



# OCEANVOLT

Clean Electric Power &  
Propulsion



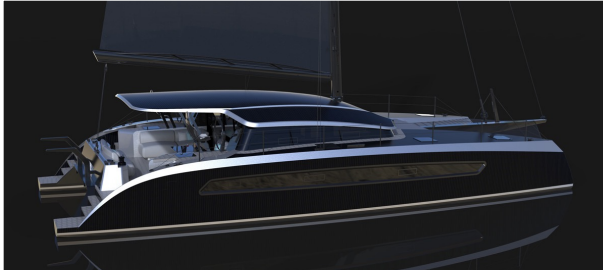
# OCEANVOLT IN A NUTSHELL

- Manufacturer of complete electric and hybrid power and propulsion systems
- Founded 2004
- Headquarters in Finland
- 23 employees (21 in Helsinki, 2 in USA)
- Almost 1000 yachts around the world
- Global sales and support network





# 80+ BOATBUILDER PARTNERS



**McConaghy Yachts**



**Vaan Yachts**



**X-Yachts**



**Baltic Yachts**



**Garcia**



**Outremer**



**Elan**



**Alubat**



**Wally**



**Leonardo Yachts**



**Spirit Yachts**



**Pogo Structures**

# OLIVER HARTAS

- Originally from Sydney
- Raced 18ft skiffs, match racing, yachts, etc.
- Area Sales Manager at Oceanvolt for 3 years: Asia, Pacific, Turkey, RSA, Greece and Baltics





# ELECTRIC PROPULSION

- Sailing yachts 30-70ft
- Light displacement motorboats
- Consider:
  - Range
    - Pure electric – 5 hrs range typically
    - Hybrid
  - Refit: Existing engine
  - New build (30+ boat builders)





