PRESS KIT

ENERGY OBSERVER

The first hydrogen vessel
around the world

Main partners

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A WORLD PREMIERE

Already 10,326 nautical miles covered by Energy Observer. Having set out from Saint-Malo in June 2017, the first hydrogen vessel around the world has made 33 stopovers and has been to 14 countries, navigating in France and the Mediterranean with no emissions of greenhouse gases or fine particles. The mission of this world tour, led by Victorien Erussard and Jérôme Delafosse, is to test the energies of tomorrow under extreme conditions, while navigating toward concrete solutions for the planet.

A rich double mission which has, for the first time, enabled us to use the innovative technologies onboard. But also to produce and distribute a series of 8x52 minutes documentaries tracing the first miles of the Odyssey from Saint-Malo to Tel Aviv, by way of Venice, the Greek islands, and Tunisia : « *Energy Observer, the Odyssey for the Future* ». A journey of 33 stopovers in 14 countries to measure on the ground the real impact of climate change, but, above all, to discover sustainable innovations to save our ecosystems.

Returning to Saint-Malo, its home port, the vessel will undergo important changes to be ready for its next challenge: Northern Europe.

On the program: increasing the surface area of solar panels, optimizing the thermal storage, and, especially, the installation of a breakthrough technology in wind propulsion: two rotating, self-supporting, 100% automatic Oceanwings® which will enable both an increase in the vessel's speed and the production, while sailing, of hydrogen by electrolysis of sea water. A technology that has never before been tested on the scale of such a large boat, and which could revolutionize maritime transport of the future.

Energy Observer will set off again in March 2019 to Antwerp, its first stopover keeping a permanent focus on innovations in renewable energy and the exploration of real solutions through the lens of the UN's Sustainable Development Goals, for which it is the first French ambassador.

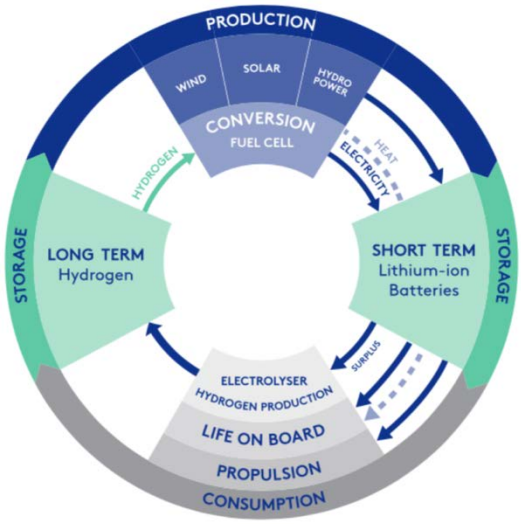
SUMMARY

INNOVATE: THE FLOATING LABORATORY OF ENERGY TRANSITION

Prefiguring the energy networks of tomorrow

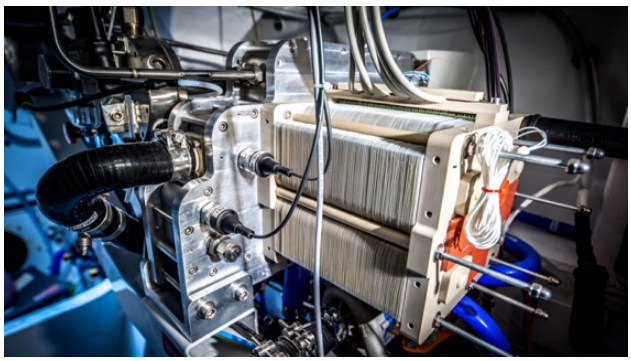
A reconditioned former legendary racing boat, Energy Observer is now a veritable experimental platform for future energies. With a combination of three sources of renewable energies (sun, wind, hydro-kinetic) and two forms of storage (batteries and hydrogen), it is a symbol of an energetic revolution already moving ahead, adapted to all territories and all latitudes.

