FUELING THE FUTURE

– By Gemma Harris –

FOR ZERO-EMISSION GOALS TO BE REACHED, VESSELS NEED ZERO-EMISSION FUELS TO RUN ON.

The race is on to rid the superyacht industry of fossil fuels. So, what will power yachts of the future? The best clue to what might be coming down the pipeline lies in current innovations and new concepts that are piquing interest. From hydrogen to methanol and biofuels to batteries, there are a lot of contenders for the best alternative fuel source. And for each of these alternative fuel sources, there are various benefits and drawbacks — the main factors being cost, storage and onboard safety.

A promising future for hydrogen appears evident when considering Energy Observer, a sailing catamaran converted into a floating, self-sufficient laboratory of ecological solutions — and the first yacht to both generate and be powered by hydrogen. "To date, hydrogen is the best ally of the renewable energies," according to the project's media sources. Although hydrogen is thought to pose some safety issues, Simon Brealey, lead mechanical engineer at Southampton, U.K.-based Lateral Naval Architects, told *Triton*: "Today we are fully confident that we can engineer a liquid hydrogen-based system to a safety level equal to or better than the current diesel yachts."

The company believes that" the ultimate future of yachting is zero — zero carbon and zero emissions," according to Brealey. "The route to zero is a difficult one with probably a few technological and design steps to get there, but it's clear that we won't be getting close to zero without the use of some alternative fuels. The type of

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alternative fuel depends strongly on the clients motivation, risk acceptance level and the overall requirements of the yacht. Within this spectrum of requirements, the options of 100% electric, methanol and liquid hydrogen all have a part to play, either by themselves or as part of a hybrid power system."

Lürssen's recently launched "Alice" concept uses a fuel cell propulsion system run on methanol. "I think the future propulsion is hydrogen of sorts, either as direct hydrogen, or hydrogen captured in a medium such as methanol," said Peter Lürrsen, CEO of the German shipyard headquartered in Bremen-Vegesack. "We have opted for a methanol-based hydrogen system and a fuel cell to reform the methanol into electrical power."

According to the company, the choice of methanol rather than elemental hydrogen was made because of its higher energy density, its simplicity of handling and easy, worldwide availability — and, most importantly, because methanol can be stored in structural tanks. At the core of the system are fuel cells that generate electrical energy using hydrogen from the reformed methanol and oxygen from the ambient air. The result is noiseless, emissions-free and climate neutral, according to the company.

"My grandfather built the world's first motorboat in 1886," Lürrsen stated. "My dream is to be the first to build a yacht without a combustion engine."

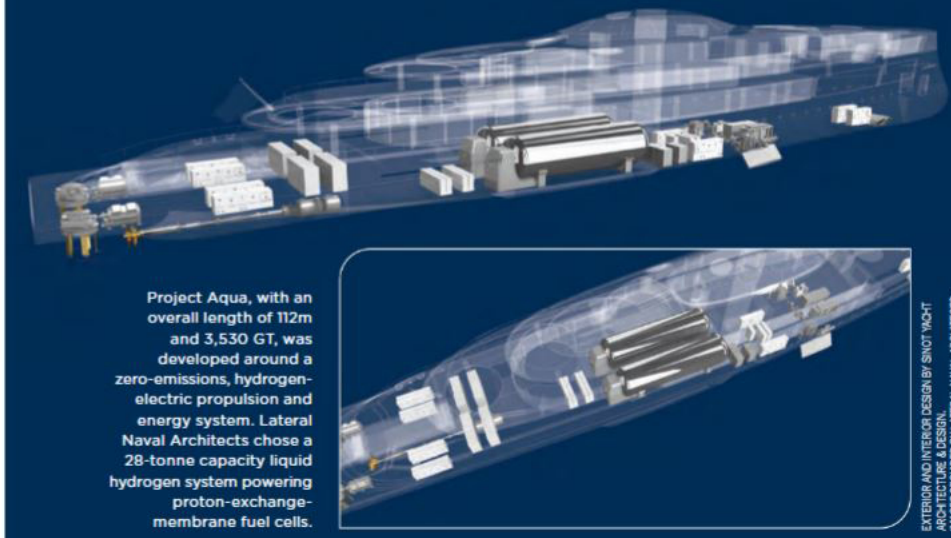
To enable a cleaner future using current engines, biofuels are a potential solution. One company leading the way on this is Gevo. Patrick Gruber, CEO of the Colorado-based company, explained to Triton that "any engine currently running on petroleum-based gasoline could run on our renewable premium gasoline right now. No need for special filters or new fuel systems, just fill the tank and go."

He went on to say that Gevo has great scope for the yachting industry. "We have developed pathways to produce renewable diesel and we expect that, once we produce it at scale, it will adhere to our goals of being a drop-in fuel with net-zero carbon emissions." In terms of sustainability, he said the company chooses to use "renewable, bio-based agricultural feedstocks because it's the sector with the largest potential upside in terms of turning the carbon cycle in our favor."

Another solution, developed by the Berkeley, California-based chemical company Twelve, is what they refer to as "carbon transformation." Using breakthrough technology developed by two doctoral graduates at Stanford University, CO2 emissions are scrubbed from the air and turned into "climate positive" products. At a Marine Research Hub summit during the 2021 Fort Lauderdale International Boat Show, Twelve co-founder and CEO Nicholas Flanders told Triton: "We make many different things out of CO2 that are currently made from oil. For example, we just made diesel fuel out of CO2, water and solar energy. So, you could run a ship with zero carbon emissions, and it would have the same performance as you have now."

The only thing certain about future fuels is that no one alternative option ticks all the boxes. The shipping industry is gaining momentum for a future free of fossil fuel, with technology filtering down to superyachts, but the question is: How ready are these solutions to be implemented? For decarbonization goals to be met, solutions must come quickly. Perhaps one of these companies will produce the silver bullet. ‹

Gevo says its biofuel technology not only produces fuel, but also generates enormous quantities of protein for the food chain. To see how it works, watch this video.



Project Aqua, with an overall length of 112m and 3,530 GT, was developed around a zero-emissions, hydrogen-electric propulsion and energy system. Lateral Naval Architects chose a 28-tonne capacity liquid hydrogen system powering proton-exchange-membrane fuel cells.

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