SNAME MARITIME 2022 CONVENTION

26-29 September | Houston, TX

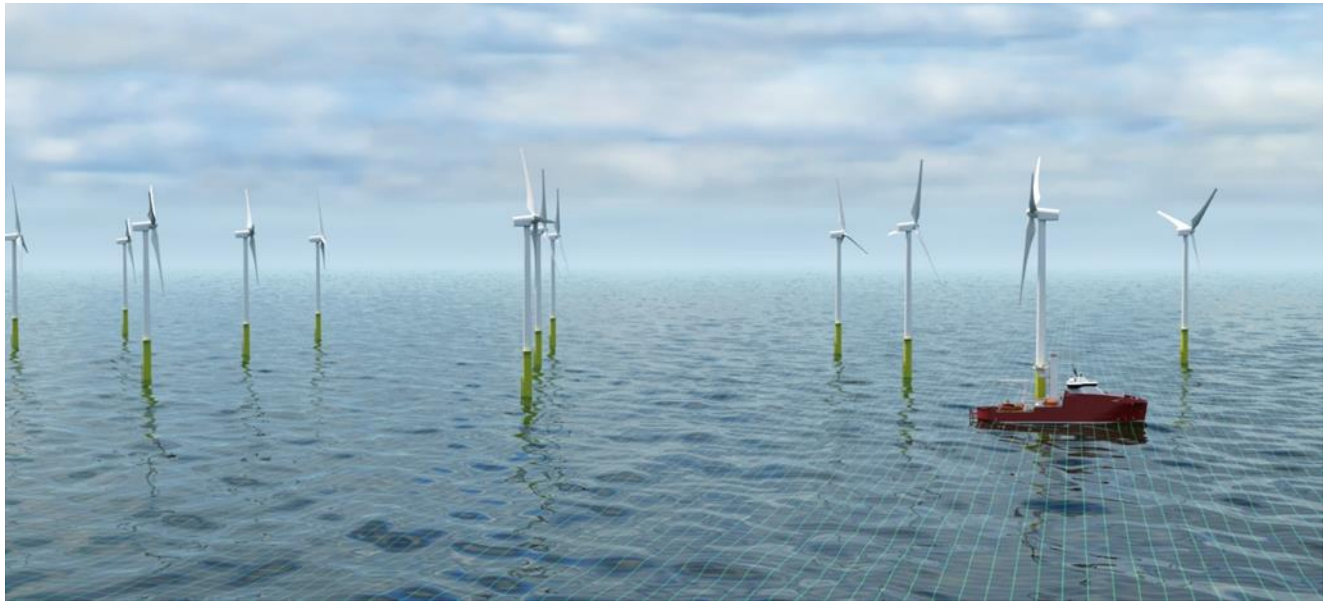
Windfarm SOV: The Pathway to a Fully Decarbonized Vessel

