Modeling Hybrid Systems in SAM Webinar (August 27, 2024)

Question and Answer Transcript

It is possible to have a simple PV, Battery and Generic system for distributed users? There may be people who have the PV, Battery and Generic such as small propane generator without wind.

This can be done by using the Generic PVWatts Wind FuelCell Battery Hybrid model and zeroing out the wind farm and fuel cell system and cost pages.

Can we model a hybrid CSP+Wind?

Not directly in SAM currently. However, one can use the generic system to combine generation profiles as discussed. Also, PySAM can be used to connect the CSP and Wind models at https://github.com/NREL/pySAM

Any possibility to include hydrogen?

We have no immediate plans to add electrolyzers, but we'd be interested to know how you would like to use an electrolyzer model if we were to add it -- please let us know on the SAM Forum https://sam.nrel.gov/forum or by email at sam.support@nrel.gov.

Is it possible to model hybrid PV and CSP plant?

Currently, the SAM desktop model cannot directly model a PV and CSP plant directly. However, one can model PV and CSP using PySAM and there are projects at NREL modeling both that we hope to include in SAM in the future based on funding.

Can any market around the world be modeled?

Yes, while SAM labels things in ""$"" alternative currencies can be used if they're consistent. We discussed more around internationalization in the previous webinar: .

How do you model a system where you have multiple inverters of the same brand/model, but one/some/all of them are derated a certain amount? Example: 250kW inverter derated to 200kW

SAM doesn't have an explicit way to do this, but we may be able to help you model this situation if you could follow up either on the SAM Forum at https://sam.nrel.gov/forum or by email at sam.support@nrel.gov.

What options do users have for non-us locations as there are no wind resource files available at SAM?

If you can find a source of hourly wind resource data for one year, you can pepare a CSV file that will work with SAM's wind power model. A description of the SAM CSV Format for WInd is in Help under "Weather File Formats".

Can I use this model for Floating solar-Hydropower hybrid?

We do not currently have a hydropower model available in SAM, but the power output of the hydropower plant could theoretically be simulated through the Generic System model as a potential workaround. Floating PV can be modeled with SAM's PV models, with potential special consideration for the ambient conditions and their effect on PV module temperatures.

Hi, its a pleasure. Where i can find information about The economics parts of an Hybrid design (O&M, installation cost), maybe you can share a reference

Several NREL publications provide some of these numbers, including the annual technology baseline: https://atb.nrel.gov/, and a few publications by Caitlin Murphy: https://research-hub.nrel.gov/en/publications/system-cost-minimizing-deployment-of-pv-wind-hybrids-in-low-carbo

How can I model Floating PV systems and VIPV systems using SAM?

For floating PV, some users have modeled floating PV by modifying the ambient temperature data in the weather file to account for reduced temperatues for the floating arrays. Everything else in SAM is modeled the same. For vehicle-integrated PV, similarly it would be possible to account for ambient conditions in the weather file, while also using timeseries shading inputs to account for times when they PV is shaded. Please follow up at sam.support@nrel.gov or through the user support forum for more discussion on this.

But REopt is only for US?

REopt (https://reopt.nrel.gov) can be used for any location, given customized utility rate data. Typically it relies on PVWatts for solar generation but you can upload a custom profile, we expect to have weather data for most of the world in PVWatts by the end of the year.

Is there support for LP/NG generators?

It is possible to model LP/NG generators through our 'Generic System' model, with inputs for time series power outputs or assumed efficiencies.

You mentioned the optimisation process needs to be done outside SAM, why is that or how do we use SAM best for optimisation?

SAM is not an optimization tool and is not running any optimization for system size or optimal dispatch, but the Parametrics tool demoed earlier can be used to converge on a goal metric such as net present value. As mentioned previously ReOpt is a tool that does do optimization for system sizes or battery dispatch. reopt.nrel.gov

Any plans to include electrolyzers?

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Please, would be possible to use the option ""parametrics"" and overlap results from several different locations in order to achieve one specific goal with the desired hybrid system? (for instance, Janine showed us net present value as an output variable) Thank you.

Yes, it is possible to vary the location of the solar and wind resource in the Parametrics tool. It is important to keep the wind and solar resource locations aligned in these parametric simulations if you are assuming a co-located system as SAM will not do this automatically.

Not a question, but a compliment. Few months ago I was able to run wind farm simulations with bachelor's students using SAM. In general, students got positively impressed how wind features can be easily setup and few of them decided to use SAM on other courses as well. Webinars like this one, and the Youtube account offer a lot of valuable tools for students. Please, keep them ongoing!

Thanks!

I am wondering if SAM can co-simulate with other programming languages. Specifically, is there a way to use an API to extract PV power data simulated in SAM into Python?

Yes, see https://sam.nrel.gov/software-development-kit-sdk.html for details.