The vessel's mission is to test these cutting-edge technologies in extreme conditions, to allow concrete feedback of experience on this intelligent energy system. That's why, after each sailing campaign, the vessel returns to its base to optimize and upgrade its high-tech systems.



An ambassador for the hydrogen revolution

Hydrogen is the most abundant chemical element in the universe. Inexhaustible, it displays exceptional energy density: it releases up to 4 times more energy than coal, 3 times more than diesel and 2.5 times more than natural gas. Its combustion emits neither greenhouse gases nor fine particles.



The 26kW fuel cell

Hydrogen storage tanks

Its potential is, therefore, immense, and in terms of energy transition, it opens up a significant field of possibilities. Because it is most often combined to other elements, we need to learn how to extract it at minor costs in a decarbonised manner without using fossil energies.

Thus, Energy Observer is the first vessel in the world that is capable of producing its hydrogen on board using sea water, by electrolysis.

By undertaking an autonomous world tour thanks to this innovative energy system, Energy Observer is demonstrating the performance of hydrogen to decision makers, companies and citizens, in order to promote its large-scale deployment in the decades to come.

Already 10,326 nautical miles and 16 months of experience on the counter

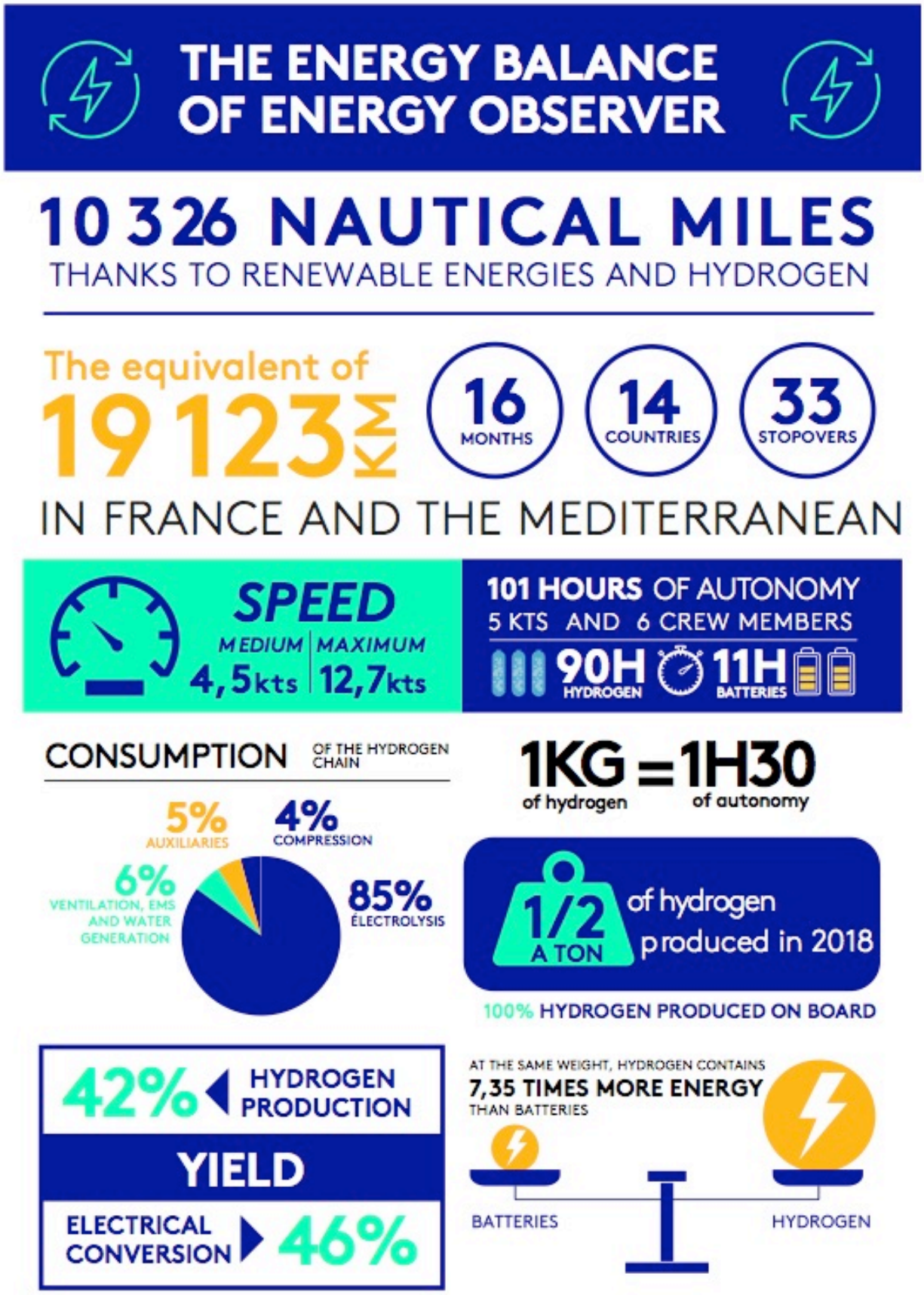
After 16 months at sea between trips and ports, it's now time for the first evaluation of this laboratory of future energies. The energy system designed on board presents a unique assembly of technologies, made possible through the help of numerous technological and operational partners. Each of these building blocks was evaluated through the prism of 3 essential criteria: **performance, lightness, and efficiency.**

