## Energy Observer



# Press kit



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## 1 - Presentation

The Energy Observer project was born in 2013 from the commitment of Victorien Erussard, merchant navy officer and ocean racer". Aware that. Aware that it is now vital to commit to the planet, he gathered around him a complementary team a complementary team of sailors, scientists, engineers and reporters to create the first self-sufficient vessel capable of drawing its energy from nature whilst also preserving it.

The dream became a reality 4 years later, when the Energy Observer vessel was launched for the first time. Developed from a legendary multiple award-winning catamaran, Energy Observer is a laboratory for the ecological transition designed to push back the limits of zero-emission technologies. Hydrogen, solar, wind and water power, all the solutions are experimented with, tested and optimised here with a view to making clean energies a practical reality that is accessible to all.

Criss-crossing the oceans in a bid to get out and meet those who are coming up with sustainable solutions for the planet every day, Energy Observer has become a movement, a round the world Odyssey, where every stopover is an opportunity to learn, to understand and to share the different energies.

Energy Observer has received the High Patronage of Mr. Emmanuel Macron, President of the French Republic. French ambassador for the UN's Sustainable Development Goals, supported by the Ministry for the Ecological Transition, Unesco, the European Union, Irena and Ademe.

© Energy Observer Productions - George Conty



### The mission of Energy Observer

## Innovation to accelerate energy transition

Energy Observer is a laboratory where engineers, researchers and scientists are developing innovations, which will make renewable energies a reality for all. With this in mind, they put to the test the latest, cutting-edge technologies in terms of hydrogen, batteries, solar and wind power and hydroelectricity production in the most demanding and at times hostile environment known to man: the ocean. These are tried-and-tested technologies optimised over the course of a voyage spanning more than 30,000 nautical miles. The variety and diversity of renewable energies are central to resilient zero-carbon energy systems developed by our engineers with the support of our manufacturing partners. The development of reliable, sustainable, noise-free, affordable energy solutions forms the nub of the challenges faced by this odyssey.

## A journey of exploring into the initiatives changing our world

The Energy Observer adventure is also a historic 7-year Odyssey to meet the pioneers who are innovating to save the planet by reinventing agriculture, energy, economy, mobility, and by finding solutions to protect biodiversity. Positive and concrete innovations that are already working and show that another world and another future is possible. As the first French ambassador of the 17 Sustainable Development Goals set by the UN in 2015, Energy Observer carry France's message on the need to preserve the planet everywhere in the world.

## Raising awareness among all audiences

At each stopover, the team meet women and men who are carrying out local and replicable projects. "Energy Observer Solutions" is the showcase for this ecosystem of committed players around the world, thanks to short films broadcast freely on a dedicated platform. The Ministry of the Ecological Transition, Ademe, the International Association of Universities, Unesco and SDSN support the project in identifying pioneers and solutions around the world.

Furthermore, at each major stopover of this Odyssey, the team is deploying an open-access exhibition village designed to raise awareness among all audiences of the challenges of the energy and ecological transition. Families, students, elected officials and local industrial decision-makers, all are invited to dive into the Energy Observer adventure of playful and immersive way. This travelling exhibition welcomes each year nearly 100,000 people.

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© Energy Observer Productions - Jérome Delafosse
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# 2- 2017 – 2020 The Odyssey's key figures

