Electrifying Nigeria's Inland Waterway Vessels Using Market Forces: A Case Study of Lagos State Inland Waterway

INTERFERRY 2024 (SAFETY, SECURITY AND SUSTAINABILITY)

MARRAKECH

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Introduction

Lagos State Inland Waterway

AIM

To highlight Lagos State as a case study, detailing the current state of its inland waterway transportation system, ongoing electrification efforts, and potential for future development.

SCOPE

- Current issues facing Lagos Inland Waterway.
- Enhancing boat safety through IACS rules and regulations.
- Analysing the potential trade route for an Electric Waterbus service on Lagos inland water.
- Design Considerations for the Electric Waterbus.
- Strategic Partnership.
- CAPEX, OPEX & CO_2 Emission of the Waterbus.
- Barriers towards waterbus electrification in Lagos Inland waterway.

Current issues facing Lagos Inland Waterway

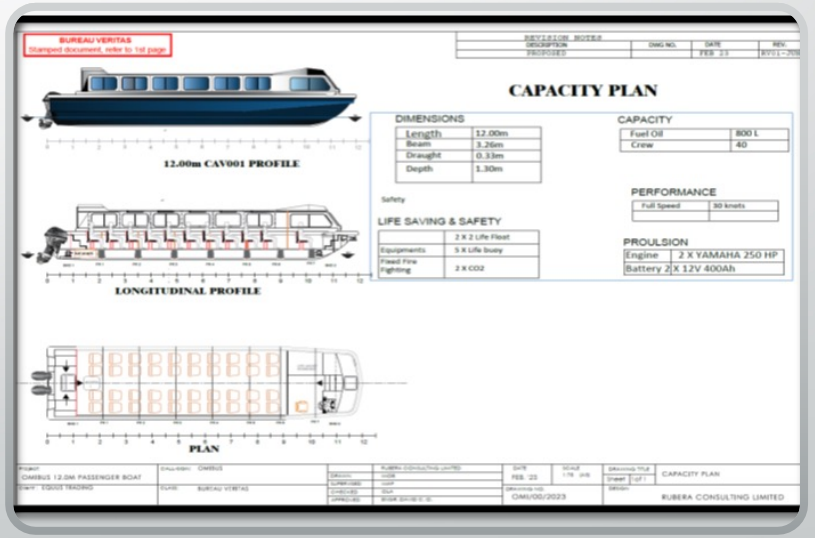
Increase in fuel cost.

Boat Safety.

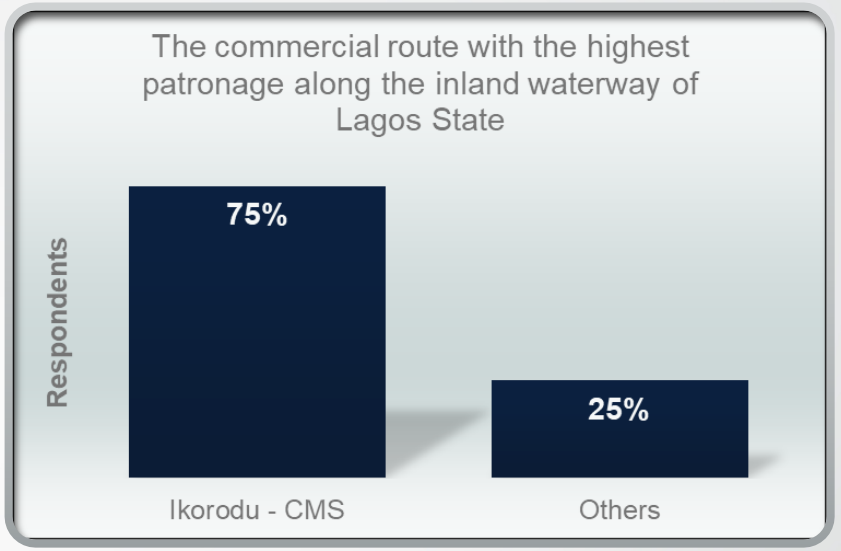
High levels of CO_2 emissions.

