BACK

ERHARD'S ELECTRIC

Erhard's Electric Renewable Energy Worksheet

Essentials	Watts	Runtime Per Day	Watt Hours per Day	Approximate Cost
Water Pump				
Heating System				
Fridge				
Basics				
Lights				
Radio				
Microwave				
Washing Machine				
Nice to Have				
Computer				
TV				
Cooking				
Answering Machine				
Electric Cooking				
Toaster				
Fax Machine				
Photocopier				
Clock				

Watts = Voltage X Current
EG 120 Volts x 12 AMPS = 1440 watts

Minimum inverter size needs to be able to handle the maximum connected load.

It also needs to be able to handle the surge current for a motor starting in addition to the load already operating. The place where this is noticed most is when, for example, there is a load of 15 amps on the inverter and the water pump kicks on with a surge current of 64 amps. Generally that surge current is of a short enough duration that the motor will start, though something to keep in mind when sizing the inverter. A good thing to use as far as a water pump goes is either a Grundfos SQ series pump which does not have this start up surge or a DC Pump. At this stage the DC Pumps require relatively frequent maintenance so I would recommend the SQ Pump.

Inefficiencies

These can be a significant user of the available power.

- **Batteries**

  Batteries are not 100% efficient - for calculation purposes use about 90% for efficiency.

- **Inverter**

  Maximum inverter efficiency is about 95%. Also when it is idle or has a very low draw, it's efficiency is very low. An SW inverter will use about 20 watts just sitting there when it is on or about 1 watt when it is in the search mode, therefore, it would consume 480 watts of power if it needs to be on all the time - that is the approximate output of 2 - 110 watt solar panels in winter - therefore about $1,700. worth of solar panels and equipment.

Batteries

Batteries have a certain life span and you get what you pay for. Better batteries will have much thicker plates to give many more years of service. Generally I would recommend enough charging capacity to keep the batteries cycling to no more than 50% full; this will significantly prolong the battery life. If batteries are cycled to less than 50%, they will need to be replaced sooner - therefore added cost. I prefer to spend more on the charging aspect up front rather than have to replace batteries sooner. Another option is to have a generator to charge the batteries if they get below a certain level (if it is too expensive at this point to have a large enough solar or wind capacity).

Price Calculations

In terms of figuring generating costs, you can use a rough figure of about $800 per 100 watt panel. So to figure out how much each item would cost in generating capacity: you would use a winter figure of about 200 watts per day produced from a 100 watt panel per day on the average - therefore each 1000 watt hours per day costs about $4,000. using solar.

Wind calculations would work a bit different. For example an AWP 3.6 would produce an average of 4000 watt hours per day with an average 10 MPH wind. Therefore if the cost of the wind generator and tower is about $10,000.00 - the cost per 1000 watt hours is about $2500. If the average wind speed is 7 1/2 mph the output is about 2000 watt hours per day, therefore about $5,000. per 1000 watt hours. If the average wind speed is about 14 mph, then the output would be about 8000 watt hours per day, therefore about $1,250. per 1000 watt hours

Core Pricing

The core of a system consists of the battery bank, the disconnects, charge controllers, metering and associated wiring. This really depends on how big of a system that you are running, though it does generally amount to a significant amount of the whole system. Once established though, you can keep adding charging equipment generally without doing much with this core.

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