DO IT YOURSELF SOLAR

Example of Low Cost Off Grid 3KW System

3/19/2015
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
Found a solar panel wholesaler 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
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
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.
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.
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 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

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Panels</td>
<td>2472</td>
</tr>
<tr>
<td>Inverter</td>
<td>0</td>
</tr>
<tr>
<td>Charge Ctrl, Roof Racking, Combiner</td>
<td>1937</td>
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<tr>
<td>Batteries</td>
<td>1739</td>
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<tr>
<td>Transfer Switch and misc</td>
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<tr>
<td>Install labor</td>
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<tr>
<td><strong>Total</strong></td>
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<td><strong>Actual Out Of Pocket Expense</strong></td>
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