

L A T E R A L

NAVAL ARCHITECTS

K A I R O S

IN COLLABORATION WITH

*pininfarina*

BUILT BY

*oceAnco*



# LATERAL

**Lateral Naval Architects** provides complete engineering expertise to the superyacht industry, from project conception to delivery.

Our core competence is engineering, but our unique focus is on meaningful innovation, to enable superyachts that meet the demands of today's owners and those of the future.

We believe that meaningful innovation starts with asking new questions.



L A T E R A L





## lateral

*/ˈlæt(ə)r(ə)l/* **adjective**

involving lateral thinking.

synonyms: unorthodox, inventive, creative, imaginative

## futurology

*/ˌfjuːtʃəˈrɒlədʒi/* **noun**

systematic forecasting of the future,  
especially from present trends in society.

synonyms: futuristics, foresight, forward-looking

## Lateral Futurology

*/ˈlæt(ə)r(ə)l/* */ˌfjuːtʃəˈrɒlədʒi/* **way of thinking**

ability to conceive innovative superyacht  
technical platforms which enable design  
via the application of engineering and  
technology. Breaking from established  
thoughts, theories, rules, and procedures;  
changing the paradigm.

synonyms: meaningful innovation, ask new questions

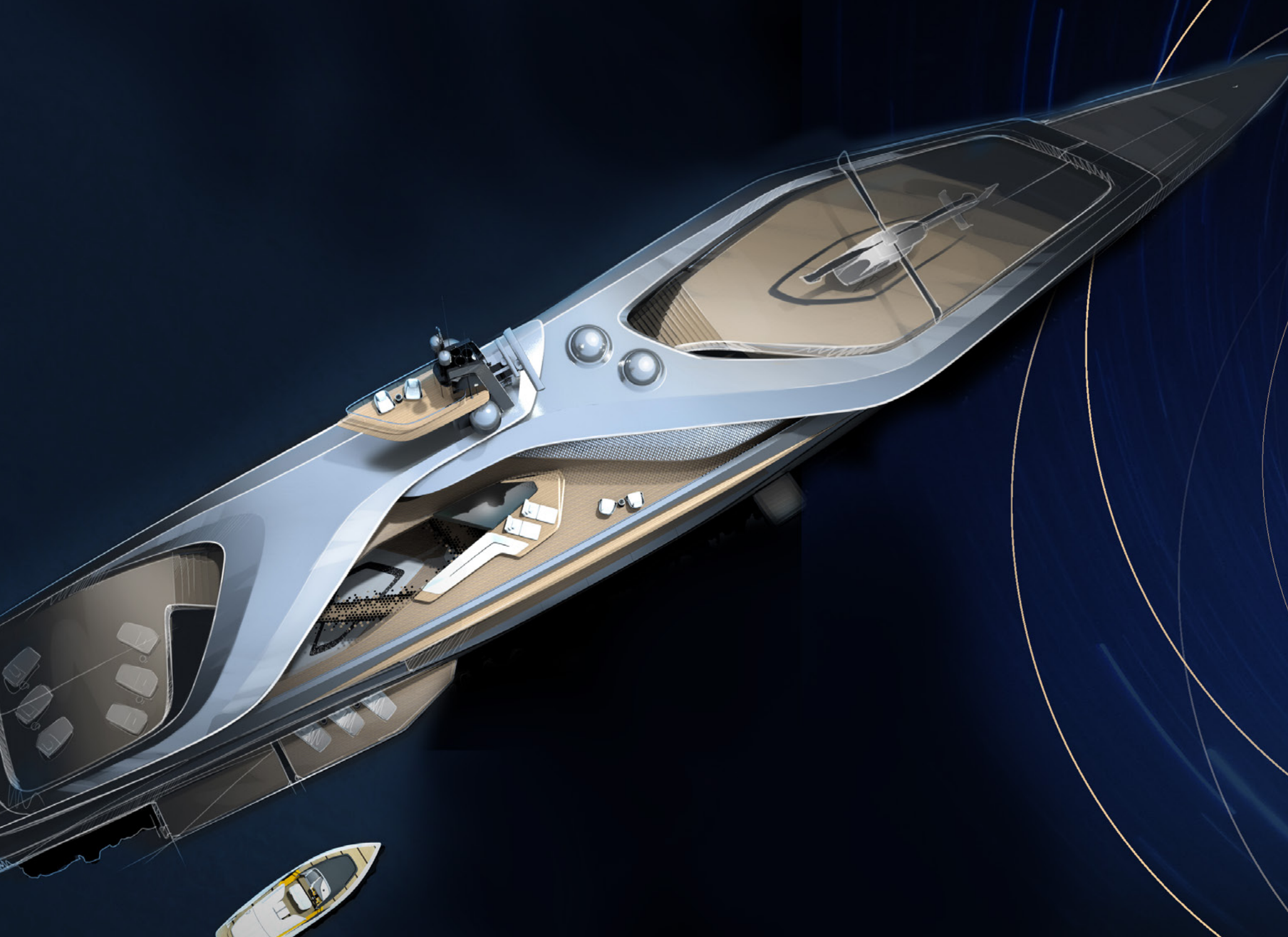
## QUESTION

**Design should challenge engineering.**

In turn engineering must respond to enable more creative design in the simplest way possible. Engineering must deliver fresh ideas underpinned by a spectrum of technology enabling design to explore new avenues, ask new questions and challenge existing paradigms.

**How can the application of future technology and engineering enable more creative design to realise a next generation of user experience?**





