



Electric Ship

Development of a solar powered Electric Ship

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## Modular Multi-Hull Boat

The modular multi-hull boat gives the user ultimate flexibility in ship purpose configuration, build cost, operational cost, hydrodynamic and energy efficiency, and safety at sea. The design maximizes the operation of the ship with the least amount of downtime. Considering that most emergencies at sea are: running aground, fouling prop from lines, fitting hull breach leading to flooding, and collision hull breach, this design addresses each one of those legacy ship hull design inherency's with a more simplistic approach that prevents the ultimate disaster at sea-sinking. While catamarans and trimarans are well known for positive buoyancy, they can still swamp, which renders them useless (aside from acting as a raft for rescue). The next generation ship will have a design to maximize operational efficiency, while minimizing legacy ship disasters, by providing solutions, and eliminating cascade-effect emergencies (i.e. hull breach, flooding, loss of power, and sinking).



## **Gaviotas: A Village to Reinvent the World**

This is the book that started my invention interest and how to invent. A description from Amazon:

Los Llanos: the rain leached, eastern savannas of war-ravaged Colombia are among the most brutal environments on Earth and an unlikely setting for one of the most hopeful environmental stories ever told. Here, in the late 1960s, a young Colombian development worker named Paolo Lugari wondered if the nearly uninhabited, infertile llanos could be made livable for his country's growing population. He had no idea that nearly four decades later, his experiment would be one of the world's most celebrated examples of sustainable living: a permanent village called Gaviotas.

In the absence of infrastructure, the first Gaviotans invented wind turbines to convert mild breezes into energy, hand pumps capable of tapping deep sources of water, and solar collectors efficient enough to heat and even sterilize drinking water under perennially cloudy llano skies. Over time, the Gaviotans experimentation has even restored an ecosystem: in the shelter of two million Caribbean pines planted as a source of renewable commercial resin, a primordial rain forest that once covered the llanos is unexpectedly reestablishing itself.

Colombian author Gabriel Garcia Marquez has called Paolo Lugari Inventor of the World. Lugari himself has said that Gaviotas is not a utopia: "Utopia literally means 'no place.' We call Gaviotas a toponia, because it's real."

Relive their story with this special 10th anniversary edition of Gaviotas, complete with a new afterword by the author describing how Gaviotas has survived and progressed over the past decade.



## Food at Sea

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 a 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 a 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.



## The Advantages of Going Solar Thermal

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

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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## Ship Galley

The galley is one of the focal points of the boat. Make it fun, efficient, and easy to use. Develop a solid strategy for food procurement, growing, storage, preparation, and enjoyment. A more sustainable approach will allow you to cruise off-grid longer, and less dependent on port visits.



## Pearl Beach Solar Powered Catamaran

Pearl Beach in Bora Bora was one of the first early adopters for the Soel solar powered cat back in 2018. I've been on this carbon fiber beauty many times. My comments are provided in the review.

1/7/2022



## Marine Design:

As a student of Elon Musk and Nikola Tesla, it's refreshing to see that they both had similar methodologies for design and inventing. For them, the clear path is not to keep improving legacy technology, but to use physics to develop a new path.

The Concept: First principles. Instead of forwarding current form (imitating current design), forward function as the initiator. Use information from different disciplines to make current innovation. Most people are so focused on form, that they overlook the function. As Elon Musk says, people often live life by analogy.

First principles involves boiling down problems to basic elements and then coming up with unique solutions. Be wary of ideas that you inherit, since they are already laden with problems and barriers. Old ideas set a boundary around creativity. That distinction is the difference between continuous improvement and first principles. First principles means that you abandon allegiance around first forms, and put the function front and center. What are you trying to accomplish? What is the functional outcome of what you are trying to achieve? Optimize function and ignore the form. This is how you learn to think for yourself.

Our Innovation: The new function we are building as the core design is a rail based yacht. That is, multihull rails to which superstructure is attached. This design element throws out conventional design along with the bilge, below waterline mechanicals, cramped quarters, and sinking. It is replaced with a new methodology for rethinking the function of yachting and marine design. The multihull concept is the most efficient waterplane available. With the exception of foils (which bring the craft above the water and is literally flying), this design takes advantage of low water drag which results in lower power requirements for propulsion. The modular design extends habitability and capacity easily. This is a projection of hydrodynamic design and function into the future.

Efficiency vs Cost: Typically at odds, efficiency doesn't necessarily mean higher cost. In this case, function is the derivative of design, and allows the hull to be the static design point, while everything attached to it, becomes modular. The hulls (three in this case) become the least design element. There are no complex curves, waterplanes, or hydrodynamics. The hulls become solid flotation with thin, structural bearing rails, to which the superstructure is attached in modules.





