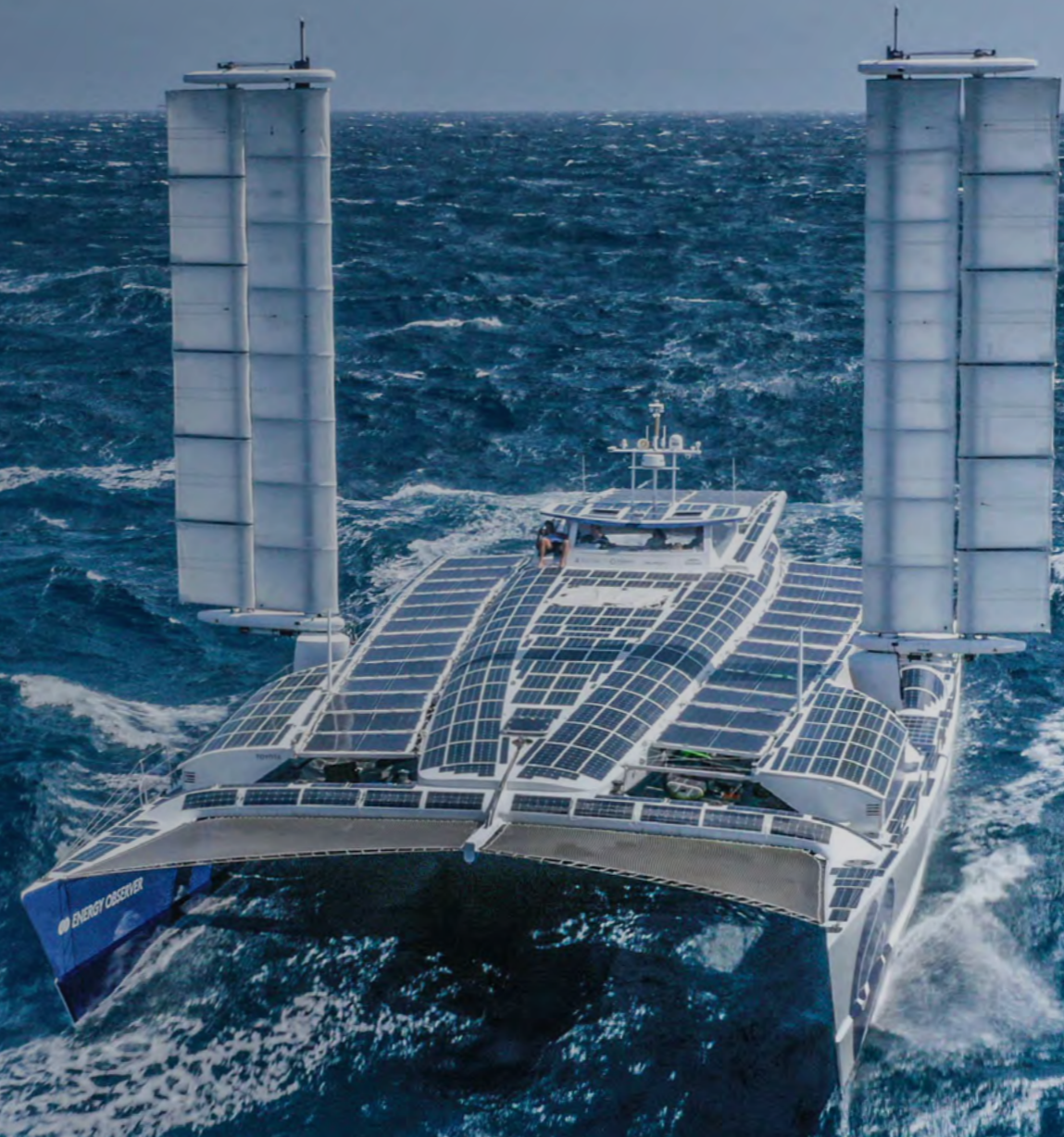


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What is Energy Observer ?

Chapter 1



Introduction

Energy Observer is a remarkable human and technological odyssey, a boat from the future that embodies the possibility of an ambitious and dynamic energy transition. After 7 years at sea around the world, it is time to assess key learnings of our experience and announce our plans for the future.

The Energy Observer project began in 2013 triggered by the visionary commitment of Victorien Erussard, a merchant navy officer and offshore racer. Inspired by the need to promote sustainable energy solutions, and in order to bring this ambitious project to life, Victorien pulled together a team of sailors, scientists, engineers, journalists and a large number of dedicated partners. Together, they created the laboratory vessel that is Energy Observer, a genuine platform for research and innovation dedicated to the energy transition.

Since her launch on 14th April 2017, Energy Observer has travelled over 68,000 nautical miles - the equivalent of sailing three times around the Earth. During this seven-year Odyssey, the ship has visited 50 countries and made 101 stopovers, demonstrating the solvency of clean technologies and actively contributing to building a low-carbon world. Thanks to a mix of renewable energies, wing propulsion sails, and a complete hydrogen chain generated by seawater electrolysis, this zero-emission ship has demonstrated the ability of renewable technologies to operate in diverse of weather and geographical conditions.

Each stopover was an opportunity for the crew to collaborate with scientists, manufacturers and decision makers in order to get a better understanding of global energy challenges and explore the decarbonization roadmaps of each country visited.

Beyond being a ship, Energy Observer is also a committed media voice. It co-produced 13 documentary films, broadcast by Canal+, and over 500 videos - available on YouTube- presenting the state of energy ecosystems and highlighting local innovations and sustainable solutions encountered around the world. As a true advocate for the energy transition, Energy Observer also raised public awareness by welcoming over 350,000 visitors to visit her free exhibition village and come aboard.

On 14th June 2024, Energy Observer returned to her home port, Saint-Malo, marking the end of an extraordinary adventure and the beginning of a new chapter in its commitment to a sustainable and environmentally respectful future. This day of celebration offered the ideal opportunity to review Energy Observer's incredible Odyssey and share her new projects.

Energy Observer received the high patronage of Mr. Emmanuel Macron, President of the French Republic/France. The project is officially supported by the Ministry of Ecological Transition, UNESCO, the European Union, IRENA and the ADEME.

Named first French ambassador for the Sustainable Development Goals by the Ministry of Ecological Transition, Energy Observer's mission is to promote local initiatives and sustainable solutions for the planet, raising energy and ecological transition awareness.

This role is achieved by several actions taken by Energy Observer during its stopovers, documentaries, and notably through its digital platform «Energy Observer Solutions,» funded by Energy Observer's endowment fund. This platform offers solutions addressing the 17 Sustainable Development Goals set by the UN for its 2030 Agenda and demonstrates their interconnections in each video. Thus, a library of «Solutions» is built, forming the guiding thread of this Odyssey.



Our missions

1
Testing towards decarbonizing the maritime sector



2
Decoding and explaining energy challenges



3
Training and sharing our expertise on hydrogen technologies



Key figures of the odyssey

4 years of preparation

- 3 temporary shipyards
- 40 dedicated engineers and technicians
- 250,000 hours worked
- 16 Central Security Commissions

51 dedicated partners

+ than 400 collaborators involved

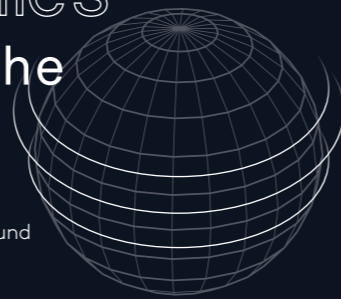
7 years navigating

- France, 2017
- Mediterranean, 2018
- Northern Europe, 2019
- Atlantic, 2020
- Pacific, 2021
- Asia, 2022
- Africa & Brazil, 2023
- North America, 2024

68 000 nautical miles travelled (126 000 km)

π times* around the world

or 3.14159265359 times around the world



50 countries visited 101 stopovers

17 exhibition villages around the world

+ than 350 000 visitors

+ than 20 000 people welcomed on board



20 000 articles published in France and internationally

266 millions euros in media value generated

Close to 25 billion cumulative reach



101 stopovers around the world

1	Saint-Malo	France
2	Paris	France
3	Boulogne-sur-mer	France
4	Cherbourg	France
5	Brest	France
6	Nantes	France
7	Île d'Yeu	France
8	La Rochelle	France
9	Bordeaux	France
10	Royan	France
11	Saint-Jean-de-Luz	France
12	San Sebastian	France
13	Porto	Portugal
14	Barcelona	Spain
15	La-Seyne-sur-Mer	France
16	Marseille	France
17	Monaco	Monaco
18	Corsica	France
19	Sardinia	Italy
20	Tunis	Tunisia
21	Valletta	Malta
22	Chania	Greece
23	Tel-Aviv	Israel
24	Limassol	Cyprus
25	Samos	Greece
26	Mykonos	Greece
27	Athens	Greece
28	Ithaca	Greece
29	Saranda	Albania
30	Kotor	Montenegro
31	Zadar	Croatia
32	Venise	Italy
33	Bari	Italy
34	Stromboli	Italy
35	Salerno	Italy
36	Saint-Tropez	France
37	Balearic Islands	Spain
38	Valencia	Spain
39	Tangier	Morocco
40	Lisboa	Portugal
41	La Coruna	Spain
42	Antwerp	Belgium
43	Amsterdam	Netherlands
44	Hamburg	Germany
45	Copenhagen	Denmark
46	Stockholm	Sweden
47	Helsinki	Finland
48	Tallinn	Estonia
49	Saint Petersburg	Russia
50	Kärdla	Estonia
51	Svalbard	Norway
52	Tromsø	Norway
53	Bodø	Norway
54	Ålesund	Norway
55	Aberdeen	United Kingdom
56	London	United Kingdom
57	Loctudy	France
58	Canary Islands	Spain
59	Praia	Cape Verde
60	Martinique	France
61	Saint-Barthélemy	France
62	Guadeloupe	France
63	Gulf of Gonâve	Haiti
64	Nassau	Bahamas
65	Saint-Laurent-du-Maroni	Guiana
66	Kourou	French Guiana
67	Panama Canal	Panama
68	Galapagos	Ecuador
69	Los Angeles	United States
70	Morro Bay	United States
71	San Francisco	United States
72	Hawaii	United States
73	New Caledonia	France
74	Kupang	Indonesia
75	Lombok	Indonesia
76	Jakarta	Indonesia
77	Singapore	Singapore
78	Pattaya	Thailand
79	Koh Samui	Thailand
80	Phú Quoc	Vietnam
81	Ho Chi Minh City	Vietnam
82	Langkawi	Malaysia
83	Cochin	India
84	Mahe	Seychelles
85	Mayotte	France
86	Maputo	Mozambique
87	Durban	South Africa
88	Port Elizabeth	South Africa
89	Cape Town	South Africa
90	Walvis Bay	Namibia
91	Jamestown	Saint Helena
92	Fortaleza	Brazil
93	Miami	United States
94	Washington DC	United State
95	New York City	United State
96	Mystic	United State
97	Boston	United State
98	Halifax	Canada
99	Saint-Pierre-et-Miquelon	France
100	Saint-Malo	France
101	Paris	France

7 years of images and reporting



13 documentary
films
produced for Canal+

+ than **500**
videos
on our YouTube channel

100 episodes
produced for the Energy Ob-
server Solutions web series, in
connection with the Sustainable
Development Goals

+ than **50 000**
photos
taken throughout the Odyssey

200 articles
on energy transition and
biodiversity



The laboratory vessel

Chapter 2



A legendary catamaran

If today Energy Observer embodies the future, it was once a legendary multihull.

Energy Observer's basic structure comes from the world's largest racing multihull of the 1980s: known as Formule Tag. Initially skippered by Mike Birch, the boat ran the 1984 Transat Québec - Saint-Malo and set a 24-hour sailing distance record with 512.5 nautical miles.

She later became Enza New Zealand, gaining fame when Sir Peter Blake and Robin Knox-Johnston won the Jules Verne Trophy in 1994. This giant of her time completed the round-the-world voyage in 74 days, 22 hours and 17 minutes, with an average speed of 14.7 knots, leaving a lasting impression on sailing enthusiasts.

Over the years, she passed through the hands of

renowned skippers. In 1997, Tracy Edwards renamed the catamaran Royal & Sun Alliance and set the women's North Atlantic record in 1998. In 2000, Tony Bullimore extended it to 102 feet and successively renamed it Team Legato, Daedalus and then Doha. In October 2010, having become Spirit of Antigua, the ship capsized before being abandoned in the port of Brest.

In 2013, the wreck was recovered and moved to the Marsaudon Composites shipyard in Lorient. After being stripped of its racing equipment, a central cabin, made on-site from existing molds, was added. This cabin, formed from the base of two multihull floats, gave the ship/boat its unique shape.

In 2015, the boat was towed to Saint-Malo, where a two-year project began to transform this racing legend into an energy transition laboratory vessel.

ENZA NEW ZEALAND

1992 Peter Blake and Robin Knox-Johnston purchase the boat, lengthen it once again and add a central living cabin.

1993 First attempt at the mythical Jules Verne Trophy, but the crew was forced to abandon after a collision with an iceberg. The boat was sent back to the shipyard in Oakland.

1994 New attempt at the Jules Verne Trophy, during which she beats the record for round- the-world sailing in 74 days, 22 hours, 17 minutes and 22 seconds (record beaten in 1997 by Olivier de Kersauson on Sport-Elec).



FORMULE TAG

1983 Built in Quebec by architect Nigel Irens, under the supervision of Mike Birch, at the Canadair shipyard, which specialized in building civilian and military aircraft. She was at the time the largest catamaran in the world.

1984 First Québec-Saint Malo and first race for the boat, with Mike Birch expected to win. She finished 4th. Crew sailing distance record in 24 hours with 512.5 miles covered. This record was later broken in 1987 by Philippe Poupon and Olivier Petit on Fleury Michon VIII, 3rd in the Route de la Découverte. That same year, Mike Birch improved the catamaran's performance by changing the bows, volumes and mast height.

1985 1st in the Monaco - New York race

1986 2nd in the Twostar
5th in the Liberty Race
4th in the Route du Rhum under the name Tag Heuer

ROYAL & SUN ALLIANCE

1997 Record for crossing the English Channel in 6 hours, 49 minutes and 19 seconds.

1998 Record for an all-female crew crossing the North Atlantic in 9 days, 11 hours, 21 minutes and 55 seconds.

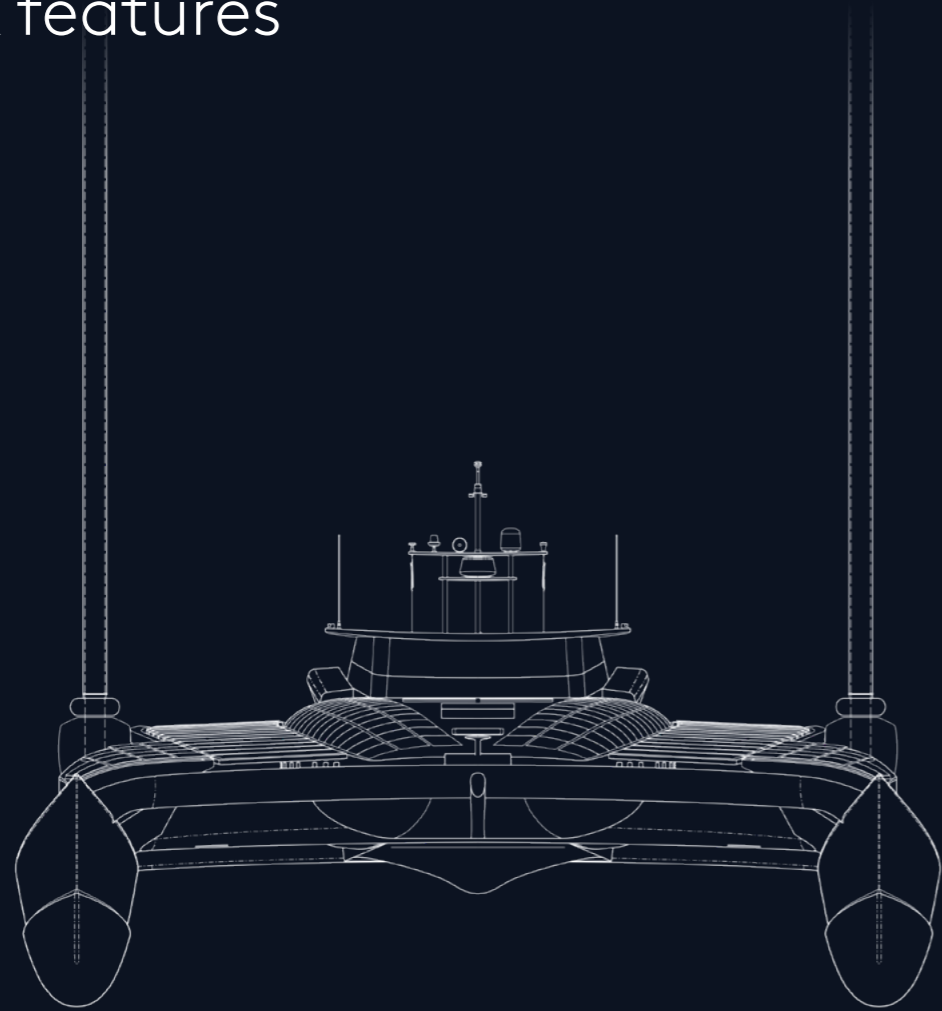
TEAM LEGATO

2001 5th position in The Race, a round-the-world race, skippered by Tony Bullimore with a crew of 5, including Frédéric Dahirel.

