

ALPHA ZULU RoPAC CLASS

RoPAC — Decarbonised Inter-Island Passenger Packet Tier

Recognised by the Government of Barbados as a Sustainable Economic Development (Shipping) Initiative under the Marine Transport (Emissions Control) Act 2024 and Merchant Shipping Act 2024. Engaged with the IMO Global Maritime Network (Caribbean MTCC, UTT) and aligned with the IMO 2023 GHG Strategy as a sub-500 GT maritime decarbonisation pathway. Concept design by Ian Dash, Champion Maritime Limited (Barbados), Naval architecture by Kurt Hughes Multihull Design (USA), appointed; in NDA discussions on composite engineering and with class societies on the classification pathway.



An integrated renewable energy, intelligent maritime transport and AI-native maritime intelligence platform delivering food security, ocean stewardship, climate resilience and regional economic development for

Caribbean Small Island Developing States.

Economic security is national security. A region that cannot feed itself, build essential productive capacity, or control a meaningful portion of its transport system ultimately leaves its resilience, food security, and economic future in the hands of others. In an unstable world of climate shocks and pandemics, countries that cannot move their own food and goods remain dependent on those who can.

Local transport resilience is about letting regions nourish themselves through their own production and distribution networks. **In an archipelago, the sea is the highway** - so resilience means sovereign marine transport: built, owned and operated from within the region.

Globalization connected the world through centralized manufacturing and fossil-fuel logistics optimised for scale — and in doing so, finished a phase of its work. But robotics, AI, advanced composites, digital fabrication and distributed energy are now letting regions feed themselves again, manufacture essential goods locally, and build and operate their own sovereign systems of production and transport with far greater resilience to external shocks. What comes next is the layer the trunk routes never built: a **distributed model optimised for speed and velocity, resilience, sovereignty and user proximity** — the capillary tier between neighbouring economies.

Fossil-fuel containerization was built to move volume efficiently between global hubs, not to serve sovereign island economies or **Small Island Developing States (SIDS)** at the speed of local consumption. As global instability, climate shocks and supply-chain disruptions increasingly reward resilience and self-provisioning, Caribbean and Pacific agriculture and manufacturing can no longer remain dependent on unscheduled foreign carriers — exporting both freight profits and supply-chain control instead of compounding national wealth through vessels they own themselves.

WHY NOW

The minimum efficient scale of industrial production has collapsed. AI, robotics, digital fabrication, advanced composites and distributed energy mean a region no longer needs a multi billion -dollar industrial base to reclaim meaningful productive sovereignty - it can build, power and operate its own systems at archipelago scale. The vessel itself is the proof: serially producible from a single build hall, not a mega-yard.

The capital is already mandated. Resilience and re-localisation are no longer fringe positions - they are the explicit funding priorities of the EU Global Gateway, the IMO 2023 GHG Strategy, and the development-finance institutions. The policy world has already decided this category should exist; what is missing is the instrument that fits the mandate.

Transport becomes the settlement layer. The per-voyage AZ-MRV+ evidence spine is settlement-grade by design - once it attests provenance, environmental integrity and custody per pallet, it is one step from being the verifiable rails for regional trade itself. The node moves goods; the standard it carries can move trust.

The **Alpha Zulu RoPAC Class** inverts that geometry. It treats the 39 SIDS not as scattered dots but as a single connected network, and gives them their own node: a light, fast sail-cargo vessel, wind as primary fuel, solar electrical and refrigeration systems, with auxiliary electric propulsion and 1000-2000 kWh of energy storage. Zero fossil fuel onboard burn. An absolute-zero (AZ), self-sustaining platform that owes nothing to a fuel supply chain.

The shift is the same one that mass production brought to every industry it touched - taking a capability that was once bespoke, slow and dependent, and making it replicable, repeatable, fast and sovereign. Applied to the marine trade between islands, this is not one prestige ship. It is a **fleet-as-platform**: a node class whose value compounds with every island that plugs in. Network edge effects, not unit economics. Each hull added makes every other hull more useful, every route denser, every island less isolated.

