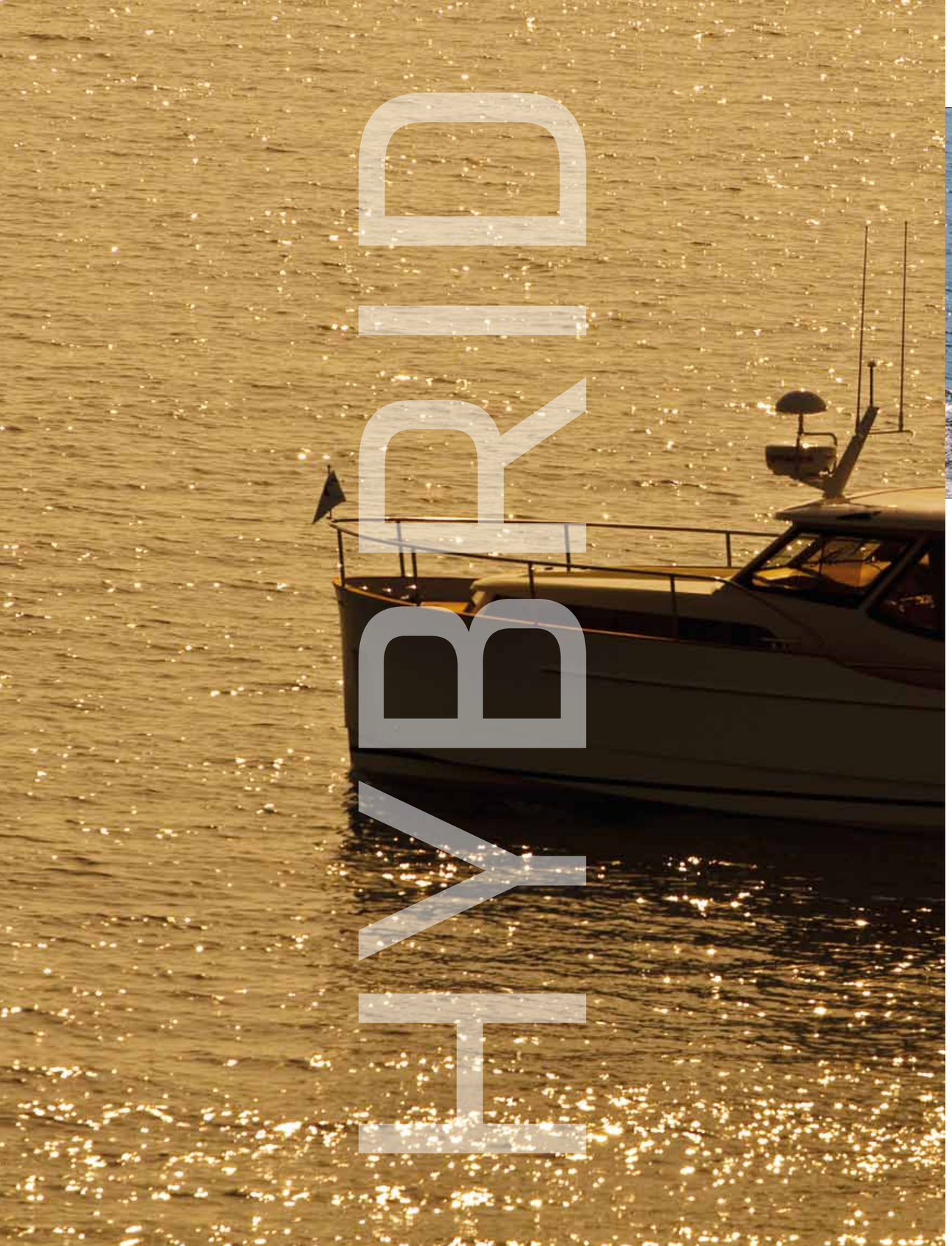
GREENLINE 33 HYBRID

THE FUTURE IS NOW.