Throughout the Mediterranean navigations, solar energy showed itself to be the best friend for the team for recharging the batteries. The hydrogen production chain played its role to perfection of prolonging autonomy, theoretically permitting 3 days and 18 hours (90 hours) of self-sufficiency.

During its stopovers, Energy Observer produced a total of 488 kg, almost ½ ton of hydrogen, during 1496 hours of functioning, that's an efficiency of 42%. Hydrogen supplied up to 60% of the energy needed for a typical voyage, and the remaining 40% was attributed to solar power, using a fuel cell functioning on average for 6 of each 24 hours of navigation, with an efficiency of 48%

By including onboard two means of storage, batteries and hydrogen, Energy Observer proves by itself the advantages of hydrogen in both terrestrial and maritime mobility: **for equal weight, hydrogen storage contains 7.3 times more energy than battery storage**!

A positive assessment for sailors and engineers, who are hoping to use their experience to optimize the performance with the installation of new technological building blocks destined to make the vessel even more efficient.


THE ENERGY BALANCE OF ENERGY OBSERVER
10 326 NAUTICAL MILES
THANKS TO RENEWABLE ENERGIES AND HYDROGEN
The equivalent of
19 123 KM
16 MONTHS
14 COUNTRIES
33 STOPOVERS
IN FRANCE AND THE MEDITERRANEAN
SPEED
MEDIUM 4,5kts
MAXIMUM 12,7kts
101 HOURS OF AUTONOMY
5 KTS AND 6 CREW MEMBERS
90H HYDROGEN
11H BATTERIES
CONSUMPTION OF THE HYDROGEN CHAIN
5% AUXILIARIES
4% COMPRESSION
6% VENTILATION, EMS AND WATER GENERATION
85% ELECTROLYSIS
1KG = 1H30
of hydrogen
of autonomy
1/2 A TON
of hydrogen produced in 2018
100% HYDROGEN PRODUCED ON BOARD
42% HYDROGEN PRODUCTION
YIELD
ELECTRICAL CONVERSION 46%
AT THE SAME WEIGHT, HYDROGEN CONTAINS
7,35 TIMES MORE ENERGY
THAN BATTERIES
BATTERIES
HYDROGEN