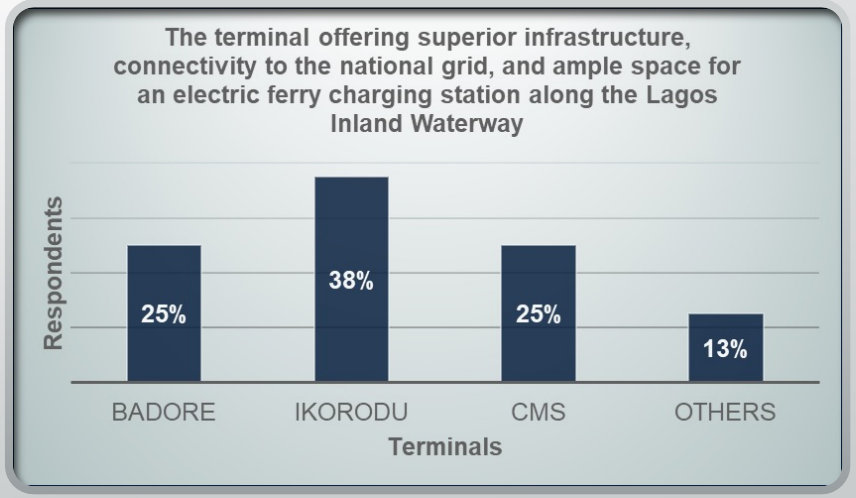
Enhancing boat safety through IACS rules and regulations.

- CAVERTON MARINE LIMITED, a Lagos-based Indigenous shipbuilding company, designed and built waterbuses that met international safety standards.



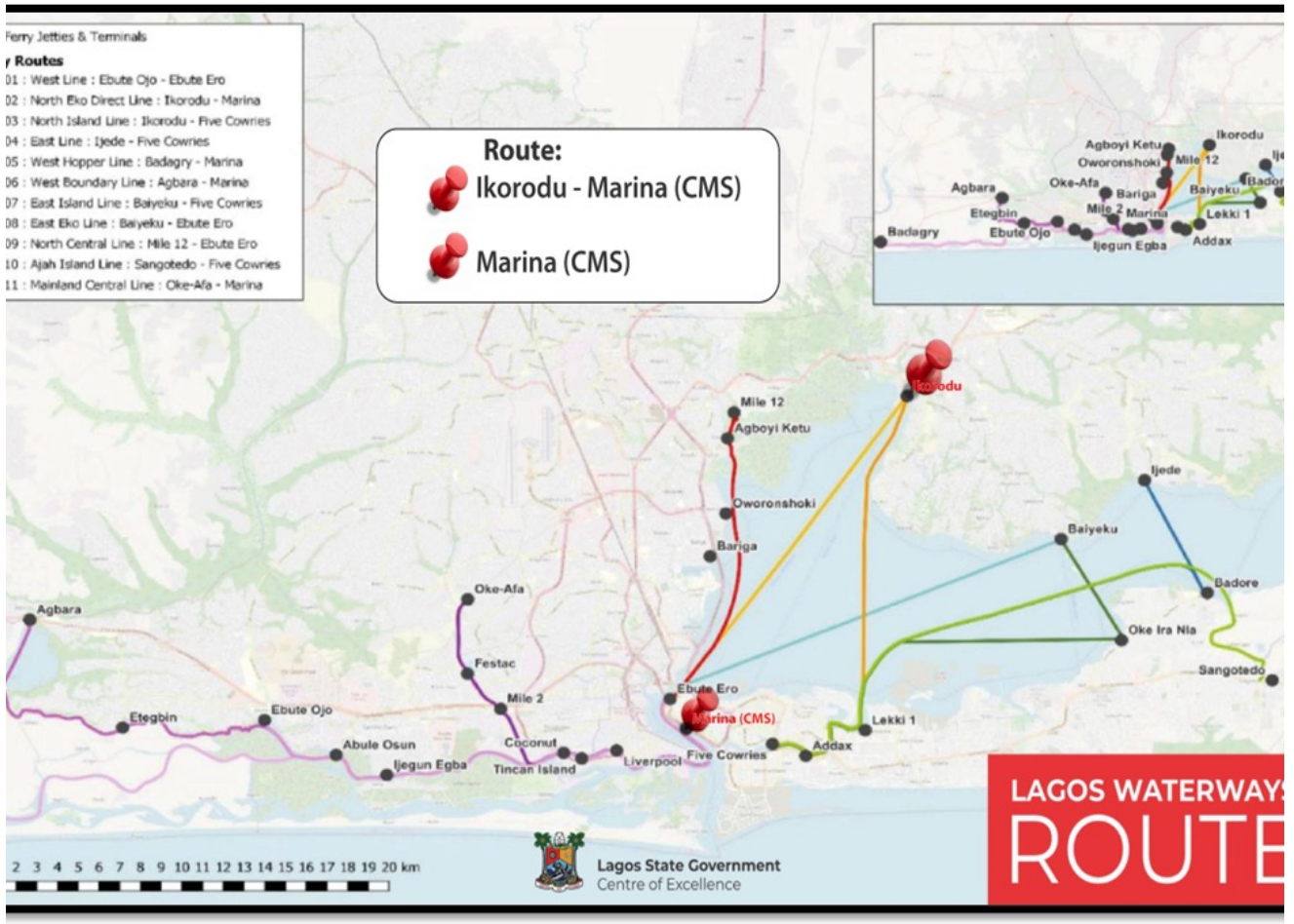
Analysing the potential route for an electric waterbus service on Lagos inland waterway





Design Consideration for the Electric Waterbus.