## 4 years of sailing

France, 2017
Mediterranean, 2018
Northern Europe, 2019
Atlantic, 2020

28 visited countries

## 1 transatlantic crossing

in energy autonomy

1 sailing
0 emissions
0 fine particles
0 noise

beyond the Arctic Circle

+ 30 000 nautical miles travelled

63 stopovers of which 15 with the exhibition village 5

300 000 visitors welcomed in the village

13 documentary films produced

## 60 episodes

of the Energy Observer Solutions web series

## more than 230 videos

on our YouTube channel

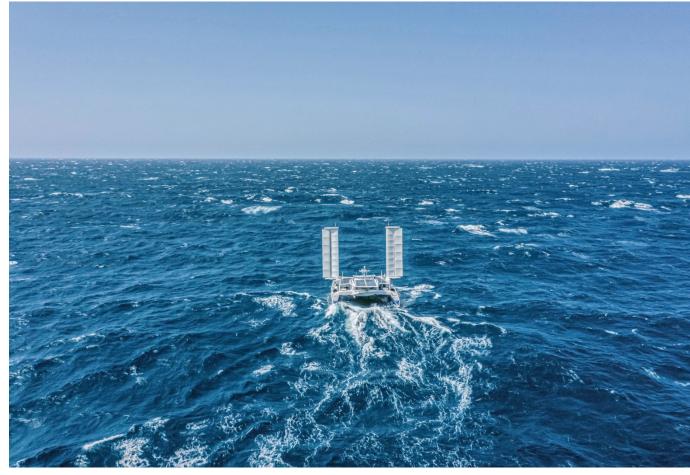
## 3 - Focus on 2020

# More than 10 000 nautical miles thanks to renewable energies and hydrogen

In an uncertain global context due to the Covid-19 pandemic, the 2020 program of the Odyssey had been completely revised, with the iconic stopovers, notably in Tokyo during the Summer Olympics or on the Californian coast, postponed to 2021. These events did not prevent our experimental vessel and its crew from continuing its documenting and research missions, while adapting to health directives day after day.

In 2020, the vessel made the longest sailings in her history with her first transatlantic crossing and the exploration of overseas territories as far as French Guiana, covering more than 10,000 nautical miles. And the year 2021 will see even more ambitious crossings!

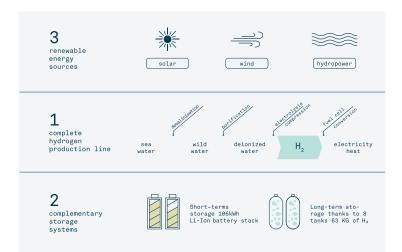
A performance achieved thanks to the total energy autonomy of the onboard systems, an example of resilience that is particularly well suited to the current situation and reassuring for the continuation of the Odyssey.



© Energy Observer Productions - George Conty

## A reliable energy mix

On board technologies, combining multiple sources -solar, wind and hydropower- and forms of storage, batteries and above all hydrogen, are the forerunners of tomorrow's smart energy grids, which can be reproduced on a large scale, everywhere and for everyone.



#### Hydrogen, the keystone of the Energy Observer system

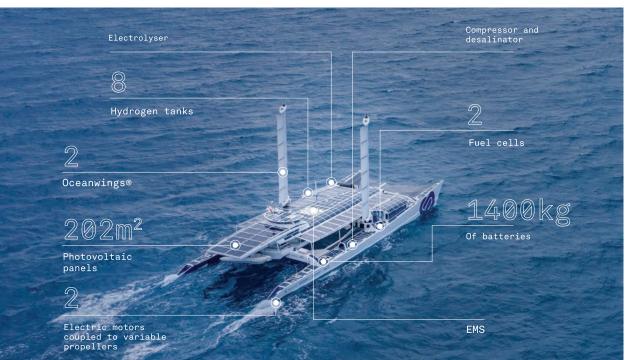
To date, hydrogen is the best ally of the renewable energies. The most abundant chemical element in the universe, light and with an energy density three times higher than traditional fuels, it allows the storage of surplus renewable energy and makes it possible to offset their intermittency. If Energy Observer stored her energy only with traditional batteries, it would weigh twice as much!

Today, the 63 kg of hydrogen stored on board provides 2 MW of electricity, i.e.

the average consumption of a household of 4 people for a month. While maritime and land mobility meet ever-increasing demands for power, speed and reliability, hydrogen is currently the only energy carrier that offers a credible alternative to fossil fuels without impacting the environment.