A CROSSING

ZERO EMISSION - ZERO FINE PARTICLE - ZERO NOISE

LEVANT ISLAND, FRANCE ▶ MAHON PORT, MINORCA

6 CREW MEMBERS

DISTANCE
241,93 NAUTICAL MILES

DURATION
49H51 MIN

SPEED
MEDIUM 5,12kts | MAXIMUM 9,2kts

CLOUDINESS
Medium 70%

REAL WIND
Average speed 11,3kts
Maximum speed 33,7kts

WAVES
Average height 2,5m
Average angle 135° starboard side

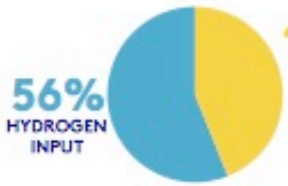
CONSUMPTION
TOTAL 503,41 kWh

63,65kWh
12,7%
LIFE ON BOARD

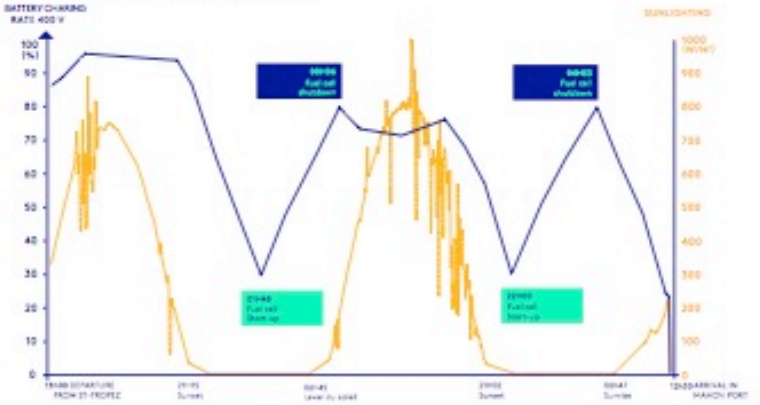
97,15kWh
87,3%
PROPULSION & NAVIGATION DEVICES