The architecture earns its independence. An evolution 3 trimaran hull with round bottoms, kick-up rudders and retractable propulsion pods lets it land and work directly on a dock or beach - no port required. Self-discharging aircraft-type cargo handling, 50 tons and 180 cbm, comes off onto bare sand or dock. It runs 24/7 at 12 kn service speed across dispersed geographies, and is built for retrofit to full green hydrogen and full autonomy as nascent hydrogen and maritime autonomous surface ships (MASS) infrastructure matures - timed to the ten to fifteen year life cycle of its sails and batteries in 2037-2042. Barbados has already legislated the regulatory frame for autonomous shipping under the Merchant Shipping Act 2024; the vessel slots straight into it.

So it is two things at once, and that is the point. In ordinary times it is high-velocity inter-island connective tissue - a new artery for trade and movement. In a disaster, when ports fail and fuel lines break, it is the platform that still arrives. Connection and resilience are the same asset.

DECARBONISATION — THE CARICOM ZeroFF CARRIAGE STANDARD - PROPOSAL

Caribbean inter-island shipping fails not from distance but from design. The Atlantic prevailing trade-wind regime - consistent, **averaging 13 knots year-round** - makes a wind-primary fleet operationally viable today, not in some future decade. Schooner RUTH already proves the prototype in service; Alpha Zulu is the architecture that scales it into a regional system.

The proposed **CARICOM ZeroFF Carriage Standard** - a policy framework now being advanced in draft for consideration at would turn that capability into demand. As proposed, from **1 January 2035** all intra-CARICOM movements of fresh produce, fish and agricultural products (HS 01–24) would be carried on vessels that are absolute-zero across the full energy chain, under 500 GT, and built, owned and operated by CARICOM nationals - phasing in **25% by 2030, 50% by 2032, 75% by 2034, 100% by 2035**, from the pilot corridor opening 1 March 2027. The Standard is not yet enacted nationally or adopted at CARICOM Secretariat level; it is the demand-side instrument the project is working to establish.

Decarbonisation here is not incidental - it is the asset. A diesel feeder fleet would merely relocate emissions and forfeit the Caribbean-origin premium. Absolute-zero carriage is what makes the food-security claim, the green-finance access and the regional sovereignty case true at once.

Sail plan, side view — wind-primary rig harnessing the year-round Atlantic trade winds.

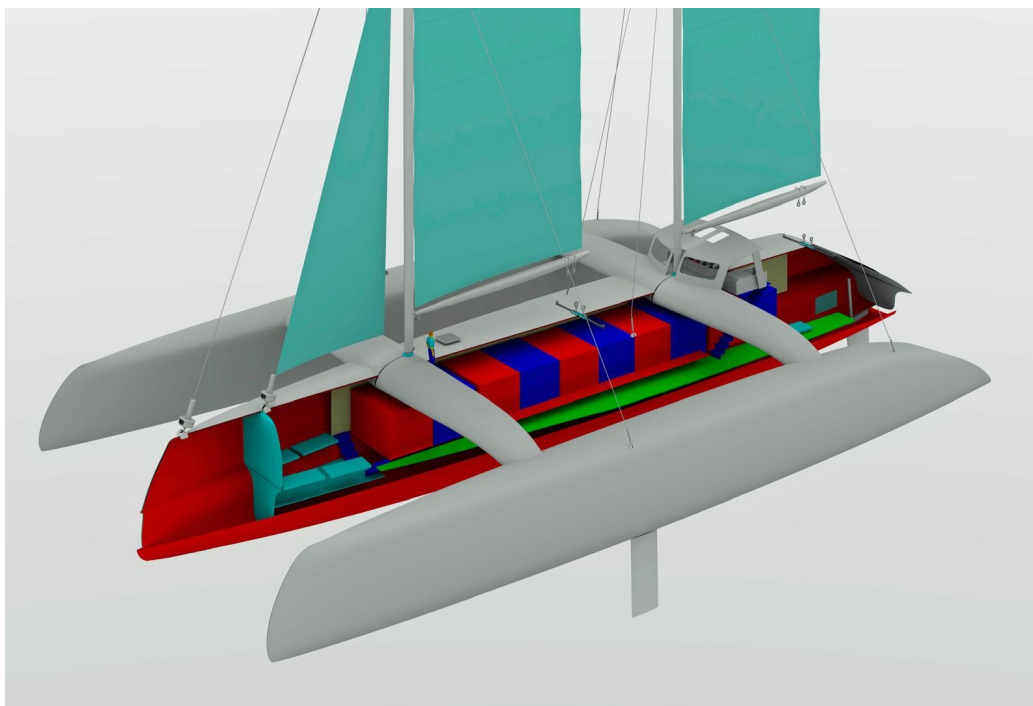
FOOD SECURITY & JUST-IN-TIME ESSENTIAL GOODS — THE CARICOM MODULAR CARGO UNIT (CMCU)