Greenline
± HYBRID



GREENLINE 33 IS ALL ABOUT **ENVIRONMENT.**

We want to keep our most beautiful boating spots in the same pristine condition as when we first discovered them. We want to enjoy the untouched beauties of the boating world for years to come and pass them on to our children and grandchildren. The Greenline 33 is a powerful answer to this concern as it uses up to four times less fossil fuel in a year than a planing powerboat, and is completely emission-free in electric mode.
The hybrid (diesel-electric) and solar powered drive systems have proven themselves both reliable and cost effective – giving birth to the Greenline 33, the world's first production hybrid and solar powered boat.

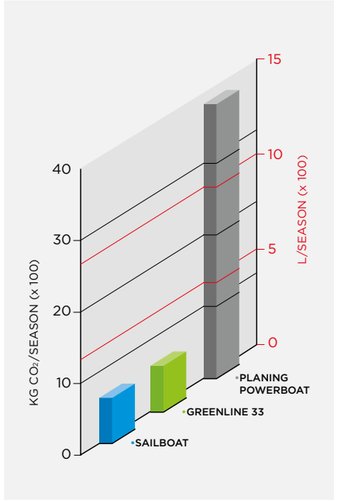
GREENLINE 33 IS ALL ABOUT **EFFICIENCY.**

In the modern age, efficiency is all important. Efficiency in how we use energy (especially energy derived from fossil fuels), important natural resources and our financial assets. That is why we invented the protected Superdisplacement low-drag hull, which, although it is not capable of attaining fast planing speeds, uses much less energy to move through the water at speeds of up to 15 knots. Not only does this innovation reduce fuel consumption, it also allows efficient electric propulsion using power supplied by the battery and solar power.
Designed and built by people who know more about volume boat manufacture than anybody else in the world, the Greenline 33 is more cost-effective to buy and use than any comparable boat, thereby offering incredible value for money.

GREENLINE 33 IS ALL ABOUT **YOU.**

Maximising your well-being on board and your enjoyment during a relaxing cruise were our main objectives when designing and building this yacht. We appreciate and share your passion for boating. Not only does the Greenline 33 deliver more comfort, greater ease of handling and more fun than any other boat, this outstanding design adds a new dimension. It allows you to savour the quietness of the water as you would on a sailing yacht without polluting your surroundings or the environment with smoke, noise or waves.
The Greenline 33 will take you to any of your favourite cruising haunts in Europe - regardless of whether they are inland waterways, lakes, inshore waters or offshore islands - in complete comfort and safety.

GREENLINE 33 IS THE BEST CHOICE FOR A COUPLE WITH OCCASIONAL FRIENDS OR A SMALL FAMILY OF EXPERIENCED YACHTSMEN, FOR HARDENED SAILORS OR EVEN FOR NEWCOMERS TO BOATING. THIS SMALL YACHT OF IMPECCABLE QUALITY PUTS YOUR WELL-BEING ONBOARD FIRST WHILE RESPECTING THE SEA AND OUR BEST BOATING TRADITIONS.



Comparison of fuel consumption in litres and CO_2 emission in kg per boating season (35 boating days): a 33-feet sailboat with a diesel engine versus Greenline 33 Hybrid versus a 33-feet twin diesel engine powerboat.

ENVIRONMENT

It is our mission to preserve the world and its best boating areas for future generations. That is why we have created the Greenline Hybrid, a major step towards a completely sustainable future.

This pan European boat will increase boating comfort, reduce running costs to a significant extent and drastically reduce the carbon emissions footprint of a boating family.

This has been made possible by the revolutionary shape of the Superdisplacement hull, and the implementation of alternative technologies and power sources.

In electric mode, the Greenline Hybrid is completely emission-free. In diesel mode, the Greenline 33 will burn up to 4 times less less fossil fuel per nautical mile than comparable planing hulls, reducing the pollution by 75 %.

The Greenline 33's ability to cruise into a port, marina or an anchorage without smoke, noiselessly and with no wake will change the way modern motor boating is enjoyed by owners, how it is perceived by the boating community and how it affects our environment.

IT'S TIME FOR A CHANGE: IT'S TIME FOR THE GREENLINE 33.