PRODUCTION
TOTAL 452 kWh

SOLAR	200,2kWh
WIND	0kWh
HYDROLINK	0kWh
HYDROGEN INPUT	252kWh



ENERGY ROADMAP

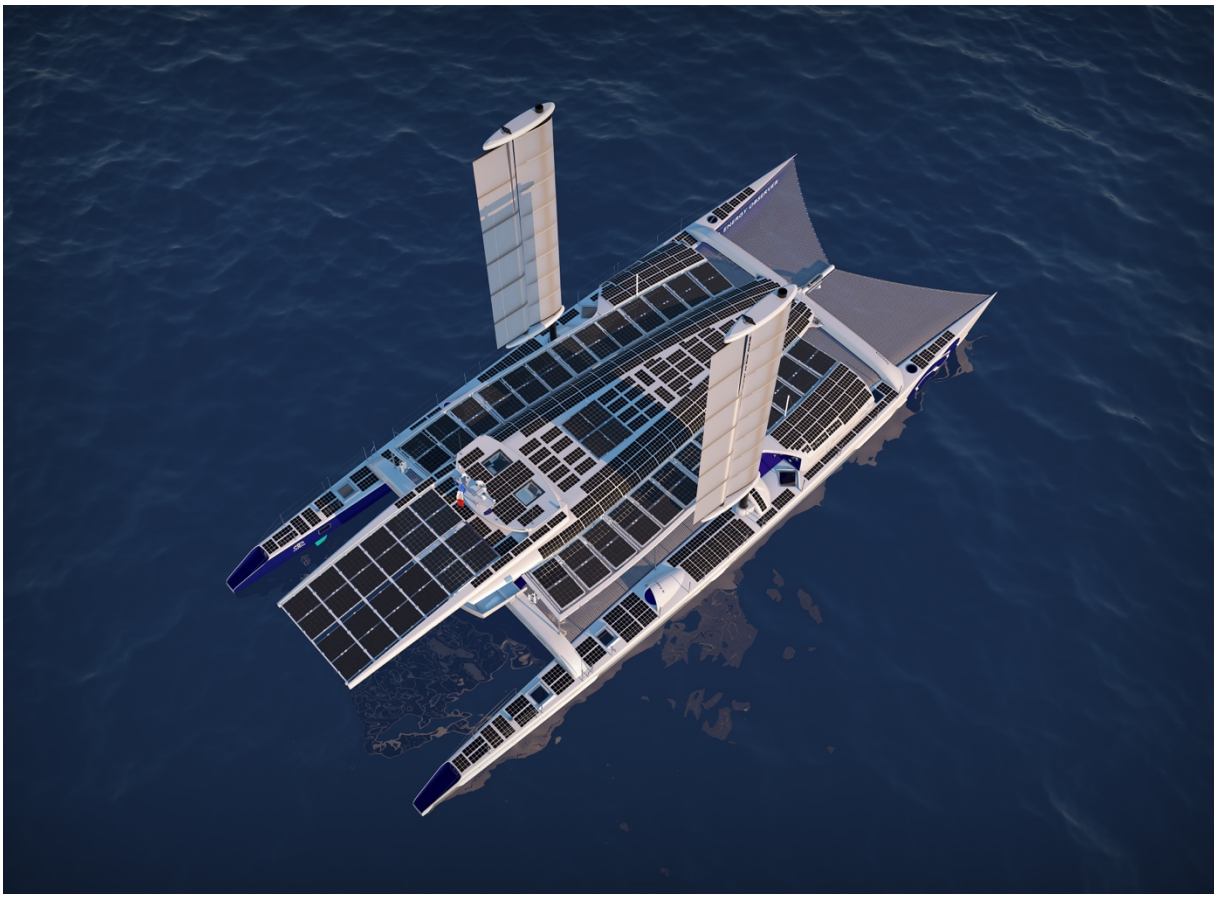


ENERGY OBSERVER AND VPLP, RESEARCHING A UNIVERSAL WIND-POWERED SOLUTION

Although it's an inexhaustible resource at sea, wind is still difficult to exploit for large scale maritime transport.

In its role as an experimental vessel, Energy Observer has set its mission to test all of the available and promising solutions. During its first navigation seasons, Energy Observer experimented with two vertical-axis wind turbines for production, and a traction wing to reduce energy consumption.

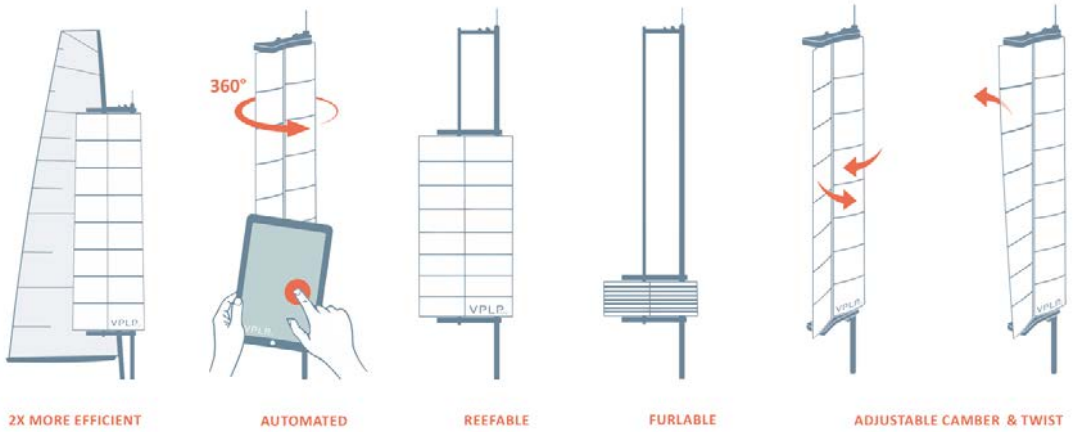
In 2019, the vessel will test a completely new system combining the advantages of the former system with a new one: a wind propeller. The Oceanwings wings® are going to reduce the vessel's energy consumption, accelerate its speed, and above all, enable it to produce energy and hydrogen while navigating.