Presented by: Shanna Hawkins

VARD™

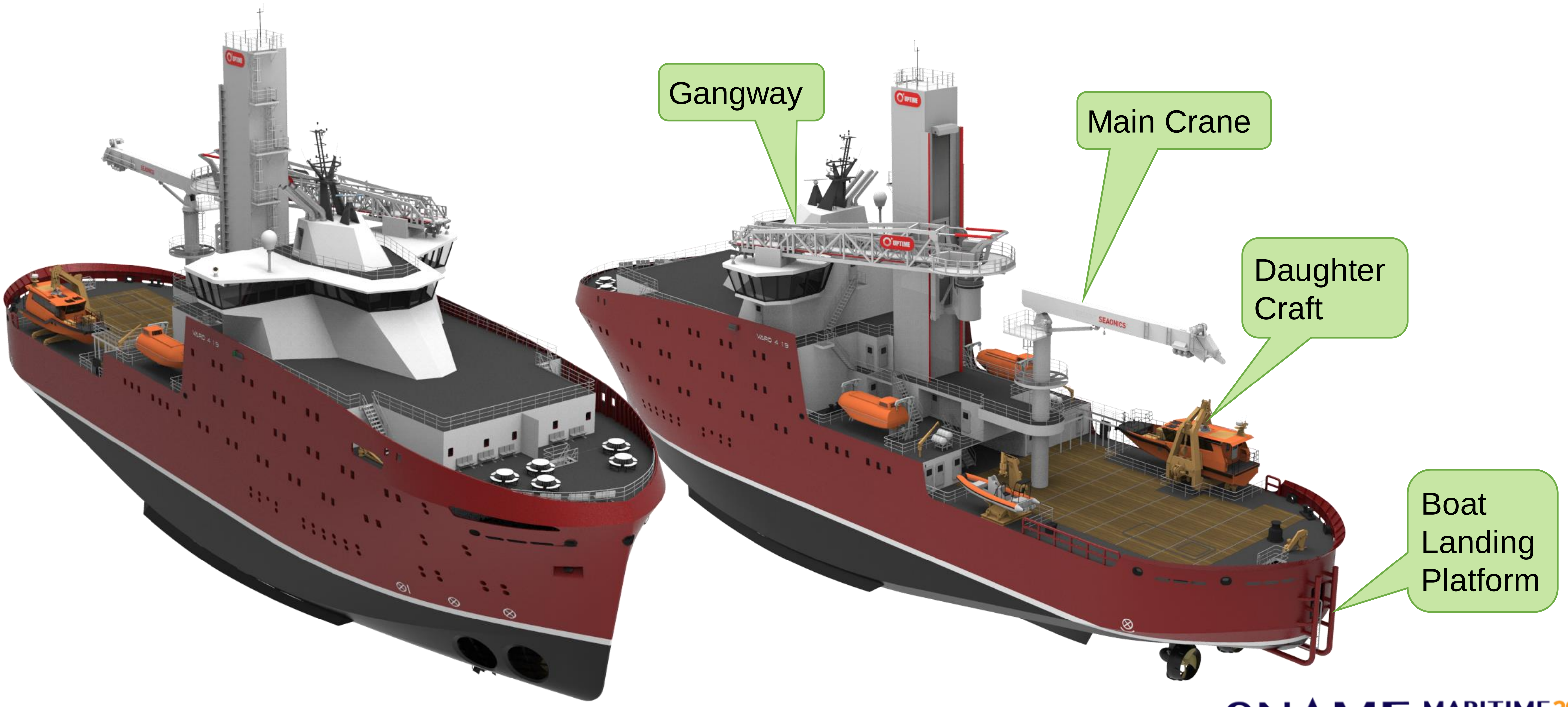
a Fincantieri company

Pathway to a Fully Decarbonized Vessel

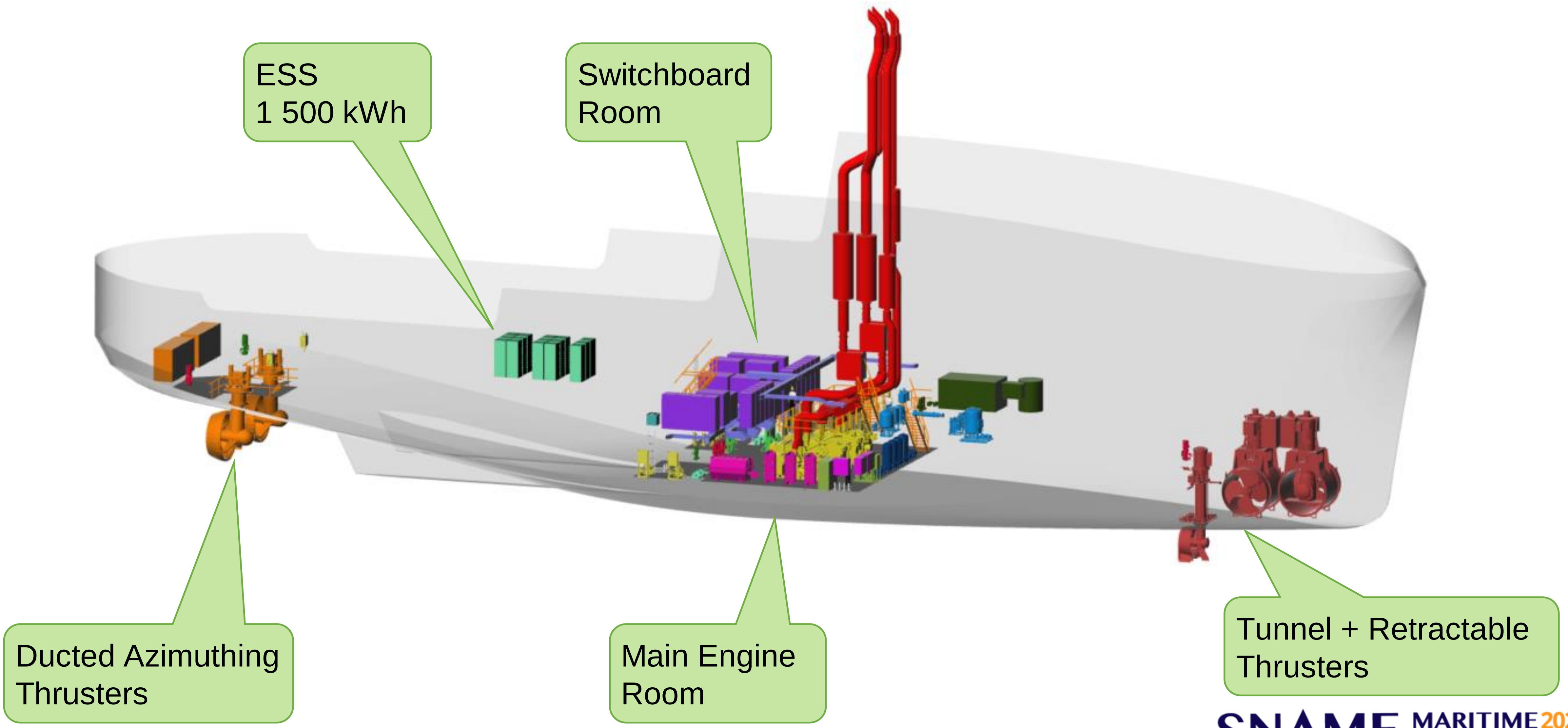


SOV Design → Renewable Energy Source → Zero Emissions Vessel

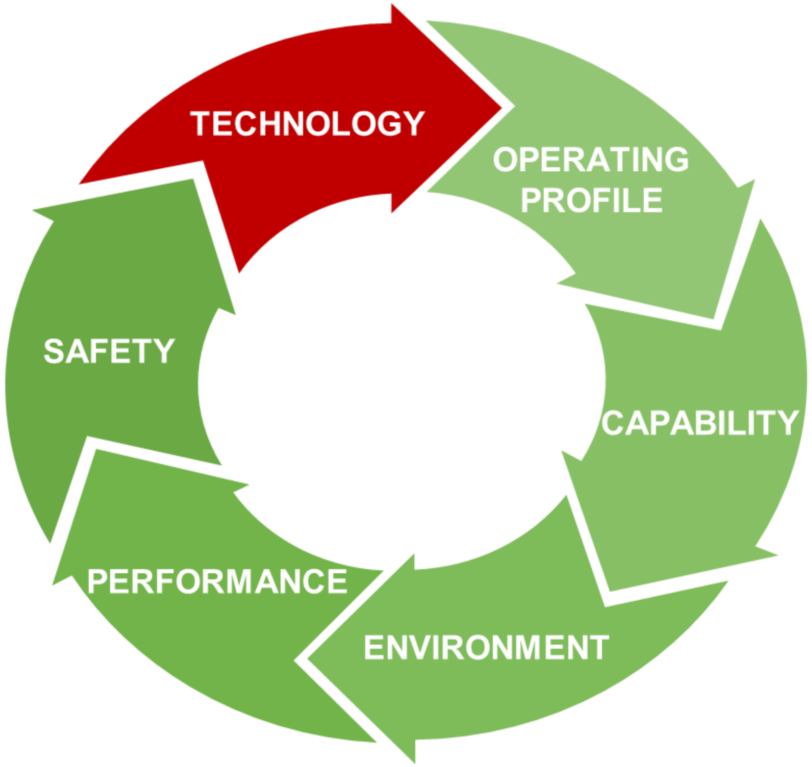
Windfarm Service Operations Vessel (SOV)