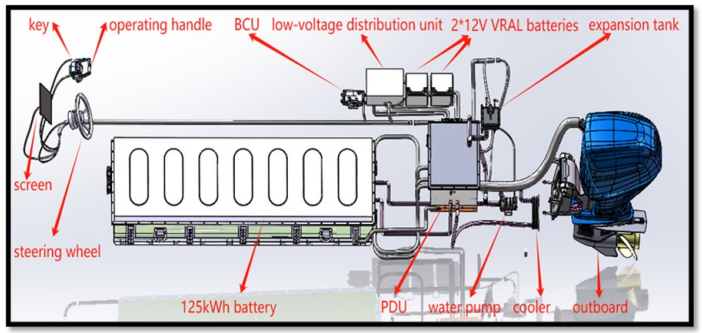
An E-Waterbus capable of covering a roundtrip distance of 21 nautical miles in 70 minutes before recharging.



Strategic Partnership.

Caverton Marine will work with OEM to supply the items indicated below to retrofit the waterbus:

- **2 * 300 hp Electric Outboard Engines.**
- **2 * 125 kwh Batteries.**
- **120 DC charging Station.**



Electric Engine Analysis							
Boat speed kn	DoD	Power		kwh/nm	Range		Range (nm)
		kw	hp		(h)	(m)	
18	0.85	223.70	298.27	12.43	1.33	80	18.50
22	0.85	399.00	532.00	18.14	1.00	60	21.26
25	0.85	548.19	730.91	21.93	0.70	42	17.58

Capital Expenditure (CAPEX) for The Fleet of Ten Waterbus Retrofit

Retrofitting the Waterbus fleet with electric propulsion and shoreside infrastructure will require a 125% higher CAPEX compared to a fuel-powered Waterbus.

Operational Expenditure (OPEX) for the Fleet of Ten Waterbus

The OPEX of operating an electric waterbus fleet is approximately 220% lower than that of a fuel-powered waterbus.

CO_2 EMISSION OF THE WATERBUS

The CO_2 emission from operating an Electric Waterbus is about half of the emission output of a fuel-powered waterbus.

Barriers towards waterbus electrification in Lagos Inland waterway.

Energy Efficiency

Current waterbus design is often not optimized in terms of energy efficiency.

Battery

Electrical infrastructure on land.

Human Factor

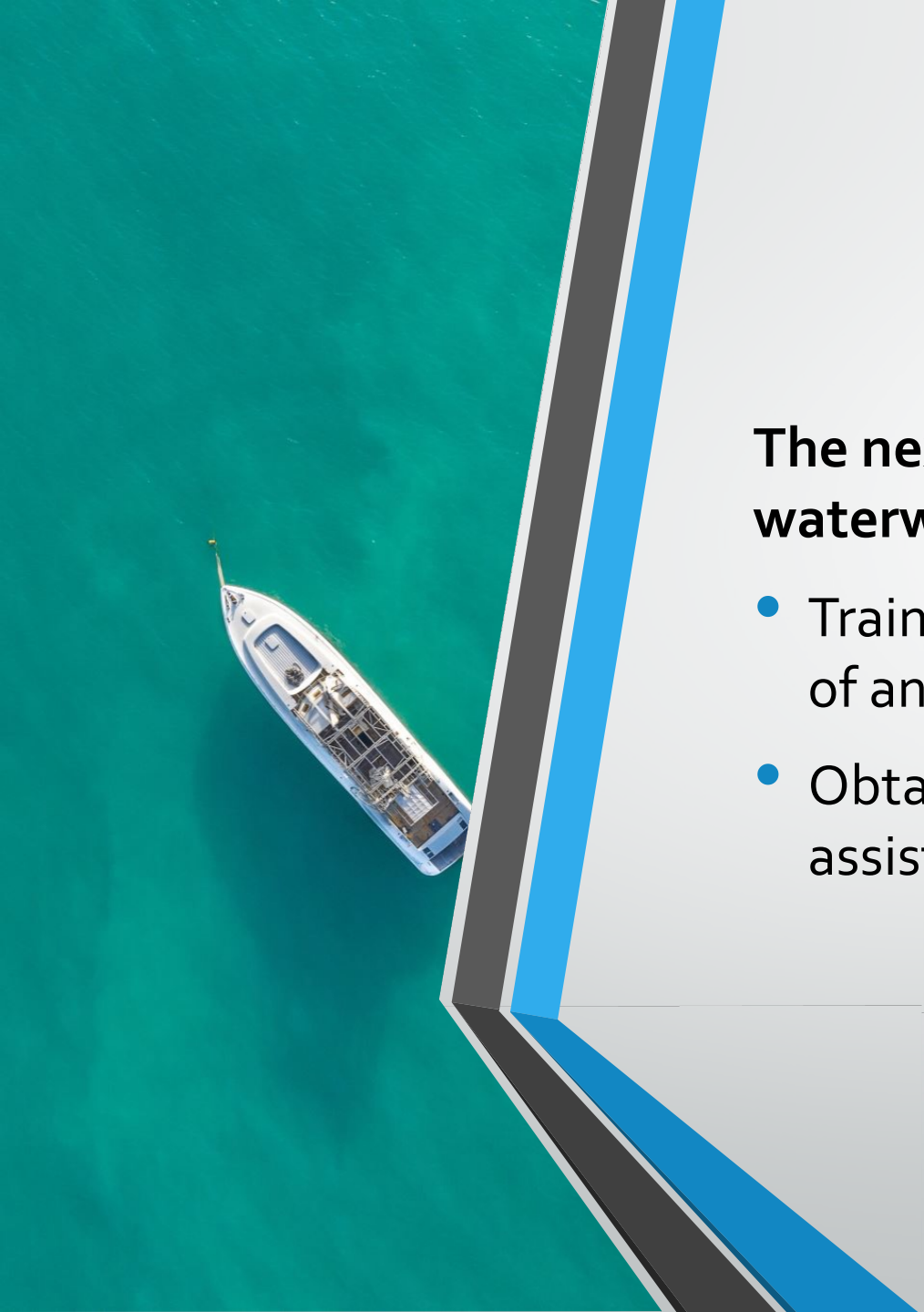
Crew competencies needed for fully electrical operation not clarified.

