Questions and Answers from Batteries in SAM 2020.2.29 Behind the Meter Systems Webinar, September 3, 2020

For a link to a recording of the webinar and other supporting materials, see https://sam.nrel.gov/battery-storage/battery-videos.html.

Can SAM look at energy arbitrage savings as well as Peak Shaving or DCM savings?

Yes. Brian is demonstrating a peak-shaving example, but SAM can also be used for energy arbitrage. Typically you would use the manual dispatch option to control when the battery is charged and discharged -- SAM does not automatically dispatch for energy arbritrage.

Also, how does SAM calculate its cycles? Is a cycle in SAM a full 100% DoD or is a cycle in SAM just reflecting battery usage of any type? If it's the latter, then how do we count full 100% DoD cycles even though it might stretch over several days?

SAM uses a rainflow algorithm to accumulate partial cycles into a full cycle. A full cycle is not necessarily a full 100% DOD, but depends on the range of the cycle. To compute to full equivalent cycles, you can look at the energy throughput and divide that by the full capacity.

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SAM charges and discharges the battery based on the dispatch options you choose and counts the number of charge-discharge cycles to model battery wear over time for lifetime and replacment modeling. You can limit the depth-of-discharge (DoD) to prolong battery life. The available capacity of the battery decreases over time with the number of charge-discharge cycles.

Thank you. Can you show today how to look at energy throughput at the end of the calendar year? Is it an option in the data tables?

It's not explicitly reported. You'd have to compute it via the absolute value of the electricity to/from battery array, the timestep, and the nominal capacity of the battery.

Hi, when Sam will be able to model DC connected battery plus grid-tied inverters in the AC side?

SAM can model a PV + battery system with a DC connected battery that shares a grid-tied inverter with the PV.

Reports on batteries still not available?

We are still actively considering the best ways to provide a report template for battery systems. Please post on the SAM forum if you have further thoughts on what you would want to see included in such a report.

In DC connected battery, PV array + battery DC to inverter AC capacity ratio is different from DC to AC ratio. How do we incorporate the different DC to AC ratio in the SAM model?

One may go to the "Parametrics" panel on the lower left hand corner of the SAM user interface and run a parmetric analysis on the DC to AC ratio to see which increases the desired output metric based on different DC to AC ratio inputs specified. Please see the help for more details...

For battery optimisation, you suggest we run different battery sizes.

The parametrics tool located underneath the simulate button is a good tool to see how varyng the battery size changes the results. Please see the help for more information on this tool.

Are the results for simulations that do not consider financial parameters (since they are outside the US) technically reliable? The purpose of the simulations is to analyze the self-sufficiency that the PV-battery system brings to a building, without

entering into an economic analysis.

You can use SAM to model projects and systems anywhere in the world, as long as you have a weather file and cost/financial data appropriate for the location. There is not an option in SAM to model battery systems with no financial model because batteries typically are used to reduce the electricity bill, and because battery replacement costs are an important consideration. If you are only interested in the system's performance, you can ignore the financial results.

Using the generic system, do you intend to make the hourly energy flows between batteries-renewable system-network-charge available for the first year? Currently, if I am not mistaken, it is only available for life cycle analysis and, for the first year, the values of PV and battery flows are grouped.

SAM's battery storage models all run simulations over the analysis period (lifetime simulations) rather than for one year to account for battery degradation over time and replacements.