DAEDALUS

2005 Record for crossing the South Atlantic with a crew in 11 days, 10 hours, 22 minutes and 13 seconds, still unbeaten. 2nd in the Oryx Quest.

Boat plans & features



TYPE
Experimental recreational catamaran

FLAG
French

PORT OF REGISTRATION
Saint-Malo

LENGTH
30.33 meters

BEAM
12.67 meters

DRAFT
2.30 meters

AIR DRAFT
15 meters

LIGHT DISPLACEMENT (WEIGHT)
34 tons

AVERAGE SPEED
5 knots

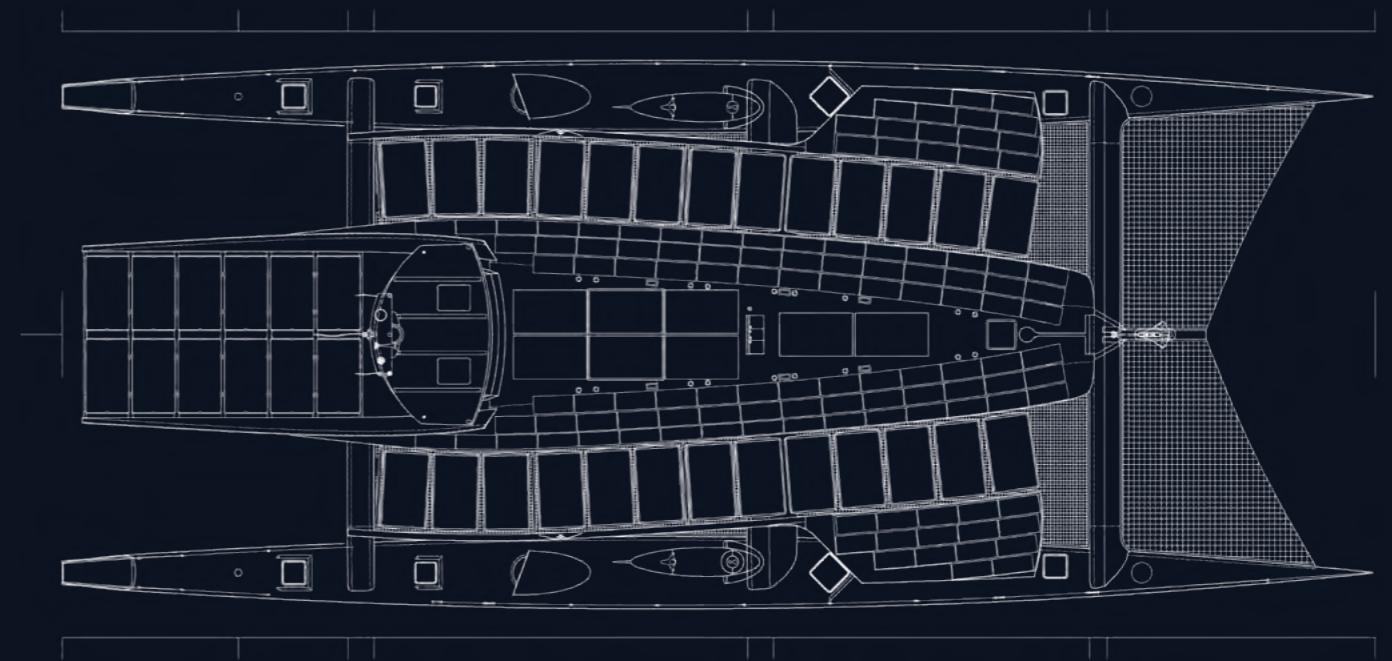
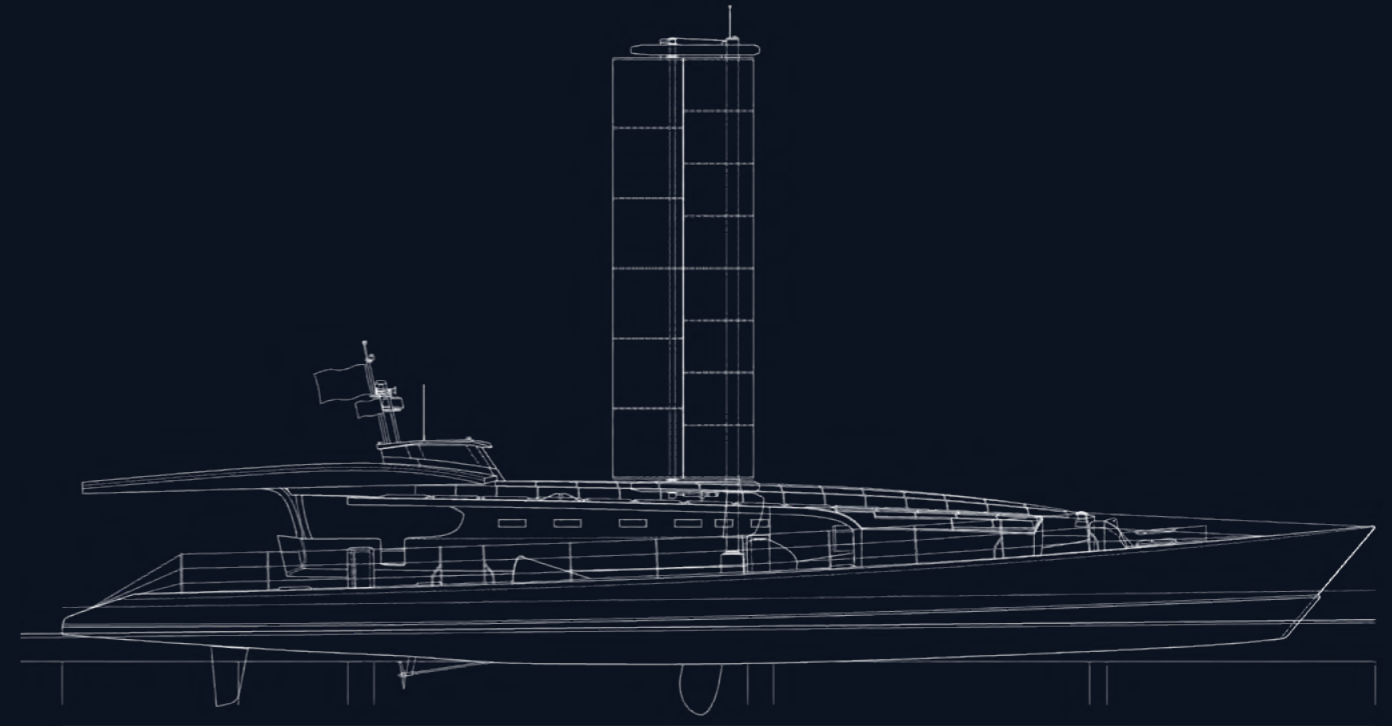
NAVIGATION CATEGORY
Unlimited

CREW
2 teams of 5

CAPACITY
· 20 people for a day trip
· 8 for offshore navigation

HULL MATERIALS
Kevlar-carbon composite

ARCHITECTURAL DESIGN
Olivier Petit, Nicolas Berthelot,
Nicolas Degorce



The transformation

It took four years to transform the dream to reality. This is the story of a maritime, technical, and above all, human adventure.

Transforming a racing catamaran into an experimental vessel was a significant challenge. It required combining technological innovation, strength, and comfort in preparation for long navigations intended for a crew that was not as specialized as offshore racing teams. This project involved substantial structural modifications during a complete renovation, requiring multidisciplinary teams to find the best technical, aesthetic and regulatory compromises.

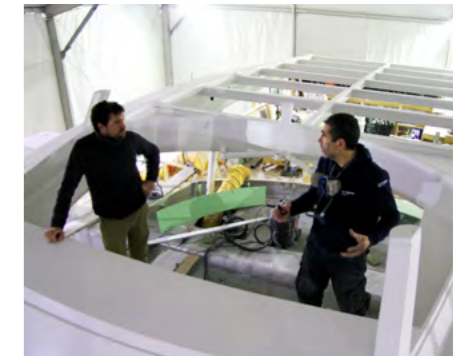
The first phase of the project began in 2013 with the dry-docking of the wreck at Marsaudon Composites in Lorient. Once the boat was stripped of her offshore racing equipment, a central cabin, made on-site from existing molds, was integrated. It was formed from the base of two multihull floats, giving it a unique shape. This new configuration allowed a total segregation between man and machine. The crew could now move from the floats to the comfortable and attractive/aesthetic central cabin, freeing up room for the technologies in the hulls.

The second phase began in 2015 with the towing of the ship to Saint-Malo. This was the start of an extensive two-year project to continue

composite work while integrating various innovative technological components. Three temporary shipyards were specially constructed in Saint-Malo to welcome a team of tech enthusiasts, passionate about this technological adventure. 30 experts in boats and shipyards worked continuously at the port, while in Grenoble, at the CEA Liten laboratories, a similar number of engineers and technicians spent months imagining and building the onboard energy architecture, and testing technological components.

Energy Observer is so unique, fitting into no predefined category, that it is classified as an «experimental ship» under a specific framework of the 243 Division. This classification is the result of a close collaboration between various stakeholders surrounding Energy Observer, such as the Maritime Affairs Directorate, various state services, classification societies, insurers, sea rescuers, unions and maritime sector organizations. 16 central safety commissions were required to issue the final navigation title three years later.

Administrative follow-up became a key component before and during the operation of this vessel. All these efforts significantly contributed to the development of the maritime hydrogen sector, promoting the emergence of many new hydrogen ship projects.



The energy system

A true technological tour de force, Energy Observer is the first zero-emission hydrogen ship, operating thanks to a mix of renewable energies and a hydrogen production chain from seawater electrolysis.

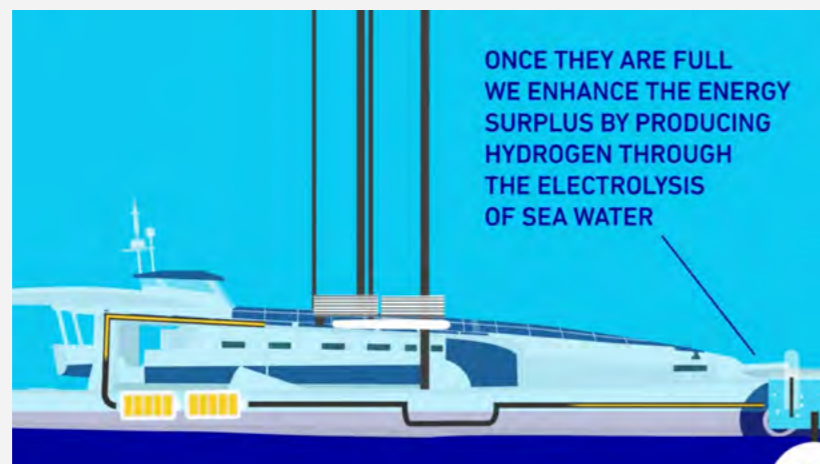
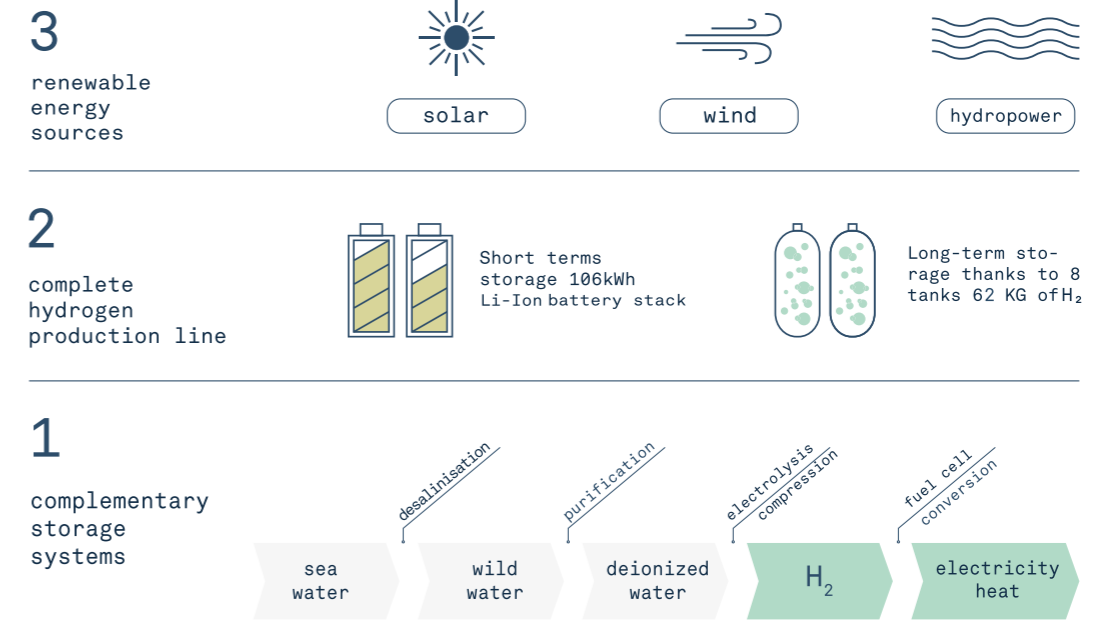
The Energy Observer vessel uses an innovative, multi-source energy system to sail without emitting greenhouse gas emissions or fine particles. Here's how it works:

→ **AT PORT**

The batteries are charged by solar panels. When they reach 100% charge, the excess energy is used to produce hydrogen through seawater electrolysis.

→ **AT SEA**

The electrical consumption for propulsion and onboard living is compensated by solar, wind and hydroelectric power. To extend autonomy, the fuel cell converts hydrogen back into electricity and heat.



Presentation of onboard technologies

Energy Observer's energy chain contains no fewer than 10 innovative systems working in perfect symbiosis. Here's an overview of this unprecedented architecture...

Tests, optimization, exploration, filming, education—Energy Observer has been operating intensively for over 7 years with an unprecedented energy architecture, result of the collaboration between a technical teams and the CEA-Liten. This innovative architecture includes custom-designed technological components to meet the vessel's geometric constraints, marine environment requirements, and the quest for perfect efficiency while ensuring the safety of the boat, her crew and the 350,000 visitors who came to discover this spaceship-like living and working space.

1 • PHOTOVOLTAIC PANELS

Solar energy stands out as the primary source of energy production on board. The photovoltaic panels cover the floats, the central cabin and the solar wings of the vessel, totaling 202 m² and representing a production capacity of 35 kWc. Two technologies are used: conformable homojunction panels and rigid heterojunction bifacial panels.

2 • WING PROPULSION SYSTEM

Two Oceanwings® sails, with a total sail area of 62 m², efficiently capture the wind and in so doing reduce engine consumption. They are self-supporting, 360° rotatable, and furlable. Fully automated, they do not require experienced sailors to operate. Without the operator needing to give instructions, they adjust their orientation according to wind angle and ship direction, automatically securing themselves if the wind strengthens beyond a predefined limit.

3 • HYDROKINETIC TURBINES

The catamaran harnesses the kinetic energy of water currents to produce electricity. Installed under the hull, the hydrokinetic turbines use two reversible electric motor propellers, which then act as generators. The theoretical electrical output of this system is 8 kW.

