

## Communiqué - EODDev's REXH2® and HYNOVA Yachts' The New Era exhibited in Monaco

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HYNOVA Yachts and EODDev unveiled on Wednesday September 23rd, 2020, the RangeExtender H2 (REXH2®) solution selected by HYNOVA for the energy supply of its future HYNOVA 40, whose The New Era prototype was introduced to the public at the Yacht Club de Monaco during the Monaco Capital of Yachting Experience event. This presentation came after the conference held on Tuesday, September 22nd, on hydrogen as an alternative to diesel for low-carbon maritime mobility.

Developed from the latest generation Toyota fuel cells, the REXH2® designed by EODDev is part of the industrialization of accessible hydrogen solutions for zero emissions maritime and river mobility. Thanks to hydrogen-electric hybridization combining the use of hydrogen as fuel and batteries "Alternatives Energies", the system is used for both the propulsion of the boat and the operation of onboard systems.

The HYNOVA 40, designed by HYNOVA Yachts in collaboration with naval architecture firm CLYD and EODDev, is the first tender or dayboat in the world running on hydrogen. A 12-m open boat, it is intended to be produced in series from 2021 and received the "Coup de Coeur" award during the 7th edition of the Monaco Solar & Energy Boat Challenge, organized in July by the Yacht Club de Monaco.

The moment when the first electro-hydrogen "dayboat" in the world was revealed on the terrace of the 3rd deck of the Yacht Club de Monaco was quite emotional. Especially for Chloé Zaied, Managing Director of HYNOVA Yachts, but also for the EODDev team, finally able to present to the public the results of the work of its engineers, after the cancellations of the Cannes and Monaco yacht shows. An event all the more significant as HSH the Sovereign Prince Albert II also wished to support with his presence the display of this innovative boat, which marks a turning point in the pursuit of low-carbon maritime mobility and sustainable yachting, challenges that are particularly close to his heart.

### Simple principles, but a complex integration

The launch of the first HYNOVA 40 results from the commitment of many companies in the consortium set up by HYNOVA and EODDev to make its completion possible.

From a technological standpoint, all of the electro-hydrogen hybridization carried out by EODDev around the Toyota fuel cell and its integration on board were the result of collaborative work with EVE System and Alternatives Energies.

Architecturally, the optimization of the hull was carried out with the help of Syroco, whose supercomputers and hydrodynamic engineers improved the efficiency of the whole by nearly 20%, thanks to the addition of foils, when the data related to the integration of new technological elements were relatively unknown.

To put it simply, the HYNOVA 40 is equipped with a fuel cell that transforms hydrogen into electricity. In addition to its very high energy density, hydrogen has a two key benefits: it is an inexhaustible resource whose combustion only releases water, oxygen and heat, which are easily reusable. As a reminder, the first internal combustion engine running on hydrogen dates from 1806, and was invented by a Swiss national, Isaac de Rivaz. The electricity produced is then either used directly to power the propulsion chain via the electric motors, or is stored in batteries which can make it available for propulsion and onboard systems as and when needed. The hydrogen (H2) gas that powers the system is compressed at 350 bar, the standard used by hundreds of buses around the world. The specially designed tanks are integrated into the boat, but on the outer part so as to benefit from direct ventilation.

The HYNOVA 40 will thus have, in this first configuration, three tanks with a total capacity of 22.5 kg of hydrogen, placed on the rear side of the boat, their weight being balanced by the presence of the batteries placed towards its central part, offset longitudinally.

The solution developed by EODDev to meet the specifications of the HYNOVA 40 consists of a REXH2®, designed around the Toyota fuel cell, which can supply up to 80kW, and three LiFePO (Lithium-Iron-Phosphate) batteries of 44kW each designed by EVE Systems and approved for marine use. Finally, two BorgWarner electric motors provide 184kW of power each (or approximately 2 x 250CV in diesel equivalent). The set has been designed to allow the boat, which weighs around 9 tonnes, to reach 26 knots at maximum speed and have a cruising speed of 12 knots. The operating speed limit with the battery alone is 8 knots, with the boat sailing up to 69 nautical miles at 6 knots.