This node connects farmers to markets every ordinary week. CARICOM food imports run to roughly USD 6 billion a year, yet the binding constraint on substituting them with regional produce is not growing capacity — it is inter-island logistics. Container lines will not economically move sub-50-tonne parcels of perishable produce at fresh-chain frequency, and it remains cheaper to tranship a pallet through Miami than to carry it between neighbouring islands.

Alpha Zulu RoPAC is a scheduled inter-island packet service — restoring a tier the Caribbean had and lost: the seventeenth-to-twentieth-century packet that moved mail, passengers and high-value freight on a published timetable, redesigned today for food-security, decarbonisation and verifiability. The **CARICOM Modular Cargo Unit (CMCU)** is how it closes the logistics gap that constrains regional food substitution:

- **Right-sized parcel at scheduled frequency** — the 50-tonne parcel matches producer-cooperatives and SME agri-businesses — too small for conventional RoRo, too large for air freight, exactly matched to single-island-day-of-consumption for fresh produce.
- **Self-loading roll-on/roll-off** — integrated aircraft multi-modal cargo handling lets a farmer-cooperative load directly off a flatbed — no crane, stevedores or port-side fees that erode margin on small consignments.
- **Verifiable cold-chain per pallet (Track AZ·MRV+)** — a per-voyage evidence bundle attests environmental-chain integrity against commodity envelopes — ambient (cassava, breadfruit, dried fish, rum), cool (mangoes, soursop), cold (leafy greens, dairy), frozen (meat, fish), live-seafood (lobster, conch). Phytosanitary certification rides on the same object — regulatory clearance without paper re-keying.
- **Decarbonised origin claim** — zero-fossil-fuel-burn propulsion and refrigeration preserve the integrity of the Caribbean-origin claim end to end, supporting premium and eco-certified positioning that import-substitution alone cannot reach, aligned with Mission 1 and the Bridgetown Initiative on climate finance.
- **Pilot corridor in place** — ZeroFF Schooner RUTH - Phase 1 runs Bridgetown ⇄ Portsmouth ⇄ St John's, with a sovereign Letter-of-Intent pipeline scoping a Phase 2 corridor (Trinidad–Grenada–SVG, or St Lucia–Martinique–Dominica). Go-live fixed at 1 March 2027.

This is the operational instrument behind Mission Barbados Mission 3 and CARICOM Vision 25 by 2030 — timely, just-in-time delivery of fresh and perishable food and essential goods, island to island, on a published timetable, at the speed produce is consumed.



Cutaway: CARICOM Modular Cargo Units stowed in the central hull, with passenger accommodation port and starboard.

SEARCH, RESCUE & DISASTER RESPONSE

The same platform that moves food in ordinary times is the one that still arrives when ports fail and fuel lines break. Beach-capable, energy-independent and self-discharging, it reaches populations conventional port-dependent vessels cannot — carrying up to **100 survivors across 64 modular stretcher berths**, with a refrigerated bay for medical supplies and onboard power and potable water for relief operations.