4 • DESALINATOR

The process used for seawater desalination is reverse osmosis, with onboard innovation involving a series of three successive stages. The first stage produces sanitary water for the ship, while the second and third stages are dedicated to the purification required to supply the electrolyzer with deionized water.

5 • ELECTROLYZER

The PEM (Proton Exchange Membrane) electrolyzer uses an electric current to break down deionized

water into hydrogen and oxygen. The hydrogen produced is stored for further processing, while the oxygen is released into the atmosphere.

6 • COMPRESSORS

Two stages of compression are needed to store the hydrogen at high pressure. H₂ arrives from the electrolyzer at 30 bars and is pressurized first at 150 bars and then at 350 bars. This two-step compression is essential to ensure an acceptable volumetric energy density under perfectly safe maritime conditions.

7 • STORAGE TANKS

Consisting of eight high-pressure tanks of 320 liters each, this system allows for storage of 62 kg of hydrogen, representing 1 MWh of electrical energy and 1 MWh of recoverable thermal energy. The tanks are made of composite materials with a carbon fiber shell and an aluminum liner to ensure airtightness. They are distributed in two exterior compartments that allow natural ventilation, ensuring optimal safety and essential redundancy.

8 • FUEL CELL

The fuel cell uses PEM (Proton Exchange Membrane) technology, combining hydrogen and oxygen to produce electricity and heat, without emitting greenhouse gas emissions or fine particles, releasing only water. The marine module developed by EODEV, in collaboration with Toyota, is based on the Toyota Mirai fuel cell, offering a maximum power of 70 kWh.

9 • BATTERIES

Le stockage court terme est assuré par deux types Short-term storage is provided by two types of batteries, which are the common denominator of the entire energy chain. The 400 V Li-ion NMC batteries offer a capacity of 106 kWh for high-power needs. The 24 V LiFePO₄ (LFP) batteries have a capacity

of 20 kWh and are dedicated to servitude, control-command, and safety equipment.

10 • ENERGY MANAGEMENT SYSTEM (EMS)

The EMS is the energy brain of the ship, controlling and coordinating the various technological components via an automation system and supervision screens. The system adjusts energy production and consumption in real-time to ensure propulsion, battery management and hydrogen reserves, as well as crew comfort and

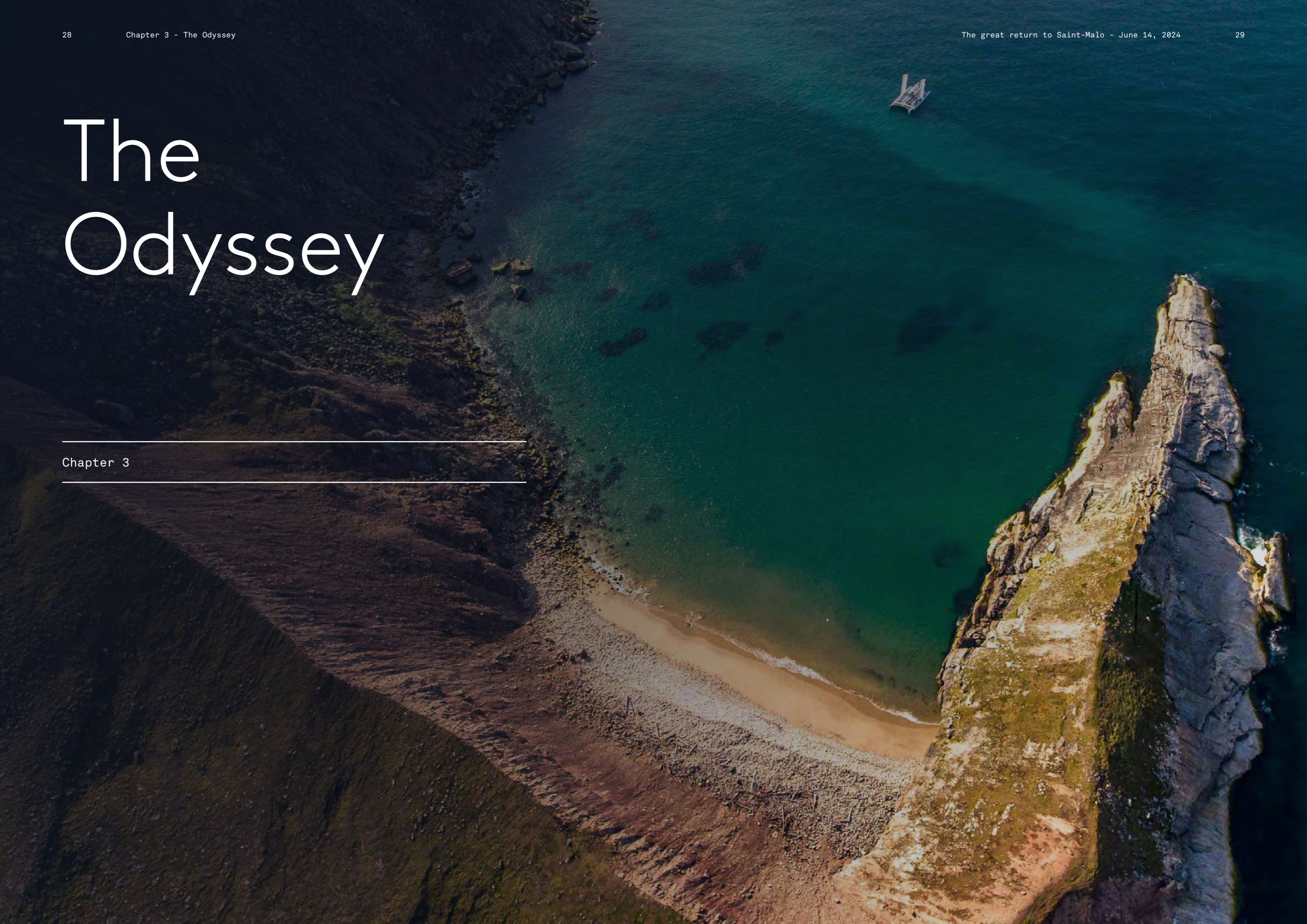
safety. It processes about 2,000 real-time data points and controls more than 600 alarms to ensure the optimal operation of all systems. It is also coupled with a maritime routing system.



→ Find the extended mapping of the energy systems in the appendix on page 72.

The Odyssey

Chapter 3



Victorien Erussard, the founding captain



Victorien Erussard, born in Saint-Malo in 1979, is a visionary sailor and entrepreneur whose career is marked by both competitive sailing and the merchant navy. A former top-level athlete, Victorien has reached many prestigious podiums on racing catamarans and transatlantic races such as the Route du Rhum and the Transat Jacques Vabre.

As a merchant navy officer, he witnessed the worrying pollution caused by commercial shipping and the alarming degradation of our marine ecosystems. In 2013, during the Transat Jacques Vabre between the Cape Verde islands and Brazil, he found himself out of energy in the middle of the Atlantic following various technical failures. This key moment made him realize that he was surrounded by renewable energy sources but wasn't able to exploit them.

In light of these observations, in 2015 Victorien decided to give up his sporting adventures and focus exclusively on the challenge of creating Energy Observer, an energy transition laboratory vessel. In so doing, he put his maritime expertise, innovative spirit and project management skills in nautical sports to the service of this great technological adventure.

In 2019, Victorien expanded his commitment by creating EODev, a young French company that has

recently become a world leader in the design and industrialization of electro-hydrogen generators.

Following the decarbonization goals of the International Maritime Organization (IMO), in February 2022 Victorien announced his aspiration to develop the first low-carbon cargo vessel, Energy Observer 2. This 160-meter electric feeder vessel is powered by fuel cells and liquid hydrogen.

Victorien Erussard embodies a fierce determination to decarbonize the maritime sector, relying on revolutionary technological innovations and vital international collaborations to compete with fossil technologies. His vision and leadership continue to inspire and mobilize partners and collaborators, all united behind the same ambition to build a more sustainable maritime future.



The Odyssey team

Energy Observer's Odyssey relies on a passionate and versatile team of around twenty collaborators, working in perfect harmony between land and sea. Driven by a shared motivation to act in favor of decarbonization, this group takes advantage of its multiple skills to successfully carry out this adventure.

At sea, two crews rotate approximately every two months to ensure the continuity of the mission, each bringing their expertise and commitment. Each crew is composed of:

A CAPTAIN: Responsible for the ship and its crew, ensuring the smooth conduct of maritime operations.

A BOATSWAIN: In charge of the ship's maintenance and handling manoeuvres on deck, ensuring the vessel is always in perfect appearance and working order.

AN ENGINEER: Specialist of onboard technologies, supervising the energy systems and ensuring their optimal performance.

AN ONBOARD REPORTER: Captures key moments of the expedition, producing audiovisual and editorial content both at sea and on land throughout countries visited.

A SCIENTIST: Conducts in-depth research on the themes explored during stopovers, publishes articles and educational content and embodies themes related to/in line with the recordings.

On land, a dedicated team ensures the Odyssey runs smoothly by handling stopovers organization, embassies, visits, communication, partner relations, logistics and events for village operations. This team covers:

COMMUNICATION: Responsible for diffusing the Energy Observer messages and values, raising public awareness through available tools—village, social media, press.

MEDIA PRODUCTION: Sources, investigates on location and creates expert content on energy issues, documenting and highlighting the expedition.

EVENT MANAGEMENT AND PARTNER RELATIONS: Organizes events and meetings with partners, the press, the public, schools, as well as local institutions and industrials.

LOGISTICS: Coordinates material needs, village setup worldwide and team movements, ensuring each mission runs smoothly.

ADMINISTRATIVE AND FINANCIAL: Manages the project's finances, ensuring effective and transparent use of resources.

Onboard crew



Marin Jarry
Captain and Director
of Armaments



Jean-Baptiste Sanchez
Captain



David Champion
Boatswain



George Conty
Boatswain



Mélanie de Groot
Journalist



Agathe Roullin
Journalist



Vincent Reynaud
Systems engineer



Luc Bourserie
Systems engineer



Beatrice Cordiano
Scientist

Land team



Fabienne Calimas
Film Production
Director



Dominique Lecocq
Communication Strategy



Margaux Prigent
Editorial and
Brand Manager



Louise Motury
Partner and Event Relations
Manager



Lou Scherpereel
Corporate Relations
Manager



Gérard Rumen
Logistics Manager



Manuela Rouault
Administrative and Financial
Director



Hélène Pucher
Accounting Manager



Erwan Blin
Accounting Assistant



Fanny Régnier
Press Agent

2017 France

SAINT-MALO. PARIS. BOULOGNE SUR MER. CHERBOURG. BREST. NANTES. ÎLE D'YEU.

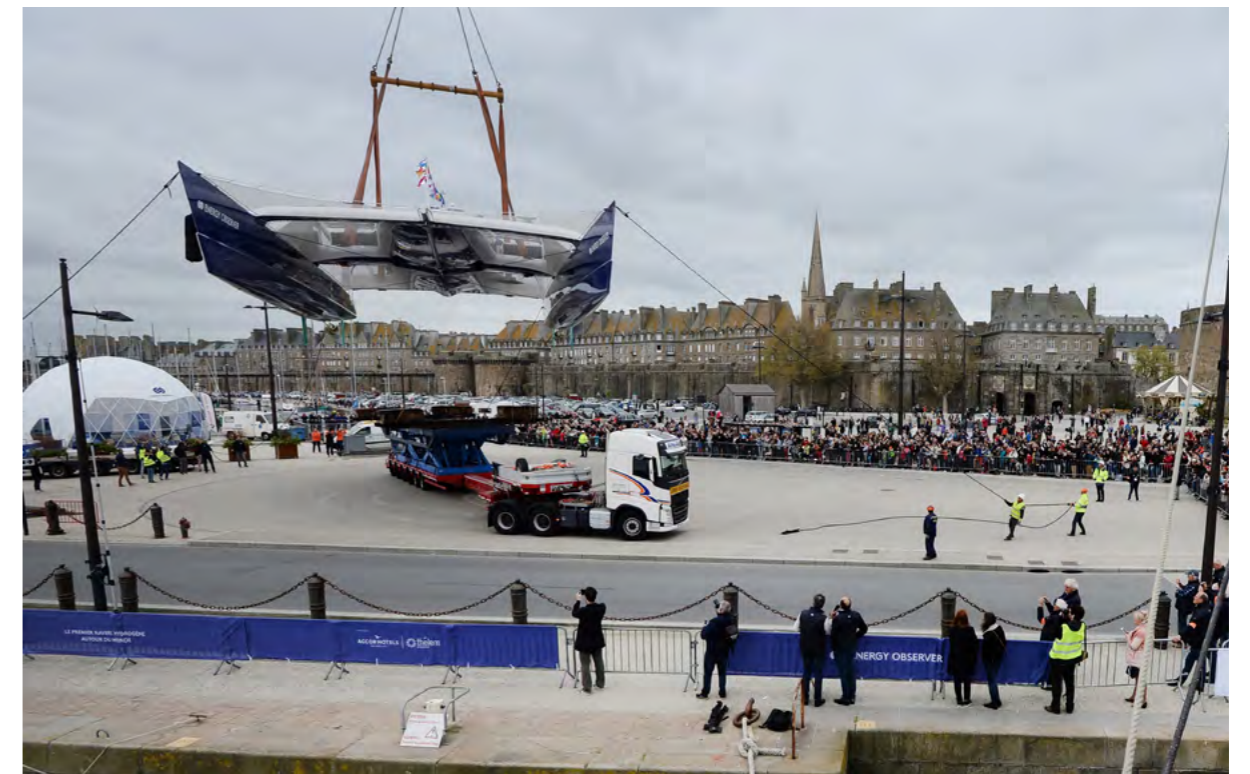
LA ROCHELLE. BORDEAUX. ROYAN. BAYONNE. SAN SEBASTIAN. LA-SEYNE-SUR-MER. MARSEILLE

A "tour de France" in real conditions, to initiate, test and fine tune the technologies of a vessel that was already considered unique.

Saint-Malo, 14th April 2017, 12:30 PM, Energy Observer launches after four years of preparation, in front of an enthralled, amazed and proud local public. It floats! And so, begins an extraordinary Odyssey aboard a boat which the team still needs to learn to manage, so that it can prove its worth and justify this daring bet.

The agenda for the opening run includes testing the ship's maneuverability, ensuring system reliability, adjusting equipment and analyzing preliminary technical readings. Onboard, the sailors are attentive to the boat's every move, while mechanics, technicians and engineers measure, adapt, correct and experiment. From the very first miles, a remarkable documentary adventure also begins, with a team of journalists, photographers and videographers, capturing, commenting and sharing every moment of the Odyssey.

Over the 4,000 miles travelled around France, Energy Observer gains confidence, notably welcoming on board personalities from the scientific community as well as politicians and decision-makers, impressed by this unique vessel. A vessel that fast establishes itself as a remarkable technological demonstration and an undeniable advocate for an ambitious and courageous energy transition.



2018 Mediterranean

FRANCE . MONACO . ITALY . TUNISIA . MALTA . GREECE . ISRAEL . CYPRUS .

ALBANIA . MONTENEGRO . CROATIA . SPAIN . MOROCCO . PORTUGAL

New tour, new challenges, Energy Observer sails the Mediterranean, the ideal setting to test her 202 m² of solar panels.

For her second year at sea, Energy Observer embarked on a Mediterranean tour, allowing the crew to truly test the boat during offshore navigations and under extreme heat conditions, often exceeding 40°C. An yearly optimization project in Saint-Malo aimed to increase the solar surface and work on recovering heat from the fuel cell to store energy as heat. The journey began in Marseille and included iconic stopovers around one of the most polluted seas in the world, where environmental issues are particularly pressing.

In parallel with the Odyssey, Energy Observer gained acclaim and recognition through the nomination of Victorien Erussard as first French ambassador for the UN's 2030 Sustainable Development Goals. Following this nomination, "Energy Observer Solutions" platform was created and "Energy Observer: The Odyssey for the Future" the documentary series was produced, completing Energy Observer's efforts to raise awareness on energy transition.



2019 Northern Europe

BELGIUM. NETHERLANDS. GERMANY. DENMARK. SWEDEN.

