

Renewable Energy




A project about renewable energy on a boat



Hot water from the sun

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(11 years old)*



We can get power from Mains Power, Engine Alternator, and Wind generator, Water Generator, Solar Panels and Petrol Generator. The power that we get has to be stored somewhere. We call these batteries.

Batteries, How Do they work?

We use batteries -rechargeable ones- for listening to C.D players, cassettes and radios

The ship's battery supplies power to the engine starter and ignition system. It supplies the extra power needed when the total electricity loads exceeds the amount being generated. It acts as a shock absorber or voltage stabilizer for the whole electric system. It reduces or smoothes out temporally high voltage (transient), which could cause damage to sensitive electronic componetents.

- Most boat batteries in use are 12volt lead acid type. It is the same used in most motor vehicles
- All lead-acid batteries contain the same chemical ingredients, and undergo the same chemical reaction.

Here is what they are made of:

1. Sponge leads (PB). This material makes up the negative plates in all of the cells. It is metallic lead.
2. Lead dioxide (PB02). The material on all the positive plates in the cells.
3. Sulphuric acid (H2O2) the electrolyte or liquid in the cells.



Solar Power

What does solar power help us with?

Solar means that it is to do with the sun.

Solar panels work when the sun shines on them and the electric which is produced is sent down wires to the boats batteries. Most solar panels are adjustable so that you can turn them to be the sun is. On some boats there are solar vents which work when the sun shines down on them and the fan inside spins round.



Water Generator

You can get power from water, by putting a propeller in the water and attaching a rope which spins and makes electricity which is sent to the batteries.



Wind Power

Wind is used by hoisting a wind generator in the rigging or putting it permanently on the back of the boat on a pole. They turn wind into electricity and send it to the battery just like solar panels.

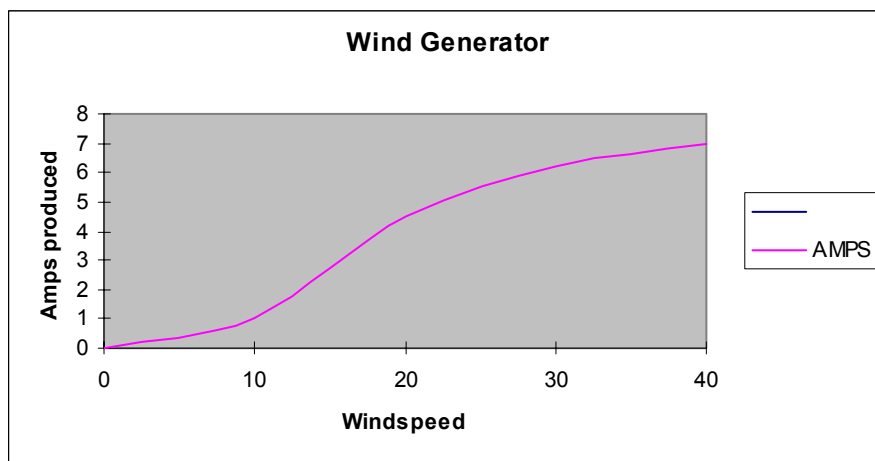
Wind power doesn't just mean creating power for a yacht but yachts can use the wind to get to places with the sails. You can also use a wind steering gear which steers the boat like an auto pilot steers with the engine on. You can put the steering system on different settings depending on how strong the wind is.



These are the different methods of charging the batteries. Not all of them are sustainable. The boat's engine uses diesel and the Honda Generator uses petrol.

This is the amount of power each generates:

- Battery Charger with a Honda Generator or shore power 15amps.
- Engine alternator 25 amps. variable
- Towing generator 1 amp per knot
5 Knots = 5 amps
- Wind generator.
As graph below



Solar Panels

The amount of electricity produced by S Solar panels varies with their size and their position to direct sunlight.

Now for the facts .

To know how much power everything onboard uses, we use the following:

Amps equals watts divided by volts.

So, the Radar uses 38 watts so I divide the watts by the volts. $38 \text{ divided by } 12 = 3.17 \text{ amps.}$

SSB Radio $150 \text{ w divide } 12 = 12.5 \text{amps} - \text{ on transmit}$

GPS Garmin $128 \text{ 2w divide } 12\text{v} = .17\text{A}$

VHF Radio 2.08 amps on transmit

Fridge 3.2 amps

Tricolour 2.08 amps

Anchor light 0.83 amps

Shower pump 8amps

Navigation Lights $3 \times 25\text{w} = 75\text{w} = 6.25 \text{ A}$

Mast 0.83 amps

Steaming light 2.08amps

Pressure water system pump. 8amps

Laptops via 150w inverter 12.5 amps

Lights in main cabin $7 \times 10 \text{ w} = 70 \text{ w } 5.83 \text{amps}$

Bilge pump 8amps

Auto Helm 7amps 2.5 amps variable by use and sea

The battery storage capacity is 275 amps
($2 \times 105 \text{ amps } 1 \times 65 \text{ amps}$).

Now I would like you to imagine that you are on a boat for 12 hours (a day).

What equipment would you have on?

Radar occasionally
Fridge 7.50
GPS 2.04
Instruments 3.60

Various. 2 amps

SSB Standby	31.58 amps
VHF Standby---	
Radar Standby	



So.....

We use around about 46.72 Amps a day.

Now I want you to imagine that you are on a boat for 24 hours. What things would you use plus the equipment that is used in the day.

Tricolour navigation lights $2.8 \text{ A} \times 12 \text{ hours} = 33.60\text{amps}$
Various i.e.—cabin lights $(2 \times 10\text{W} = 20\text{W} \times 12 = 1.67 \times 12 = 20.04\text{Amps})$

33.60 amps
46.72amps
20.04amps
Total 100.36amps (night)
Plus 46.72 amps (day)
Total 147.08 amps



So

In 1 hour we use 6.13 amps x that by 24 = 147.08 Amps.

Because we have used the boats batteries to run things, we need to fill the batteries up again.

So..... We need these things to keep the Batteries full.

To put in electric I could use the towing generator at 6.13 knots (6.13A) I would make enough electric to fill the batteries.

Or: by using any other method of generating power at 6.13A per hour over a 24 hour period.