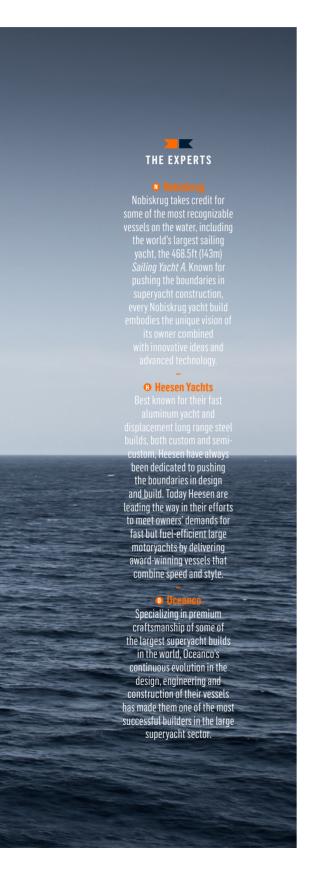
01





A number of shipyards are showing a growing concern for the environment, building yachts with lower carbon footprints and improved fuel efficiency. What "green solutions" do you have in place to build eco-friendly vessels?

- The 262-foot (80m) hybrid superyacht *Artefact* incorporates several new technological and engineering features to minimize its environmental impact. These include 247 square feet (23sqm) of solar panels on the sundeck hardtop, as well as a large battery storage system and a diesel-electric propulsion system developed with ABB. The technology makes her up to 30% more efficient than other diesel yachts of her size. *Artefact* is also one of the first superyachts in the world to meet IMO Tier III emissions regulations.
- At Heesen, we are continually investing in research and development to look at new ways of reducing fuel consumption, using sustainable materials, pioneering progressive hull designs, and developing innovative propulsion systems. More importantly, Heesen are renowned for our lightweight aluminum construction and meticulous weight reduction. The most important steps we can make with regards to fuel savings involve building a lighter yacht.
- We are not only working toward building yachts with lower carbon footprints, we are creating a greener world within our own facilities in The Netherlands. We have undergone major renovations to our outfitting facilities in Alblasserdam. Similar to our 520-foot (160m) dry dock, which opened in 2015, this will also be ecologically enhanced and updated with state-of the-art technologies.

Has your environmental initiative come from your owners or did you embrace the cause?

- In the case of the eco-friendly *Artefact*, it was the owner's desire from the beginning of the project to minimize the environmental impact of the vessel using advanced technology.
- Both. We are always pushing the boundaries of what can be achieved and looking to develop new technologies and smart initiatives within yacht builds that will help to make yachts and the yachting lifestyle more environmentally conscious. However, without owners who are willing to embrace new technologies and implement pioneering innovations on board their private vessels, we wouldn't be able to make the progress that we have seen in recent years. Heesen, as a company, are fully embracing this philosophy, and we are putting all our effort into building more efficient yachts that use less fuel to take our clients further. Both motor yacht *Home* and *Project Electra* the world's first FDHF (fast displacement hull form) with hybrid propulsion were built on speculation. At Heesen, we believe it is our responsibility to bring to the market products that are more respectful of our environment.
- It is a two way street it comes both ways.

Do you believe a yacht can be built that is truly eco-friendly or is calling a superyacht eco-friendly an oxymoron?