- **Reaches the unreachable** — lands directly on beaches and unprepared shorelines; self-discharges 50 tons / 180 cbm of shelters, water, medical supplies and equipment onto bare sand.
- **Arrives under its own power** — wind- and solar-driven, with battery storage — not dependent on the fuel supply chains that break first in a disaster.
- **Multi-hazard and autonomous-ready** — earthquake, volcano, hurricane, biohazard and radiological zones; integrates drones and AUVs, with thermal imaging, sonar and radar; retrofittable to crewless autonomous operation.

Connection and resilience are the same asset — one node, two missions.



The Alpha Zulu RoPAC Class — sub-500 GT sail-electric passenger-cargo trimaran, wind-primary with retractable electric propulsion.

ALPHA ZULU OceanOS™ – THE DIGITAL INTELLIGENCE LAYER

While Alpha Zulu RoPAC provides the physical platform for zero-emission inter-island maritime transport, Alpha Zulu OceanOS™ provides its AI-native digital intelligence layer. Conceived as an open, interoperable maritime intelligence platform, OceanOS transforms every scheduled voyage into an opportunity to generate operational, environmental and logistical knowledge that supports food security, maritime safety, ocean stewardship, scientific research, education, engineering innovation and evidence-based public policy. Through specialised Agentic AI, secure data sharing and collaboration among governments, universities, industry and development partners, OceanOS enables every vessel to function not only as a transport asset but also as a connected platform for knowledge generation and sustainable development. Together, Alpha Zulu RoPAC and Alpha Zulu OceanOS create an integrated maritime ecosystem in which every voyage simultaneously advances commerce, renewable energy utilisation, regional resilience and the digital transformation of Caribbean Small Island Developing States. This concept is presented in the Alpha Zulu OceanOS™ Discussion Brief, prepared as a basis for regional consultation and collaborative development.

INTELLIGENT HYBRID WIND-ELECTRIC PROPULSION

Unlike conventional battery-electric ferries, **Alpha Zulu RoPAC** is not designed to replace wind with batteries. Rather, it is designed to replace fossil fuels through the intelligent integration of advanced wind propulsion and electric propulsion, allowing the wind to provide the overwhelming majority of propulsion energy while electric propulsion delivers precision, reliability, manoeuvrability, schedule assurance and operational resilience.