# TYPES OF ELECTRIC MOTOR



Sail drive



Shaft drive



Outboard



Pod motor



# TYPES OF ELECTRIC MOTOR



Sail drive



Shaft drive

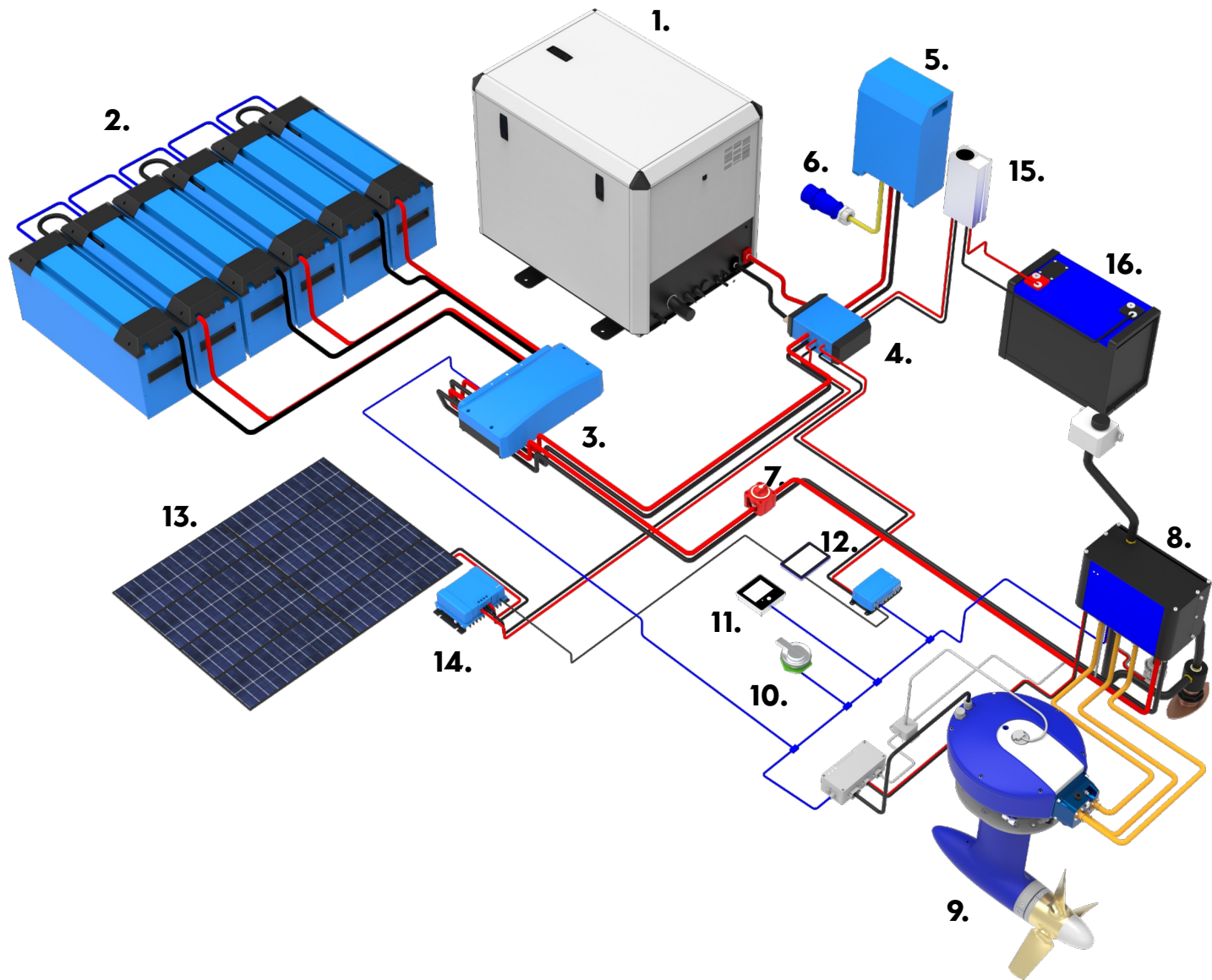


Outboard



Pod motor



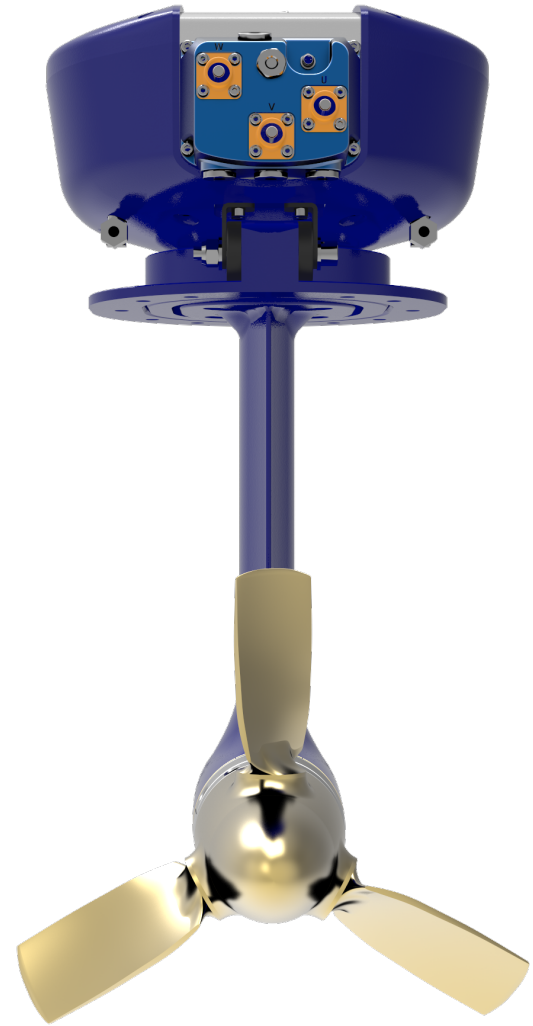


1. DC Generator
2. Propulsion batteries (46.8 kWh)
3. Battery connection box (BMS)
4. Bus bar
5. Charger/inverter
6. Shore power connection
7. Main switch
8. Motor controller (liquid cooled)
9. Electric motor (saildrive)
10. Control lever
11. Display
12. Remote system monitoring & diagnostics
13. Solar panels
14. Solar charger
15. DC/DC converter
16. House battery



