



electric-ship

1/11/2024

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Cruising Review

European Electric Yacht AirBNB and Renewable Energy



This webpage QR code

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PDF Version of the webpage (first pages)

## Electric Ship

Electric Ship is a project to redefine shipping by using a modular build concept, with multiple missions, using renewable energy. Gaviotas: A Village to Reinvent the World. This is the book, the story, the philosophy that started it all. Alan Weisman has captured the essence of sustainable, renewable energy, in his epic story-telling of this amazing project, and concept, in the eastern llanos of Colombia.

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## Galley

### The Advantages of Going Non-Animal Products at Sea

**There's no better time to go vegan while cruising.**

PRODUCT: Save your animal cravings for shore, it will save your power needs and provide you with a sustainable living methodology at sea. What's the first thing to go during an emergency power outage ? Food spoils. In this case, meat (seafood), and dairy. Not to mention that the availability of meat products can be very expensive. You don't have to go vegan, just save your steak endeavors for shore visits.

During the hurricanes, what were the first pressing needs ? Power. All those refrigerators and freezers need power to keep meat and dairy from spoiling. Need a hot meal during a natural disaster ? Get an emergency solar oven. You can even make them. Dried beans and rice are easy to rehydrate and cook for a hot meal.

Onboard, use electrical efficient induction stove top or hot plate, microwave, or Instant Pot pressure cooker. Cooking time is faster, less cleanup, and less heat in the galley (reduces air conditioning in the tropics). All these small electrical savings add up. You reduce generator time, or battery time if on solar.

Dump the propane usage and storage. It's a heavy gas, which means it sinks into your bilge and can be explosive. It's hard to get and expensive. Instead, get a solar oven, or an extra solar panel to drive an induction cook top.

Dried beans and rice are easy to store, have a long shelf life, and inexpensive to buy. They rehydrate and cook easy, and are a staple in most parts of the world, which means easy access. A cup of beans and rice will give you all the protein you need for one day.

Dried beans and other seeds not only can be cooked, but used as micro greens (sprout overnight and eat the next day for nutrient packed fresh food), or grown into sprouts or plants.

Micro greens offer a fast-grow solution for delicious variety in salad and fresh food. Best of all, they can be grown with minimal amounts of light (you can use LEDs) in stormy weather. Most micro greens and sprouts pack more nutrition than the grown plants. They offer vitamins and protein.

For more substantial greens, consider varieties of tomatoes and peppers sized for cruising boats. A solar still can produce all the fresh water these plants need. At the very least, consider starting with herb plants, such as cilantro, basil, parsley, oregano, and sage. They can provide you with a fresh spice option for any meal.

Harvesting plants for food daily does not require the use of refrigeration.

**On-Board Vegetable Garden:** Micro-greens and other vegetables can be grown at sea.

**Less Refrigeration Hassles:** Lessen your need for freezing and refrigeration. No spoilage.

## Refrigeration

### Refrigerator, freezer, and ice maker.

PRODUCT: Full batteries ? Make ice. 1 amp (120 watts AC).

Dometic or Sunfrost.

Top Load: The most efficient method of cold storage is a chest-type device. Why ? Because the cold sinks, and preserves the volume of cool. In cabinet type refrigerator freezers, as soon as you open the door, the cold volume spills out (again, cold sinks).

**Efficient Operation Versus Initial Purchase Price:** A Dometic will cost one have to the same for volume, while the SunFrost is typically more efficient by a factor of two.

**On Demand Cooking Versus Refrigerated Storage:** While it might seem like a good idea to freeze, store, defroze, and then cook, if you cook on-demand you can store dry and save the energy. If you must freeze, defrost ahead of time in the refrigerator, to re-capture the cool energy before final defrost.

**Biggest Meal of Day at Noon:** Try to keep the biggest meal of the day at noon or early afternoon. Save dinner for lightest meal. That way all cooking gets done when the Sun is out.

## Food at Sea

Infinity Electric Ship

Date:

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# Modular Hull

## Modular Multi-Hull Boat

The case for a unsinkable, modular composite hybrid boat hull.

**PRODUCT: Wound Matrix Hulls:** The hulls would be constructed from sheets of high strength bubble pack or foam, spiral wound within sheets of fiber material (bamboo mat, carbon fiber, fiberglass, or other fabrics), infused with vacuum bagged epoxy resin. The epoxy resin is made with graphene, from a inexpensive process for color and strength. The hull sections can be made with a continuous casting (feed) mould or loom. For additional strength, the outer layer can be fiber filament wound(similar to carbon fiber tubes).