By testing an energy system based on a mix of renewable energies and hydrogen produced on board this ship, Energy Observer is paving the way for multiple land and maritime applications that can be replicated at the level of a user, a neighborhood or even an entire city.

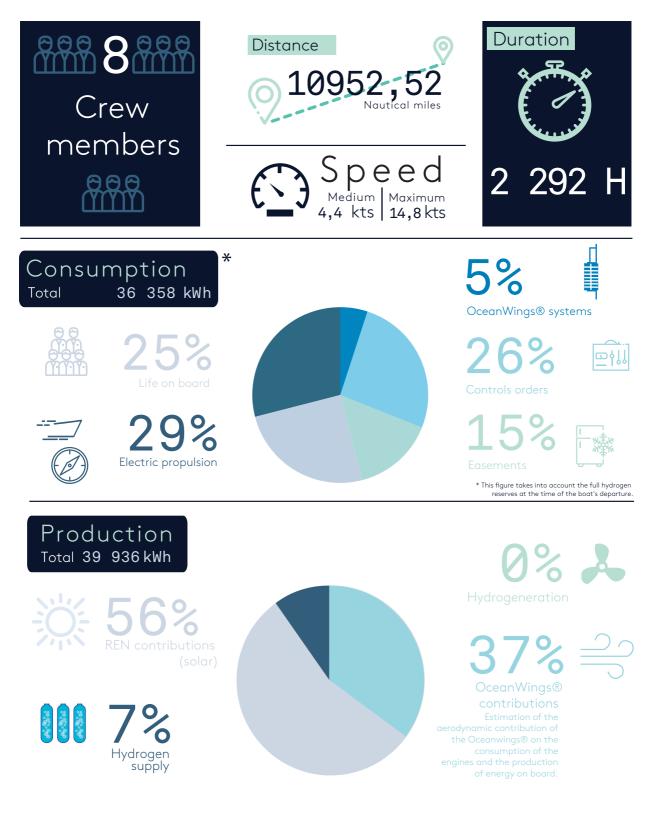
© Energy Observer Productions - George Conty



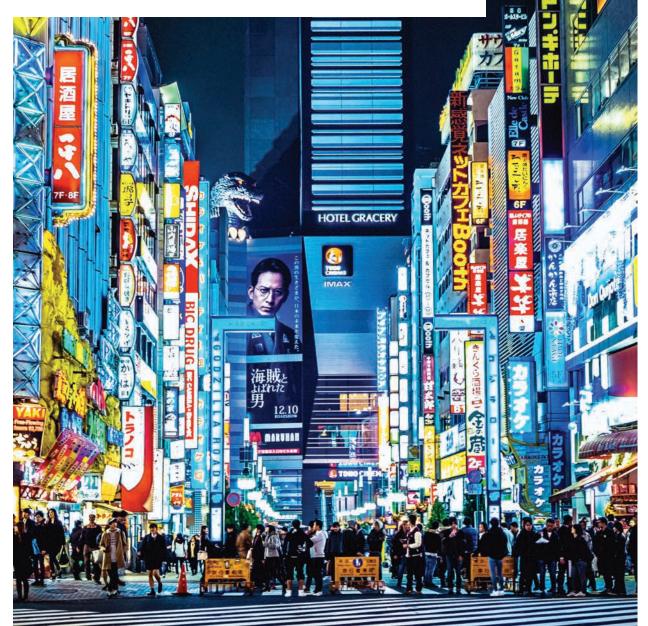
# 2020 ENERGY BALANCE Zero emission - Zero fine particle - Zero noise

March 2, 2020 🕨

December 16, 2020



4 - The Odyssey through to 2024: from Tokyo to Paris via Dubai, amidst a series of planetary events





© Energy Observer Productions - George Conty

## A short optimization refit

The 5th optimisation refit, which took place in Le Marin, in Martinique, was geared around preparing the boat and her systems for some even longer passages, including including Pacific.