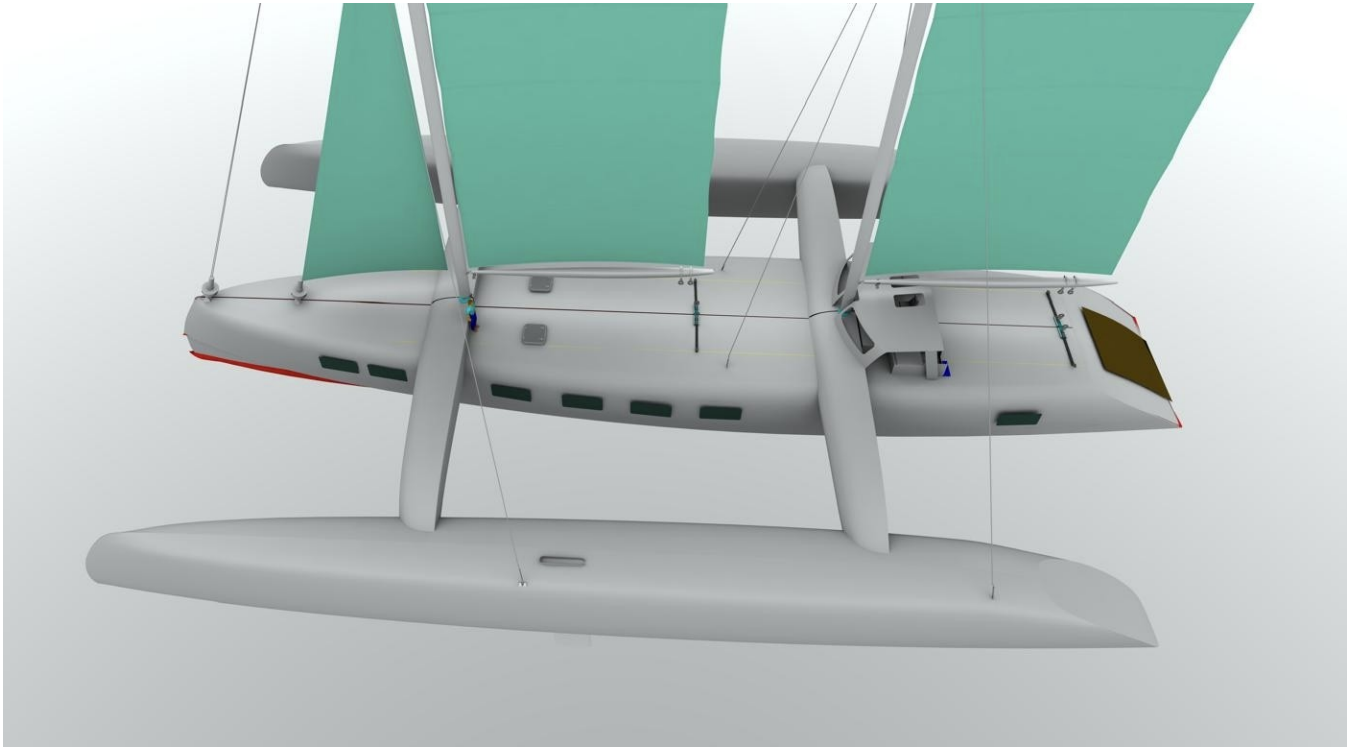
The vessel's advanced sailing rig functions as the primary renewable energy system, directly converting naturally occurring wind into useful propulsive work without first generating, transmitting, storing and redistributing electricity through conventional utility infrastructure. Electric propulsion is employed principally for zero-emission harbour manoeuvring, docking, pilotage, low-wind operation, schedule assistance, regenerative energy management and emergency propulsion. Consequently, battery energy storage requirements are measured in hours of operation rather than days, substantially reducing installed battery capacity, weight, cost and lifecycle environmental impact compared with fully battery-electric vessels.

Based on projected operating profiles, a single **Alpha Zulu RoPAC** vessel has the potential to avoid the need for an amount of annual renewable electricity generation broadly equivalent to the annual output of an **approximately 2 MW-class utility-scale wind turbine**. While underway, the vessel directly converts wind energy into useful propulsion, harnessing approximately **0.4 MW** of renewable propulsive power at **15 knots** and approximately **1.0 MW** at **20 knots**. Delivering an equivalent quantity of propulsion energy through conventional shore-based electrical infrastructure would typically require investment in a utility-scale wind turbine together with its associated foundations, power electronics, transformers, grid interconnection and distribution infrastructure, representing an indicative capital investment in the order of **US\$3.5–5.5 million**, depending upon site conditions and connection requirements.

The electric propulsion system will comprise twin electric propulsion motors sized to provide efficient harbour operations, manoeuvring, schedule assistance, regenerative capability and supplemental propulsion during periods of low wind. Final motor ratings will be determined during detailed vessel design to optimise overall vessel performance, propulsion efficiency, energy storage requirements and lifecycle economics.

Viewed from this perspective, each **Alpha Zulu RoPAC** vessel effectively embodies a significant renewable energy asset while simultaneously performing a productive transport function. Rather than requiring governments or utilities to construct additional renewable generation capacity to electrify maritime transport, the vessel harvests renewable energy directly at sea where it is required, reducing demand for equivalent land-based generation and transmission infrastructure while simultaneously delivering commercially productive maritime transport.