**Overall Constraints:** Proa, catamaran, or trimaran. Lighter weight construction materials. Positive buoyancy without any bilge. Sectional builds for modular construction. Efficient hydrodynamics requires less power. Modular construction ease in maintenance and repair. Entire hull is a crash bulkhead.

**Multipurpose Hulls:** Sole purpose of hulls is for buoyancy (lifting) and bulk fluid storage (water and power storage): Hull construction allows the actual fabrication to make hull a large battery or super-capacitor. Not only does the lightweight hull provide battery storage, but becomes a solid-state utilities infrastructure.

**TIME: Hull Design:** The three hull ship would have a center hull for main propulsion, while the outer hulls would be for directional control and thrusters for slow speed maneuvering and docking. Outer hulls would have bulk liquid storage built into the sections, and become a super-capacitor storage device.

**Propulsion:** Center hull would be for main propulsion, which would be a large fin-type design that has pod drive thrusters at the tips of the fins which not only provide upward and downward motion to the fins to move large volumes of water at slow speed, but also low volume, high speed tip thrust for maneuvering at slow speed. The small tip thrusters would have counter-rotating props for 30 percent more efficient power. Propulsion would have line guards for anti-fouling from crab/lobster pots or other fishing line.

**Modular Deck:** The multi-hulls would provide anchor supports for a deck, which would have anchor points for modular structures, such as cabins, galley, salon, wheel house, storage, greenhouse, and other modules, which give the user an unlimited configuration option, depending on the ships mission.

**Hybrid Power:** The electrical system would powered by a combination of solar electric, wind, solar thermal, and conventional engine generator (backup). Storage via super-capacitors in the hulls.

**Roll Forming Composite Hull:** A new process to form boat hulls, by vacuum bag epoxy infused rolling bubble-pack with composites and other fibers for strength.

**Hull Super-Capacitor:** Roll forming using bubble pack and carbon or graphene separation allows assembly to become a battery or super-capacitor.

# Paddlewheel Propulsion

## Propulsion Options

### **Renewable energy powered prime mover.**

**PRODUCT:** Traditional screw propeller propulsion has been around for more than one hundred years. In its various forms, it has been proven to be reliable, and has morphed into the most modern evolution of electric pods (tractor and tug). Personal watercraft slow speed options include very efficient fins. All have the inherent issues of grounding, and line fouling. Providing planing hull propulsion requires a great deal of horsepower, while foiling devices require clean water due to fouling.

**Overall Constraints:** Multiple power drive options. Reliability. Resistant to underwater hazards (grounding, line fouling). Repairability. Low maintenance. Ease of access. Sub-planing speeds for sustainable fuel efficient power (less than 15 knots).

**Electric Drive:** An electric drive option gives the user the option of multiple ways to produce power, including fuel engine, wind, thermal, and solar electric.

**Using AC Motor with DC:** While contradictory to common knowledge, a AC motor can run on DC. The advantages of a AC motor are longer running life, and less acquisition cost. On smaller AC motors in commercial appliances, you'll need to replace the switch, which will burn out quickly.

## Solar Heat

### Using Solar for 24 Hour Heat Access

**Review of the Zeolite heat storage pellets. Just add water.**

**Just Add Water:** A revolutionary heat storage product has been around for some time now, but this is one of the first applications for solar cooking and hot water heating use off-grid. The product is called a Zeolite, which is a high surface area substance, which when exposed to water, releases heat. The structure is unique, in that it can be recharged with heat, and retain that latent heat virtually indefinitely if kept dry, until it comes in contact with water.

**Instant Heat:** The remarkable feature of this substance in pellet or ball form, is that it can boil water almost instantly. So it is perfect for emergency water purification, and cooking.

**Heat Recharge:** Because the Zeolites need to be heated to be recharged, it is a perfect application for the solar vacuum tube. The recharge temperature is 130 to 250 C.

**Charge Now Use Later:** The unique qualities of the heat storage (at room temperature), allow you to use the Zeolite at any time of the day, just add water. After cool down of the pellets, dry off and recharge in your solar thermal vacuum tube. The pellets store at ambient temperature.

**Storage:** The best method of storage of pellets is in vacuum sealed bags, or mason jars. For larger amounts, vacuum sealed 5 gallon buckets (either pressure sealed lid or vacuum bag entire bucket). It's imperative to keep water and moisture out of the charged Zeolites. Any water incursion can result in the rapid release of heat around 212 F or 100 C.

**Use:** A few pellets can heat an entire cup of coffee or tea. This provides a very simple way to deliver heat to your cup of morning beverage. They can also be used for soups, double boilers, and with some ingenuity, they can be used as a low to medium temperature burner heat source. Used with boiling water, you can make steamed vegetables, rice, and pasta.