# HP VS KW DISCUSSION

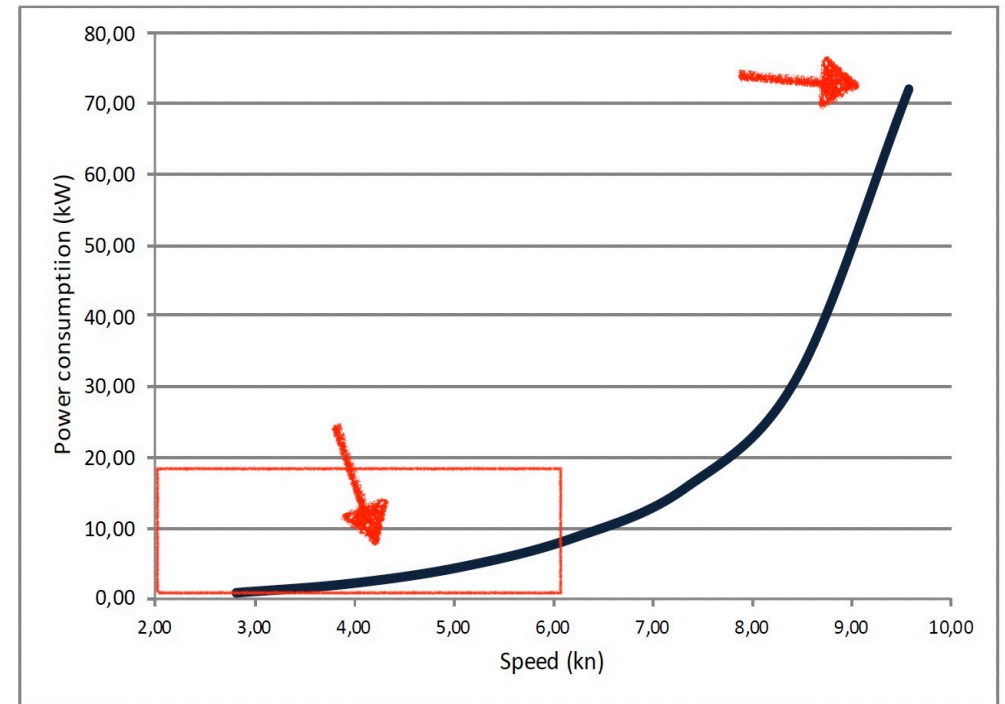
- “Common conversion”  
1 kW = 1.34 horsepower → misleading
- The propeller moves the boat
  - Bigger, slower propeller much more efficient
- Diesel power at 3000 rpm
  - Saildrive reduction to 1200-1350 rpm
  - No power (thrust) at low RPM





# HP VS KW DISCUSSION

- Most boat builders use 4 kW per ton as a guideline
- With Oceanvolt the recommendation is 1.25 kW/t to max 2 kW/t
  - This is because it is torque that is moving the boat, not power
    - Therefore, we calculate 2.5-3 hp/kW instead of the standard 1,34hp/kW
- How much does the hull require power?
  - Because the torque is instant with electric motors, it does not require excess horsepower to create torque