# KAIROS

90m / 295ft

BUILT BY

**oceAnco**

*pininfarina*



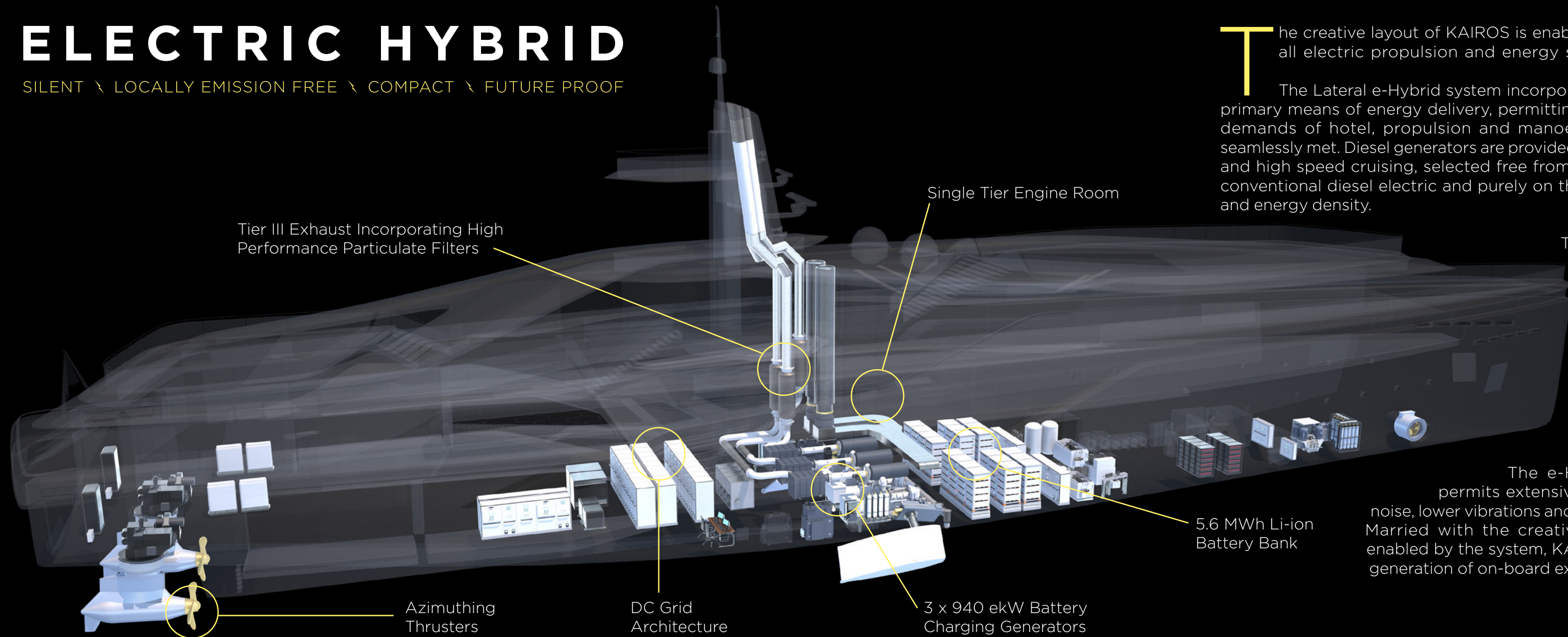
L A T E R A L

NAVAL ARCHITECTS



# ELECTRIC HYBRID

SILENT \ LOCALLY EMISSION FREE \ COMPACT \ FUTURE PROOF



Tier III Exhaust Incorporating High Performance Particulate Filters

Single Tier Engine Room

Azimuthing Thrusters

DC Grid Architecture

3 x 940 ekW Battery Charging Generators

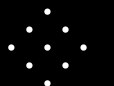
5.6 MWh Li-ion Battery Bank

The creative layout of KAIROS is enabled via an innovative all electric propulsion and energy system architecture.

The Lateral e-Hybrid system incorporates batteries as the primary means of energy delivery, permitting the varying power demands of hotel, propulsion and manoeuvring loads to be seamlessly met. Diesel generators are provided for battery charging and high speed cruising, selected free from the constraints of a conventional diesel electric and purely on the basis of efficiency and energy density.

The result is a an elegant solution with flexibility in space distribution and a compact arrangement that allows the primary machinery space to be accommodated within a single tier compartment.