EFFICIENCY

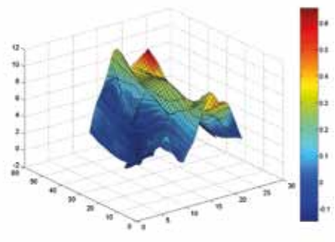
The revolutionary Superdisplacement hull is the secret behind the Greenline 33 Hybrid's ability to use less fuel, generate lower CO_2 emissions and produce less wake. The fuel consumption per nautical mile is half that of a comparable displacement hull and one quarter that of a semi-displacement, twin-engine planing boat. In a full boating season the Greenline 33 will burn an amount of fossil fuel that is comparable to a sailing yacht of the same size and up to 10 times less than a twin-engine planing boat of the same size.

Less drag

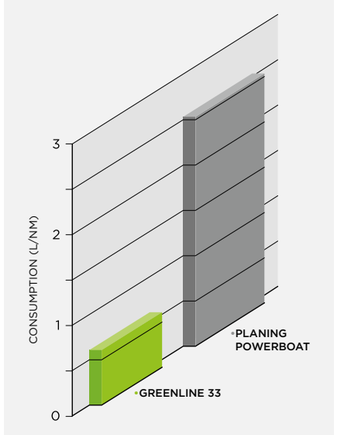
The Greenline 33 is remarkably efficient throughout its speed range, guaranteeing great mileage. Its 165 hp engine consumes a mere 4 litres of fuel at 7 knots, providing up to a 700 mile range at normal cruising speed. It combines this outstanding efficiency with a top speed of 15 knots, making long day trips possible. The reduced energy requirement means less burned fuel, so lower running costs and up to a 1000 miles of range, excluding the additional range available with electric power. You will stop less for fuel, and spend more time in your favourite cruising areas and anchorages. In most cases a single tank will last for a boating season.
The Greenline 33 Hybrid performs flawlessly in electric drive mode, reaching a top speed of 6 knots and offering a range of up to 25 nautical miles.

Better seaworthiness

This revolutionary hull efficiently covers the speed range from zero to double displacement speed - up to 15 knots in the case of a 10 metre waterline.
The newly developed, sailing boat derived Superdisplacement hull (patent pending) with twin stabilisers has unmatched anti-roll and tracking stability. It offers a comfortable and safe ride in all weather conditions, faced by a head-on, side or following sea.



Numerical analysis was used on the tank-testing data to find the geometry which requires least energy for a given speed.



Comparison of fuel consumption in litres per nautical mile: Greenline 33 in Diesel Mode (speed 7 knots) versus a 33-feet Twin Diesel Engine Powerboat (speed 15 knots)

TECHNOLOGY. NEW, BUT SIMPLE.

Through an enormous effort in time and money spent in the development phase of the Greenline hybrid, this state-of-the-art product offers great performance, reliability and user friendliness at an incredible value for money.

Unlike today's modern cars which still need to burn fuel to produce electricity, the Greenline Hybrid Solar is capable of collecting, storing and using power from the sun, which is a breakthrough in hybrid marine technology. With a 1.3 kW solar roof and the Hybrid drive (5kW generator/7kW electric motor integrated in one unit), the Greenline Hybrid Solar is a mobile power station that provides a constant supply of electric power on board.
In spite of its revolutionary design, the technology used in the Greenline Hybrid Solar is not at all complicated. All the systems are electronically controlled, automatically charging the battery when there is an adequate supply of daylight or when the diesel engine is running.

Protected Superdisplacement hull

Benefits: • comfortable, safe ride
• easy manoeuvring
• low running costs

Besides being efficient, the Superdisplacement hull shows optimum performance in all sea conditions - an important factor in comfort and safety when underway. The Greenline 33 manages any kind of sea situation with ease, needing only minute corrections at the wheel. The twin sacrificial stabilisers are a further advantage of this hull, and have three functions: they deliver roll stability, tracking stability, and protect the drive and rudder. If the stabilisers get damaged, the structure of the boat will not be affected. The fins can be quickly and inexpensively replaced.

Hybrid drive

A fully electronically managed and maintenance-free system.