The first task involved the simplification and optimization of the hydrogen chain using the high-performance REXH2®, developed by EODev in collaboration with Toyota, which proved its worth over a 2020 route that spanned more than 10,000 nautical miles.

Note that the REXH2® fuel cell - compressor – inverter set, installed back in 2019, boasts a maximum power output of 60 kW (though it is operated at around 50% of its potential to optimize its output). Its reduced weight and its compactness, teamed with a level of reliability that has been tried and tested on thousands of cars and heavy goods vehicles, mean that a whole array of new applications can be considered.

The variable-pitch propellers, installed in 2019, have also been the subject of extensive studies into performance and corrosion, whilst some of the photovoltaic panels have undergone maintenance. Indeed, the tropical conditions experienced since last summer have enabled the team to work on some innovative encapsulation systems for the flexible solar panels, which have been severely put to the test by the temperatures and the significant UV radiation.

Finally, this latest refit has enabled Energy Observer to finalize the training up of a new systems engineer, Vincent Reynaud, who now forms an integral part of the crew.

## The sailing program



The boat set sail again on February 3rd to cross the Panama Canal in mid-February, which links the Atlantic and Pacific oceans and where nearly 14,000 boats pass through each year.. A 10-day passage will then take her down to the Galapagos Islands, a Unesco biosphere reserve which greatly inspired Charles Darwin's theory of evolution, in order to document a unique ecosystem through a series of films.

© Panama Canal

Unesco has been partnering Energy Observer since 2016 with the joint aim of promoting and raising awareness about sustainable energies and channelling their energies to work towards the protection of the oceans and biodiversity. The partnership integrates the activities of the <u>Intergovernmental Oceanic Commission</u> <u>a</u> in terms of ocean science and <u>The Man and the Biosphere Programme (MAB) <u>a</u> in terms of biodiversity, which celebrates its 50th anniversary in 2021.</u>

#### Bound for California and Tokyo, during the Olympic Games

Following this 15-day film shoot, health conditions permitting, the crew will embark on a month-long sea passage to reach Los Angeles, in California.

This region, considered for a long time to be the final frontier, is today demonstrating a remarkable pioneering spirit in terms of energy and ecological transition, in a country largely fuelled by hydrocarbons.

With its megacities, its oil-producing tradition and its water stress, the State of California is particularly exposed to climate change, large fires and the saturation of air particles. This is why it has changed course and is now investing heavily in sustainable solutions with such bodies as the CCI (California Climate Investments), setting the most drastic standards in terms of emissions, as issued by the CARB (California Air Resources Board), to become an international reference. Hydrogen is used widely here along the entire Californian coast, with the highest concentration in the world of cars running on hydrogen (more than 7,000 in 2019) and a target of 5-million zero-emission vehicles in 2030, compared with 350,000 today.

Los Angeles has witnessed the design that is now the first hydrogen-powered lorries, a fuel that's now a regular at normal service stations, and above all it boasts a new generation of entrepreneurs, designers and pioneers inventing tomorrow's world. The largest solar park in the country, Solar Star, features over 1.7-million photovoltaic panels and the State of California has committed to the "100% Clean Economy Act", which plans to switch from 30% to 100% renewable energies by 2045.



© Yirang Ding

After a few days on stopover in the Golden State, the crew will likely link onto a more lengthy sea passage, which is set to include a stopover in Hawaii, en route to Tokyo Bay during the Olympic Games, a showcase for a new hydrogen company. There, Victorien Erussard will have the honour of being among the torch bearers relaying the Olympic flame, the latter being powered by hydrogen for the first time in the history of the event. It is a highly symbolic stage in this planetary event and serves to highlight the latest

innovations in technology and energy.

Japan's infatuation with hydrogen dates back to the seventies, after the first oil crisis, resulting in massive investment in fuel cell technologies from the nineties onwards. Since the Fukushima disaster, the country has been prioritizing hydrogen as an energy vector, for its mobility and for its city of tomorrow, as is evidenced by an array of spectacular initiatives in this direction. Some serious investment has been granted to develop transport and infrastructure based on its use. The country's fundamental strategy unveiled in 2017, together with the road map adopted in 2019, allow for far-reaching diversification in the uses of hydrogen and its massive production to make it competitive when compared against other fuels.