## Electric Ship Update

The electric ship project has been a few years in the making. The basic vessel design has morphed over the past few years and is now becoming a more stable design and mission. Updated on November 25, 2020.

**Multihull:** The design started as a proa or a catamaran, but with additional hydrodynamic studies and build criteria, a trimaran design has been finalized. The trimaran design allows very thin hulls, and distributes weight very well. It also allows a hull design that is relatively easy to build.

**Dimensions:** The hull and waterline is currently at 50 feet (15.24 meters) and a beam of 30 feet (9.14 meters). Working draft of 3 feet (1 meter) and a air draft of 18 ft (6 meters). The air draft is an important figure and references navigating up the Rhine River to Basel, Switzerland.

**Propulsion:** Modeled after Swiss lake cruising vessels, a modernized paddlewheel design with electric outboards (for emergency power) will power the vessel. The paddlewheels will be made from carbon fiber, and powered by a magnetic drive from the top of the wheel using stainless steel washdown 110V (or 220V) standard AC motors. Design vessel speed is at or less than 10 knots. The focus is on efficiency and simplicity.

**Hull Design:** The three carbon fiber matrix positive floatation ama's are made from a continuous weave modulus from a hybrid Maypole weaving device designed by the inventor. Each hull will be about 2 feet wide with a draft of 3 feet (1 meter). The design displacement is around 70,000 pounds, and with each foot of additional draft, expect a 20,000 pound additional buoyancy. With an air draft of 18 ft (6 meters), the vessel will have design clearance for the entire length of the Rhine River from Amsterdam to Basel, Switzerland. Depending on build sites, hull modules may be made available to fit in a 53 international shipping container. The dimensions of those modules will be 2 ft wide by 4 feet in height. The hulls will have flat bottoms, since they are relatively thin.

**Superstructure Drag (windage) Versus Hydrodynamic Drag:** In the early design stages, it was determined that the focus would be on a very efficient hull design (long waterline and thin canoe-like hulls) which would not require a huge powerplant. Since the vessel would be electric motor powered, the priority was in decreasing hydrodynamic drag as much as possible. Since most vessels spend most of the time at anchor or port, it doesn't make sense to maximize the powerplant and emphasize speed for a luxurious lake cruiser. If additional power is needed, simply add paddlewheels, or electric outboard motors. For fast current rivers (going upstream) such as the Rhine, a towboat or temporary diesel (vegetable oil) powered engine generator can be put onboard for the AC power drive requirements.

**Mission:** The mission of the electric ship is to provide a working platform for a solar powered electric vessel, which can not only provide a worldwide navigable ship, but a platform for revenue based on the AirBNB model.

**Completed Hull Available Via Container Freight:** A modularized carbon fiber hull is available for DIY multihull builders for \$250,000 USD.

**Build License Electric Ship:** A unlimited build license for the vessel is available for \$499,000 USD.

Current update is November 25, 2020.



## The GPU Ground Power Unit for Stand Alone Portable Power

Infinity Turbine is developing a home based GPU (ground power unit) that is based on lithium batteries.

This cart mounted system is easy to move around to the jobsite, home, mobile, or marine. Hook up your PV panels, wind generator, backup generator, or grid power to charge.

Price: \$15,000    Kit Price: \$10,000    Plans: \$699.00

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## Using Solar for 24 Hour Heat Access. Just add water.

Zeolites give you the option of 24 hour liquid heating for cooking, water sterilization, or small amounts of hot water for heat. They can be recharged using the heat of the Sun in a solar vacuum tube. The primary advantage of using Zeolites is the ability to have long term latent heat storage, which can be used any time of the day. Zeolites need to be stored in airtight and watertight containers. Zeolites can be recharged with the latent heat using any heat source between 130-250 C.



## MS Burgenstock Hybrid Electric Catamaran

The MS Burgenstock has been in operation daily (aside from resort closure during the pandemic of 2020) since May 2018 between Lucerne and Kehrsiten as a hourly shuttle for Burgenstock resort patrons and guests. It is a catamaran design with a hull length of 38 meters (125 feet) and a width of 10.30 meters (34 feet). It has a crew of two who can easily manage docking amidships. Built by Shiptec AG in Lucerne, the hybrid multihull has (2) 552 kW Scania diesel engines and (2) 180 kW (Type B 3200 RPM continuous motor/generator 180 kg) Siemens synchronous electric motors. Vessel weight is 110.92 tons (221,840 pounds). The passenger service has 26 first class inside seats, 15 first class outside seats, 93 second class inside seats, and 84 second class seats on the second deck, for a total of 218. The rated capacity is 300 passengers.



