



Enjoy the sound of silence

Powered by EST-Floattech



Green Orca[®]

The world's leading lithium-polymer energy system
from EST-Floattech

Our vision



"A cleaner shipping industry brings together our love of water, our passion for technology, and our worldview. We developed the lithium polymer battery using the knowledge and expertise we had gained in the luxury-yacht building industry and electrical engineering. In it we saw the potential to satisfy the demands of both economics and sustainability.

Thanks to our innovative energy storage systems, vessels become more environmentally friendly and consume less energy without compromising on power, comfort or safety. We specifically opted for battery cells using EST battery technology, which generate stable and safe energy. Not only for the shipping industry, our cells are also used in mission-critical environments such as those found in the aviation and aerospace industries. They are also used on land too, often under extreme conditions, such as on a United Nations peacekeeping mission, where our batteries power an energy storage system in the desert heat.

We believe that if a job's worth doing, it's worth doing well. As engineers, we know all too well that a good battery system can only generate optimum yield if the communication between all systems on board is coordinated integrally. As far as charging is concerned, this happens automatically, quickly and safely using engines, generators or the grid, but ideally with sources of renewable energy. After all, not only does our planet provide us with clean power, it needs us to use it too."

The EST Floattech team

Our sustainable future



Nothing. Just the sound of rippling water. True appreciation by the guests on board, and the natural surroundings. Peace and quiet and luxury. That's what yachts were made for.

Ultimate comfort and the environment can go hand in hand

Worldwide, EST Floattech helps yacht owners and builders with clean, silent, powerful energy systems based on lithium polymer batteries. The environmental gains are great: NO_x and CO₂ emissions reduced to little to nothing, and no offensive odours or noise pollution – perfect for entering and leaving marinas, or for anchoring on one of the beautiful unspoilt corners of our planet.

Intelligent solutions

Everyone is responsible for caring for the natural world and the environment. Fortunately, fully electrical and hybrid yachts with diesel-electric propulsion are quickly gaining in popularity.

Our clean lithium polymer batteries are implemented in luxury yachts and are a reliable, safe and quiet energy source. Their small volume and low weight means you do not lose any space or speed. The batteries are automatically charged during the day, using the residual energy from your (smaller) diesel engine, or simply from a source on shore. You can leave the marina at night, or go and lie under the stars during the quiet hours. Simply enjoy the sound of silence.



COMFORT



SAFETY



100% RECYCLABLE



ZERO EMISSIONS



ENGINE POWER

Intelligent ECO power for yachts

Comfort



No smell



No noise



Clean water swimming

CO2 Reduction



Connect to renewable energy



Safety

Singe Cell Control

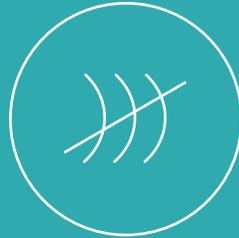


Performance

output from 40 kW to 8 MW

7,15 kg/kWh_{power/weight ratio}

Comfort



NO NOISE



NO SMELL

Advantages

- Maximum comfort for owner, guests and crew: silent and odour-free.
- No impact on people or the planet: no NO_x or CO₂ emissions.
- No soot emissions in the harbour or noise at night.
- Clean water around your vessel, no thin floating layer of waste created by exhaust.
- Low weight and small volume, so little impact on space and performance.
- Energy to power powertrains and electric systems on board.

All yachts are built for comfort. They offer all manner of comfort on board and access to the most beautiful spots and harbours in the world. The difference when powering the powertrain and electrical systems with lithium polymer batteries can be felt by everyone on board. No more noise, smells or vibrations and no more thin floating layer of waste created by exhaust on the surrounding water. That is true relaxation, enjoying each other's company and the wonderful natural surroundings.

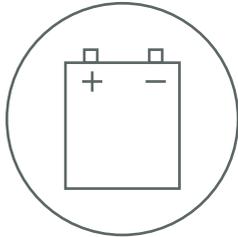
For you and your surroundings

The lithium polymer batteries are not only comfortable for your guests and crew, but for your surroundings too. After all, no soot (NO_x) or CO₂ emissions are produced when entering and leaving the marina, for example. And at night, neither those on board nor the surroundings are disturbed by generator noise.