The e-Hybrid architecture permits extensive operation with no noise, lower vibrations and zero local emissions. Married with the creative design solutions enabled by the system, KAIROS delivers a next generation of on-board experience.



L A T E R A L







# KAIROS MODES OF OPERATION

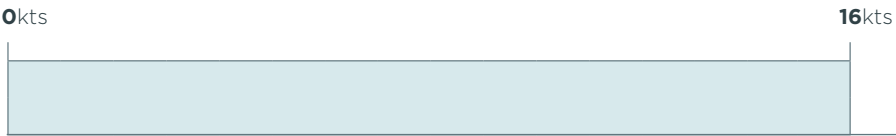
The Lateral e-Hybrid has two principle modes of energy management;

- Battery Discharge
- Battery Charge

The Lateral e-Hybrid system uses these two modes of energy management to support four typical operating scenarios;

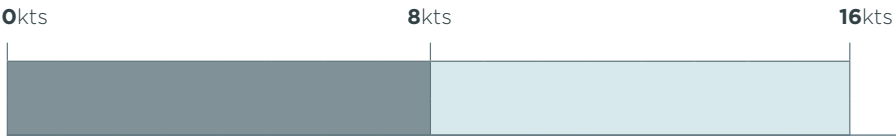
- Zero Emissions at Anchor
- Zero Emissions Silent Cruise
- Extended Cruise
- Performance Cruise

## Zero Emission At Anchor



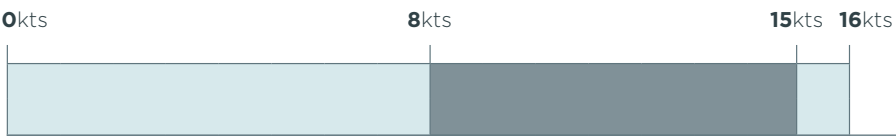
All power is supplied via the battery pack for 8 – 10 hours with zero emissions. The battery is charged during a 2 hour period with generators operating at maximum efficiency. The generators are selected not to match variable power requirements (as is current practice) but to provide optimum fuel efficiency and energy density for the extended operation of the yacht.

## Zero Emission Silent Cruise



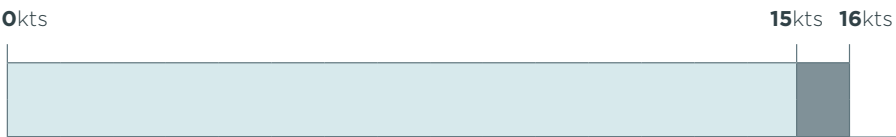
Power is provided via the battery pack only to assure silent cruising and zero emissions. The battery offers 5 hours operation at 8 knots.

