Crossing the Digital Divide (v142)

Generation

by Joseph Feigon

for the Observer

My work has changed since I began focusing my efforts in Laytonville versus San Francisco. It goes without saying, both markets (here and there) are radically different from one another. Aside from population density discrepancies, our terrain constantly challenges most man-made changes, from roadway and power grid, to usable water and communications. Weather is more than a convenience (or inconvenience) here then it is in a paved over valley with over a century of man-made improvements.

As many of our neighbors have learned with their homesteading progress, self-sufficiency, if one adopts modern conveniences, requires power. Power from the grid (PG&E) is AC (alternating current), power from an off-grid solution is always DC (direct current), and may be converting to AC for many solar powered applications. For the wireless and security projects I've been involved in (the change in my work), solar generation is somewhat simple: generate and store enough Direct Current electricity to power radios and cameras when there's little sunlight and long nights.

What's involved? Solar panels (where generation occurs), gel cell batteries (where energy is stored in amp hour ratings), and a demand interface (power over ethernet switching). In most cases, my radios and cameras use 24volts of passive DC power, drawn at a maximum of .5 amp/hour. One wireless radio therefore uses 288 watts of power in one day. (Watts=Volts x Amps x hours-of-use), or a total of 12AH (amp hours) of storage.

If the sun doesn't shine, we need enough battery capacity to store at least double the 288 watts needed for a radio to work all day long. Battery technology has yet to yield a solution that can be fully discharged and recharged continuously without degrading the performance of the storage cell (battery). Assuming we want a 50% reserve for the battery to last a long time, we'd need storage rated for at least 24AH, which might be one large gel cell, or two.

The sample above would require one solar panel and two batteries to safely power one radio for one day without sunlight. A one-radio solution is atypical.

Sizing generation (solar panels) and suitable storage (gel cells) requires attention to both a single day without sunlight as well as multiple days of partial sunlight. The impact of the earth's rotation (winter/summer) is a critical component, as the quality and quantity of sunlight changes with the seasons.

I found one resource one the web @ https://www.wholesalesolar.com/solar-information/start-here/offgrid-calculator which I found educational, and hopefully useful for you as well.

Happy New Year!

Control those things you can, and keep the surprises to a minimum.