This integration of renewable energy generation and maritime transport represents an important shift in infrastructure thinking. Instead of viewing renewable energy solely as electricity produced on land and delivered through transmission networks, **Alpha Zulu RoPAC** demonstrates how renewable energy can be harvested, converted and utilised directly within the transport sector itself. The result is a highly capital-efficient approach that simultaneously advances maritime decarbonisation, regional food security, supply-chain resilience, climate adaptation and sustainable economic development across Caribbean Small Island Developing States.

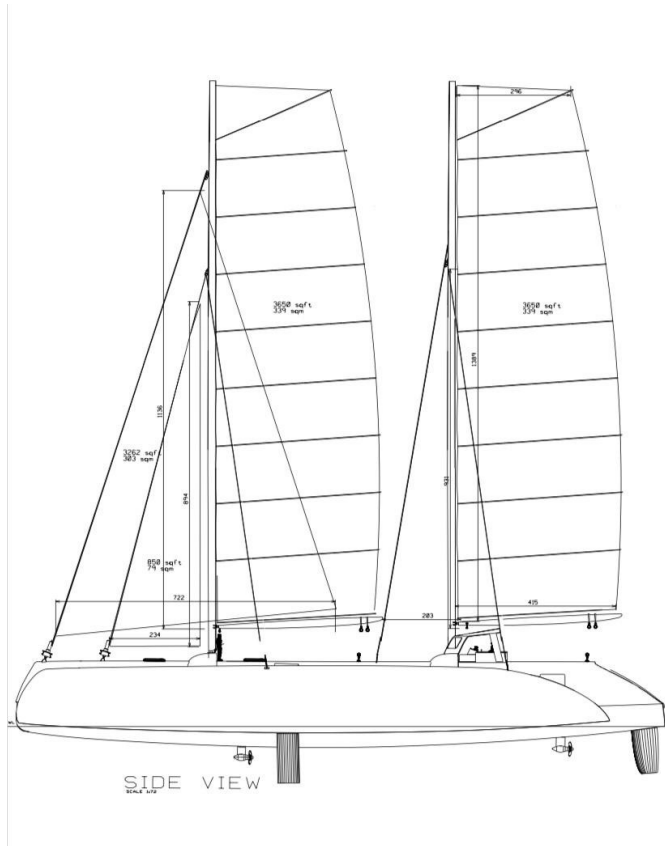


CONCLUDING PERSPECTIVE

The operation of a single Alpha Zulu RoPAC vessel has the potential to avoid the need for an amount of annual renewable electricity generation broadly equivalent to the annual output of an approximately 2 MW-class utility-scale wind turbine. By directly harnessing renewable wind energy for propulsion, intelligently integrating electric propulsion for operational flexibility, and employing Alpha Zulu OceanOS™ as its AI-native maritime intelligence platform, each vessel becomes far more than a zero-emission transport asset.

Every scheduled voyage has the potential to transport passengers and palletised cargo, generate operational and environmental intelligence, strengthen regional food security, support ocean stewardship, contribute to scientific research, enhance maritime safety, improve logistics efficiency, and provide trusted evidence to support policy development and investment decisions. In this way, Alpha Zulu RoPAC integrates renewable energy, intelligent maritime transport and digital innovation within a single commercially productive platform.

The result is a new model of maritime infrastructure that reduces dependence on fossil fuels, avoids the need for equivalent land-based renewable generation and transmission infrastructure, and creates measurable economic, environmental and societal value. Rather than viewing ships solely as vehicles for moving cargo and passengers, Alpha Zulu RoPAC demonstrates how commercial vessels can become mobile renewable energy assets, intelligent data platforms and catalysts for sustainable island development. Through this integrated approach, the programme seeks to strengthen regional resilience, accelerate Caribbean economic integration and establish a globally relevant model for climate-smart maritime transport in Small Island Developing States.



Sail plan, side view — wind-primary rig harnessing the year-round Atlantic trade winds.



ALPHA ZULU RoPAC

The sea is our highway