Benefits: • no maintenance
• ease of use
• use of electric energy for propulsion: the running costs of electric boating are 10 times less than burning diesel fuel, even disregarding solar energy
• eliminating smoke and noise
• 230V AC power system

The user-friendly and reliable hybrid drive system (patent pending) consists of the following elements:

- a single switch that lets you choose between two drive modes: diesel or electric.
- a modern marine diesel engine made by Cummins Marine.
- a fully electronically managed and maintenance-free electric motor/generator (eM/G), which consumes 7 kW in the electric drive mode and provides 5 kW of electrical power when driven by the diesel engine (charging the batteries and supplying power to on-board consumers). The two components are integrated into one unit, thereby saving space and weight. The eM/G is coupled to a ZF gearbox, which drives the propeller.
- a hydraulic clutch between the diesel engine and the electric motor/generator
- A 3 kW inverter/charger that charges the battery in the shore power mode and delivers a 230 V AC power supply throughout the boat at all times.

• Solar roof

The solar roof array keeps the batteries fully charged and provides additional energy for the boat's electric drive system. No-cost and emission-free sailing is possible at low speed (up to 3,5 knots) where the amount of energy harvested from the sun and the system's energy consumption are equal, making the Greenline Hybrid a solar sailboat..

Benefits: • green energy production
• cost and emission-free sailing
• no maintenance

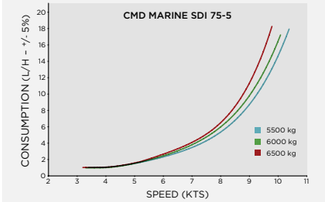
6 standard photovoltaic solar panels with forced air cooling deliver up to 1.3 kW of electric power in daylight conditions. As the solar cells are protected against hail by a 3.2 mm glass shield and are easy to access for cleaning, your solar power station requires only a minimum of maintenance. It is capable of supplying constant power to on-board consumers like the refrigerator and TVs and can recharge the batteries to 80% when exposed to a full day of sunlight.

• Lithium battery

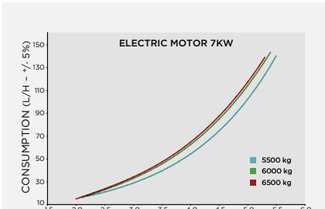
Just like your mobile phone or laptop computer, the Greenline Hybrid uses the best lithium battery technology available: a 240 Ah battery array with a permissible discharge of 100%.

Benefits: • low maintenance
• ease of use
• more time spent out on the water, whether cruising or at anchor
• estimated 10 years life expectancy
• lightweight and compact

Rated at thousands of charge cycles, these batteries outperform lead battery types by a factor of five to six. Very powerful, light-weight (7 times lighter, 1/3 of normal battery size) and maintenance-free, these batteries are the best choice for your hybrid boat.



The relation of fuel consumption versus speed for different boat displacements.



The relation of current versus speed (@48 V) for different boat displacements.

WITH ITS HYBRID PROPULSION SYSTEM, SOLAR ROOF, LOW-DRAG HULL AND UNPARALLELED COMFORT, THE GREENLINE HYBRID IS READY TO MEET ANY CHALLENGE.

COMFORT: WELCOME HOME.

The design of the Greenline 33 completely redefines user-friendliness, changing the way you will spend your leisure time at sea. A flexible interior, excellent visibility, high levels of ambient light and room to move around in comfort – all features that have never been offered on a 10 metre boat before.

Natural light, panoramic vista

With big glass surfaces in the salon and the owner's cabin, the Greenline interior is always full of natural light, offering great visibility and a feeling of connection to the outer world.

Adaptive owner's cabin

Another benefit is found in the owner's cabin, where the beds can be moved to create single or double berths. The mattresses are standard sized, greatly enhancing sleeping comfort. The standard size is also highly practical when it comes to buying or replacing your bed linen and accessories, keeping the costs reasonable. You will no longer want to leave the boat to sleep in a "real" bed.