SOV Baseline Design



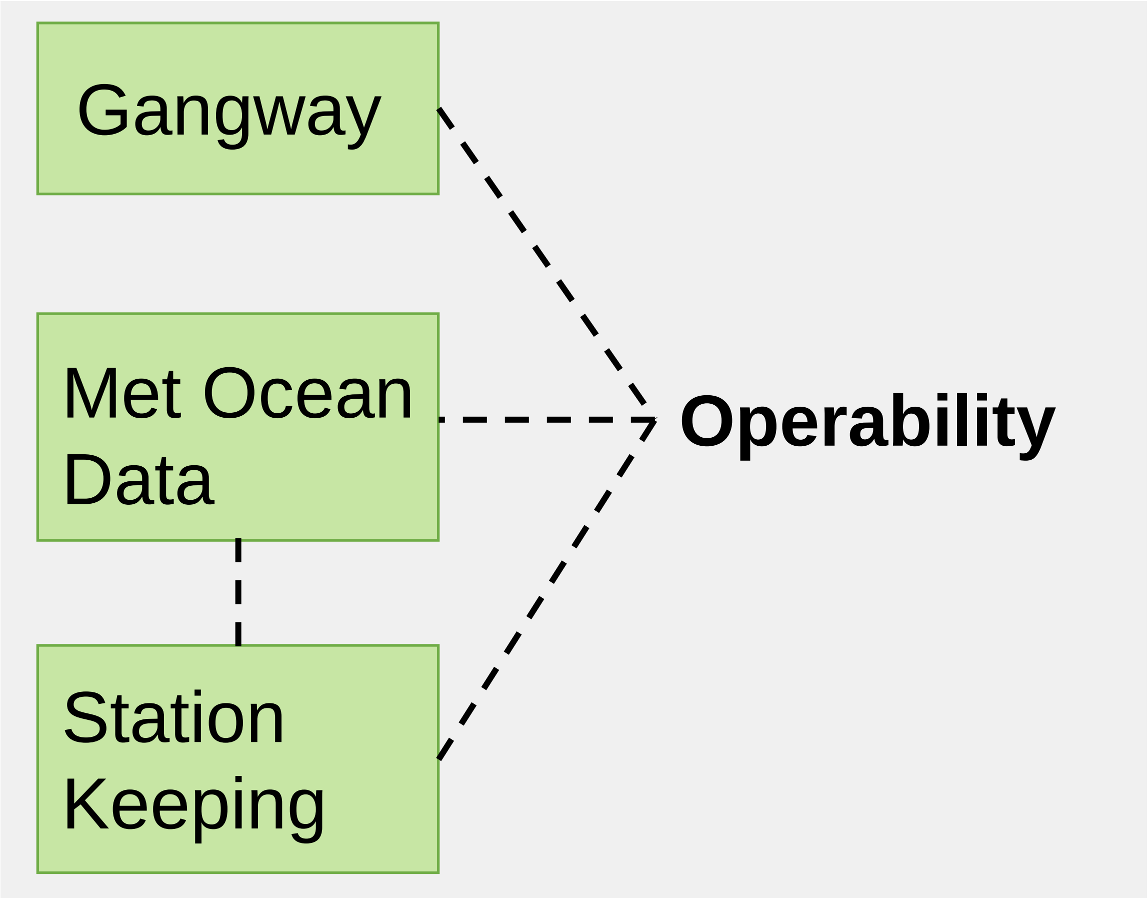
Zero Emissions SOV Design

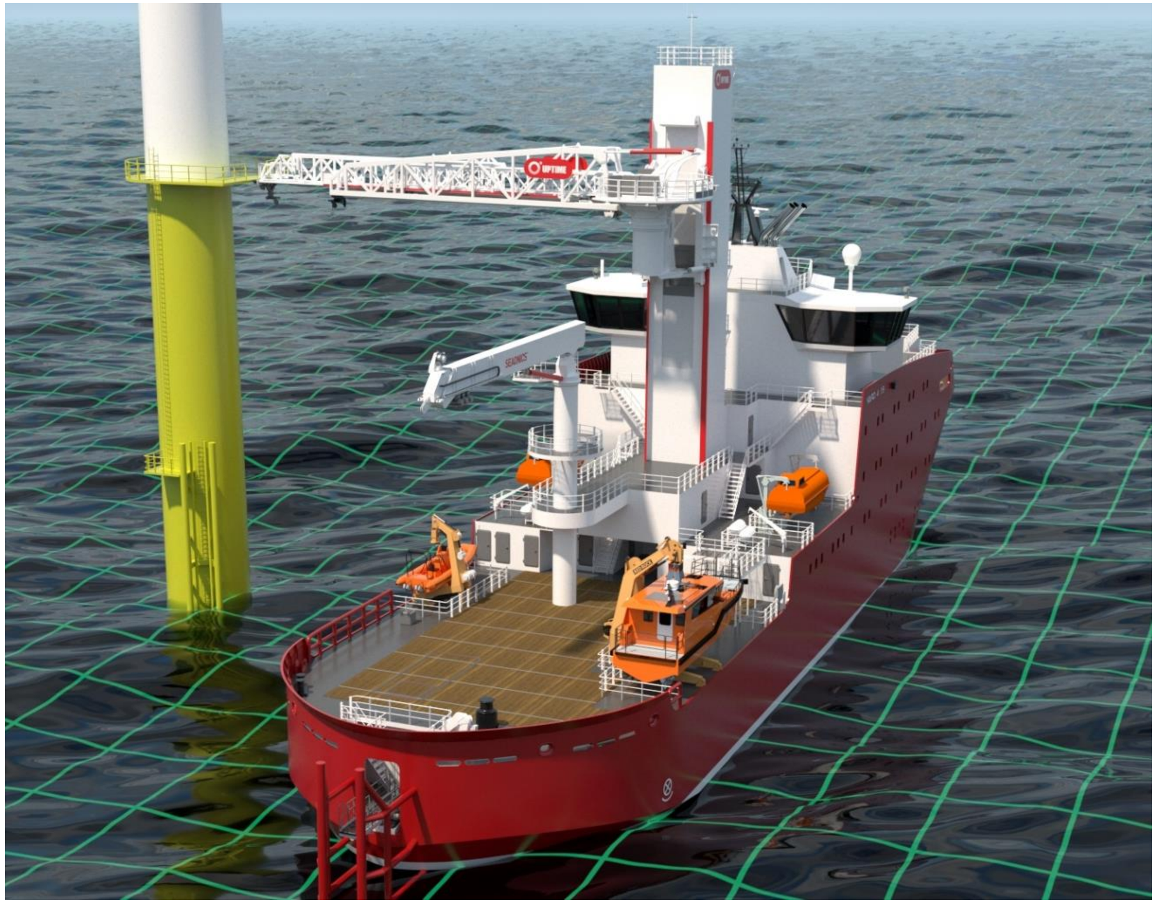


Batteries as Decarbonized Solution

- Proven Technology
- Good Performance
- Flexible Integration

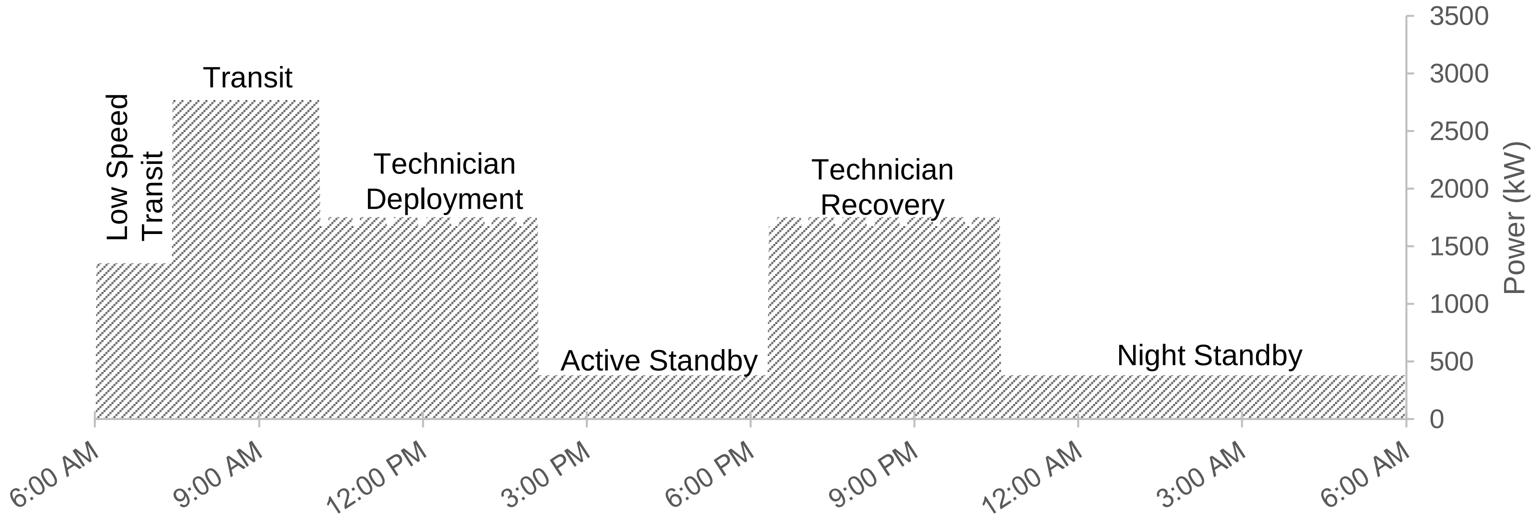
Environmental Impact on Operability



