Changes to SERVM software and to data inputs since 2020 ACC

Revised July 21, 2022

There have been several major changes to the SERVM model and to the underlying input data since the previous ACC released in 2020. Our current 2022 ACC is based on the work performed for the Integrated Resource Plan proceeding since 2020 and incorporates the NoNewDER resource portfolio adopted in D.22-02-004. The major changes are described below.

Since the 2021 ACC results, several changes have been made to the SERVM model to better simulate the emerging resource fleet, specifically interactions of batteries with other resources in the fleet. Upgrades were made to increase the ability of storage to provide AS, allowing for provision of regulation services while the resource is charging as well as discharging. Lastly, moving from charging to discharging are now made as distinct dispatch decisions.

The model also allows for restricting provision of AS to meet a region’s AS targets to each region individually, not cross an entire coregion. This is to ensure that AS requirements are met locally.

Prior battery dispatch optimization in SERVM was designed primarily to flatten the net load shape. Recent updates better consider economic hurdles to incremental dispatch decisions such that charging only occurs with energy that costs less than the subsequent dispatch energy is worth after considering round-trip losses.

Recent SERVM modeling enhancements for market price formation include adjusting market price to remove the effect of must run but dispatchable generation. Prior versions of SERVM considered dispatchable must run units as eligible to set the marginal unit commitment price. Now the energy price is set at the unit that serves marginal net load after subtracting all must run generation, including dispatchable must run generation.

In addition to upgrades to the SERVM model itself, there have been several SERVM data updates made, including the following:

1. Loaded a new NoNewDER case that was based on the new IRP PSP adopted in December 2021
2. GADS data update – updated from outage data drawn from 207-2019 to outage data from 2018-2020.
3. Added outage rates for batteries
4. Added economic 90% discharging limits for batteries (able to override for LOLE events)
5. Heat rates – updated many units heat rates from 2020 CAISO data and 2028 ADS to 2021 CAISO data and 2030 ADS.
6. IEPR update – from 2019 Mid Mid scenario to 2020 Mid with High EV scenario
7. Adding back the effects of demand energy resources removed for the NoNewDER case into the peak and energy forecasts otherwise based on IEPR
8. Assume CHP, both IFOM and BTM declines to zero from 2030 to 2040, following assumption included with IRP PSP adopted in December 2021

Staff made several updates to the underlying dataset. First, we loaded a new NoNewDER portfolio derived from the Preferred System Plan decision in the IRP proceeding at the end of 2021. Staff also updated to a new IEPR demand forecast version, moving from the 2019 IEPR to the 2020 IEPR Update. In the process, we also incorporated the High Electric Vehicle projections, also consistent with the Preferred System Plan.

For the NoNewDER case, staff also added back the peak and energy impacts of the DER resources removed from the existing portfolio to account for the NoNewDER portfolio’s flatlining of demand modifier resources growth after 2021. This includes flatlining of AAEE savings, TOU rate impacts, EV load growth, and BTM storage installations. BTM PV projections were also reduced to near flatline but with still modest growth – reflecting the same BTM PV assumption used to develop the NoNewDER portfolio from the RESOLVE model used for the IRP PSP portfolio.

Staff updated unit outage rates for major categories of units, from 2019 GADS data used in last year’s ACC update to this year, also including 2020 GADS data in the outage rate averages applied to CC, CT, Geothermal and cogen resources. Based on feedback from the CAISO Department of Market Monitoring, staff also created outage rates for batteries and implemented a new restriction on batteries to economically dispatch batteries to preserve at least 10% state of charge, though that can be overridden in the event of reliability events.

We also focused in on updating and correcting specific unit heat rates that were anomalous to ensure proper dispatch on power plants. This led to more reasonable power prices during the middle of the day and overall, more reasonable dispatch.

There were other minor bug fixes and input changes made as well, some of which were not used for the 2022 ACC modeling as noted below.

* Implemented "Optimize Storage Dispatch by duration" option to maximize capacity value of shorter duration storage units
* Added ability to simulate partial year by defining a start week and end week – though we have not used it in the ACC work yet.
* Pre Maintenance schedule maintenance based on average net load across all of the weather years. Previously, maintenance was scheduled based on case specific net load
* Added ability to specify 8760 hourly AS requirement profile but this was not used in the ACC modeling
* Optimizing quick start commitment decisions (better consideration of startup costs with respect to the number of hours the unit will be online)
* Other minor bug fixes and reporting enhancements