ESIG Webinar: Advancing Resource Adequacy Analysis with the GridPathRA Toolkit: A Case Study of the Western US	
Question	**Answer**
You assumed meeting load plus reserves. Are those operating reserves or also planning reserves? If for planning, do you assume the same margin at all hours?	We model operating (contingency) reserves only. The planning reserve margin could be based on the results from the simulation (with resources added as needed to achieve the target reliability standard).
How do you account for compounding reliability risk (heat, drought , wildfire (lost transmission capacity), supply chain (delayed new resource)) in planning?	The simple answer is that we don't explicitly capture these types of compounding risks. It's hard to include these types of things in probabilistic analysis because their probabilities are not well understood. Instead, it's probably more informative to test specific scenarios with these types of failure modes to see what the consequences would be on the system. This type of scenario analysis could certainly be undertaken with the model in the future.
Have you had success in getting utilities or companies like PacifiCorp to use these tools, or do they ignore these kinds of tools?	We haven't pitched the RA toolkit to any specific utilities yet, but at least three LSEs are using GridPath to support planning.
How is hydropower modeled - based on chronological flows and storage or daily generation capabilities?	GridPath optimizes hydro dispatch to minimize unserved energy subject to weekly hydro budget derived from EIA Form 923/906 and corresponding min and max constraints derived from various sources, including BPA, CAISO, and WECC. Hydro constraints are applied across the hydro fleet for each BAA, not for individual resources.
Why are you emphasizing LOLE over EUE?	We do not advocate for the use of a particular standard or metric. The GridPath RA Toolkit produces a range of metrics for each scenario. We talked mostly about LOLE in the presentation because LOLE-based standards are common and familiar to people in this space, but EUE or normalized EUE might provide a better sense of the impact of shortages.
Regarding missing wind data, couldn't you just use actual wind generation data?	The reason we can't just use historical wind data is that the wind fleet has changed over time, so historical wind generation in 2015 will reflect a different wind fleet than we have in our 2026 case study. So instead, we use site-specific simulated data for the study year wind fleet and we benchmark that data against historical generation where possible. To fill in 2015-2020, we use actual generation data to select the best "day" of simulated wind data to use. There's more information on this approach in the report.

Do you have a sense for how much heat-related risk was caused by load versus reduced energy production?	We model both temperature-driven load increases and thermal derates. We haven't specifically attributed the risk to one over the other, but that's something we could look into in the data!
what was point of discarding known planned additions, other than to force inadequacies?	Our goal was to start with a baseline system similar to today's in order to understand the magnitude and nature of the risk and shortages if no action is taken.
In CPUC Energy Division modeling, they capped imports during high load conditions due to concerns about relying on imports. Reasonable?	It depends on how that cap interacts with the rest of their determination. Capping imports can be a reasonable way to approximate regional dynamics in some circumstances, but the devil is in the details. In the report we include some graphs that show pretty substantial imports during some hours when California is constrained.
Can GridPath perform the optimal siting task where it can determine which specific buses are the optimal location of the proposed technology?	Yes, GridPath has capacity expansion functionality and can select resources at specific locations.
What to the "frontier curves" look like if you extend them out to 10-20 hours (to shed some light on what long duration storage could do to help)	For the modeled system, the capacity need remains the same past durations of 4-5 hours.
how were the perfect capacity additions added in your regional model to meet criteria?	We did not add perfect capacity to the simulation, but were able to derive the perfect capacity need from the outputs of the simulation, namely the frequency and magnitude of the observed events.
Are regional transmission limitations considered?	Mostly, yes. All transmission data is based on the 2026 WECC Common Case. We have a BAA-level zonal transmission model and also enforce interface limits on groups of transmission lines along the WECC paths. We had to make some approximations to align the WECC path definitions with our zonal topology.
What is the relation between import assumption of receiving area and possible errors in the load forecast of the sending area? (edited)	We do not consider forecast error in this study. GridPath has the ability to conduct multi-stage production cost simulation, so forecast error could be layered on in future work.
Did you happen to do an extreme case taking out all 'firm' (burnable) fuel?	We did not run this case for this study, but are planning on exploring this in future work.