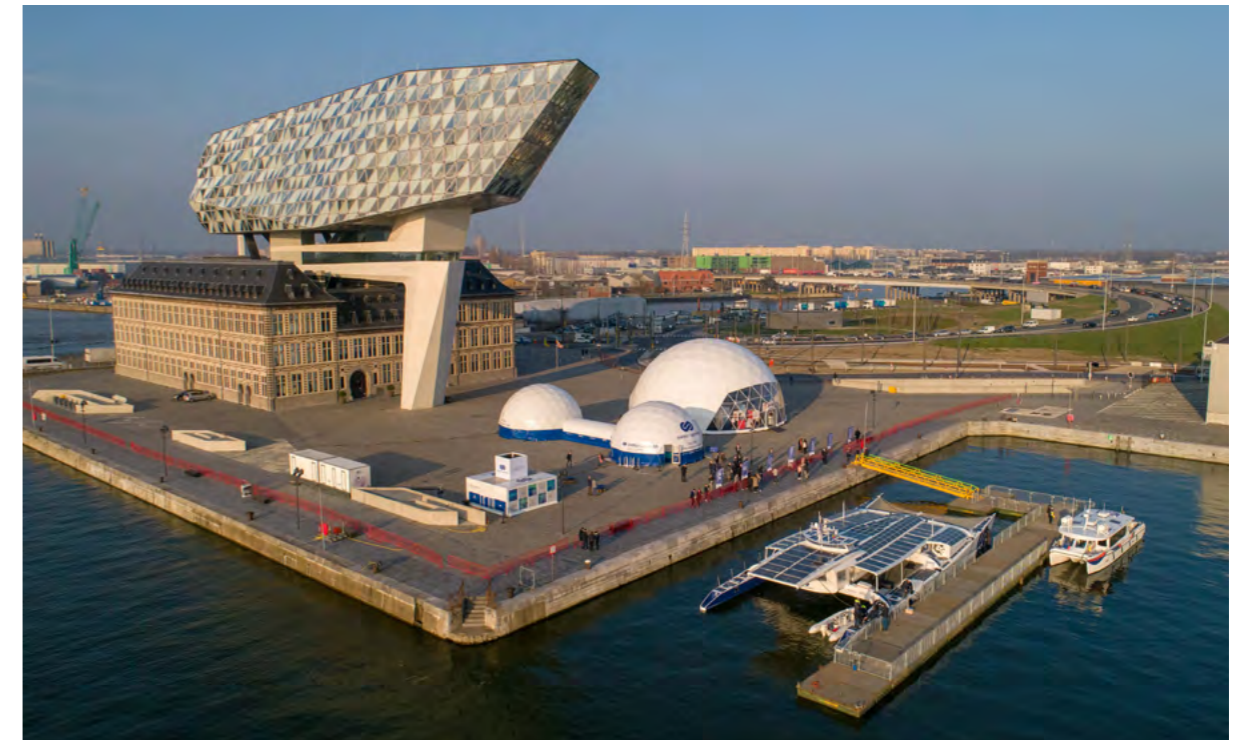
FINLAND. ESTONIA. RUSSIA. ESTONIA. NORWAY. UNITED KINGDOM.

Heading North! Energy Observer explores the epicenter of climate change and tests her technologies under the most extreme conditions.

The Northern Europe expedition was marked by many highlights, including its voyage through the Svalbard archipelago (Arctic) from Saint Petersburg, covering 5,700 km in total self-sufficiency, powered solely by renewable energies and hydrogen, without emitting any fine particles or noise. A world first! A symbolic moment that reminds us of the urgency to act against climate change, particularly visible in this polar region.

Another technical innovation, the OceanWings® sails, were installed for Arctic navigation in order to optimize the wind's energy contribution and save the energy traditionally allocated to the boat's propulsion, even allowing hydrogen production during navigation.

2019 is also a year rich in exchanges, marked by a series of spectacular stopovers (Antwerp, Amsterdam, Hamburg, Stockholm, Saint Petersburg, London...) during which Energy Observer carried out numerous demonstrations and events with shipowners, specialized organizations and major international institutions. This was also an opportunity for Energy Observer to discover and document the many initiatives undertaken by the major capitals of Northern Europe in terms of energy and environmental transition.



2020 Atlantic

CANARY ISLANDS. CAPE VERDE. MARTINIQUE. SAINT BARTHELEMY.

GUADELOUPE. HAITI. BAHAMAS. FRENCH GUIANA.

Due to Covid, the crew remains confined at sea, an unprecedented situation that pushes their experience of onboard autonomy to the limits.

In an uncertain global context, due to the Covid-19 pandemic, the 2020 Odyssey program was completely reviewed, with major stopovers, including Tokyo during the Olympics or the Californian coast, postponed. Nevertheless, Energy Observer adapted to the situation and undertook her first transatlantic journey, the longest navigation in its history, exploring overseas territories up to French Guiana, totaling over 10,000 nautical miles. This performance was achieved thanks to the onboard systems energy mix, a model of resilience particularly suited to the ongoing health situation and reassuring for the Odyssey's future.

Confined at sea, the crew members couldn't set foot on land during their stopovers in the Canary Islands or Cape Verde, receiving fresh supplies remotely in the Canaries. While the entire world experienced an unprecedented period of lockdown, the crew made the best of the situation, taking the opportunity to experience the crossing in complete harmony with nature. With no possible stopovers, the onboard reporter turned her camera to the sea, producing stunning images of the numerous marine species encountered - dolphins, whales, turtles, manta rays off Cape Verde and salp plankton.

The year ended with the ship being welcomed by the CNES in French Guiana at the Guiana Space Center, followed by a series of shootings in French Guiana, one of the few territories that agreed to host us.



2021 Pacific

PANAMA . ECUADOR . UNITED STATES . NEW CALEDONIA . INDONESIA .

The largest ocean on the planet presents a significant challenge for Energy Observer, which embarked on her longest navigation so far.

After an intense month of technical maintenance in Martinique, the boat set sail for the legendary Panama Canal! This unprecedented crossing was a necessary step toward the real navigation adventure for this new year: the Pacific Ocean. Covering one-third of the blue planet, this ocean was an ideal testing ground for the Energy Observer experimental platform.

On the agenda were navigations from the Galapagos to California and then to Oceania, via Hawaii. The health crisis still required Energy Observer to adapt her route; the crew forgoes Japan and undertakes its longest crossing yet: 28 days without setting foot on land across the Pacific to New Caledonia. This leg provided the crew with the opportunity to film subjects on rare elements and nickel, essential resources in battery production. The ship set sail in September for a 25-day journey to Kupang, Indonesia, adding 15,000 new nautical miles to the 2021 log!

Meanwhile, 7,000 nautical miles away, on 25th May 2021, the industrial subsidiary EODev, lit up the Eiffel Tower, using a GEH2® electro-hydrogen generator, powered by 100% green hydrogen. Staying true to its goal of making the boat's technological advancements accessible to the general public, this world first proved that reliable and accessible hydrogen technologies, that support the electrical grid, exist.



2022 Asia

INDONESIA . SINGAPORE . THAILAND . VIETNAM . MALAYSIA . INDIA .

Indonesia, Singapore, India, Vietnam, Malaysia – Energy Observer tours Southeast Asia and brings together key players in maritime decarbonization.

Leaving from Bali, Indonesia, in February, Energy Observer navigated the challenging Java Sea, against winds and currents, headed to Singapore. The “Asian tiger” aims to embody the future of maritime transport through LNG, and imminently ammonia-powered ships, and was a fitting venue for the Odyssey’s partners and Asian industry players to meet on the subject of maritime decarbonization. Energy Observer set up its exhibition village and entire team for this major stopover. Despite Singapore’s ambitions, the continuous flow of cargo ships refueling with oil persists. This Singaporean episode highlighted our dependence on fossil fuels, prompting us to start producing media content on oil, natural gas, coal, carbon capture and storage technologies (CCUS).

The vessel then headed to Thailand, Vietnam and Malaysia to explore their energy potential. All three countries are heavily investing in renewable energies but also facing exponential energy needs. Pollution in this rapidly growing region is striking. Energy Observer undergoes significant maintenance in Langkawi, Malaysia. During this period, the ship suffered a fall that damaged some of its equipment, though safety was not compromised.

From Malaysia, Energy Observer sailed to Kochi, Kerala’s capital, in southern India. An exceptional welcome awaited us in this country of engineers, already very advanced in hydrogen technologies, with three days of conferences organized around the theme.

The boat then crossed the Indian Ocean, with its turquoise waters and majestic coral reefs, ending the year in the Seychelles: a true paradise on earth.



2023 Africa

SEYCHELLES. MAYOTTE. MOZAMBIQUE. SOUTH AFRICA.

NAMIBIA. SAINT HELENA. BRAZIL. FRENCH GUIANA.

From South Africa to Brazil, two key continents for Energy Observer.

In 2023, our vessel originally headed towards Tanzania but ultimately diverted to Mayotte due to technical issues. From Mayotte, the vessel sailed down the Mozambique Channel, facing numerous depressions that forced it to seek refuge in Maputo, Mozambique. On the way to Cape Town, Energy Observer made two weather stops in Durban and then Port Elizabeth, avoiding the frequent austral winter depressions. After Asia, the crew met a community of sailing enthusiasts in South Africa.

In June 2023, Energy Observer reunited with its exhibition village and its land team in Cape Town, for a stopover at the base of Table Mountain, one of the world's seven new wonders. The second-largest economy on the continent, South Africa faces significant energy challenges. With an aging network of coal-fired power plants, the country must shift away from coal while supporting its coal dependent population. Three months of maintenance work allowed for a complete inspection of the hydrogen chain, weakened by the fall during the Malaysia stop. Despite the complex conditions endured over the previous six years, all components remained intact, with the exception of some safety valves that had to be replaced on the tanks.

Next, Energy Observer headed to Namibia, the last African stopover before her transatlantic crossing to Brazil. Africa was rich in audiovisual production, allowing for documentaries about geothermal energy in Kenya, biomass in Madagascar, the energy crisis in South Africa and the production of renewable energy and hydrogen in Namibia. On her way to Brazil, Energy Observer stopped at Saint Helena, Napoleon's last refuge in the middle of the Atlantic. The ship arrived in Brazil in December 2023, where we welcomed on board the Governor of Ceara, who announced the creation of a State Hydrogen Day. Northern Brazil has unique wind potential, encouraging low-cost production. Energy Observer set sail once again to reach French Guiana and its space center, then onwards to Martinique, an overseas territory and base for our Odyssey during Covid-related standbys and technical maintenance.



2024 North America

FORT LAUDERDALE. WASHINGTON DC. NEW YORK CITY. BOSTON. HALIFAX.

After the West Coast in 2021, Energy Observer resumed her American tour on the East Coast for a series of strategic meetings.

The United States, world's largest economic power and second-largest emitter, have a key role to play in our transition. During our American stopover, Energy Observer was met with immense enthusiasm from public decision-makers, key finance, tech and media actors.

The tour began in Florida, nicknamed the «Sunshine State» due to its 237 sunny days per year. Although it ranks third in solar panel installations, climate change and rising sea levels greatly threaten its coasts. The vessel then sailed north to Washington DC, where Energy Observer docked near the White House, at the heart of the American capital, welcoming over 200 people and public officials on board. Among them was a large delegation from the U.S. Department of Energy, led by Sunita Satyapal, director of the Hydrogen & Fuel Cell Program, dubbed the «godmother of hydrogen.»

Next was a symbolic stopover in New York, at the foot of One World Trade Center, the world's leading stock exchange, where we welcomed numerous finance industry figures during the conference co-organized by our partners Hy24 and John Cockerill, titled «Financing the US Hydrogen Momentum.» This event highlighted the crucial role of the financial sector in supporting clean technologies and sustainable initiatives within the United States and worldwide. Finally, the last stopover was Boston, where our crew met legendary MIT members, one of the world's leading centers for innovation and research, with climate at the core of its work.





2024, The great return

SAINT PIERRE AND MIQUELON

MAY 17TH TO 23RD 2024

Final stop of our Odyssey, but also our first step towards returning to France. Over 120 people among the 5,818 inhabitants of the island, recorded in 2024, had the opportunity to discover the boat and its technologies. Departure for a final transatlantic journey to complete our world tour.

SAINT-MALO

JUNE 14TH TO 23RD

Energy Observer arrived in Saint-Malo on June 14th to celebrate its great return to France. An exceptional day dedicated to conviviality, recognition and sharing between all the people who had been involved in this incredible Odyssey: collaborators, partners, personalities and officials. A unique opportunity to share the Odyssey's retrospective, relive unforgettable moments, congratulate and honor the teams and partners who made this dream possible. It was also an opportunity to review our world tour, share behind-the-scenes stories of this great adventure and present future perspectives and projects.

PARIS

JULY 27TH TO SEPTEMBER 8TH

The boat will be moored between the Pont de l'Alma and Pont Alexandre III bridges, Port de la Conférence, next to the Bateaux-Mouches embarkation pier; the latter becoming a new supporter-partner of the Odyssey for this event. Arrival is planned for just 48 hours after the opening ceremony of the Olympic Games, in the heart of the capital during this worldwide event, through to the close of the Paralympic Games.

SEPTEMBER 12TH TO OCTOBER 13TH

We will then up anchor and cross to the Port du Gros-Caillou, just opposite, along the Quai d'Orsay. Set up here the boat and its exhibition village will be open to the public for a whole month. This period will be especially dedicated to schoolchildren.

A Journey to the center of energy Issues

2024 will also see the publication of a retrospective book published by Gallimard, retracing the Energy Observer Odyssey, its adventures and its innovations.

For the past six months, the Energy Observer team has been collaborating with Gallimard Editions to produce a photography book for the general public which retraces the technological and human adventure of our project through images. This book, designed as a logbook, focuses on the boat and its innovative energy system, its voyages around the world and the most emblematic places and discoveries of this initiatory journey.

Illustrated with spectacular photographs, this book provides an overview of global energy issues. It bears witness to the possibility of a more sustainable energy future for the planet.

To be published by Gallimard Editions in October 2024.

Texts by Gilles Luneau · Foreword by Jean Jouzel, French paleoclimatologist.



H₂ and Territories: Marine Fuels of the Future

In 2024, Energy Observer will continue to produce audiovisual content about energy. The two main series of the year will focus on the French hydrogen sector and the marine fuels of the future. These contents will be broadcast on the Web via our YouTube channel and later shared with our partners, on social media and in our exhibition village.

1 H₂ and Territories: Exploring the French Hydrogen Sector

The French low-carbon hydrogen sector is booming. In 2020, France announced a 10 year-long €9 billion plan to decarbonize the industry and heavy transport and to develop an industrial sector. French regions see hydrogen as a future solution for their territories, although the public still struggles to envision this future hydrogen-powered France, often perceived as distant and complex.

This series aims to immerse the general public in this future hydrogen France by showcasing its practical applications and highlighting the dynamism of this sector and its professions.

Two episodes were released in January 2024:

→ **Hydrogen to Decarbonize Our Cars**

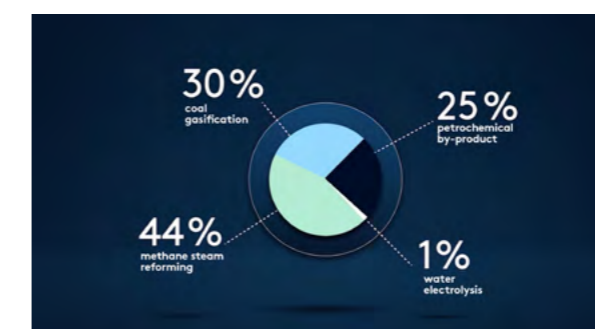
→ **Hydrogen to Decarbonize Our Transport**

Six additional episodes are upcoming, covering production, industry, marine industry, ecosystems and research.

2 Marine Fuels of the Future

Through 7 episodes animated with infographics, this series explains the challenges of decarbonizing maritime transport. Currently, most ships are powered by marine diesel, generating over 3% of global GHG emissions. Batteries, hydrogen, ammonia, methanol, LNG, SMR, biofuels: shipowners are exploring all solutions to reduce emissions, in line with the IMO targets.

This series explores the advantages and disadvantages of each solution to give the general public the keys to understanding this major ecological issue.