## Extended Cruise

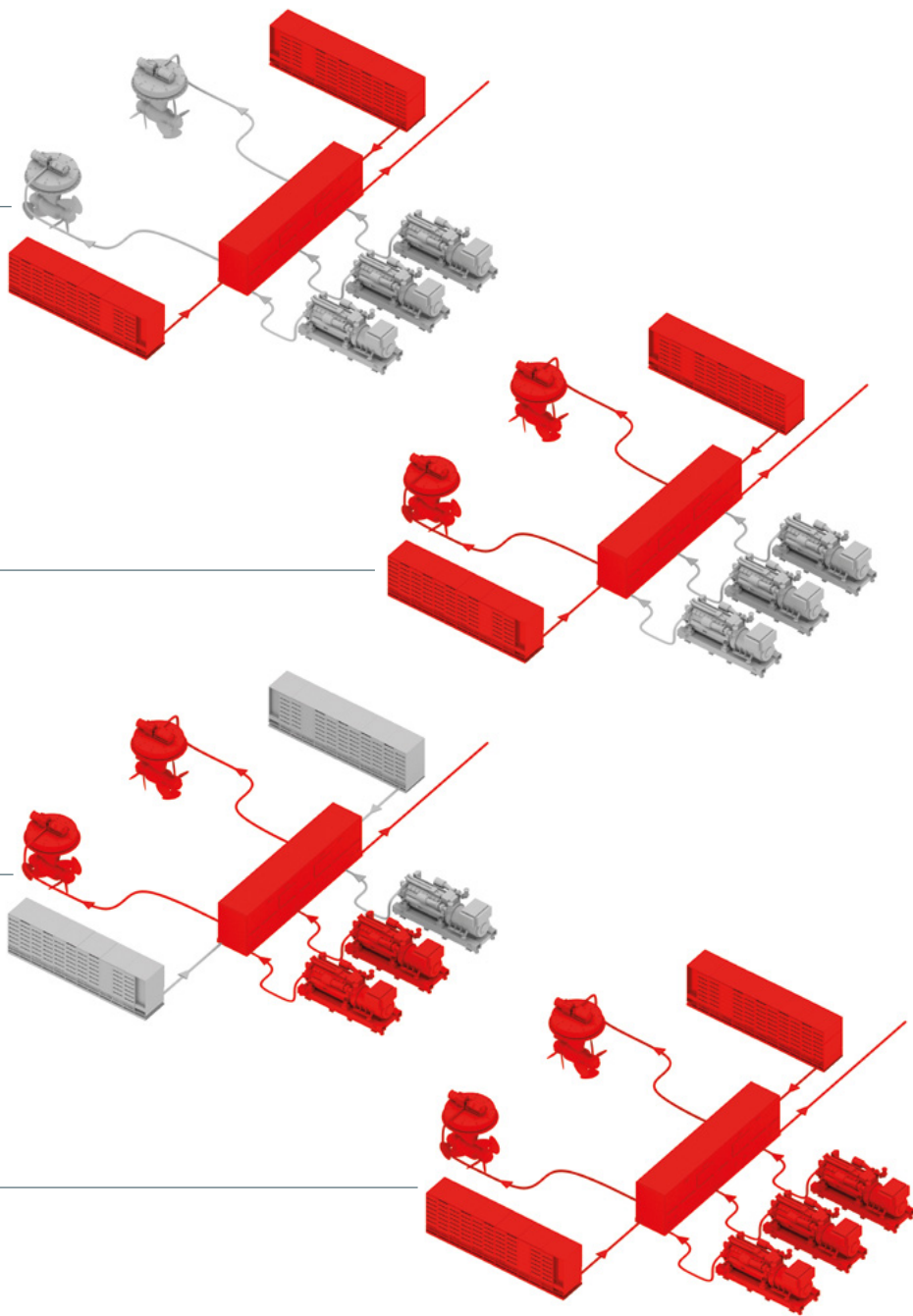


For efficient relocation or efficient long distance cruise, the power is provided by diesel generator(s) depending on speed requirement. Generator(s) will operate at peak efficiency to allow extended periods of zero emission cruising.

## Performance Cruise



All the electric power is used to achieve a top speed up to 16 knots for up to 4 hours. In this mode the three generators and the battery pack work seamlessly together to deliver maximum power.