**Commercial Uses:** Bosch has been using Zeolite in their PerfectDry dishwashers since 2008, to assist in drying at the end of the washing cycle. They also claim to have a quieter drying operation. Thermador also has entered the dishwasher market with the StarDry drying solution.

**Zeolite Pellets:** The unique latent heat storage capabilities of the Zeolite pellets allow them to release heat by just adding water. They can be recharged with solar vacuum tube heat.

**Solar Vacuum Tube Heating Zeolite:** The solar thermal vacuum tube can efficiently heat to recharge Zeolite pellets. Without a reflector it can heat up to 212 F or 100 C. With reflectors up to 400 F or 204 C.



# Solar Power

## Merging Solar Technologies

While solar pv (photovoltaic) panels are a great resource for stored power, consider solar thermal for a smaller point-of-use compact solution that delivers a cost effective solution.

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Using both solar pv as well as solar thermal, provide the maximum benefits for the best price. If you are staging in tropical locations, this can be as simple as a black painted hot water tank. More sophisticated systems include solar vacuum tubes which can provide stored heat at a more economical price than batteries.

## Solar Strategy

Goal: Provide energy from the Sun which is free and doesn't require that you're tethered to land-based hydrocarbon fuel sources.

1. Solar PV: The best primary power collection, storage, and delivery is solar photovoltaics. Panel costs are now very affordable with great portability (i.e. no fuel stops). Using light-weight Lithium batteries, you can now dump the legacy propane based cooking and heating.
2. Solar Thermal:
  - (a) Solar Reflector Oven: Used for decades, this basic devices work reliably and can be used for cooking everything from rice and beans, to bread. Can be used to heat water, and focuses mealtimes at the lowest glycemic index period of the day (multiple benefits).
  - (b) Solar Vacuum Tube: Primarily used for hot water, provides a excellent source of free heat.
3. Wood Fired Pizza Oven: Always have a back up. Having a small wood fired oven can provide hot water and delicious meals.
4. Survival: Acquire inflatable solar desalination units available for liferafts and other survival situations.

Solar Oven On Deck: While some solar ovens can be bulky, they fold up for compact storage.

Solar Beans and Rice: Solar ovens can bake a complete meal such as rice and beans

Solar: Solar ovens have folding reflectors, for ease of storage. Even if you don't regularly cook with solar, keeping one for emergencies is a good idea.

Solar Oven Temperatures: Even the most basic of solar ovens can reach temperatures between 250-300 F.

## Eco Ship

With the advent of overpriced and overtaxed land-based accommodations and workspaces, a eco-minded alternative has been inspired by the Swiss lake paddlewheelers.

Switzerland and Italy are adorned with many large lakes, rivers, canals, and access to seas and oceans. Yet, finding reasonably priced housing and workspaces are a challenge. While this is not a solution for many, for a few it provides a environmentally friendly alternative to not only access the region, but make money at it.

The concept of a efficient multihull that is alternatively powered by the sun and wind may be the answer. Using a modular platform allows this concept to apply for a AirBNB, vacation home, workspace, or even workshop. The portability gives this concept far reaching possibilities.

For South Pacific getaways, simply adding stainless steel legs makes this modular platform into a over-water-villa, completely self-sufficient.

Most important, this solution is a low carbon emitting, sustainable habitat that can be self-built, or commercially produced.

The efficiency and simplicity of multihulls have been used since the Polynesians used them centuries ago.

Fast forward to the future and they are the hallmark of streamlined marine transportation.

Adding modularity to the concept gives you a scalable solution for any marine based habitat.

The concept of a unsinkable hull with all power and habit above the waterline adds to its low maintenance and operation costs.

PROFIT: The methodology of a modular build starts with the concept of a standardized hull design which is bolted together to extend length and beam.

Further that concept above decks to easily designed and built carts which perform functionality from workbenches, kitchens, cabinets, and furniture.

Design with purpose not only reduces build time, but virtually eliminates maintenance and anything becoming obsolete. Make updates and innovation part of the design and life of the product.

The use of eco-friendly transportation and habitat is not only good for the bottom line, but helps reduce our dependency on deplete resources, and can eliminate our footprint compared to conventional power guzzling and land hogging strategies.

Reduce moving parts to a minimum, while extending the usefulness and functionality of anything you build, creates a eco-system that enhances your experience aboard.

The challenge with any new strategy is merging legacy systems into new ones, which benefits all.

Goal: Develop a low cost, easy-to-build, modular multi-hull, that is efficient with a low water plane, low induced drag, lightweight, and can utilize standard formats for low cost outfitting



