

Faire Wind & Song

Sustainability & Environmental Stewardship Plan



Sailing Lightly on the Earth

Faire Wind & Song is an expedition documentary series and global community initiative. As such, we are committed to the stewardship of our Earth.

Our ship, The Faire Wind, a 170-foot expedition sailing vessel of ~500 tons, is being rebuilt and equipped with the clear mission of operating with the smallest environmental footprint possible — today and into the future. By combining sail power, a high-efficiency, hybrid, propulsion drive and modern, efficient marine diesel generators, advanced water and waste treatment, and a fully self-contained philosophy, she operates with exceptional efficiency. At the same time, she functions as a world-class film production and post-production facility, recording studio, and live streaming platform capable of broadcasting concerts and events from anywhere on Earth via satellite. This combination sets a new benchmark for sustainable expeditionary and remote entertainment production operations.

This document outlines the measures taken to ensure independence, efficiency, and compliance with international environmental standards.



1. A True Sailing Vessel

The Faire Wind is first and foremost a sailing vessel. Her sails provide the primary means of propulsion on ocean passages and coastal voyages. The electric propulsion system is only engaged when conditions require:

- Harbour manoeuvres in tight quarters.
 - River passages where sailing is impractical due to narrow channels, variable winds, or strong currents.
 - Heavy weather contingencies to maintain steerage or stability.
 - When there is no wind and progress must be maintained.
 - On average, the ship sails 80% or more of the time, with fuel use limited to 20% or less of operations.
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- Winds (global trade belts): Long-term satellite and blended reanalysis show persistent easterly trade winds between $\sim 10^\circ$ and 25° latitude in both hemispheres, with mean 10 m winds typically 6–9 m/s (≈ 12 –18 knots) in season.
 - Low calm frequency: Pilot Charts annotate the percentage of calms in each 5° cell. In established trade-wind routes (e.g., Canary Islands to the Caribbean in November), calm conditions are typically 1–5% of observations, with published examples showing $\sim 1\%$ calms for that corridor in season.
 - Assisting currents: Drifter-derived climatology maps persistent westward flow in the North and South Equatorial Currents on the order of 0.2–0.5 m/s (≈ 0.4 –1 knot), which combine with the trades to support sail-first passages.

2. Self Containment Philosophy

All systems aboard The Faire Wind are designed for full independence, with no reliance on local utilities. This includes:

- Power generation, distribution, and storage — hybrid propulsion, modern, efficient, marine diesel generators, solar, wind, and a 1 MWh lithium battery bank.
- Seawater desalination and purification — high-capacity RO units, UV sterilisation, and point-of-use filtration.
- Wastewater management — dual marine sanitation devices with holding tanks for MARPOL zones.
- Galley operations and provisioning — locally sourced ingredients, efficient cold storage, waste-minimised food preparation, and appliances that meet the highest current international environmental efficiency codes.

A strict carry-in, carry-out ethic governs all operations.



3. Energy Independence

The Faire Wind never connects to external shore power. Every watt required is produced onboard more efficiently than any local grid, using modern, efficient, marine diesel generators managed by the PMS.

- Independence: Onboard generation keeps all expeditionary and production activities free of external dependency.
- Economics: Bulk marine diesel for the 78,000-litre (20,600-gallon) fuel capacity is consistently more cost-effective than local electrical tariffs.
- Security & Reliability: Producing electricity onboard avoids unstable or incorrect local power, protects critical production systems, and eliminates exposure to unscrupulous providers.

4. Hybrid Propulsion & Energy Systems

4.1 Propulsion

Danfoss EM-PMI540B-T3000 electric motor (500 VAC, inverter-fed).

4.1.1 Regenerative Power Generation (Under Sail)

- Bi-directional drive enables hydrogeneration: the propeller turns the shaft under sail and the electric machine back-feeds the DC bus.
- Always active when sailing within the regeneration RPM window; torque limits prevent excessive drag and preserve boat speed.
- Output: typically 20–60 kW continuous at ~8–10 knots; higher peak outputs are available at greater speeds.
- Use of power: covers hotel loads first, with surplus charging the ~1 MWh battery bank.
- Integration: PMS prioritises regenerative input over generators, automatically reducing or eliminating generator runtime while under sail.

4.2 Generators

- 2 × modern, efficient, marine diesel generators (~300 kW class), IMO III / US EPA Tier 3 compliant, in silent enclosures.
- 2 × Perkins 50 kW backup units in silent enclosures for low-load and ultra-quiet operations.



4.3 Solar Array

- 48 × Canadian Solar BiHiKu7 bifacial panels (~650 W each) = 31.2 kW peak.
- Cloudy (≈30% of peak): ~9.4 kW, ≈125 kWh/day (4 sun hours).
- Clear (≈60% of peak): ~18.7 kW, ≈187 kWh/day (6 sun hours).
- Optimal (100% peak): ~31.2 kW, ≈250 kWh/day (8 sun hours).

4.4 Wind

- 2 × Ryse Energy E-3 horizontal-axis turbines, 3.8 m rotor, 3 kW max each.
- Combined daily harvest: 45–66 kWh in 7–10 m/s winds.

4.5 Battery Storage

16 × BatteryEVO King Kong 2 (62 kWh each) = 992 kWh total (~794 kWh usable to 20% SOC).

4.6 Integration

All sources feed a common DC bus, managed by a Power Management System (PMS) for seamless mode switching and renewable prioritisation.

5. Power Management System

All generation sources — propulsion regeneration, solar, wind, batteries, and generators — feed into a central PMS. The PMS balances loads, prevents over-cycling, and ensures maximum renewable utilisation.