The Energy Observer ecosystem

Chapter 4



Energy Observer's Endowment Fund

Energy Observer's Endowment Fund focuses on three main actions in support of energy transition: experimenting ways to decarbonize the maritime sector, deciphering and explaining energy issues to the general public and training the next generation of professionals in hydrogen technologies.

1 EXPERIMENTING WAYS TO DECARBONIZE THE MARITIME SECTOR

Close to 3% of global greenhouse gas emissions are emitted by the maritime sector. To meet the reduction requirements imposed by the IMO and European regulations, for the past seven years Energy Observer, through the laboratory vessel, has committed to experimenting a low-carbon energy mix, focused on research and innovation.

Our sea trials evaluate the performance and reliability of low-carbon technologies in real conditions, allowing us to adjust our performance, collect valuable data and share it. We collaborate with key industry players, research institutions and regulatory bodies to promote the introduction of decarbonized technologies and accelerate their deployment. Energy Observer remains determined to explore and implement innovative solutions for a more sustainable maritime future, proving that viable and effective alternatives exist to reduce the sector's carbon footprint.



3 TRAINING AND SHARING OUR EXPERTISE ON HYDROGEN TECHNOLOGIES

Hydrogen is a key element in energy transition, playing a fundamental role in decarbonizing mobile, terrestrial and industrial uses. Building on the unique experience from our seven-year Odyssey around the world, we aim to pass on this expertise.

By developing partnerships with technical and engineering schools we offer specialized training programs in collaboration with academic institutions. These programs provide students with the practical and theoretical skills needed to master onboard hydrogen technologies.

Our goal is to train a new generation of professionals capable of meeting the energy transition challenges.

2 DECODING AND EXPLAINING ENERGY ISSUES

The energy transition is a complex and urgent challenge. Our goal is to decode and explain these issues to raise public awareness on energy themes, from the fossil era to a fully decarbonized world.

We give voice to a platform of experts, researchers and whistleblowers to debate with verified information and recognized expertise. Our mission is to simplify complex subjects, demystify misleading narratives and help the public to fully understand energy challenges. We also explore the impacts on our democracies in the face of crucial decisions regarding energy and the environment.

Energy Observer organizes conferences, workshops and awareness campaigns, producing educational content and collaborating with institutions to reach a diverse audience. By sharing our knowledge, we inspire concrete and sustainable measures towards a successful energy transition.



Industrial projects: Energy Observer Developments

EODev is the industrial and commercial spin-off of Energy Observer, enjoying spectacular growth since its creation in 2019.

EODev designs, produces and markets two solutions, in France and internationally, that are CO2 emission-free, particle-free, connected and silent:

- The GEH₂®, a hydrogen electric generator, paving the way for a new era of off-grid decarbonized electricity production.
- The REXH₂®, a compact, marinated hydrogen electric generator designed around the same fuel cell to power propulsion and onboard systems of all types of vessels or offshore installations.

EODev is a hydrogen electric generator market pioneer. This is due to its agility, industrial lead over its peers and product development cycles that are 3 to 5 times shorter than the major historical players in the generator market.

2019 Creation of EODev

90 employees

3 production sites in France

9 million
sales revenue in 2022

100 million
raised in 4 years

Annual production capacity:

600 units

EODev solutions are assembled and produced in Montlhéry, close to Paris. Collaboration with over 50 national suppliers enables the production of approximately 15 units per month. 70% of the unit cost comes from the national territory, creating nearly 230 direct jobs. GEH₂® benefits from the Guaranteed of French Origin certification, with most components sourced from small businesses and industrial sites based in France and assembled at the Eneria site in Montlhéry. Only the fuel cell is manufactured outside France, at Toyota's plants in Belgium. A GEH₂® can be assembled in one day, with an annual production capacity of over 600 units.



GEH₂® EODev's electro-hydrogen generators (GEH₂®) meet off-grid or grid-support energy needs. They are suited to challenges of several sectors whose operations are temporary and activities mainly mobile: construction, events, telecommunications, sustainable mobility and audiovisual production. GEH₂® generators are also grid support solutions during power shortages.



REXH₂® The REXH₂® converts hydrogen stored onboard a vessel into electricity. This electricity can be used to power the electric engine as well as onboard auxiliaries, for all types of vessels, both professional and recreational.

Industrial projects: EOConcept

Created in 2023, EOConcept is an engineering office specializing in naval and port energy architectures.

EOConcept, a pioneer in low-carbon maritime solutions, is developing its pioneering and ambitious project, Energy Observer 2, a feeder vessel powered by liquid hydrogen. This cargo ship, aimed at being the lowest carbon vessel in the world, represents a technological breakthrough. To bring this project to life EOConcept, LMG Marin and EODev have conducted in-depth studies on the commercial, operational and technological aspects.

The choice of liquid hydrogen as the cornerstone of this project illustrates the group's ambition to push the boundaries of decarbonization technology. This fuel, with its exceptional properties, stands out significantly from other alternative solutions and fully meets the greenhouse gas emission reduction requirements imposed by the IMO and European regulations. Energy Observer aims to establish a new environmental standard in the industry, proving that liquid hydrogen is a viable complementary solution to biofuels and e-fuels for an effective energy transition in the maritime sector by 2035.

To complete this project, the initial investment is estimated at over €100 million, covering studies and construction of the vessel. An Innovation Fund application was submitted to the EU in April 2024. EOConcept is fully engaged in seeking funding and partnerships, bringing together a range of stakeholders around this major project, including the creation of a liquid hydrogen ecosystem in a French port. The achievement of this avant-garde project will propel the merchant marine sector towards carbon neutrality.



KEY FIGURES

LENGTH 155 m

WIDTH 24.5 m

DRAFT (DESIGN) 8.80 m

DEADWEIGHT (DESIGN) approx. 12.000 dwt

FLAG France

CREW 18 people

CAPACITY approx. 1.100 TEU

ENERGY SYSTEM

TYPE Zero-emission LH₂ feeder

FUEL CELLS 4.8 MW/12 modules of 400 kW LH₂

STORAGE 42 t

BATTERIES 1 MWh

AUXILIARY GENERATORS 2 x 1,8 MW

BOW THRUSTER 1 200 kW

STERN THRUSTER 800 kW

COMMERCIAL ZONING

NAVIGATION Inter-regional/intra-european

NUMBER OF STOPOVERS ~10

TARGET DISTANCE ~1 800 nautical miles

RANGE 14 days

BUNKERING 1 per cycle
(Le Havre, Brest, Fos-sur-Mer, etc.)

AVERAGE SPEED TARGET 12,5 knots

POWER RESERVE AND BOOST CAPACITY
16 knots



New projects 2025 – 2030

Chapter 5

Energy Observer 3

A New Visionary Vessel to Explore Technological Solutions.

Nearly ten years after the creation of the first Energy Observer vessel, our ambition is to design a new laboratory ship named Energy Observer 3. Like its predecessor, this ship will push the boundaries of onboard technologies with a complex yet essential energy architecture to study the real impact of synthetic fuels known as e-fuels and associated technologies.

EO3 will embark and experiment 10 technological modules in real conditions, whose integration and hybridization, with a proven architectural component from Energy Observer, will make it an extraordinary experimental platform, essential to the maritime energy transition.

Our goal is to better understand future proposed solutions, quantify their effectiveness in terms of decarbonization and energy efficiency and study common storage systems.

Led by the EOConcept engineering office, construction of the vessel is expected to begin second half of 2025, with a target launch in the summer of 2026.





Energy, an enlightened future

A new documentary series aboard Energy Observer 3.

This series is set in a context where the comfort and technological progress of the past fifty years have led to unprecedented energy consumption, posing major challenges. This increased consumption has resulted in a critical climate disruption, marked by extreme weather events, rising sea levels and ecosystem disturbances. Simultaneously, dependency on fossil fuels continues to threaten biodiversity and human health, with greenhouse gas emissions reaching alarming levels.

The series addresses the complexity of energy and climate debates. It highlights growing polarization and misinformation, exacerbated by social media, making it difficult for the public to distinguish reliable scientific facts from unfounded opinions. The goal is to enlighten these debates by relying on verified expertise and giving a voice to true specialists.

Through ten captivating episodes, mixing adventure and investigations, the series, embodied by five energy explorers, deciphers our modern world. It covers the history of energy, its impact on our comfort, the urgent challenges posed by climate change and the quest for carbon neutrality.

EO3, a visionary ship exploring new technological solutions, is the recurring «figure» in our episodes. Our onboard explorers have the best platform to meet experts from around the world! While testing an energy mix daily, often in extreme conditions, they also venture into equally perilous territories: industrial complexes, ultra-secure research sites, stock exchanges where the future of certain raw materials is decided, etc. When filming certain subjects is impossible, EMS, the brain of EO3, decodes for our team by sourcing archival footage, creating clear infographics, questioning AI and suggesting alternatives.

The importance of Energy, An Enlightened Future lies in its ability to engage with the public around so-called unappealing topics, yet captivate their attention through our upbeat, likeable, expert explorers and striking themes. This aim of the series is to inform, educate and inspire on these complex issues, while also encouraging awareness and collective action.

EO Weekly Digital Platform

The media that decodes the energies of the world and the world of energy.

Energy Observer Weekly is a digital platform that aims to become the go-to media source for contemporary energy issues. In a context where environmental questions are increasingly alarming and technological responses more complex, it is difficult for citizens to navigate and act accordingly.

Analyzing strategic issues, exploring viable solutions, sharing innovative experiences and promoting sustainable practices are the missions of Energy Observer Weekly. By offering an in-depth analysis of an energy-related question each week, the platform allows everyone to understand the challenges of our time and thus become active participants in the energy transition.

Energy Observer Weekly targets the general public, educational community, press and our partners via a dynamic interface organized in thematic files covering renewable energies, fossil fuels, nuclear power, hydrogen, climate change, technologies, energy policies and more.

More than a simple information site, Energy Observer Weekly is a media ecosystem offering a variety of content to match contemporary dissemination

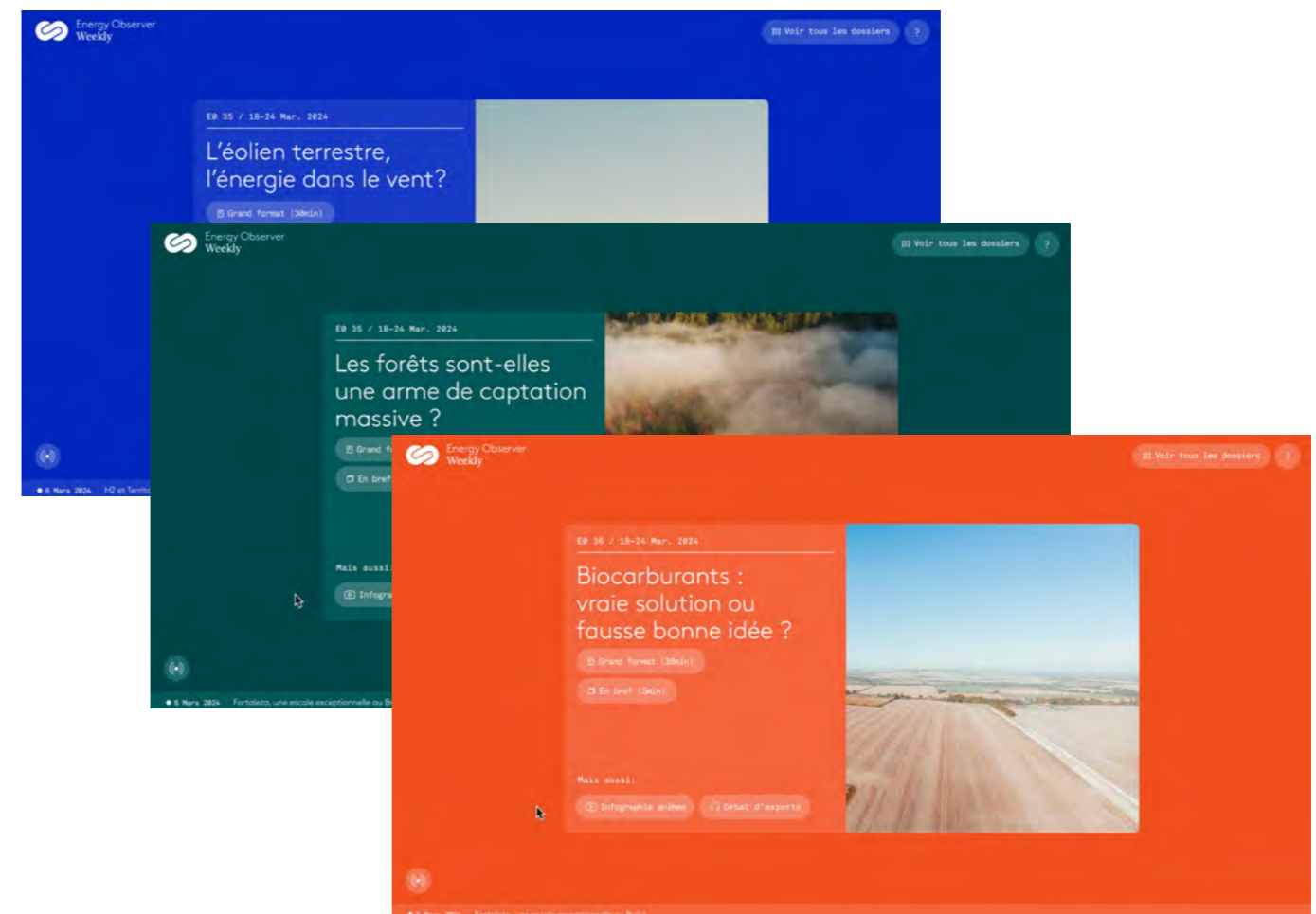
modes. The weekly «Grand Format» thematic file brings together a multitude of modules – texts, videos, audios, infographics – to be read in one go or flicked through on social media, depending on individual preferences. For those in a hurry, each file is available in a brief format, to provide a quick understanding of the major energy projects of tomorrow.

In line with Energy Observer systems, the platform's design adopts a clean and disruptive style, highlighting interactive and immersive content. Its innovative navigation, based on a system of themed cards, to explore one after another, adds a dynamic and playful dimension.

In addition, the platform includes an energy dictionary and a constantly updated news feed.

Provided in real-time by the discoveries of the laboratory vessel and her Odyssey, Energy Observer Weekly will become the essential meeting point for those who want to understand and master the world of energies. A powerful and practical influencer platform, it will advance the interests of energy transition in hearts and minds, in unison with the Energy Observatory, sharing her vision and mission.

Launch scheduled for 2025.





Energy Observatory

A Place That Embodies Change. An Ambitious and Pioneering Project in Saint-Malo, Birthplace of Energy Observer.

Energy Observatory will be a cultural destination at the crossroads of science and technology, art, history and anthropology, open to the public daily. It will serve as a reference center dedicated to education and research around all things energy.

The Observatory will feature temporary and permanent exhibition spaces, an immersive tour of the laboratory vessel, an educational gallery, an auditorium, a corporate seminar space, a pilot project incubator, a research residency, a partner space, a bookstore and a training area.

With its artistic programming, frequent conferences and screenings, the venue will awaken senses and create connections between different energy fields. It will present the state-of-the-art on various energy themes, aiming to raise awareness and encourage development and adoption of cleaner and more efficient energy solutions. It will offer a knowledge-sharing space for both the general public and experts, relying on data verified by high-ranking partners, and a pedagogical and scientific committee comprised of objective figures.

The exhibitions will cover the history of energy, current environmental challenges, energy-saving strategies,

transitions to renewable energies, resource recycling, energy distribution, the impact of raw materials, geopolitical dynamics and the latest technological innovations. The approach will also include perspectives from historians, anthropologists, climatologists, sociologists, architects and artists enabling them to offer their testimonies and points of view.

Our ambition is to create an accessible and lively place, founded with passion and wonder, to achieve carbon neutrality by 2050. It's an invitation to project oneself and imagine a desirable future... a toolbox, not only designed to nourish reflection but also to invent new modes of existence and action. The aim is for the general public to reclaim this subject, become aware of the issues and believe in the future.

We aim for this place to be in Saint-Malo, the port where Energy Observer was born. This project fits perfectly within the local territory and the Brittany region's commitment towards energy transition, capturing national and international attention.