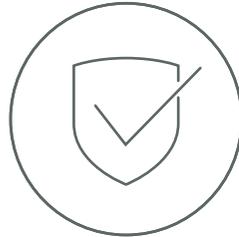
Integral sustainability

Our smart batteries open up great opportunities to yacht-builders and interior architects as they are lighter and occupy less space than standard battery systems. That way, you don't have to make any concessions when it comes to speed, and space and comfort in the interior. All electric systems on board and the powertrains can be integrally connected to the lithium energy system. The batteries are maintenance-free and are fully recyclable at the end of their life span.

State of the art and safe



LITHIUM POLYMER



SAFETY

Advantages

- Lloyd's certified.
- DNV GL 2015 tested (IEC 62619).
- Pro-active control of status, energy level and temperature at individual cell level.
- Remote active monitoring service®.
- Waterproof housing (IP65).
- Practically unaffected by vibrations, for example.
- No engine noise, offensive odours or particulate matter.

The lithium polymer batteries from EST Floattech are innovative, high-tech energy systems. Each battery system is fitted with smart technology and safety features. Thanks to its performance, stability and reliability, the cell technology used is also used in the aviation and aerospace industries (NASA), in submarines and in fighter jets. The continuity of the energy provision is safeguarded; in mission critical processes, the batteries deliver safe and quiet energy for all systems whatever the circumstances.

Lloyd's and DNV IEC 62619

The constant smart monitoring of the status, energy level and temperature of the batteries ensure a comfortable and safe crossing. Our batteries are Lloyd's certified, and were tested by DNV/GL in 2015. We expect to be the first in the maritime sector to receive DNV certification according to the new IEC 62619 standard, which will apply to the system as a whole including the battery control unit (BCU). That means the entire system will be certified. The spring loaded system of internal connections, rather than screws and bolts, is maintenance-free and vibration-proof, and the batteries' robust housing is waterproof, in accordance with IP65.

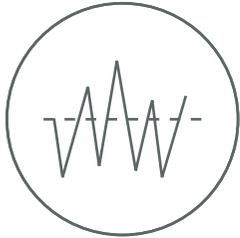
Pro-active safety system

Lithium polymer is known for its excellent heat control and relatively high energy storage capacity per cell. This way, it is possible to safely and effectively monitor and manage larger systems. If, under very exceptional circumstances, an individual cell were to unexpectedly exceed the permissible values, the battery management system will interfere to pro-actively shut down the relevant string, shutting down the battery before it starts functioning beyond its critical values. During the shutdown, the other battery strings of course remain available to generate engine power.

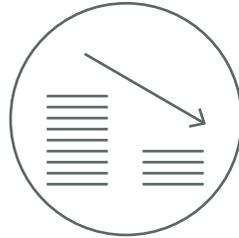
Remote monitoring

It is also possible to connect the battery system to our remote active monitoring service®. We will then monitor the performance of your system, and will contact you in the unlikely event of a critical error. In addition, we can advise you on your energy consumption and will take preventative action in that respect if the data we receive gives us reason to do so. That saves you time and money.

Energy-efficient, cost-efficient



PEAK SHAVING



COST SAVING

Advantages

- Peak shaving: high engine power achieved with smaller engines.
- Reduction in costs and fossil fuel use.
- Savings on maintenance costs.
- Optimum energy distribution at all times thanks to active balancing.
- High power, small volume, low weight
- Long battery life.

Every journey has peaks and troughs when it comes to energy consumption. For example, extra power is needed when entering and leaving marinas and when berthing and unberthing. The correct configuration of our lithium polymer batteries makes peak shaving possible, whereby peak demand is provided by the batteries rather than the existing engines or generators. The result is a significant saving in fuel and maintenance, and investments in (often excessively) heavy-duty engines are no longer needed. Furthermore, a more efficient and consistent use of engines means they last longer.

Low weight, small volume

Our battery systems achieve the optimum balance between weight and volume. The special cells can store up to 240Ah per cell. The result is savings on weight and space and great improvements in the performance and speed of the vessels. With regard to the traditional lead-acid battery systems, the gains in weight and space can reach up to 75%. It's not for nothing that our cells are used in fighter jets and even in the Solar Impulse, the first aeroplane in the world to be fully powered by solar energy.

Intelligent charging, active balancing

Charging is possible at any time, in any place; at sea, when the engines are running at their most efficient, as well as while your yacht is in the marina, via a cable. Charging the batteries 100% is not necessary. The smart active balancing system ensures that the battery cells automatically compensate each other. This system makes redundant the familiar discharging and charging cycle characteristic of many battery systems.