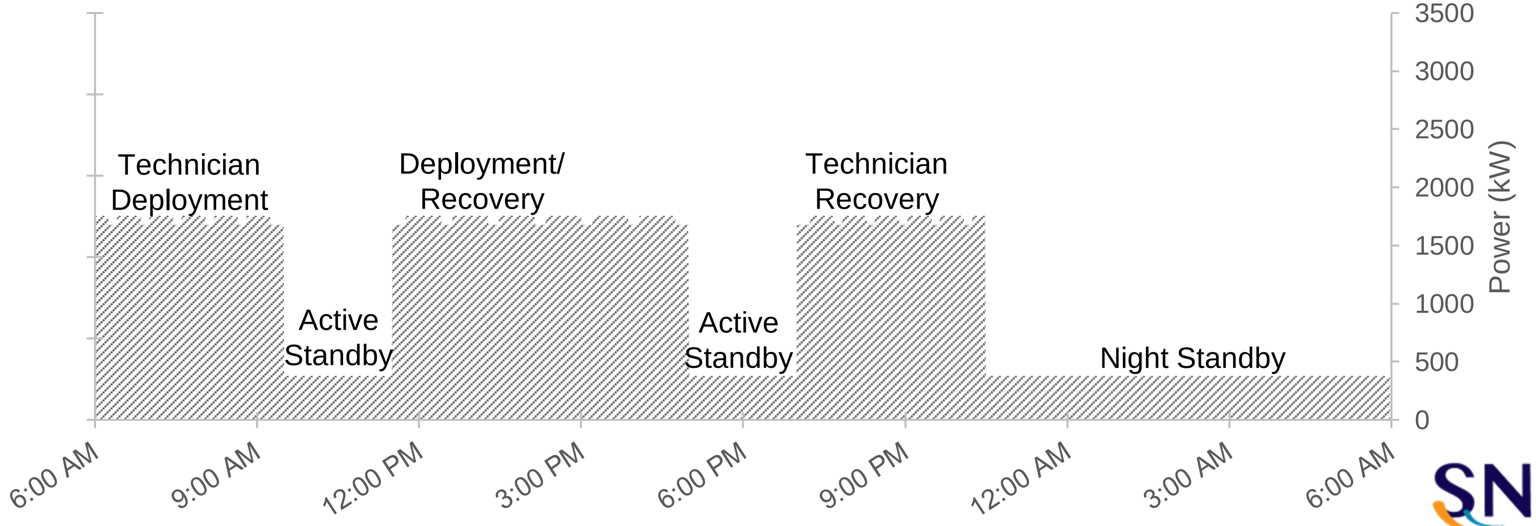


Operational Profile: 14-day Cycle

Day 1



Day 2-13



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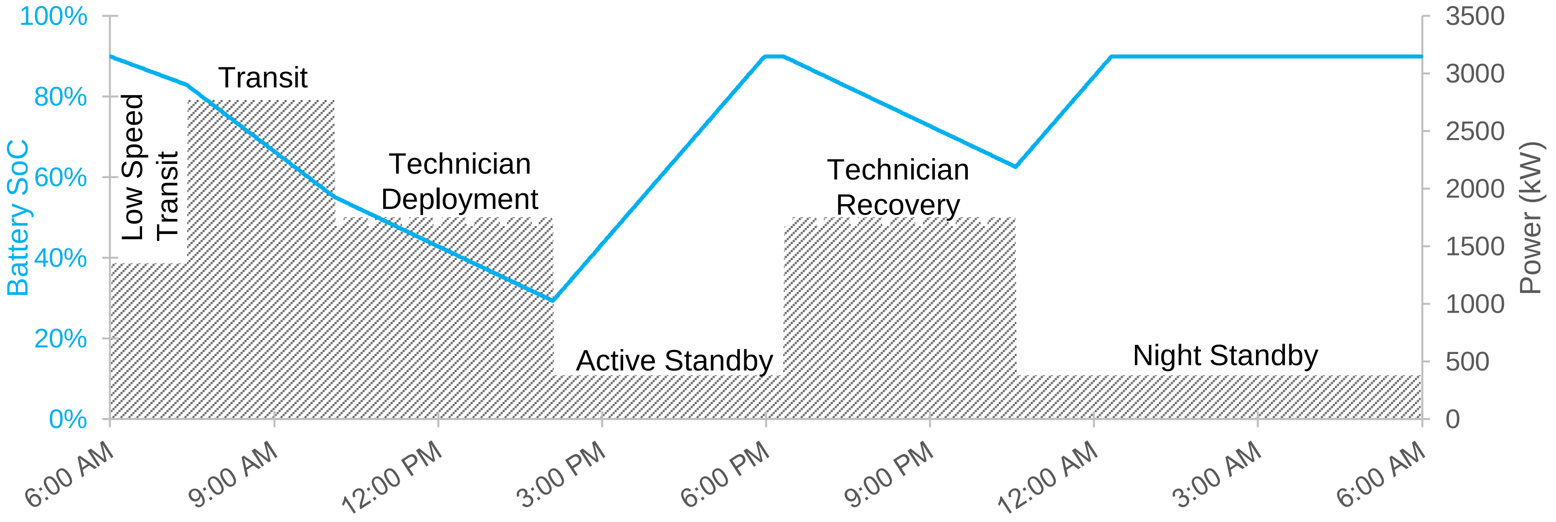
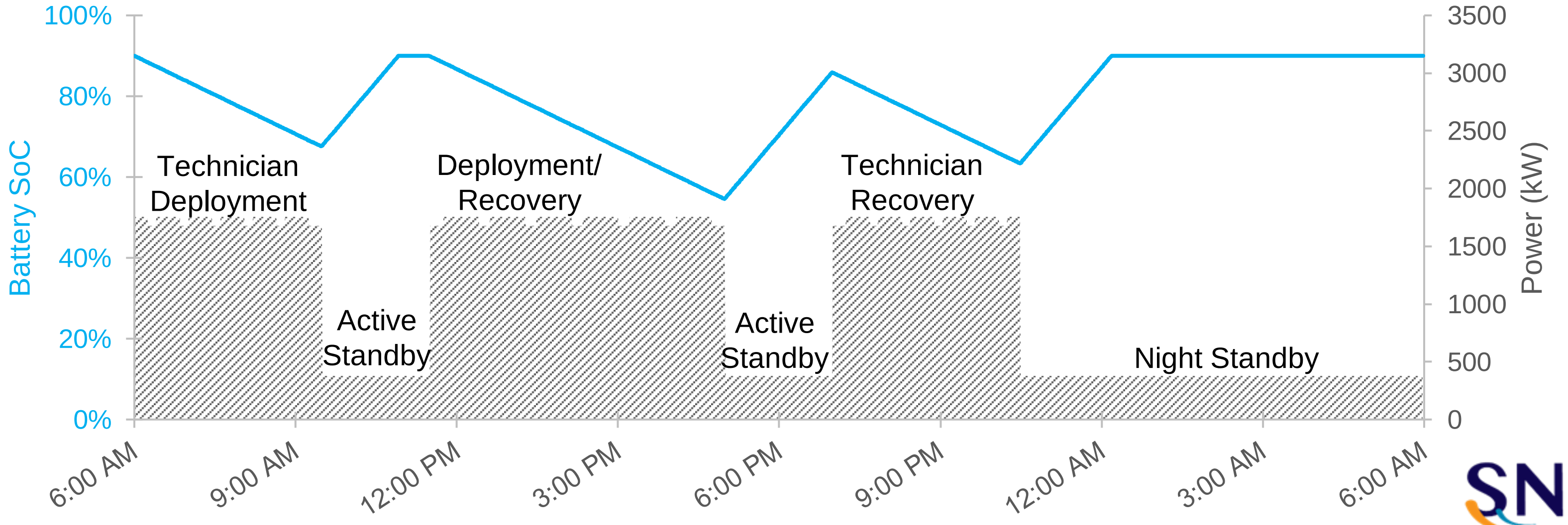
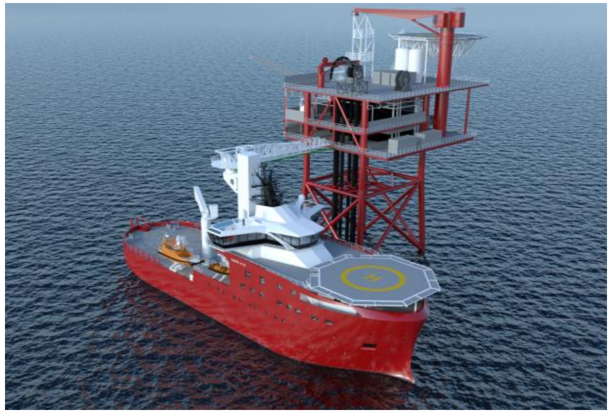


