



Marine Clean Energy Island: Smart Charging Buoy

Sponsor: American Bureau of Shipping/Jude Tomdio

The Buoy Bunch:

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ABSTRACT

This project introduces a smart charging buoy designed to provide renewable energy to electric vessels, reducing carbon emissions, and fuel costs.

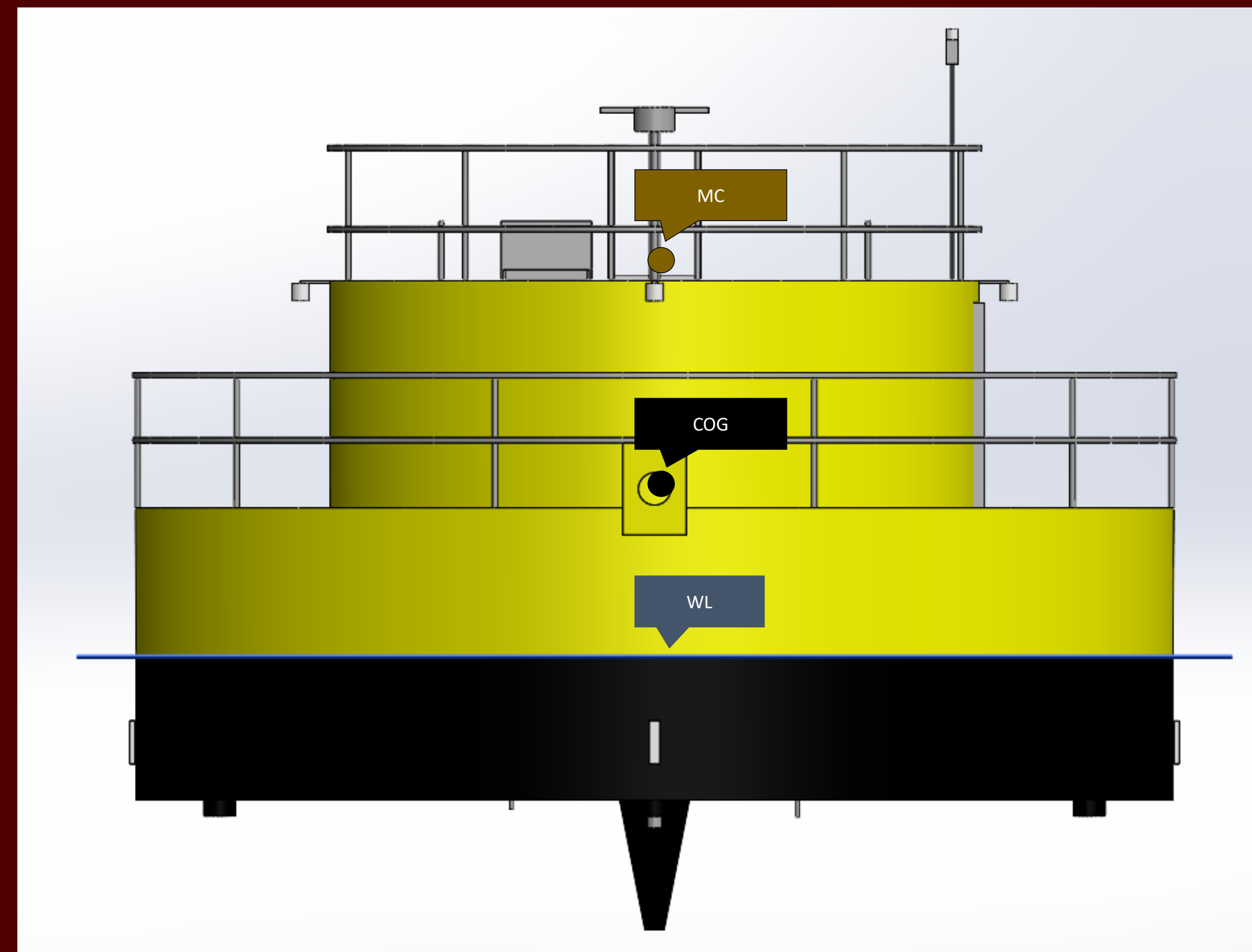
It includes detailed analyses of hydrostatic, hydrodynamic, and structural performance, as well as environmental and cost-benefit considerations, showing a potential reduction of 18,900 tons of CO₂ over its lifetime.

The project highlights the buoy's integration into existing infrastructure, its ability to withstand extreme weather, and its financial viability.