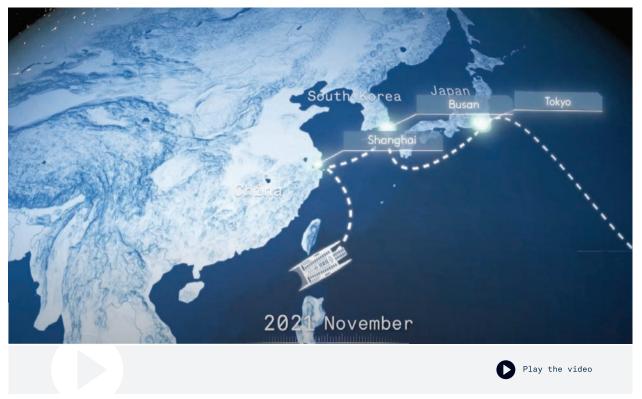
#### From South Korea to China

Energy Observer will then set a course for Busan in South Korea, before rounding off her 2021 Odyssey in Shanghai in China.

China and South Korea are also implementing some very ambitious policies aimed at building a genuine hydrogen society.

China alone is responsible for a quarter of the global greenhouse gas emissions. The main culprits are its electricity production, which still heavily relies on coal, its rampant industrialization and the soaring number of vehicles on its roads. It is within this context that Beijing recently set itself the challenge of achieving carbon neutrality by 2060! This fundamental political objective has translated into several announcements, regulatory actions and industrial developments.

- Initiative one: set some strict standards for manufacturers and encourage the construction of eco parks like the Shanghai Chemical Industry Park (SCIP).
- Initiative two: encourage energy efficiency with systems like the Shanghai Tower's double-skin facade.
- Initiative three: develop public transport.Today, the Shanghai Metro network is the longest in the world and thousands of children already go to school each day via a hydrogen-powered bus...



© YL Motion

In 2018, China was already making a name for itself as the world's primary hydrogen producer. In August 2019, the largest hydrogen fuelling station opened its doors in Shanghai. The station's hydrogen supply capacity is about two tonnes each day for powering fuel cell (PAC) vehicles.

South Korea seems to want to follow suit with its plan for a 'hydrogen economy'. The objective is twofold: to increase the number of fuel cell vehicles on the country's roads to 1.8-million by 2030 — and to 2.9-million by 2040 — and to reduce the country's dependence on fossil fuels and nuclear energy for electricity production. The government also sees it as a response to the atmospheric pollution issues, which South Korea also suffers from.

The installation of stations has been rising for several months. In this way, the country should boast 660 stations by 2030 compared with just 40 in 2020.

As a result, Energy Observer's aim is to introduce the community following its innovations, its journey and its environmental performance to the key innovative initiatives emerging around the Pacific, known today as the 'new centre of the world'. On this side of the globe, from California to China, hydrogen has long been at the heart of all the national strategies and the subject of countless projects.

#### 2022-2024: from Asia to Paris

In 2022, the Odyssey will continue in Asia via Vietnam, Indonesia and Singapore, economic tigers with unashamed growth lamenting obvious climatic fragility. More evident here than in Europe, the climatic pressure on Asian metropolises is becoming unbearable, as is their atmospheric pollution and their dependence on energy. The vessel will then head for the United Arab Emirates on the invitation of the World Expo in Dubai, before making for the Indian Ocean via Reunion Island and South Africa.

Energy Observer will be able to bear witness to the fundamental interrelationship between the 17 Sustainable Development Goals; how can we preserve the biodiversity and quality of waters without guaranteeing everyone access to clean energy?