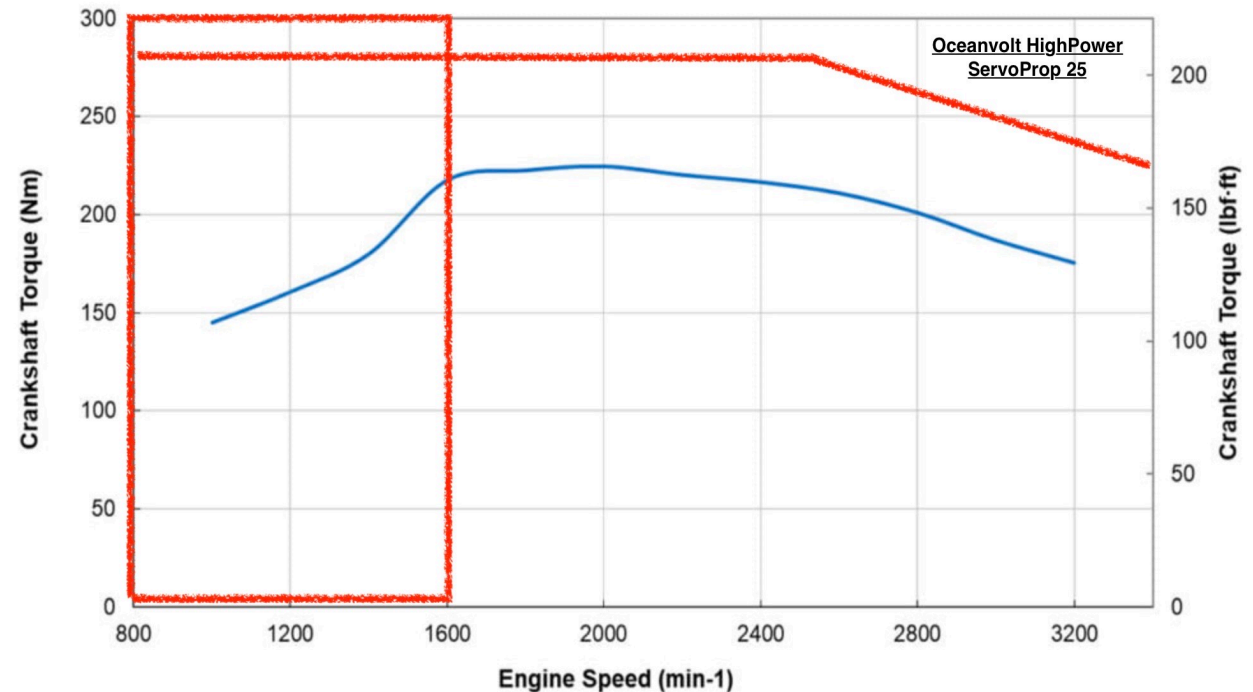
Fn	Speed [kn]	Resistance [N]	P eff	Power [kW] P del	P bat
0,125	2,82	218	0,32	0,72	<b>0,85</b>
0,175	3,94	438	0,89	1,88	<b>2,13</b>
0,225	5,07	767	2,00	4,04	<b>4,49</b>
0,275	6,20	1251	3,99	7,71	<b>8,57</b>
0,325	7,32	1948	7,34	14,05	<b>15,61</b>
0,375	8,45	3381	14,70	28,13	<b>31,25</b>
0,425	9,58	6880	33,90	64,87	<b>72,08</b>



# HP VS KW DISCUSSION

- It is all about low end torque
  - The ServoProp 25 (33.5 mhp) produces almost two times more low end torque than the 80 mhp Yanmar.
- Diesel has higher top speed
  - Where you need power is in top end speed
  - Diesel superior here, but...
  - Are you drag racing your yacht?

