USEFUL CAPACITY ON LEAD BATTERIES

Lsdx 2022.12.05

On my offgrid photo-voltaic system, to keep a long life on my lead batteries I only use 1/3 of their nominal capacity. Emptying them completely has no sense and would harm them. Following is a possible protocol that has to be adapted to each situation. My specific data are underlined

- Load the batteries up to 3 hours of float, enventually with a generator;

- Equalize (1h);

- Measure density to make sure its ok, correct it as needed, then back to previous step;

- Suppress alarms except _SOC=66%_ or be on the spot when needed;

- Cut off all incoming power (panels and gen);

- Cut off all outcoming power DC ans AC if using an inverter which could be convenient. Only keep the output to the discharging resistor;

- Discharge the batteries at constant ampérage. For me, the mean hourly load was from 367 to 1118W Discharging at about 1000W woul do which gives 42A with my 24V batteries.

- Measure Amps I_t (ammeter or if Victron CCGX advanced[1]) each hour as it may diminish regularly. For each hour calculate with the mean value from beginning to end. For one hour period this gives the Ah_t. just to please the manufacturer;

- For easier further planning, Watt.hours are more pratical. Thence, measure at the same time as It the voltages Vt (Voltmeter or CCGX) and compute the mean value from beginnning to end of the period. Compute $Wh_t = (I_t * V_t)$.

- When _SOC=66%,_ notethe duration of the experiment **H.**

- Set back alarms, panels, generator, CC and CA loads to relieve the stress of the uther users.;

- The useful capacity is the sum of the hourly amps (Ah), or better the sum of the hourly Wh;

- For me that test will take about 10 hours (Bats are 24V, 1250Ah, 30kWh, 10kWh useful, divided by 42A = 10h: half a day, less if my bats ageing.

- Once a year or more frequently, the procedure, with the same resistor, will allow to evaluate their ageing;

- One may use this procedure with various amperages or levels of discharge to adapt to any specific system or estimate the error between the actual load and the testing load.

My system:
- Southern french Alps, altitude 1740m. Offgrid, hourly load: 367 to 1118W. Dayly load up to 8kWh
- 2kWp panels, 12 PpZS lead batteries (24V, 1250Ah, installed 2012), 1500W generator (SDMO);
- System managed by Victron (BLUE SOLAR mppt 150/65, Multiplus24/5000/230, BMV 712, monitoring local:CCGX, remote: VRM
- Discharge limited at 30% of nominal battery capacity

---

[1]   Qui permet de relever ces valeurs en fin de protocole, sans avoir à être présent toutes les heures.