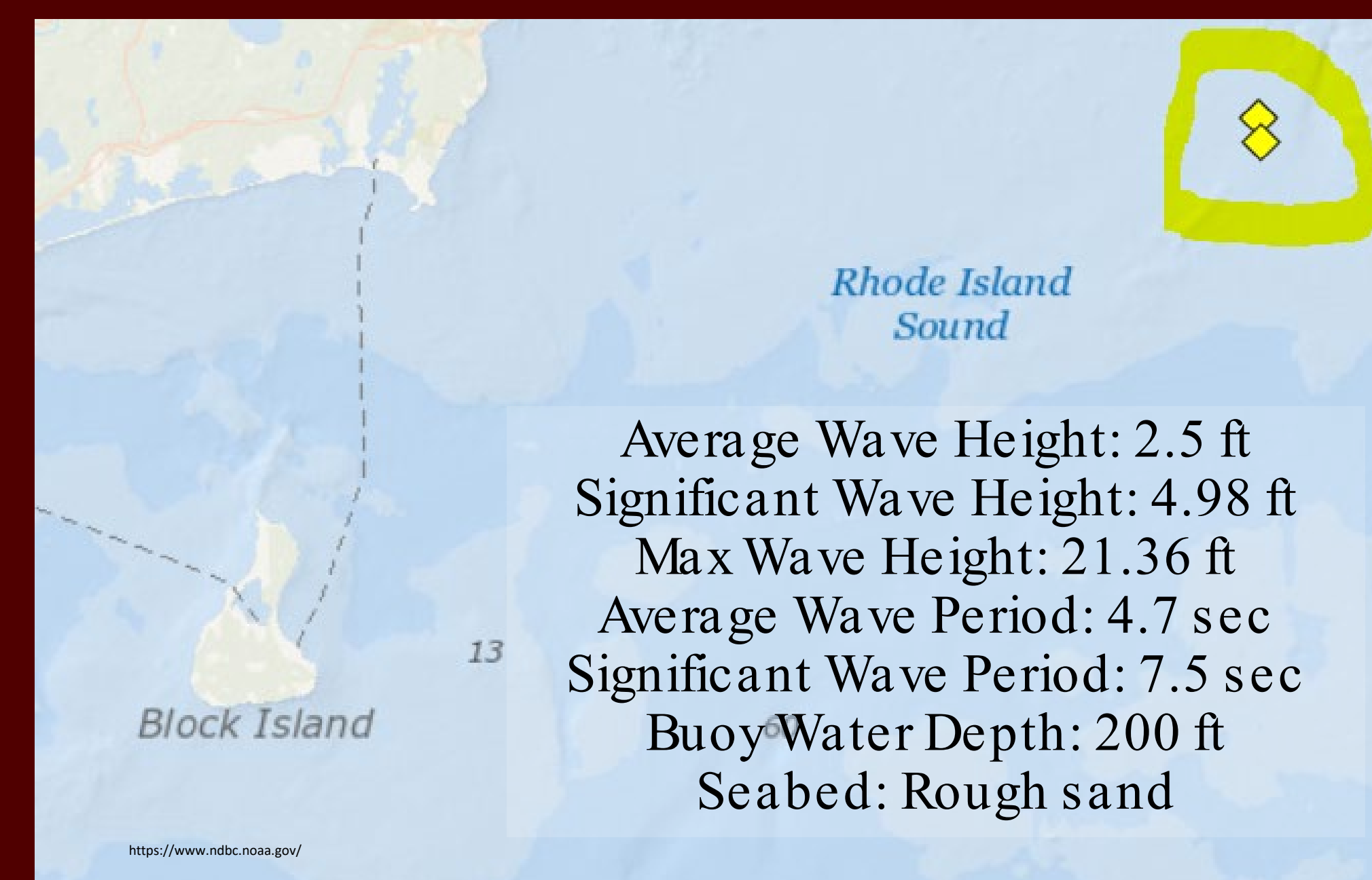
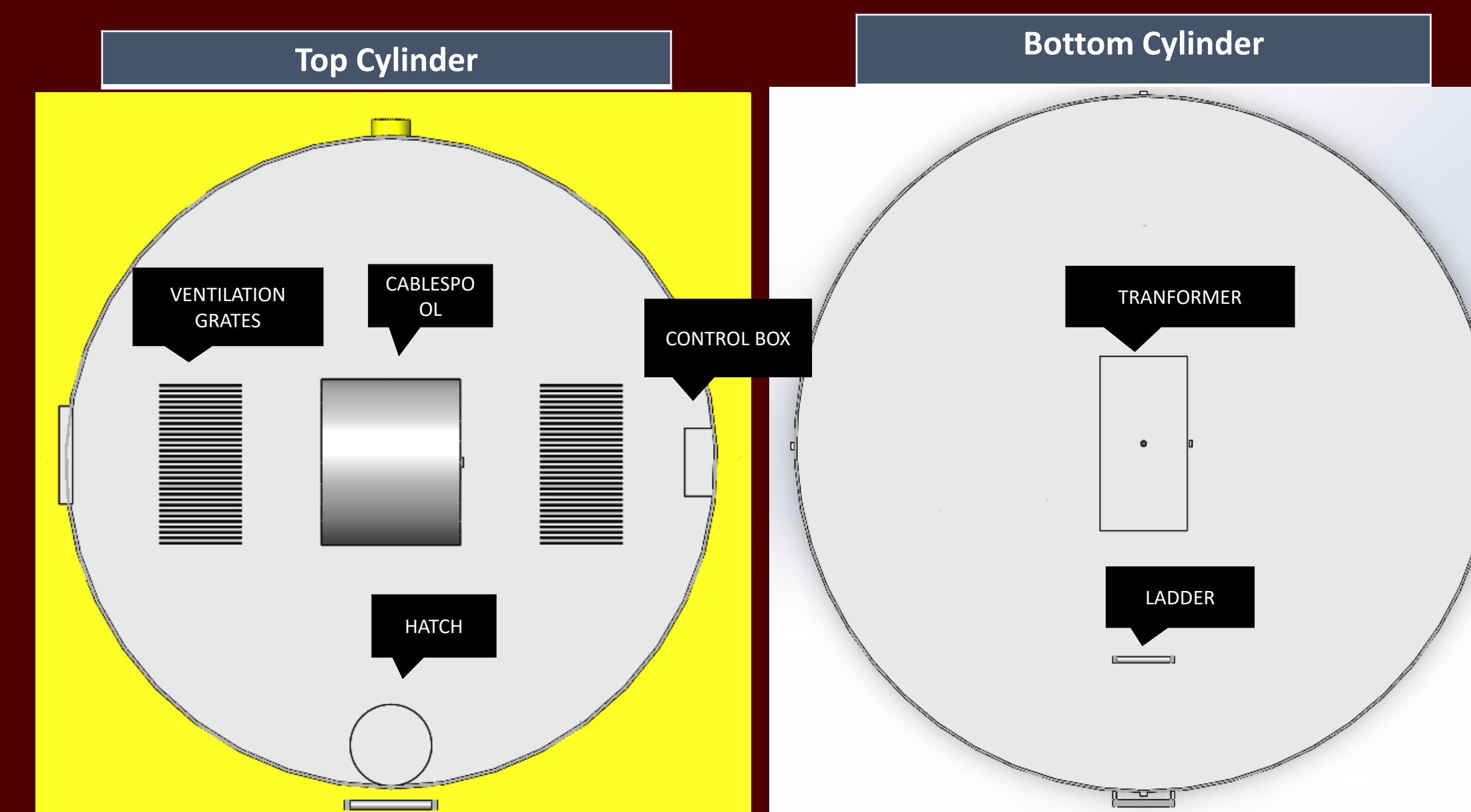