Mapping of our energy systems

Appendix





Initial feedback on on-board technologies

Initial learnings following use of onboard technologies

The COVID-19 pandemic forced us to extend our initial program by one year (+ 360 PCR tests for the crew). But that wasn't enough! When it came time to turn right into the Indian Ocean towards the Suez Canal, which was the shortest route back to port, we, thirsty for adventures and discoveries, motivated by the passage around the legendary Cape of Good Hope, and frustrated at not having seen the Statue of Liberty, turned left instead, extending our navigation around the world by 10,000 miles.

This added two additional years to the initial five-year program, pushing the onboard technologies to their limits. Some manufacturers claiming lifespans of five years...

Energy Observer now boasts a unique and rich database with millions of data points.

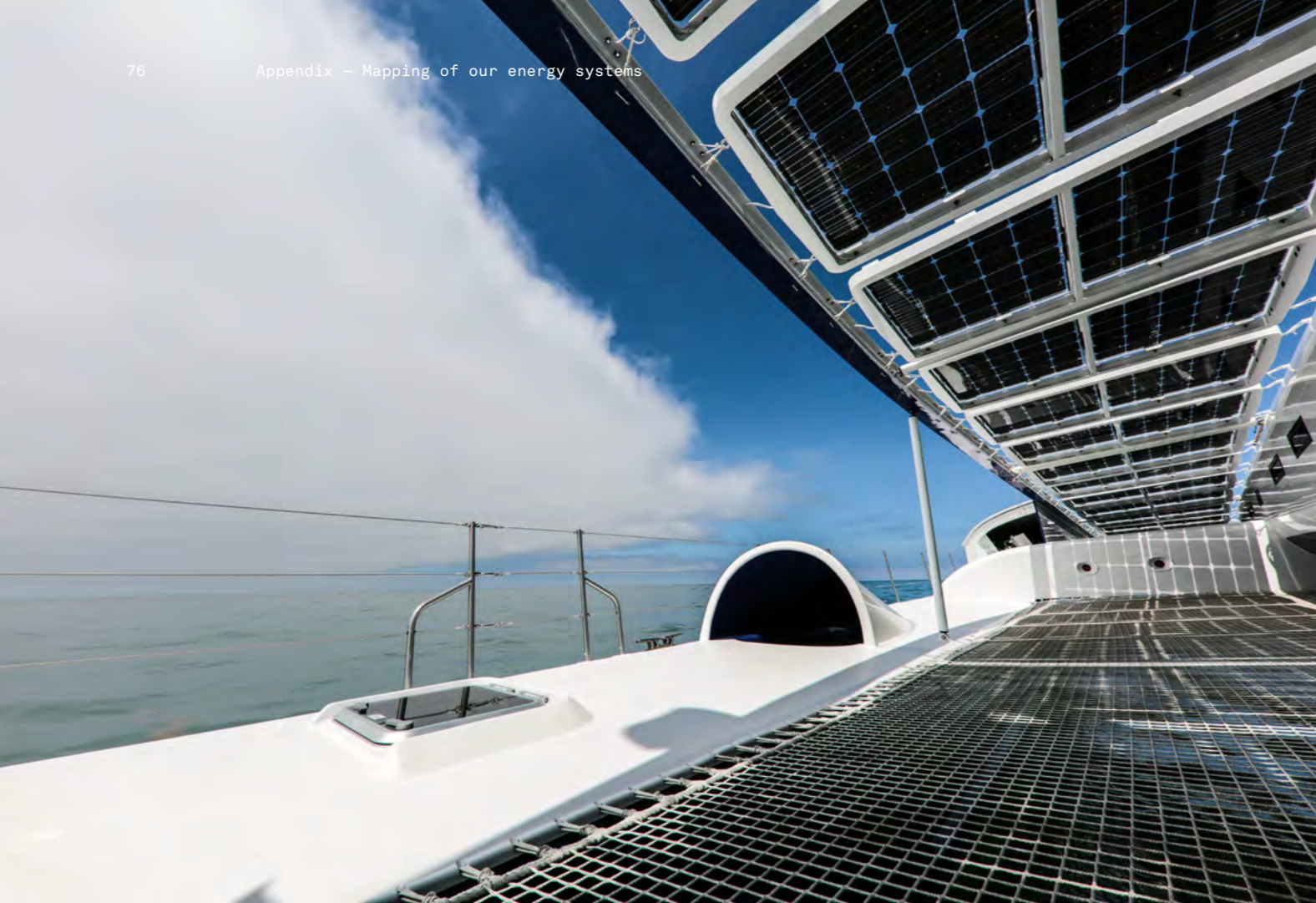
Here are some feedbacks from the two onboard systems engineers:

Solar energy

CONFORMABLE PHOTOVOLTAIC PANELS

Technological partner: [Solbian](#)

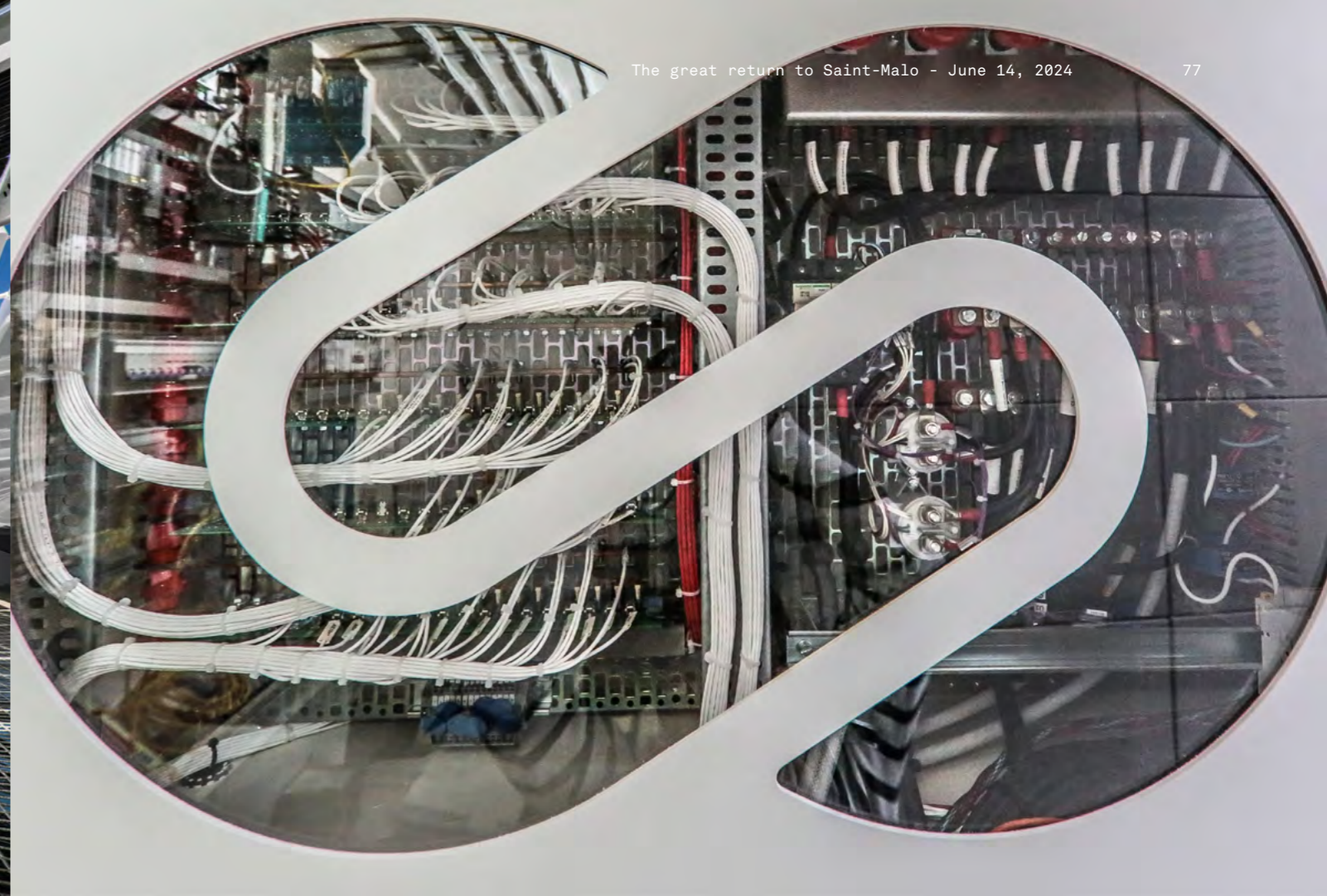
- **SURFACE INCREASE:** Thanks to conformable panel technology, the vessel's photovoltaic surface was increased four times: 130 m² (21 kWc); 141 m² (23.7 kWc); 168 m² (28.5 kWc); 202 m² (34 kWc).
- **OPTIMAL TILING:** The flexibility of these panels allowed for easy adaptation to various surfaces of the vessel, fitting perfectly to its different shapes and exploiting every nook. This flexibility optimizes the number of installed cells, which now number 6,788.
- **CONNECTIVITY:** Numerous tests were conducted on the connections, including deck pass-throughs and junction boxes.
- **ANTI-SLIP COATING:** Six different series were tested before finding the right formulation.
- **BONDING AND SEALING:** Various polymer references were tried. The most effective bonding method proved to be extra-strong, waterproof and high-temperature resistant double-sided adhesive, while polyurethane is preferred for joints.
- **PERFORMANCE IN THE TROPICS:** A significant efficiency loss was observed in the tropics, with cell temperatures reaching 75°C.
- **ELECTRICAL SAFETY:** Some short circuits were encountered, but no fires occurred thanks to the presence of branch protection diodes and the very low voltage architecture chosen (30 V).



BIFACIAL PHOTOVOLTAIC PANELS

Technological partner: INES (Institut National de l'Énergie Solaire/National Institute for Solar Energy)

- **HIGH EFFICIENCY:** A 30% production improvement was observed compared to the traditional panels glued to the deck.
- **CONTINUITY OF PRODUCTION:** The 2,298 cells are connected by independent branches, ensuring that a damaged panel continues to produce power. This proved extremely important as the first six rows were damaged by waves, and other panels were broken by falling objects.
- **AESTHETICS:** The visual appearance of the bifacial panels was greatly appreciated, especially for the canopy of the central cabin, which created a real well of light in the living area.
- **CORROSION ISSUES:** Some tracks showed signs of corrosion. The panel mounting system on its frame caused constraints and separation of polycarbonate plates, allowing water to penetrate. A better fixation system along the length of the plates would be beneficial to absorb vibrations and deformations due to maritime conditions.
- **PANEL MOUNTING:** The PVs are mounted on composite material frames, which are integrated into the lateral and rear wings with a unique lashing system. This setup absorbs vibrations and platform deformations and has proven extremely effective.



CABLING

Technological partners: PRYSMAIN GROUP/MECATRACTION

- **LIGHTWEIGHT:** The 6.2 km of aluminum cables guarantees lightness but leads to Joule effect losses, resulting in decreased efficiency.
- **DURABILITY:** The cabling has shown excellent durability, except for UV-exposed clamps.
- **CONNECTION:** Specially developed lugs for the copper-to-aluminum transition maintained a good grip.

SOLAR CONVERTERS

Technological partner: BRUSA

- **FIABILITY:** The solar converters have been very reliable, despite a few failures since late 2023, with diagnostics ongoing. However, their expected lifespan was five years.
- **MULTIPLICATION:** The number of photovoltaic fields and associated converters increased from 7 to 13.
- **REDUNDANCY:** The increase in fields moderated the impact of failures, as some components needed for repairs were very long to get or required a return to the supplier.

Wind energy

VERTICAL AXIS WIND TURBINES

Technological partner: ICAM

- **PERFORMANCE:** Good production when stationary, i.e., at anchor or in port, but excessive wind resistance (drag) during navigation due to the size of the sails.
- **QUIET TECHNOLOGY:** Vertical axis wind turbines generate much less noise compared to the horizontal axis wind turbines tested late 2017.
- **VIBRATIONS:** Vibration issues led to the removal of one of the two turbines for wind tunnel testing.
- **REPLACEMENT:** Due to drag, weight and space considerations, these turbines were replaced during the 2018-2019 technical stopover by another sail system, this time for propulsion.



TRACTION WING

Technological partner: BEYOND THE SEA

- **TESTS AND DEVELOPMENT:** Sea trials were conducted in 2017 with an initial 16 m² prototype. The final kite surface was intended to reach 50 m².
- **POTENTIAL:** This technology is interesting for offshore navigation, particularly for ocean crossings with stable wind flows such as trade winds.
- **COASTAL NAVIGATION:** Frequent course changes during the catamaran's coastal navigation made the kite wing unsuitable.
- **DECK PLAN:** The deck configuration was not sufficiently adapted to the maneuvers required by such a sail and presented many potential breakage risks, both on the system itself and other technologies.
- **REMOVAL:** The traction wing was removed in 2018 due to weight considerations and to reclaim volume for integrating alternative technologies.



OCEANWINGS® PROPULSION SAILS

Technological partner: AYRO

- **FIRST VERSION:** This is the first installation on an offshore vessel.
- **AUTOMATION:** Despite the diverse backgrounds of the crew members, from boatswain to onboard reporter, to systems engineer, everyone could keep watch day and night without encountering adjustment or decision-making difficulties, thus preserving the captain...
- **360° ROTATION:** No accidents were recorded on board, although these are extremely common during gybing maneuvers with traditional rigging.
- **INDISPENSABLE ALLY:** Providing on average 40% of the energy and up to 60% on some navigations such as transatlantic crossings.
- **PERFORMANCE:** The boat regularly reached speeds of 7 to 9 knots with winds around 15 knots, despite the small sail area and the platform's 34 tons. Speed peaks, with a record of 16.6 knots, were observed in more extreme conditions (winds over 30 knots).
- **RELIABILITY:** Some technological choices on these first prototypes posed challenges and required optimization, marinization needs and frequent maintenance, without bringing the concept into question.
- **PROGRAMMING:** Many software updates for the pilot system, with the addition of many lines of code, resulting from collaboration between the crew and designers.

Hydrogen chain

DESALINATION

Technological partner: SLCE

- **ELECTRICITY CONSUMPTION:** 250W instantaneous for a production flow of 90 liters of fresh water per hour, with 30 liters subsequently treated for use by the electrolyzer.
- **PRODUCTION :** 1 liter of deionized water produces 100g of H₂, which will become water during conversion to electricity by the fuel cell. Over the 7 years, more than 100,000 liters of freshwater were converted from seawater.
- **MAINTENANCE:** The challenge was maintaining acceptable water quality for the system despite diverse water sources (ports, rivers, etc.). Modular filtering stages were implemented, but pumps suffered in some areas, leading to frequent replacements.

ELECTROLYSIS

Technological partner: PROTON ONSITE

- **PRODUCTION RATE:** 4 Nm³/h at an output pressure of 30 bar.
- **MAINTENANCE:** Over the 7 years, only the connector of a sensor needed adjustment. The electrolyzer itself required no curative maintenance.
- **AGING:** Annual preventive maintenance kept performance at acceptable levels, with efficiency dropping by about 4%.
- **VENTILATION :** The harsh ambient environment was managed by filtering salty air with a spray separator, cleaned quarterly.
- **COOLING:** An additional cooling stage was necessary in the Mediterranean to ensure uninterrupted production.
- **OXYGEN UTILIZATION :** Due to lack of need and the complexity involved, oxygen was not recovered.
- **SIGNIFICANCE:** The system's place is ideally on land, but with hydrogen unavailable in most destinations, its presence onboard was essential for testing all H₂ technologies.