- In the future, we will continue to see growth and innovation within propulsion systems and hybrid engines, as well as yachts that possess sleeker, more efficient hull designs. This significantly reduces both costs to the owner and a yacht's carbon footprint.
- There are small yachts built today that are powered entirely by solar or electricity, and that gives us hope that in the coming years the technology applied to these vessels will be transferred to larger superyachts to make them truly eco-friendly. The industry has already seen concepts launched that use hydrogen, wind, electricity, battery and solar energy for propulsion with the aim of building a fossil-free yacht, so while it doesn't as yet exist, we remain hopeful that it won't be long before we see a carbon-free environmentally-friendly yacht on the market. *Project Electra*, which launched in February, is the second of our hybrid yachts at Heesen, which sees two water-cooled DC electric shaft motors of 127kW each quietly power the yacht when in hybrid mode.
- Our 350-foot (106.7m) Black Pearl is a strong testament to greener yachting. As for motoryachts, there are newer technologies becoming available that are making yachting more and more sustainable. Sometimes with incremental change and sometimes with step change - the 357-foot (109m) Bravo Eugenia being a good example. People like to see meaningful innovation and that is what we are focusing on to make an impact on sustainability while at the same time not compromising comfort. Yachts can be greener, but there are rules and regulations that are not always in line with energy reduction and other improvements that can be made to reduce the yacht's overall environmental footprint. There may also be an initial resistance to paying the price tag of the specialized systems that will be installed to make the yacht more environmentally-friendly at this time. However, we have faith that we are moving in that direction.

A large proportion of the carbon dioxide emissions from superyachts is due to energy requirements for onboard equipment and operations. Defined as "hotel load," a superyacht needs to deliver all the luxurious trappings an owner or charterer desires. How do you combat this demand and optimize efficiency on board?

• The main consumption in hotel loads are the AC system and laundry. We constantly work on improving insulation and, with the help of our partners, on installing the most efficient systems. In addition, we increase our efficiency of use of power on our hybrid yachts. For example, our 164-foot (50m) hybrid yacht *Electra*, in Economic Mode (for speeds between 9 and 12 knots) allows you to switch off the generators. Running off the main engines alone, the e-motors supply the hotel load. In Cruising Mode (the most





02



Nobiskrug's 262ft (80m)*Artefact* features 247 square feet of solar panels on the sundeck hardtop

03

Fuel efficiency considerations played a majore role in the design of Oceanco's 357ft (109m) Bravo Eugenia conventional mode), the e-motors are switched off, with the generators providing power to the hotel load. The main engines drive the yachts' propellers.

• Black Pearl was designed with many eco-conscious considerations. For instance, she has a large-scale battery storage capacity on board. Under sail power at 14 knots the yacht regenerated enough energy to power the full house load, thus obviating the need to run generators while under sail.

Proven concepts, such as the axe bow and the use of composite materials or aluminum has helped reduce the weight of superyachts and improved overall fuel consumption. How have you embraced new materials in your builds?

- Taking the example of *Artefact*, unusually, much of the superstructure is made out of fiberglass to ensure stability. Lightweight and corrosion-resistant GRP compensates for the heavy glass and allows for the complex shapes of the moldings. It also saves weight and fuel.
- We have always been at the forefront of aluminum yacht builds and are, in fact, the leaders in that field, but the use of composite materials is not something we advocate due to the material's inability to be broken down at the

end of a yacht's life cycle. We do, of course, welcome new developments that help to reduce fuel consumption, and the FDHF - which was devised by our long-term partners Van Oossanen Naval Architects - is an innovative hull shape that we have become known for. The FDHF increases the overall performance of the yacht by reducing the hydrodynamic resistance. The beauty of this hull form is that it combines low resistance with high performance and therefore brings advantages to both the builder and the owner. For the builder, the lower installed power for a given speed translates into lower building costs that can be passed on to the owner. From the owner's point of view, lower fuel consumption means lower operational costs, while less bunker capacity frees up more space for other services, and smaller engines help to reduce noise and vibration and free up space for guests' use.

• A long time ago, Oceanco built a couple of aluminum-hulled yachts, but now we build steel hulls with aluminum superstructures. *Bravo Eugenia* does have an axe bow and it was developed on our LIFE (Lengthened, Innovative, Fuel Efficient and Eco-Friendly) design platform, with eco-consciousness and fuel efficiency considerations leading the design. We are also using more carbon fiber – the 295ft (90m) *DreAMBoat* has a full carbon canopy, mast house and mast.