CONCLUSION

Key findings show that:

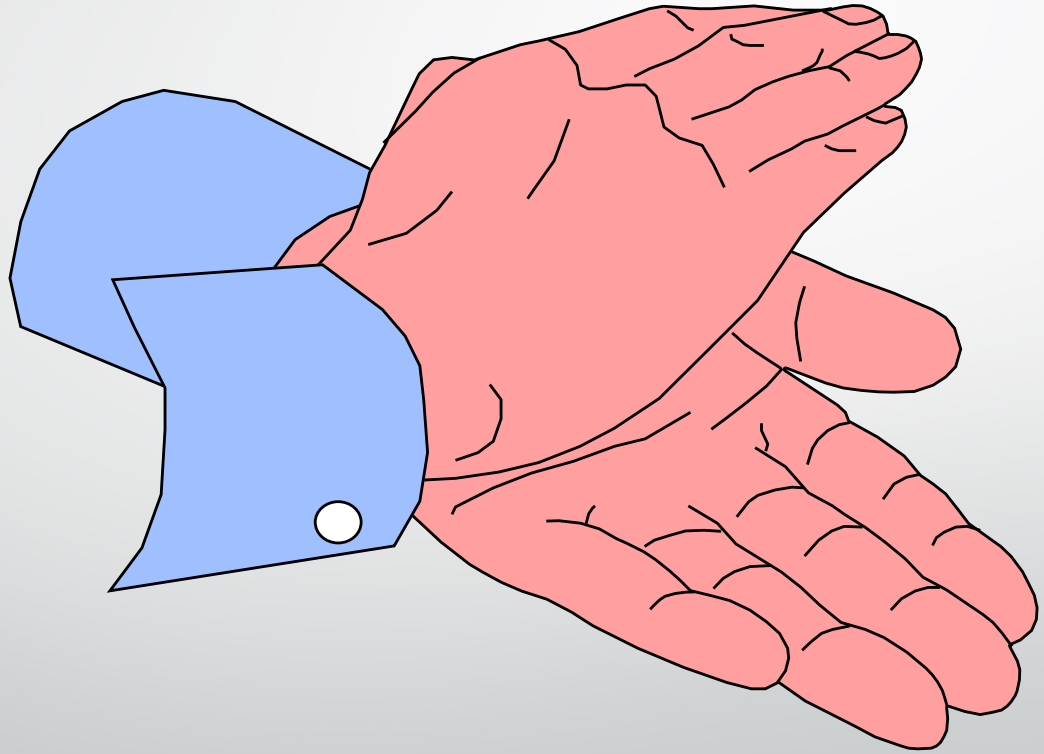
The use of the Electric Waterbus will cut CO_2 emissions in Lagos Inland waterway by half.

Adopting an electric ferry will reduce operating costs by approximately 220% of the waterbus.



Next Step

The next steps in the electrification of the Lagos inland waterway will include:

- Training of personnel in boat maintenance and operation of an electric waterbus.
- Obtaining, partnerships, grants, and government assistance.

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