In 2023, the boat will travel to Brazil, the Caribbean and then America's East Coast, in preparation for a return transatlantic passage from New York, which will coincide with the 78th session of the UN General Assembly. Finally, 2024 will be punctuated by a return to Paris and to France for all the Energy Observer teams, the city of light set to host the planetary games and with it some very ambitious goals in terms of environmental impact!

Energy Observer is hosted by the French Pavilion at the World Expo during the 15 Oceans fortnight to be held from March 18 to 31, 2022.

Her venue is fully in line with the ambitions of the French Pavilion which will testify of French excellence and know-how by promoting its innovations, talents and skills and its assets. The challenge of the Pavilion during the World Expo is also to demonstrate France's commitment to building the future through political, economic, cultural and social initiatives and actions. This commitment will be illustrated in particular in the event programming of the French Pavilion, whose guideline is the achievement of the Sustainable Development Goals (SDGs) defined by the United Nations and for which Energy Observer is the first French ambassador.

© French Pavilion - Dubaï World Expo 2022



"Over the next four years, we're going to witness the development of numerous green hydrogen projects and with them the emergence of some virtuous new solutions. We're convinced that once the boat returns to France, there will be green hydrogen there at an affordable price, which major events like the Olympic Games will be able to benefit from".

Victorien Erussard



## Our program around the world (2017-2024)

2019 Northern Europe 2020 Atlantic 2021 California, Asia 2022 Singapore, Indian Ocean 2023 Brazil and USA 2024 France

## A versatile and complementary team

Aboard the boat, the founder, captain and professional sailors guide this extraordinary vessel's expedition, mechanics, engineers and technicians ensure the on-board systems perform well, whilst the reporters and cameramen document the stopovers and share Energy Observer's encounters with pioneers of change.



© Energy Observer Productions - George Conty



© Energy Observer Productions - Francine Kreiss

## A new Expedition leader aboard

The crew welcomes aboard a doctor in marine biology, Katia Nicolet. Her arrival as Expedition leader will enable the Odyssey to accentuate the scientific content whilst developing expertise on topics related to biodiversity and maritime pollution.

Katia began exploring the globe from a very early age and her curiosity for the natural world prompted her to launch into a career in science. Fascinated by the bounty of oceanic mysteries, she did her PhD in Australia, where she got interested in coralbased disease. During her thesis, she had a direct window onto the impact of human activity and global warming on marine ecosystems.

At the same time as her university studies, she became a naturalist guide and then an expedition leader for the Compagnie du Ponant cruise ship operator, which enabled her to broaden her horizons further. Through her trips, Katia tries to share her scientific knowledge and her love of nature to raise awareness and help to make the transition towards a future which is more respectful of the planet.

# 5 - An SDGs ambassador role strengthened by the development of the Endowment Fund

17 goals, a real roadmap for sustainable development

Appointed first French Ambassador for the Sustainable Development Goals by the Ministry of the Ecological transition, Energy Observer has the mission to promote local initiatives and sustainable solutions for the planet and to raise awareness of the energy and ecological transition.

All over the world, women and men are devoting their energy to the creation of sustainable solutions for a more harmonious world. Energy Observer is navigating its way along to meet them, in order to detect and promote their local initiatives and their actions in terms of the circular economy, responsible consumption, actions in favour of gender equality, reasoned and responsible agriculture, protection of life on earth and aquatic life, etc. This role of ambassador is highlighted through the stopovers, the documentaries and the "Energy Observer Solutions" digital platform, which enables the team to get to the real heart of the matter in terms of solutions and promote these 17 Sustainable Development Goals and their interrelationship. In this way, Energy Observer is are constructing a database of "Solutions" akin to Ariadne's thread this around-the-world odyssey. It is proving to be a positive and inspiring thread, as evidenced by the fact that thousands of protagonists are already working to change the world.