## WHY E-HYBRID?

- Allows periods of zero emissions to suit sensitive environments and enhance the experience of those on-board with silent mode enabled.
- Offers complete flexibility of power management to suit any yacht operation without compromise, enabling the Captain and Crew to operate at higher operational efficiencies.
- This system is designed with the future in mind. The Owner will benefit from an adaptable system, allowing more freedom when it comes to upgrading to the latest technology.
- Fits in a single deck height engine room. This in turn results in more guest space available at the lower deck, next to the water.
- Lower machinery running hours resulting in reduced maintenance costs.



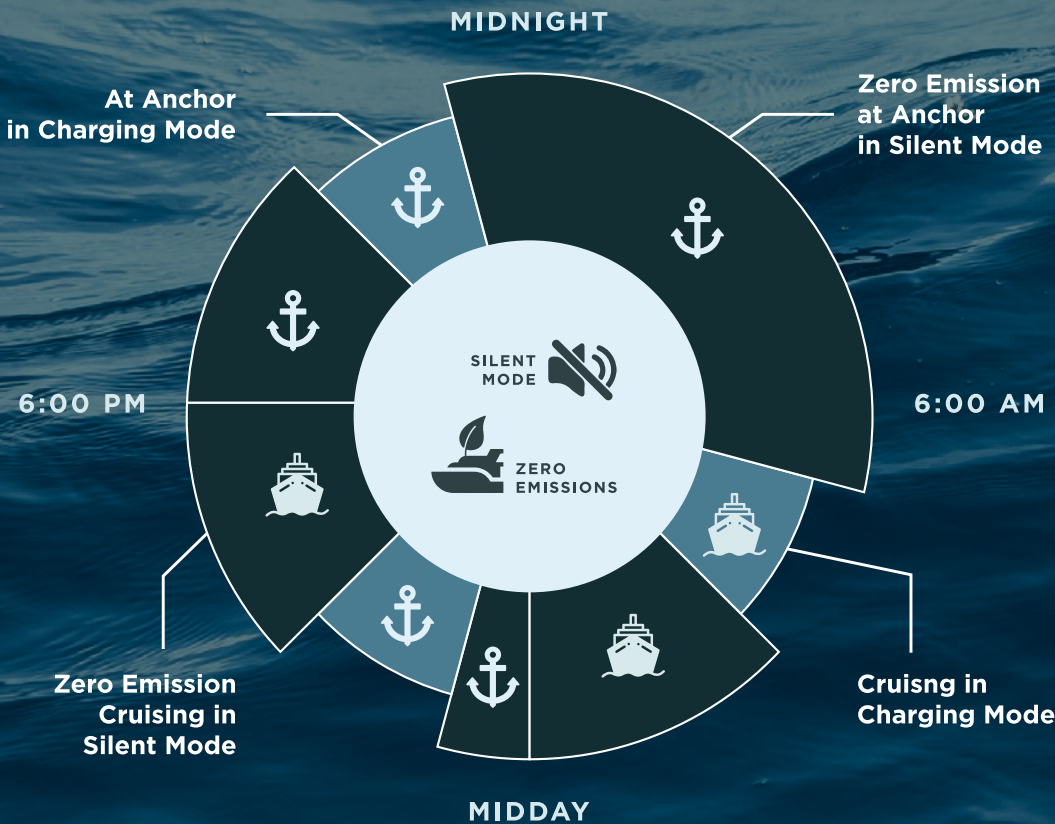




# ONE DAY ON-BOARD KAIROS

The e-Hybrid system is designed to suit a wide range of possible operating scenarios. This illustration presents one possible example of a day on-board KAIROS.

75%  
OF A DAY ON-BOARD IS SPENT IN  
ZERO EMISSION  
& SILENT MODE  
INCLUDING  
6 HOURS  
OF CRUISING



Ranges shown are for vessel in Zero Emission Cruising in Silent Mode.

A range of 5400 nm is achieved by sailing in **Extended Cruise Mode**



BAY AREA



MONACO



NEW YORK



SINGAPORE











A standard-bearer of Italian style on the world stage for 90 years, internationally renowned design house Pininfarina has offices in Italy, Germany, the United States and China. Blending the physical and digital worlds through aesthetics and technology, Pininfarina is deeply involved in the creation of unique user experiences, focusing its activities on the design, conception and production of one-off or limited series cars.

Pininfarina is not only a leader of design in the automotive industry, however. It has carried out more than 600 projects in areas such as transportation (including yachts, airplanes and trains), industrial design, architecture and interior design, and digital design, garnering numerous international awards for its work.