4JH80 Torque curve

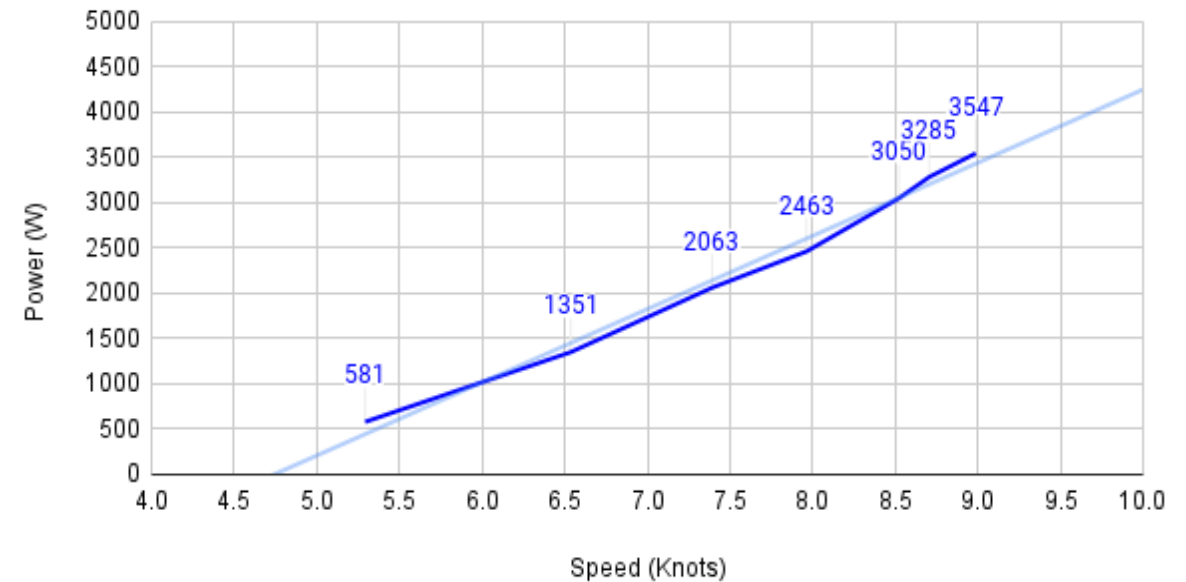


# HYDROGENERATION

- All electric motors have this capability, however few can control it
  - The motor works therefore as a 2-in-1 system
- The ServoProp 25 will produce 2 kW at 7.5 knots
  - Gain energy for free, without any emissions
- What about drag?
  - Drag is very dependant on the hull and the speed
    - At hull speed (8.8 knots for XC47) the drag penalty is max. 0.5 knots
    - If below hull speed the drag penalty can be up to 20% speed reduction
      - SOW 6 kts w/o hydrogeneration → 4.8 kts with hydrogeneration

## X-Yachts XC47 Regeneration Estimate

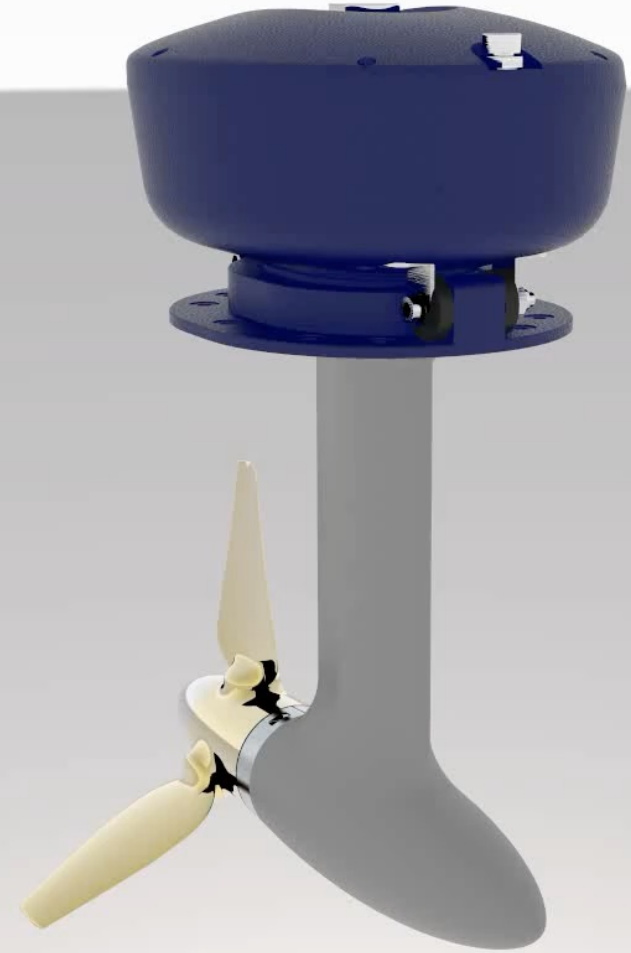
Estimate is based HighPower ServoProp





# SERVOPROP

- Patented, award-winning technology
- Controllable pitch propeller blades
- Compared to folding prop:
  - 30% better forward thrust
  - 100% better reverse thrust (equal thrust both directions)
  - 300% better hydrogeneration
- Available in 10 kW, 15 kW and 25 kW version