REFUELING

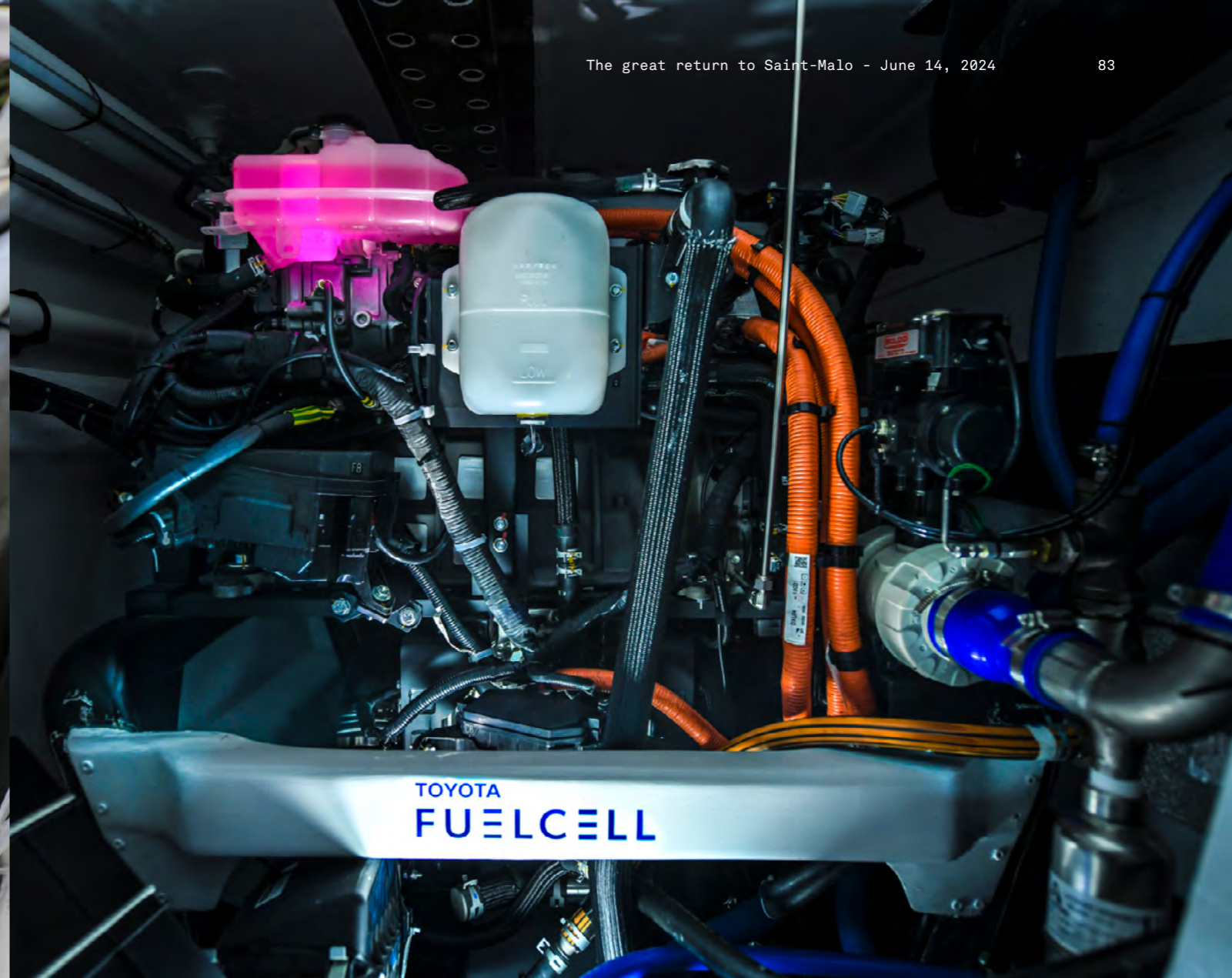
Technological partner: AIR LIQUIDE

- **ÉVOLUTION :** The electrolyzer started producing hydrogen in November 2017, requiring changes to the original piping circuit to expedite operations without using compressors.
- **PIONEERS :** While waiting to produce our own hydrogen, refueling was necessary for four months, requiring special permission to bring hydrogen into port areas (Saint Malo, Le Havre, Brest, Saint Nazaire, Royan, and La Seyne-sur-Mer).

COMPRESSION

Technological partner: NOVA SWISS

- **TIME STAMP:** Compressors logged 4,344 hours at the 1st stage (150 bar) and 3,183 hours at the 2nd stage (350 bar).
- **FRAGILITY:** In the first 16 months, 11 membranes failed due to various contaminants. Solutions included testing other alloys and adjusting the control system for startup procedures. Once the right strategy was found, fewer than ten failures occurred during the rest of the Odyssey. Safety valves were also problematic due to boat vibrations causing oil leaks and belt ruptures.



STORAGE AND H₂ CIRCUITS

Technological partner: LUXFER - KTI

- **CORROSION:** Tanks equipped with solenoid valves and safety elements were impacted by the marine environment, requiring replacements in 2023. Inspections showed no internal tank aging.
- **SUPPORTS:** Support brackets, designed and patented by Energy Observer teams prevented degradation of connections, ensuring stability of the bottles relative to the piping. This system simplified handling, such as during the technical stopover in Cape Town in July 2023.
- **PIPING:** The 120 meters of piping showed robustness, with no leaks detected.
- **CURATIVE MAINTENANCE:** Pressure regulators frequently failed due to water hammer and environmental factors. Solutions included automated control adjustments and extensive cleaning, repair, or replacement due to corrosion, photodegradation, or thermal stresses.

FUEL CELLS

Technological partners: CEA LITEN - TOYOTA - EODev

- **CEA FUEL CELL:** First to be integrated and custom-designed by the CEA, it operated for about 1,300 hours at 24 kW, showing a hydrogen-electric conversion efficiency of 48%.
- **REXH₂[®] EODEV / TOYOTA FUEL CELL:** The REXH₂[®] V1, integrated in 2020, resulted from the collaboration between Toyota Motor Europe and EODev. This led to the development of the GEH₂[®] electro-hydrogen generator, a flagship product of Energy Observer Developments, now a global leader. Integration optimizations were made based on user feedback. With an output power set at 30 kW, the system's electrical efficiency is 58%.
- **THERMAL UTILIZATION:** Both systems utilized thermal energy for heating sanitary water and living spaces.

PROPULSION

Technological partners: PHASE AUTOMATION, BRUNTONS

MOTORS: The sound footprint of the propulsion system was measured at less than 1 kHz, benefiting crew quality of life and significantly reducing impact on marine fauna, which is disturbed by sounds beyond 4 kHz. Additionally, motor controllers allowed the technical team to adapt motor control over time, which would not have been possible with a traditional combustion engine.

However, air cooling of these controllers proved unsuitable, as the electrical components suffered from salty air, leading to corrosion and failures. A water-cooling solution was studied but not implemented due to design constraints.

HYDROGENERATORS: An energy production of 7.6 kW was recorded through propeller rotation, but at the cost of reduced boat speed, similar to regenerative braking in electric cars. This mode was only used occasionally.

PROPELLERS: In 2020, fixed-pitch propellers were replaced with self-variable pitch propellers to reduce drag. This decreased hydrogeneration efficiency but significantly improved performance, increasing the catamaran's speed by approximately 15 to 20% in good wind conditions.

400V BATTERIES

Technological partner: FORSEE POWER

AGING: Storage capacity decreased by 10% after approximately 4,000 discharge cycles at more than 70% of their capacity.

MAINTENANCE: Regular tightening of interlock connections was necessary.

BATTERY MANAGEMENT SYSTEM (BMS): The BMS, which controls and ensures the safety of battery cells, underwent regular reprogramming and three replacements over the 7 years in operation.

24V BATTERIES

Technological partner: CLAYTON POWER

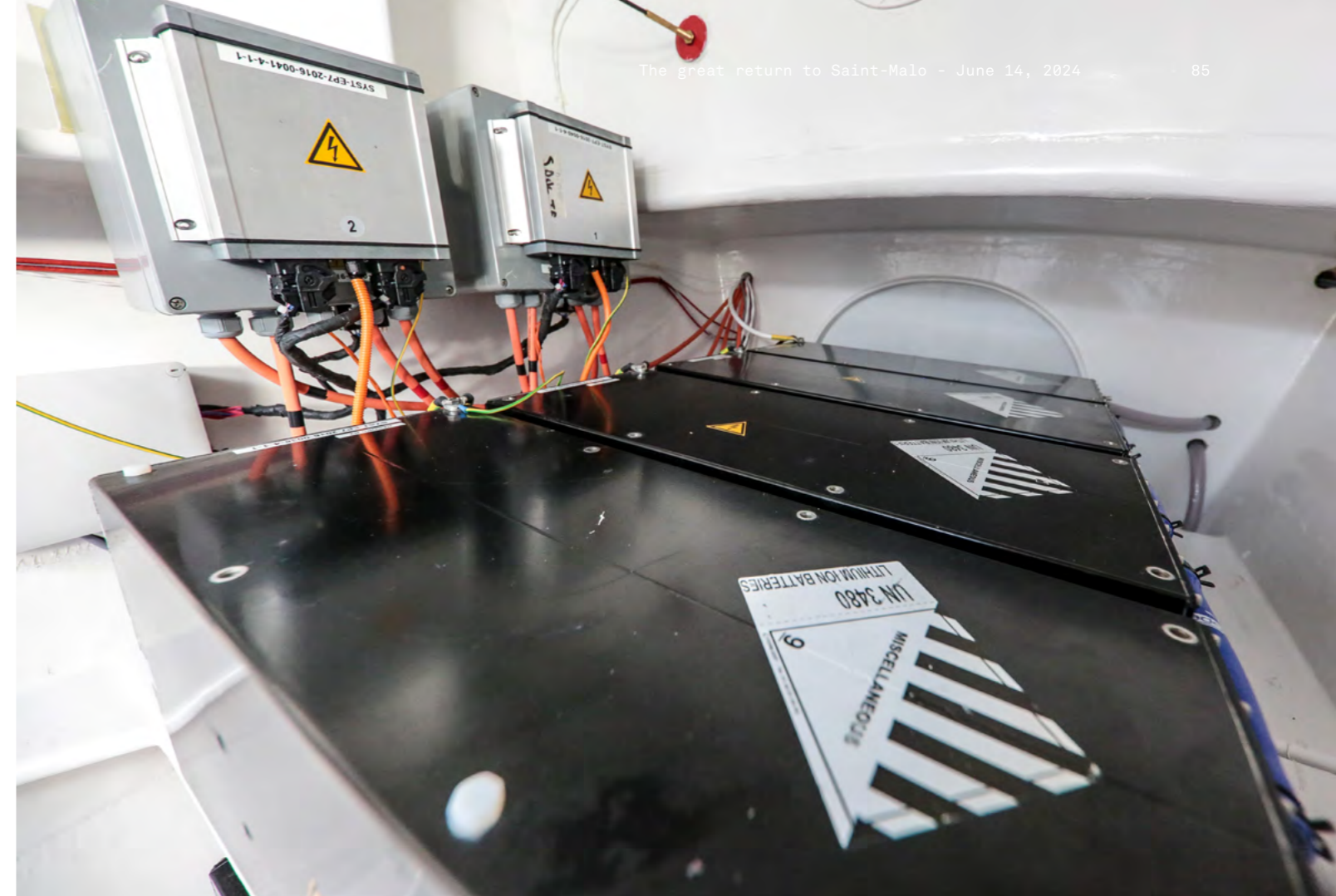
AGING: An imbalance was observed, prompting the technical teams to disconnect three batteries. This aging resulted from the electrical architecture, as these batteries were connected to independent photovoltaic fields, creating very irregular charge and discharge cycles. The absence of appropriate regulation, which was corrected over time, also contributed to this issue.

INVERTER

Technological partner: BEL POWER

TECHNICAL SPECIFICATIONS: A 6kW inverter interfaces the 400VDC battery storage with the 230VAC onboard living network.

DURABILITY: As a specific power converter, it faced issues after 5 years of intensive use. It was removed in December 2023 after two repair attempts and returned to the supplier.



AUTOMATION

Technological partner: ROCKWELL AUTOMATION

SOFTWARE: To keep up with developments and changes in technological components, 51 versions of the Energy Management System (EMS) were programmed.

EXAMPLES: Notable evolutions include: energy flow control for battery charge regulation to limit aging, and optimization of propulsion motor control with various functionalities to adapt to the boat's conditions while limiting energy consumption. These functionalities range from control based on instant power balance, to control based on maintaining a target average speed.

ROBUSTNESS: Only 5 automation cards needed replacement throughout the system's operation.

MARITIME ROUTING

Technological partner: WEATHERNCO - SAILGRIB

SOFTWARE: Reliable reception of files, even with low-bandwidth Internet. Energy savings: estimated at 25% on certain voyages.

June 14th, 2024, marks the vessel's return to France; after a short technical stop early July in Saint-Malo, the catamaran will set sail again towards Paris.

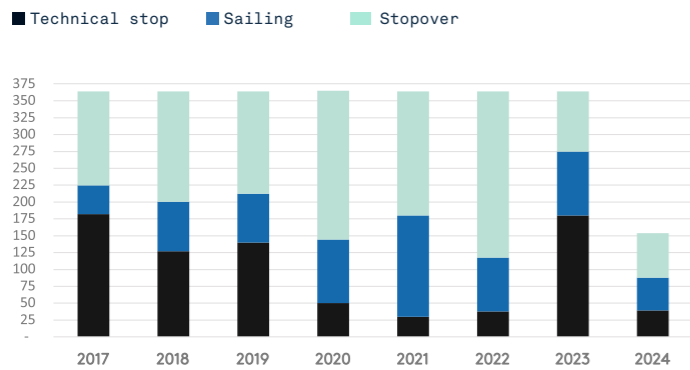
Tackling the challenge of sailing all types of seas and oceans with strict schedules and a complex energy architecture made this project an extremely ambitious endeavor.

But we did it, seeking and finding the best compromises. The fall of the boat during the technical stop in Malaysia in 2022, due to a handling error at the shipyard, certainly didn't make our lives easier!

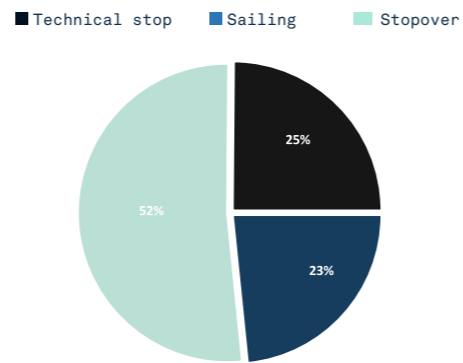
The work list scheduled during this stopover exponentially increased over the two months, turning into a nightmare. Due to insufficient time for sea trials, resuming the journey across the Indian Ocean became the stage of numerous disastrous discoveries. The technical and administrative consequences continue to handicap the technical team: we've had an anchor dragging us down for nearly two years.

The two onboard engineers present the main navigation data and the energy measurements collected around the world at the end of this technical report. From January 2017 to June 2024, the crew has completed, as of June 3rd 2024, 657 days of navigation, 1,260 days in port and 786 days in technical stopovers.

