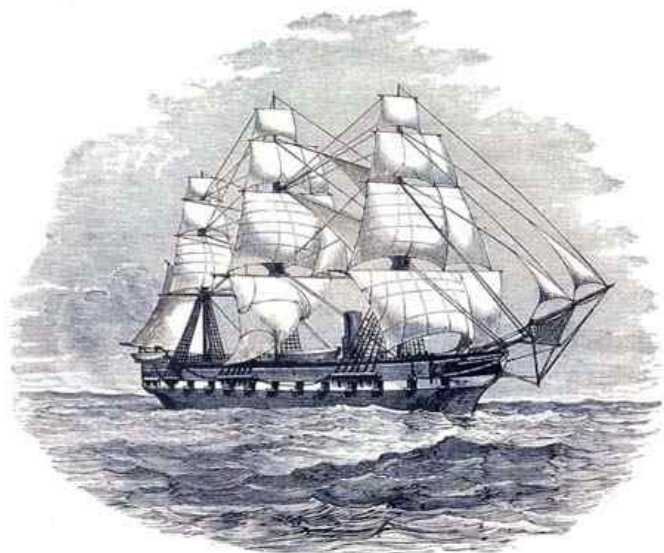




GREEN SHIPS AND BLUE WATERS

ENVIRONMENTAL CONSIDERATIONS FOR THE FUTURE UNOLS FLEET



<http://www.geology.19thcenturyscience.org/books/hmsc.jpg>





Solar Sailer- Syney, Australia



Creating a Green Fleet

Life Cycle:

1) Construction

2) Operation

3) Recycling



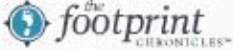
Hornblower Yachts- San Francisco: Ferry Design



Construction:

- 1) Hull and design
- 2) Propulsion, fuel and lubricants
- 3) Power systems
- 4) Fluids; water and sewage
- 5) Interior: cabins, labs, galley and mess areas (Leadership in Energy and Environmental Design-LEED)

Patagonia: The Footprint Chronicles

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Nano Puff™ Pullover

[View Details](#) [Men's](#) | [Women's](#)



The Good

The Nano Puff Pullover pairs a newly developed, ultralight shell fabric with PrimaLoft® One, the lightest, warmest and most compressible synthetic insulation available. The Nano Puff is fully recyclable and made in a factory that meets our four-fold criteria for product manufacturing: quality craftsmanship, competitive pricing, strong environmental standards and fair labor practices.



The Bad

While the shell fabric has recycled content, PrimaLoft® One does not. We use this insulation for its high warmth-to-weight ratio, which affords performance superior to that of PrimaLoft® Eco (made with 50% recycled polyester). The shell and zipper are treated with a durable water-repellent (DWR) finish that contains perfluorooctanoic acid (PFOA), a synthetic chemical that is now persistent in the environment.

What We Think

We're investigating alternatives to the use of PFOA in water repellents and working with Albany International, the company that makes PrimaLoft® products, to develop a synthetic insulation with recycled content that offers the outstanding performance attributes of PrimaLoft® One.

Call us anytime: 1.800.638.6464 or visit [patagonia.com](#). © 2009 Patagonia, Inc.



<http://www.patagonia.com/web/us/footprint/index.jsp>



Construction and Operation

- 1) Hull and design
- 2) Propulsion, fuel and lubricants
- 3) Power systems
- 4) Fluids; water and sewage
- 5) Interior: cabins, labs, galley and mess areas (Leadership in Energy and Environmental Design-LEED)



OPERATION:

1) Propulsion

*New designs: solar, wind

a) Solar Sailor

b) M/V Auriga Leader

2) Fuels and lubricants: Biofuels

a) NOAA Green Ship Initiative

b) Cape Hatteras Waste Vegetable Oil

WIND

Solar Sailor:

*Solar wings used as solar collectors and as sails



<http://www.solarsailor.com/>

Power Systems



The *M/V Auriga Leader* has 328 solar panels to provide power for the ship's main electrical grid. (<http://www.inhabitat.com/2009/07/06/auriga-leader-cargo-ship-gets-power-from-solar-panels/>)

BIOFUELS: Ethanol and Biodiesel

Objective: convert Great Lakes vessels with petroleum-based fuels to renewable and environmentally friendly products