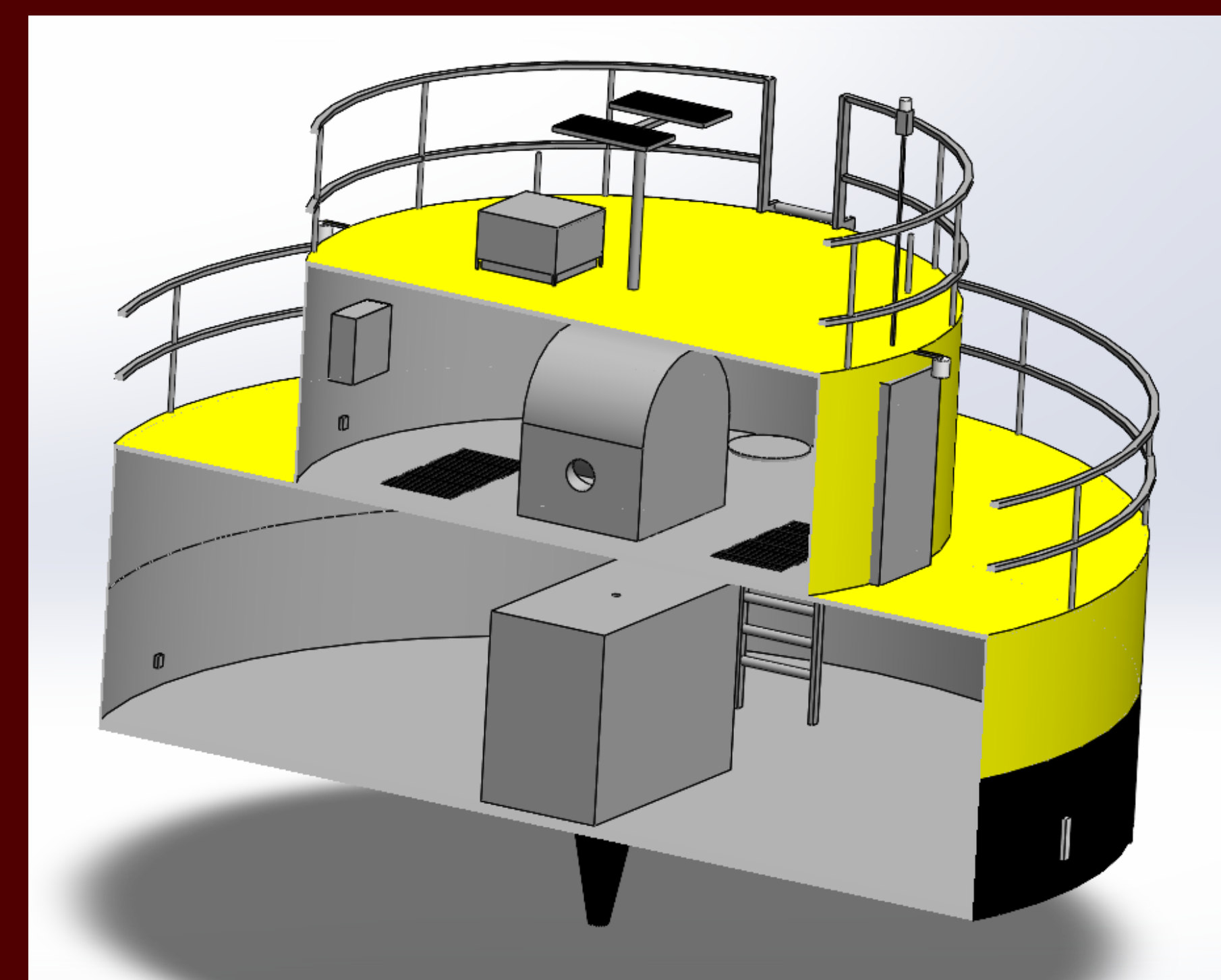
SOLUTION