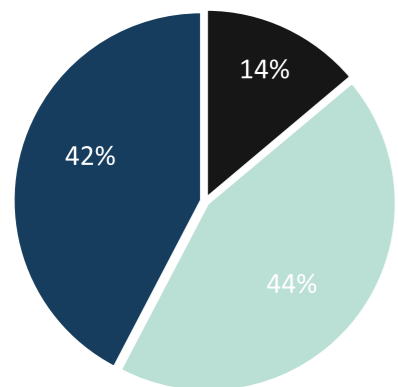
Navigation Data and Energy Measurements (January 2017 - June 2024) by day



Typical operation of the Energy Observer during the Odyssey (January 2020 - June 2024 period)



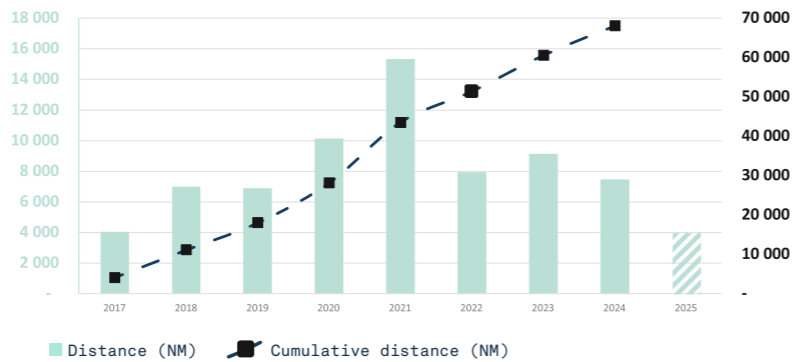
Propelled simply by wind, pushed solely by our propellers, or combining sails and motors, navigations were split into these three categories. From 45-knot winds braved in the North Atlantic to the calm seas of northern Australia, after encountering all types of weather conditions, it's a tie! Our Oceanwings® have proven just as useful as our propulsion motors:



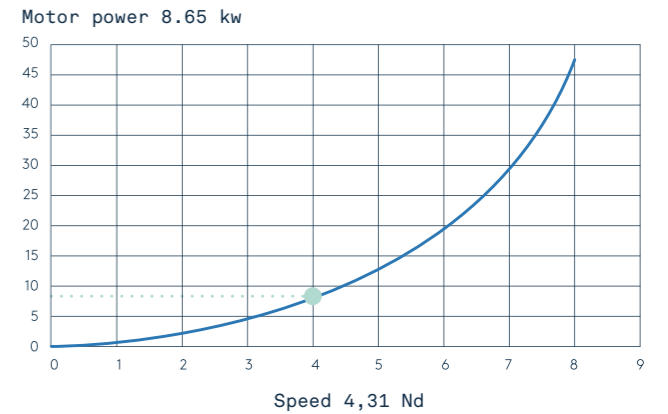
Energy Observer sailing profile with Oceanwings® January 2020 - June 2024

■ Sail ■ Sail + Motor ■ Motor

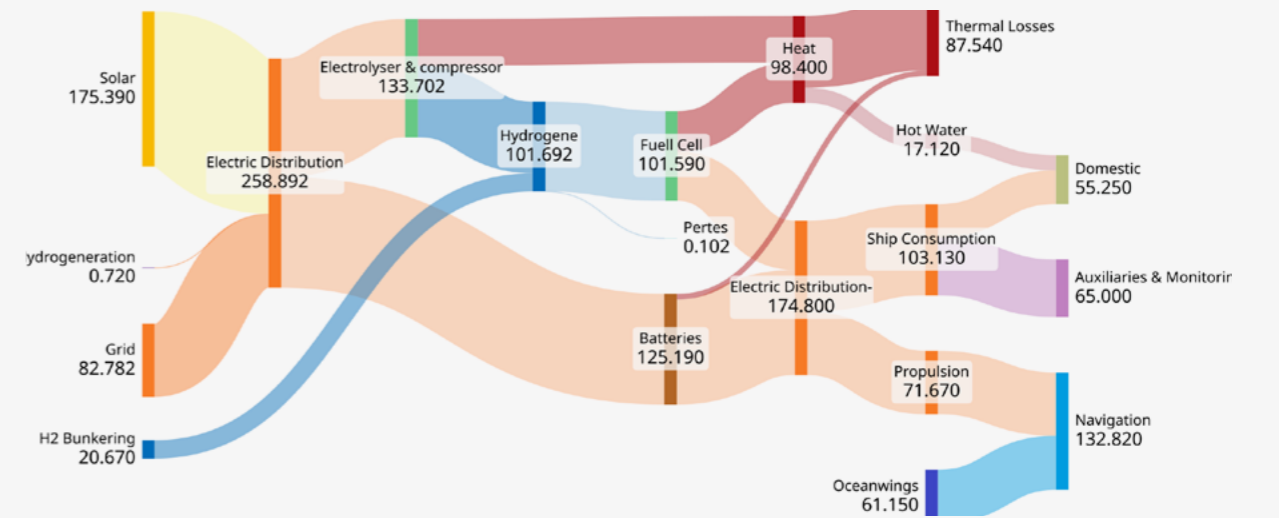
The 68,000-nautical-mile journey was accomplished with highly variable annual distances depending on the year, directly impacted by weather conditions as well as breakdowns and various difficulties encountered:



The average speed is 4.31 knots, but we surfed at 16.6 knots off the coast of Florida:



Energy flows in megawatt/hour (MWh) for the entire Odyssey:



CONSUMPTION

LIFE ONBOARD: Bravo to the frugal crew! While the total energy consumption of a household of 5 people ranges between 20,000 and 40,000 kWh per year, we consumed the equivalent of 5,500 kWh over 365 days, which is four times less than the most economical French families.

CONTROL-COMMANDE: Only an average of 1,000 W for 171 sensors and 158 actuators, a well-calibrated setup for this true gas factory!

NAVIGATION: The average power consumption is 8.65 kW, which represents 2.01 kWh per nautical mile travelled.

THERMAL LOSSES: A new challenge for our future projects is to find a way to valorize these losses.

CONTRIBUTIONS

SOLAR: Energy Observer's strongest ally!

HYDROGENERATION: It is often said that endurance is more important than speed performance, but to maintain such a schedule, every knot is precious...

HYDROGEN: The duration of some stopovers, combined with breakdowns in the H2 production system, led us to make a total of 15 refuels, including 9 with green hydrogen.

SHORE POWER: During our numerous technical stopovers, maintenance on our systems required them to be powered down, so electricity needs were compensated by shore power grids.

GOOD JOB GUYS!

Thank you to Roland Reynaud, Hugo Devedeux, Julien Bonnard, Vincent Reynaud, Luc Bourserie, Jean-Baptiste Sanchez, George Conty, David Champion, Didier Bouix, and Marin Jarry.

Many thanks to our partners



Main partners



For Accor, the world's leading hotel operator, Energy Observer is much more than a simple sponsorship operation; it is a genuine opportunity to involve its employees and customers in the energy transition process.

ABOUT ACCOR

Accor is a global leader in hospitality, offering experiences in over 110 countries with 5,600 hotels, 10,000 restaurants and bars, wellness spaces and teleworking areas. The Group deploys one of the most diversified ecosystems in the sector, thanks to more than 45 hotel brands, ranging from luxury to economy, including lifestyle with Ennismore.

Accor is committed to concrete actions in ethics and professional integrity, responsible tourism, sustainable development, solidarity engagement, diversity and inclusion.

Founded in 1967, Accor SA, headquartered in France, is listed on Euronext Paris. For more information, visit group.accor.com or follow us on X, Facebook, LinkedIn, Instagram, and TikTok.

«Energy Observer is a journey full of promises that will help set Accor in motion. Each year, the group consumes more than 400 million euros worth of water and energy. While we have managed to reduce this consumption by 7% in five years, we need to go further, and our partnership with Energy Observer and the CEA-LITEN will help us achieve this. By partnering with Energy Observer, Accor reaffirms its ambition to become a pioneer in energy transition. Advancing faster in the search for new, clean and sustainable energies is the goal of this skills-based partnership.»

Sébastien Bazin
Chairman and CEO of Accor

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Main partners



Thélem assurances, one of the leading mutual insurance companies in France, was already a partner of Victorien Erussard on Défi Voile Solidaires en Peloton. They decided to support the navigator at the start of the Energy Observer project, with the aim of involving its employees and clients in the Odyssey. Energy Observer symbolizes Thélem assurances' strong values, particularly its commitment to environmental protection. A true human adventure drawing its energy from sharing, Energy Observer combines innovation, performance, along with social and environmental responsibility, resonating with the concerns of Thélem assurances, which seeks new solutions to transform the company for the benefit of its subscribers.

ABOUT THÉLEM ASSURANCES

With over 200 years of existence serving our subscribers, Thélem assurances owes its longevity to its constant ability to reinvent itself. Through its mission «Making insurance simple and easy with a human relationship based on co-construction», it expresses its commitment to developing the profession and providing solutions for its policyholders. The relationship with its subscribers is based on understanding their needs, the quality of its contracts and the respecting its commitments. Thélem assurances offers personal, property and liability insurance for individuals and professionals. Its services are accessible through digital and physical distribution channels, including a network of over 300 agencies across France and numerous partner brokers. Thélem assurances also provides insurance offers and services for distribution partners. The company reached a turnover of nearly 453 million euros in 2023, with an over one million contracts and a portfolio of 514,000 subscribers. Its headquarters are based in Chécy, in the Loiret region.

«Seven years ago, we stood by Energy Observer for its launch and the beginning of the Odyssey. I was keen to show that as a company, we are not just payers/investors but contributors to the great challenges of the future. Energy Observer is the first autonomous hydrogen and zero-emissions vessel, both an advocate and a laboratory for the ecological transition. In our insurance business, we also have the civic mission to preserve future generations. We are truly proud to be main partner! But this project is above all a real human adventure. It is the promise to activate the necessary levers and offer a better future for all, especially those whom we support daily.»

Daniel Antoni
General Manager of Thélem assurances

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Main partners



Air Liquide supports Energy Observer, the first hydrogen vessel to travel around the world powered by renewable energies, autonomous in energy, and emitting no greenhouse gases or fine particles.

The Group shares, with the creators of Energy Observer, the desire to develop new technologies to support the transition to a low-carbon society and the development of a hydrogen economy. This approach is fully in line with the Group's sustainable development goals, particularly its commitments to accelerate renewable hydrogen development.

As a hydrogen pioneer, the Group is convinced that hydrogen is an energy transition cornerstone. Over the past 60 years, the Group has developed unique expertise and controls the entire supply chain, from hydrogen production and storage to distribution. Air Liquide is a major player in the supply of low-carbon and renewable hydrogen, especially for industrial uses and clean mobility. Furthermore, Air Liquide is committed to achieving carbon neutrality by 2050, aligning with global efforts to limit climate change.

« Air Liquide is proud to continue to support this scientific and human adventure, and to strengthen this partnership as the Energy Observer continues to evolve. Through the collaboration of our teams with Energy Observer's, and the testing of hydrogen technologies in extreme environments, we will be able to accelerate the development of hydrogen-based solutions and their large-scale applications, in particular in the maritime sector. It is by acting now, as we prepare for the future and develop new models of sustainable mobility, that we will be able to have a positive impact on tomorrow's society. »

Matthieu Giard
Air Liquide Group Executive Committee Member

ABOUT AIR LIQUIDE

Air Liquide is a world leader in providing gas, technologies and services for industry and health. Present in 73 countries with approximately 67,100 employees, the Group serves more than 3.9 million customers and patients. Oxygen, nitrogen and hydrogen are essential molecules for life, matter and energy. They embody Air Liquide's scientific territory and have been at the heart of the Group's activities since its creation in 1902.



Main partners



BPCE Group is the second-largest French banking group. With 100,000 employees, it serves 36 million customers worldwide. It operates retail banking and insurance with its two main networks, Banque Populaire and Caisse d'Épargne, as well as Banque Palatine and Oney. Globally, it also engages in asset management and corporate banking through Natixis. BPCE Group supports its clients in all their projects, be they individuals, professionals, associations, companies of all sizes, local authorities or institutions.

BPCE Group has placed the fight against climate change at the heart of its strategic plan, making its partnership with Energy Observer a natural fit for its ambition to be a major player in energy transition. Beyond supporting Energy Observer as a whole, this partnership will particularly help design and deploy tailored financing tools, thereby boosting hydrogen technology development. This aligns perfectly with BPCE Group's goal to assist its clients in their own transition challenges.

Furthermore, it is an opportunity to raise awareness among BPCE Group employees about climate change issues and to enhance their pride in the actions taken by the Group and its businesses.



Official partners



For DELANCHY Group, the partnership with Energy Observer seals its commitment to being an active energy transition player within the transport and logistics sectors. This partnership aligns with its ongoing sustainable development efforts within its CSR program.

Moving forward without waiting for imposed changes, DELANCHY actively explores technologies and innovations in its vehicles and refrigeration platforms. The Group constructs its own «energy mix» by daily operating trucks that meet the latest standards, 100% electric refrigerated vehicles in urban areas, biofuels, and gas and biogas vehicles. Hydrogen is considered the energy of the future for heavy transport; DELANCHY already operates a refrigerated fuel- cell-integrated Chereau semi-trailer.

DELANCHY's agencies have modern buildings that meet HQE or THQE standards, with environmentally friendly refrigeration systems. Production and self-consumption of green electricity via solar power are becoming standard in new constructions to increase the share of clean energy while reducing CO2 emissions.

The Group embarked on this adventure after meeting Victorien Erussard and his crew during the sporting and charitable challenges of the Solidaires en Peloton – ARSEP association. As a main partner, DELANCHY is also the logistical partner for the land-based teams, organizing various events, stopovers and exhibitions.

TOYOTA

Toyota has been Energy Observer's Odyssey for the Future partner since its christening in Paris on July 6th, 2017.

As a global mobility company, Toyota is an environmentally friendly technologies pioneer and leader. Toyota's global environmental roadmap, the «Toyota Environmental Challenge 2050,» includes objectives aimed at minimizing the environmental impact of vehicles throughout their lifecycle.

Building on its hybrid heritage, Toyota once again pioneered the automobile market in 2014 with the launch of the Mirai, the world's first commercial car equipped with zero-emission fuel cell electric vehicle (FCEV) technology.

In 2019, in preparation for Energy Observer's Atlantic and Pacific Ocean crossings in 2020, Energy Observer and Toyota worked closely to introduce Toyota's advanced fuel cell technology into the boat. Toyota Europe's technical center specifically developed a fuel cell system using components first introduced in the Toyota Mirai, integrating them into a compact module suitable for marine applications – offering more power and efficiency, as well as high reliability.



In 2021, Triangle Intérim Solutions RH joined the Energy Observer adventure as an official partner. Specializing in personnel recruitment for 25 years, the Group is firmly focused on more responsible employment, aligned with sustainable development. Providing credible alternatives to fossil fuels is a crucial societal challenge that resonates with Triangle Intérim Solutions RH. Energy Observer, as an ambassador of the energy transition, met with leaders and industrialists worldwide during its Odyssey, triggering concrete projects. This tangible impact on societies is what attracted Triangle Intérim.

The development of new energies that reduce carbon footprint is also a source of job creation. The currently booming hydrogen sector is paving the way for numerous professions such as maintenance technician, pipefitter or electrical technician.

As a recruitment company at the forefront of short-term industrial needs, Triangle Intérim Solutions RH aims to be a pioneer of this high-demand sector. It trains and recruits temporary workers to meet the needs of today and tomorrow. With a network of over 250 employment agencies, including 190 in France, the Group meets the operational needs of more than 30,000 client companies each year.

Qair

Energy Observer and Qair share a common ambition: to accelerate energy transition. Becoming an official partner of a technological, innovative and human project was a natural fit for an international and versatile group committed to studying and preserving the marine environment in which it operates.

Founded over 30 years ago by a former merchant marine captain, Qair is an independent renewable energy producer with 1GW of assets in operation and construction. Its 300 employees develop solar and wind projects (both onshore and offshore), hydroelectric projects and green hydrogen production projects in Europe, Brazil, Africa and Asia.

As a marine renewable energy player, Qair is a pioneer in floating wind technology, developer of the first French pilot farm Eolmed, winner of 2GW offshore wind projects in Scotland in 2022, candidate for the offshore wind tender in South Brittany, and developer of a tidal energy pilot project at Raz Blanchard.

Qair will bring to the project its international vision and multi-local approach to specific territories with varied resources, as well as its expertise in developing responsible energy production ecosystems.

GUYOT environnement

GUYOT environnement embarked on the Energy Observer adventure in 2022, becoming an official «Circular Economy” partner. An innovative player in recycling and committed to the energy transition, GUYOT environnement has chosen to partner with Energy Observer in their research and development projects for the circular economy and decarbonizing transport. Ultimately, GUYOT environnement aims to decarbonize its maritime transport, just as it has done with its road transport.

For over thirty years, GUYOT environnement has placed the environment at the heart of its strategy, striving to provide alternatives to fossil fuel use. It transforms non-recyclable waste into fuel and aims to produce its own energy for autonomy. Energy autonomy is a key objective of Energy Observer: consuming only what can be produced, achieving maximum efficiency, thus gaining energy independence.

Already committed to the «zero emissions» goal for truck mobility, GUYOT environnement is keen to be heavily involved in Energy Observer’s new project, developing solutions for decarbonizing maritime transport. GUYOT environnement is particularly demonstrating its support in the research and development for the construction of this cargo ship until 2024, and is also investing in the green hydrogen sector at one of its sites.

By joining this initiative, GUYOT environnement not only supports the sustainable efforts of Energy Observer but also aligns with its long-term goals of environmental preservation and innovation in energy solutions.



Chart Industries, one of the global leaders in solutions for clean energy and industrial gas markets, became an official partner of Energy Observer in June 2024.

«We look forward to collaborating with Energy Observer and the rest of their partners to decarbonize maritime transport while demonstrating the viability and potential of hydrogen as a marine fuel.»

Jill Evanko
President and CEO of Chart Industries

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