© Energy Observer Productions - Amélie Conty

## Energy Observer Solutions

Energy Observer Solutions is a digital platform launched in 2019, though production began from the very start of the project. It highlights solutions regarding ecological and inclusive transition identified by Energy Observer's editorial and scientific community all over the world and directed by the pioneers who are reinventing tomorrow's world. All these Solutions are being grouped together on the Energy Observer Solutions platform and illustrated through short episodes through the prism of Sustainable Development Goals, in connection with the Ministry of the Ecological Transition, the United Nations Sustainable Development Solutions Network (SDSN) created in 2012 under the auspices of the UN Secretary-General, the International Association of Universities (IAU), Ademe and Unesco. These inspirational and positive 2 to 3-minute videos, whose tone and format are geared around the social networks, are designed to raise awareness beyond the borders about these forces for change by giving visibility to their solutions and their local projects.

## Educational editorial and audiovisual programs

Energy Observer has produced nearly 13 documentaries since its launch:

→ A series of 12 documentaries broadcast on the Canal + Group channels, "Energy Observer, the Odyssey for the Future ®". From Saint Malo to Saint Petersburg, this collection of films traces the lives of the crew aboard Energy Observer and their encounters around the world.

 $\rightarrow$  A 90-minute video was also broadcast in prime time during the COP 25.

This CANAL+ documentary creation was produced by Energy Observer Productions and Upside Télévision and directed by Jérôme Delafosse. Entitled "Energy Observer, les messagers de la Terre" (Energy Observer, the Earth's messengers), it traces both the human adventure and the technological challenges taken on by Energy Observer during her passage from Saint Petersburg to Spitsbergen whilst self-sufficient in energy, and during encounters with committed communities in Europe, Asia, South America and Africa to protect our children's future.

Other science-focused documentaries are expected to emerge and address major societal issues related to energy and biodiversity.

# On-board live and scientific content

Energy Observer also shares live content: log books about the highlights of the Odyssey (life aboard, deciphering of the ecosystems by a scientist or biologist, the making of the film, the boat's technical operation, perspectives on the major world days...), a way of immersing oneself in the daily life of the crew.

This educational content, accessible to all, enables a greater understanding of the key challenges of renewable energies and ecological transition.



© Energy Observer Productions - Francine Kreiss

# 6 - New aims in the fight to combat maritime pollution plus training in the uses for hydrogen



© Energy Observer Productions Francine Kreiss

In addition to the actions to raise awareness about the 17 Sustainable Development Goals, the Group is developing its 'nonprofit' calls for action via its Energy Observer Foundation capital fund. To bolster its impact, three new priority areas now form the nub of its community action.

As they advance, sharing expertise on its developments in the field of sustainable energies, which fuel the zero-emissions energy mix on the self-sufficient vessel, Energy Observer. This will include collaborations and exchanges with university laboratories, researchers and manufacturers via cycles of conferences or groups of experts. Whether this is a question of the economic, environmental and societal impact, innovations in progress or the technological impact in terms of usage, today exchanging ideas to strengthen expertise appears to be a strategic way to enhance the performance and competitiveness of sustainable energies and hydrogen.

Circulating scientific knowledge with regards maritime pollution and piloting research programmes about atmospheric and noise pollution in particular.

In constant motion, the global merchant fleet transports over 80% of merchandise around the world in response to the ever-increasing demand for trade, transport, food and fun. These vessels, together with the intensification of their meanderings, are leading to massive pollution of the marine environment. The 'laboratory' mission based on technological innovations affecting Energy Observer's energy remains key. Today though, given the climate emergency and the research opportunities opened up by a zero-emissions, zero-noise vessel, this has to be coupled with a research mission to help gauge the impact of pollution from boats on ecosystems.

Sharing this know-how on sustainable energies with students and young professionals and training them in the uses of hydrogen in particular. In fact, having built Energy Observer, having tested the on-board innovative technologies and the validated and improved performance, it seemed essential to explain to the students and the relevant professionals each of the innovations, the sustainable energy mix, the role of hydrogen in particular, as well as to prepare them for tomorrow's new professions in this sector. This will involve itinerant theoretical training in mobile form so as to be in a position to move around the whole region. This will also find expression in practical training, so as to be in a position to handle and utilise these technologies as well as understand them.