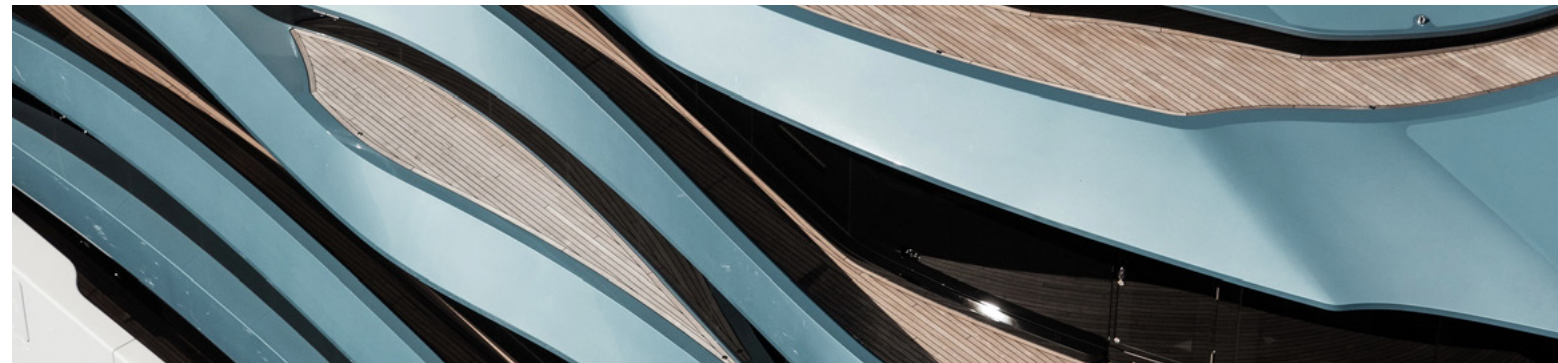
*“Our passion as designers is to imagine new concepts of space capable of bringing enchantment to every moment of the experience.”*

PAOLO PININFARINA



Oceanco collaborates with creative minds from inside and outside of yachting to imagine designs that are simultaneously visionary and practically achievable.

Inspired by evolving lifestyle mindsets and emerging technologies, we see our Future Designs as a viable vision of what a superyacht could be and the freedom it could provide, when executed at the highest possible level.









# S K A I R



L A T E R A L

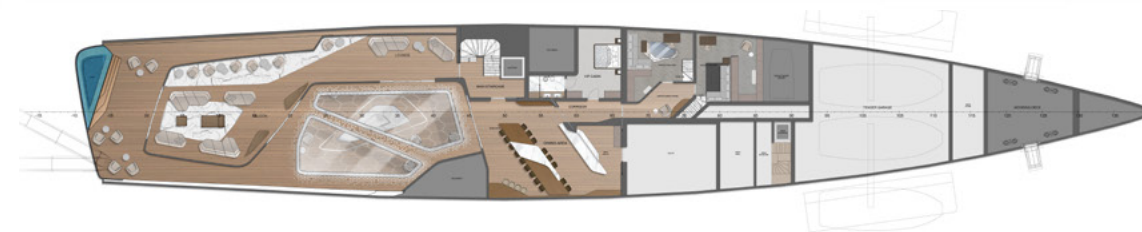
*pininfarina*

BUILT BY  
*oceAnco*

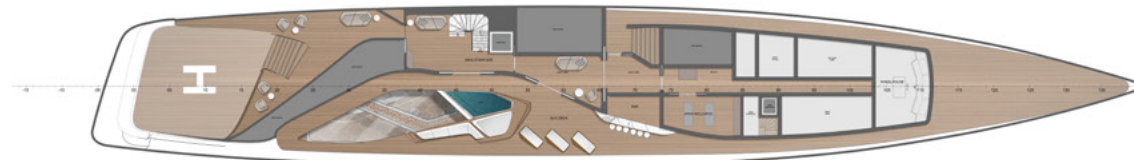
PROFILE



TOP DECK



MAIN DECK



UPPER DECK



LOWER DECK





# TECHNICAL CHARACTERISTICS

Length Overall ..... **88.0 m**  
Length Waterline ..... **88.0 m**  
Beam..... **15.0 m**  
Draught (Full Load)..... **3.9 m**  
Gross Tonnage ..... **2900**  
Performance Speed.....**16 knots**  
Extended Cruise.....**14 knots**