12-meter wingspan

The Oceanwings® are the largest to be tested to date. They are the fruit of a concept patented by **VPLP Design** co-developed in partnership with **CNIM,** where they are assembled. Energy Observer will, thus, enable a unique experience feedback for the future of maritime transport. With a surface of 31.5 m², each wing is self-supporting and has a rotation capacity of 360°.

VPLP Design gets its inspiration and experience from the rigid wings of the America's Cup whose aerodynamic efficiency is superior to traditional sails. One fundamental reason has, however, limited their development: precisely their rigidity. Up to now, they have lacked the ability to reduce the surface area, in other words their reefing and dumping capacity, as in a classic rigging.



With Oceanwings®, VPLP Design hopes to offer a simple solution to overcome this obstacle and generalize the use of rigid wings. "***We want to propose a wind-powered propulsion system that is sure, simple, and can be automated***, says Marc Van Peteghem. ***We've therefore developed a concept of sustainable and reefable rigging, based on the aerodynamics of the multi-element profiles of the Cup***. "

Thanks to Ademe, a complete functional prototype with a wingspan of 8 m permitted validation of the wing feasibility, making the systems more reliable, and to complete the navigation surveys on the performance prediction models (VVP) developed internally.

In fact, it was while navigating on the prototype with Marc Van Peteghem, during Energy Observer's Odyssey for the Future, that this technology won Victorien Erussard over.

For the first stage they'll be covered with *Hydranet*, a resistant fabric that can painted or varnished.

A performance multiplier for Energy Observer's energy mix.

On board Energy Observer, the Oceanwings® won't only serve as part of the rigging, they will actually increase the vessel's energy efficiency. Their installation on the vessel's two floaters will in fact allow it to:

- Increase the speed, by complementing the electric motors
- Reduce energy consumption when they are used to compensate the electric motors
- Increase energy production during navigation by producing hydrokinetic energy (reversing the electronic motors into hydrogenerators)
- Produce hydrogen during navigation by the electrolysis of water

This is one of the main breakthroughs for Energy Observer. Up until now, hydrogen production was only possible during stopovers, but the installation of Oceanwings® will make hydrogen production possible while the vessel is navigating. It will only be for 1 to 2 hours a day in the beginning, but introducing hydro-generation by inverting the electric motors is an indispensable power supplement in Northern Europe where the sunlight conditions are not as favorable.

Up to a 42% decrease in energy consumption for global maritime transportation

The installation of Oceanwings® on board Energy Observer is the first step to reducing the environmental impact of maritime transportation around the world. According to simulations carried out on a large range of boats, the results are extremely promising: **from 18% to 42% less energy is required**. An important statistic when one recognises that 90% of global commerce is transported at sea. Maritime transportation is also responsible for large quantities of air pollution, emitting into the atmosphere pollutants such as fine particles, nitrogen oxide (NOx), and sulfur oxide (SOx).

***"Beyond pure technology that we are eager to test onboard as the system appears efficient and automated, I strongly believe that these wings can be a real technological breakthrough in the reduction of energy requirements of merchant vessels. Associated with hydrogen, it's a winning combination for clean maritime transportation"*,**
raved Victorien Erussard, founder and captain.

A solution intended for industrialization

The Oceanwings® approach is based on a logic of cost-efficiency and eco-responsible design. If wind-powered propulsion allows a double-digit reduction in fuel consumption, it would not need a dedicated crew member; automation of the rigging is unavoidable. Industrialization, considered from the design stage, allow the proposal of this technology at a price comparable to a high-performance rigging. For professionals, it will quickly pay for itself.

Other optimizations are also planned aboard Energy Observer

- **Increasing the surface of solar panels with**

An added 27m² of supplementary panels, increasing the total surface from 141 to **168 m²** for a maximum potential of **28 kWc**. These panels will basically be cells encased in flexible, conformable and anti-slip panels, the same type of panel that can be placed on any vessel deck.