- Buoy that uses renewable energy from onshore power grid or existing infrastructure to charge electric ships and reduce carbon emissions
 - Can be integrated into existing infrastructure
 - Provides physical separation from power stations increasing safety

FINAL DESIGN



- Buoy Weight: 125 Tons
Wall Thicknesses: 1, 2, and 4 inches
- Top Cylinder
- Height: 7 ft
 - Diameter: 20 ft
- Bottom Cylinder
- Height: 9 ft
 - Diameter: 32 ft
- Stability Numbers
- Water Line (WL): 4.44 ft
 - Center of Gravity (COG): 7.64 ft
 - Metacentric Height (MC): 16.62 ft



30-Year Cost Estimates

Marine ABS EH 36 Steel	\$65,450
Purchased Energy	\$40/MWh
Anchor	\$30,000
Mooring Chains	\$60,000
Subsea Cable Installation	\$2,000,000 per km (~6 km)
Corrosion Resistant Coating	\$15,000
STEVADJUSTER	\$450,000
Transformer	\$150,000
Smart Sensors	\$45,000
Manufacturing and Labor	\$350,000
Installation	\$450,000
Maintenance	\$7,400,000

BACKGROUND INFORMATION

ABS Guidelines

- Provide rules for integrating smart technology and mooring systems safely

Smart Buoys with IoT

- Use sensors for real-time monitoring, maintenance alerts, and data sharing from offshore to onshore
- Helps optimize charging and improve structural health monitoring

Existing Solutions

- Current solutions pull power from grid connections
- OUR GOAL: Enhance existing grid connections by adding smart technologies and autonomous systems

STAKEHOLDERS