Silent Cruise.....**8 knots**  
Range ..... **5400 Nm**  
Main Propulsion Battery Pack... **5600 kW/h**  
Generator Package ..... **3x 940 ekW**  
Guest Anchor Silent Mode.... **8-10 hours**  
Silent Cruise Mode..... **5 hours**  
Battery Bank Charge Time..... **2 hours**







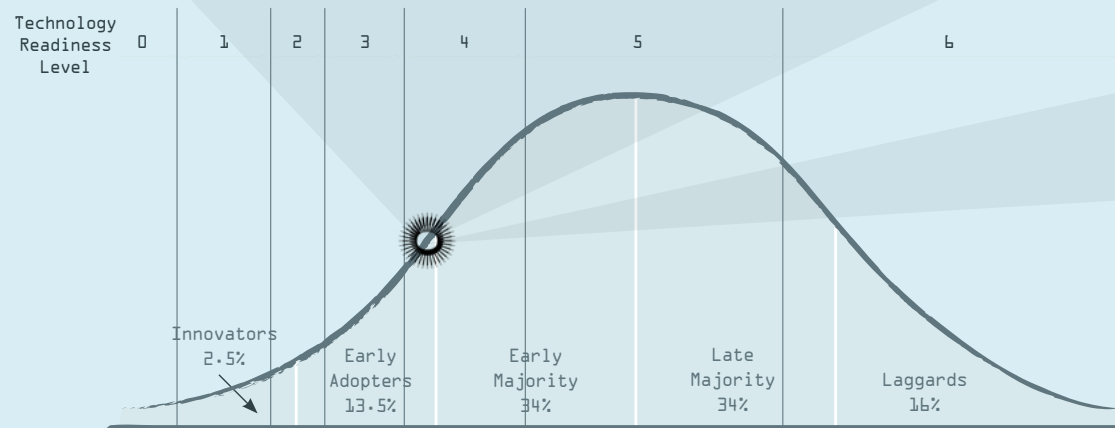


# KAIROS

The use of large batteries on-board superyachts is not novel, there are many existing or in build projects utilising batteries at large scale. The size of battery bank selected for KAIROS is however large compared with the size of the yacht. This is not a significant technical or commercial risk.

The innovative aspect of the Lateral e-Hybrid system is in the

holistic integration of the battery as the primary source of power and subsequent reduction in installed power and prime movers. This arrangement is in use for some commercial vessels and is a logical development of existing power management systems fitted to large yachts. It represents a low risk development that is optimising current available technology in a novel arrangement.



## TECHNOLOGY READINESS LEVEL

- **TRL 0 – Blue Sky Idea**  
Anecdotal concept with no analytical proof of feasibility.
- **TRL 1 – Paper Concept**  
Exists only in paper proposals or academic research, analytically proven.
- **TRL 2 – Industrial Development**  
Product is not being developed for a marine industry application however a test rig or prototype product exists to develop the technology to a real world application.
- **TRL 3 – Marine Product Development**  
Product is not offered for sale, however a test rig or prototype product/ installation exists.
- **TRL 4 – First User**  
At least 1 reference yacht, concept fully certified by authorities for marine use.
- **TRL 5 – Common Practice**  
Multiple reference yachts and vendors available.
- **TRL 6 – Obsolete**  
Obsolete by increased regulation or alternative technology.



## ASK FURTHER QUESTIONS

### Matteo Magherini

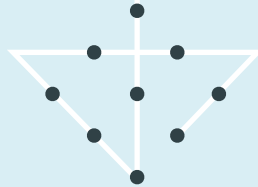
Naval Architect/Business Development Coordinator  
mmagherini@lateral.engineering  
T +44 (0)7741 657 550



### Simon Brealey

Principal Engineer - Mechanical  
sbrealey@lateral.engineering  
T +44 (0)23 8022 8855





L A T E R A L

NAVAL ARCHITECTS

BUILDING 13,  
SHAMROCK QUAY,  
WILLIAM STREET, SOUTHAMPTON,  
SO14 5QL, UK

T +44 (0)23 8022 8855

[WWW.LATERAL.ENGINEERING](http://WWW.LATERAL.ENGINEERING)