The benefit of the hydrogen-electric combination in comparison with a full electric system, in addition to significant saving in weight and therefore in energy consumption, is to make it possible to manage power needs according to use, relying on constant fuel cell power in "cruise" mode, while being able to instantly get power from the batteries when extra power is needed. The set is managed by an automated Power Management System specifically developed by EODDev, which calculates the remaining range based on use and expected average speed, like in a car.

### Making sustainable technologies accessible to the largest number of users

The hydrogen solutions developed by EODDev have many advantages over traditional power systems, especially diesel, but also "full electric". In addition to its environmental objectives, without emissions or noise pollution, the REXH2® is totally modular to optimize the

response to energy needs, with reduced size and weight, and rapid refueling — the time it takes to fill up a tank of gasoline. The lack of moving parts in the fuel cell allows for simplified and predictive maintenance, for a service life of at least 10,000 hours. Finally, the REXH2® being a "plug and play" solution, it is not necessary to be an engineer specializing in hydrogen to operate the boat. As in modern cars, the system is "connected" and the data of all components is tracked and archived remotely.

#### They said

Chloé Zaied, Managing Director, HYNOVA Yachts : *"I'm proud to be the first company in the world to mass-market pleasure boats equipped with this innovative technology and unique process. I am all the more happy to share this wonderful adventure with EODev, a great partner! HYNOVA Yachts then hopes to be able to contribute to the development of this solution, which fits perfectly with my personal values. In addition to thinking and designing tenders with the least possible impact on the environment, I want to educate and promote the use of green hydrogen for tomorrow's world and make HYNOVA Yachts a beacon lighting up the path towards better behavior. It is a way to participate, at my level, in the ecological transition of tomorrow."*

Jérémie Lagarrigue, Managing Director, EODev : *"Making boats silent and zero emissions is a great opportunity to accelerate the virtuous development of the hydrogen society, because it drives the consumption of several hundred kilograms of hydrogen per day, which in turn promotes the multiplication of distribution points and hydrogen consumption to benefit the environment."*

#### About the REXH2®

With a footprint of barely one cubic meter and a light weight of 300 kilos (excluding chassis), the REXH2® equipped with the latest generation of Toyota fuel cells (FC) is, today, considering power delivered, the most compact and efficient Range Extender on the market. The R&D carried out by the EODev and Toyota teams has made it possible to adapt perfectly to the extreme conditions of the marine environment, to reach powers of 100kW per unit, up to 1MW when they are mounted in parallel. It is this flexibility in the implementation that makes the REXH2® the ideal vehicle for tailor-made hydrogen solutions for propulsion and the supply of carbon-free energy at sea.

#### About EODev

EODev is a subsidiary of the Energy Observer group that develops solutions and technologies to prove that another future is possible, one that will be more respectful of Man and Nature. The company's ambition is to be a key player and an accelerator of the energy transition by offering sustainable, reliable and accessible industrial solutions. The products and solutions developed by EODev are based on the intelligent and optimized use of energy mixes combining ranges of renewable energies, and hydrogen as a means of storage. The company also offers "energy mix" optimization services through its Energy Designer department.  
[www.energy-observer-developments.com](http://www.energy-observer-developments.com)

#### About HYNOVA Yachts

HYNOVA is a French start-up founded by Chloé Zaied, which specializes in the manufacture of boats with electric motors powered by hydrogen. For her, the natural ecosystem is precious and it must be protected. The HYNOVA YACHTS tenders, designed with respect for the environment in mind, are intended as an alternative to diesel in the world of yachting thanks to the use of hydrogen. The construction of these boats is carried out at the shipyards of La Ciotat. The New Era, the name of the "demonstrator" of the HYNOVA 40 model, will test waters at the end of 2020. HYNOVA Yachts received the "Coup de cœur" prize during the Monaco Solar & Energy Boat Challenge 2020.  
[www.hynova-yachts.fr](http://www.hynova-yachts.fr)