© Kadeg Boucher

# 7 - A brand new immersive and digital exhibition



Throughout the Odyssey, an itinerant exhibition is deployed during all the main stopovers to welcome the public free of charge and provide them with a unique experience. Through an interactive and educational exhibition, as well as projections, it is a real window on the world of today and tomorrow. It is a place of meetings, exchanges and discoveries on the theme of the energy and ecological transition and has welcomed nearly 300,000 visitors over the last 3 years.

For its 2021 tour, the village has been given a new look. Now equipped with containers, thanks to our partner CMA CGM, and its two geodesic domes, the exhibition will unveil to visitors a brand new route and a new immersive and digital experience.

The visitors' journey is now punctuated by various themes, such as the project's missions, the on-board technologies, the key stopovers, our role as ambassador, as well as the practical applications, which can be developed both at sea and on land. One of the containers is also intended to be historical by combining the histories of energy transition, ecological awareness and awareness of self, together with that of the Energy Observer laboratory in partnership with Ademe.

The objective of this timeline is clear: to show that the development of renewable energies, green hydrogen and the intelligent energy mix is an answer to climate emergency.

© Laurène Blottière

# 8 - An international multi-partner project

In light of the urgent struggle to combat climate change, it is essential to rethink our model of society: to push the envelope in terms of inter-sectorial cooperation, switch the traditional models of competitiveness, halt the quest for unlimited growth in a world with limited resources...

To take up these challenges, many companies are searching for new models for working together. Energy Observer intends to become a catalyst to enable these committed protagonists to realise their projects and really step things up a gear in terms of ecological transition. In total, there are already 60 companies and institutions from the public and private sector, who are responsible for making this expedition possible.

This adventure exists thanks to the financial, technological and human commitment of a solid cluster of partners, the key ones being: Accor and AccorInvest, Thélem assurances, Delanchy Group and Engie. Official partners and sponsors like Toyota and CCR, Strategic partner such as CMA CGM, as well as several official supporters like Air Liquide, Petit Forestier, the BenTouch Group, Lamotte, Chereau and the Crédit Maritime Grand Ouest, are all making a specific contribution and often become a key player in the programme.



© Energy Observer Productions - Amélie Conty

## $\rightarrow$ Project instigator



© Energy Observer Productions Francine Kreiss

#### Victorien Erussard Chairman, founder and captain

As a versatile officer in the merchant navy, he has been sailing on several vessels as far as Antarctica. However, this professional sailor has also graced a series of race podiums over the past 10 years, from the Route du Rhum, to the Transat Jacques Vabre to the Quebec-St Malo. During one of these transatlantic passages, a broken diesel generator in the middle of the Atlantic made it impossible for him to helm his machine albeit surrounded by solar, wind power and hydropower and Victorien realized that the finest victories are those that have some meaning. At that point, he decided to invest his time in the race for smart energy rather than the race for trophies.

## $\rightarrow$ The patrons



© Jean-Sébastien Evrard



© Jean-Sébastien Evrard

«Energy Observer, the first hydrogen-powered vessel to navigate its way around the globe, is more than a boat. She's a demonstrator and detector of solutions. She is shaping a future that is already upon us. It's a long-term evolutionary project, which is creating a wave of positive energy and is a unique showcase for innovations regarding ecological and energy transition.»

Nicolas Hulot Founder of the Fondation pour la nature et l'homme

«Today, the world of energy is undergoing a genuine revolution by integrating more and more renewable energies using different mediums: electricity, hydrogen and heat. Connecting these is a real challenge, which is even more ambitious on something like a boat. Energy Observer is an early indication of how tomorrow's energy networks will be on land.»

Florence Lambert CEO Genvia and former Director of CEA-Liten

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