# LITHIUM BATTERIES

- Only use LFP (LiFePO4) batteries
  - One of the safest lithium battery chemistries
  - No thermal runaway risks
- Battery fires only caused by riskier chemistries such as NMC & NCA
- Battery Management System (BMS) is most important aspect
  - The BMS protects and ensures safe operation and health of the batteries, thus making the batteries longer lasting and problem free
  - If you opt to source your own batteries, you may find cheaper batteries. Cost of lithium cells is not the difference, it is in the BMS design where corners are cut.
  - Cheap batteries = lower quality BMS = problems and risk

## LFP Series

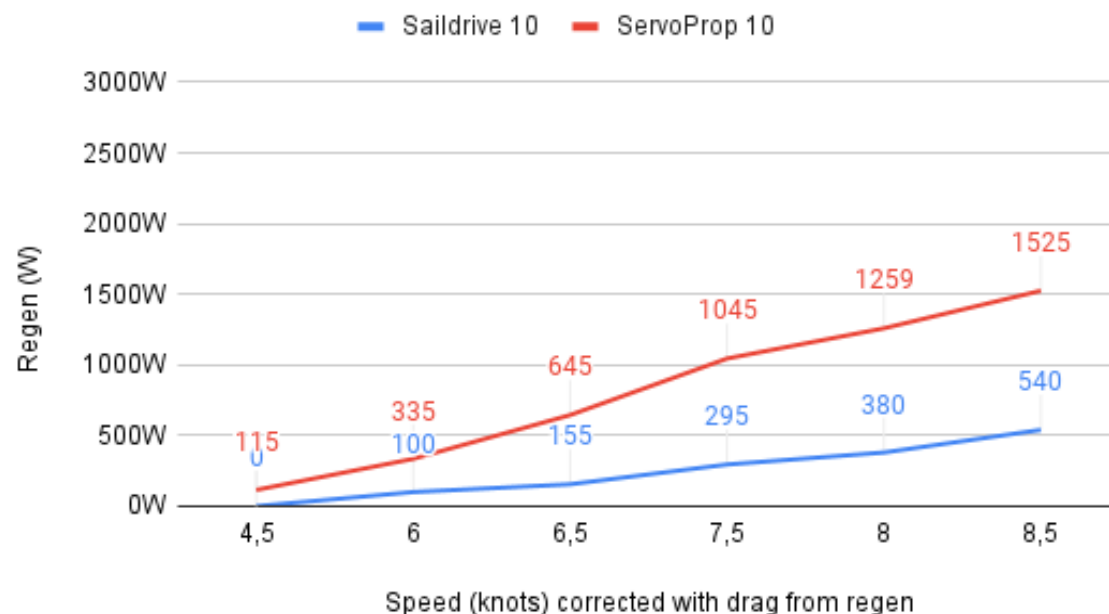




# CHARGING

- Shore power
  - Most of the marinas have access to shore power (6-16 A – 1.4-3.8 kW)
  - All Oceanvolt systems able to recharge overnight with standard marina power
- Hydrogeneration
  - ServoProp 25 produces approx. 2 kW at 7.5 knots
  - All Oceanvolt motors can regenerate
  - Very dependant on prop
- Generator
  - Enables complete energy self-sufficiency, thus adding comfort
- Auxiliary sources
  - Solar, wind turbines etc
  - Solar panels are always recommended

Hydrogeneration Estimate for Saildrive 10 & ServoProp 10



# GENERATORS IN HYBRID SYSTEMS

- 48 VDC generators
  - Lighter, more efficient, less wear and tear compared to AC generators
- Consumption 0.3L/kWh + small margin
  - 11 kW generator = 3.8L/hr
- How is the generator sized for a Hybrid boat?
- [“Explaining an Oceanvolt Hybrid”](#)