- **Optimization of thermal storage**

Upgrading the intermittency of 3 heat storage means (fuel cell, electrolyser, and converter) to reach **20 kWh** to heat the central nacelle and produce hot water. And therefore further reducing the overall consumption onboard.

EXPLORE : ODYSSEY FOR THE FUTURE

The Energy Observer adventure is also synonymous of a historic Odyssey during which pioneers innovate to save our planet by reinventing agriculture, energy, economy, transportation, and by finding solutions to protect the biodiversity. These are positive and concrete innovations that are already in place, proving that another world and another future are dawning.

Already 33 stopovers and 14 countries

The crew will return to sea in March 2019, heading towards Antwerp, the first stage of the Northern Europe tour. Welcomed by **the Belgian Maritime Company and the Port of Antwerp**, the visit will be classified as a sign of maritime transport of the future and will be accompanied by the integral village.

The explorers of the future

The leaders of the expedition

One is an offshore racer, the other an explorer, Victorien Erussard and Jérôme Delafosse both travelled the planet and witnessed the urgency to protect it. United by a common passion for the ocean, and a strong will to act, these two sailors from Saint-Malo, have set up one of the greatest expeditions of the 21st century: Energy Observer's Odyssey for the Future.

Victorien Erussard
Founder and captain

· 10 years as on offshore racer
· 1 Route du Rhum
· 4 Transat Jacques Vabre
· 3 podiums over 6 transatlantic races
· 3 F-18 French championships titles
· 2 Transat Quebec-Saint-Malo... one without rudder
· 1 year expedition in the South Pole
· 80 partners reunited around the sailing challenge, Défi Voile Solidaires En Peloton

Jérôme Delafosse
Expedition Leader

· 23 years of ocean exploration
· 20 000 hours underwater
· 10 years of broadcasting on Canal +
· 1 sunken palace of Cleopatra discovered
· 2042 days of shooting
· 800 dives with sharks
· -1000 metres in a submarine
· 62 countries visited
· 2 novels and 500 000 copies sold

The sponsors

“Energy Observer, the first hydrogen vessel to sail around the world, is more than a boat. It is a demonstrator and a solution sensor. It creates a future that is already here. This is a long-term evolutionary project that generates a wave of positive energy, an incredible showcase for ecological and solidarity transition innovations.”

Nicolas Hulot,
Founder of the Foundation for Nature and Mankind

"The world of energy is today going through a real revolution by integrating more and more renewable energy with different vectors: electricity, hydrogen, heat. Connecting these streams is a real challenge and even more ambitious at the scale of a vessel. Energy Observer is a forerunner of what tomorrow's energy networks will be on land."

Florence Lambert
CEA – Liten Director

The first ambassador of Sustainable Development Goals

OBJECTIFS DE DÉVELOPPEMENT DURABLE

Openness to the world, maximization of hope-bearing solutions, knowledge and experience sharing are thus at the heart of the project, all responding to the need for an ecological and solidarity transition.

That is why the Minister for ecological and solidarity transition is delighted to board Energy Observer, the first ambassador for sustainable development Goals.

By seeking locally-developed solutions and by maximizing their values, the Odyssey brings together women and men who invent and act to create the world of tomorrow toward achieving the sustainable development goals.