04



The 357ft (109m) *Bravo Eugenia* was developed on Oceanco's LIFE design platform

05

The 163.3ft (49.8m) *Home* was Heesen's first Hybrid Propulsion System build



"WITHOUT OWNERS WHO ARE WILLING TO EMBRACE NEW TECHNOLOGIES AND IMPLEMENT PIONEERING INNOVATIONS ON BOARD THEIR PRIVATE VESSELS, WE WOULDN'T BE ABLE TO MAKE THE PROGRESS THAT WE HAVE SEEN IN RECENT YEARS"

The most obvious application of eco-friendly technology is in the growing use of hybrid and all-electric drive systems. What low-energy technologies have you incorporated into your builds?

- Sailing Yacht A (delivered in 2017) has a diesel-electric engine on board. Artefact's advanced DC bus digital power management system allows the vessel to fully integrate multiple sources of power from solar cells, variable-speed generators, and lithium batteries as well as potential future technologies, such as fuel cells.
- We were among some of the first shipyards to build a yacht with hybrid propulsion. The 163.3ft (49.8m) *Home* was the first in its class. She has won many awards since her launch in 2017. The most prestigious accolade was the MYS/RINA Green Award by HSH Prince Albert of Monaco for the most environmentally-friendly luxury vessel.
- LIFE revolves around intelligent naval architecture that leverages a number of fundamental principles, which create a harmonious balance between weight, power, technical areas and luxury interior on board. These principles are combined with a hybrid propulsion system that result in a virtuous circle, with a single-tier engine room at the center.

Along with alternative, non-fossil, renewable energies, solar energy is one of the options to making supervachts greener. What measures are you taking

to embrace renewable energies in both the build process and the running of your builds?

- Our team takes great care to ensure that the activities are as sustainable as possible, from the materials they choose to the technologies that they pioneer. Optimizing propulsion, engines and hull design, and continuous advances in the field of software and onboard technology are potentially the most important factors to address environmental obstacles.
- As already mentioned, we are concentrating our efforts on the use of hybrid diesel electric propulsion at present. We are also carefully monitoring the progress being made with lithium batteries, but it is always a careful balance between concerted efforts to make superyachts greener, and not compromising the onboard experience for the owner and their guests.
- Black Pearl is fully equipped to have solar panels installed on the masts, it is a matter of time for the materials to be thin enough for them to be positioned. We are also repurposing our wastewater and installing solar panels on the roof of our outfitting facilities. Oceanco will also be taking part in the Monaco Solar & Energy Boat Challenge this summer. The aim is to inspire to create tomorrow's yacht together with our partners by investigating the latest innovations regarding materials, fuel cells, solar panels, energy storage and propulsion drives. This project is an interesting milestone toward our vision for the future.





UE

Oceanco's 357ft (109m) Bravo Eugenia has a top speed of 17.5 knots

Λ7

Nobiskrug's 468.5ft (143m) *Sailing Yacht A* has a disel-electric engine on board

08

Heesen launched their second hybrid yacht, the 164ft (50m) *Electra*, in February







08





Being more environmentally responsible is a primary focus for everyone in the superyacht industry, from designers and shipyards, to owners, brokers and charterers. Do you believe it is simply down to levels of investment, and if so, should this always be down to the owner or do you believe the industry should invest more?

- Just their size alone means that superyachts will never be truly eco-friendly; but the industry seems to be mindful of its image and the tightening of regulations. Together with many owners' desire for both novelty and an attempt to mitigate their impact on the ocean, the industry is leaning toward increasingly greener yachts.
- It is too easy to sit back and expect owners to invest all their time, effort and money into making superyachts environmentally responsible. We believe the industry as a whole is accountable for pushing the design, build and enjoyment of yachts in a greener direction, and thankfully, the vast majority of my peers agree.
- Building innovative yachts will become the norm in the coming years. It is vitally important to build a product that is optimized for low energy consumption, low emissions and overall environmental impact. It is the future of yachting.