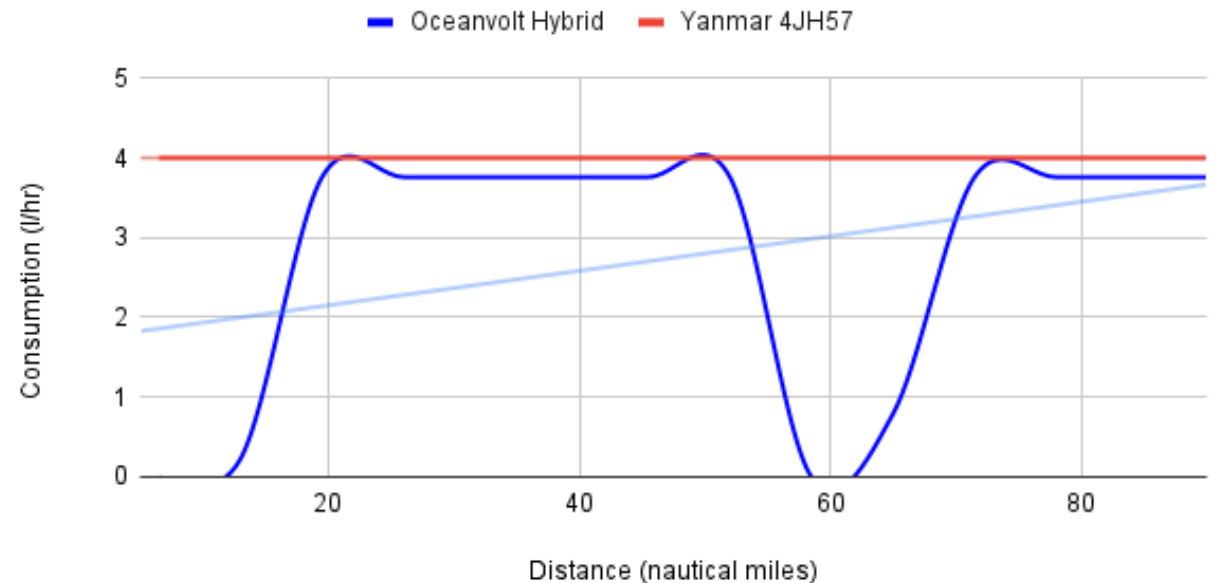


# HOW DOES THE HYBRID SYSTEM COMPARE TO A TRADITIONAL DIESEL?

- Consumption – Heartbeat
  - Approximately 30% less consumption over 90 nautical miles of motoring
- Generator
  - Graph indicative only for propulsion needs, excluding house power
- Versatility & Comfort
  - The whole system is not only for propulsion, but for the entire power management system.
  - Use electricity as you were at home, when the system is not used for propulsion