Adaptive salon

As the large aft glass door in the lounge area can be fully opened, the Greenline 33 gives you a unique feeling of being inside and outside at the same time. This feature allows you to turn the salon and cockpit into one large space in warm weather, either to increase your living area and create a truly al-fresco environment when dining with guests or when you simply want to relax on your own. Whatever the case, you will enjoy your favourite anchorage, or a newly discovered port, in a way that was not possible before.

Galley

With a large refrigerator, deep freezer, microwave and classical oven, cooking and food preparation on board will become an enjoyable pastime, minimising the difference in comfort between your home and your boat.

Twin-access, high-volume washroom

A regular-sized shower and toilet make your boat a home from home and increase comfort on prolonged cruises. With separate doors for the owner and guests, both will be able to keep their privacy.

WITH ALL THE COMFORTS OF HOME AND THE SPACIOUSNESS YOU WOULD EXPECT OF A MUCH BIGGER BOAT, YOU WILL NEVER AGAIN HAVE TO LOOK FOR EXCUSES TO RETURN HOME EARLIER THAN PLANNED.

WHEN DOCKED IN A MARINA, YOU CAN CONNECT YOUR WATER SYSTEM TO THE SHORE SUPPLY IN THE SAME MODE AS THE ELECTRICITY: DIRECT PRESSURE ON THE KITCHEN TAP WITHOUT THE NOISE OF THE WATER PUMP AT NIGHT.

Opening cockpit platform

A remote-controlled, electrically opening and closing platform for easy water and dock access. Enlarging the lounge/cockpit area by 4 m², this option creates the impression of a much more spacious boat.

Trash receptacle

The trash receptacle that is accessed through the kitchen top is another nice feature: you can conveniently dispose of your kitchen waste and collect it from the outside. No more spills and smell in the kitchen!

230V AC power at all times

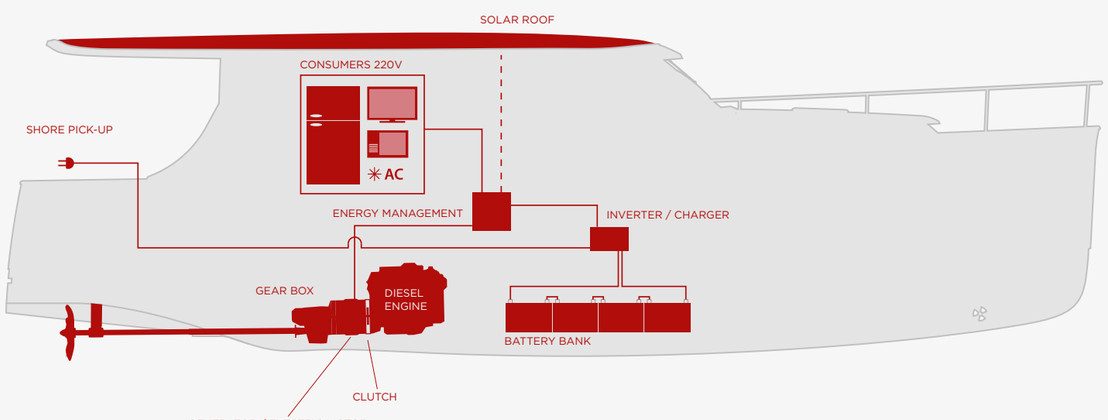
Because the Greenline 33 uses a 230V AC internal power supply system, you can recreate the comfort of your own home with a range of home appliances like a refrigerator (there's room for a 270 litre unit), a microwave oven, TVs and A/C. These appliances can be brought from home, or bought/exchanged conveniently and affordably.

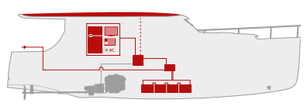
Sheltered cockpit and sidewalks

The extended cabin roof gives full protection from the sun, rain or wind. An optional canvas cover can be fitted to fully enclose the cockpit area and extend your boating season when the weather turns colder. Safe and useful when standing at anchor or sailing under power on rainy, cold or windy days. Deep, covered sidewalks provide additional security while anchoring, mooring or going to the bow, ensuring that your guests are safe and comfortable.