Day 2-13



In-Field Charging Concepts

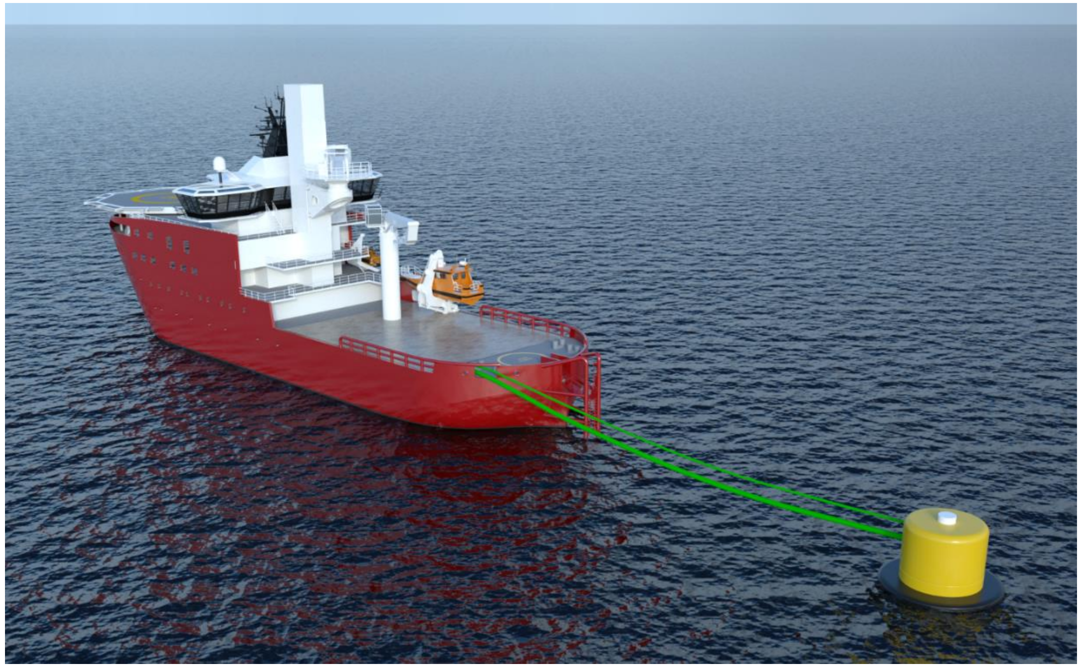


Courtesy of Vard Design AS 2021

Offshore Substation

Courtesy of Vard Design AS 2021

Wind Turbine Generator



Courtesy of Vard Design AS 2021

Charging Buoy

In-Field Charging

		Battery Mode	
Operational Mode	**Profile**	**Baseline**	**IFC Stations Added (Ph.2-5)**
Port	2%	Charging	Charging
Inner Passage Transit (5 kts)	1%	Discharging	Discharging
Transit to/from Wind Park (10 kts)	2%	Spinning Reserve	Discharging/SR
Transit In Windfarm	36%	Spinning Reserve	Discharging/SR
Day Standby	17%	Spinning Reserve	**Charging**
DP Operations	14%	Spinning Reserve	Discharging/SR
Night Standby	29%	Spinning Reserve	**Charging**