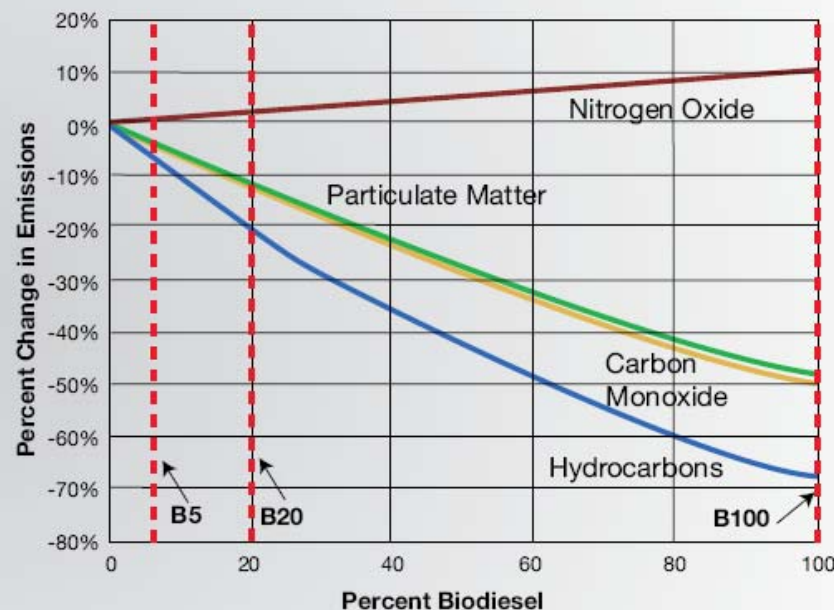


NOAA GREEN SHIP INITIATIVE ***Development of Biodiesel and Bio-Products in Marine Applications***

Environmental Research That's Environmentally Friendly

There were many motivating factors for undertaking the Green Ships project. These include:

- ◆ Reducing ecosystem impact of ship-based research activities.
- ◆ Reducing workplace health and safety hazards.
- ◆ Advancing renewable technologies.
- ◆ Lessening dependence on fossil fuels.



Source: US EPA Report 2002, Document #EPA420-P-02-001

Waste Vegetable Oil for Diesel Power

Cape Hatteras; Mark Smith, Chief Engineer and John Wilder, Marine Superintendent

OPERATION

- *Configured generator to run on waste vegetable oil (WVO)
- *WVO preheated to 70°C (heat exchange on generator)
- *Initial start-up with diesel fuel and WVO heated
- *Once heated, WVO introduced into generator fuel line
- *Diesel fuel switched back near shutdown to remove WVO from system

WVO

- *Restaurants contacted; tank and pump mounted on trailer; WVO transferred, filtered, stored, and transferred to ship
- *Reliable pick-up service on schedule (2-3 hours) from restaurant
- *WVO filtered.
- *Storage tanks-shore facility and vessel
- *Install pipes/valves/heat exchange system on main engines

LEED Project Checklist

Sustainable Sites

14 Possible Points

Prereq 1	Construction Activity Pollution Prevention <i>Reducing Pollution during Yacht Construction</i>	Required
Credit 1	Site Selection	1
Credit 2	Development Density & Community Connectivity	1
Credit 3	Brownfield Redevelopment	1
Credit 4.1	Alternative Transportation, Public Transportation Access	1
Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
Credit 4.3	Alternative Transportation, Low Emitting & Fuel Efficient Vehicles	1
Credit 4.4	Alternative Transportation, Parking Capacity	1
Credit 5.1	Site Development, Protect or Restore Habitat	1
Credit 5.2	Site Development, Maximize Open Space	1
Credit 6.1	Stormwater Design, Quantity Control	1
Credit 6.2	Stormwater Design, Quality Control	1
Credit 7.1	Heat Island Effect, Non-Roof	1
Credit 7.2	Heat Island Effect, Roof	1
Credit 8	Light Pollution Reduction	1

Water Efficiency

5 Possible Points

Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
Credit 2	Innovative Wastewater Technologies <i>Reducing potable water consumption and grey water generation</i>	1
Credit 3.1	Water Use Reduction, 20% Reduction	1
Credit 3.2	Water Use Reduction, 30% Reduction	1

Energy & Atmosphere

17 Possible Points

Prereq 1	Fundamental Commissioning of the Building Energy Systems <i>Ensuring that the energy-related systems are performing as designed.</i>	Required
Prereq 2	Minimum Energy Performance <i>Establishing a minimum level of energy efficiency.</i>	Required
Prereq 3	Fundamental Refrigerant Management <i>Eliminating ozone depletion by using non-CFC refrigerants.</i>	Required
Credit 1	Optimize Energy Performance <i>Achieving energy cost savings by improving efficiencies.</i>	1-10

LEED Criteria Applied to Boat Building

(From: Peters, M., 2009, The Large Green Yacht, Part 2, Professional Boatbuilder, #117, February/March, 26-43.)