Candidate Systems:

- Danfoss Editron EMS/PMS – seamless with Danfoss motors and inverters.
- Marine Commercial Control (MCC) – optimised for generator load sharing.
- ABB Onboard Microgrid – proven hybrid/renewable integration.
- Siemens BlueDrive PlusC – scalable with strong regeneration management.
- Schneider Electric EcoStruxure Microgrid Controller – robust renewable + storage control.

6. Operating Modes

6.1 Sail-Only

- Zero-emissions travel under sail (≥80% of the time).
- Daytime hotel loads supplied by solar.
- Nighttime hotel loads supplied by batteries.
- Regeneration offsets hotel loads and recharges batteries.



6.2 Cruise/Charge Mode

One generator runs at optimal efficiency, powering propulsion and charging batteries while servicing hotel loads.

6.3 Drive Mode (Heavy Seas)

- Both main generators online in parallel, delivering full power to the Danfoss motor.
- Batteries provide spinning reserve and stability.

6.4 Silent Mode

- Propulsion (low speed) and all hotel loads powered exclusively by batteries and solar, with no generator use.
- Used in sensitive environments — harbour manoeuvres, dive support, wildlife encounters, or river exploration.

7. Battery Only Endurance

- 3 knots: 16–20 hours endurance (48–61 nm).
- 4 knots: 11–14 hours endurance (41–57 nm).
- Assumptions: Clean hull, calm water, 10–30 kW hotel load, 20% reserve maintained.

8. Water & Waste Systems

8.1 Water: Desalination, Purification & Delivery

- 26,000 litres storage in dedicated freshwater tanks.
- Water production: 2 × AMPAC AP3000-SM RO units (3,000 GPD / 11,350 L/day each) = 6,000 GPD (22,700 L/day) total.
- Purification: RO primary desalination, UV sterilisation at the potable manifold, and final point-of-use tap filtration.
- Delivery: duplexed freshwater pressure pumps with accumulator tank; food-grade distribution plumbing with backflow prevention and isolation valves.
- Monitoring: Bi-weekly potable water testing by the Security Officer or First Mate; periodic tank sanitation protocol.
- Hot water: On-demand electric heaters in each cabin to eliminate waste from long pipe runs.
- Safety: Avoids risks from unknown, unregulated, generally suspect local port water.



8.2 Marine Sanitation: Treatment & Holding

- 2 × AHEAD AT-25STP-D units (USCG/IMO Type II MSD).
- Normal: Blackwater → AT-25 #1; Greywater → AT-25 #2.
- Failover: Both streams can be rerouted to either unit.
- Holding: In MARPOL no-discharge zones, routed to a 5,000 L (1,320 gal) tank; batch-treated offshore.
- Green practice: Eco-certified cleaning and maintenance products only.
- Real-world loads: Designed for high liquid throughput — dilute streams improve aerobic treatment.
- Compliance: Exceeds MARPOL Annex IV, IMO MEPC.227(64), USCG, and EPA standards.

9. Materials & Interior Refit

- Steel framing with spray-foam insulation for efficiency and acoustic control.
- No drywall; ½-inch plywood walls with carpet/acoustic finishes.
- All joints sealed with Green Glue acoustic sealant.
- Modular construction for durability, reduced waste, and extended lifecycle.
- All lighting is LED, DMX-controlled, and designed for low power draw with maximum lifespan.
- Fire Detection & Suppression (vessel-wide):
 - Addressable fire detection across all compartments using heat, smoke, and flame detectors as appropriate; alarm and monitoring on the bridge and in the ECR.
 - Portable extinguishers distributed to meet class/flag requirements: foam (AFFF) for Class A/B, CO₂ for electrical/machinery spaces, and dry powder where appropriate.
 - Fire boundaries maintained with A-60 rated doors/bulkheads where specified; ventilation fire dampers and remote closures on fuel/vent systems.
- Engine Room (fixed system):
 - Fixed fire suppression with water-mist or clean-agent (FK-5-1-12) system sized for machinery-space volume.
 - Automatic detection and release with manual pull stations; interlocks for engine shutdown, ventilation closure, and fuel quick-closing valves.
 - Drip trays, lagging, and cable routing to minimise ignition risk; hot-work permitting and fire watch procedures in force.



- Battery Spaces (DOCAN PANDA 32kWh):
 - Marine-rated lithium battery enclosures with BMS-controlled cell/module temperature monitoring, overcurrent/short-circuit protection, and HV isolation contactors.
 - Early warning via gas/off-gas detection (including HF) and aspirating smoke detection; forced ventilation to a safe area with automatic shutdown on alarm.
 - Dedicated water-mist cooling/deluge to limit thermal runaway propagation; compartment thermal insulation and segregation from other spaces.
 - Automatic isolation on alarm: BMS trips chargers and opens main contactors; PMS blocks charge/discharge until cleared.
 - Compliance commitment with class/flag guidance for marine battery installations and energy storage systems; documentation retained onboard.
- Galley and hotel appliances meet or exceed the highest current international environmental efficiency codes.

10. Future Proofing

- All major systems are modular and upgradeable.
- Annual reviews keep the vessel aligned with evolving best practices and standards.
- Provisions for expanded solar arrays, advanced PMS software, and additional renewable integration.

11. Conclusion

The Faire Wind demonstrates that large-scale, fact-based media production can operate sustainably, independently, and responsibly. By integrating sail propulsion, hybrid electric systems, advanced power management, and rigorous water and waste practices, she sets a new benchmark for sustainable expeditionary and remote entertainment production.