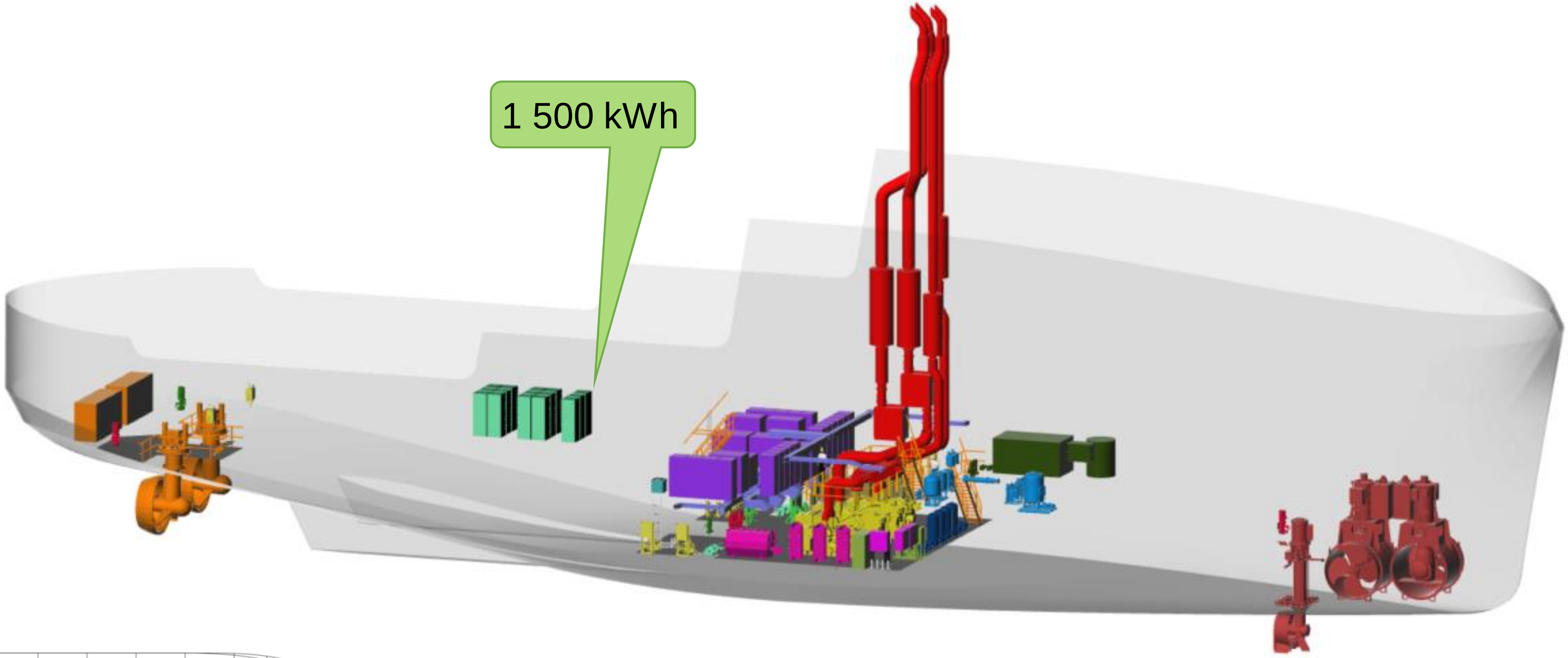
Phased Approach

Baseline

Fully Decarbonized Vessel

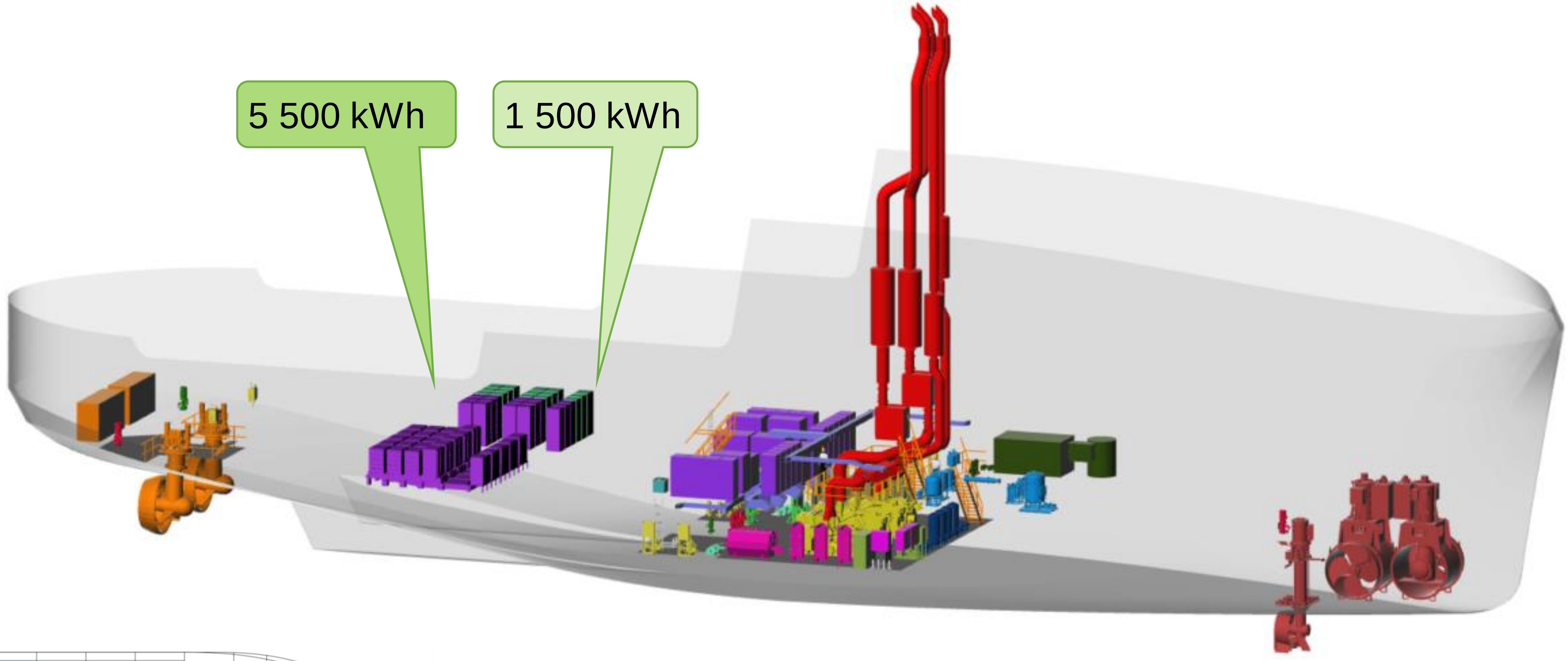
Phase 1 → Phase 2 → Phase 3 → Phase 4 → Phase 5

Phase 1: 1 500 kWh (Baseline Design)



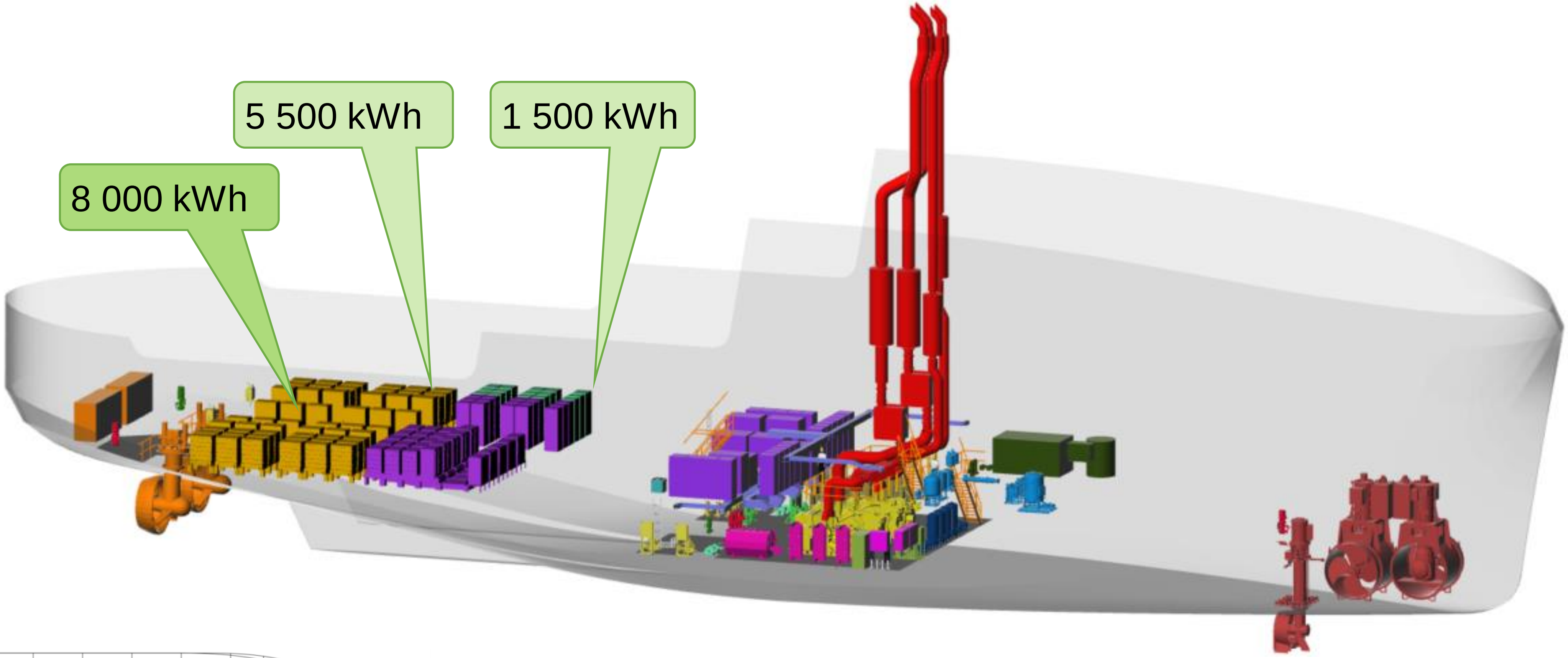
Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5