Long life

The intelligent batteries function in all conditions and have an extremely long life of up to 20 years, depending on the number of cycles and the C-rate. The built-in active battery management system constantly measures the values and performance of each cell and ensures that all individual cells are actively kept at the same voltage level. The result is an increase in the life of the cells, and in turn the batteries. As part of this, active balancing gives real-time insight into the performance of individual cells and battery systems.

Reducing NO_x and CO₂



CO₂ + NO_x REDUCTION



100% RECYCLABLE

Advantages

- Maximum comfort for owner, guests and crew: silent and odour-free.
- No impact on people or the planet: no NO_x or CO₂ emissions.
- No soot emissions in the harbour or noise at night.
- Low weight and small volume, so little impact on space and performance.
- Energy to power powertrains and electric systems on board.

The need for cleaner shipping can no longer be ignored. With electric or hybrid shipping, you are already future-proof. All over the world, ports, regions and countries are committing to improving air quality and reducing water pollution and the negative impact on the climate. The international MARPOL Convention of the IMO is already prescribing tighter standards for the next few years, the number of Emission Control Areas is increasing, and on a local level there is increasing regulation governing the carbon footprint.

Clean and economic

The energy generated by our intelligent and powerful lithium polymer battery systems is a clean and economic alternative. The batteries are charged simply and quickly using sustainable and clean solar, wind, tide and geothermal energy. Once your yacht is running at its most economic, the batteries can also be charged by the conventional engines.

Running vessels on hybrid energy systems results in a large to very large reduction in NO_x and CO₂ emissions, depending on the chosen solution. Greener sailing is not only advantageous for the natural world, environment, and climate, but also results in savings.

Technical information

System integration

In our eyes, an optimally performing system is about more than battery technology alone. Our background in electrical engineering and roots in the maritime sector mean we truly understand the importance of the proper and robust integration of all technical systems on board. A seamless fit between our systems and the rest of the systems on board is crucial if you are to safely and efficiently gain maximum return from your investment. Our hybrid solutions are custom-made.

Together with our customers and their partners, such as system integrators, we seek the most economic and sustainable energy systems for clean shipping. If required, we can even engineer and realise the entire powertrain. We ensure all the necessary power, including intelligent 24/7 performance monitoring.

Lithium polymer batteries

Our lithium polymer battery systems score excellently when it comes to the balance



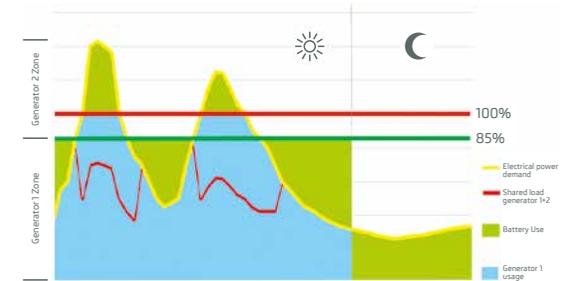
between weight and volume. The special cells can store up to 200A (ampere) per cell. With regard to the traditional lead-acid battery systems, the gains in weight and space can reach up to 75%.

Peak shaving

Every journey has peaks and valleys when it comes to energy consumption. For example, extra power is needed when entering and leaving marinas and when berthing and unberthing. The correct configuration of our lithium polymer batteries makes peak shaving possible, whereby peak demand is provided by the batteries rather than the existing engines or generators.

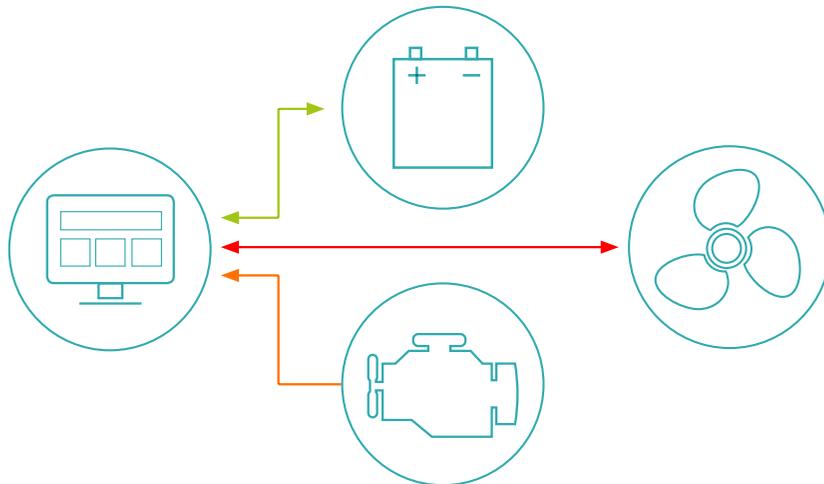
- Only one generator is active
- No cold start for second generator
- Battery support for total silence at night
- Peak shaving to reduce fuel consumption and generator maintenance
- Rapid & high current response of the energy storage system is required for peak shaving.

