Modern Alternate Energy Options

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For any of us using 12-volt electrical power on a cruising boat, being able to reliably charge our batteries is critical. Achieving a full charge on a daily basis is important for longest battery life. Even a nearly full, but not complete, charge eventually leads to premature battery failure. If using liquid lead acid (LLA) batteries, equalization every couple of months is also required. However, deciding what equipment to buy to accomplish this is no easy matter, especially for those new to cruising trying to evaluate the many options. To further complicate the issue, making the correct decision depends on your intended cruising plans, lifestyle, and location.

So let's take a look at the options and then explore in some depth what we believe to be the best source for alternate energy on a blue water cruising boat in the tropics.

MAIN ENGINE ALTERNATOR- Using a boat's main engine to run an alternator, at anchor or in port, to charge on a daily basis, is a bad idea. Many articles have been written describing the negative effects of running a diesel under light loading. And there are other problems including excessive fuel usage, noise, heat and smoke. Besides this, it takes several more hours of charging, past the regulator's bulk and accept phases, to fully top up the batteries. Underway with the engine on, the alternator will usually do an acceptable job charging batteries, assuming it is properly regulated and can be run for adequate time on a daily basis. But it is those wonderful days at anchor that dictates the need for one or more additional charging sources.

DIESEL GENERATOR- An installed diesel generator runs in similar fashion as the main engine but with less fuel usage. The AC power it produces is usually converted to battery charging current by a separate AC battery charger. This system requires running a diesel engine with its inherent problems (space, noise, fuel consumption, and maintenance). A diesel generator installation also involves a significant additional cost (typically $4K+), added weight and loss of storage space. It is subject to electrical failure which may require an expensive, experienced repair technician. However, it is a must for those that run high current AC equipment for long periods, like an air conditioner, away from a dock.

For emergencies, a good option is a relatively inexpensive, portable, small gas-powered generator, like those made by Honda and Generac for about $900. They can be used efficiently for a battery failure emergency or to charge the batteries if no other charging source is available.

Small Honda eu2000 portable generator with electrical cord, a great choice for an inexpensive emergency electrical generator.

Small efficient inverters can be used for charging the batteries in common electronic devices like computers, cell phones and small batteries.

WATER GENERATOR- These have the significant disadvantage of only being useful while underway at cruising speed or above. This option also suffers from having to be deployed and retrieved for use, being susceptible to fouling and fish attack, and providing no battery equalization capability.

WIND GENERATOR- Despite the hype by vendors and others, we have found this source for alternate energy to be marginally useful for full-time cruisers in the tropics. Not only are they relatively expensive at around $2K for a quality unit and installation, but it rarely produces more than about 25% of a cruising boat's daily energy usage. In order for it to be effective, a steady wind speed of about 15 knots is necessary. Most cruisers anchoring in sheltered anchorages behind islands, headlands or in marinas don't often experience that, especially at night. Also, there is no equalization capability for LLA battery users. Possibly the biggest problem is that the best mounting location is often above a solar array where its shadow can be a problem for the solar panels.

SOLAR- Our opinion, and that of many other full-time cruisers cruising **in the tropics**, is that modern solar technology provides the best, most reliable and possibly only alternate energy charging source you will need. The keys to this statement are:

Fore and aft rotating solar array on the aft utility arch onboard a CSY 44.

1 If mounted flat, the array should be roughly 50% over sized for a boat's daily amperage load. If mounted so the array can rotate fore and aft at least 45 degrees, 30% over sized will probably be sufficient.

2 Nearby hard shading, such as from booms, arches, wind generators, flags, etc, must be at a minimum.

3 The panels must be properly installed and wired.

4 A quality maximum power point tracking (MPPT) solar charge controller regulator must be installed.

5 If you cruise in high latitudes, on the west coast of the Americas or other areas with heavy clouding much of the day, you will also have to look at other options. But be aware that these areas might also have little wind.

Since we installed our first solar panel 20 years ago, the price has dropped from about $4 to $1 per watt, efficiency has increased from less than 15% to about 20%, and MPPT regulators have allowed increased panel output by up to 25%. Monocrystalline panels are more efficient and a better value than polycrystalline panels. There are slightly more efficient and lighter weight flexible panels available now, but at a greatly increased price.

Solar is the only alternate energy source that can provide full battery charging capability nearly all the time without using fossil fuel, if the solar array is properly sized. Solar technology

is silent, there is almost no maintenance, and reliable panel life exceeds 20 years. Previously when I had LLA batteries aboard, I normally used solar charging to equalize my batteries. By splitting the bank into two banks of about 350 amp hours capacity each, I could use about 35 amps of solar charging to equalize them for about 3 hours each. That was easily manageable on any full sun day.

For us there is no need for other charging sources; solar normally does all of our battery charging on a daily basis. Our daily amp hours usage is normally 90% replaced by about noon, and then the solar controller trickle charges the batteries to 100% the rest of the day. Even though we have two alternators, a Honda generator and a modern shore power charger, they are rarely used, whether underway or at a dock.

Below are a few selected references. (Remember not everything you read on the internet is true, but I believe these from a well-respected refrigeration and solar dealer are!)

https://www.coastalclimatecontrol.com/images/PDF/marine_solar_panels_planning_and_installation_guide.pdf - Excellent planning and installation information

http://coastalclimatecontrol.com/index.php/blog/161-solar-state-of-play.html -Panel technology improvements and graphs

http://www.coastalclimatecontrol.com/images/PDF/solar/Estimating_Daily_Power_Output_From_Solar_Panels.pdf -panel identification and output comparisons

http://coastalclimatecontrol.com/index.php/blog/140-marine-solar-panel-planning-guide.html -Basic solar information and planning

http://lib.store.yahoo.net/lib/wind-sun/TS-MPPT-60-comparison.pdf -Controller information and comparisons

The bottom line to all this is that if you plan to mostly cruise in the tropics, you probably don't need to spend lots of money on additional alternate energy charging equipment other than solar. And this is one project that anyone can do themselves. The best news is that the price continues to go down because of the ever increasing worldwide renewable energy demand.

As always do your homework so that you can be sure to do it right the first time. Then you can enjoy those beautiful silent sunsets and happy hours, hopefully with no smoky, noisy neighbors.

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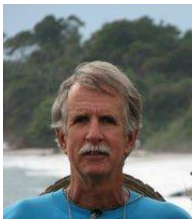

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