AWARENESS:
A MEDIA FOR THE PLANET

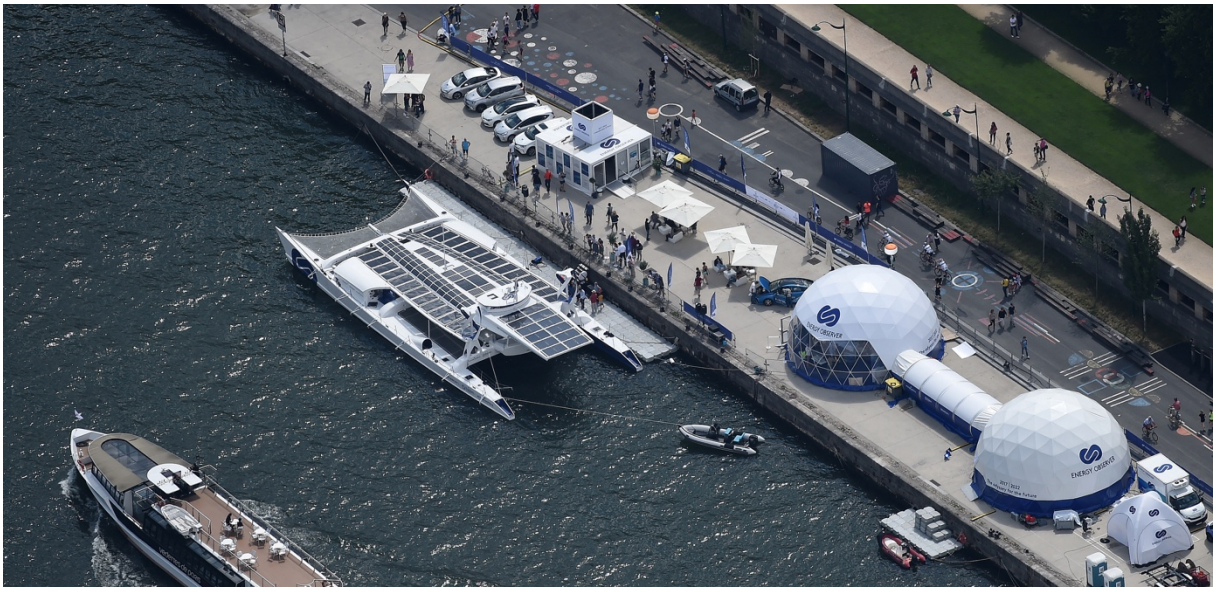
More than a boat, Energy Observer has the ambition to become a media for the public in order to share this incredible adventure from the inside and to raise awareness around the ecological transition:

- A first premium documentary collection of 8x52 minutes, for International broadcast and National broadcast in France, shot in 2017 and 2018 - Planète+/ Canal+ group
- Logbooks to share the day-to-day work of our crew and their meetings with engaged personalities
- A « Solutions » web series focused on pioneers that are constantly innovative for the planet

"Through this new Odyssey, we hope to raise awareness. To prove that man can live in harmony with nature and that ecological transition paves the way to a new economic boom. The promise of a better world."

Jérôme Delafosse, Expedition Leader

During the Odyssey, a travelling village is displayed during the vessels main stopovers to welcome the public free of charge for a unique experience. Thanks to an interactive exposition - virtual reality and 360° projections- it provides a true window into the future. It becomes a meeting place where people can connect and exchange around our shared ambitions in favour of the ecological transition.



BOUND TOGETHER: AN INTERNATIONAL MULTI-PARTNER PROJECT

Faced with the urgency of the fight against global warming, it is necessary to rethink our model of society: shifting the lines for a cross-sectoral collaboration, changing the traditional models of competitiveness, stopping our search for unlimited growth in a world with limited resources...

To address the challenges of climate risks, numerous firms and companies are looking for new models of collaboration. Energy Observer aims at becoming the catalyst they need in order to achieve that goal. In total, 60 public and private stakeholders are committed to making this expedition a reality.

The adventure exists thanks to a financial, technological, and human commitment from a strong group of partners, principally **being AccorHotels, Thélem Assurances, Delanchy Transports**, and **Engie**. Official partners and patrons such as **Toyota** and CCR as well as several official supporters like **Air Liquide, Delta Dore, Petit Forestier, Technitoit, Lamotte Immobilier, Sacib and Crédit Maritime**.

Our institutional partners recognize the innovative, political, and international dimension of the Odyssey, which benefits from the official support of the **European Commission**, with **UNESCO, IRENA** and the **Ministry of Ecological and Solidarity Transition included among its partners**.

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