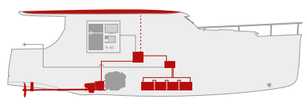
Silent performance

When you combine one of the best insulated engine bays with a modern Cummins diesel engine, you get one of the most silent boats on the market today. With nothing more than a whisper-like hum at cruising speed, both when using electric or diesel power, the Greenline 33 never disturbs your comfort while underway or when recharging the batteries.

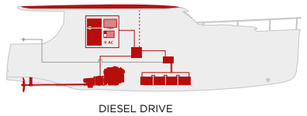




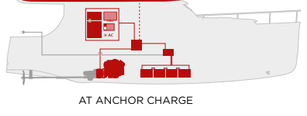
PLUG-IN AT DOCK



ELECTRIC DRIVE



DIESEL DRIVE



AT ANCHOR CHARGE

The protected hybrid system (patent pending) connects the 4 modes of operation with universality and simplicity. A control system simplifies the interface to the user via a (Diesel or Electric) switch.

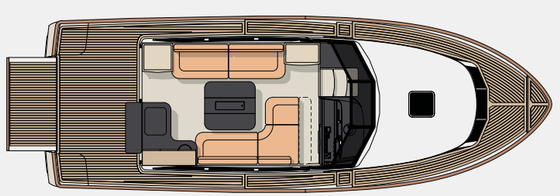
MODES OF OPERATION

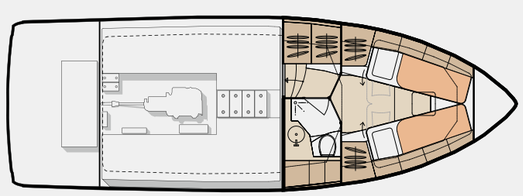
- **When in dock (shore power mode)**, the boat is plugged into the 230 V AC shore power supply. The battery array is under charge and the inverter provides up to 3 kW of AC power to run home appliances like the fridge, TVs, etc.

- **In electric drive mode (e)**, the boat is powered by the eM/G, which can produce up to 7 kW of electric power. This mode is used to sail in and out of a marina or anchorage with no noise, no smoke and an insignificant wake at speeds of up to 6 knots. At 4 knots a fully charged battery array provides a range of up to 20 miles.

- **In diesel drive mode (d)**, the diesel engine propels the boat and drives the generator, which recharges the battery array at an output of 5 kW.

- **At anchor** the solar roof array charges the batteries, which provide a 230 V AC power supply to the appliances (via a 3 kW inverter). If the level of battery charge drops below a set value, the diesel engine is switched on in order to drive the generator and charge the battery array via the 5 kW generator. The propeller is disengaged (the gearbox is in neutral). This is the anchor charge mode.





THE **SPECIFICATIONS**

DECK

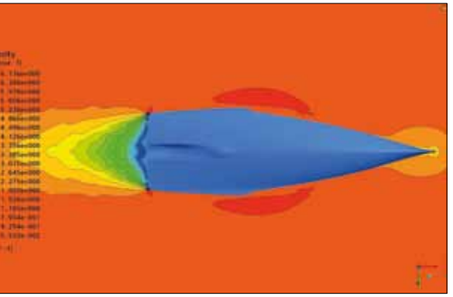
- Boarding and swimming access via a fold-out stern platform.
- Large sun and rain protected cockpit with storage under.
- Protected sidewalks.
- Sun bathing area on the front coachroof.
- Uncluttered bow area for easy anchoring and rope handling.

INTERIOR

- Salon with a 360 degree vista.
- Salon fully connected to cockpit to form one area (fully opening aft salon glass enclosure).
- Galley starboard aft – to be served also from the cockpit when enclosures open.
- Numerous lockers.
- To port a 270 l fridge with a deep freeze locker (optional).
- Two large sofas to port and starboard. Starboard sofa converts to a double bed, making it possible to sleep 3 persons.
- A table with 2 flaps.
- TV (optional).
- A two-position driver/passenger double seat (facing forward in drive position and facing back to increase the settee area at anchor or in port).
- Steering console.
- Hanging lockers to port.
- Washroom / toilet to starboard.
- 2 home-sized spring-mattresses (80 × 200 cm).
- An optional TV forward.
- Lockers, shelves.