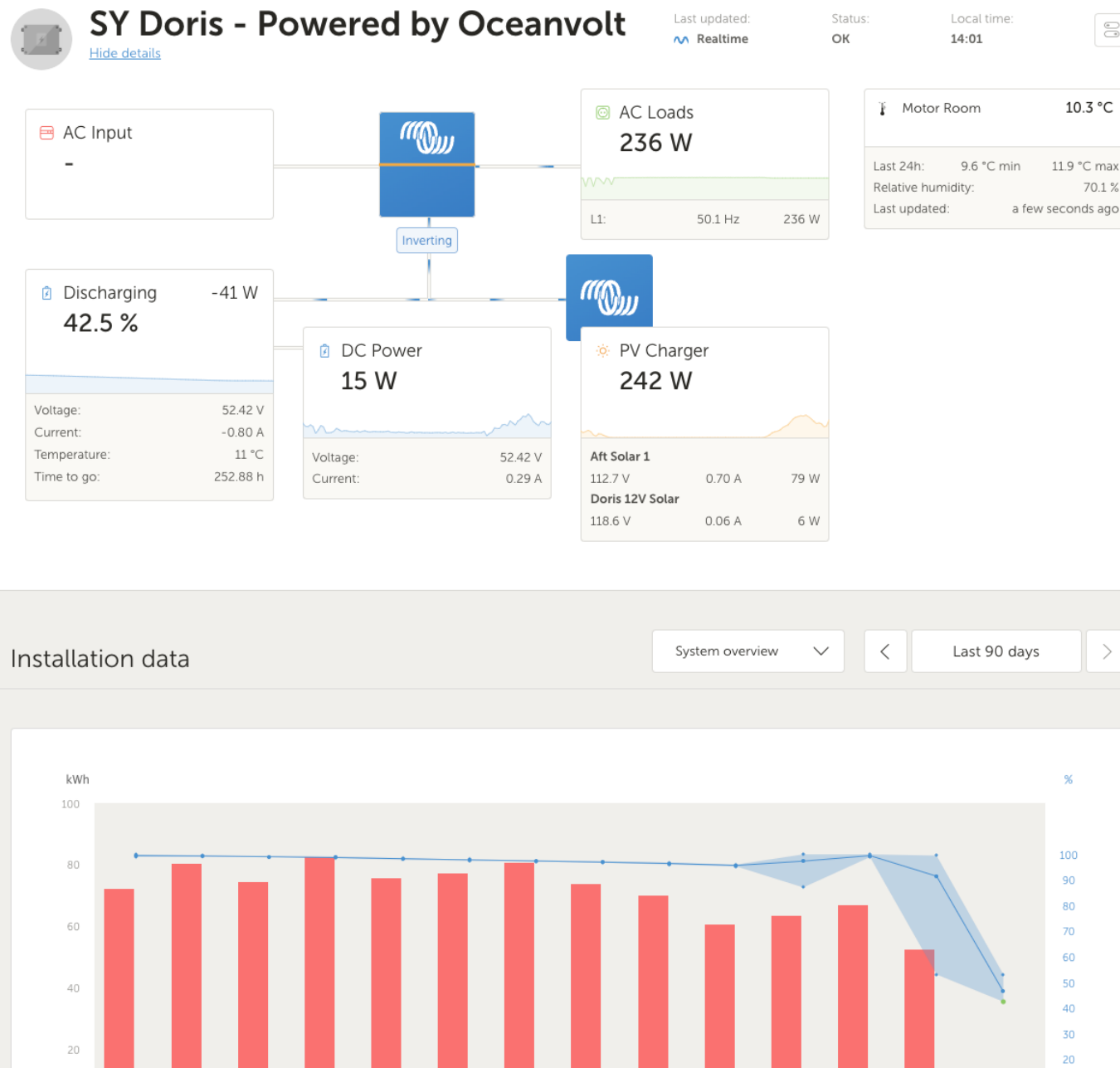
## Diesel vs. Hybrid consumption

X4.9e consumption at 6,5 knots



# SYSTEM MONITORING

- Custom Victron VRM & Cerbo GX
  - The main monitoring and support interface both onboard and remote access
- Enables control for most of the system from one point
- Provides statistics for the user and control
- For best experience, requires an internet connection
- User can configure custom dashboards with almost any data inputs





# MAINTENANCE

- Almost maintenance free except for the generator (normal diesel engine maintenance schedule)
- Keep batteries above freezing point
- Allow system to continue monitoring to prevent deep discharge
- Regular software updates from Oceanvolt
- Remote maintenance/service
- Due to this the maintenance costs are significantly lower than on traditional diesel systems

 OCEANVOLT

- 
- # MAINTENANCE
- Almost maintenance free except for the generator (normal diesel engine maintenance schedule)
  - Keep batteries above freezing point
  - Allow system to continue monitoring to prevent deep discharge
  - Regular software updates from Oceanvolt
  - Remote maintenance/service
  - Due to this the maintenance costs are significantly lower than on traditional diesel systems
-  OCEANVOLT





# ADVANTAGES FOR THE USER/SKIPPER

- Motor sailing
- No range or operating restrictions when sailing
- Instant torque and power!
- Easy handling
- Silent
- Facilitates deck communication
- The generator runs automatically, when needed
- Complete power management
  - Sustainable energy from wind, sun and sea
  - Hydrogeneration as the main energy source





# WHY SHOULD YOU SWITCH TO ELECTRIC – NOW?

- More living space
- More comfort
- Complete power management
- Easy maintenance
- Sustainable development
- Incoming legislation forbidding combustion engines in major harbours/cities. E.g. AMS, CPH, etc.







# THANK YOU

[oliver.hartas@oceanvolt.com](mailto:oliver.hartas@oceanvolt.com)