Phase 2: 7 000 kWh



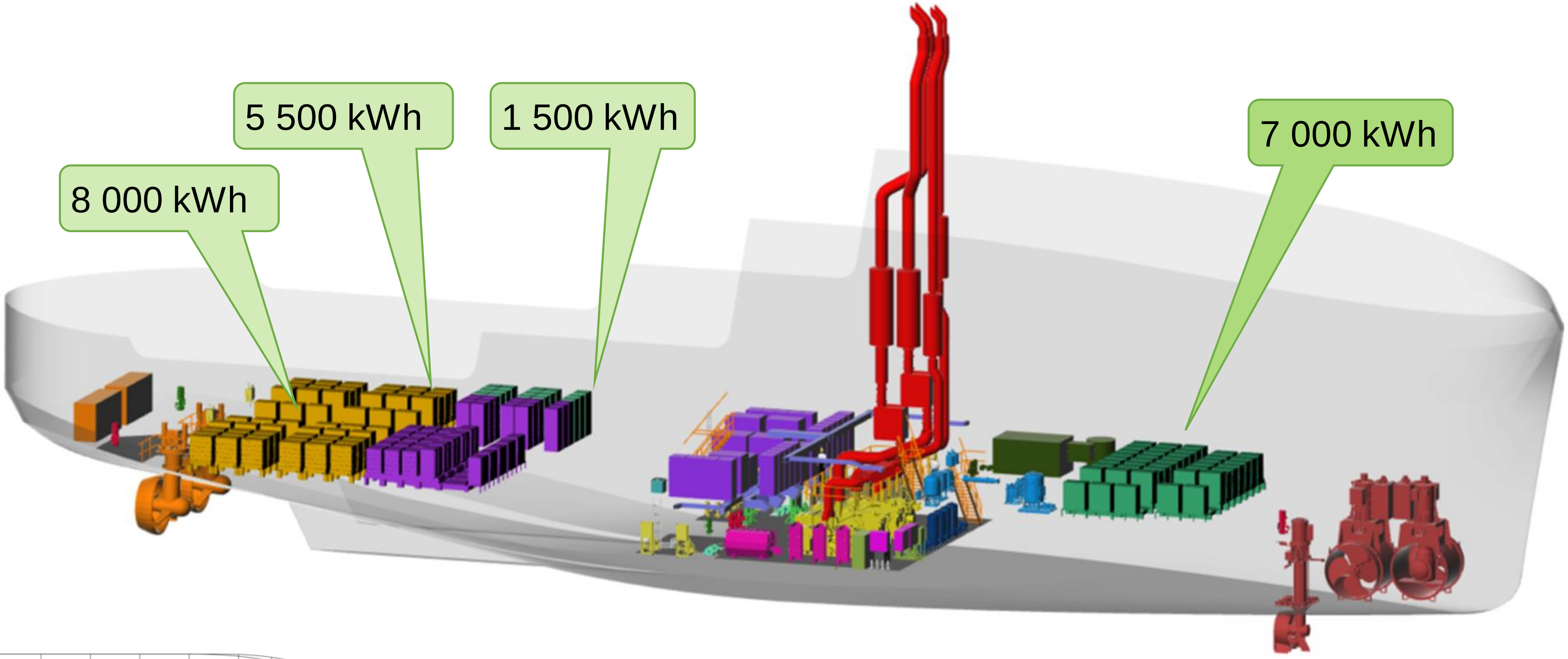
Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5

Phase 3: 15 000 kWh



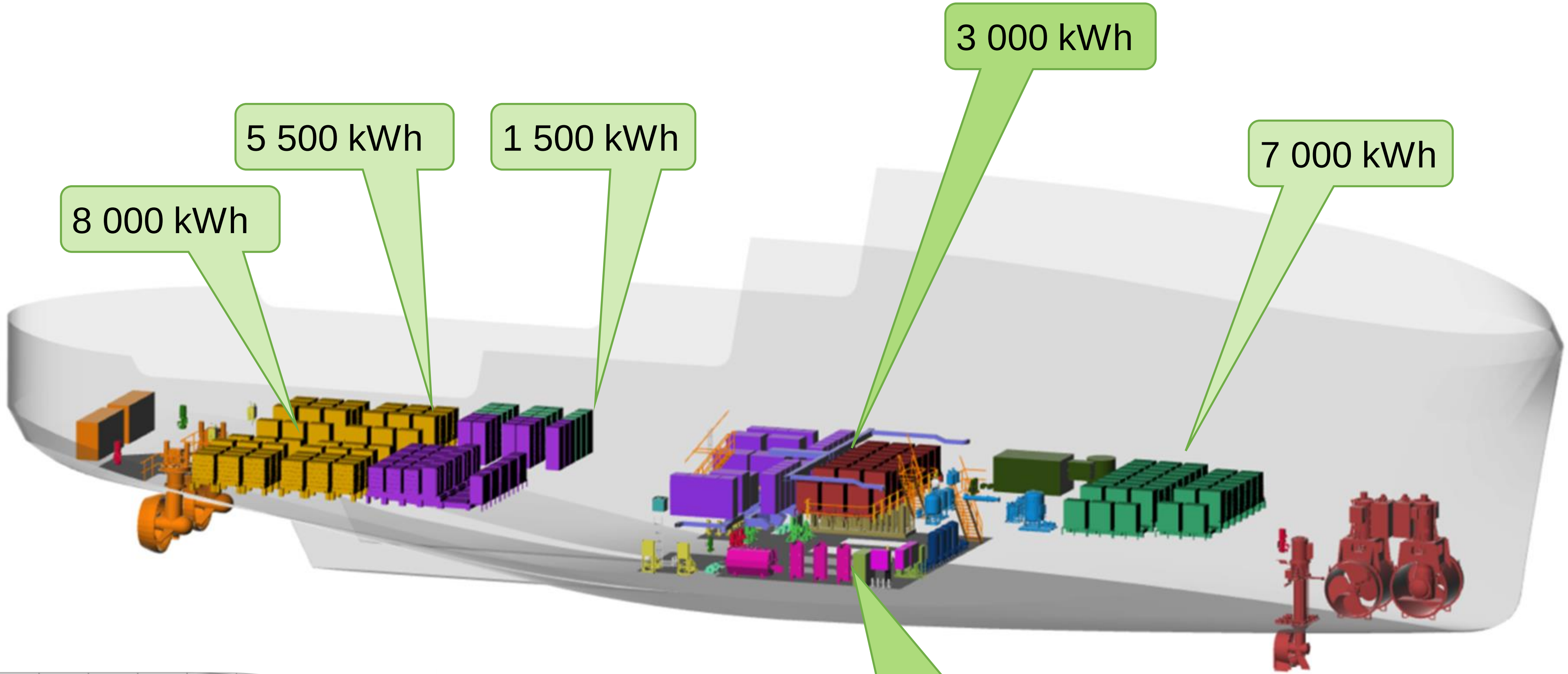
Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5

