1. Sunreef Yacht's luxury charter fleet operating in the British Virgin Islands includes around 100 catamarans each standing at above 52ft (16m)

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Luxury catamaran

This supplier has made it their mission to transform the industry, producing hybrid and fully electric solutions for a variety of boats

WORDS: **KASPER FALKENBERG**

The owner of Catsy, a luxury 62ft catamaran that sailed off the British Virgin Islands (BVI), realized he was running one of the two gensets 24 hours a day, seven days a week, for 30 weeks a year. To supply the required power for the house loads and air-con, the owner sought a more sustainable solution.

An experienced boat owner, he had never been comfortable with the way the power was managed, stored and produced on vessels. Being a former electrical engineer, he went back to the books and installed a 70kW $LiFePO_4$ battery bank on board with the associated power management solutions – cutting generator runtime down to around three hours per day.

Most importantly, without the noise of the generator running, the catamaran was silent during the night, even with the air-con switched on. Once people became used to the silence, it was undesirable to start the generator to top up the batteries, even just for an hour, because passengers appreciated the silence so much.

This system worked extremely well until Hurricane Irma destroyed the beautiful vessel in 2017 and it was left turned upside down on the entrance to Nanny Cay Marina in the BVI. As this was the first Sunreef Yacht owner to lose a vessel, the yard offered the owner a very reasonable price for a new-build that simply couldn't be rejected.

However, the owner had one demand – that the new boat be a hybrid. And so the first Sunreef electric vessel was born. This electric catamaran is propelled by technology from EPTechnologies, a Danish specialist in electric propulsion.

It has been argued that if you put a diesel engine at the propshaft and run at 80% of full power most of the time, then the diesel engine uses the available mechanical power directly and this is more efficient than first converting it to electricity. EPTechnologies acknowledges this fact.

Diesel downsides

Most boats are overpowered, given the torque and peak power needed in harbor or to maneuver around a cliff in headwinds, for example. In the event of strong headwinds, no serious sailor would ever travel at 80% power, battling against the wind and waves.

The standard propulsion setup of such boats is four diesel engines, two for propulsion and two heavy AC generators. That is a lot of metal to transport, which burns a lot of fuel in itself. The standard rating of the batteries used in such a setup is 800Ah to 1,000Ah at 24V.

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2. Passengers of Tiril enjoy the silence thanks to hybrid propulsion. They can now eat breakfast in peace while at anchor and truly appreciate sightseeing

Most cruisers shut down one engine when traveling for longer periods, with the remaining engine running at around 50% engine power at an inefficient fuel point, and with a rudder to compensate for asymmetrical thrust, increasing drag.

Let us review the weight of such a diesel setup. As an example, the two main 80hp diesel engines with accessories weigh in at around 700kg. The two main AC generators weigh 800kg in total and have an electric efficiency of 75% if used direct, or 60% if charging the 24V batteries. Usually a gas cooker (weighing 50kg) plus associated safety systems. Add to that a standard battery at around 560kg. The system can thus weigh up to around 2,100kg in total.

Other downsides to a diesel setup are the 24/7 noise while the air-con is running and other heavy users are in operation, plus the maintenance required for four diesel engines.

Advantages of electric

In an electric propulsion setup, like the new Sunreef 50 Tiril, the main electric engines are dimensioned to have a similar power to but more torque than a standard diesel engine. Two efficient DC generators are added; DC current can be used directly for the drives or to load the battery bank. There are two main electric engines with accessories (weighing 160kg in total). The two main 25kW to 35kW DC generators (weighing 600kg in total) offer an efficiency of 90% if used directly as a propulsion system and 95% when the batteries are charged. The batteries are 70kW to 90kW and weigh between 460kg and 600kg. An extra inverter (80kg) can be added. One could also install smaller fuel tanks – or alternatively, the owner can simply store less fuel, which can save another 500kg. The total weight of the system is thus up to around 1,440kg.

Additional benefits of a hybrid setup, aside from the low weight, are that the air-con and other heavy users run off the batteries, silently. The 60- to 90-minute generator time compensates for the use of 24-hour house loads. The battery can be used for cooking. Maintenance is only needed for the two diesel engines, and the electric engines only need cooling water checks.

Real results for Sunreef

Tiril, which is part of the Navigare charter fleet in Split, uses between 200 and 300 liters (50-80 gallons) of fuel per week for the same distances and number of clients as Catsy. The comparable Lagoon 52 and 560 vessels, which can carry 10 passengers and two crew each, use 800 to 900 liters (210-240 gallons) per week. This is not because electric propulsion is more efficient, but due to the fact that the generators are not run 24/7 as there is a big house bank, and due to weight savings. When Tiril is used as a motor vessel and not just for sailing, the boat will burn the same amount of fuel to achieve the same speed; the physics do not change.

But the boat has some plus points, including being able to maneuver in silence without waking up the passengers. Motoring up to five hours in silence can also be achieved. And if there is access to a charging point then the generators do not need to be started at all.

With conversion to hybrid propulsion, up to 500 liters (132 gallons) of fuel per boat can be saved per week; that equates to 15,000 liters (4,000 gallons) of fuel per owner on an annual basis for 30 weeks of sailing, and the corresponding cost savings. Multiply this by 100 and that is a whopping 1,500,000 liters (396,000 gallons) of diesel in the BVI luxury charter fleet, for example.