Typical generator loadcycle



Active balancing

Thanks to the smart active balancing system, it is not necessary to fully charge the batteries, because the battery cells automatically compensate each other. This system makes redundant the familiar discharging and charging cycle characteristic of many battery systems.



- Optimum energy distribution at all times thanks to active balancing.
- Real time active balancing per cell
- Each EST module contains 7 or 14 large cells, depending on the module type
- Each cell has a solo chemical process, therefore an advanced balancing system is required
- Each cell automatically receives a unique address via a NMEA 2000 based EST-CanBus system
- The system monitors cell voltage, SOC, SOH, cell temperatures and all safety features per cell
- When unbalanced, the system transfers energy from the highest cell to the lowest cell with an accuracy of 0.005 Volts in milliseconds.

Per module, EST uses a state-of-the-art, real-time active balancing and monitoring board developed in-house.

Active module series balancing

- Active balancing per serial system during charging, discharging or standby
- Up to 18 battery modules connected in a serial configuration
- Balancing between modules is required for serial higher voltage systems.

Battery control unit

Our battery control unit interferes to pro-actively shut down the relevant string of batteries, if one of the individual cells exceeds its permissible values, shutting down the battery before it starts functioning beyond its critical values. During the shutdown, the other battery strings of course remain available to generate engine power. Our BCU was the first in the maritime sector to be tested by DNV certification according to the new IEC 62619 standard.

Certification

- Lloyd's-certified batteries
- In 2015, the battery control unit was tested by DVN/GL in accordance with IEC 62619 – a first in the maritime sector
- Waterproof housing, in accordance with IP65.



Green Orca® battery module specifications

Green Orca 525 Marine Lithium Polymer batteries

- 505 x 540 x 240 mm (H x D x W)
- Lloyd's certified
- 52 Volt, 100Ah
- 5.25kWh at 47.5 kg.
- 300A/3C nominal charge, @23 ±3°C
- 300A/3C nominal discharge, @23 ±3°C
- 600A/6C maximum discharge, <10 sec., > SOC 50%
- Stack up to Megawatts and 1,000 Vdc
- Unique BMS with advanced active cell balancing
- NMEA 2000 based CanBus communication
- Designed for marine application, IP65
- Warranty 5,000 cycles at 80% DOD or 10 years
- No electrical or mechanical maintenance

Green Orca 620 Marine Lithium Polymer batteries

- 505 x 540 x 240 mm (H x D x W)
- Lloyd's certified
- 26 Volt, 240Ah
- 6.2kWh at 47.5 kg.
- 240A/1C nominal charge, @23 ±3°C
- 300A/1¼C nominal discharge, @23 ±3°C
- 720A/3C maximum discharge, <10 sec., > SOC 50%
- Stack up to Megawatts and 1,000 Vdc
- Unique BMS with advanced active cell balancing
- NMEA 2000 based CanBus communication
- Designed for marine application, IP65
- Warranty 5,000 cycles at 80% DOD or 10 years
- No electrical or mechanical maintenance

Green Orca 1050 Marine Lithium Polymer batteries

- 505 x 540 x 325 mm (H x D x W)
- Lloyd's certified
- 52 Volt, 200Ah
- 10.5kWh at 75 kg.
- 200A/1C nominal charge, @23 ±3°C
- 300A/1½C nominal discharge, @23 ±3°C
- 600A/3C maximum discharge, <10 sec., > SOC 50%
- Stack up to Megawatts and 1,000 Vdc
- Unique BMS with advanced active cell balancing
- NMEA 2000 based CanBus communication
- Designed for marine application, IP65
- Warranty 5,000 cycles at 80% DOD or 10 years
- No electrical or mechanical maintenance



Green Orca®



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EST Floatech was established in 2009. Since 2014 it has been part of an investment fund affiliated with one of the largest family companies in the Netherlands, safeguarding the continuity of our company and our sustainable and economic battery systems.

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