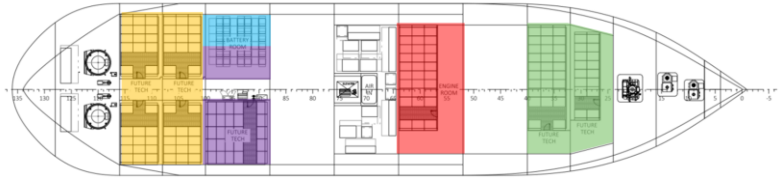
Phase 4: 22 000 kWh



Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5

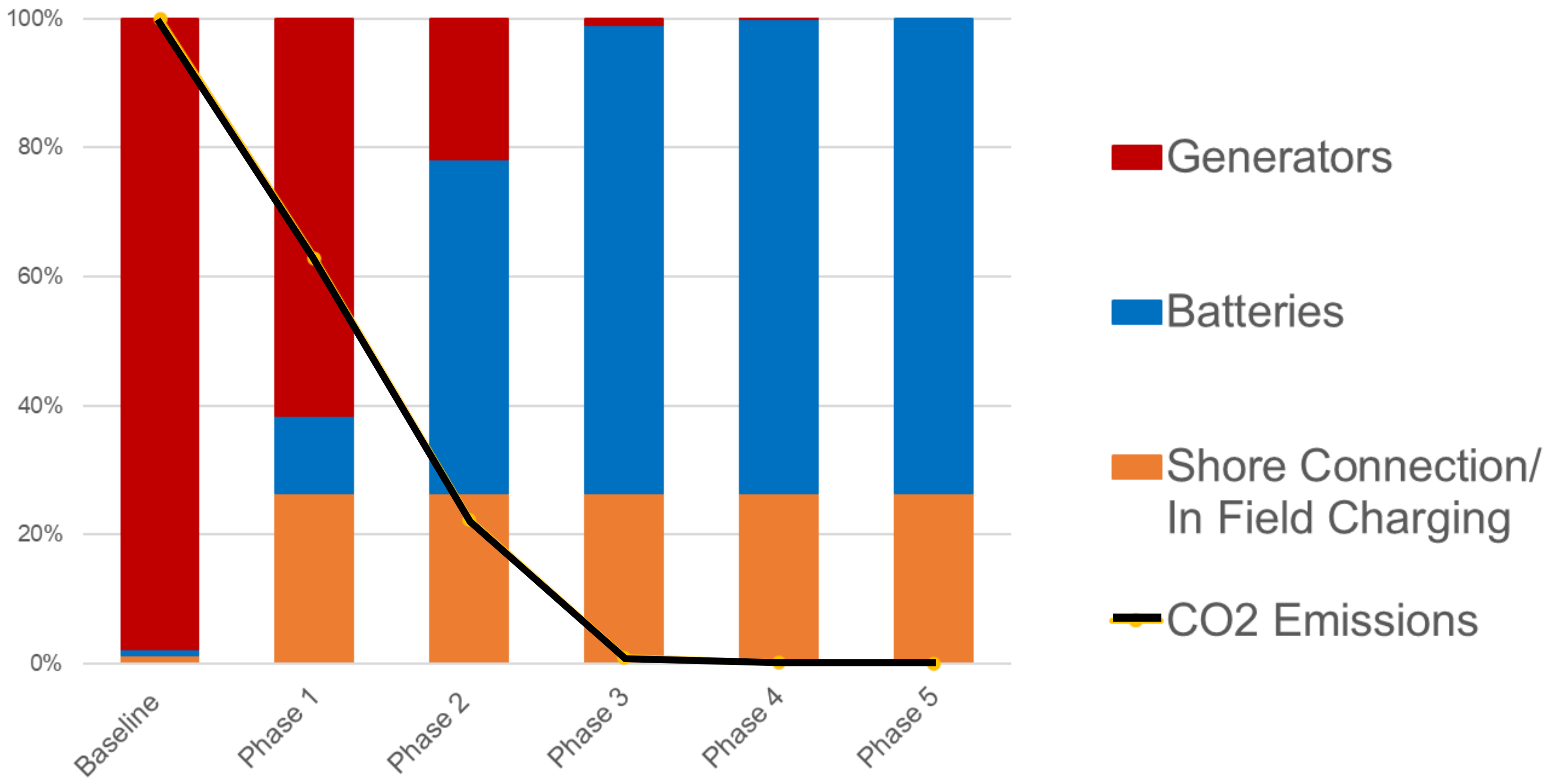
Phase 5: 25 000 kWh (Fully Electric)



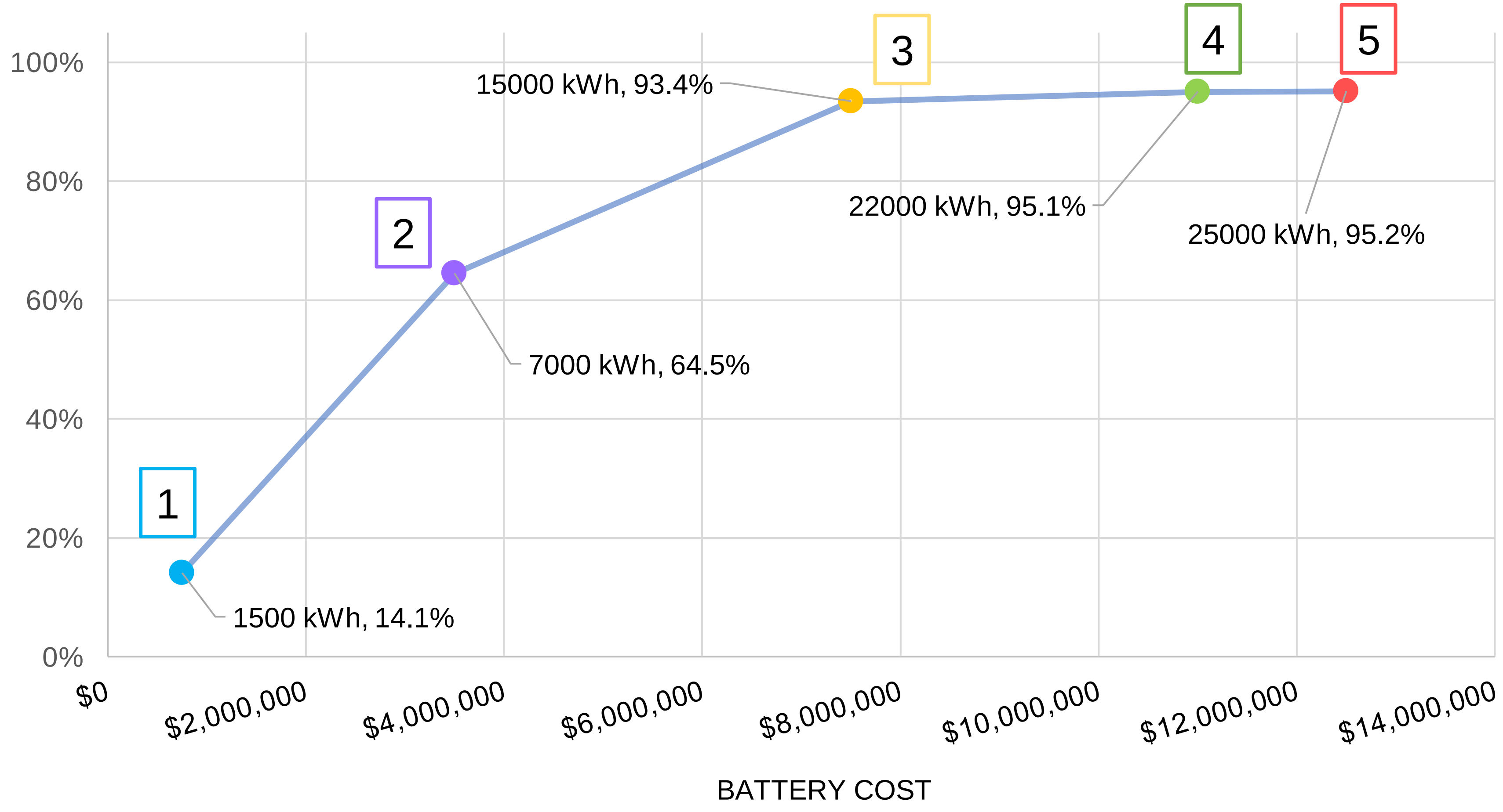


Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5

Power Source and Emissions per Phase



Clean Energy Usage vs Battery Cost



Conclusions

- Impractical to achieve the same level of operability as a hybrid vessel with batteries alone
- Diminishing returns on emissions reduction/kwh installed as you approach full electric operation
- Batteries significantly reduce fuel consumption and emissions
- External factors influence decarbonization

Thank you for your attention. This concludes the presentation.

Questions?