DO IT YOURSELF SOLAR

EXAMPLE OF LOW COST OFF GRID 3KW SYSTEM

9/19/2017
SYSTEM GOALS

• Low Cost!!! Find ways to make lowest cost system that meet other goals below.

• Usable output during power outage for critical circuits (Power for refrigerators and lights minimum)

• Self teaching project

• Reduce utility consumption

• Low maintenance

• Off Grid; Do not have to sign contract with utilities

• Safe to use in personal residence

• Removable to eventual new home site
SYSTEM COMPONENTS

- Sharp Solar Panels - 12 panels at 250W each (3KW)
- Outback Flexmax-80 Charge Controller
- Batteries – 80 cell, 150AHrs 48V Flooded Ni Cad battery pack
- Midnight Solar combiner – 6 channel
- Reliance Transfer Switch – 6 circuit
- Inverter – Discarded Server UPS, 1500W 48V
- Roof Racking – Snap N Rack
SOLAR PANELS

• Found a solar panel wholesaler (Sun Electronics) that sells quantity of manufacturer over stock and panels with mild cosmetic defects.

• Bought a pallet (22 panels) of Sharp 250W panels to get best price

• Sold half the pallet of panels to friends

• Ended up with a cost of $206 per panel or $2472 for the system
RACKING, CHARGE CONTROLLER, AND COMBINER

- Researched Roof racking systems extensively to find best one that will not cause leaks
- Contacted wholesaler to get best price. They offered me dealer status for north AL.
- Used this dealer status to buy Charge Controller, Roof Racking system and Combiner below any cost I could find on the web
- Cost of Combiner, breakers, Wiring, Charge Controller, and Roof racking system totaled $1937
BATTERIES

• Low maintenance goal required research into alternate battery technologies

• Lead Acid batteries must be replaced at high expense.

• Found out that Ni-Cad Flooded cell batteries can last for 50 years or more with infrequent maintenance. If charged correctly do not have to fill water for 5-7 years.

• Know of folks currently using Ni-Cad batteries manufactured in the ‘70s for their solar electric system
LOW COST BATTERY ACQUISITION

• Ni-Cad batteries are a technology that lends itself to reasonable purchase of used batteries

• Searched multiple cities in southeast looking for Flooded Cell Ni-Cads.

• Found 92 unused cells that were bought for a cell tower backup at about 10% of cost if purchased new

• Cost of 80 batteries for 150AHr of backup capability is $1739
INVERTER

• Developed side project for low cost solar generator using discarded Uninterruptable Power Supplies (UPS)

• These devices contain high quality pure sine inverters for server farms

• Found company that recycles the materials from these UPS devices

• Was allowed to experiment with a number of these to see if it is cost effective to provide solar generators rather than just recycle materials only
INVERTER CONT.

• Inverter could not be removed from the cumbersome UPS packaging

• Only about 14% of batteries in UPS were usable

• About 30% of the inverters were operational. Minor repairs upped that to 50%.

• Due to the poor yield and high labor content in assembling working systems a business model based on using discarded UPS could not be realized

• Ended up with several left over working UPS

• Used the two 48V UPS for inverters for my DIY solar power system.
# System Costs

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<thead>
<tr>
<th>Item</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Solar Panels</td>
<td>2472</td>
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<tr>
<td>Inverter</td>
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<td>Charge Ctrl, Roof Racking, Combiner</td>
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<tr>
<td>Batteries</td>
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