RECYCLING

Green Passport

- IMO's Guidelines on Ship Recycling (2003): Green Passport- inventory of material in ship's structure, systems, and equipment that may be hazardous to health and the environment
- Maintained through the life of the ship
- Green Passport can be used to formulate a safe and environmentally sound plan for decommissioning a ship
- Raises awareness of hazardous material
- Lloyd's Register- verifies Green Passport for both new and existing vessels

•<http://www.lr.org/Industries/Marine/Services/Consultancy/Green+Passport.htm>

•<http://www.lr.org/NR/rdonlyres/5EA619D8-0788-47DE-806A-FE2E6C7FAC6F/43816/GreenPassport0606.pdf>

(RINA Green Star: ballast water; chemicals)

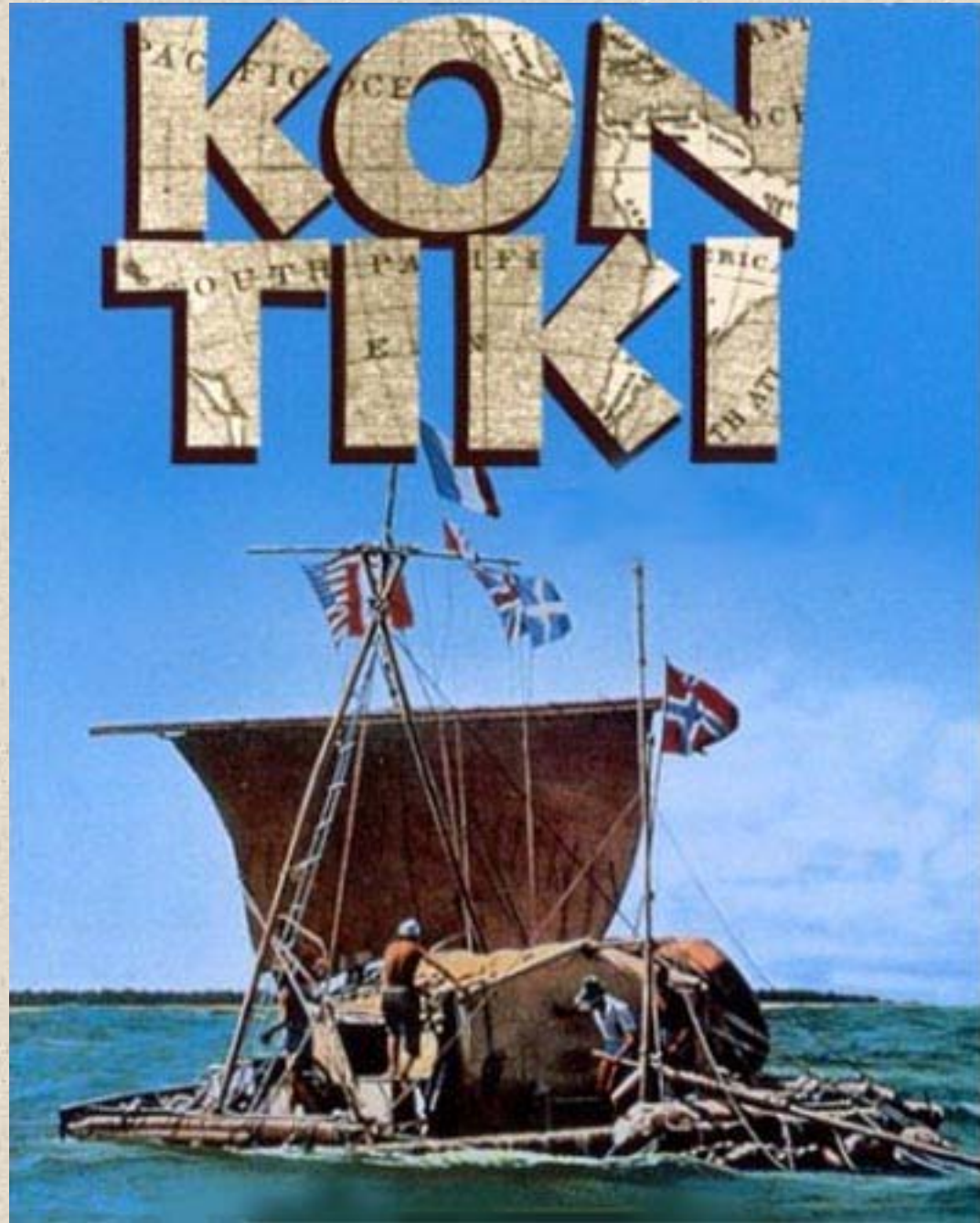


GREENING THE FLEET: FUNDING CONSIDERATIONS

- *Additional costs will be incurred to address or incorporate “green” solutions

- *Many of these expenses will be front-loaded: construction phase

- *Opportunity for philanthropic funding????





OPTIONS FOR GREENING THE UNOLS FLEET

*Development of guidelines for a) existing and b) new vessels to be submitted to the federal agencies

1. FIC and/or

2. Council Subcommittee:

Members from Council, FIC, RVOC,
RVTEC

3. Initiate discussions with designers,
architects, LEED companies

*Incorporation of guidelines to existing vessels

*Incorporation of guidelines in design of new vessels