MAIN DIMENSIONS

Length overall	9,99 m
Beam overall	3,49 m
Draft loaded	0,70 m
Displacement empty	4800 kg appr.
Cabins	1 plus salon, sleeps 4/5
Toilets/washrooms	1
Diesel tank	500 l
Water tank	300 l
Engine (standard) CMD SDI 75	
Speed max std. engine	10 knots
Range at 7 knots (std engine)	700 nautical miles
Engine (optional) CMD TDI 165	
Speed max optional engine	15 knots
Speed under electric power	up to 6 knots
Range (electric drive) at 4 knots	20 nautical miles
Design	J&J Design
Engineering, tooling and development	Seaway
CE cat.	B
Versions	Hybrid Ready Hybrid Solar Electric



CREATORS AND BUILDERS

The concept of the Greenline 33 was developed by J&J Design at the end of 2007. After computer-based studies and simulations using CFD (computational fluid dynamics) and Velocity Prediction software, a full range of tank testing trials were performed. Based on the 4 geometries tested in the tank a full scale hull shape was developed. Similar research effort was devoted to the development of the hybrid, battery and solar drive technology. Volkswagen Marine joined the project early in 2008 in order to help develop a new hybrid diesel-electric system.
A fully functional prototype was built by Seaway and tested during nine months in a range of displacement, trim, propulsion variants and weather conditions. During the initial months of 2009, Seaway performed the production engineering for the Greenline 33 and installed the associated tooling. A preliminary run of 6 pre-production yachts was built in August and September of the same year. The Greenline 33 was exhibited at major European autumn boat shows and won both design prizes and Boat of the Year awards. The craft has been tested in a variety of conditions in several European countries, in the Mediterranean, on the North Sea, on large lakes and on the rivers and canals of Northern and Southern Europe. This extensive automotive-style development and testing programme, a first in the boating industry, has resulted in a reliable and user-friendly product in spite of the use of new technology. Full volume production started in January 2010.

J&J Design, Seaway and Vokswagen Marine shared a vision and ideas on the future of motor boating that have led to the creation of the Greenline 33. All of these companies are convinced that this compact yacht will not only bring boating closer to the public in environmentally and economically challenging times, it will also improve the general public's perception of boating as a sport and pastime.

J&J Design

J&J Design was founded in 1983 by brothers Jernej and Japec Jakopin. They have designed more than 250 powerboats and sailboats for boat manufacturers worldwide. Based on their designs, nearly 60,000 boats and yachts have been built by 58 boatyards in 28 countries (Beneteau, Jeanneau, Bavaria, Windy, Askeladden, ETAP, Dufour and others). These designs have won 33 Boat of the Year awards in several countries around the world.

Seaway

Seaway, which is based in Italy and Slovenia (www.seawaygroup.eu), is the world's leading boat development and building company. The company, which employs a unique 250-strong team of talented engineers and boat builders from many different countries, has combined the power of an extensive range of the most up-to-date 3D design, engineering, CAD/CAM, 5-axis milling and boatbuilding software and hardware available with unmatched craftsmanship and a long tradition of manufacturing boats.
Seaway is also the world's largest builder of carbon sailing yachts and owns the Shipman (www.shipman.dk) and Skagen (www.skagenyachts.com) brands and manufactures the products produced under these brand names.

Volkswagen Marine

Vokswagen Marine is one of world's most innovative suppliers of marine diesel engines. The range of 13 marine engines offers power outputs from 29 kW to 257 kW (40 to 350 HP). The engines are based on 4, 5, 6 and 8 cylinder Vokswagen and Audi automobile engines and are definitely among the quietest, most reliable and most fuel efficient diesel engines available. All reasons for offering Vokswagen Marine's five cylinder 2.5 litre electronically controlled engine as standard in the Greenline 33. This engine is one of the most popular and reliable diesel engines of all times.

WWW.GREENLINEHYBRID.COM

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Photo: Jurij Korenc (exteriors); Branko Čeak, Jože Maček (interiors); decorations: Nataša Mandelj; decor: Tisoč in en dar

design: atelje Balant, printed by: Racman, June 2011, v.01